National University of Computer & Emerging Sciences, Peshawar
Computer Science Department
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Course Code: CL-2005	Course: Database Systems Lab
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Contents:

- Introduction to Joins
- Types of Joins
- Introduction to Outer Joins and Its Types
- Introduction to Set Operator
- Types of Set Operator
- Exercise

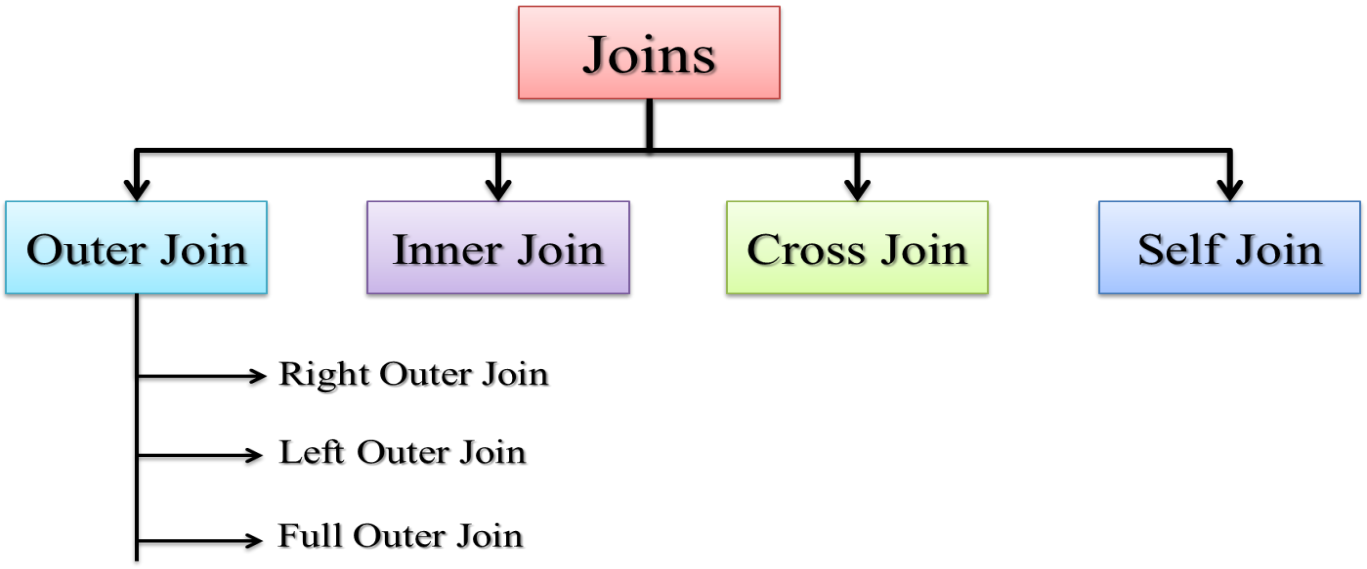
INTRODUCTION TO JOIN

The JOIN keyword is used in an SQL statement to query data from two or moretables based on a relationship between certain columns in these tables.

TYPES OF JOINS:

Following are the types of joins. They are:

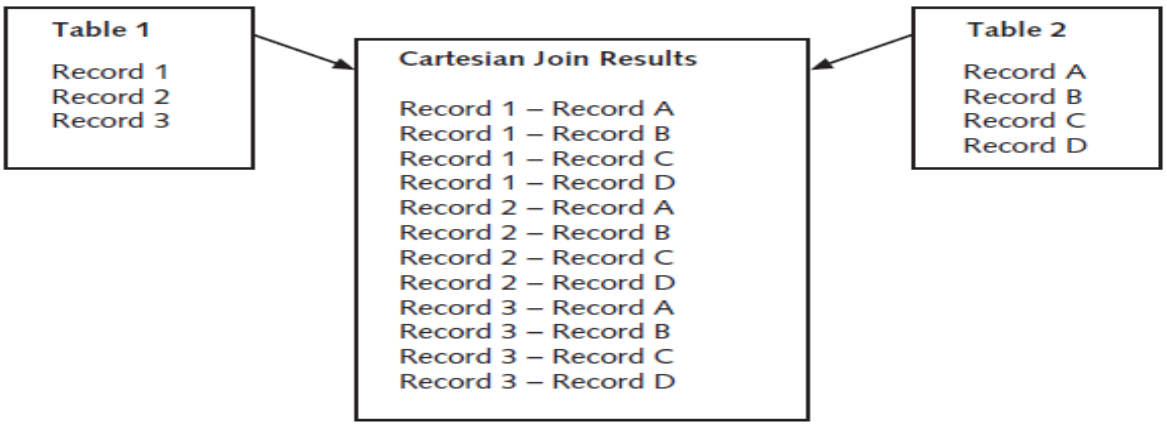
- Cross Join / Cartesian Join
- Inner Join / Equity Join
- Outer Join
- Left Outer
- Right Outer
- Full Outer
- Self-Join



Cross Join / Cartesian Join:
In a Cartesian join, also called a Cartesian product or cross join, each recordin the first table is matched with each record in the second table.

(# rows in Table 1) * (# rows in Table 2)

Syntax for Cross Join/Cartesian Join:




```
SELECT * FROM TABLE1, TABLE2;
```

ISO Standard:

```
SELECT * FROM TABLE1 CROSS JOIN TABLE2;
```

Inner Join / Equality Joins:
If the join contains an equality condition, it is also called Equi Join, Natural Join,Inner Join.

Syntax For Inner Join:

```
SELECT T1.COLUMN_NAME, T2.COLUMN_NAME
FROM TABLE1 T1
INNER JOIN TABLE2 T2 ON T1.COLUMN_NAME = T2.COLUMN_NAME;
```

Example
To retrieve the employee name, their job and department name, we needto extract data from two tables, employee and Department:

```
SELECT E.first_FIRST_NAME,
E.JOB_ID,
D.DEPARTMENT_NAME
FROM EMPLOYEES E
JOIN DEPARTMENTS D ON E.DEPARTMENT_ID = D.DEPARTMENT_ID;
```

The SQL-1999 standard:

```
SELE  SELECT E.first_name, E.job_id , D.DEPARTMENT_NAME FROM EMPLOYEES E
NATURAL JOIN DEPARTMENTS D;
```

Using Clause:
No matter how many common columns are available in the tables, NATURALJOIN will join with all the common columns.
Use USING clause to join with specified columns.

Syntax for Using Clause:

```
SELECT COLUMN_NAME1, COLUMN_NAME2
FROM TABLE1
JOIN TABLE2 USING (COMMON_COLUMN);
```

Example

```
SELECT E.EMPLOYEE_ID AS ,
    E.FIRST_NAME,
    E.MANAGER_ID AS MGR,
    D.DEPARTMENT_NAME AS DNAME
FROM EMPLOYEES E  JOIN DEPARTMENTS D USING (DEPARTMENT_ID);
```

Self-Join:

When a table is joined to itself then it is called as Self join or in less words we Can just say "joining a table to itself is called self-join".

Syntax for Self-join:

```
SELECT T1.COLUMN_NAME, T2.COLUMN_NAME
FROM TABLE_NAME T1
JOIN TABLE_NAME T2 ON T1.COMMON_COLUMN = T2.COMMON_COLUMN;
```

Example

```
SELECT WORKER.FIRST_NAME || ' ' || WORKER.LAST_NAME AS EMPLOYEE,
    MANAGER.FIRST_NAME || ' ' || MANAGER.LAST_NAME AS MANAGER
FROM EMPLOYEES WORKER
JOIN EMPLOYEES MANAGER ON WORKER.MANAGER_ID = MANAGER.EMPLOYEE_ID;
```

INTRODUCTION TO OUTER JOIN & ITS TYPES

Use Outer join to return records which don't have direct match.
In outer join operation, all records from the source table included in the resulteven though they don't satisfy the join condition.

Syntax for Outer Join:

SELECT column names from both tables FROM table name 1 LEFT|RIGHT|FULL OUTER JOIN table name 2 on condition;

Types of Outer Joins:

Outer joins are classified into three types:

1. Left Outer Join
2. Right Outer Join
3. Full Outer Join

Left Outer Join:

The left outer join produces a table that contains the matched data from the two tables, as well as the remaining rows of the left table and null from the columns ofthe right table.

Syntax for Left Outer Join:

```
SELECT T1.COLUMN_NAME, T2.COLUMN_NAME
FROM TABLE1 T1, TABLE2 T2
WHERE T1.COLUMN_NAME = T2.COLUMN_NAME(+);
```

Example

```
SELECT E.EMPLOYEE_ID,
    E.FIRST_NAME || ' ' || E.LAST_NAME AS EMPLOYEE_NAME,
    D.DEPARTMENT_ID,
    D.DEPARTMENT_NAME
FROM EMPLOYEES E, DEPARTMENTS D
WHERE E.DEPARTMENT_ID = D.DEPARTMENT_ID(+);
```

NOTE: The outer join operator appears on only that side that has informationmissing.
The SQL-1999 standard:

```
SELECT T1.COLUMN_NAME, T2.COLUMN_NAME
FROM TABLE1 T1
LEFT OUTER JOIN TABLE2 T2 ON T1.COLUMN_NAME = T2.COLUMN_NAME;
```

Example

```
SELECT E.FIRST_NAME || ' ' || E.LAST_NAME AS ENAME,
    D.DEPARTMENT_ID AS DEPTNO,
    D.DEPARTMENT_NAME AS DNAME
FROM EMPLOYEES E
LEFT OUTER JOIN DEPARTMENTS D ON E.DEPARTMENT_ID = D.DEPARTMENT_ID;
```

Right Outer Join:
The right outer join returns a table with the matched data from the two tablesbeing joined, then the remaining rows of the right table and null for the remaining left table's columns.

Syntax for Right Outer Join:

```
SELECT T1.COLUMN_NAME, T2.COLUMN_NAME
FROM TABLE1 T1, TABLE2 T2
WHERE T1.COLUMN_NAME(+) = T2.COLUMN_NAME;
```

Example:

```
SELECT E.FIRST_NAME || ' ' || E.LAST_NAME AS EMPLOYEE_NAME,
    D.DEPARTMENT_ID,
    D.DEPARTMENT_NAME
FROM EMPLOYEES E, DEPARTMENTS D
WHERE E.DEPARTMENT_ID(+) = D.DEPARTMENT_ID;
```

SQL-1999 standard:

```
SELECT T1.TABLE1_COLUMN, T2.TABLE2_COLUMN
FROM TABLE1 T1
RIGHT OUTER JOIN TABLE2 T2
ON T1.TABLE1_COLUMN = T2.TABLE2_COLUMN;
```

Example:

```
SELECT E.FIRST_NAME || ' ' || E.LAST_NAME AS EMPLOYEE_NAME,
    D.DEPARTMENT_ID,
    D.DEPARTMENT_NAME
FROM EMPLOYEES E
RIGHT OUTER JOIN DEPARTMENTS D
ON E.DEPARTMENT_ID = D.DEPARTMENT_ID;
```

Full Outer Join:
The full outer join returns a table with the matched data of two table then remainingrows of both left table and then the right table.

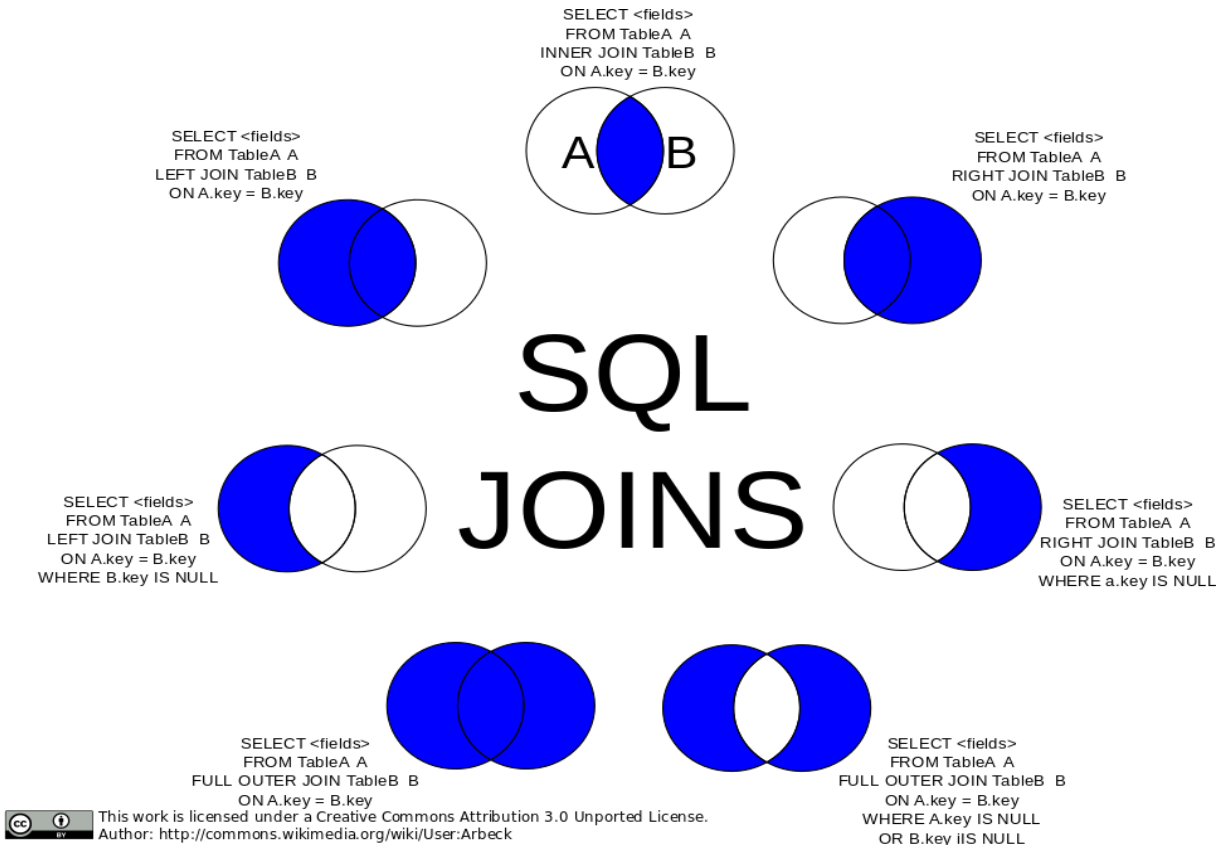
Syntax for Full Outer Join:

```
SELECT T1.TABLE1_COLUMN, T2.TABLE2_COLUMN
FROM TABLE1 T1
FULL OUTER JOIN TABLE2 T2
ON T1.TABLE1_COLUMN = T2.TABLE2_COLUMN;
```

Example

```
SELECT E.FIRST_NAME || ' ' || E.LAST_NAME AS EMPLOYEE_NAME,
    D.DEPARTMENT_ID,
    D.DEPARTMENT_NAME
FROM EMPLOYEES E
FULL OUTER JOIN DEPARTMENTS D
ON E.DEPARTMENT_ID = D.DEPARTMENT_ID;
```

Conclusion for Joins:



INTRODUCTION TO SET OPERATOR

Set operators are used to join the results of two (or more) SELECT statements. The SEToperators available in Oracle 11g are UNION, UNION ALL, INTERSECT and MINUS.

All of the SET operators have the same order of precedence. Instead, Oracleevaluates queries from left to right or top to bottom during execution. If parenthesesare used explicitly, the order may change because parentheses take precedence over dangling operators.

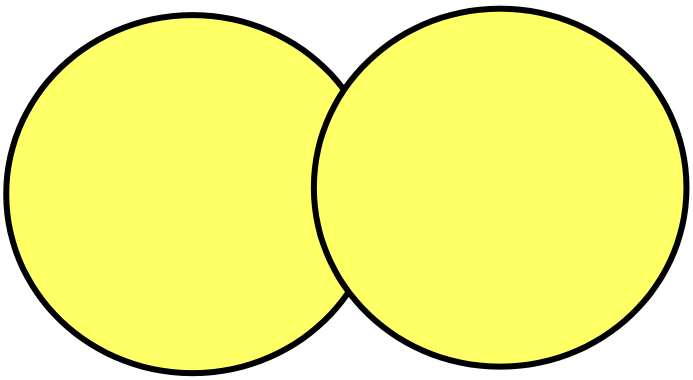
TYPES OF SET OPERATOR

Following are the types of operators that are used for set in oracle. They are:

1. Union
2. Union all
3. Intersect
4. Minus

Union Operator:

The SQL Union function joins the results of two or more SQL SELECT queries. The numberof datatypes and columns in both tables on which the UNION operation is performedmust be the same in order to perform the union operation. The duplicate rows areremoved from the result of the union operation.



Diagrammatic view of Union operator

Syntax for Union Operator

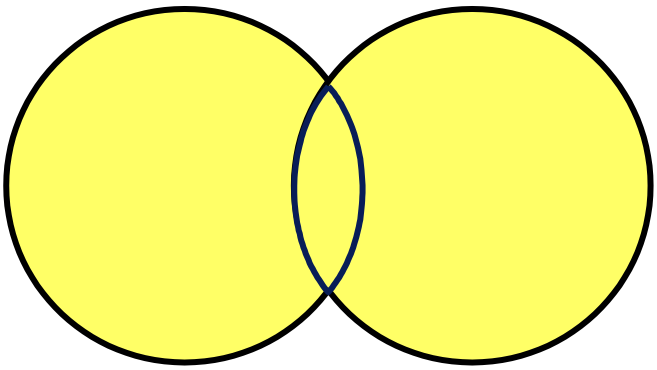
```
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE1
UNION
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE2;
```

Example

```
SELECT employee_id, job_id FROM employees
UNION
SELECT employee_id, job_id FROM job_history;
```

Union All Operator:

With one exception, UNION and UNION ALL operate in a similar manner. UNION ALL,on the other hand, returns the result set without eliminating duplication or sorting thedata.



Diagrammatic view of Union all operator

Syntax for Union All Operator

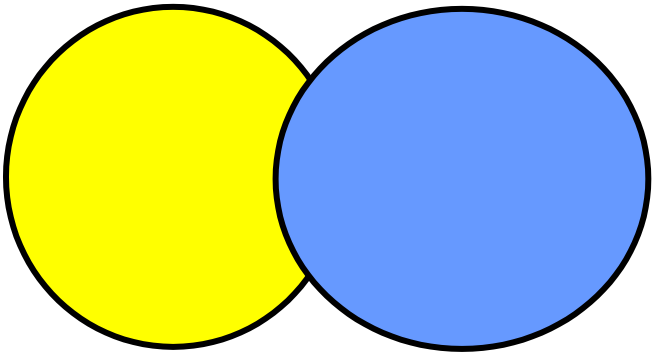
```
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE1
UNION  ALL
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE2;
```

Example

```
SELECT employee_id, job_id FROM employees
UNION  All
SELECT employee_id, job_id FROM job_history;
```

Intersect Operator

It's used to join two SELECT statements together. The common rows from both SELECT statements are returned by the Intersect procedure. The number of datatypes and columns in the Intersect operation must be the same. There are no duplicates, and the data is arranged in ascending order by default.



Diagrammatic view of Intersect operator

Syntax for Intersect Operator

```
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE1
INTERSECT
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE2;
```

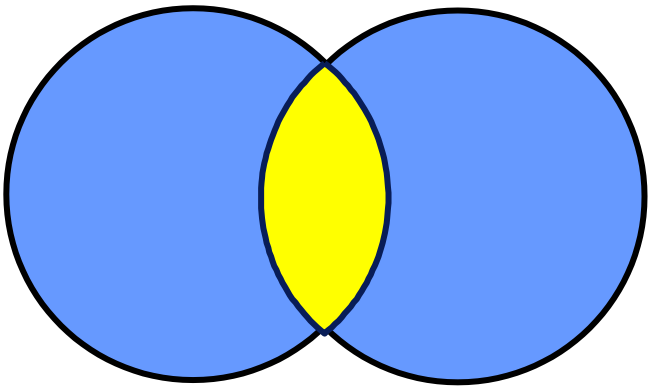
Example

```
SELECT employee_id, job_id
FROM employees
INTERSECT
```

```
SELECT employee_id, job_id
FROM job_history;
```

Minus Operator

It combines the results of two SELECT statements into a single statement. The minusoperator is used to show rows that are present in the first query but not in the second.There are no duplicates, and the data is sorted ascending by default.



Diagrammatic view of Minus operator

Syntax for Minus Operator

```
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE1
MINUS
SELECT TABLE1_COLUMN, TABLE2_COLUMN
FROM TABLE2;
```

Example

```
SELECT employee_id, job_id
FROM employees
MINUS
SELECT employee_id, job_id
FROM job_history;
```

How to Implement Joins as Set Operator