SQL Joins

Types of Joins

- Inner Join
  - Natural Join
- Left (Outer) Join
- Right (Outer) Join
- (Full) Outer Join
- Left (Outer) Join Excluding Inner Join
- Right (Outer) Join Excluding Inner Join
- (Full) Outer Join Excluding Inner Join
- Cross Join

Different Types of SQL JOINs

Here are the different types of the JOINs in SQL:

(INNER) JOIN: Returns records that have matching values in both tables

LEFT (OUTER) JOIN: Returns all records from the left table, and the matched records from the right table

RIGHT (OUTER) JOIN: Returns all records from the right table, and the matched records from the left table

FULL (OUTER) JOIN: Returns all records when there is a match in either left or right table
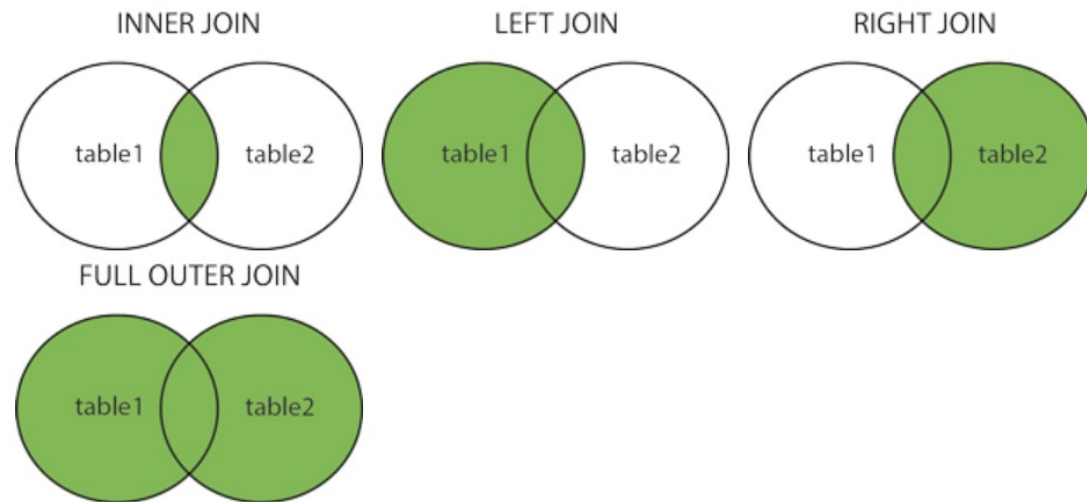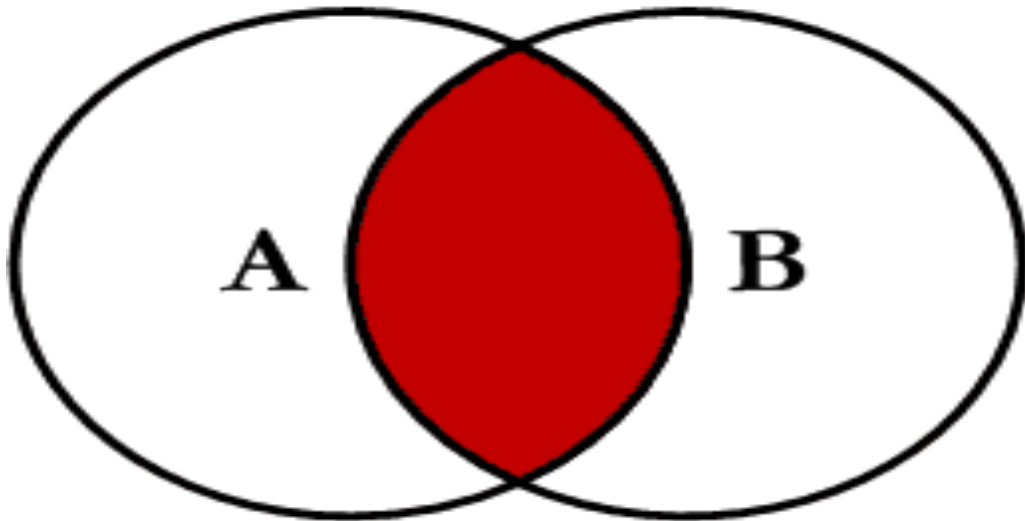
Sample Tables

TableA

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

TableB

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

Inner Join

Inner join produces only the set of records that match in both Table A and Table B

Most commonly used, best understood join

INNER JOIN Syntax

```
SELECT column_name(s)
FROM table1
INNER JOIN table2
ON table1.column_name = table2.column_name;
```

- Note:
- Inner Joins do not have to use equality to join the fields
- Can use <, >, <>

Inner Join

TableA Value	PK	TableB PK	Value
FOX	1	1	TROT
COP	2	2	CAR
TAXI	3	3	CAB
WASHINGTON	6	6	MONUMENT
DELL	7	7	PC

SELECT *
FROM TableA **INNER JOIN** TableB
ON TableA.PK = TableB.PK;

This is the same as doing

SELECT *
FROM TableA, TableB
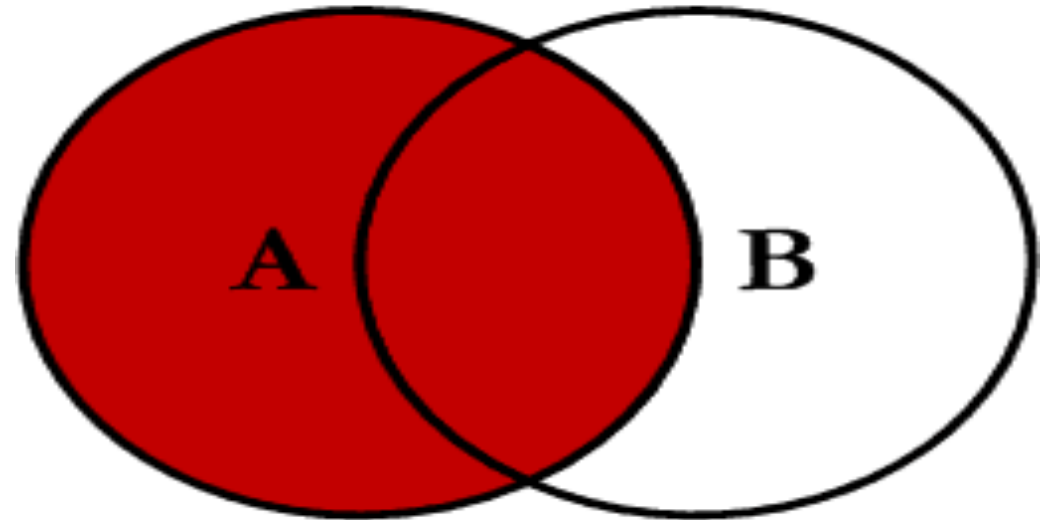**WHERE** TableA.PK = TableB.PK;

Inner Join (continued)

SELECT *
FROM TableA
INNER JOIN TableB
ON TableA.PK > TableB.PK;

TableA PK	Value	TableB PK	Value
2	COP	1	TROT
3	TAXI	1	TROT
3	TAXI	2	CAR
4	LINCOLN	1	TROT
4	LINCOLN	2	CAR
4	LINCOLN	3	CAB
5	ARIZONA	1	TROT
5	ARIZONA	2	CAR
5	ARIZONA	3	CAB
…	More…	Rows…	

Left Outer Join

- Left outer join produces a complete set of records from Table A, with the matching records (where available) in Table B. If there is no match, the right side will contain null.

Left Outer Join

TableA Value	PK	TableB PK	Value
FOX	1	1	TROT
COP	2	2	CAR
TAXI	3	3	CAB
LINCOLN	4	NULL	NULL
ARIZONA	5	NULL	NULL
WASHINGTON	6	6	MONUMENT
DELL	7	7	PC
LUCENT	10	NULL	NULL

- SELECT *
- FROM TableA LEFT OUTER JOIN TableB
- ON TableA.PK = TableB.PK

SQL Joins…Example

```
SELECT S.name, E.classid
FROM Students S LEFT OUTER JOIN Enrolled E
ON S.sid=E.sid
```

S

S.name	S.sid
Jones	11111
Smith	22222
Brown	33333

E

E.sid	E.classid
11111	History105
11111	DataScience194
22222	French150
44444	English10

S.name	E.classid
Jones	History105
Jones	DataScience194
Smith	French150
Brown	NULL

Right Outer Join

- Right outer join produces a complete set of records from Table B, with the matching records (where available) in Table A. If there is no match, the left side will contain null.
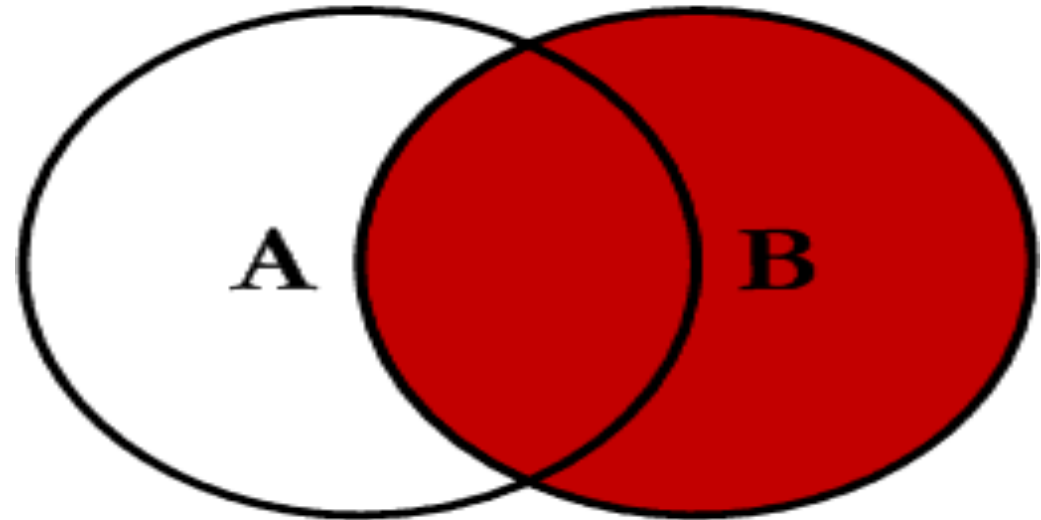
Right Outer Join

Note: RIGHT are not currently supported

TableA Value	PK	TableB PK	Value
FOX	1	1	TROT
COP	2	2	CAR
TAXI	3	3	CAB
WASHINGTON	6	6	MONUMENT
DELL	7	7	PC
NULL	NULL	8	MICROSOFT
NULL	NULL	9	APPLE
NULL	NULL	11	SCOTCH

- SELECT *
- FROM TableA RIGHT OUTER JOIN TableB
- ON TableA.PK = TableB.PK

SQL Joins…..example

```sql
SELECT S.name, E.classid
FROM Students S RIGHT OUTER JOIN Enrolled E
ON S.sid=E.sid
```

S

S.name	S.sid
Jones	11111
Smith	22222
Brown	33333

E

E.sid	E.classid
11111	History105
11111	DataScience194
22222	French150
44444	English10

S.name	E.classid
Jones	History105
Jones	DataScience194
Smith	French150
NULL	English10

Full Outer Join

- Full outer join produces the set of all records in Table A and Table B, with matching records from both sides where available. If there is no match, the missing side will contain null.
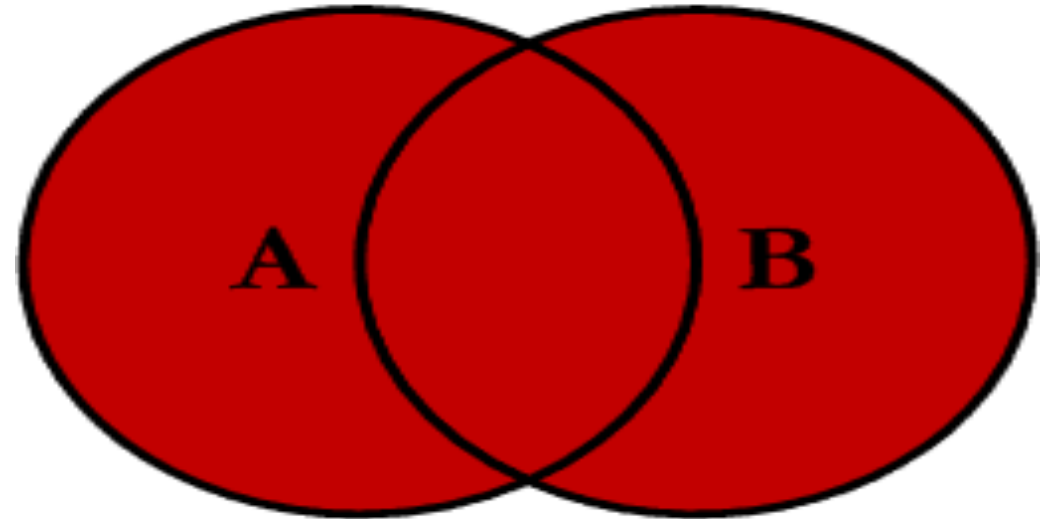
Full Outer Join

TableA Value	PK	TableB PK	Value
FOX	1	1	TROT
COP	2	2	CAR
TAXI	3	3	CAB
LINCOLN	4	NULL	NULL
ARIZONA	5	NULL	NULL
WASHINGTON	6	6	MONUMENT
DELL	7	7	PC
LUCENT	10	NULL	NULL
NULL	NULL	8	MICROSOFT
NULL	NULL	9	APPLE
NULL	NULL	11	SCOTCH

- SELECT * FROM TableA FULL OUTER JOIN TableB ON TableA.PK = TableB.PK

SQL Joins..... Example

```
SELECT S.name, E.classid
FROM Students S FULL OUTER JOIN Enrolled E
ON S.sid=E.sid
```

S

S.name	S.sid
Jones	11111
Smith	22222
Brown	33333

E

E.sid	E.classid
11111	History105
11111	DataScience194
22222	French150
44444	English10

S.name	E.classid
Jones	History105
Jones	DataScience194
Smith	French150
NULL	English10
Brown	NULL

Cross Join

- A cross join is a Cartesian Product join – it is every record in Table A combined with every record in Table B.

- It gives the same results as not using a WHERE clause when querying two tables in MySQL

- SELECT * from TableA CROSS JOIN TableB

- SELECT * from TableA, TableB

Cross Join

```
1  SELECT *
2  FROM TableA CROSS JOIN  TableB
3
4
5
```

PK	Value	PK1	Value
1	FOX	1	TROT
1	FOX	2	CAR
1	FOX	3	CAB
1	FOX	6	MONUMENT
1	FOX	7	PC
1	FOX	8	MICROSOFT
1	FOX	9	APPLE
1	FOX	11	SCOTCH

SQL Joins

```
SELECT *
FROM Students S CROSS JOIN Enrolled E
```

S

S.name	S.sid
Jones	11111
Smith	22222

E

E.sid	E.classid
11111	History105
11111	DataScience194
22222	French150

S.name	S.sid	E.sid	E.classid
Jones	11111	11111	History105
Jones	11111	11111	DataScience194
Jones	11111	22222	French150
Smith	22222	11111	History105
Smith	22222	11111	DataScience194
Smith	22222	22222	French150

Left Join Excluding Inner 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).
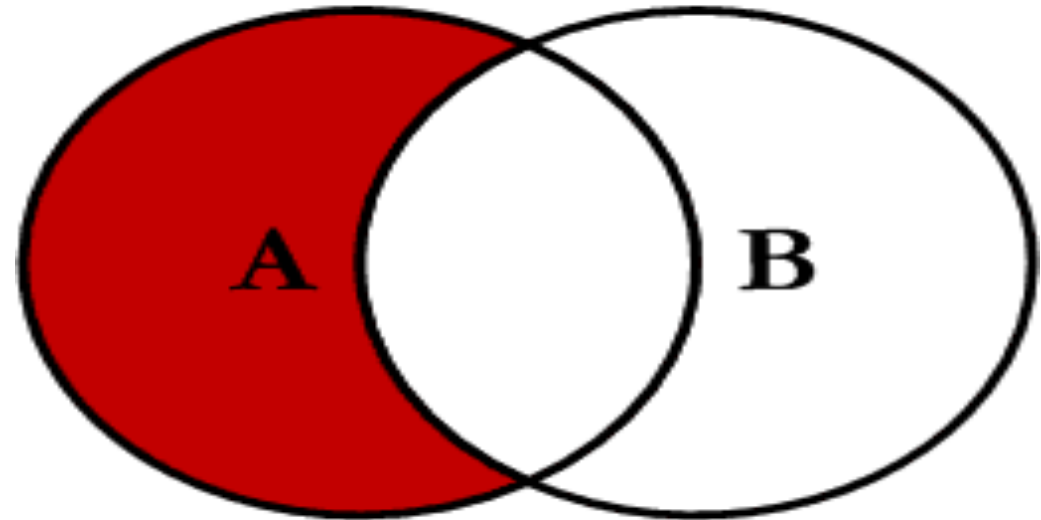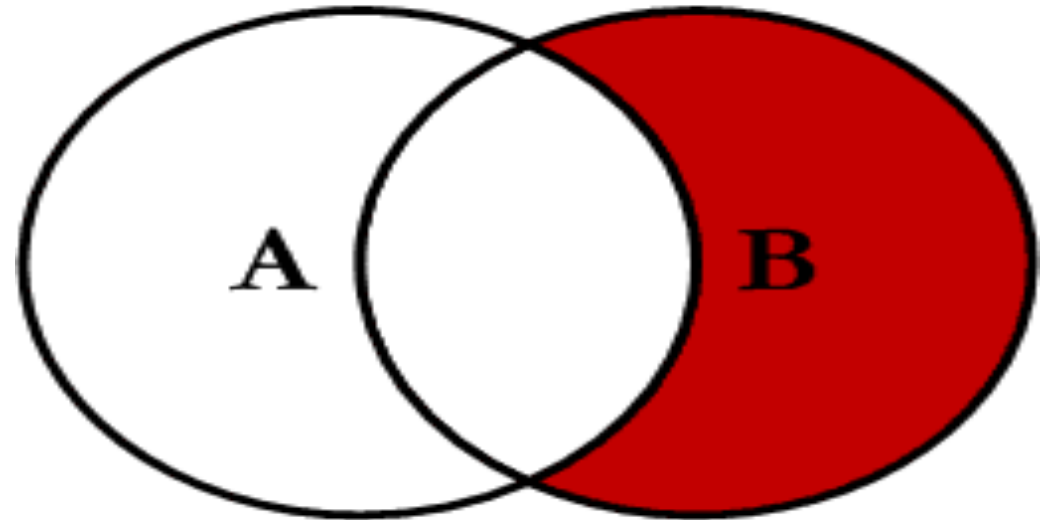
Left Join Excluding Inner Join

TableA Value	PK	TableB PK	Value
LINCOLN	4	NULL	NULL
ARIZONA	5	NULL	NULL
LUCENT	10	NULL	NULL

- SELECT * FROM TableA LEFT JOIN TableB
- ON TableA.PK = TableB.PK
  WHERE TableB.PK IS NULL;
- Perform left outer join, then exclude the records we don't want from the right side via a where clause.

Right Join Excluding Inner 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).

Right Join Excluding Inner Join

TableA Value		TableB PK	
	PK		**Value**
NULL	NULL	8	MICROSOFT
NULL	NULL	9	APPLE
NULL	NULL	11	SCOTCH

- SELECT * FROM TableA RIGHT JOIN TableB
- ON TableA.PK = TableB.PK
  WHERE TableA.PK IS NULL
- Perform right outer join, then exclude the records we don't want from the left side via a where clause.

Thank You