PostgreSQL - JOINS

The PostgreSQL **Joins** clause is used to combine records from two or more tables in a database. A JOIN is a means for combining fields from two tables by using values common to each.

Join Types in PostgreSQL are −

- The CROSS JOIN
- The INNER JOIN
- The LEFT OUTER JOIN
- The RIGHT OUTER JOIN
- The FULL OUTER JOIN

Before we proceed, let us consider two tables, COMPANY and DEPARTMENT. We already have seen INSERT statements to populate COMPANY table. So just let us assume the list of records available in COMPANY table −

```
 id | name  | age | address    | salary | join_date
----+-------+-----+------------+--------+-----------
  1 | Paul  |  32 | California |  20000 | 2001-07-13
  3 | Teddy |  23 | Norway     |  20000 |
  4 | Mark  |  25 | Rich-Mond  |  65000 | 2007-12-13
  5 | David |  27 | Texas      |  85000 | 2007-12-13
  2 | Allen |  25 | Texas      |        | 2007-12-13
  8 | Paul  |  24 | Houston    |  20000 | 2005-07-13
  9 | James |  44 | Norway     |   5000 | 2005-07-13
 10 | James |  45 | Texas      |   5000 | 2005-07-13
```

Another table is DEPARTMENT, has the following definition −

```
CREATE TABLE DEPARTMENT(
   ID INT PRIMARY KEY      NOT NULL,
   DEPT           CHAR(50) NOT NULL,
   EMP_ID         INT      NOT NULL
);
```

Here is the list of INSERT statements to populate DEPARTMENT table −

```
INSERT INTO DEPARTMENT (ID, DEPT, EMP_ID)
VALUES (1, 'IT Billing', 1 );

INSERT INTO DEPARTMENT (ID, DEPT, EMP_ID)
```

```
VALUES (2, 'Engineering', 2 );

INSERT INTO DEPARTMENT (ID, DEPT, EMP_ID)
VALUES (3, 'Finance', 7 );
```

Finally, we have the following list of records available in DEPARTMENT table −

```
 id | dept        | emp_id
----+-------------+--------
  1 | IT Billing  |  1
  2 | Engineering |  2
  3 | Finance     |  7
```

The CROSS JOIN

A CROSS JOIN matches every row of the first table with every row of the second table. If the input tables have x and y columns, respectively, the resulting table will have x+y columns. Because CROSS JOINs have the potential to generate extremely large tables, care must be taken to use them only when appropriate.

The following is the syntax of CROSS JOIN −

```
SELECT ... FROM table1 CROSS JOIN table2 ...
```

Based on the above tables, we can write a CROSS JOIN as follows −

```
testdb=# SELECT EMP_ID, NAME, DEPT FROM COMPANY CROSS JOIN DEPARTMENT;
```

The above given query will produce the following result −

```
emp_id| name  |  dept
------|-------|-------------
    1 | Paul  | IT Billing
    1 | Teddy | IT Billing
    1 | Mark  | IT Billing
    1 | David | IT Billing
    1 | Allen | IT Billing
    1 | Paul  | IT Billing
    1 | James | IT Billing
    1 | James | IT Billing
    2 | Paul  | Engineering
    2 | Teddy | Engineering
    2 | Mark  | Engineering
    2 | David | Engineering
    2 | Allen | Engineering
```

```
    2 | Paul  | Engineering
    2 | James | Engineering
    2 | James | Engineering
    7 | Paul  | Finance
    7 | Teddy | Finance
    7 | Mark  | Finance
    7 | David | Finance
    7 | Allen | Finance
    7 | Paul  | Finance
    7 | James | Finance
    7 | James | Finance
```

The INNER JOIN

A INNER JOIN creates a new result table by combining column values of two tables (table1 and table2) based upon the join-predicate. The query compares each row of table1 with each row of table2 to find all pairs of rows, which satisfy the join-predicate. When the join-predicate is satisfied, column values for each matched pair of rows of table1 and table2 are combined into a result row.

An INNER JOIN is the most common type of join and is the default type of join. You can use INNER keyword optionally.

The following is the syntax of INNER JOIN −

```
SELECT table1.column1, table2.column2...
FROM table1
INNER JOIN table2
ON table1.common_filed = table2.common_field;
```

Based on the above tables, we can write an INNER JOIN as follows −

```
testdb=# SELECT EMP_ID, NAME, DEPT FROM COMPANY INNER JOIN DEPARTMENT
        ON COMPANY.ID = DEPARTMENT.EMP_ID;
```

The above given query will produce the following result −

```
 emp_id | name  | dept
--------+-------+------------
      1 | Paul  | IT Billing
      2 | Allen | Engineering
```

The LEFT OUTER JOIN

The OUTER JOIN is an extension of the INNER JOIN. SQL standard defines three types of OUTER JOINs: LEFT, RIGHT, and FULL and PostgreSQL supports all of these.

In case of LEFT OUTER JOIN, an inner join is performed first. Then, for each row in table T1 that does not satisfy the join condition with any row in table T2, a joined row is added with null values in columns of T2. Thus, the joined table always has at least one row for each row in T1.

The following is the syntax of LEFT OUTER JOIN −

```
SELECT ... FROM table1 LEFT OUTER JOIN table2 ON conditional_expression ...
```

Based on the above tables, we can write an inner join as follows −

```
testdb=# SELECT EMP_ID, NAME, DEPT FROM COMPANY LEFT OUTER JOIN DEPARTMENT
   ON COMPANY.ID = DEPARTMENT.EMP_ID;
```

The above given query will produce the following result −

```
 emp_id | name  | dept
--------+-------+------------
      1 | Paul  | IT Billing
      2 | Allen | Engineering
        | James |
        | David |
        | Paul  |
        | Mark  |
        | Teddy |
        | James |
```

The RIGHT OUTER JOIN

First, an inner join is performed. Then, for each row in table T2 that does not satisfy the join condition with any row in table T1, a joined row is added with null values in columns of T1. This is the converse of a left join; the result table will always have a row for each row in T2.

The following is the syntax of RIGHT OUTER JOIN −

```
SELECT ... FROM table1 RIGHT OUTER JOIN table2 ON conditional_expression ...
```

Based on the above tables, we can write an inner join as follows −

```
testdb=# SELECT EMP_ID, NAME, DEPT FROM COMPANY RIGHT OUTER JOIN DEPARTMENT
   ON COMPANY.ID = DEPARTMENT.EMP_ID;
```

The above given query will produce the following result −

```
 emp_id | name  | dept
--------+-------+--------
```

```
      1 | Paul     | IT Billing
      2 | Allen    | Engineering
      7 |          | Finance
```

The FULL OUTER JOIN

First, an inner join is performed. Then, for each row in table T1 that does not satisfy the join condition with any row in table T2, a joined row is added with null values in columns of T2. In addition, for each row of T2 that does not satisfy the join condition with any row in T1, a joined row with null values in the columns of T1 is added.

The following is the syntax of FULL OUTER JOIN −

```
SELECT ... FROM table1 FULL OUTER JOIN table2 ON conditional_expression ...
```

Based on the above tables, we can write an inner join as follows −

```
testdb=# SELECT EMP_ID, NAME, DEPT FROM COMPANY FULL OUTER JOIN DEPARTMENT
   ON COMPANY.ID = DEPARTMENT.EMP_ID;
```

The above given query will produce the following result −

```
 emp_id | name    | dept
--------+---------+---------------
      1 | Paul    | IT Billing
      2 | Allen   | Engineering
      7 |         | Finance
        | James   |
        | David   |
        | Paul    |
        | Mark    |
        | Teddy   |
        | James   |
```