50 SQL Interview Questions and Answers

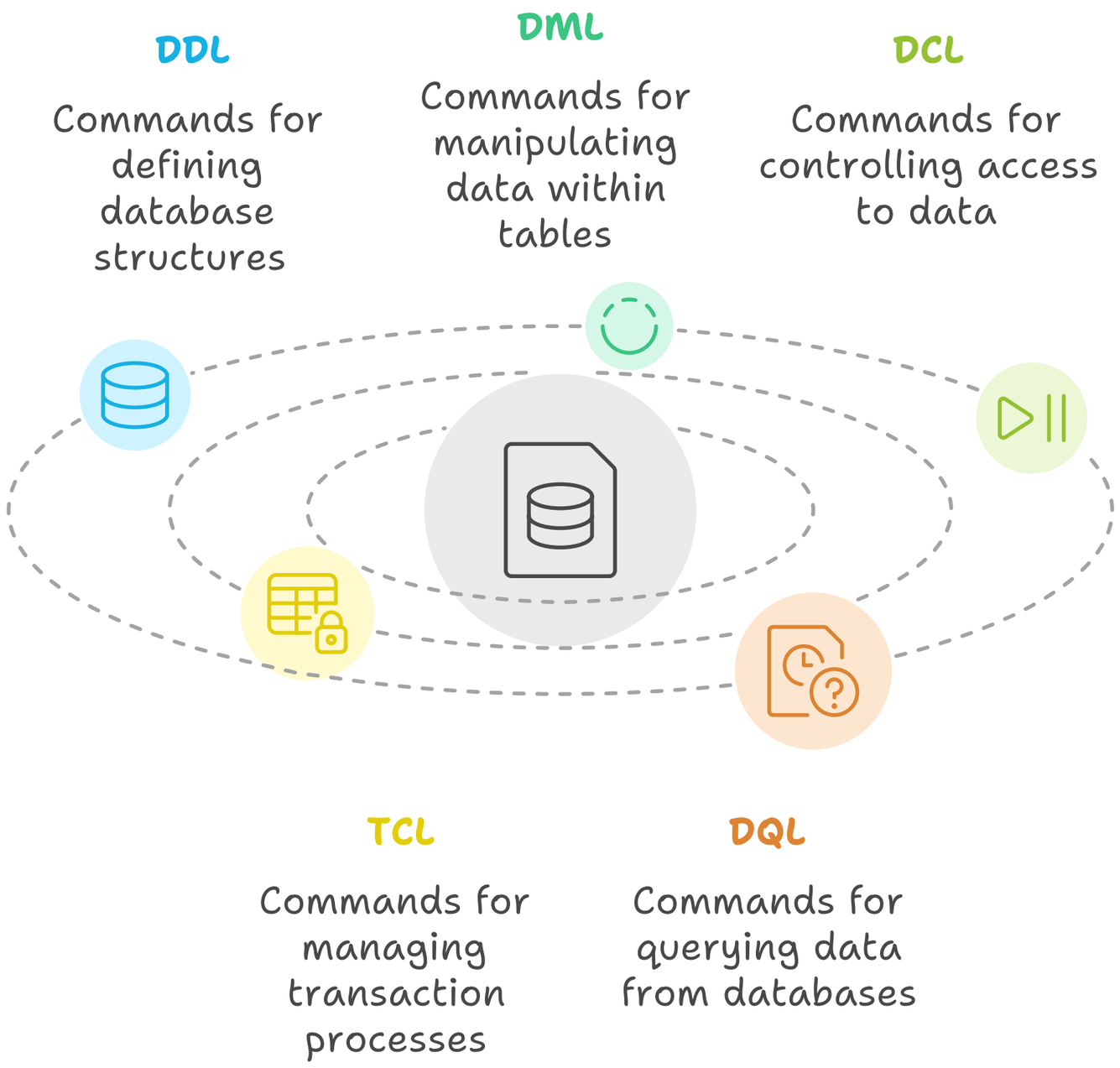
Follow me : Rajat Jain for more Interview Questions for Data Analyst Role

This document provides a comprehensive list of 50 SQL interview questions along with their answers. It is designed to help candidates prepare for SQL-related interviews by covering a wide range of topics, from basic concepts to advanced queries. Whether you are a beginner or an experienced professional, this guide will enhance your understanding of SQL and improve your chances of success in interviews.

Basic SQL Questions

1. **What is SQL?**
    - SQL (Structured Query Language) is a standard programming language used to manage and manipulate relational databases. It allows users to create, read, update, and delete data.

2. **What are the different types of SQL commands?**
    - SQL commands are categorized into five types:
        - DDL (Data Definition Language): CREATE, ALTER, DROP
        - DML (Data Manipulation Language): SELECT, INSERT, UPDATE, DELETE
        - DCL (Data Control Language): GRANT, REVOKE
        - TCL (Transaction Control Language): COMMIT, ROLLBACK, SAVEPOINT
        - DQL (Data Query Language): SELECT



3. **What is a primary key?**

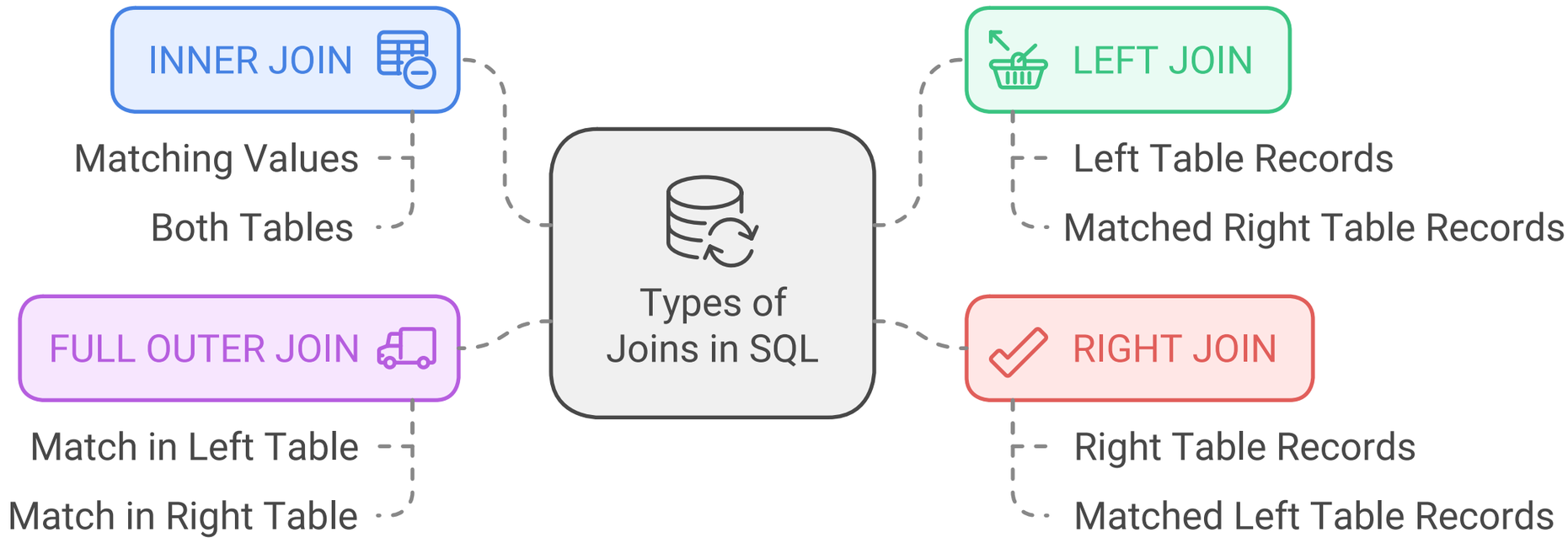
- A primary key is a unique identifier for a record in a table. It ensures that no two rows have the same value in that column and cannot contain NULL values.

4. **What is a foreign key?**
    - A foreign key is a field (or collection of fields) in one table that uniquely identifies a row in another table. It establishes a relationship between the two tables.

5. **What is normalization?**
    - Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity. It involves dividing large tables into smaller ones and defining relationships between them.

Intermediate SQL Questions

6. **What are the different types of joins in SQL?**
    - The main types of joins are:
        - INNER JOIN: Returns records with matching values in both tables.
        - LEFT JOIN: Returns all records from the left table and matched records from the right table.
        - RIGHT JOIN: Returns all records from the right table and matched records from the left table.
        - FULL OUTER JOIN: Returns all records when there is a match in either left or right table.



7. **What is a subquery?**
    - A subquery is a query nested inside another query. It can be used in SELECT, INSERT, UPDATE, or DELETE statements to perform operations based on the results of the outer query.

8. **What is an index?**
    - An index is a database object that improves the speed of data retrieval operations on a table. It creates a pointer to the data in a table, allowing for faster searches.

9. **What is the difference between UNION and UNION ALL?**
    - UNION combines the results of two or more SELECT statements and removes duplicate rows. UNION ALL combines the results and includes all duplicates.

10. **What is a view?**

- A view is a virtual table based on the result of a SELECT query. It does not store data physically but provides a way to simplify complex queries and enhance security.

Advanced SQL Questions

11. **What is a stored procedure?**
    - A stored procedure is a precompiled collection of SQL statements that can be executed as a single unit. It allows for code reuse and can accept parameters.

12. **What is a trigger?**
    - A trigger is a special type of stored procedure that automatically executes in response to certain events on a particular table, such as INSERT, UPDATE, or DELETE.

13. **What is the difference between clustered and non-clustered indexes?**
    - A clustered index determines the physical order of data in a table and can only be created on one column. A non-clustered index creates a separate structure from the data and can be created on multiple columns.

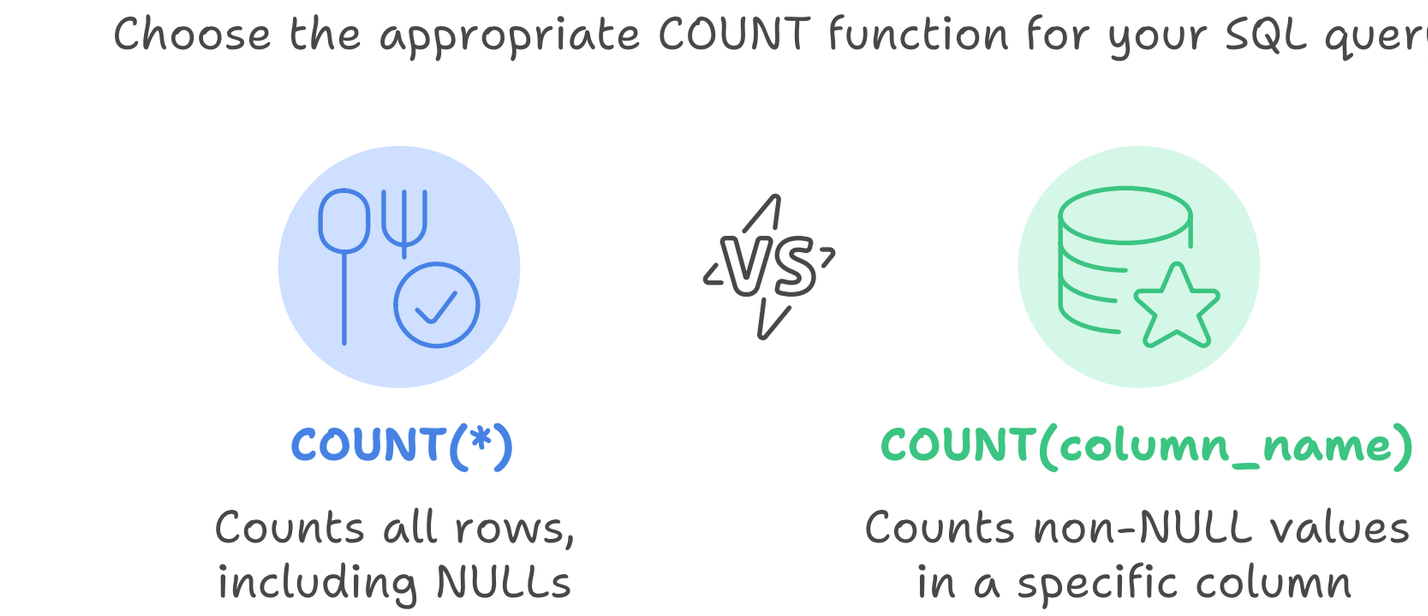
14. **What is a transaction?**
    - A transaction is a sequence of one or more SQL operations that are executed as a single unit of work. Transactions follow the ACID properties (Atomicity, Consistency, Isolation, Durability).

15. **What is the purpose of the GROUP BY clause?**
    - The GROUP BY clause is used to group rows that have the same values in specified columns into summary rows, like COUNT, SUM, AVG, etc.

SQL Functions and Operators

16. **What are aggregate functions?**
    - Aggregate functions perform calculations on a set of values and return a single value. Common aggregate functions include COUNT, SUM, AVG, MAX, and MIN.

17. **What is the difference between COUNT(*) and COUNT(column_name)?**
    - COUNT(*) counts all rows in a table, including NULLs. COUNT(column_name) counts only the non-NULL values in that specific column.



18. **What is the purpose of the HAVING clause?**
    - The HAVING clause is used to filter records after the GROUP BY operation. It allows for conditions to be applied to aggregate functions.

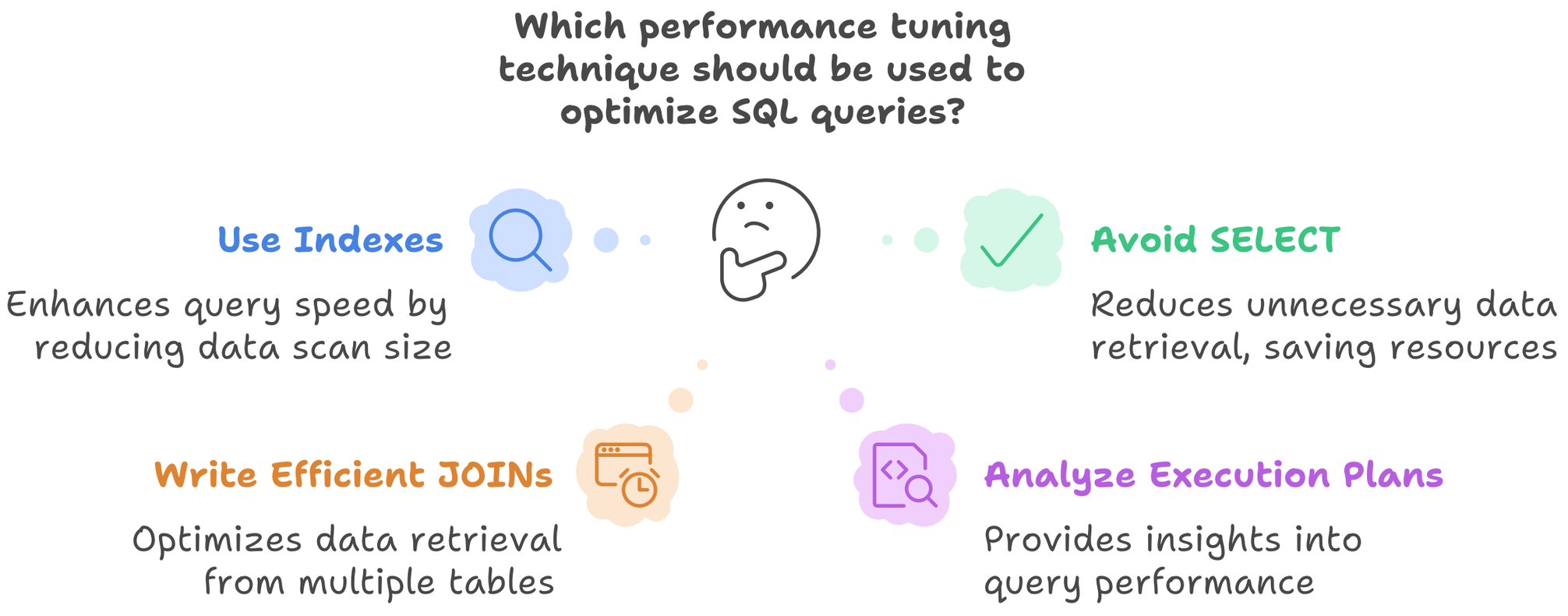
19. **What are window functions?**
    - Window functions perform calculations across a set of table rows that are related to the current row. They are used for tasks like running totals and moving averages.

20. **What is the COALESCE function?**
    - The COALESCE function returns the first non-NULL value in a list of arguments. It is useful for handling NULL values in queries.

SQL Performance and Optimization

21. **What is query optimization?**
    - Query optimization is the process of improving the performance of a SQL query by analyzing and modifying its execution plan to reduce resource consumption and execution time.

22. **What are some common performance tuning techniques?**
    - Common techniques include:
        - Using indexes effectively
        - Avoiding SELECT *
        - Writing efficient JOINs
        - Analyzing execution plans
        - Reducing the number of subqueries



23. **What is a deadlock?**
    - A deadlock occurs when two or more transactions are waiting for each other to release locks, resulting in a standstill. Database systems typically have mechanisms to detect and resolve deadlocks.

24. **What is the difference between a temporary table and a table variable?**
    - A temporary table is created in the tempdb database and can be accessed by multiple sessions. A table variable is scoped to the batch, stored procedure, or function in which it is declared.

25. **What is the purpose of the EXPLAIN statement?**
    - The EXPLAIN statement provides information about how a SQL query will be executed, including details about the execution plan, indexes used, and estimated costs.

SQL Data Types and Constraints

26. **What are the different data types in SQL?**
    - Common data types include:

        - INT: Integer values
        - VARCHAR: Variable-length string
        - CHAR: Fixed-length string
        - DATE: Date values
        - FLOAT: Floating-point numbers

27. **What are constraints in SQL?**
    - Constraints are rules applied to table columns to enforce data integrity. Common constraints include PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, and CHECK.

28. **What is the difference between a unique constraint and a primary key?**
    - A unique constraint ensures that all values in a column are different, while a primary key uniquely identifies a row and cannot contain NULL values.

29. **What is a CHECK constraint?**
    - A CHECK constraint limits the values that can be placed in a column based on a specified condition. It ensures that data meets certain criteria.

30. **What is the purpose of the DEFAULT constraint?**
    - The DEFAULT constraint provides a default value for a column when no value is specified during an INSERT operation.

SQL Miscellaneous Questions

31. **What is the difference between SQL and NoSQL?**
    - SQL databases are relational and use structured query language for defining and manipulating data, while NoSQL databases are non-relational and can handle unstructured data, offering flexibility in data storage.

32. **What is a schema in SQL?**
    - A schema is a logical container for database objects such as tables, views, and procedures. It helps organize and manage database objects.

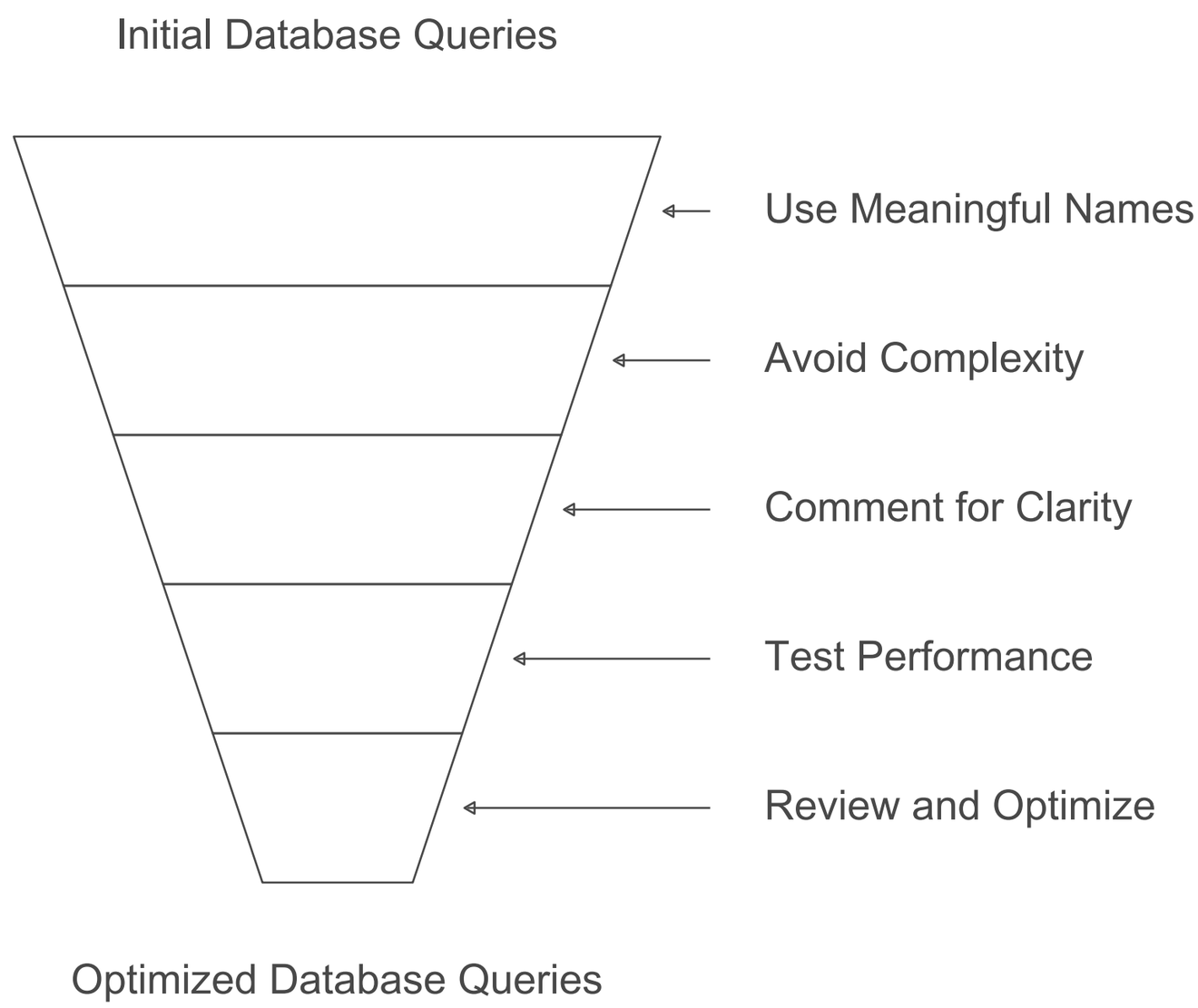
33. **What is the purpose of the ROLLBACK statement?**
    - The ROLLBACK statement undoes changes made during the current transaction, reverting the database to its previous state.

34. **What is a data warehouse?**
    - A data warehouse is a centralized repository that stores large volumes of structured and unstructured data from multiple sources for analysis and reporting.

35. **What is the difference between OLTP and OLAP?**
    - OLTP (Online Transaction Processing) systems are designed for managing transaction-oriented applications, while OLAP (Online Analytical Processing) systems are optimized for complex queries and data analysis.

SQL Best Practices

36. **What are some best practices for writing SQL queries?**
    - Best practices include:
        - Using meaningful table and column names
        - Avoiding unnecessary complexity
        - Commenting code for clarity
        - Testing queries for performance
        - Regularly reviewing and optimizing queries



37. **How can you prevent SQL injection attacks?**
    - Prevent SQL injection by using prepared statements, parameterized queries, and input validation to ensure that user inputs do not alter the intended SQL commands.

38. **What is the importance of backups in SQL?**
    - Backups are crucial for data recovery in case of data loss, corruption, or system failure. Regular backups ensure that data can be restored to a previous state.

39. **What is the role of a database administrator (DBA)?**
    - A DBA is responsible for managing, maintaining, and securing a database environment. Their tasks include performance tuning, backup and recovery, and ensuring data integrity.

40. **What is data integrity?**
    - Data integrity refers to the accuracy and consistency of data over its lifecycle. It is maintained through constraints, validation rules, and proper database design.

SQL Scenario-Based Questions

41. **How would you retrieve the second highest salary from a table?**

```
SELECT MAX(salary)
FROM employees
WHERE salary < (SELECT MAX(salary) FROM employees);
```

42. **How can you find duplicate records in a table?**

```
SELECT column_name, COUNT(*)
FROM table_name
GROUP BY column_name
HAVING COUNT(*) > 1;
```

43. **How would you update records in a table based on another table?**

```
UPDATE target_table
SET target_column = source_table.source_column
FROM source_table
WHERE target_table.id = source_table.id;
```

44. **How can you delete duplicate rows from a table?**

```
DELETE FROM table_name
WHERE id NOT IN (SELECT MIN(id)
                 FROM table_name
                 GROUP BY column_name);
```

45. **How would you calculate the total sales for each product?**

```
SELECT product_id, SUM(sales_amount)
FROM sales
GROUP BY product_id;
```

SQL Advanced Scenario Questions

46. **How can you implement pagination in SQL?**

```
SELECT *
FROM table_name
ORDER BY column_name
OFFSET 10 ROWS FETCH NEXT 10 ROWS ONLY;
```

47. **How would you find the most frequently sold product?**

```
SELECT product_id, COUNT(*) AS frequency
FROM sales
GROUP BY product_id
ORDER BY frequency DESC
LIMIT 1;
```

48. **How can you join three tables in SQL?**

```
SELECT a.column1, b.column2, c.column3
FROM table_a a
JOIN table_b b ON a.id = b.a_id
JOIN table_c c ON b.id = c.b_id;
```

49. **How would you create a temporary table?**

```
CREATE TEMPORARY TABLE temp_table AS
SELECT * FROM original_table WHERE condition;
```

50. **How can you retrieve the current date and time in SQL?**

```
SELECT CURRENT_TIMESTAMP;
```