SQL for Beginners: A Comprehensive Guide

Introduction

Structured Query Language (SQL) is the standard language used to interact with relational databases. This guide covers fundamental SQL concepts, including basic queries, aggregation, and essential operations.

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1. Basic Queries

SQL queries are used to retrieve and manipulate data from databases.

1.1 SELECT Statement

The `SELECT` statement retrieves data from a table.

```
SELECT column1, column2 FROM table_name;
```

To select all columns:

```
SELECT * FROM table_name;
```

1.2 WHERE Clause

The `WHERE` clause filters records based on a condition.

```
SELECT * FROM table_name WHERE column1 = 'value';
```

1.3 ORDER BY Clause

Sorts the result set in ascending (`ASC`) or descending (`DESC`) order.

```
SELECT * FROM table_name ORDER BY column1 ASC;
```

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2. Aggregation Functions

Aggregation functions perform calculations on multiple rows and return a single value.

2.1 COUNT()

Counts the number of rows that match a condition.

```
SELECT COUNT(*) FROM table_name;
```

2.2 SUM()

Calculates the sum of a numeric column.

```
SELECT SUM(column1) FROM table_name;
```

2.3 AVG()

Finds the average value of a numeric column.

```
SELECT AVG(column1) FROM table_name;
```

2.4 MIN() and MAX()

Finds the minimum and maximum values in a column.

```
SELECT MIN(column1) FROM table_name;
SELECT MAX(column1) FROM table_name;
```

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3. Grouping Data

3.1 GROUP BY Clause

Groups records and applies aggregate functions.

```
SELECT column1, COUNT(*) FROM table_name GROUP BY column1;
```

3.2 HAVING Clause

Filters grouped records using aggregate functions.

SELECT column1, COUNT(*) FROM table_name GROUP BY column1 HAVING COUNT(*) > 5;

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4. Joins

Joins combine rows from multiple tables.

4.1 INNER JOIN

Returns records with matching values in both tables.

SELECT a.column1, b.column2 FROM tableA a INNER JOIN tableB b ON a.id = b.id;

4.2 LEFT JOIN

Returns all records from the left table and matching records from the right table.

SELECT a.column1, b.column2 FROM tableA a LEFT JOIN tableB b ON a.id = b.id;

4.3 RIGHT JOIN

Returns all records from the right table and matching records from the left table.

SELECT a.column1, b.column2 FROM tableA a RIGHT JOIN tableB b ON a.id = b.id;

4.4 FULL OUTER JOIN

Returns all records when there is a match in either table.

SELECT a.column1, b.column2 FROM tableA a FULL OUTER JOIN tableB b ON a.id = b.id;

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5. Data Modification

5.1 INSERT INTO

Inserts new records into a table.

INSERT INTO table_name (column1, column2) VALUES ('value1', 'value2');

5.2 UPDATE

Modifies existing records.

```
UPDATE table_name SET column1 = 'new_value' WHERE column2 = 'condition';
```

5.3 DELETE

Removes records from a table.

```
DELETE FROM table_name WHERE column1 = 'condition';
```

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6. Subqueries

A subquery is a query nested inside another query.

```
SELECT column1 FROM table_name WHERE column2 = (SELECT MAX(column2) FROM table_name);
```

Conclusion

This guide introduces essential SQL concepts, helping beginners write and understand basic queries. As you practice, explore more advanced topics such as indexing, stored procedures, and database normalization.