

SQL QUERY NOTES (DBMS)

1. Introduction to SQL

SQL (Structured Query Language) is a standard language used to store, retrieve, manipulate, and manage data in a relational database.

SQL was developed by IBM and later standardized by ANSI and ISO.

SQL is used in databases such as:

- MySQL
 - Oracle
 - PostgreSQL
 - SQL Server
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2. Features of SQL

- Easy to learn and use
 - Works with relational databases
 - Supports data definition and data manipulation
 - Provides security and access control
 - Supports transaction management
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3. Categories of SQL Commands

SQL commands are divided into five main categories:

1. DDL – Data Definition Language
 2. DML – Data Manipulation Language
 3. DQL – Data Query Language
 4. DCL – Data Control Language
 5. TCL – Transaction Control Language
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4. Data Definition Language (DDL)

DDL commands are used to define and modify database structure.

4.1 CREATE

Used to create database objects like tables.

```
CREATE TABLE Student (
    RollNo INT PRIMARY KEY,
    Name VARCHAR(50),
    Department VARCHAR(30),
    Age INT
);
```

4.2 ALTER

Used to modify an existing table.

```
ALTER TABLE Student ADD Email VARCHAR(50);
```

4.3 DROP

Deletes table permanently.

```
DROP TABLE Student;
```

4.4 TRUNCATE

Deletes all records but keeps table structure.

```
TRUNCATE TABLE Student;
```

5. Data Manipulation Language (DML)

DML commands are used to manipulate data inside tables.

5.1 INSERT

Used to insert records.

```
INSERT INTO Student VALUES (1, 'Amit', 'CSE', 20);
```

5.2 UPDATE

Used to modify existing records.

```
UPDATE Student SET Age = 21 WHERE RollNo = 1;
```

5.3 DELETE

Used to delete records.

```
DELETE FROM Student WHERE RollNo = 1;
```

6. Data Query Language (DQL)

DQL is mainly used for retrieving data.

6.1 SELECT Statement

```
SELECT * FROM Student;
```

6.2 WHERE Clause

Used to apply conditions.

```
SELECT * FROM Student WHERE Department = 'CSE';
```

6.3 ORDER BY

Sorts records.

```
SELECT * FROM Student ORDER BY Age DESC;
```

6.4 DISTINCT

Removes duplicate values.

```
SELECT DISTINCT Department FROM Student;
```

7. Aggregate Functions

Aggregate functions operate on multiple rows and return a single value.

Function Description

COUNT() Counts rows

SUM() Calculates total

AVG() Calculates average

MAX() Finds maximum

MIN() Finds minimum

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

```
SELECT AVG(Age) FROM Student;
```

8. GROUP BY and HAVING

GROUP BY

Groups rows with same values.

```
SELECT Department, COUNT(*)
```

```
FROM Student
```

```
GROUP BY Department;
```

HAVING

Used with GROUP BY to filter groups.

```
SELECT Department, COUNT(*)
```

```
FROM Student
```

```
GROUP BY Department
```

```
HAVING COUNT(*) > 5;
```

9. SQL Joins

Joins are used to combine data from multiple tables.

9.1 INNER JOIN

Returns matching records.

```
SELECT Student.Name, Course.CourseName
```

```
FROM Student
```

```
INNER JOIN Course
```

```
ON Student.RollNo = Course.RollNo;
```

9.2 LEFT JOIN

Returns all records from left table.

```
SELECT * FROM Student
```

```
LEFT JOIN Course
```

```
ON Student.RollNo = Course.RollNo;
```

9.3 RIGHT JOIN

Returns all records from right table.

9.4 FULL JOIN

Returns all matching and non-matching records.

10. Subqueries

A subquery is a query inside another query.

SELECT Name

FROM Student

WHERE Age > (SELECT AVG(Age) FROM Student);

11. Constraints in SQL

Constraints ensure data integrity.

Constraint Description

PRIMARY KEY Unique + Not Null

FOREIGN KEY References another table

UNIQUE Unique values

NOT NULL No NULL values

CHECK Condition-based

DEFAULT Default value

12. Data Control Language (DCL)

DCL controls access to data.

GRANT

GRANT SELECT ON Student TO user1;

REVOKE

REVOKE SELECT ON Student FROM user1;

13. Transaction Control Language (TCL)

Used to manage transactions.

COMMIT

Saves changes permanently.

COMMIT;

ROLLBACK

Undo changes.

ROLLBACK;

SAVEPOINT

Creates a restore point.

SAVEPOINT sp1;

14. Advantages of SQL

- **Easy syntax**
 - **Portable across databases**
 - **Secure data access**
 - **Handles large data efficiently**
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15. Conclusion

SQL is a powerful language used to interact with relational databases.

By using SQL queries, users can efficiently create, retrieve, update, and manage data.

Understanding SQL is essential for:

- **Database administrators**
- **Backend developers**
- **Data analysts**