

SQL Joins

What are SQL Joins?

SQL Joins are used to combine data from two or more tables based on a related column between them. This is very useful when your data is stored across multiple tables and you need to view combined results.

Example: A Customers table contains customer details, and an Orders table contains their purchase records. Using a join, you can see which customer placed which order.

1. INNER JOIN Definition: Returns records that have matching values in both tables.

Syntax:

```
SELECT Customers.CustomerID, Customers.Name, Orders.OrderID  
FROM Customers INNER JOIN Orders  
ON Customers.CustomerID = Orders.CustomerID;
```

2. LEFT JOIN Definition: Returns all records from the left table and matched records from the right table. If there is no match, NULL values are shown for the right table.

Syntax:

```
SELECT Customers.CustomerID, Customers.Name, Orders.OrderID  
FROM Customers LEFT JOIN Orders  
ON Customers.CustomerID = Orders.CustomerID;
```

3. RIGHT JOIN Definition: Returns all records from the right table and matched records from the left table. If there is no match, NULL values are shown for the left table.

Syntax:

```
SELECT Customers.CustomerID, Customers.Name, Orders.OrderID  
FROM Customers RIGHT JOIN Orders  
ON Customers.CustomerID = Orders.CustomerID;
```

4. FULL OUTER JOIN Definition: Returns all records when there is a match in either table. If there is no match, NULL is returned.

Syntax:

```
S SELECT Customers.CustomerID, Customers.Name, Orders.OrderID  
FROM Customers FULL OUTER JOIN Orders  
ON Customers.CustomerID = Orders.CustomerID;
```

5. **CROSS JOIN Definition:** Returns the Cartesian product of both tables, combining every row of the first table with every row of the second.

Syntax: SELECT * FROM Customers CROSS JOIN Orders;

6. **SELF JOIN Definition:** A table is joined with itself to compare rows within the same table.

Syntax:

```
SELECT A.Name AS Employee, B.Name AS Manager  
FROM Employees A INNER JOIN Employees B  
ON A.ManagerID = B.EmployeeID
```

Interview Questions & Answers

1. Difference between INNER JOIN and LEFT JOIN?

INNER JOIN returns only matching records from both tables, while LEFT JOIN returns all records from the left table and matching records from the right table. If no match is found, NULL values are displayed for the right table.

2. What is a FULL OUTER JOIN?

A FULL OUTER JOIN returns all records when there is a match in either table. If there is no match, NULL is shown for the missing side.

3. Can joins be nested?

Yes, you can nest joins to combine multiple tables step-by-step in the same query.

4. How to join more than 2 tables?

You can join more than two tables by using multiple JOIN statements, one after another.

5. What is a cross join?

A CROSS JOIN returns the Cartesian product of both tables, combining every row from the first table with every row from the second.

6. What is a natural join?

A NATURAL JOIN automatically joins tables using all columns with the same name in both tables.

7. Can you join tables without a foreign key?

Yes, you can join tables without a foreign key using common columns, but logically defining relationships is recommended.

8. What is a self-join?

A SELF JOIN is when a table is joined with itself to compare rows within the same table.

9. What causes a Cartesian product?

A Cartesian product happens when you join tables without specifying a condition, producing every possible combination of rows.

10. How to optimize joins?

- Use indexes on join columns
- Avoid unnecessary columns using SELECT specific columns
- Filter data early using WHERE conditions
- Use proper join types for your data relationships.