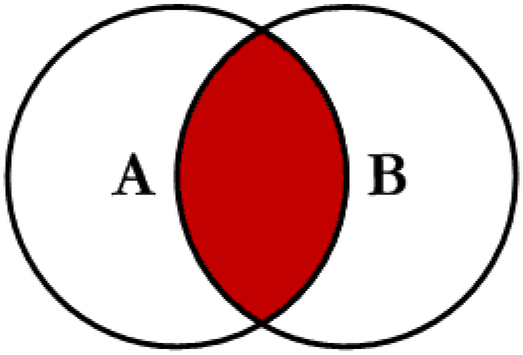
SQL Joins

I am going to discuss seven different ways you can return data from two relational tables. I will be excluding cross Joins and self-referencing Joins. The seven Joins I will discuss are shown below:

1. INNER JOIN
2. LEFT JOIN
3. RIGHT JOIN
4. OUTER JOIN
5. LEFT JOIN EXCLUDING INNER JOIN
6. RIGHT JOIN EXCLUDING INNER JOIN
7. OUTER JOIN EXCLUDING INNER JOIN
8. CROSS JOIN

For the sake of this article, I'll refer to 5, 6, and 7 as LEFT EXCLUDING JOIN, RIGHT EXCLUDING JOIN, and OUTER EXCLUDING JOIN, respectively. Some may argue that 5, 6, and 7 are not really joining the two tables, but for simplicity, I will still refer to these as Joins because you use a SQL Join in each of these queries (but exclude some records with a WHERE clause).

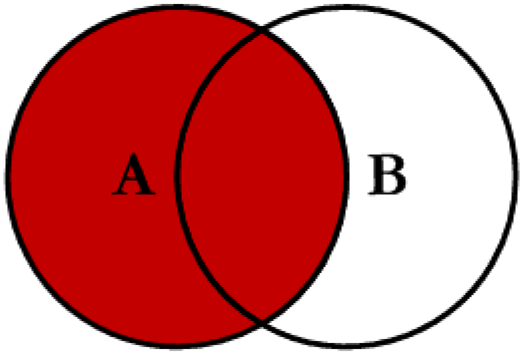
1. Inner JOIN



This is the simplest, most understood Join and is the most common. This query will return all of the records in the left table (table A) that have a matching record in the right table (table B). This Join is written as follows:

```
SELECT <select_list>
FROM Table_A  A
INNER JOIN Table_B B
ON A.Key = B.Key
```

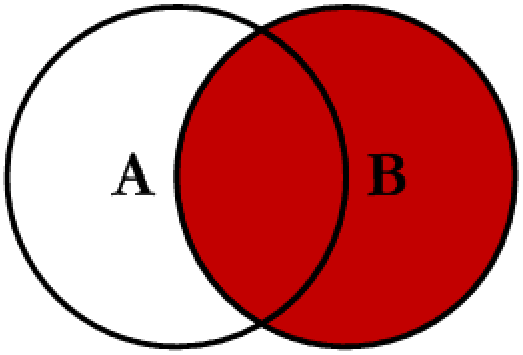
2. Left JOIN



This query will return all of the records in the left table (table A) regardless if any of those records have a match in the right table (table B). It will also return any matching records from the right table. This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
LEFT JOIN Table_B B
ON A.Key = B.Key
```

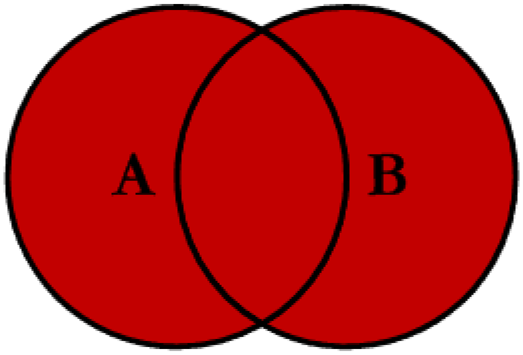
3. Right JOIN



This query will return all of the records in the right table (table B) regardless if any of those records have a match in the left table (table A). It will also return any matching records from the left table. This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
RIGHT JOIN Table_B B
ON A.Key = B.Key
```

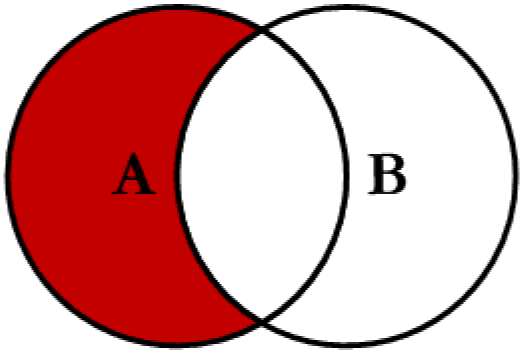
4. Outer JOIN



This Join can also be referred to as a FULL OUTER JOIN or a FULL JOIN. This query will return all of the records from both tables, joining records from the left table (table A) that match records from the right table (table B). This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
FULL OUTER JOIN Table_B B
ON A.Key = B.Key
```

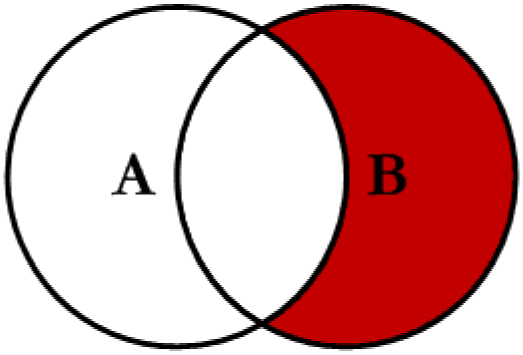
5. Left Excluding JOIN



This query will return all of the records in the left table (table A) that do not match any records in the right table (table B). This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
LEFT JOIN Table_B B
ON A.Key = B.Key
WHERE B.Key IS NULL
```

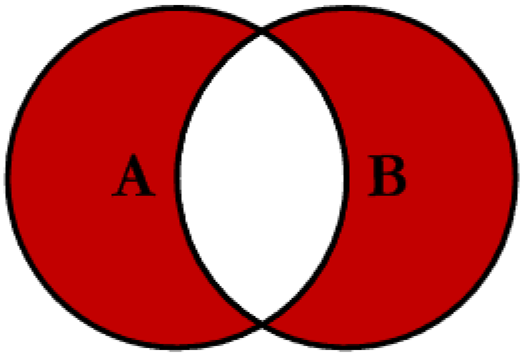
6. Right Excluding JOIN



This query will return all of the records in the right table (table B) that do not match any records in the left table (table A). This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
RIGHT JOIN Table_B B
ON A.Key = B.Key
WHERE A.Key IS NULL
```

7. Outer Excluding JOIN



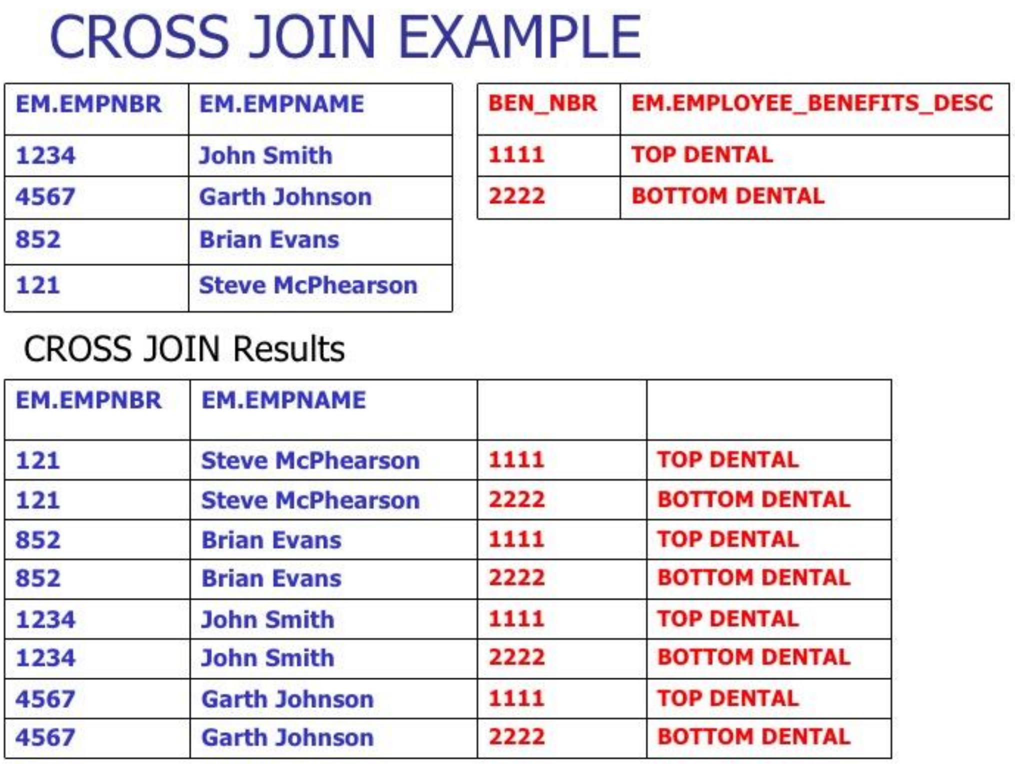
This query will return all of the records in the left table (table A) and all of the records in the right table (table B) that do not match. I have yet to have a need for using this type of Join, but all of the others, I use quite frequently. This Join is written as follows:

```
SELECT <select_list>
FROM Table_A A
FULL OUTER JOIN Table_B B
ON A.Key = B.Key
WHERE A.Key IS NULL OR B.Key IS NULL
```

8. CROSS JOIN

It is the Cartesian product of the two tables involved. The result of a CROSS JOIN will not make sense in most of the situations. Technically, it returns result set of a query without WHERE-Clause

```
SELECT <select_list>
FROM Table_A A
CROSS JOIN Table_B B
```



CROSS JOIN EXAMPLE

EM.EMPNBR	EM.EMPNAME
1234	John Smith
4567	Garth Johnson
852	Brian Evans
121	Steve McPhearson

BEN_NBR	EM.EMPLOYEE_BENEFITS_DESC
1111	TOP DENTAL
2222	BOTTOM DENTAL

CROSS JOIN Results

EM.EMPNBR	EM.EMPNAME		
121	Steve McPhearson	1111	TOP DENTAL
121	Steve McPhearson	2222	BOTTOM DENTAL
852	Brian Evans	1111	TOP DENTAL
852	Brian Evans	2222	BOTTOM DENTAL
1234	John Smith	1111	TOP DENTAL
1234	John Smith	2222	BOTTOM DENTAL
4567	Garth Johnson	1111	TOP DENTAL
4567	Garth Johnson	2222	BOTTOM DENTAL

Examples

Suppose we have two tables, Table_A and Table_B. The data in these tables are shown below:

```
TABLE_A
  PK Value
---- ----------
   1 FOX
   2 COP
   3 TAXI
   6 WASHINGTON
   7 DELL
   5 ARIZONA
   4 LINCOLN
  10 LUCENT

TABLE_B
  PK Value
---- ----------
   1 TROT
   2 CAR
   3 CAB
   6 MONUMENT
   7 PC
   8 MICROSOFT
   9 APPLE
  11 SCOTCH
```

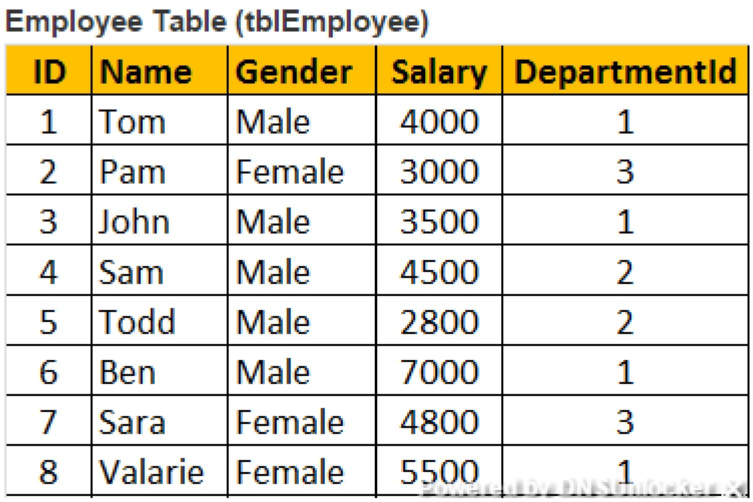
The results of the seven Joins are shown below:

```
-- INNER JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
       B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
INNER JOIN Table_B B
ON A.PK = B.PK

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
   1 FOX        TROT          1
   2 COP        CAR           2
   3 TAXI       CAB           3
   6 WASHINGTON MONUMENT      6
   7 DELL       PC            7

(5 row(s) affected)

-- LEFT JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
```

```
LEFT JOIN Table_B B

ON A.PK = B.PK

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
   1 FOX        TROT          1
   2 COP        CAR           2
   3 TAXI       CAB           3
   4 LINCOLN    NULL       NULL
   5 ARIZONA    NULL       NULL
   6 WASHINGTON MONUMENT      6
   7 DELL       PC            7
  10 LUCENT     NULL       NULL

(8 row(s) affected)

-- RIGHT JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
RIGHT JOIN Table_B B
ON A.PK = B.PK

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
   1 FOX        TROT          1
   2 COP        CAR           2
   3 TAXI       CAB           3
   6 WASHINGTON MONUMENT      6
   7 DELL       PC            7
NULL NULL       MICROSOFT     8
NULL NULL       APPLE         9
NULL NULL       SCOTCH       11

(8 row(s) affected)
-- OUTER JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
FULL OUTER JOIN Table_B B
ON A.PK = B.PK

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
   1 FOX        TROT          1
   2 COP        CAR           2
   3 TAXI       CAB           3
   6 WASHINGTON MONUMENT      6
   7 DELL       PC            7
NULL NULL       MICROSOFT     8
NULL NULL       APPLE         9
NULL NULL       SCOTCH       11
   5 ARIZONA    NULL       NULL
   4 LINCOLN    NULL       NULL
  10 LUCENT     NULL       NULL

(11 row(s) affected)
```

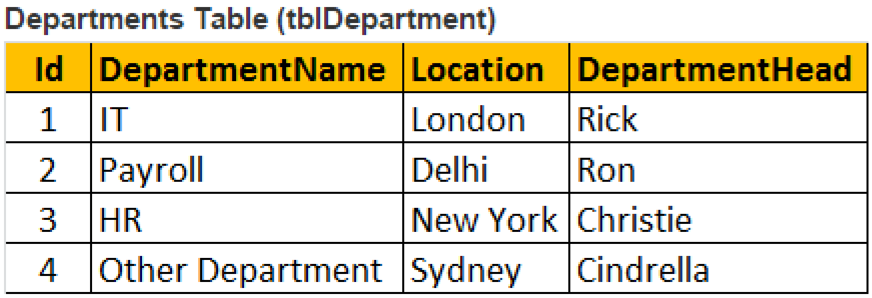
```
-- LEFT EXCLUDING JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK

FROM Table_A A
LEFT JOIN Table_B B
ON A.PK = B.PK
WHERE B.PK IS NULL

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
   4 LINCOLN    NULL       NULL
   5 ARIZONA    NULL       NULL
  10 LUCENT     NULL       NULL
(3 row(s) affected)


-- RIGHT EXCLUDING JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
RIGHT JOIN Table_B B
ON A.PK = B.PK
WHERE A.PK IS NULL

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
NULL NULL       MICROSOFT     8
NULL NULL       APPLE         9
NULL NULL       SCOTCH       11

(3 row(s) affected)
-- OUTER EXCLUDING JOIN
SELECT A.PK AS A_PK, A.Value AS A_Value,
B.Value AS B_Value, B.PK AS B_PK
FROM Table_A A
FULL OUTER JOIN Table_B B
ON A.PK = B.PK
WHERE A.PK IS NULL
OR B.PK IS NULL

A_PK A_Value    B_Value    B_PK
---- ---------- ---------- ----
NULL NULL       MICROSOFT     8
NULL NULL       APPLE         9
NULL NULL       SCOTCH       11
   5 ARIZONA    NULL       NULL
   4 LINCOLN    NULL       NULL
  10 LUCENT     NULL       NULL

(6 row(s) affected)
```

Example 2:



Employee Table (tblEmployee)

ID	Name	Gender	Salary	DepartmentId
1	Tom	Male	4000	1
2	Pam	Female	3000	3
3	John	Male	3500	1
4	Sam	Male	4500	2
5	Todd	Male	2800	2
6	Ben	Male	7000	1
7	Sara	Female	4800	3
8	Valarie	Female	5500	1



Departments Table (tblDepartment)

Id	DepartmentName	Location	DepartmentHead
1	IT	London	Rick
2	Payroll	Delhi	Ron
3	HR	New York	Christie
4	Other Department	Sydney	Cindrella

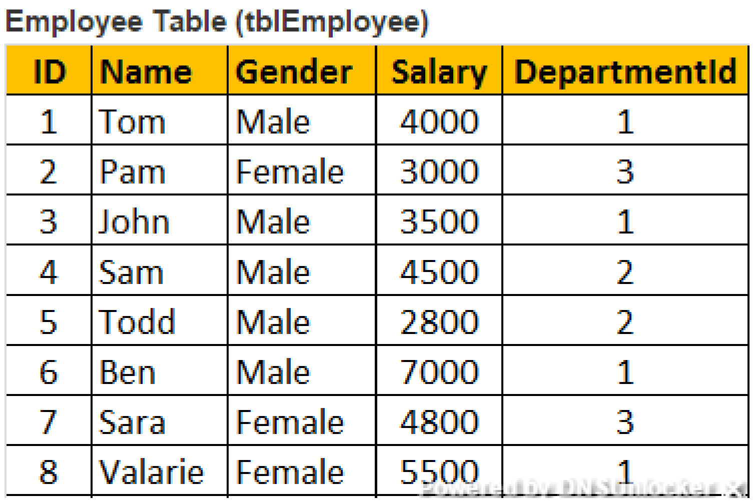
JOIN or INNER JOIN

In SQL server, there are different types of JOINS.

1. CROSS JOIN
2. INNER JOIN
3. OUTER JOIN

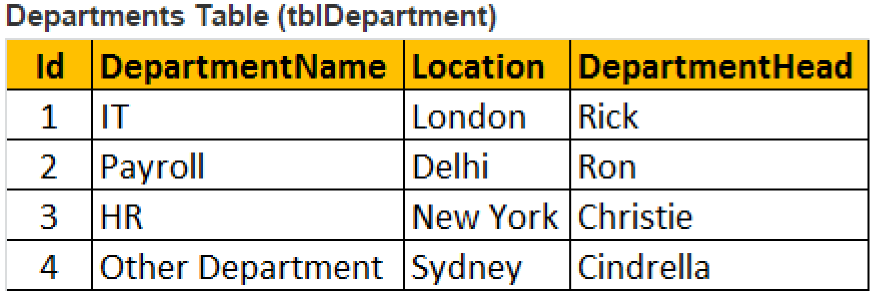
Outer Joins are again divided into 3 types

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



Employee Table (tblEmployee)

ID	Name	Gender	Salary	DepartmentId
1	Tom	Male	4000	1
2	Pam	Female	3000	3
3	John	Male	3500	1
4	Sam	Male	4500	2
5	Todd	Male	2800	2
6	Ben	Male	7000	1
7	Sara	Female	4800	3
8	Valarie	Female	5500	1

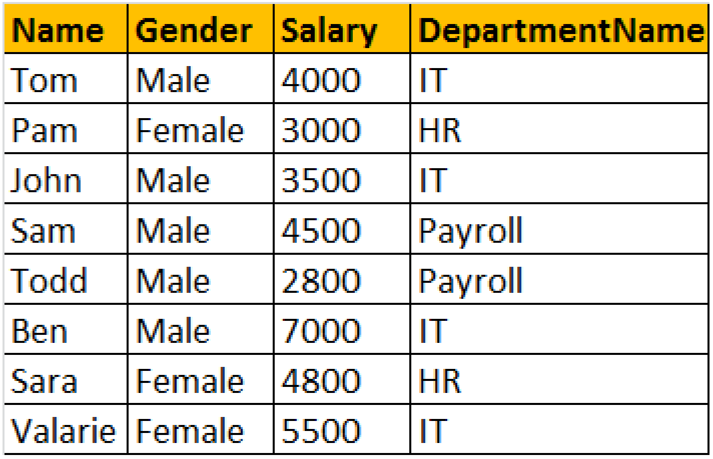


Departments Table (tblDepartment)

Id	DepartmentName	Location	DepartmentHead
1	IT	London	Rick
2	Payroll	Delhi	Ron
3	HR	New York	Christie
4	Other Department	Sydney	Cindrella

JOIN or INNER JOIN

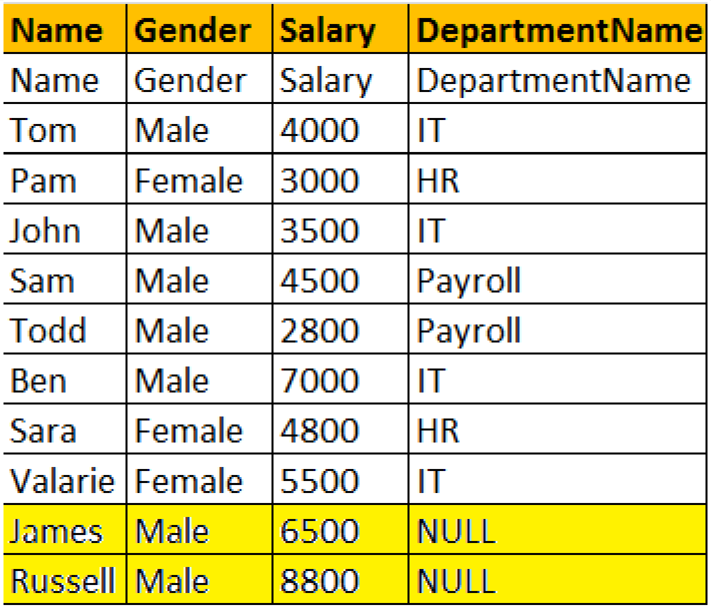
```
SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
INNER JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id

OR

SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id
```



Name	Gender	Salary	DepartmentName
Tom	Male	4000	IT
Pam	Female	3000	HR
John	Male	3500	IT
Sam	Male	4500	Payroll
Todd	Male	2800	Payroll
Ben	Male	7000	IT
Sara	Female	4800	HR
Valarie	Female	5500	IT

LEFT JOIN or LEFT OUTER JOIN

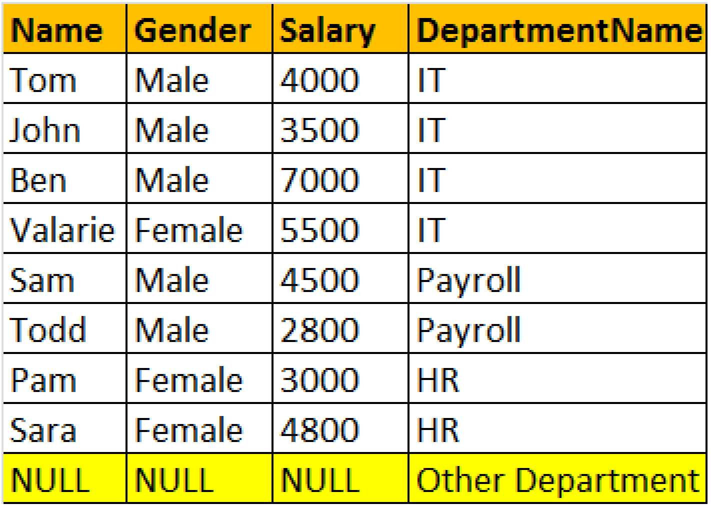
```
SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
LEFT OUTER JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id

OR

SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
LEFT JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id
```



Name	Gender	Salary	DepartmentName
Name	Gender	Salary	DepartmentName
Tom	Male	4000	IT
Pam	Female	3000	HR
John	Male	3500	IT
Sam	Male	4500	Payroll
Todd	Male	2800	Payroll
Ben	Male	7000	IT
Sara	Female	4800	HR
Valarie	Female	5500	IT
James	Male	6500	NULL
Russell	Male	8800	NULL

RIGHT JOIN or RIGHT OUTER JOIN

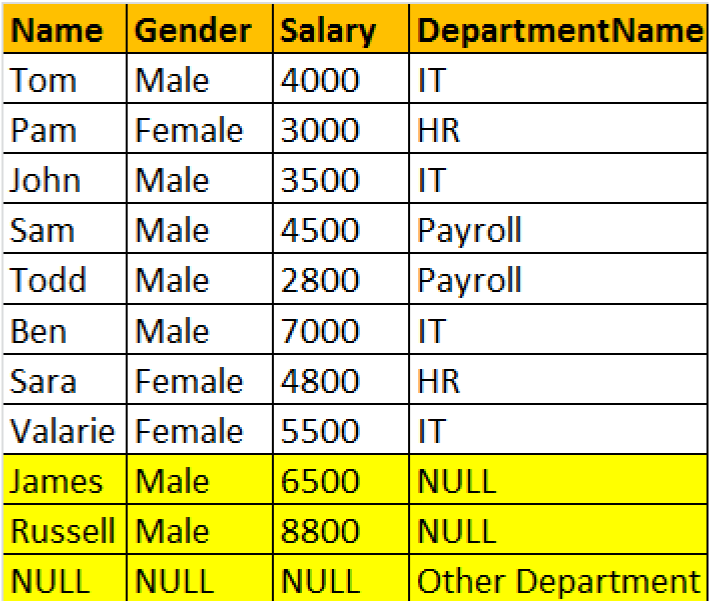
```
SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
RIGHT OUTER JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id

OR

SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
RIGHT JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id
```



Name	Gender	Salary	DepartmentName
Tom	Male	4000	IT
John	Male	3500	IT
Ben	Male	7000	IT
Valarie	Female	5500	IT
Sam	Male	4500	Payroll
Todd	Male	2800	Payroll
Pam	Female	3000	HR
Sara	Female	4800	HR
NULL	NULL	NULL	Other Department

FULL JOIN or FULL OUTER JOIN

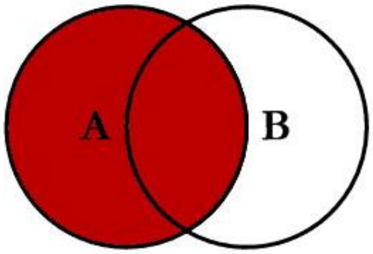
```
SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
FULL OUTER JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id

OR

SELECT Name, Gender, Salary, DepartmentName
FROM tblEmployee
FULL JOIN tblDepartment
ON tblEmployee.DepartmentId = tblDepartment.Id
```



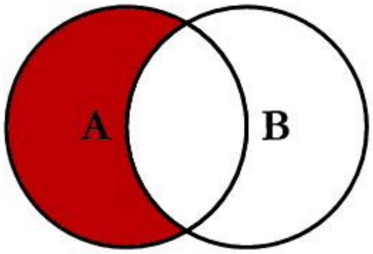
Name	Gender	Salary	DepartmentName
Tom	Male	4000	IT
Pam	Female	3000	HR
John	Male	3500	IT
Sam	Male	4500	Payroll
Todd	Male	2800	Payroll
Ben	Male	7000	IT
Sara	Female	4800	HR
Valarie	Female	5500	IT
James	Male	6500	NULL
Russell	Male	8800	NULL
NULL	NULL	NULL	Other Department

Note on the `OUTER JOIN` that the inner joined records are returned first, followed by the right joined records, and then finally the left joined records

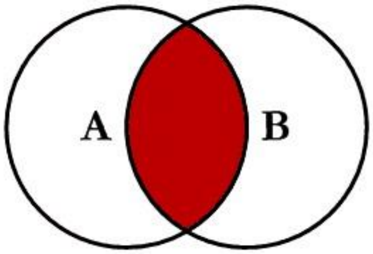
SQL JOINS



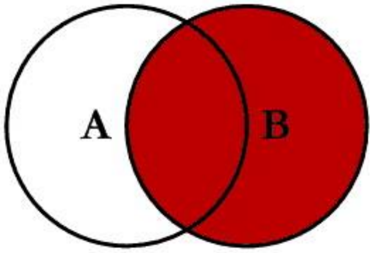
```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
```



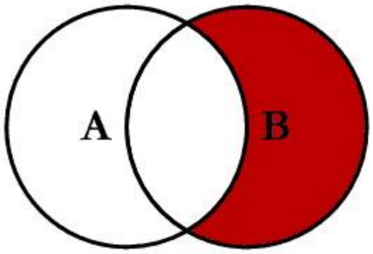
```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
WHERE B.Key IS NULL
```



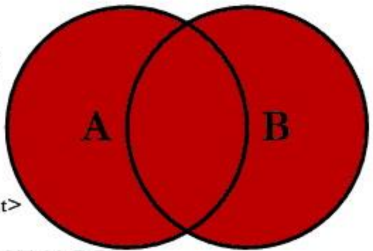
```
SELECT <select_list>
FROM TableA A
INNER JOIN TableB B
ON A.Key = B.Key
```



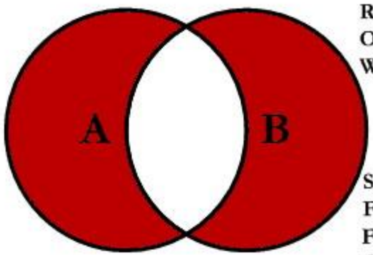
```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
```



```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
```



```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
```



```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
OR B.Key IS NULL
```