INTRODUCTION
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
- Left Anti Join
- Right Anti Join

Sample Tables

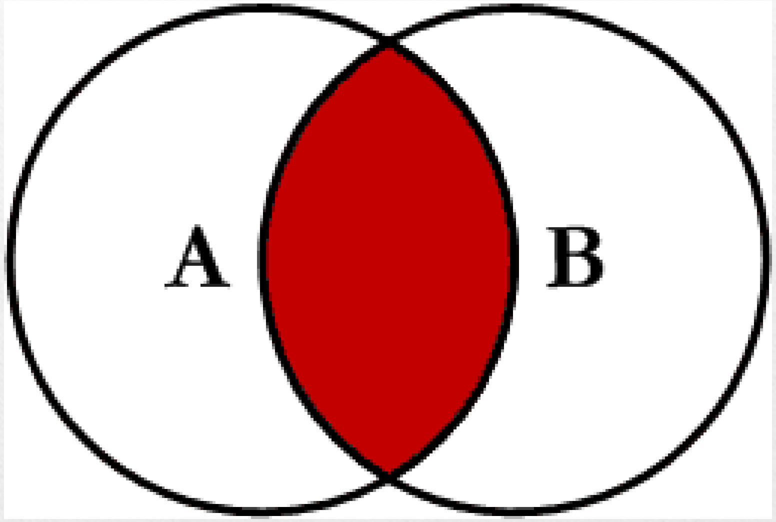
TableA

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

TableB

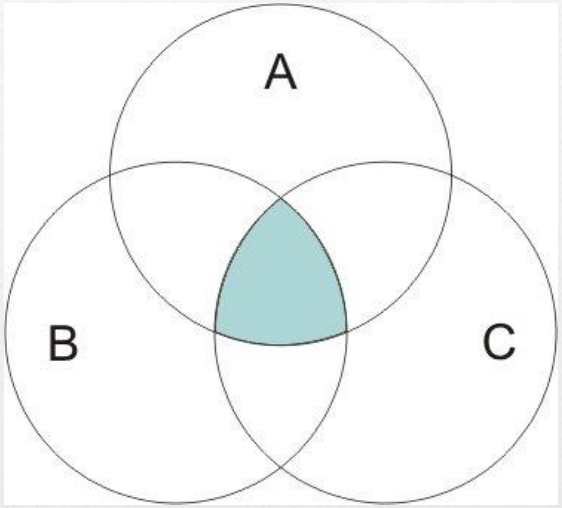
PK	Value
1	TROT
2	CAR
3	CAB
6	MONUMENT
7	PC
8	MICROSOFT
9	APPLE
11	SCOTCH

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



An **inner join** includes only records in which a value for the key field is common to all input tables.

That is, unmatched records will not be included in the output dataset.

Inner Join

TableA		TableB	
Value	PK	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…	

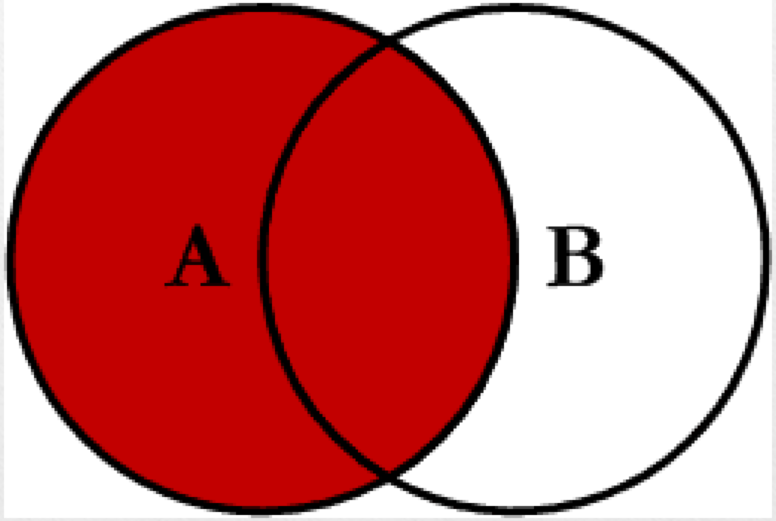
Inner Join/Natural Join

- 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.



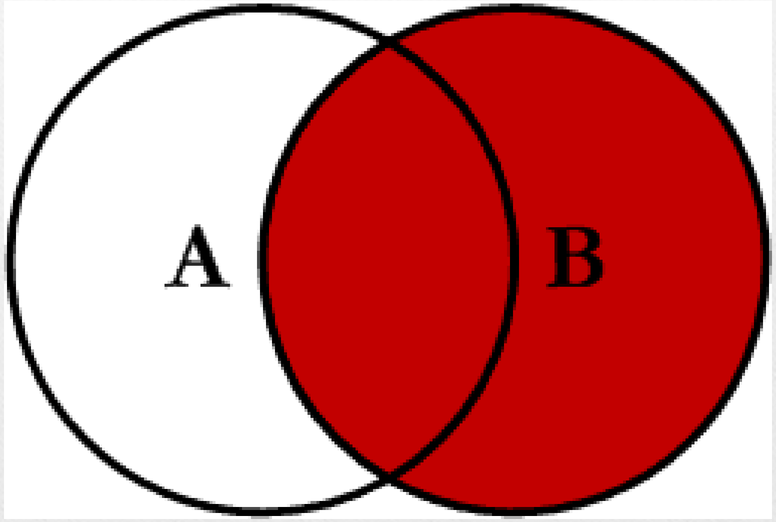
Left Outer Join

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.



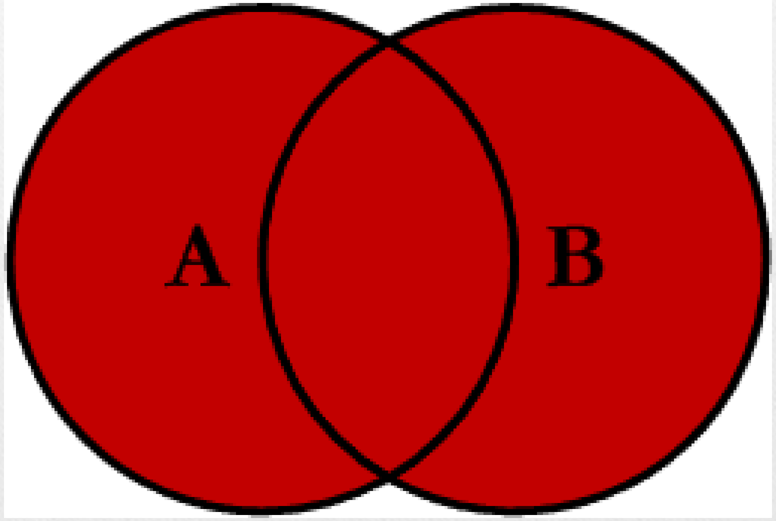
Right Outer Join

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

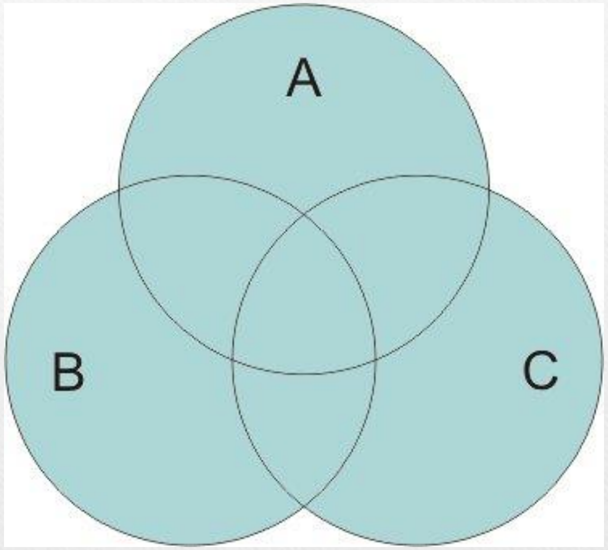
- SELECT * FROM TableA RIGHT OUTER JOIN TableB ON TableA.PK = TableB.PK

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



A **full outer join** includes all records, both matching and nonmatching, from the input tables.

Left and right outer joins are referred to as partial outer joins and are described below.

Full Outer Join

TableA		TableB	
Value	PK	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
  ```

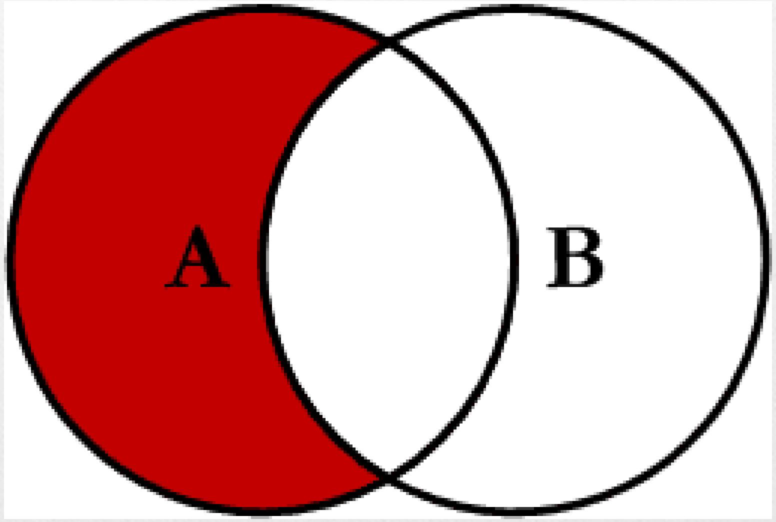
Full Outer Join in Snowflake

- Snowflake Support Full Outer Join as compare to MySQL
- Returns all joined rows, plus one row for each unmatched left side row (extended with nulls on the right), plus one row for each unmatched right side row (extended with nulls on the left).

- SELECT * FROM Table A FULL OUTER JOIN Table B 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).



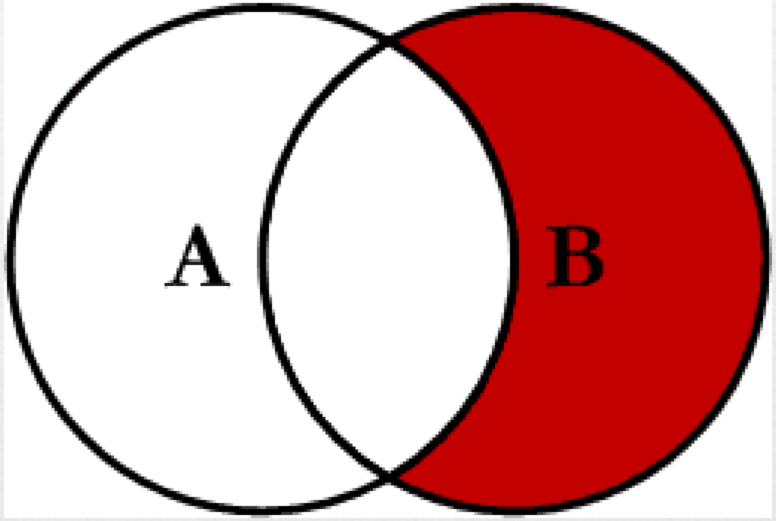
Left Join Excluding Inner Join

TableA		TableB	
Value	PK	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).



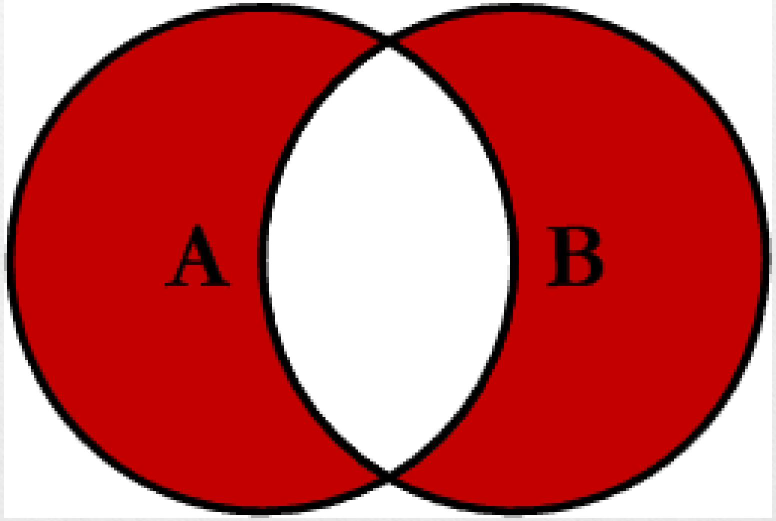
Right Join Excluding Inner Join

TableA		TableB	
Value	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.

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

Table A Value	PK	Table B 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

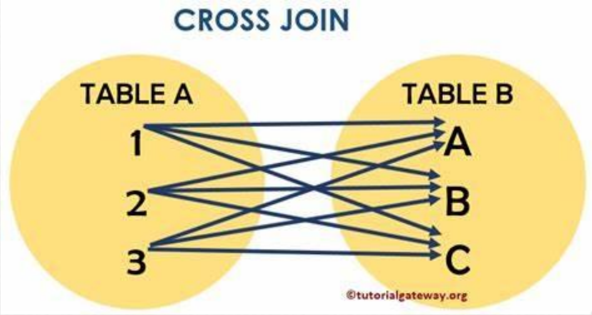
How Can We Do This in MySQL?

- 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



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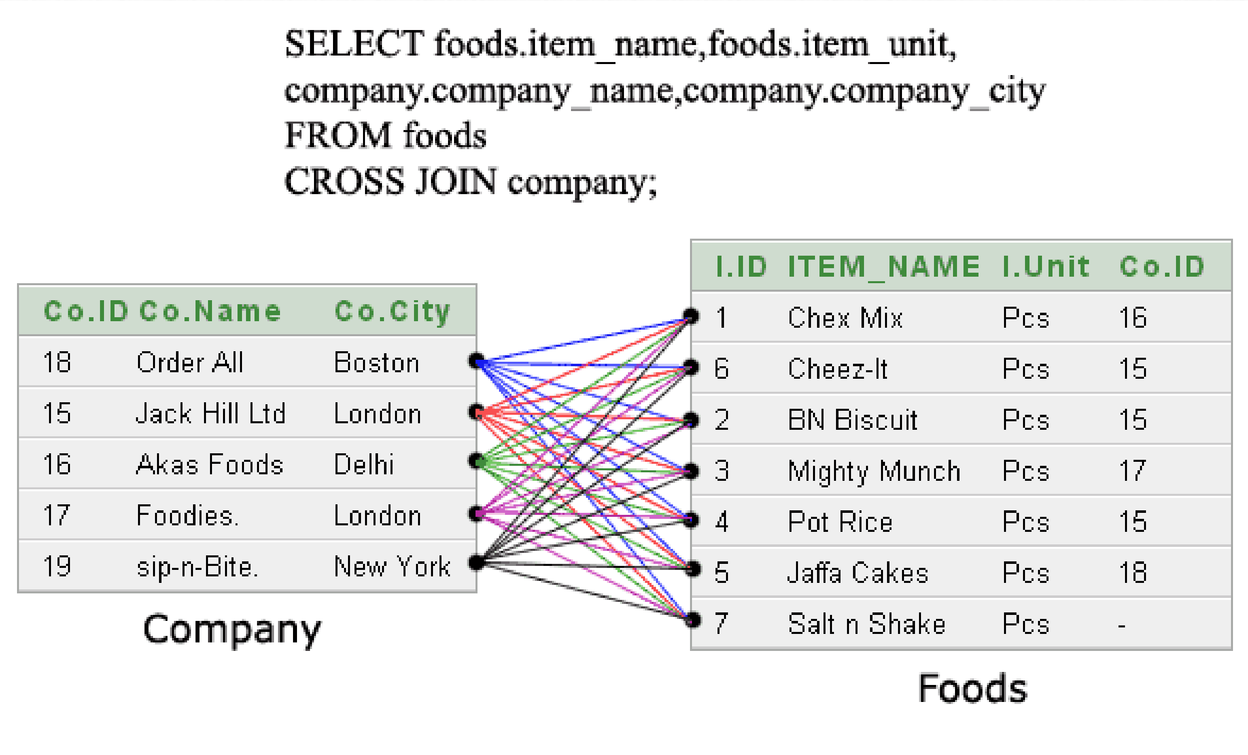
Cross Join



```
SELECT foods.item_name,foods.item_unit,
company.company_name,company.company_city
FROM foods
CROSS JOIN company;
```

Co.ID	Co.Name	Co.City
18	Order All	Boston
15	Jack Hill Ltd	London
16	Akas Foods	Delhi
17	Foodies.	London
19	sip-n-Bite.	New York

Company

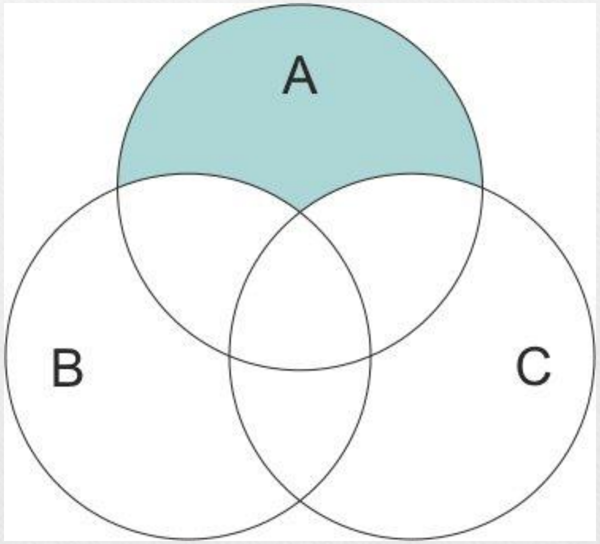
I.ID	ITEM_NAME	I.Unit	Co.ID
1	Chex Mix	Pcs	16
6	Cheez-It	Pcs	15
2	BN Biscuit	Pcs	15
3	Mighty Munch	Pcs	17
4	Pot Rice	Pcs	15
5	Jaffa Cakes	Pcs	18
7	Salt n Shake	Pcs	-

Foods

Anti Join

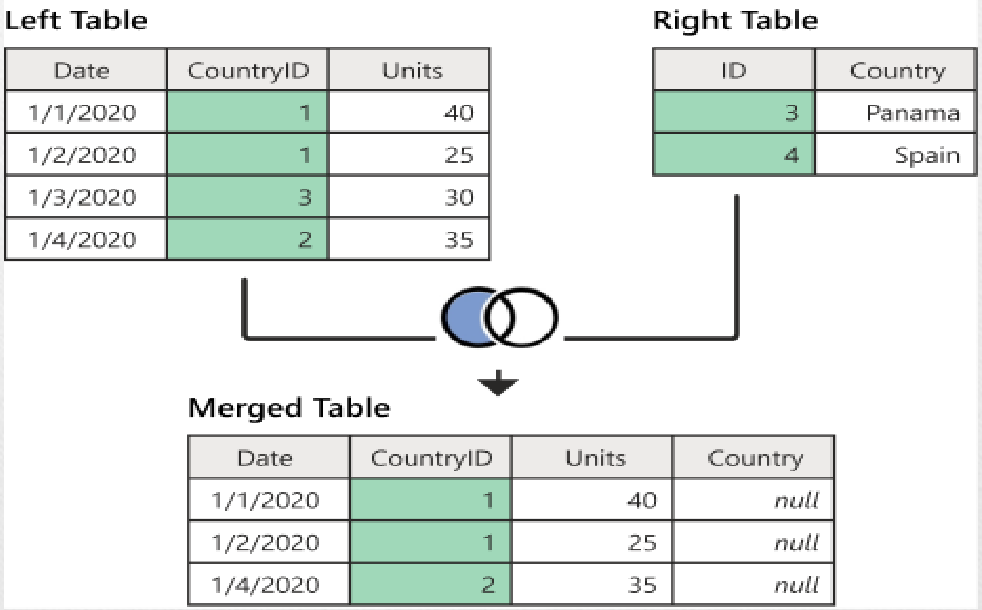
An **anti-join** includes only unmatched records for the first input table (Table A shown here).

This type of join is the opposite of an inner join and does not include complete records in the output dataset.



Left Anti join

- One of the join kinds available in the Merge dialog box in Power Query in **POWER BI** is a left anti join, which brings in only rows from the left table that don't have any matching rows from the right table.



Left Table

Date	CountryID	Units
1/1/2020	1	40
1/2/2020	1	25
1/3/2020	3	30
1/4/2020	2	35

Right Table

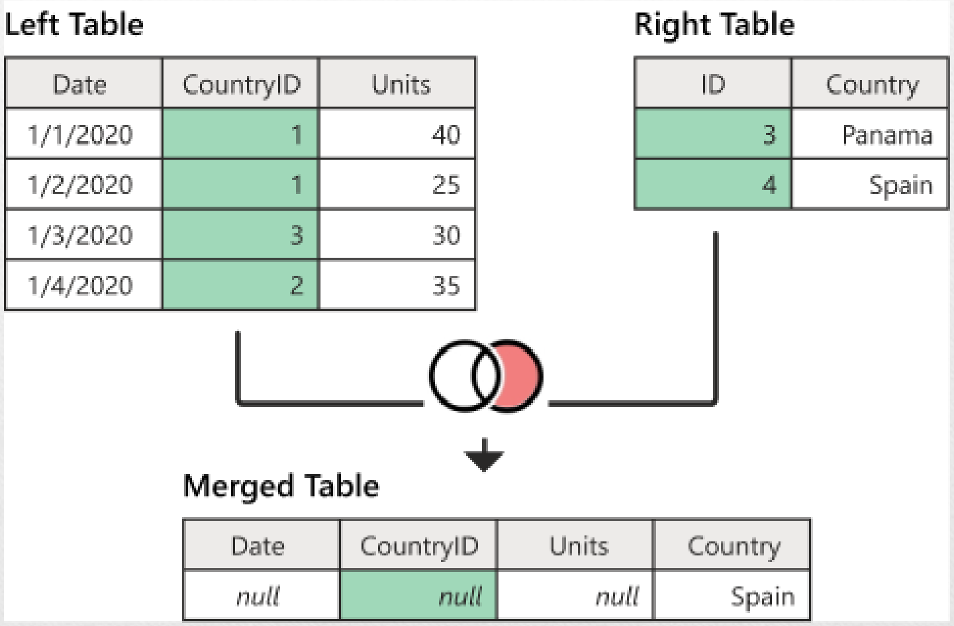
ID	Country
3	Panama
4	Spain

Merged Table

Date	CountryID	Units	Country
1/1/2020	1	40	*null*
1/2/2020	1	25	*null*
1/4/2020	2	35	*null*

Right Anti join

- One of the join kinds available in the Merge dialog box in Power Query IN POWER BI is a right anti join, which brings in only rows from the right table that don't have any matching rows from the left table



Left Table

Date	CountryID	Units
1/1/2020	1	40
1/2/2020	1	25
1/3/2020	3	30
1/4/2020	2	35

Right Table

ID	Country
3	Panama
4	Spain

Merged Table

Date	CountryID	Units	Country
null	*null*	*null*	Spain

THANK YOU