**-----------------------------Assignment-4 (Interview Questions) ---------------------------------------------**

1. **Database Concepts:-**

**1. What is a database?**

A **database** is an organized collection of data that can be easily accessed, managed, and updated. It stores information in a structured way to support data retrieval, insertion, deletion, and modification.  
**Example:** A library management system stores book details in a database.

**2. What is the difference between a database and a DBMS?**

* **Database:** A collection of data stored systematically.
* **DBMS (Database Management System):** A software that manages and interacts with the database to perform operations like querying, updating, and managing users.  
  **Example:** MySQL, Oracle, and PostgreSQL are DBMSs that manage databases.

**3. What are the different types of databases?**

* **Relational Database (RDBMS):** Uses tables (MySQL, PostgreSQL).
* **NoSQL Database:** Stores unstructured data (MongoDB, Cassandra).
* **Hierarchical Database:** Tree-like structure (IBM IMS).
* **Network Database:** Graph-based structure (IDMS).
* **Object-Oriented Database:** Stores objects (db4o, ObjectDB).

**4. What is a relational database?**

A **relational database** organizes data into tables (relations) with rows and columns. It follows ACID properties for consistency.  
**Example:** A student database with a table storing student IDs, names, and marks.

**5. What is normalization? Explain its types.**

**Normalization** is the process of organizing data to remove redundancy and improve integrity.

* **1NF (First Normal Form):** No duplicate columns; each column has atomic values.
* **2NF (Second Normal Form):** No partial dependency (depends on the entire primary key).
* **3NF (Third Normal Form):** No transitive dependency (non-key column should not depend on another non-key column).  
  **Example:** Splitting a table into Students (ID, Name) and Courses (CourseID, StudentID) removes redundancy.

**6. What is denormalization?**

**Denormalization** is the process of combining tables to improve read performance by reducing joins.  
**Example:** Instead of separate Orders and Customers tables, a denormalized table may include customer details within Orders.

**7. What is a primary key? How is it different from a unique key?**

* **Primary Key:** Uniquely identifies each row and cannot be NULL.
* **Unique Key:** Ensures unique values but allows NULL.  
  **Example:**
  + Primary Key: StudentID (must be unique & not null).
  + Unique Key: Email (must be unique but can be null).

**8. What is a foreign key?**

A **foreign key** is a column that links to the primary key of another table to maintain relationships.  
**Example:** In a Orders table, CustomerID is a foreign key referencing Customers(ID).

**9. What are indexes? Why are they used?**

**Indexes** are data structures that speed up database searches by allowing quick lookups.  
**Example:** Creating an index on Employee(Name) allows fast searching in an Employee table.

**10. What is a composite key?**

A **composite key** is a primary key made of two or more columns.  
**Example:** A StudentCourse table with a composite key (StudentID, CourseID) ensures unique enrollments.

**(2.) MySQL Commands:-**

**11. What is the purpose of the CREATE command?**

**Definition**: The CREATE command is used to create a new database or table in SQL.

**Types**:

* CREATE DATABASE – Creates a new database.
* CREATE TABLE – Creates a new table.
* CREATE INDEX – Creates an index on a table.

**Example**:

CREATE DATABASE myDatabase;

CREATE TABLE students (id INT, name VARCHAR(50));

**12. How do you delete a database in MySQL?**

**Definition**: The DROP DATABASE command is used to delete an existing database permanently.

**Example**:

DROP DATABASE myDatabase;

**13. What is the ALTER command used for?**

**Definition**: The ALTER command is used to modify an existing table by adding, deleting, or modifying columns.

**Types**:

* ADD COLUMN – Adds a new column.
* DROP COLUMN – Deletes a column.
* MODIFY COLUMN – Changes the datatype of a column.

**Example**:

ALTER TABLE students ADD COLUMN age INT;

ALTER TABLE students DROP COLUMN age;

**14. How do you create a table in MySQL?**

**Definition**: The CREATE TABLE command is used to define a new table in a database.

**Example**:

CREATE TABLE employees (

id INT PRIMARY KEY,

name VARCHAR(50),

salary DECIMAL(10,2)

);

**15. What is the DROP command?**

**Definition**: The DROP command is used to delete a database or table permanently.

**Example**:

DROP TABLE employees;

**16. How do you insert data into a table?**

**Definition**: The INSERT command is used to add new records into a table.

**Example**:

INSERT INTO students (id, name) VALUES (1, 'Shivam');

**17. What is the syntax for updating records in a table?**

**Definition**: The UPDATE command modifies existing records in a table.

**Example**:

UPDATE students SET name = 'Amit' WHERE id = 1;

**18. How do you delete records from a table?**

**Definition**: The DELETE command removes specific records from a table.

**Example**:

DELETE FROM students WHERE id = 1;

**19. What is the SELECT statement used for?**

**Definition**: The SELECT statement retrieves data from one or more tables.

**Example**:

SELECT \* FROM students;

**20. How do you retrieve unique records from a table?**

**Definition**: The DISTINCT keyword is used to fetch unique values from a column.

**Example**:

SELECT DISTINCT name FROM students;

**(3.) Clauses and Operators:-**

**21. What is the purpose of the WHERE clause?**

**Definition:** The WHERE clause is used to filter records based on a specific condition.

**Example:**

SELECT \* FROM employees WHERE age > 30;

**22. Explain the ORDER BY clause.**

**Definition:** The ORDER BY clause is used to sort the result set in ascending (ASC) or descending (DESC) order.

**Example:**

SELECT \* FROM employees ORDER BY salary DESC;

**23. What is the GROUP BY clause used for?**

**Definition:** The GROUP BY clause is used to group rows with the same values in specified columns and aggregate data.

**Example:**

SELECT department, COUNT(\*) FROM employees GROUP BY department;

**24. How do you use the HAVING clause?**

**Definition:** The HAVING clause is used to filter groups after applying the GROUP BY clause.

**Example:**

SELECT department, COUNT(\*) FROM employees GROUP BY department HAVING COUNT(\*) > 5;

**25. What are the different comparison operators in MySQL?**

**Definition:** Comparison operators are used to compare values in SQL queries.

**Types:**

* = (Equal)
* != or <> (Not Equal)
* > (Greater Than)
* < (Less Than)
* >= (Greater Than or Equal)
* <= (Less Than or Equal)

**Example:**

SELECT \* FROM employees WHERE salary >= 50000;

**26. What is the BETWEEN operator?**

**Definition:** The BETWEEN operator is used to filter values within a given range.

**Example:**

SELECT \* FROM employees WHERE salary BETWEEN 40000 AND 60000;

**27. Explain the LIKE operator.**

**Definition:** The LIKE operator is used to search for a specified pattern in a column.

**Types:**

* % (Matches any number of characters)
* \_ (Matches a single character)

**Example:**

SELECT \* FROM employees WHERE name LIKE 'A%';

(This selects names starting with 'A')

**28. What is the IN operator?**

**Definition:** The IN operator is used to filter results based on multiple specified values.

**Example:**

SELECT \* FROM employees WHERE department IN ('HR', 'IT', 'Finance');

**29. How do you use the NULL operator?**

**Definition:** The IS NULL and IS NOT NULL operators are used to check for NULL values in a column.

**Example:**

SELECT \* FROM employees WHERE email IS NULL;

**30. What is the difference between AND and OR operators?**

**Definition:**

* AND: Returns records where all conditions are true.
* OR: Returns records where at least one condition is true.

**Example:**

SELECT \* FROM employees WHERE age > 30 AND salary > 50000;

SELECT \* FROM employees WHERE age > 30 OR salary > 50000;

**(4.) Predefined Functions:-**

**31. What are aggregate functions?**

Aggregate functions perform calculations on a set of values and return a single value.

**Examples:** COUNT(), SUM(), AVG(), MAX(), MIN()

SELECT AVG(salary) FROM employees;

**32. What is the COUNT() function?**

The COUNT() function returns the number of rows that match a specified condition.

**Example:**

SELECT COUNT(\*) FROM employees WHERE department = 'IT';

**33. Explain the SUM() function.**

The SUM() function returns the total sum of a numeric column.

**Example:**

SELECT SUM(salary) FROM employees WHERE department = 'Finance';

**34. What is the AVG() function?**

The AVG() function calculates the average value of a numeric column.

**Example:**

SELECT AVG(salary) FROM employees;

**35. How does the MAX() function work?**

The MAX() function returns the highest value in a column.

**Example:**

SELECT MAX(salary) FROM employees;

**36. What is the MIN() function?**

The MIN() function returns the lowest value in a column.

**Example:**

SELECT MIN(salary) FROM employees;

**37. Explain string functions in MySQL.**

String functions manipulate text data in MySQL.

**Examples:**

* CONCAT() – Joins strings
* SUBSTRING() – Extracts a part of a string
* LENGTH() – Returns string length
* UPPER()/LOWER() – Converts case

SELECT UPPER(name) FROM employees;

**38. What is the CONCAT() function?**

The CONCAT() function joins two or more strings together.

**Example:**

SELECT CONCAT(first\_name, ' ', last\_name) AS full\_name FROM employees;

**39. How do you use the SUBSTRING() function?**

The SUBSTRING() function extracts a part of a string.

**Example:**

SELECT SUBSTRING('Hello World', 1, 5); -- Output: Hello

**40. What is the NOW() function?**

The NOW() function returns the current date and time.

**Example:**

SELECT NOW();

**(5.) User -Defined Functions:-**

**41. What is a user-defined function (UDF) in MySQL?**

A **User-Defined Function (UDF)** in MySQL is a custom function created by users to perform specific tasks that are not available in built-in functions. It extends MySQL’s functionality.

**42. How do you create a UDF?**

UDFs in MySQL are created using shared libraries (C/C++) and registered using SQL commands.  
**Steps to create a UDF:**

1. Write the function in C/C++.
2. Compile it into a shared library (.so file).
3. Install it in MySQL using CREATE FUNCTION.

**Example:**

CREATE FUNCTION square RETURNS INTEGER SONAME 'square.so';

**43. What is the syntax for calling a UDF?**

After a UDF is registered, it can be called like any other MySQL function.

**Syntax:**

SELECT function\_name(arguments);

**Example:**

SELECT square(5); -- Returns 25

**44. Can UDFs return multiple values?**

No, UDFs in MySQL can only return a single scalar value (string, integer, or floating point). To return multiple values, use **stored procedures** instead.

**Example of stored procedure returning multiple values:**

DELIMITER //

CREATE PROCEDURE GetUser(IN userId INT, OUT userName VARCHAR(50), OUT userAge INT)

BEGIN

SELECT name, age INTO userName, userAge FROM users WHERE id = userId;

END //

DELIMITER ;

**45. What are the advantages of using UDFs?**

* **Performance:** Faster execution than stored procedures for simple calculations.
* **Reusability:** Can be used across multiple queries.
* **Extensibility:** Extends MySQL with custom logic.

**Example Use Case:**  
A UDF like square can be used for mathematical operations directly in queries.

SELECT square(4); -- Output: 16

**(6.) Views:-**

**46. What is a view in MySQL?**

A **view** in MySQL is a virtual table based on the result of a SQL query. It does not store data itself but dynamically fetches data from underlying tables.

**Types of Views:**

1. **Simple View** – Based on a single table.
2. **Complex View** – Based on multiple tables using joins.

**Example:**

CREATE VIEW employee\_view AS

SELECT id, name, salary FROM employees;

**47. How do you create a view?**

You create a view using the CREATE VIEW statement with a SELECT query.

**Syntax:**

CREATE VIEW view\_name AS

SELECT column1, column2 FROM table\_name WHERE condition;

**Example:**

CREATE VIEW high\_salary AS

SELECT name, salary FROM employees WHERE salary > 50000;

**48. What is the difference between a view and a table?**

| **Feature** | **Table** | **View** |
| --- | --- | --- |
| Storage | Stores data permanently | Does not store data, just retrieves it dynamically |
| Modification | Can insert, update, and delete | Can be updatable (with conditions) |
| Performance | Faster as data is stored | Slower as it fetches data dynamically |

**49. Can you update a view? If yes, how?**

Yes, a view can be updated if:

* It is based on a single table.
* It does not use aggregate functions, joins, or DISTINCT.

**Example (Updating a View):**

UPDATE high\_salary SET salary = 60000 WHERE name = 'John';

**Example (Creating an Updatable View):**

CREATE VIEW editable\_view AS

SELECT id, name, salary FROM employees WHERE department = 'IT';

**50. How do you drop a view?**

A view can be removed using the DROP VIEW statement.

**Syntax:**

DROP VIEW view\_name;

**Example:**

DROP VIEW high\_salary;

**(7.) Common Table Expressions (CTE):-**

**51. What is a Common Table Expression (CTE)?**

A **Common Table Expression (CTE)** is a temporary named result set that exists within the execution of a single query. It improves readability and simplifies complex queries.

**Types of CTE:**

1. **Non-Recursive CTE** – Standard CTE without self-referencing.
2. **Recursive CTE** – A CTE that references itself to perform iterative operations.

**52. How do you create a CTE?**

A **CTE is created using the WITH clause** followed by a temporary result set.

**Example:**

WITH EmployeeCTE AS (

SELECT EmployeeID, Name, Salary

FROM Employees

WHERE Salary > 50000

)

SELECT \* FROM EmployeeCTE;

This selects employees with salaries above 50,000.

**53. What is the difference between a CTE and a subquery?**

| **Feature** | **CTE** | **Subquery** |
| --- | --- | --- |
| Readability | More readable and structured | Can become complex and harder to read |
| Reusability | Can be used multiple times in a query | Cannot be reused directly |
| Performance | Optimized in some cases | Might be less optimized |

**Example of a Subquery:**

SELECT EmployeeID, Name FROM Employees

WHERE Salary > (SELECT AVG(Salary) FROM Employees);

This filters employees with a salary above the average.

**54. Can you use a CTE recursively?**

Yes, **CTEs can be recursive**, meaning they can refer to themselves to generate hierarchical or iterative results.

**Example of Recursive CTE:**

WITH RecursiveCTE (n) AS (

SELECT 1 -- Base case

UNION ALL

SELECT n + 1 FROM RecursiveCTE WHERE n < 5 -- Recursive case

)

SELECT \* FROM RecursiveCTE;

This generates numbers from 1 to 5.

**55. How do you reference a CTE in a query?**

A **CTE is referenced just like a table** by using its name in a SELECT, INSERT, UPDATE, or DELETE statement.

**Example:**

WITH HighSalary AS (

SELECT EmployeeID, Name, Salary FROM Employees WHERE Salary > 70000

)

SELECT Name FROM HighSalary;

Here, HighSalary is used like a table in the final SELECT statement.

**(8.) Joins**:-

**56. What is a JOIN in SQL?**

A **JOIN** in SQL is used to combine rows from two or more tables based on a related column.

**57. Different Types of JOINs in SQL**

SQL supports the following types of joins:

* **INNER JOIN**
* **LEFT JOIN (LEFT OUTER JOIN)**
* **RIGHT JOIN (RIGHT OUTER JOIN)**
* **FULL JOIN (FULL OUTER JOIN)**
* **CROSS JOIN**
* **SELF JOIN**

**58. What is an INNER JOIN?**

An **INNER JOIN** returns only the matching rows between both tables based on a common column.

**Example:**

SELECT employees.name, departments.department\_name

FROM employees

INNER JOIN departments ON employees.department\_id = departments.id;

**59. What is a LEFT JOIN?**

A **LEFT JOIN (LEFT OUTER JOIN)** returns all records from the left table and the matching records from the right table. If no match is found, NULL is returned for the right table’s columns.

**Example:**

SELECT employees.name, departments.department\_name

FROM employees

LEFT JOIN departments ON employees.department\_id = departments.id;

**60. What is a RIGHT JOIN?**

A **RIGHT JOIN (RIGHT OUTER JOIN)** returns all records from the right table and the matching records from the left table. If no match is found, NULL is returned for the left table’s columns.

**Example:**

SELECT employees.name, departments.department\_name

FROM employees

RIGHT JOIN departments ON employees.department\_id = departments.id;

**61. What is a FULL OUTER JOIN?**

A **FULL OUTER JOIN** returns all records when there is a match in either the left or right table. If no match is found, NULL is returned in non-matching columns.

**Example:**

SELECT employees.name, departments.department\_name

FROM employees

FULL OUTER JOIN departments ON employees.department\_id = departments.id;

**62. How to perform a CROSS JOIN?**

A **CROSS JOIN** returns the Cartesian product of both tables, meaning every row from the first table is paired with every row from the second table.

**Example:**

SELECT employees.name, departments.department\_name

FROM employees

CROSS JOIN departments;

**63. What is a SELF JOIN?**

A **SELF JOIN** joins a table with itself, treating it as two separate tables.

**Example:**

SELECT e1.name AS Employee, e2.name AS Manager

FROM employees e1

JOIN employees e2 ON e1.manager\_id = e2.id;

**64. How to join multiple tables?**

You can join multiple tables using multiple JOIN statements.

**Example:**

SELECT employees.name, departments.department\_name, locations.city

FROM employees

JOIN departments ON employees.department\_id = departments.id

JOIN locations ON departments.location\_id = locations.id;

**65. Difference between JOIN and SUBQUERY?**

| **JOIN** | **SUBQUERY** |
| --- | --- |
| Combines data from multiple tables | Uses a query inside another query |
| Typically performs better on large datasets | Can be slower due to nested execution |
| Requires a relationship between tables | Can be used even without direct relationships |

**Example of a subquery:**

SELECT name FROM employees

WHERE department\_id = (SELECT id FROM departments WHERE department\_name = 'IT');

**(9.) Subqueries:-**

**66. What is a Subquery?**

A **subquery** is a query nested inside another SQL query. It is used to retrieve data that will be used in the main query.

**Types of Subqueries:**

* **Single-row Subquery** (returns one value)
* **Multi-row Subquery** (returns multiple values)
* **Correlated Subquery** (dependent on the outer query)

**Example:**

SELECT name FROM students WHERE id = (SELECT MAX(id) FROM students);

**67. How do you write a subquery in the SELECT statement?**

A subquery can be written inside the SELECT clause to retrieve computed values.

**Example:**

SELECT name, (SELECT AVG(salary) FROM employees) AS avg\_salary FROM employees;

Here, the subquery calculates the average salary and displays it with each row.

**68. Can you use a subquery in the WHERE clause?**

Yes, a subquery can be used inside the WHERE clause to filter data based on another query’s result.

**Example:**

SELECT name FROM employees WHERE salary > (SELECT AVG(salary) FROM employees);

This retrieves employees earning more than the average salary.

**69. What is a Correlated Subquery?**

A **correlated subquery** is a subquery that depends on the outer query for its execution. It runs once per row processed in the outer query.

**Example:**

SELECT e1.name, e1.salary

FROM employees e1

WHERE salary > (SELECT AVG(e2.salary) FROM employees e2 WHERE e1.department = e2.department);

Here, the subquery calculates the department-wise average salary dynamically for each employee.

**70. How do you handle subqueries that return multiple rows?**

If a subquery returns multiple rows, you must use operators like IN, ANY, or ALL instead of =.

**Example:**

SELECT name FROM employees WHERE department\_id IN (SELECT department\_id FROM departments WHERE location = 'New York');

This retrieves employees working in New York departments.

**(10.) Stored Procedures:-**

**71. What is a Stored Procedure?**

A **stored procedure** is a precompiled set of SQL statements stored in a database that can be executed repeatedly to perform a specific task.

**72. How do you create a stored procedure in MySQL?**

A stored procedure is created using the CREATE PROCEDURE statement.

**Example:**

DELIMITER //

CREATE PROCEDURE GetAllUsers()

BEGIN

SELECT \* FROM users;

END //

DELIMITER ;

**73. What is the syntax for calling a stored procedure?**

Stored procedures are executed using the CALL statement.

**Example:**

CALL GetAllUsers();

**74. Can stored procedures accept parameters?**

Yes, stored procedures can accept **IN, OUT, and INOUT** parameters.

**Example:**

DELIMITER //

CREATE PROCEDURE GetUserByID(IN userID INT)

BEGIN

SELECT \* FROM users WHERE id = userID;

END //

DELIMITER ;

**Calling the procedure:**

CALL GetUserByID(1);

**75. What are the advantages of using stored procedures?**

* **Improved Performance**: Reduces query compilation time.
* **Code Reusability**: Eliminates repetitive SQL code.
* **Security**: Limits direct access to the database.
* **Faster Execution**: Optimized execution plan.

**Example (Advantage - Security)**

Instead of allowing direct access to the users table, a stored procedure can be used:

DELIMITER //

CREATE PROCEDURE SecureGetUsers()

BEGIN

SELECT id, name FROM users; -- Hides sensitive columns like passwords

END //

DELIMITER ;

**Calling the procedure:**

CALL SecureGetUsers();

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**(11.) Triggers:-**

**76. What is a trigger in MySQL?**

A **trigger** in MySQL is a stored procedure that is automatically executed or fired when certain events (such as INSERT, UPDATE, or DELETE) occur on a specified table or view.

**Example**:

CREATE TRIGGER before\_insert\_trigger

BEFORE INSERT ON employees

FOR EACH ROW

SET NEW.created\_at = NOW();

**77. How do you create a trigger?**

A **trigger** can be created using the CREATE TRIGGER statement, specifying the event (INSERT, UPDATE, DELETE), the timing (BEFORE, AFTER), and the associated table.

**Example**:

CREATE TRIGGER trigger\_name

AFTER INSERT ON table\_name

FOR EACH ROW

BEGIN

-- Trigger logic here

END;

**78. What are the different types of triggers?**

There are **3 types of triggers** based on timing and event:

1. **BEFORE Trigger**: Executes before the event.
   * **Example**: BEFORE INSERT, BEFORE UPDATE
2. **AFTER Trigger**: Executes after the event.
   * **Example**: AFTER INSERT, AFTER UPDATE
3. **INSTEAD OF Trigger**: Executes in place of the event (mainly for views).
   * **Example**: INSTEAD OF INSERT (for views)

**79. Can a trigger call a stored procedure?**

Yes, a **trigger** can call a **stored procedure**. This is useful for executing complex logic when the trigger is fired.

**Example**:

CREATE TRIGGER trigger\_name

AFTER INSERT ON employees

FOR EACH ROW

BEGIN

CALL my\_procedure(NEW.employee\_id);

END;

**80. What is the difference between a trigger and a stored procedure?**

* A **trigger** is automatically executed in response to certain events on a table (e.g., INSERT, UPDATE, DELETE).
* A **stored procedure** is a set of SQL statements that can be executed explicitly using a CALL statement.

**Difference**:

* **Trigger**: Runs automatically in response to data changes (cannot be manually invoked).
* **Stored Procedure**: Needs to be manually invoked via CALL.

**Example**:

* **Trigger**:
* CREATE TRIGGER before\_update\_employee
* BEFORE UPDATE ON employees
* FOR EACH ROW
* BEGIN
* -- Trigger action
* END;
* **Stored Procedure**:
* DELIMITER //
* CREATE PROCEDURE my\_procedure()
* BEGIN
* -- Procedure logic
* END;
* //
* DELIMITER ;

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**(12.) Data Control Language (DCL):-**

**81. What is Data Control Language (DCL)?**

**Definition**: DCL is a set of SQL commands used to control access to data stored in a database. It allows administrators to define and manage user permissions. **Types**:

* GRANT: Provides user permissions.
* REVOKE: Removes user permissions.

**Example**:

GRANT SELECT, INSERT ON database\_name.\* TO 'user'@'host';

REVOKE SELECT ON database\_name.\* FROM 'user'@'host';

**82. What is the purpose of the GRANT command?**

**Definition**: The GRANT command is used to give specific privileges to a user on database objects (tables, views, etc.). **Example**:

GRANT SELECT, INSERT ON employees TO 'john'@'localhost';

This grants the SELECT and INSERT privileges on the employees table to the user john.

**83. How do you revoke privileges using the REVOKE command?**

**Definition**: The REVOKE command is used to remove privileges that were previously granted to a user. **Example**:

REVOKE SELECT, INSERT ON employees FROM 'john'@'localhost';

This removes the SELECT and INSERT privileges from the user john on the employees table.

**84. What is the difference between a user and a role in MySQL?**

**Definition**:

* **User**: A specific individual or entity that can connect to a MySQL server and perform actions based on the privileges granted.
* **Role**: A set of privileges that can be assigned to users. Roles help manage multiple users with similar permissions.

**Example**:

CREATE USER 'john'@'localhost';

CREATE ROLE 'admin\_role';

GRANT ALL PRIVILEGES ON \*.\* TO 'admin\_role';

GRANT 'admin\_role' TO 'john'@'localhost';

**85. How do you create a new user in MySQL?**

**Definition**: You can create a new user using the CREATE USER command and assign privileges using GRANT. **Example**:

CREATE USER 'john'@'localhost' IDENTIFIED BY 'password';

GRANT SELECT ON database\_name.\* TO 'john'@'localhost';

This creates a new user john with the password 'password' and grants SELECT permission on database\_name.

**(13.) Transaction Control Language (TCL):-**

**86. What is Transaction Control Language (TCL)?**

**Definition:** TCL is a set of SQL commands used to manage changes made by DML (Data Manipulation Language) commands. It ensures that the database remains consistent even in the case of system failures.

**Types:**

1. **COMMIT**
2. **ROLLBACK**
3. **SAVEPOINT**
4. **SET TRANSACTION**

**Example:**

-- COMMIT saves all changes made in the current transaction.

COMMIT;

**87. What is the purpose of the COMMIT command?**

**Definition:** The COMMIT command is used to save all changes made during the current transaction permanently in the database.

**Example:**

-- After inserting a record, the changes are saved permanently.

INSERT INTO students (id, name) VALUES (1, 'John');

COMMIT;

**88. How do you use the ROLLBACK command?**

**Definition:** The ROLLBACK command undoes all changes made in the current transaction, reverting the database to its state before the transaction began.

**Example:**

-- Rollback undoes the insert operation.

INSERT INTO students (id, name) VALUES (1, 'John');

ROLLBACK;

**89. What is the SAVEPOINT command?**

**Definition:** The SAVEPOINT command sets a point within a transaction to which you can later roll back, without affecting the entire transaction.

**Example:**

-- Set a savepoint in a transaction.

SAVEPOINT my\_savepoint;

-- Rollback to the savepoint.

ROLLBACK TO my\_savepoint;

**90. How do you set the transaction isolation level?**

**Definition:** The transaction isolation level determines the visibility of the changes made by one transaction to other transactions. It helps control concurrency.

**Types:**

1. **READ UNCOMMITTED**
2. **READ COMMITTED**
3. **REPEATABLE READ**
4. **SERIALIZABLE**

**Example:**

-- Set the isolation level to SERIALIZABLE.

SET TRANSACTION ISOLATION LEVEL SERIALIZABLE;

**(14.) Types of Databases:-**

**91. What are the different types of databases?**  
Databases are classified into different types based on their data structure and usage.

* **Relational Databases (RDBMS):** Stores data in tables with rows and columns (e.g., MySQL, PostgreSQL).
* **NoSQL Databases:** Used for unstructured data, scalable horizontally (e.g., MongoDB, Cassandra).
* **Graph Databases:** Stores data as nodes and edges, representing relationships (e.g., Neo4j).
* **Object-Oriented Databases:** Stores objects as data (e.g., db4o).
* **Distributed Databases:** Data is spread across multiple locations or servers (e.g., Apache Cassandra).
* **Cloud Databases:** Hosted on cloud platforms (e.g., Amazon RDS, Google Firestore).

**92. What is the difference between SQL and NoSQL databases?**

* **SQL (Structured Query Language)**: Used in relational databases, stores data in tables, and requires a fixed schema (e.g., MySQL, PostgreSQL).
* **NoSQL (Not Only SQL)**: Used in non-relational databases, stores unstructured data, and can have flexible schemas (e.g., MongoDB, Cassandra).

**Key Difference:** SQL databases are better for structured data and complex queries, while NoSQL is more flexible and better for large volumes of unstructured or semi-structured data.

**93. What are some examples of NoSQL databases?**

* **MongoDB**: Document-based database, stores data in JSON-like format.
* **Cassandra**: Column-store database, highly scalable for distributed systems.
* **Redis**: In-memory key-value store, suitable for caching.
* **CouchDB**: Document store that uses JSON to store data.
* **Neo4j**: Graph database for representing and querying relationships between data.

**94. What is a distributed database?**  
A distributed database is a database that is spread across multiple physical locations, either within the same data center or across multiple data centers. This setup ensures better scalability, availability, and fault tolerance.

* **Example:** Apache Cassandra, MongoDB in a sharded setup.

**95. What is a cloud database?**  
A cloud database is a database that runs on a cloud computing platform. These databases are hosted and managed by cloud service providers, offering scalability, high availability, and remote access.

* **Example:** Amazon RDS, Google Cloud SQL, Azure SQL Database.

**(15.) Database Management Systems (DBMS):-**

**96. What is a Database Management System (DBMS)?**

* A DBMS is software that allows users to store, manage, and manipulate data in a structured format.
* **Example:** MySQL is a DBMS used to store and manage data for web applications.

**97. What are the functions of a DBMS?**

* Functions of DBMS include data storage, data retrieval, data manipulation, security management, and backup.
* **Example:** In a library system, DBMS stores book information, retrieves details, and helps with issuing and returning books.

**98. What is the difference between a DBMS and a RDBMS?**

* DBMS stores data in a single file or format, whereas RDBMS stores data in tables with relationships between them (i.e., relational data).
* **Example:** DBMS is like a flat file system, while RDBMS (like MySQL) uses tables to store data with primary and foreign keys.

**99. What are some popular DBMS software?**

* Some popular DBMS software includes:
  + **DBMS:** MS Access, SQLite
  + **RDBMS:** MySQL, PostgreSQL, Oracle, SQL Server
* **Example:** MySQL is a widely used RDBMS for building web applications.

**100. What is data integrity, and how does a DBMS ensure it?**

* Data integrity refers to the accuracy and consistency of data. A DBMS ensures it by enforcing rules like constraints, validation, and ACID properties (Atomicity, Consistency, Isolation, Durability).
* **Example:** In a school database, data integrity ensures that student grades cannot exceed a maximum value or that each student ID is unique.