

# SQL Joins

Source material from [Code Project article by C.L. Moffatt](#) and  
“Coding Horror” [blog](#) from 10/11/07

# 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
- Equi-Join

# Sample Tables

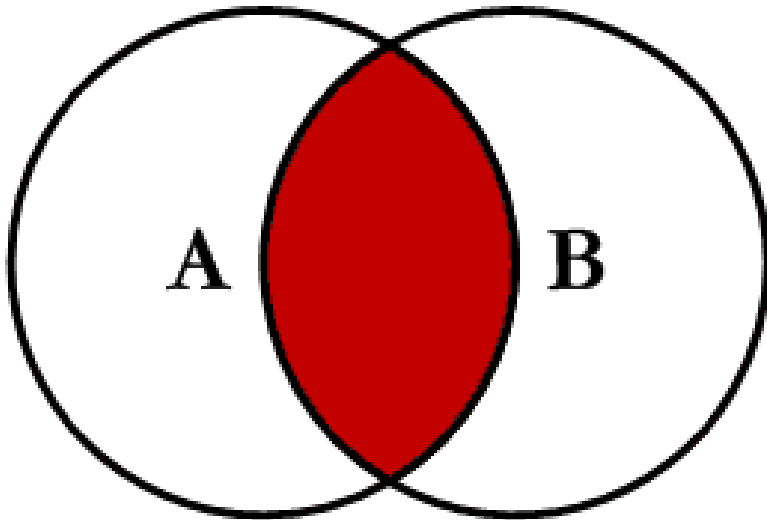
TableA

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

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)

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

# 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...	

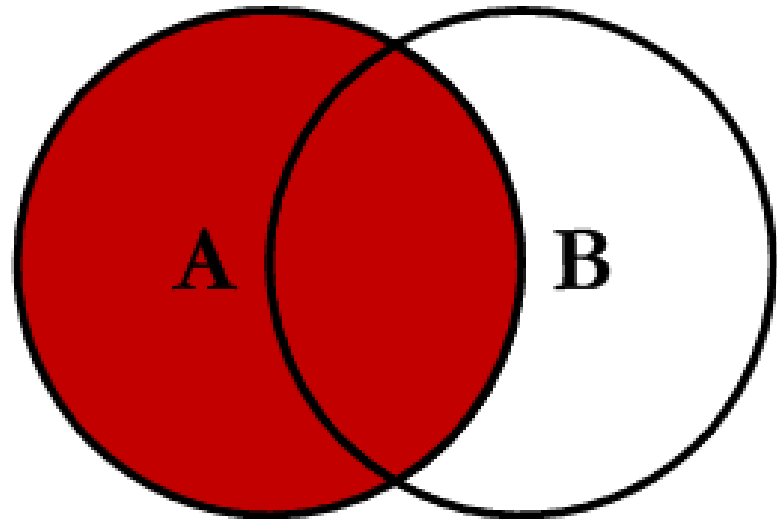
# Inner Join/Natural Join

- A NATURAL join is just an inner equi-join where the join is implicitly created using **any** matching columns between the two tables
- Example:
  - `SELECT * FROM TableA NATURAL JOIN TableB`
  - Same results as inner equi-join?
  - Which columns match?



# 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.



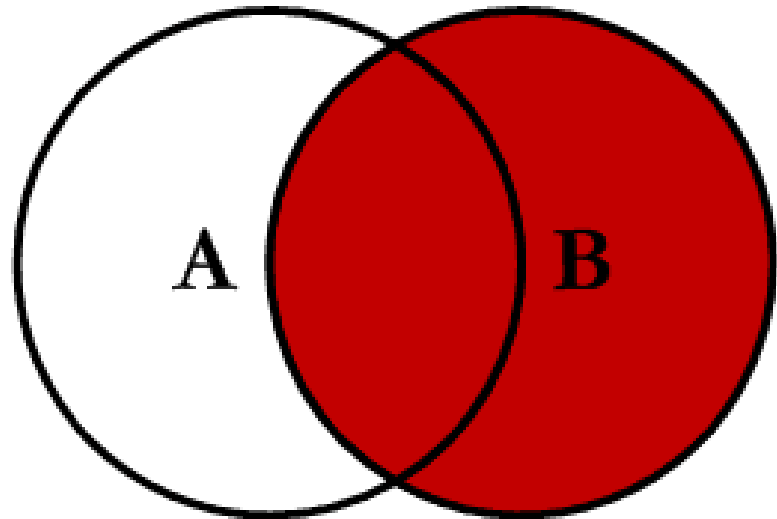
# Left Outer Join

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`

# 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.



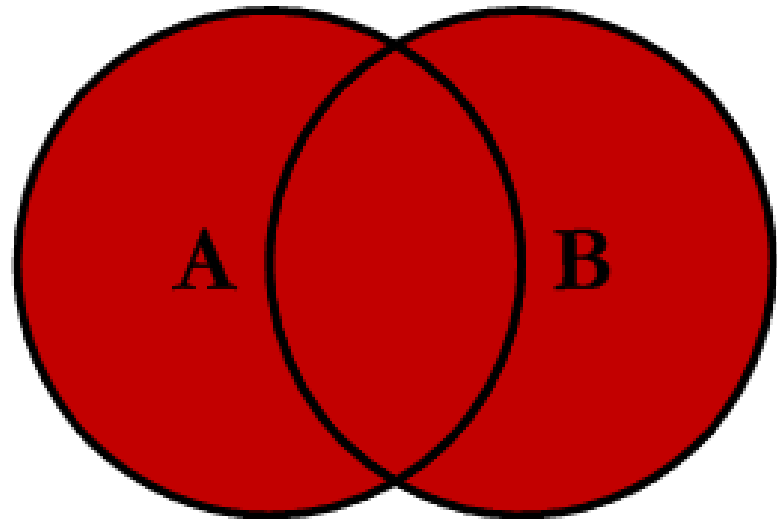
# Right Outer Join

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`

# 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

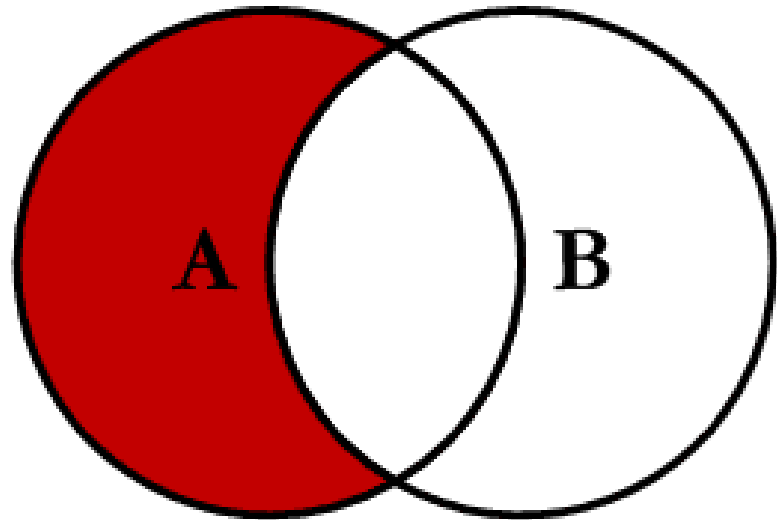
- `SELECT * FROM TableA FULL OUTER JOIN TableB ON TableA.PK = TableB.PK`

# Full Outer Join in MySQL

- MySQL doesn't have FULL OUTER JOIN
- Simulate using UNION, LEFT and RIGHT JOINS
- ```
SELECT * FROM TableA LEFT JOIN TableB  
ON TableA.PK = TableB.PK  
UNION  
SELECT * FROM TableA RIGHT JOIN TableB  
ON TableA.PK = TableB.PK
```

# 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).





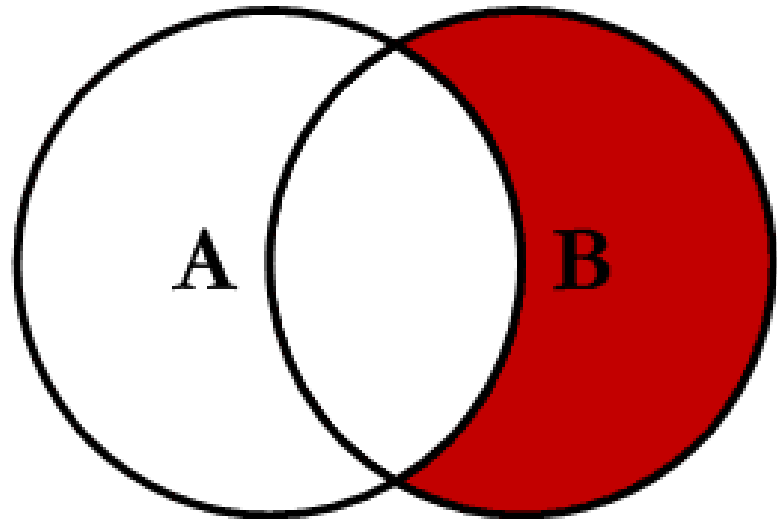
# Left Join Excluding Inner Join

| TableA<br>Value | PK | TableB<br>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).



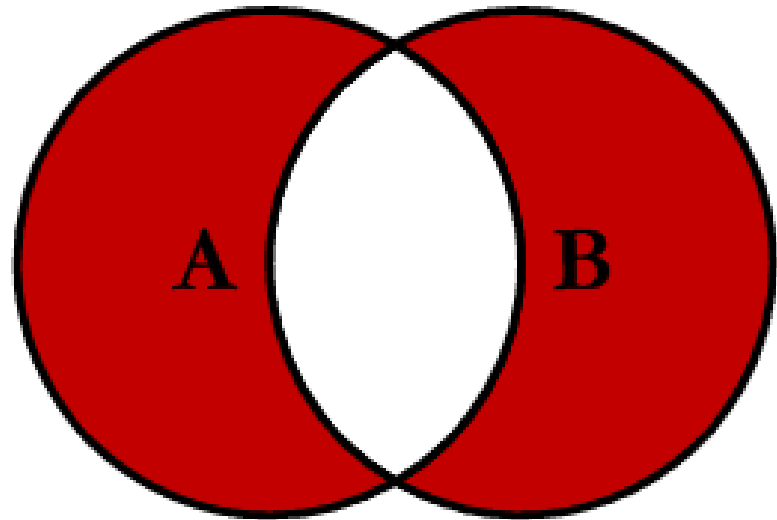
# Right Join Excluding Inner Join

| TableA<br>Value | PK   | TableB<br>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.

# Full Outer Excluding Inner Join

- This query will return all of the records in Table A and Table B that do not have a matching record in the other table.
- (If you find a useful application, let me know! 😊)



# Full Outer Excluding Inner Join

| TableA<br>Value | PK   | TableB<br>PK | Value     |
|-----------------|------|--------------|-----------|
| NULL            | NULL | 8            | MICROSOFT |
| NULL            | NULL | 9            | APPLE     |
| NULL            | NULL | 11           | SCOTCH    |
| LINCOLN         | 4    | NULL         | NULL      |
| ARIZONA         | 5    | NULL         | NULL      |
| LUCENT          | 10   | NULL         | NULL      |

- `SELECT * FROM TableA FULL OUTER JOIN TableB  
ON TableA.PK = TableB.PK  
WHERE TableA.PK IS NULL OR  
TableB.PK IS NULL`

# How Can We Do This in MySQL?

- MySQL doesn't have FULL OUTER JOIN
- Simulate using UNION, LEFT and RIGHT JOINS
- ```
SELECT * FROM TableA LEFT JOIN TableB  
ON TableA.PK = TableB.PK  
WHERE TableB.PK IS NULL  
UNION  
SELECT * FROM TableA RIGHT JOIN TableB  
ON TableA.PK = TableB.PK  
WHERE TABLEA.PK IS 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`