SQL JOINS

Combining Data

Baraa Khatib Salkini
SQL Course | JOINS

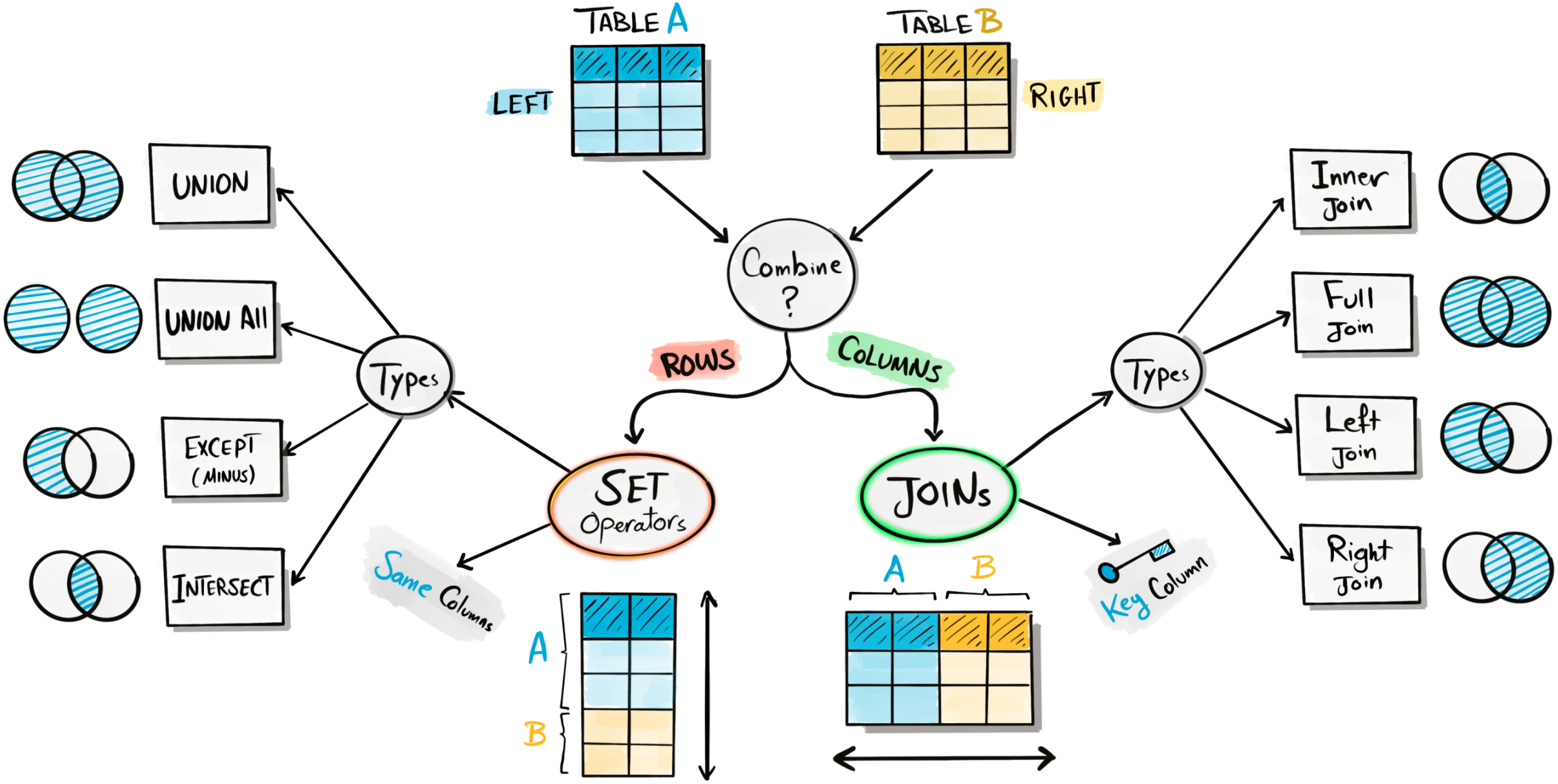
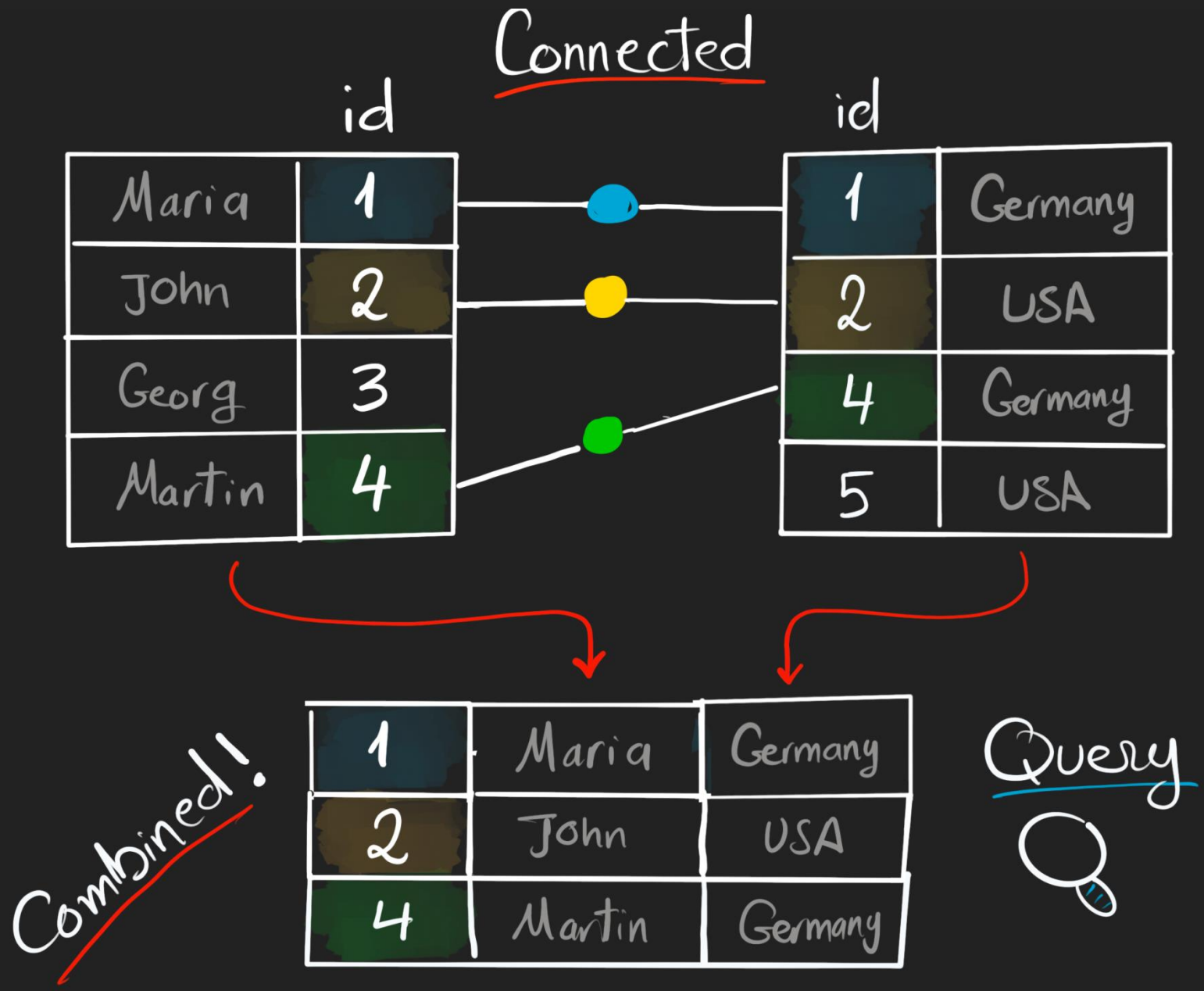
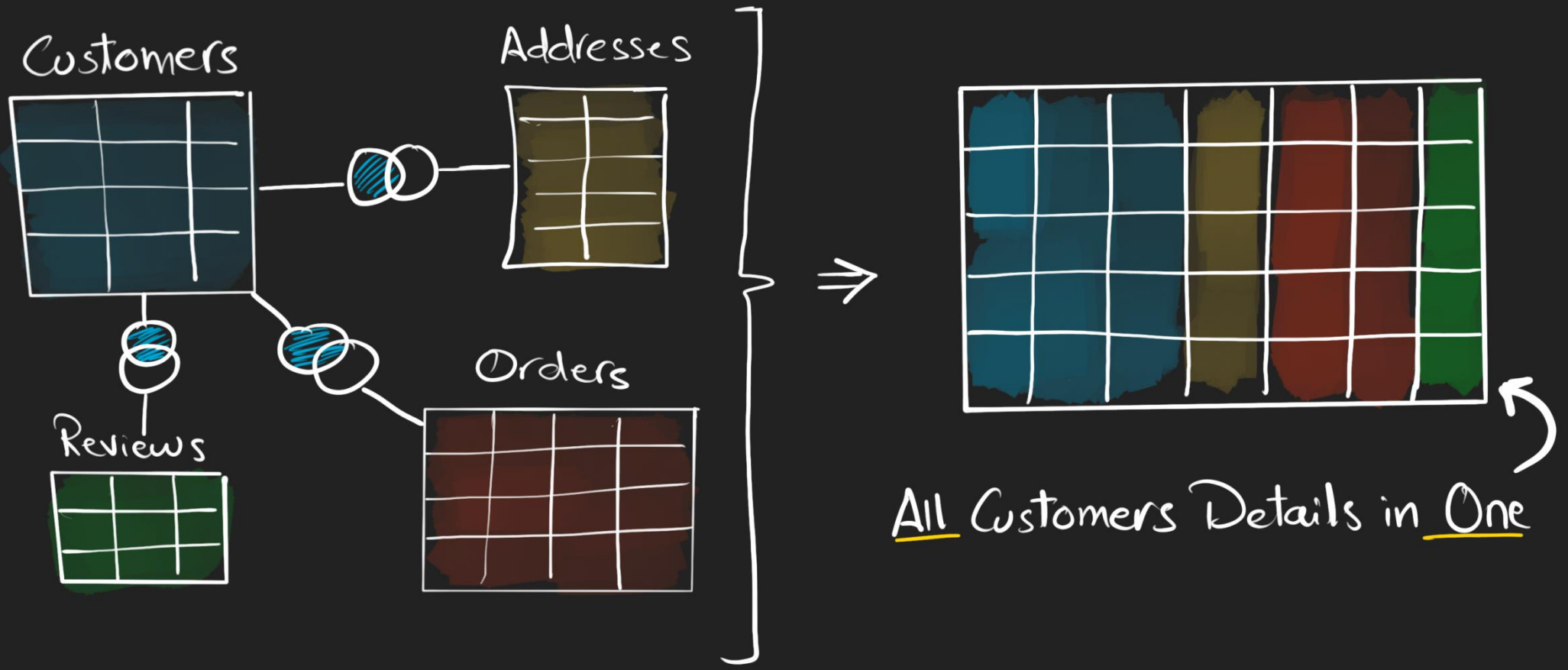


TABLE A
LEFT
TABLE B
RIGHT
Combine ?
ROWS
COLUMNS
Types
UNION
UNION All
EXCEPT (MINUS)
INTERSECT
SET Operators
Same Columns
A
B
JOINs
A
B
Key Column
Types
Inner Join
Full Join
Left Join
Right Join

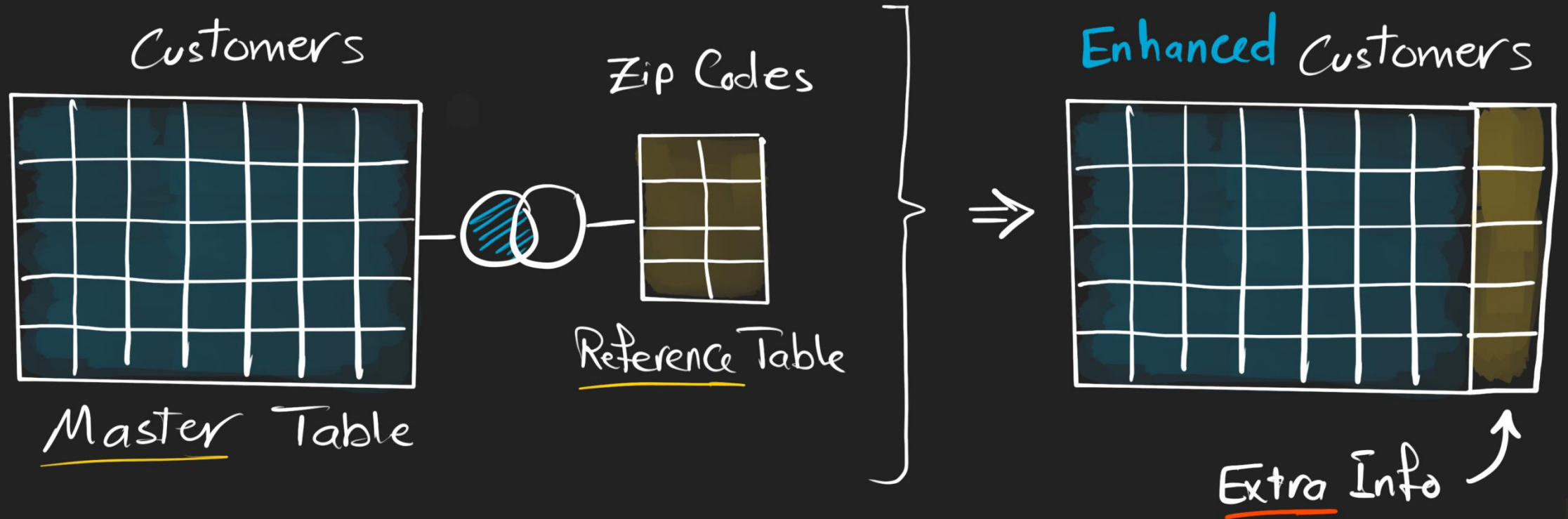
What is SQL JOIN ?



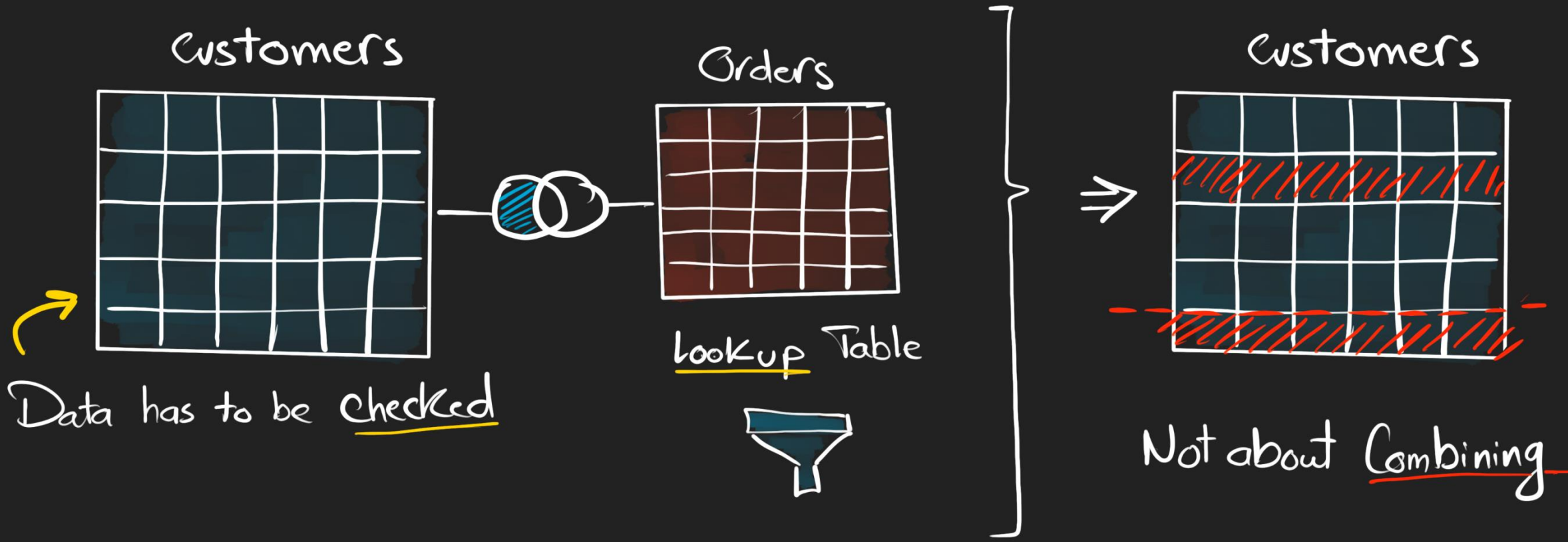
1 Recombine Data



2 Data Enrichment "Getting Extra Data"

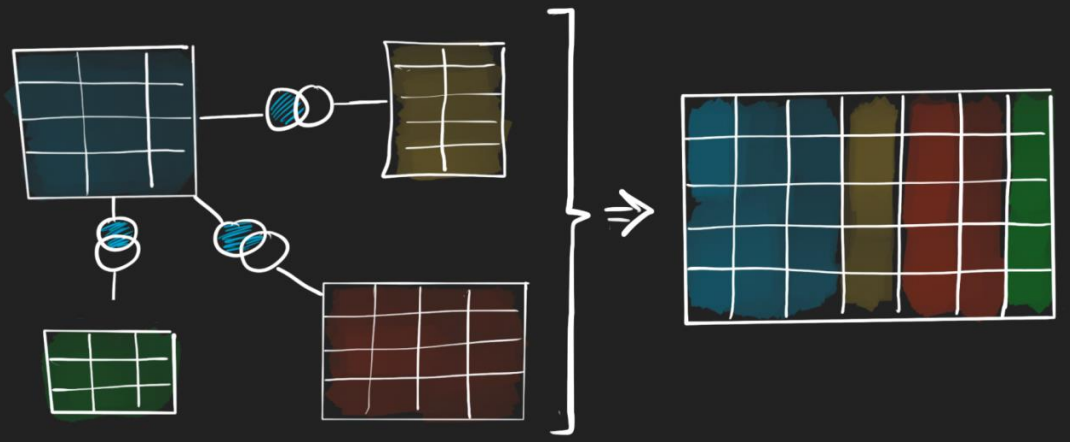


3 Check for Existence "Filtering"



1 ReCombine Data

~Big Picture~



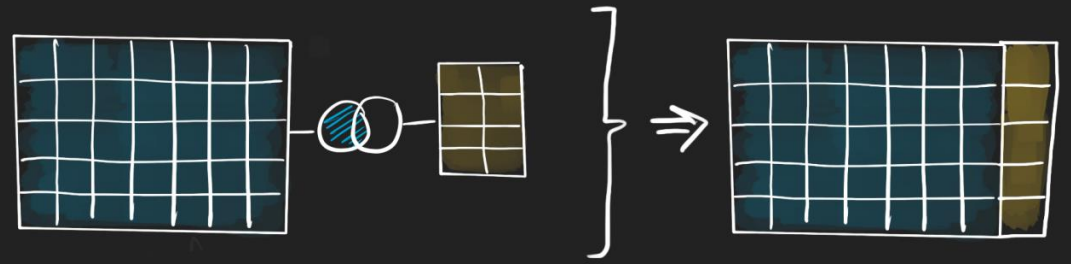
INNER

LEFT

FULL

2 Data Enrichment

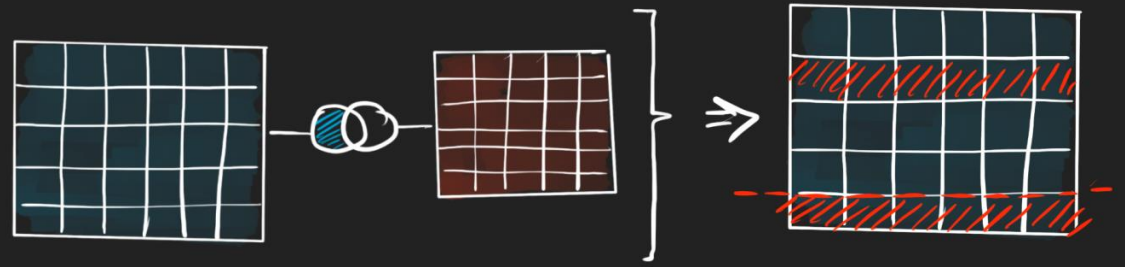
~Extra Info~



LEFT

3 Check Existence

~Filtering~

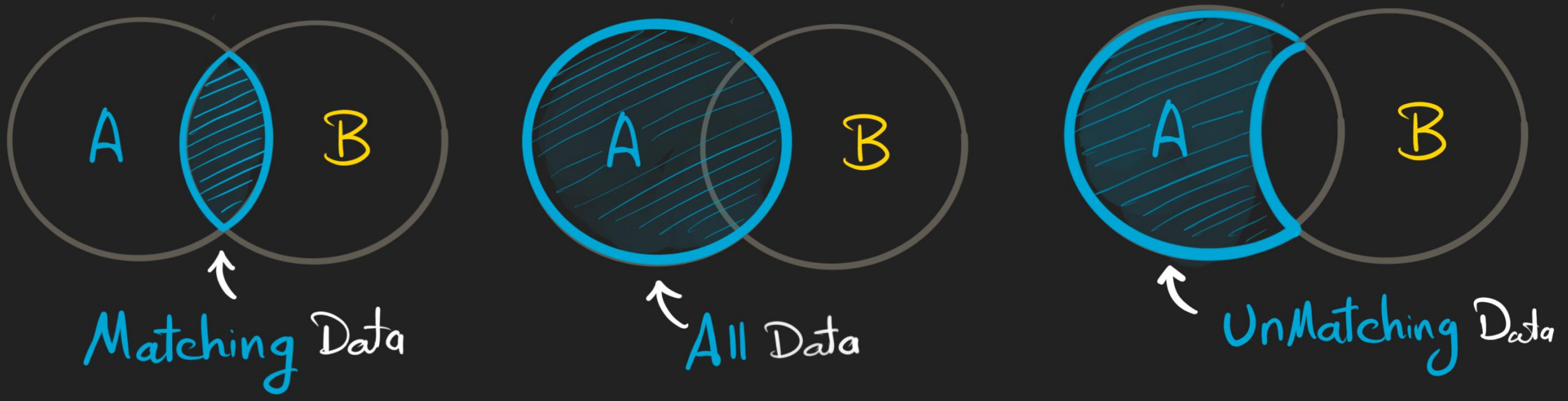


INNER

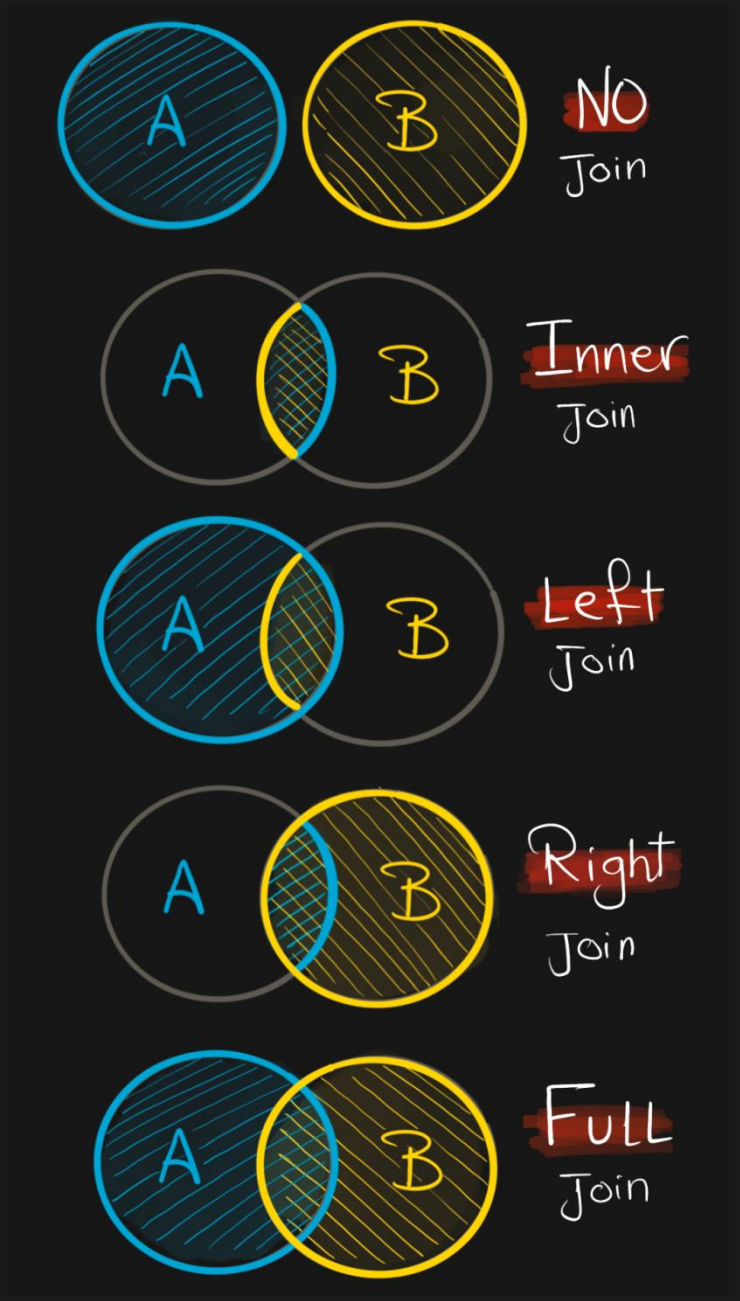
LEFT + WHERE

FULL + WHERE

Joins Possibilities



Basic Join Types

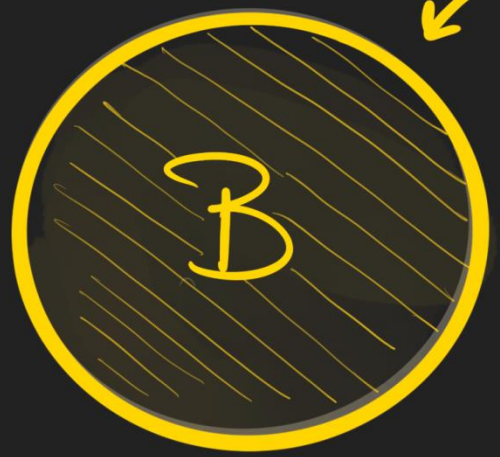


NO JOIN

Returns Data from Tables without Combining Them

All Rows

All Rows



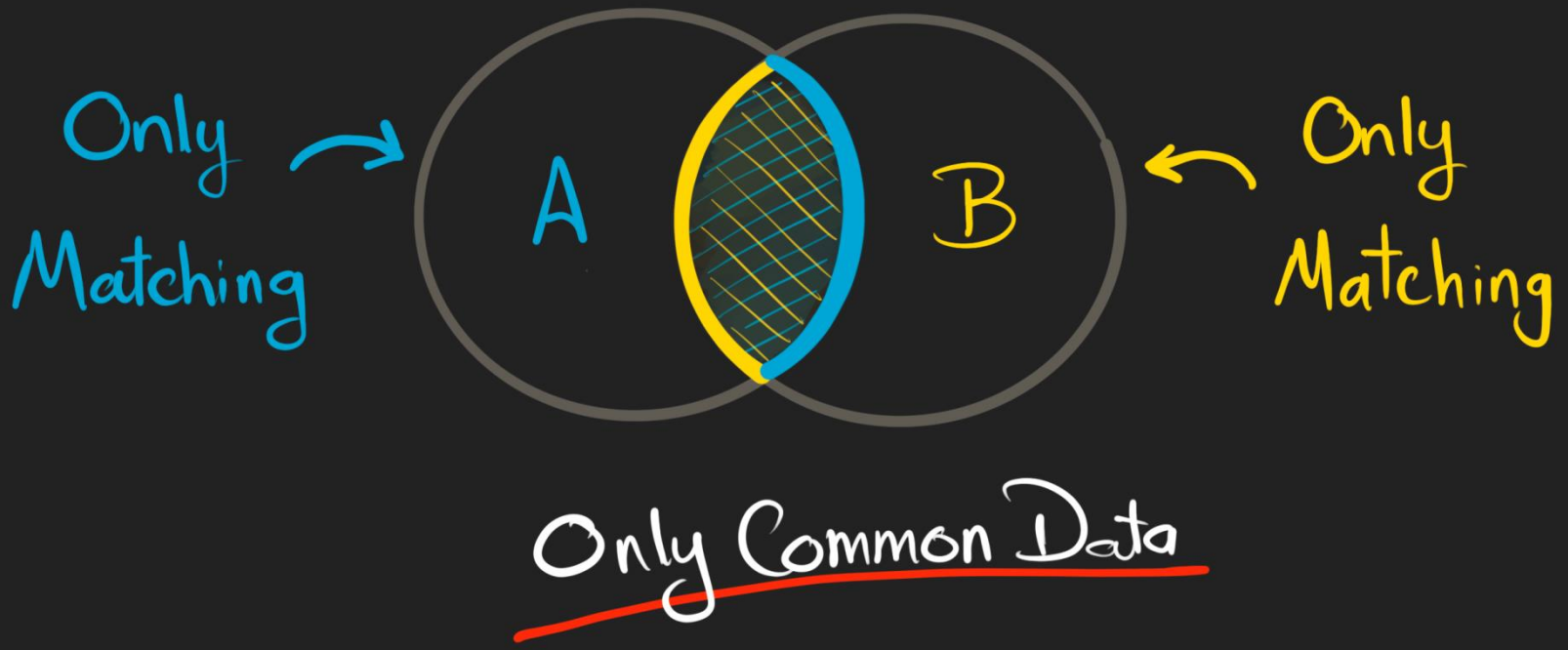
Two Results No Need To Combine

```
SELECT *
FROM A;

SELECT *
FROM B;
```

INNER JOIN

Returns Only Matching Rows from both Tables



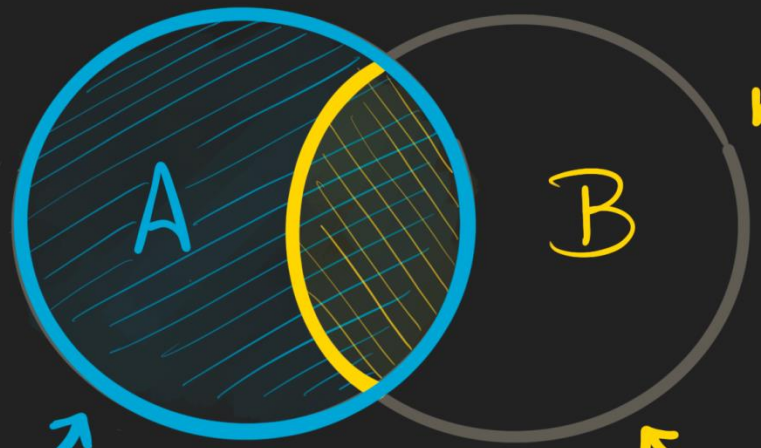
The Order of Tables Doesn't Matters

```
SELECT *
FROM A
INNER JOIN B
ON A.Key = B.Key
```

How to Match Rows ???

LEFT JOIN

Returns All rows from Left and Only Matching from Right



All Rows (Everything)

Only Matching

Primary

Main Source of Data

Secondary

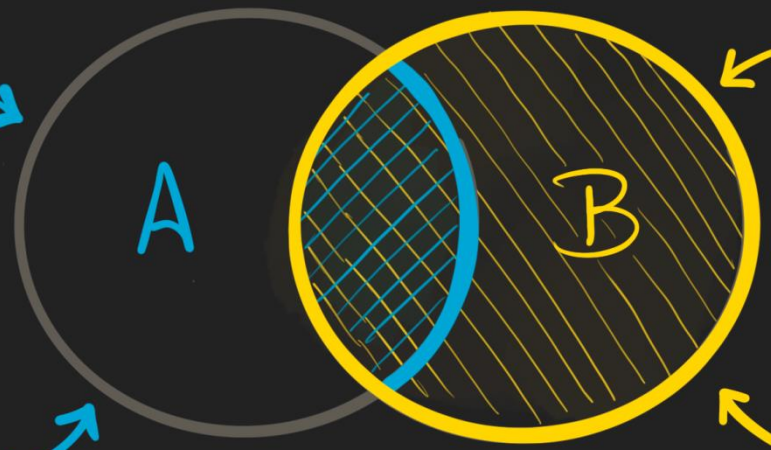
for Additional Data

The Order of Tables is IMPORTANT

```
SELECT *
FROM A        ← Left
LEFT JOIN B   ← Right
ON A.Key = B.Key
```

RIGHT JOIN

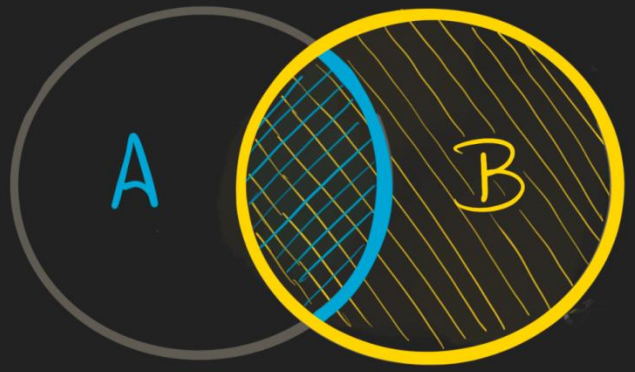
Returns All Rows from Right and Only Matching from Left



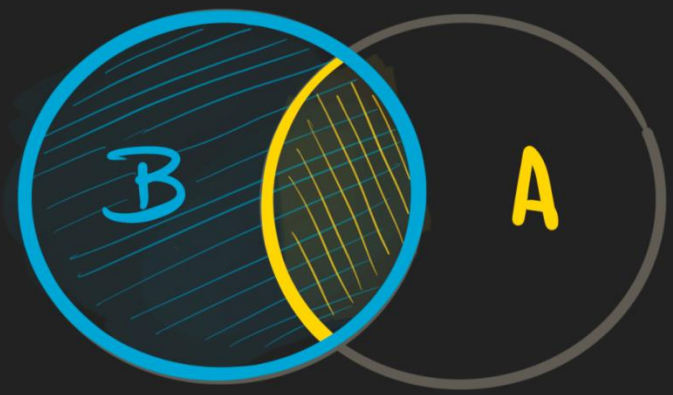
The Order of Tables Is IMPORTANT

```
SELECT *
FROM A
RIGHT JOIN B
ON A.Key = B.Key
```

Alternative To RIGHT JOIN



Same Results




```
SELECT *
FROM A
RIGHT JOIN B
ON A.Key = B.Key
```

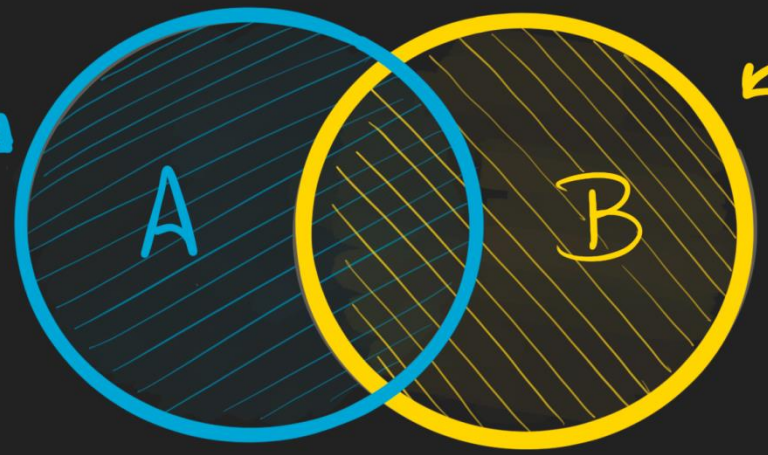
Alternative ⇒

```
SELECT *
FROM B
LEFT JOIN A
ON A.Key = B.Key
```

FULL JOIN

Returns All Rows from Both Tables

All Rows (Everything)



All Rows (Everything)

Everything!

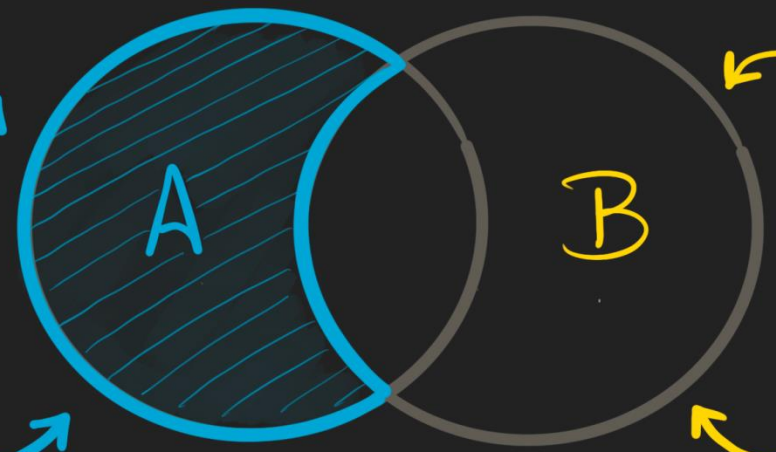
The Order of Tables Doesn't Matter

```
SELECT *
FROM A
FULL JOIN B
ON A.key = B.key
```

Advanced Join Types

LEFT ANTI JOIN

Returns Row from Left that has NO MATCH in Right



Only UnMatching Rows

Primary

Main Source of Data

Nothing

LookUp (Filter)

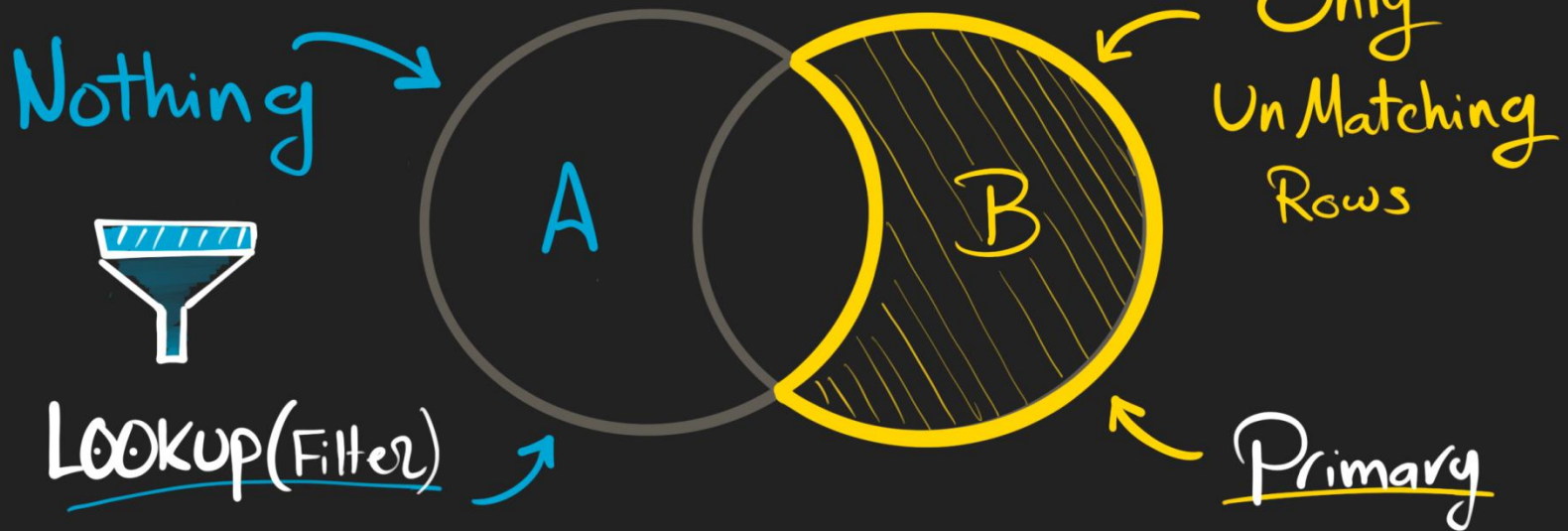
Not for Data, Just a Filter

The Order of Tables Is IMPORTANT

```
SELECT *
FROM A
LEFT JOIN B
ON A.Key = B.Key
WHERE B.Key IS NULL
```

RIGHT ANTI JOIN

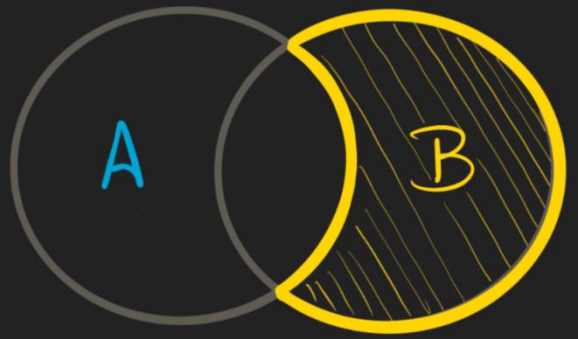
Returns Rows from Right that has NO MATCH in Left



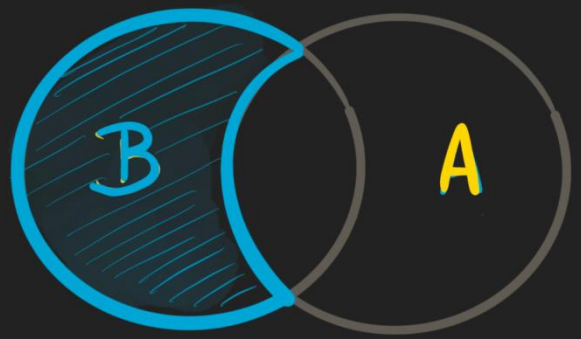
The Order of Tables Is IMPORTANT

```
SELECT *
FROM A
RIGHT JOIN B
ON A.Key = B.Key
WHERE A.Key IS NULL
```

Alternative To RIGHT Anti JOIN



Same Results



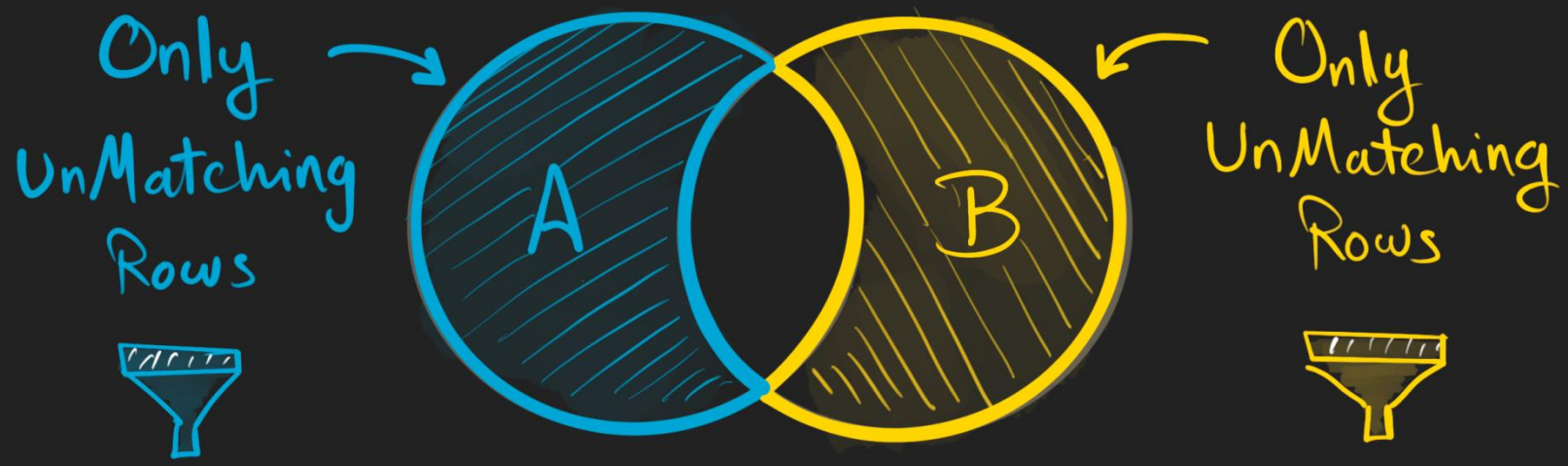

```
SELECT *
FROM A
RIGHT JOIN B
ON A.Key = B.Key
WHERE A.Key IS NULL
```

Alternative →

```
SELECT *
FROM B
LEFT JOIN A
ON A.Key = B.Key
WHERE A.Key IS NULL
```

FULL ANTI JOIN

Returns Only Rows that Don't Match in either Tables



Only Unmatching Data

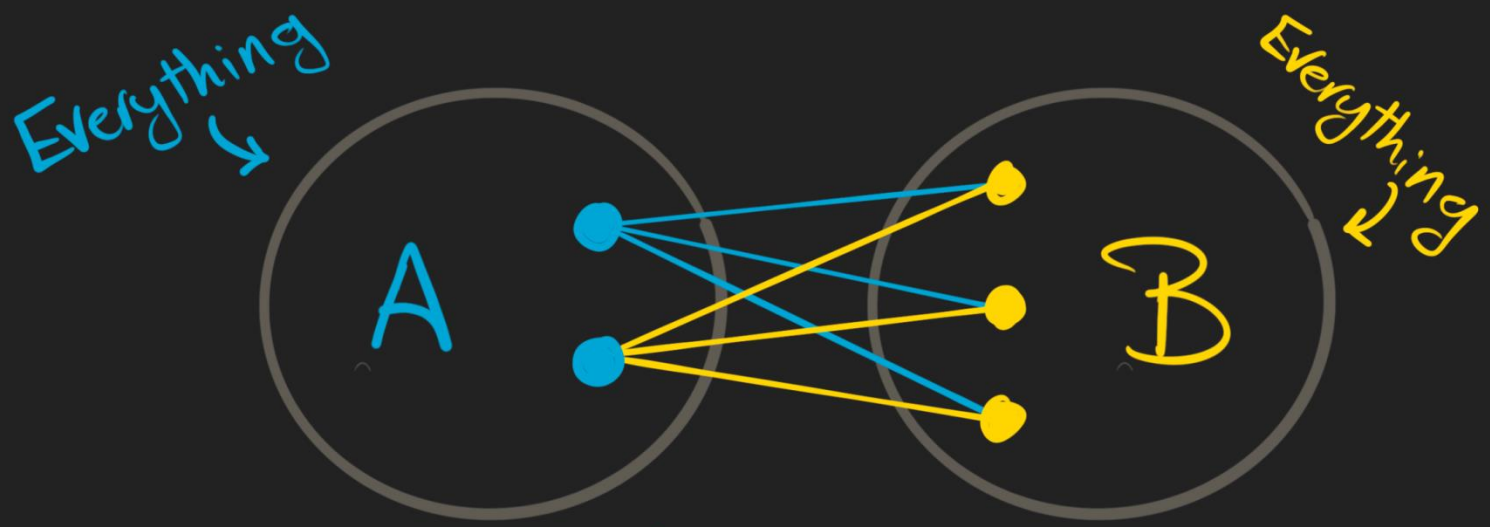
The Order of Tables Doesn't Matter

```
SELECT *
FROM A
FULL JOIN B
ON A.Key = B.Key
WHERE
    B.Key IS NULL
OR
    A.Key IS NULL
```

CROSS JOIN

Combines Every Row from Left with Every Row from Right

All Possible Combinations -Cartersian Join-



$2 \times 3 = 6$ ← Total Rows

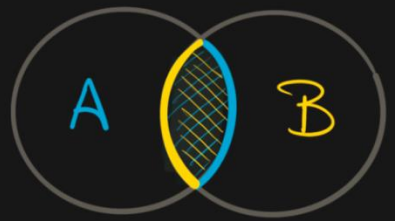
The Order of Table Doesn't Matter

```
SELECT *
FROM A
CROSS JOIN B
```

No Condition Needed

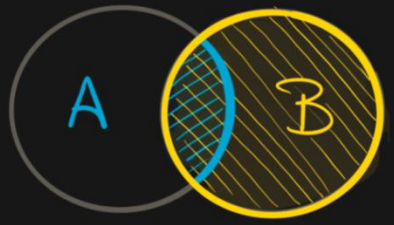
Basics

NO Join

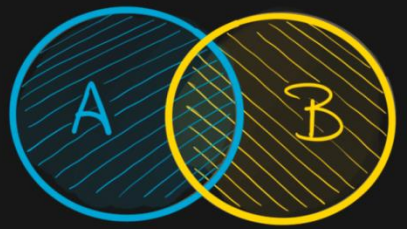


Inner Join

Left Join



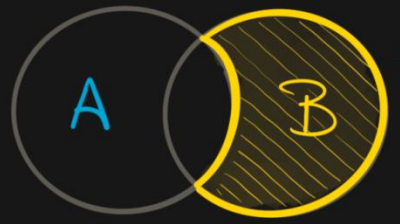
Right Join



FULL Join

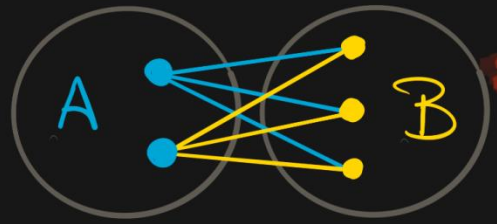
Advanced

Left Anti Join



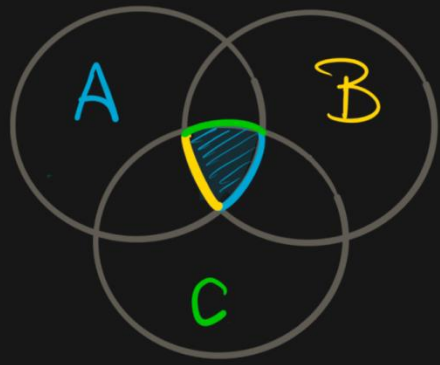
Right Anti Join

Full Anti Join

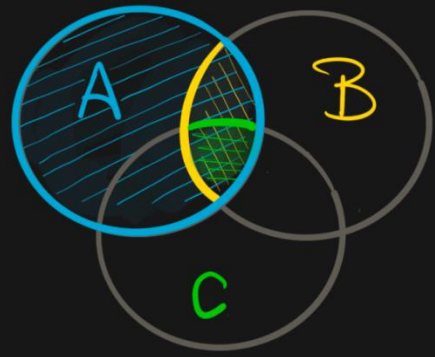


Cross Join

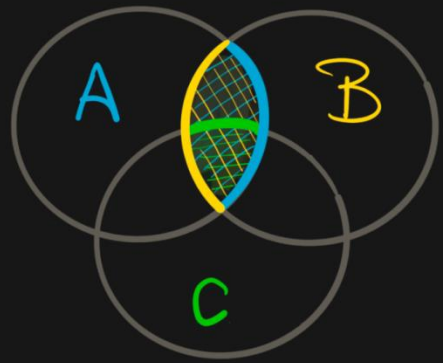
Multi-Tables



2x Inner Joins



2x Left Joins

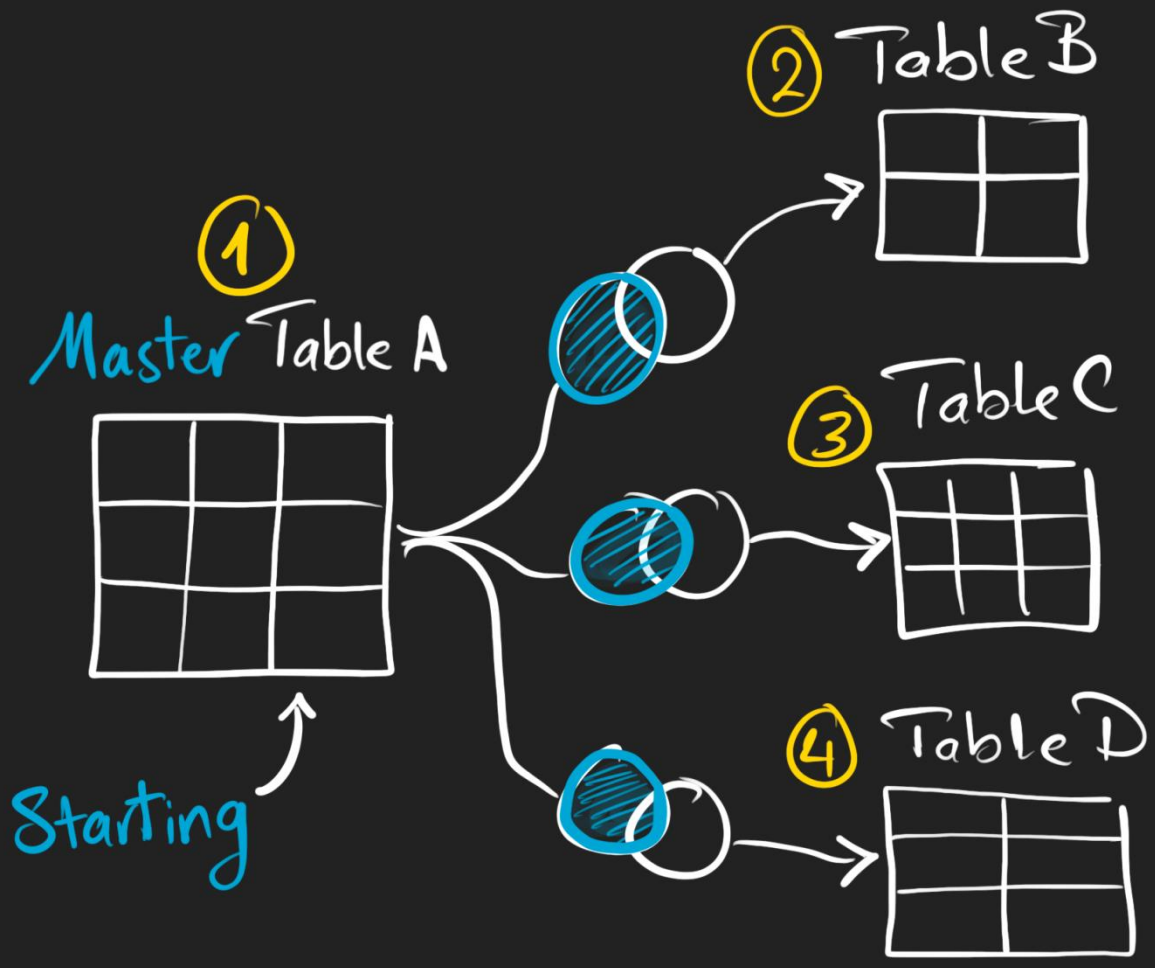


Inner + Left Joins

How I Join Multiple Tables

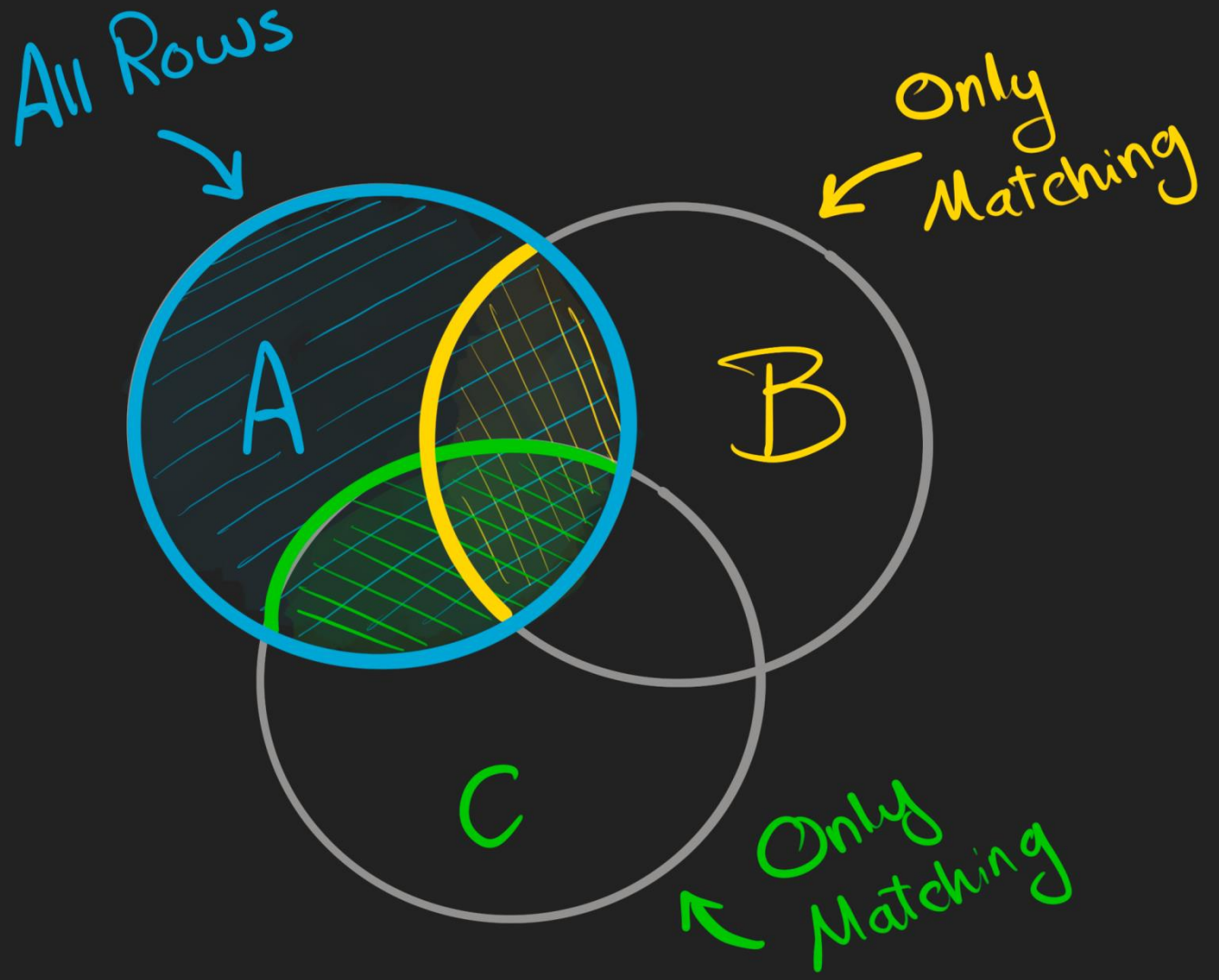
```
SELECT *
FROM A
LEFT B ON...
LEFT C ON...
LEFT D ON...
WHERE
```

Control what to keep



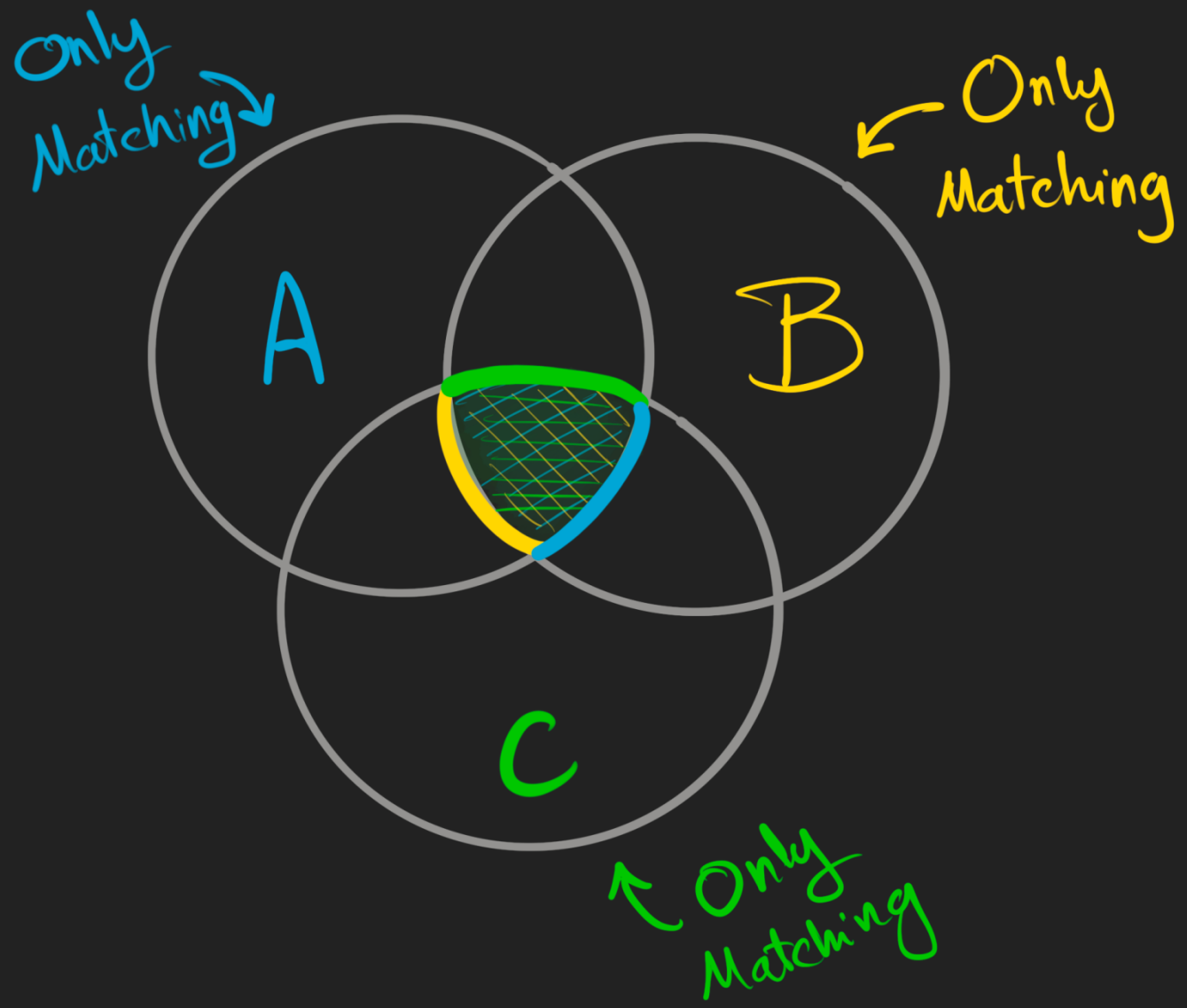
How I Join Multiple Tables

```
SELECT *
FROM A
LEFT B ON...
LEFT C ON...
LEFT D ON...
WHERE  Control what to keep
```



Inner Join Multiple Tables

```
SELECT *
FROM A
INNER B ON...
INNER C ON...
:
```



SET Operators

Combining Data

Baraa Khatib Salkini

SQL Course | SET Operators

SET OPERATORS

Combine the results of multiple queries into a single result set.

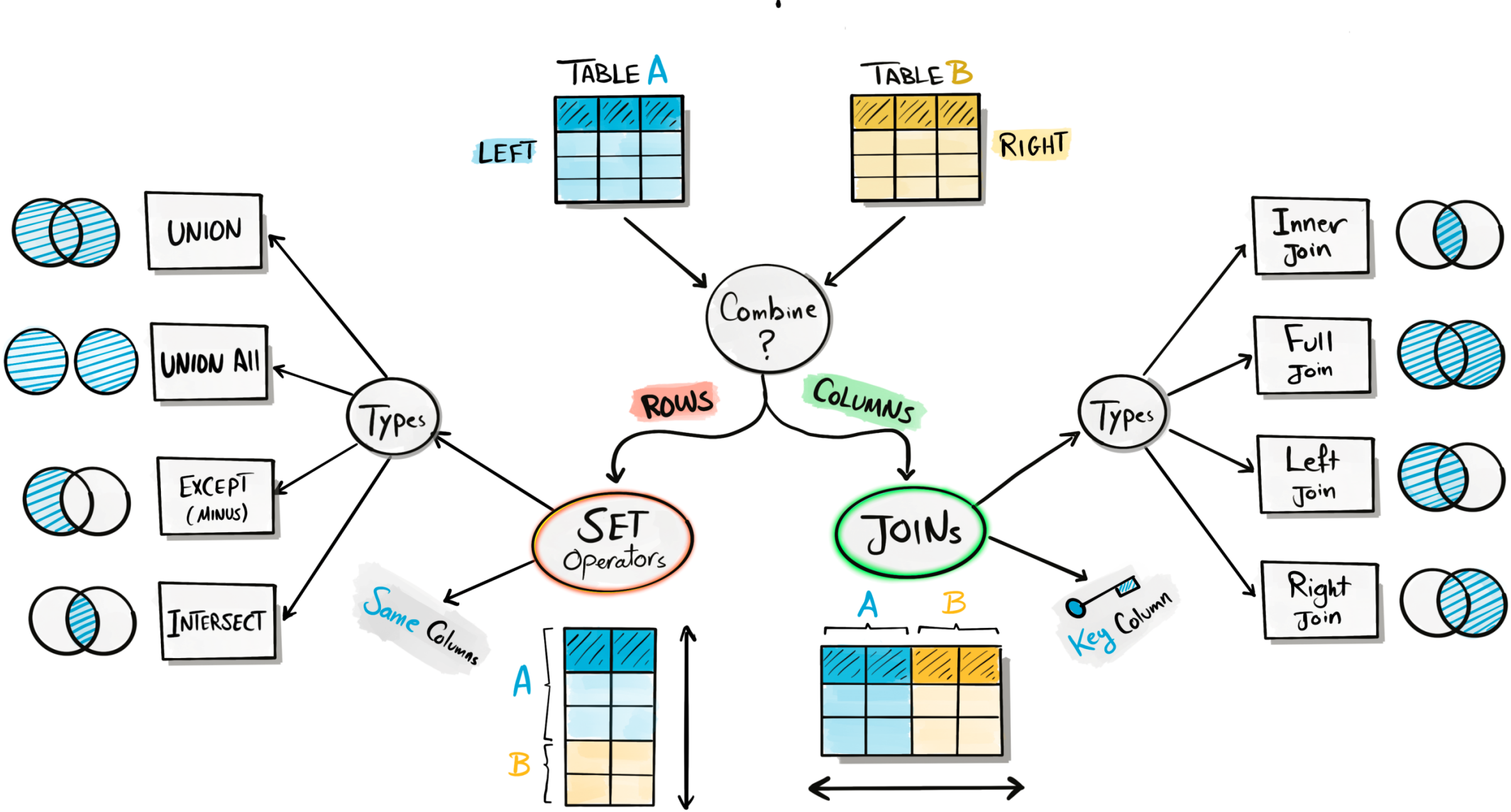


TABLE A
TABLE B
LEFT
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Combine ?
ROWS
COLUMNS
SET Operators
JOINs
Types
UNION
UNION All
EXCEPT (MINUS)
INTERSECT
Same Columns
A
B
Types
Inner Join
Full Join
Left Join
Right Join
Key Column

CTE SYNTAX

```
SELECT
   FirstName
   LastName
FROM Customers
JOIN Clause
WHERE Clause
GROUP BY Clause
```

1st SELECT Statement

SET Operator

```
UNION
```

```
SELECT
   FirstName
   LastName
FROM Employees
JOIN Clause
WHERE Clause
GROUP BY Clause
```

2nd SELECT Statement

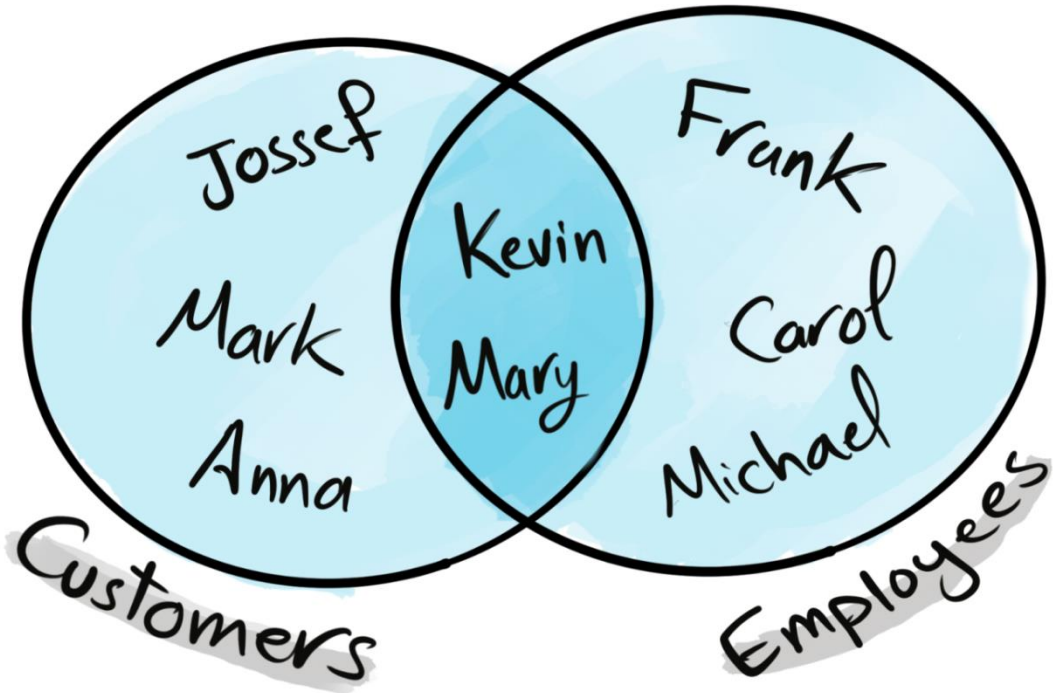
ORDER BY
can be used only at the
end to sort the final Result

```
ORDER BY FirstName
```

SET RULES

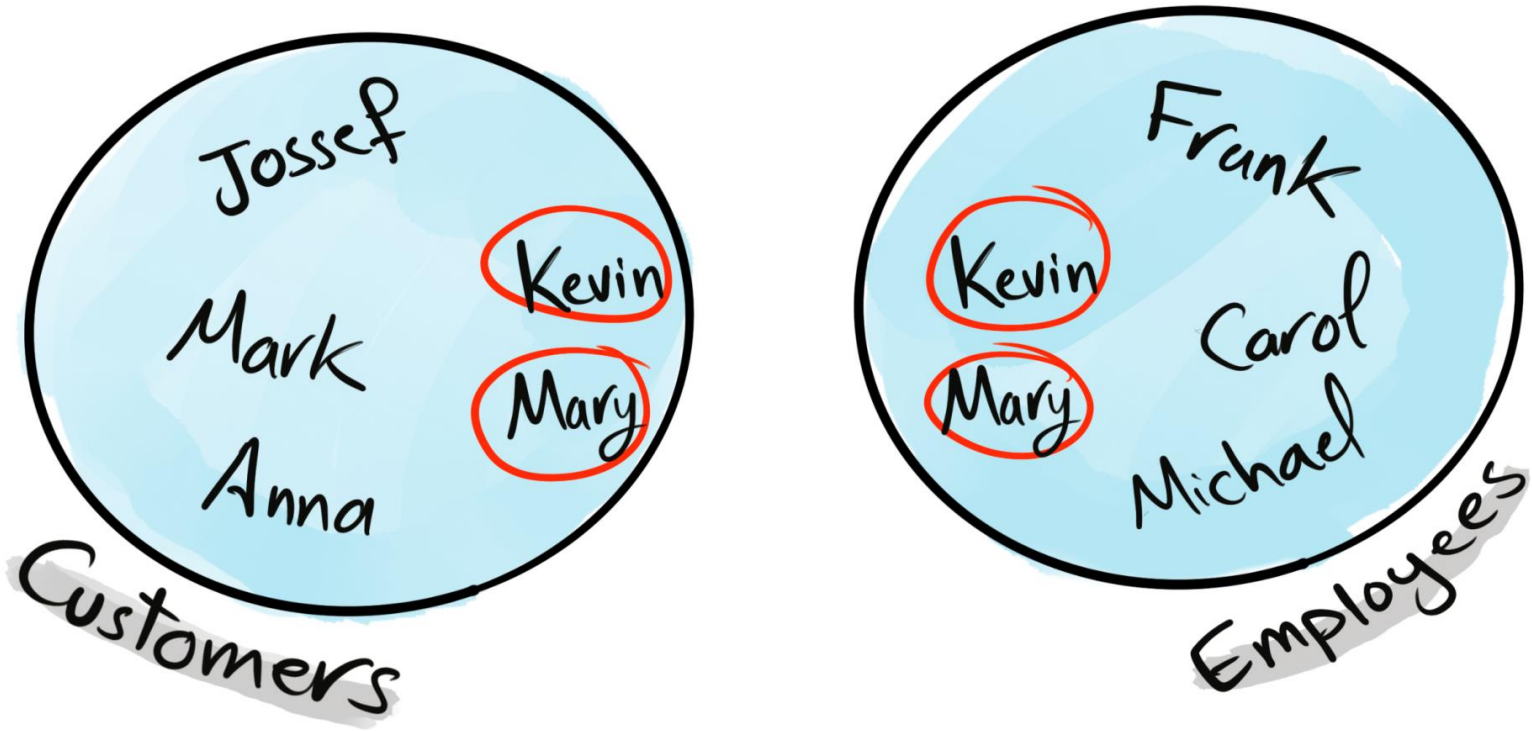
1. SET operators can be used in any clause.
2. ORDER BY is allowed only once—at the end of the query.
3. Each query must have the same number of columns.
4. Column data types must be compatible across queries.
5. The result set takes column names from the first query.

UNION



Returns All distinct rows from both tables

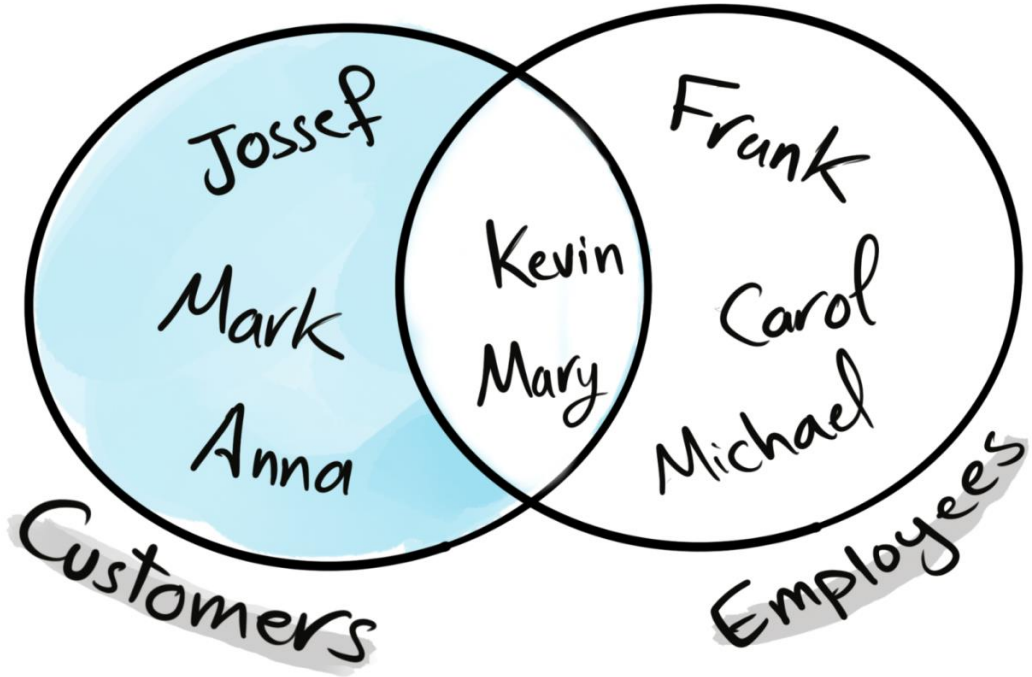
UNION All



Returns **All** rows, including **duplicates**

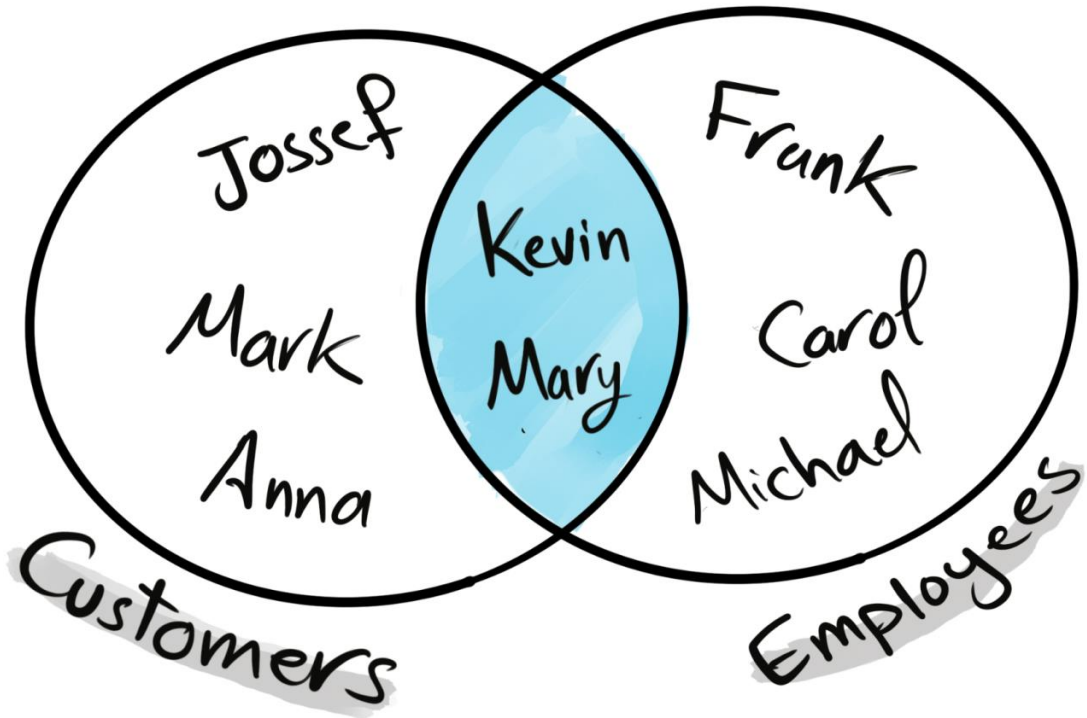
EXCEPT

(MINUS)

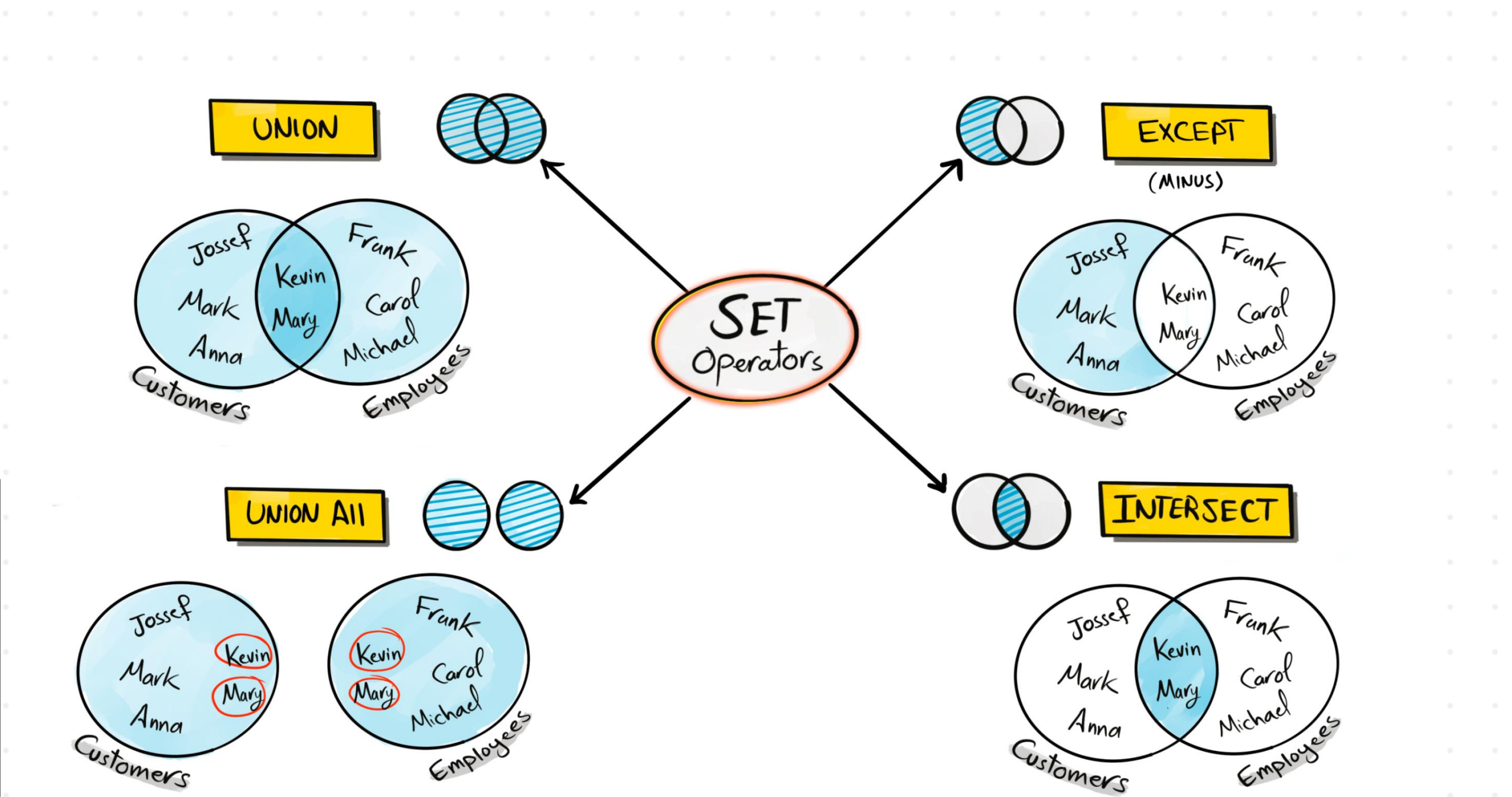


Returns unique rows in 1st Table that are not in 2nd Table

INTERSECT



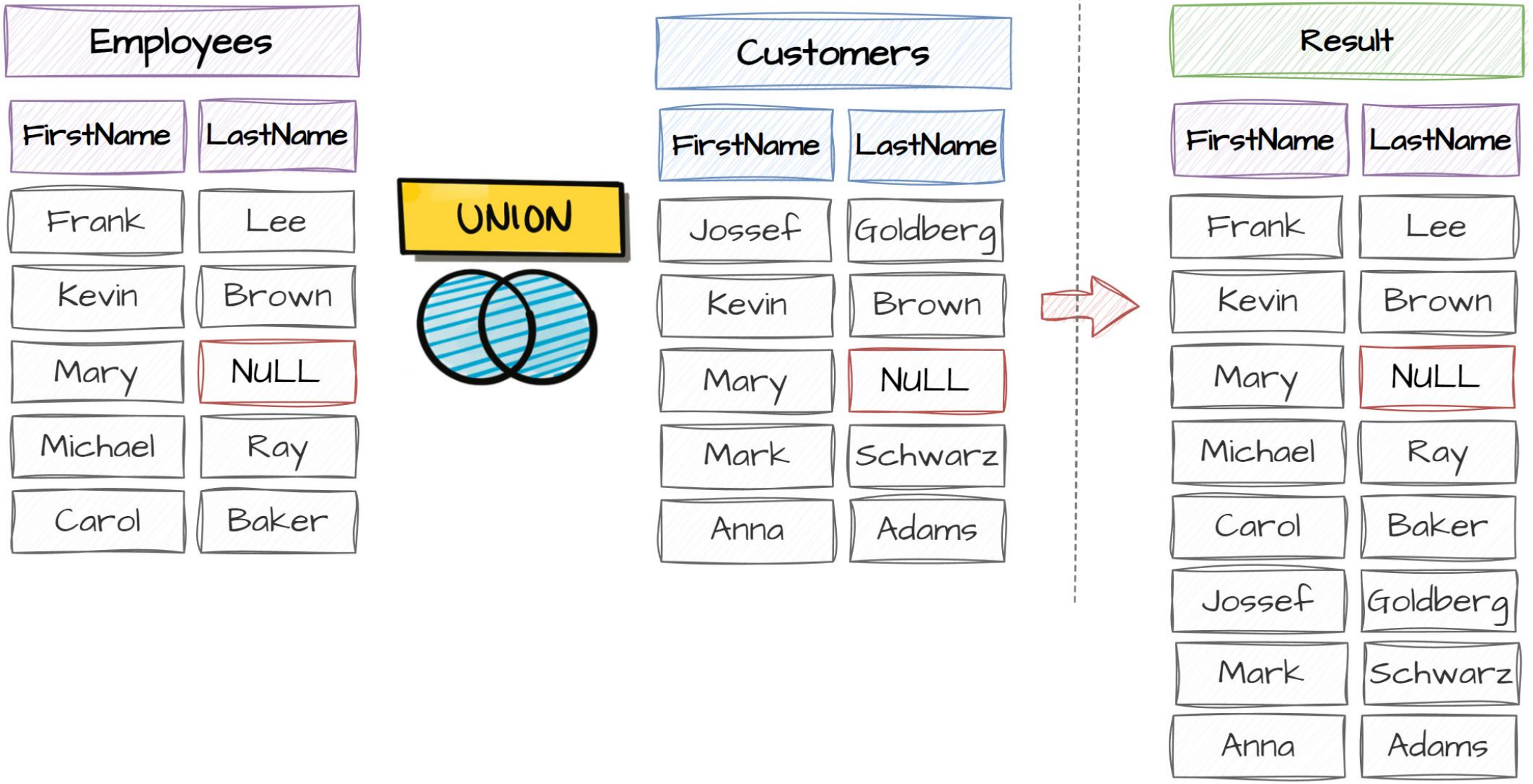
Returns Common rows between two Tables


UNION
Josef
Mark
Anna
Kevin
Mary
Frank
Carol
Michael
Customers
Employees
EXCEPT
(MINUS)
Josef
Mark
Anna
Kevin
Mary
Frank
Carol
Michael
Customers
Employees
SET
Operators
UNION All
Josef
Mark
Anna
Kevin
Mary
Customers
Frank
Kevin
Mary
Carol
Michael
Employees
INTERSECT
Josef
Mark
Anna
Kevin
Mary
Frank
Carol
Michael
Customers
Employees

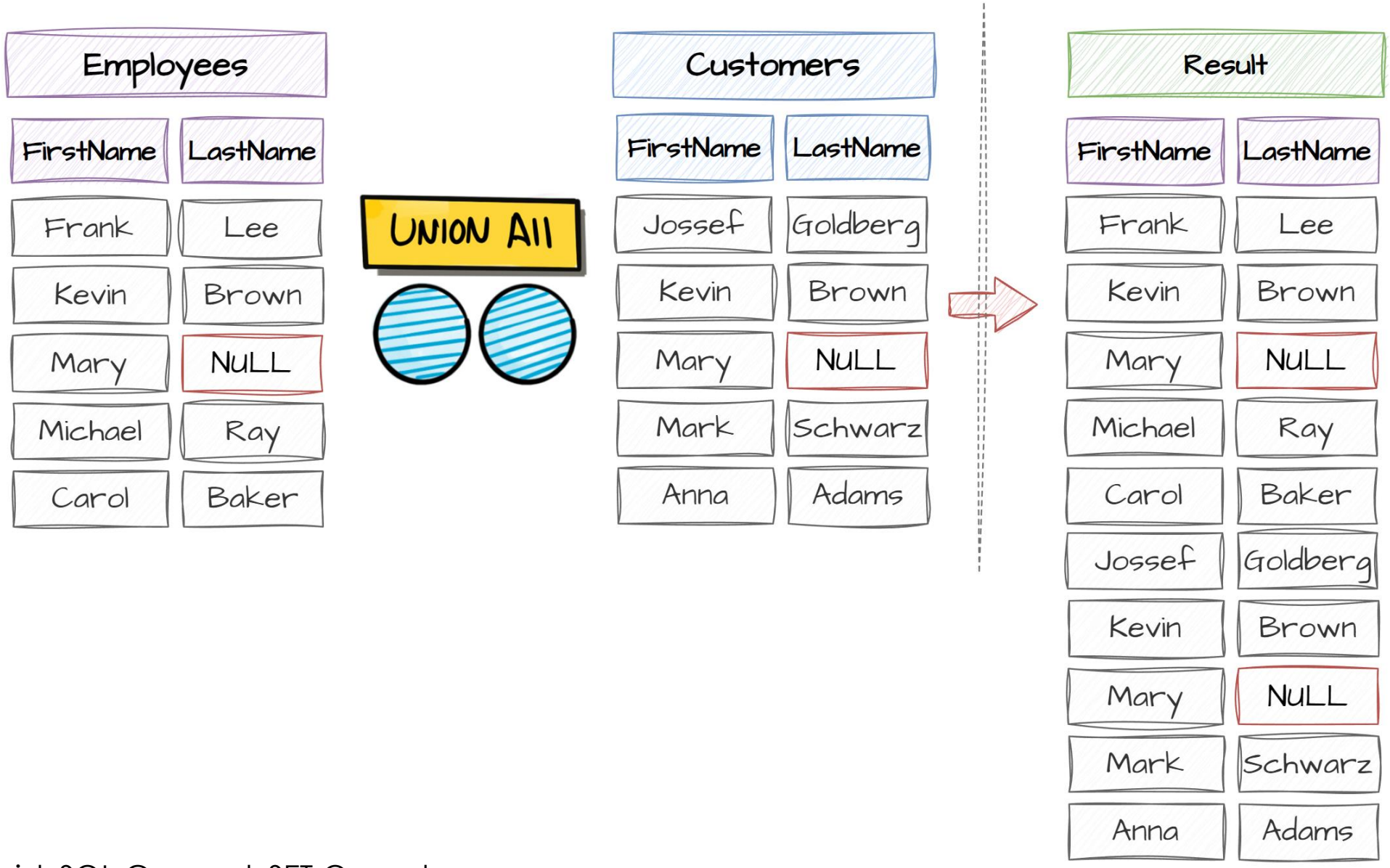
UNION ALL vs UNION

- **UNION ALL** is faster than **UNION** because it doesn't remove duplicates.
- Use **UNION ALL** if you are sure there are no duplicates.
- Use **UNION ALL** to identify duplicates and data quality issues

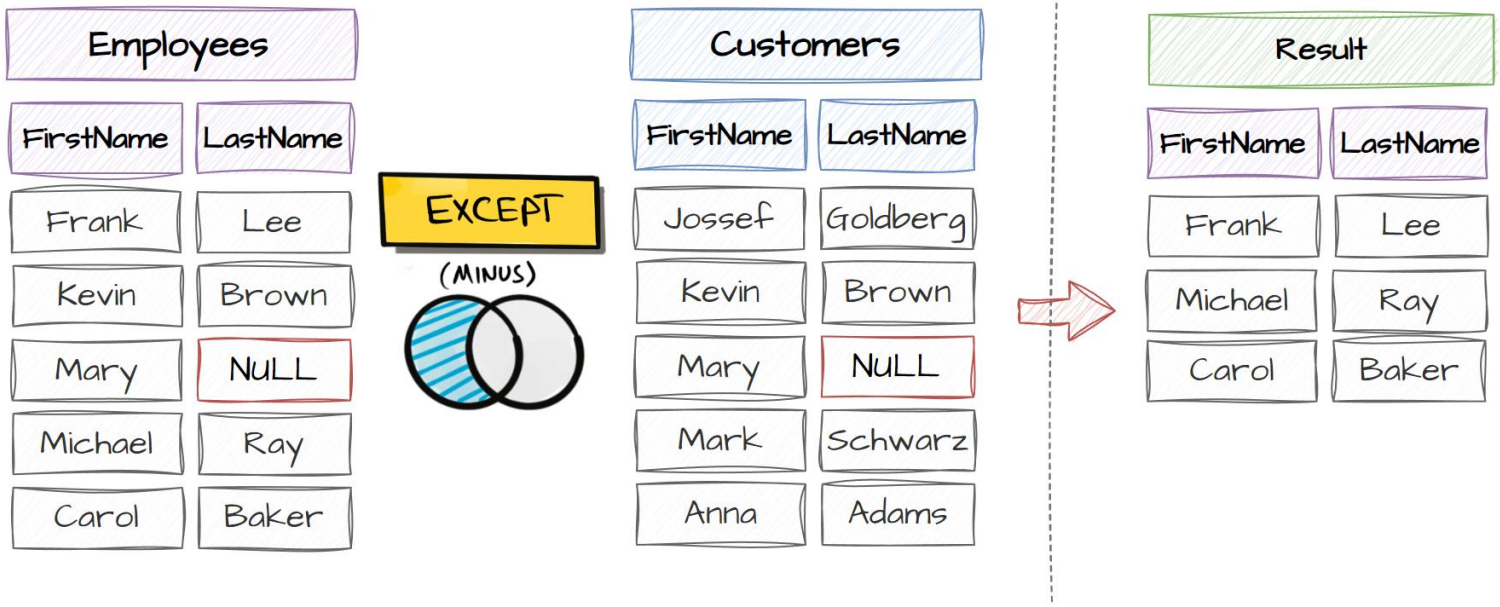
How UNION Works

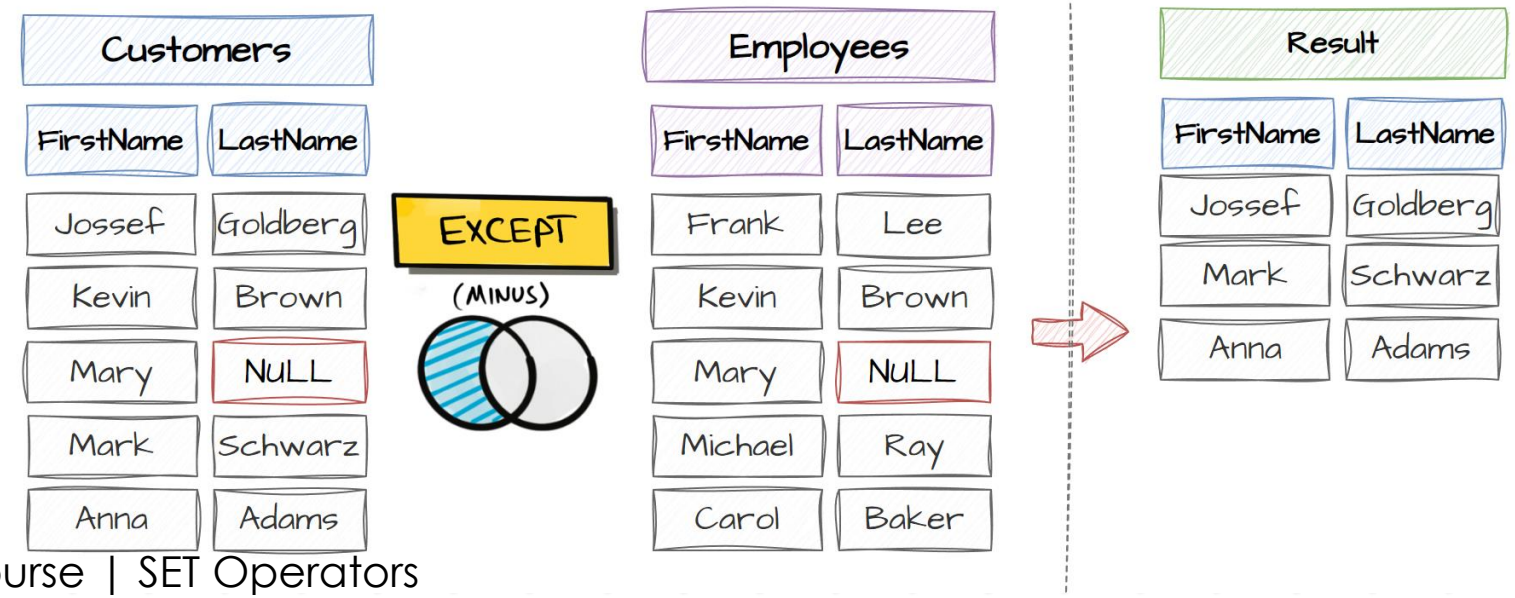


How UNION ALL Works



How EXCEPT Works





How INTERSECT Works

Employees

FirstName	LastName
Frank	Lee
Kevin	Brown
Mary	NULL
Michael	Ray
Carol	Baker

INTERSECT

Customers

FirstName	LastName
Jossef	Goldberg
Kevin	Brown
Mary	NULL
Mark	Schwarz
Anna	Adams

Result

FirstName	LastName
Kevin	Brown
Mary	NULL

SET OPERATORS

UNION

Returns All rows from both sets, elimination duplicates

```
SELECT FirstName, LastName
FROM Customers

UNION

SELECT FirstName, LastName
FROM Employees
```

UNION ALL

Returns All rows from both sets, including duplicates

```
SELECT FirstName, LastName
FROM Customers

UNION ALL

SELECT FirstName, LastName
FROM Employees
```

EXCEPT/MINUS

Return unique rows in first set that are not in second table

```
SELECT FirstName, LastName
FROM Customers

EXCEPT

SELECT FirstName, LastName
FROM Employees
```

INTERSECT

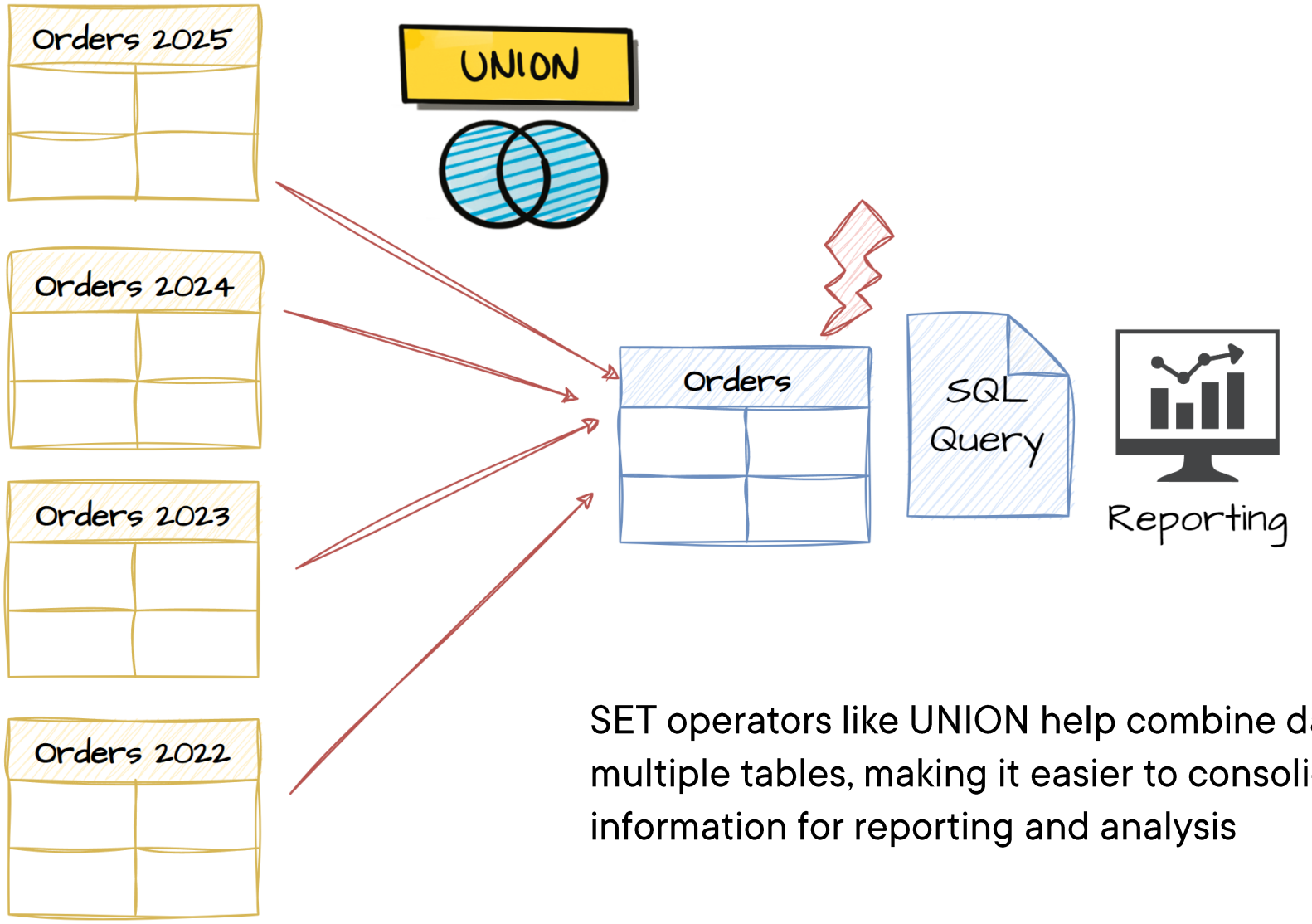
Return only the common rows between two sets

```
SELECT FirstName, LastName
FROM Customers

INTERSECT

SELECT FirstName, LastName
FROM Employees
```

SET USE CASE
Combine Information

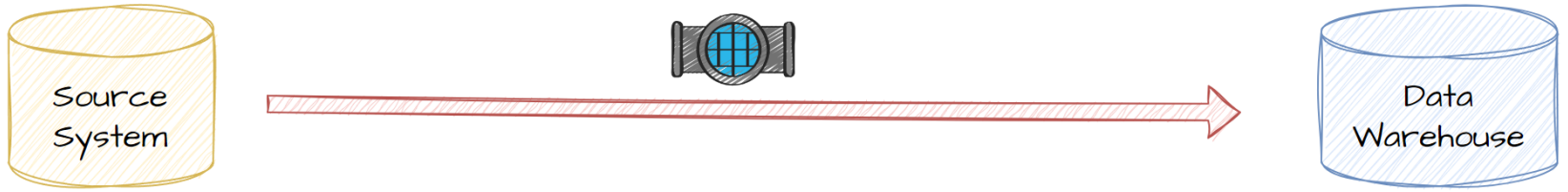


SET operators like UNION help combine data from multiple tables, making it easier to consolidate information for reporting and analysis

SET USE CASE

Delta Detection

SET operators like EXCEPT help detect changes between datasets, making it easier to identify new, updated, or missing records during data integration.

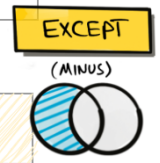


day 1

customer_id	name	email	order_Date
1	John Doe	john@gmail.com	2024-09-17
2	Jan Doe	jan@outlook.com	2024-09-18

day 2

customer_id	name	email	order_Date
1	John Doe	john@gmail.com	2024-09-17
3	Alice	Alice@outlook.com	2024-09-19

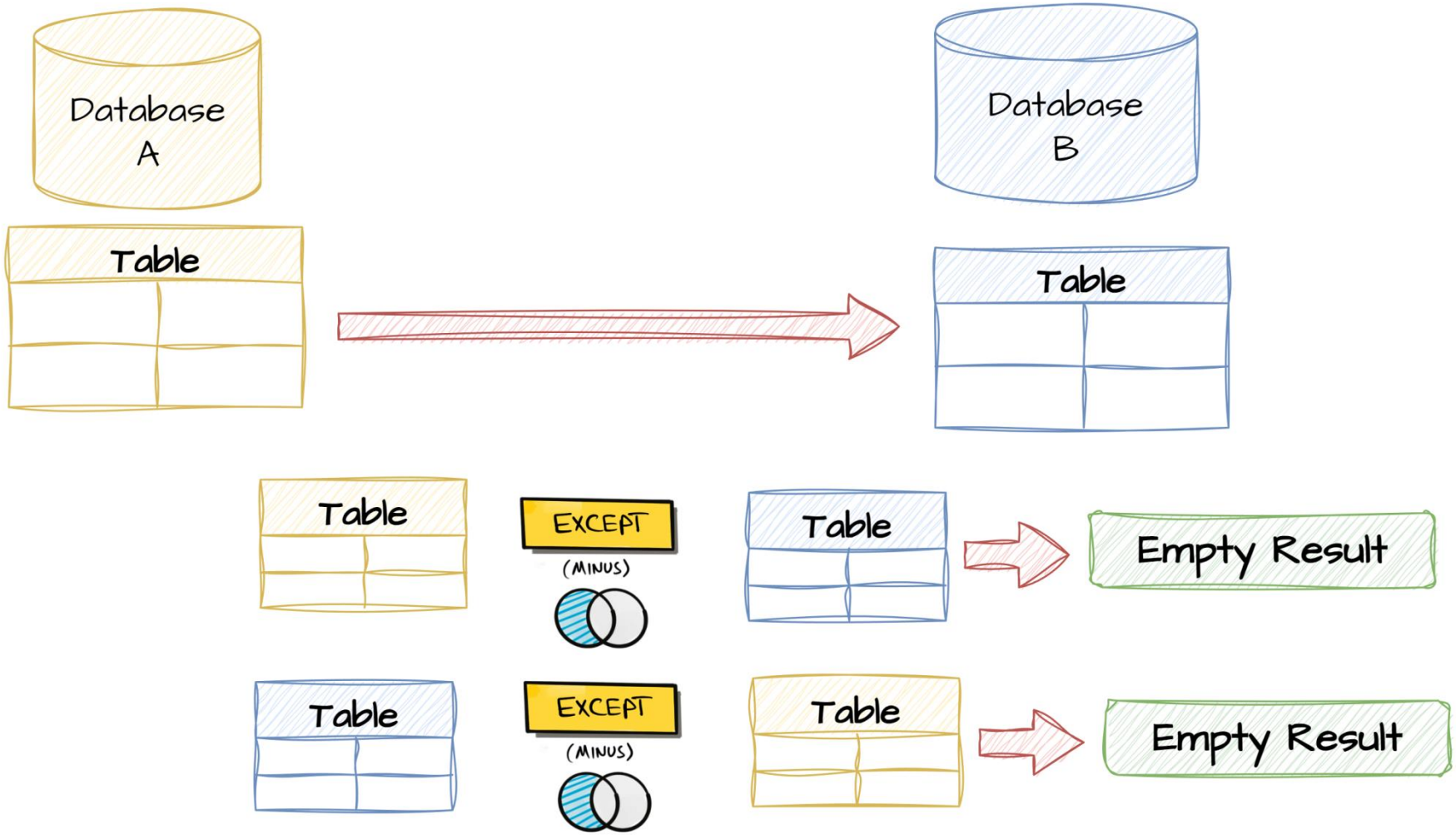


customer_id	name	email	order_Date
1	John Doe	john@gmail.com	2024-09-17
2	Jan Doe	jan@outlook.com	2024-09-18
3	Alice	Alice@outlook.com	2024-09-19

SET USE CASE

Data completeness Check

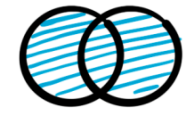
SET operators like EXCEPT help verify data completeness by comparing tables across databases, ensuring no records are missing or mismatched.

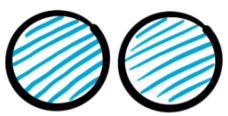


SET OPERATORS

Combine the results of multiple queries into a single result set

Types


UNION


UNION All


EXCEPT


INTERSECT

RULES

- Same Nr. of Columns, Data Types, order of Columns.
- 1st Query controls Column names.

USE CASES

- Combine Information (UNION & UNION All)
- Delta Detection (EXCEPT)
- Data Completeness Check (EXCEPT)