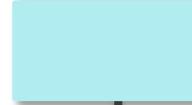


SQL

Table

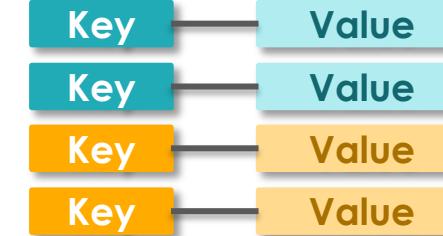


Table

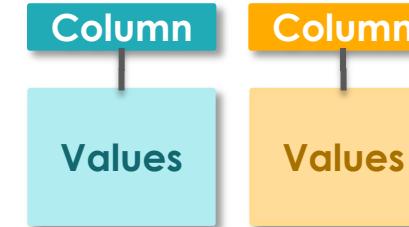


No SQL

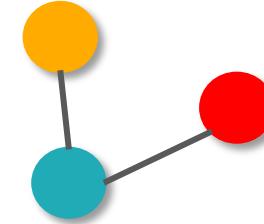
Key-Value



Column Store

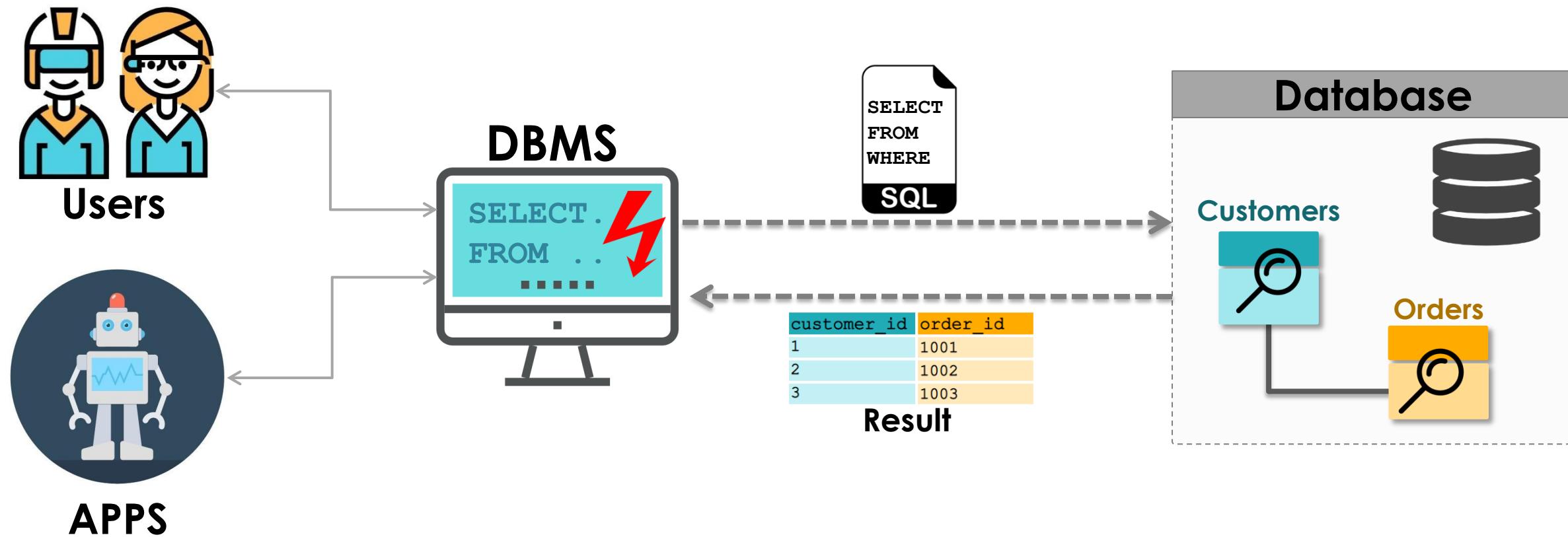


Graph Store



Document







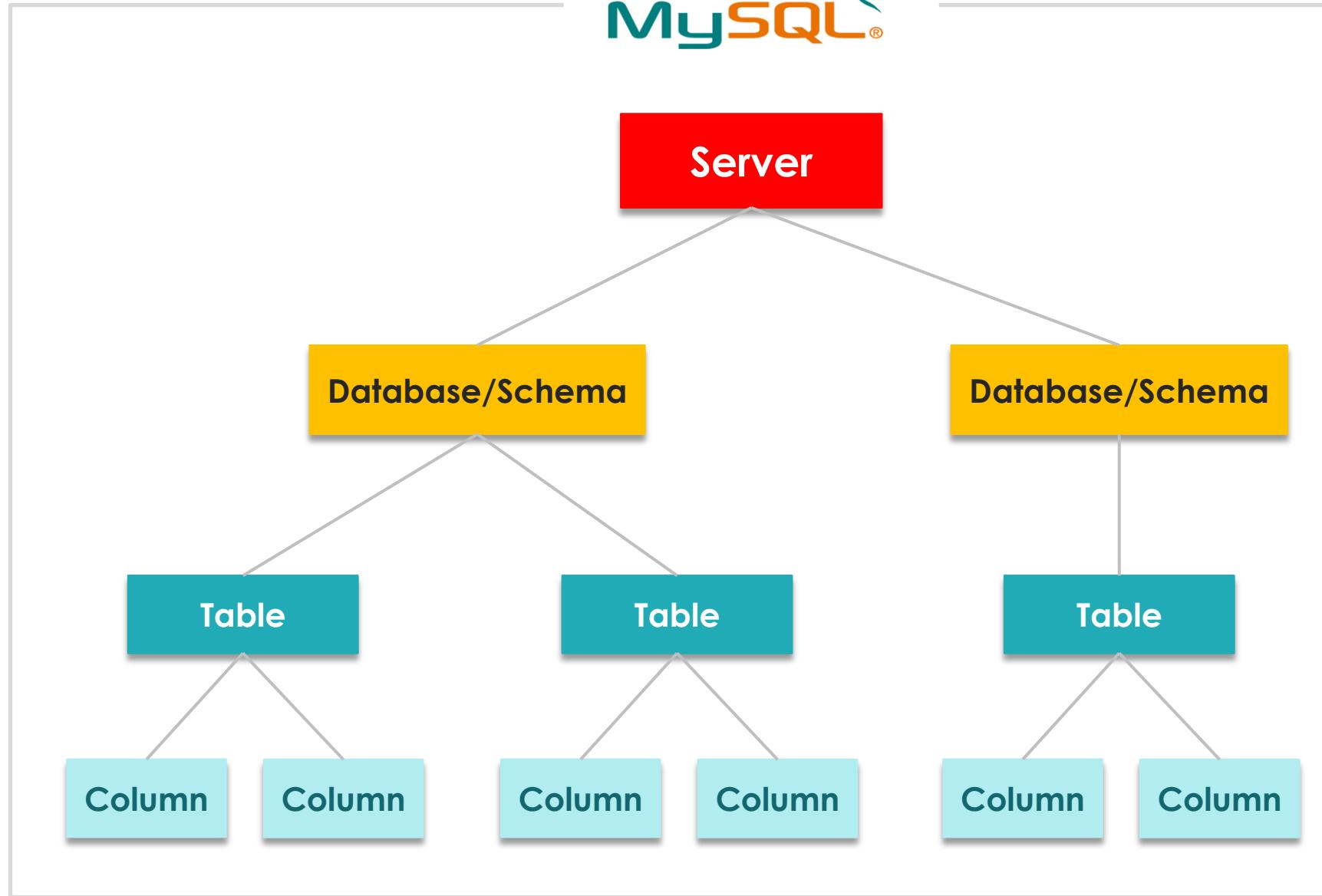
Book = Table

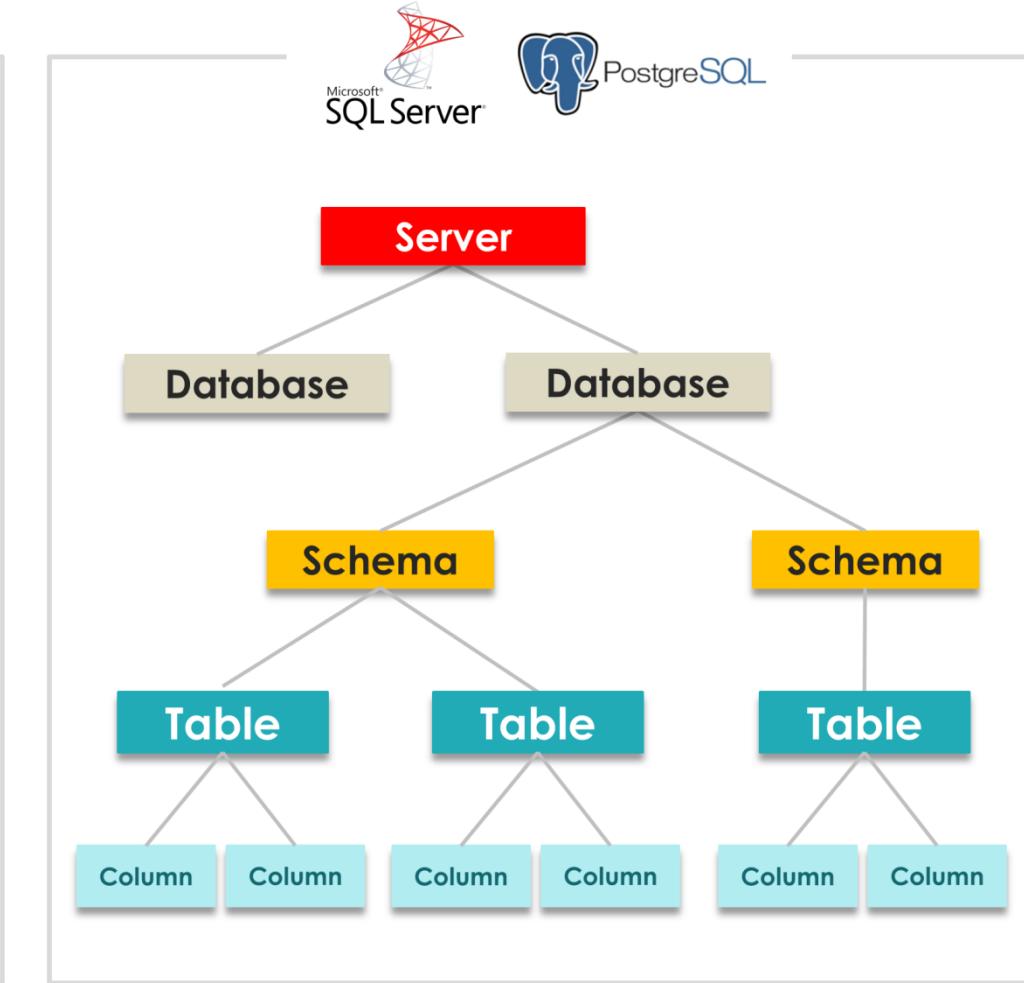
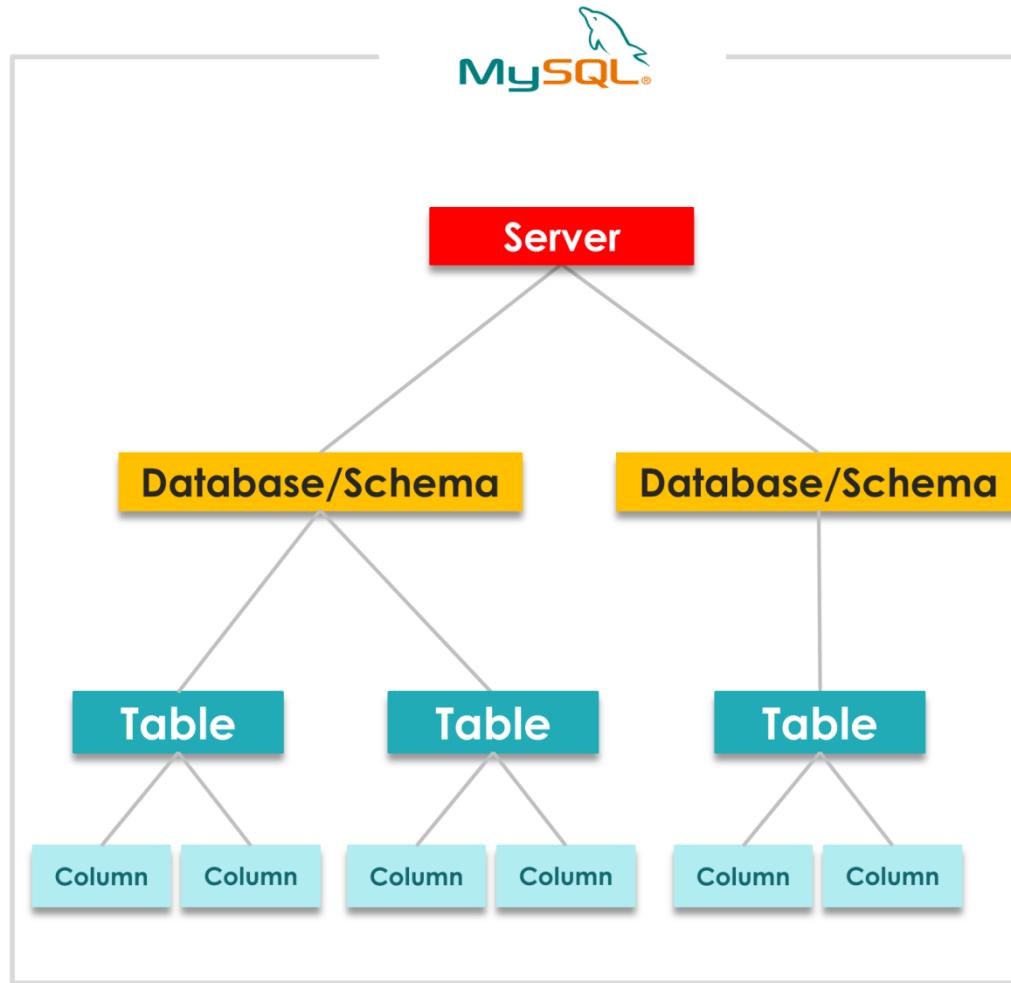
Category = Schema

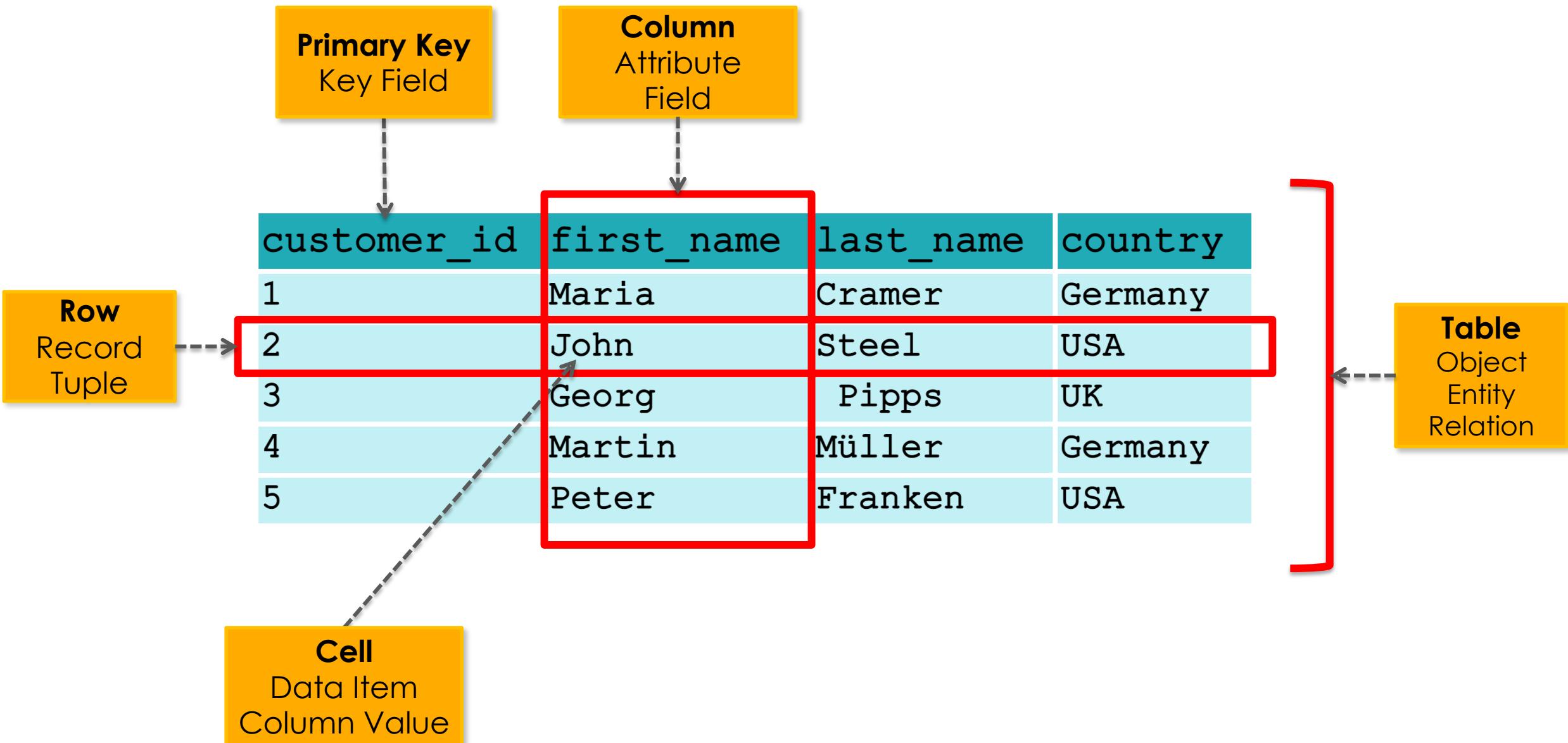
Library = Database



Public Library Stuttgart







SQL Command Types



DDL
Data Definition
Language



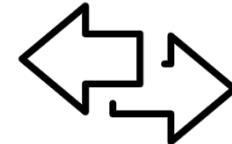
DQL
Data Query
Language



DML
Data Manipulation
Language



DCL
Data Control
Language



TCL
Transaction
Control Language

CREATE

SELECT

INSERT

GRANT

COMMIT

DROP

DELETE

REVOKE

ROLLBACK

ALTER

UPDATE

SAVEPOINT



-- Select customer data

SELECT first_name, last_name

FROM customers

WHERE country = 'Italy'

AND score < 500

SQL Statement/Query



-- Select customer data

```
SELECT first_name, last_name
```

```
FROM customers
```

```
WHERE country = 'Italy'  
AND score < 500
```

Comment

-- Select customer data

```
SELECT first_name, last_name  
FROM customers  
  
WHERE country = 'Italy'  
AND score < 500
```

-- Select customer data

Clauses

SELECT first_name, last_name

FROM customers

WHERE country = 'Italy'
AND score < 500

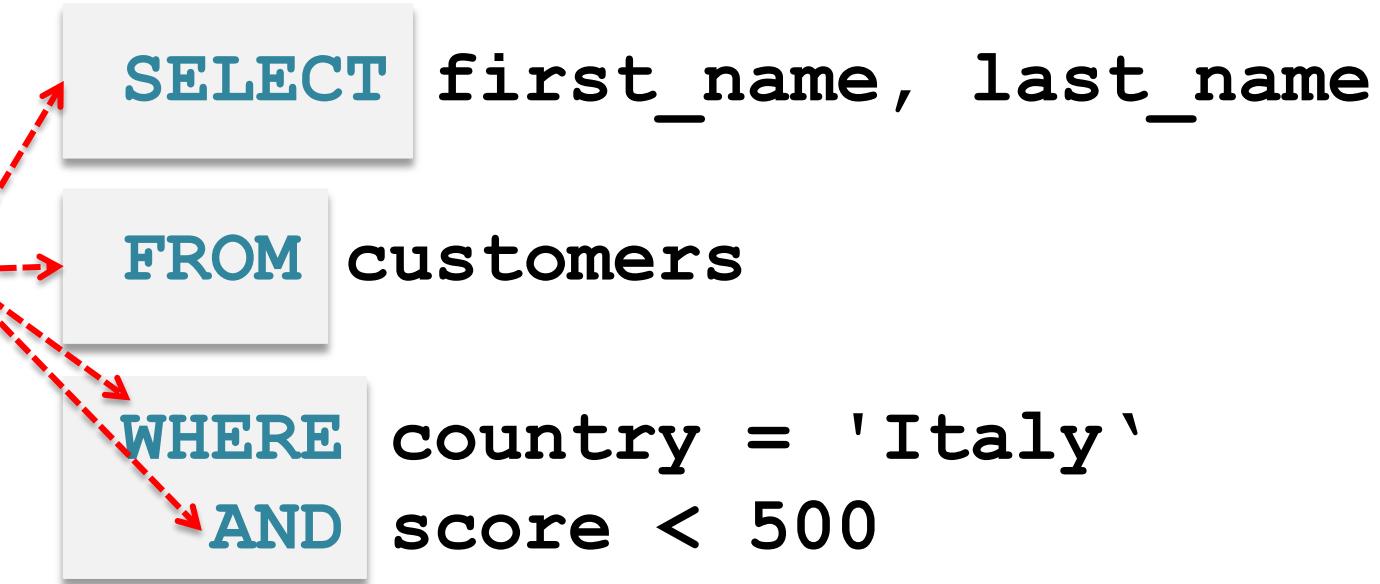
-- Select customer data

SELECT first_name, last_name

FROM customers

WHERE country = 'Italy'
AND score < 500

Keywords



-- Select customer data

SELECT **first_name**, **last_name**

FROM **customers**

WHERE **country** = 'Italy'
AND **score** < 500

Identifiers

-- Select customer data

```
SELECT first_name, last_name
```

```
FROM customers
```

```
WHERE country = 'Italy'  
AND score < 500
```

Operators

SQL Statement/Query



Comment

```
-- Select customer data
```

Clauses

```
SELECT first_name, last_name
```

Keywords

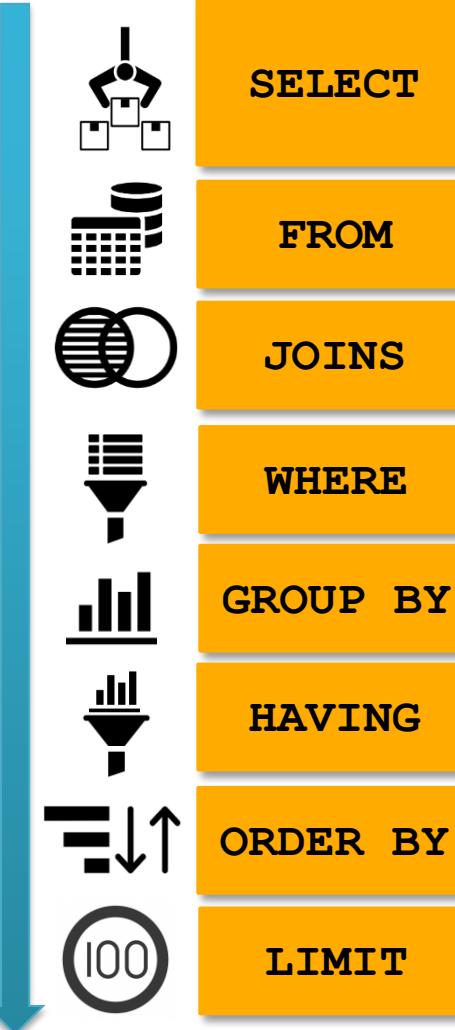
```
FROM customers
```

```
WHERE country = 'Italy'  
AND score < 500
```

Operators

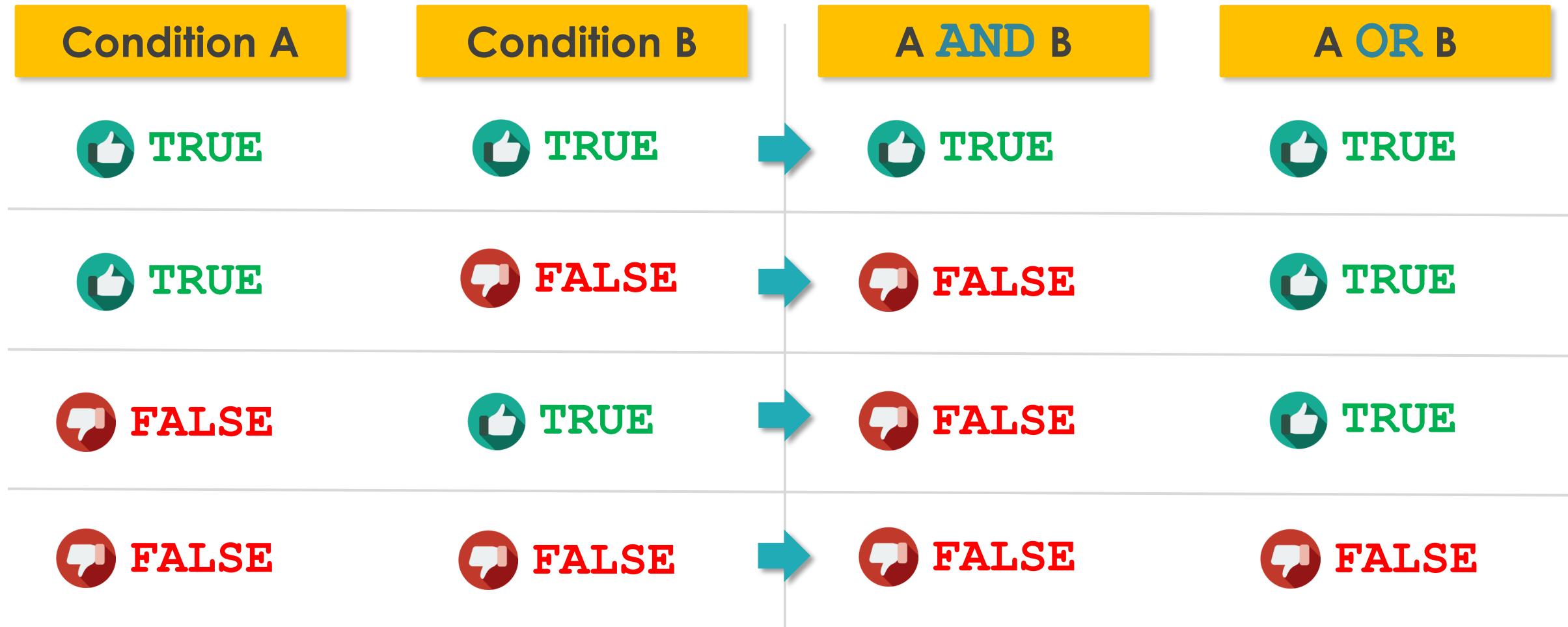
Identifiers

SELECT Statement

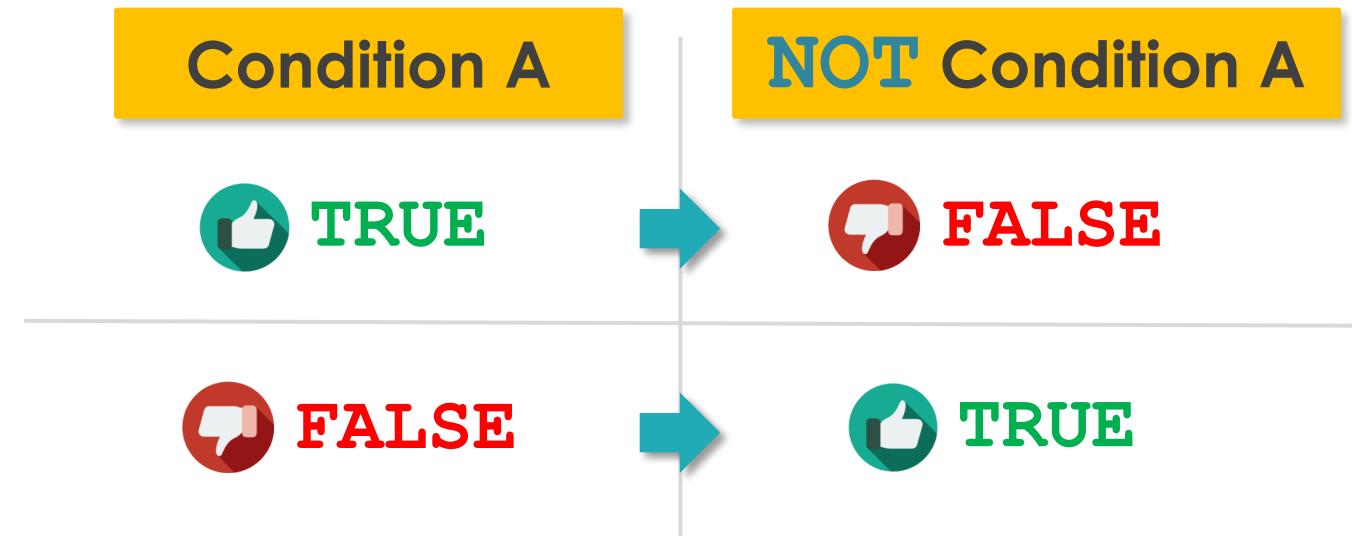


```
SELECT DISTINCT
    country,
    COUNT(c.customer_id) AS total_customers
FROM customers c
INNER JOIN orders o
ON o.customer_id = c.customer_id
WHERE country = 'germany'
GROUP BY c.country
HAVING COUNT(c.customer_id) > 1
ORDER BY c.country
LIMIT 2
```

Logical Operators AND OR



Logical Operators NOT



WHERE Operators

Comparison Operators

=	Equal
!= or <>	Not equal
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Logical Operators

AND	Return True if both conditions are True
OR	Return True if one of conditions is True
NOT	Reverse the result of any Boolean operator
IN	Return True if a value is in a set of values
BETWEEN	Return True if a value falls within a specific range
LIKE	Return True if a value matches a pattern

WHERE Operators



Comparison Operators



Equal



Not Equal



Greater than



Less than



Greater than or equal to



Less than or equal to

Logical Operators

AND

Return True if both conditions are true

OR

Return True if one of conditions is true

NOT

Reverse the result of any Boolean operator

IN

Return True if a value is in a set of values

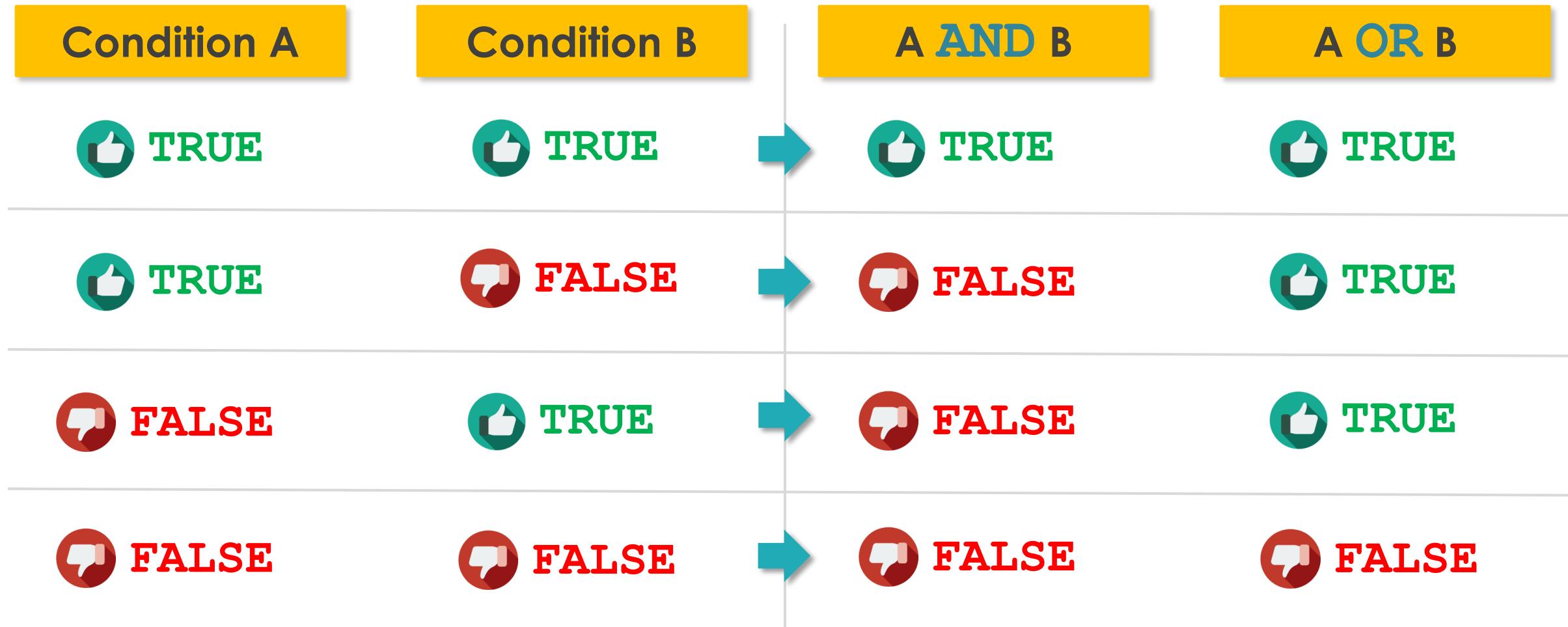
BETWEEN

Return True if a value falls within a specific range

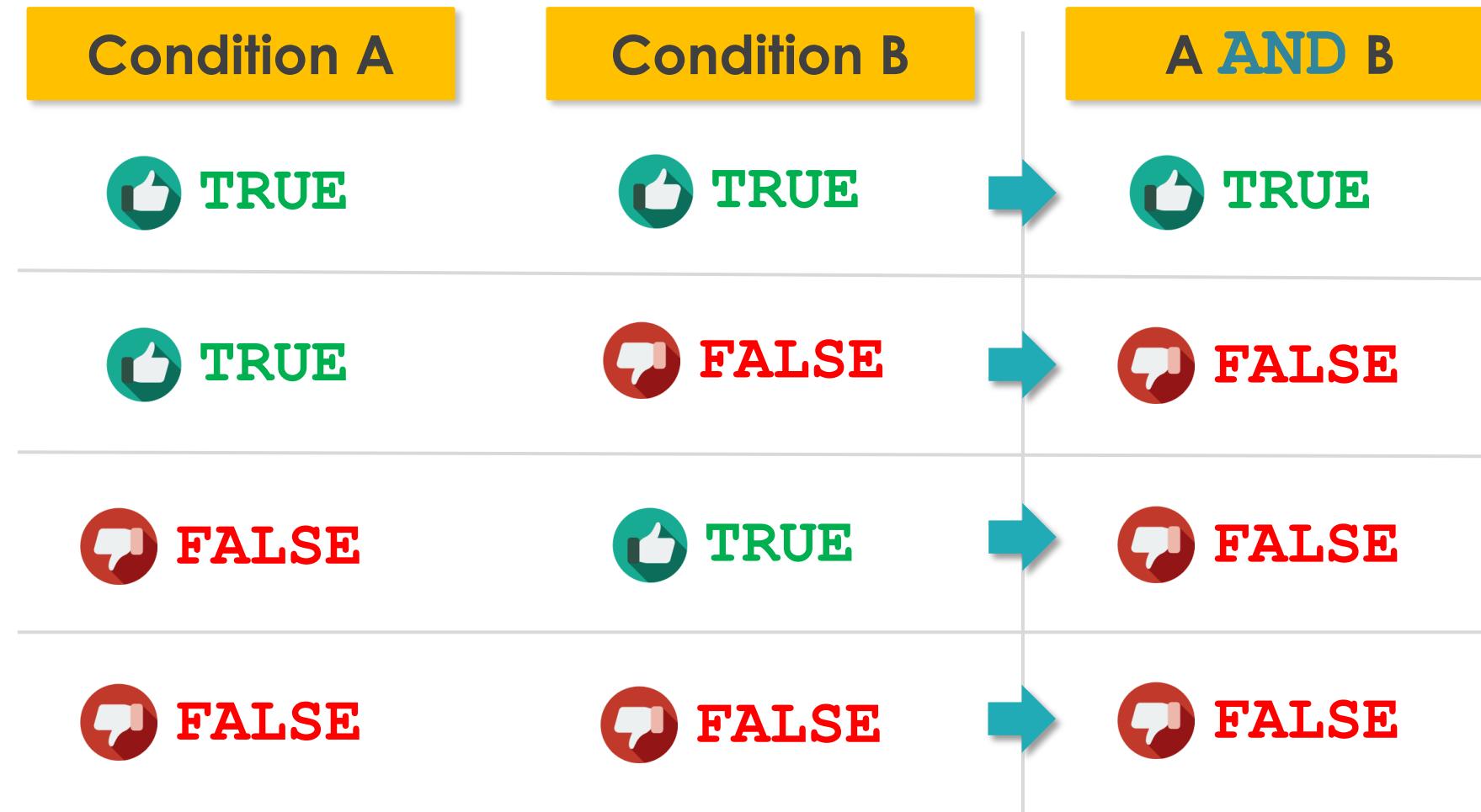
LIKE

Return True if a value matches a pattern

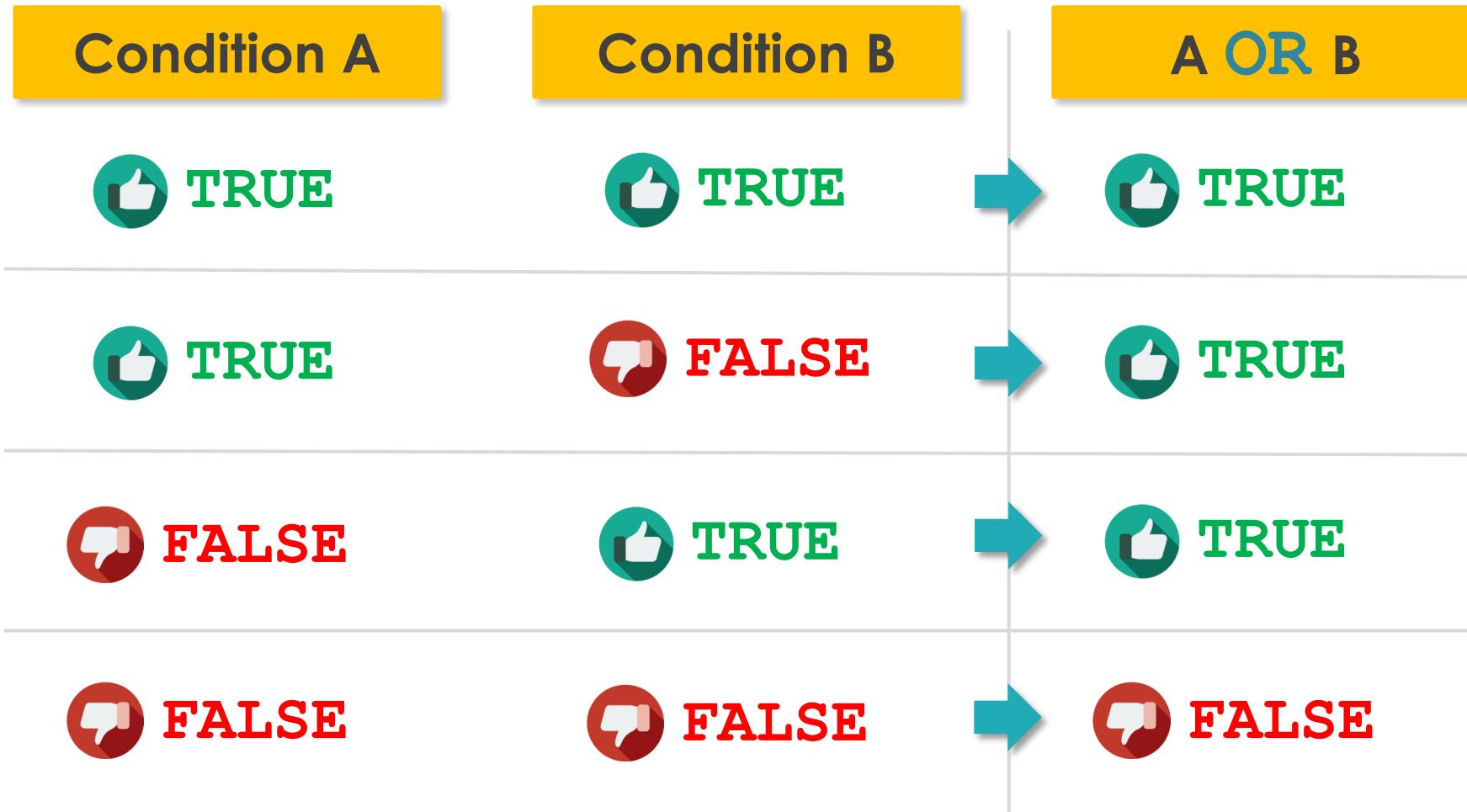
Logical Operators AND OR



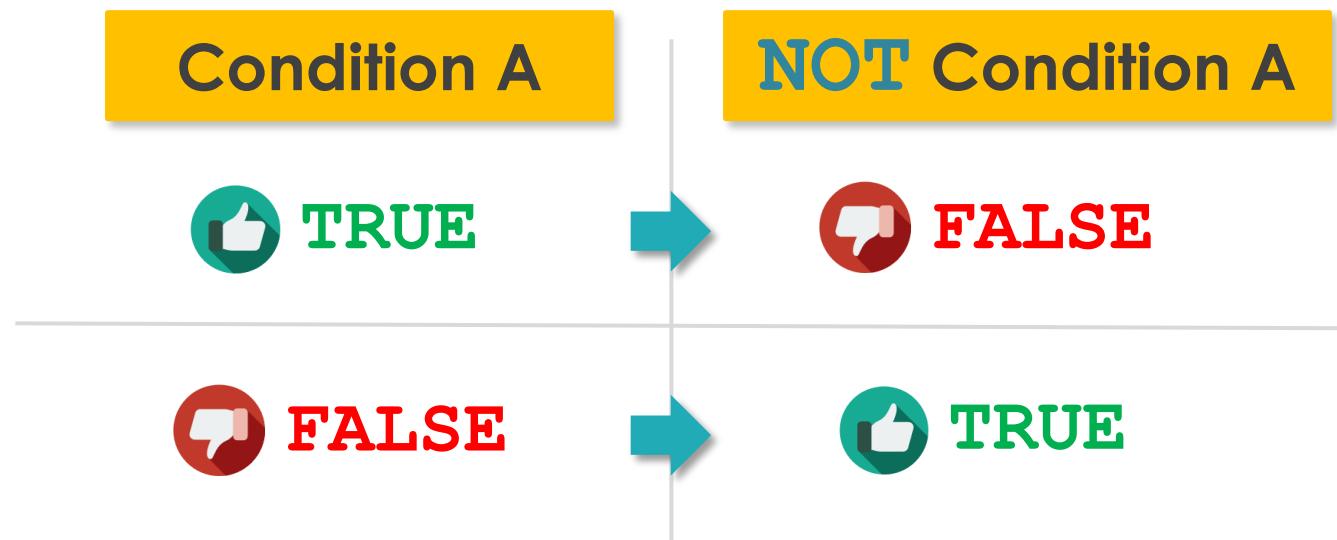
AND - Return True only if both conditions are true



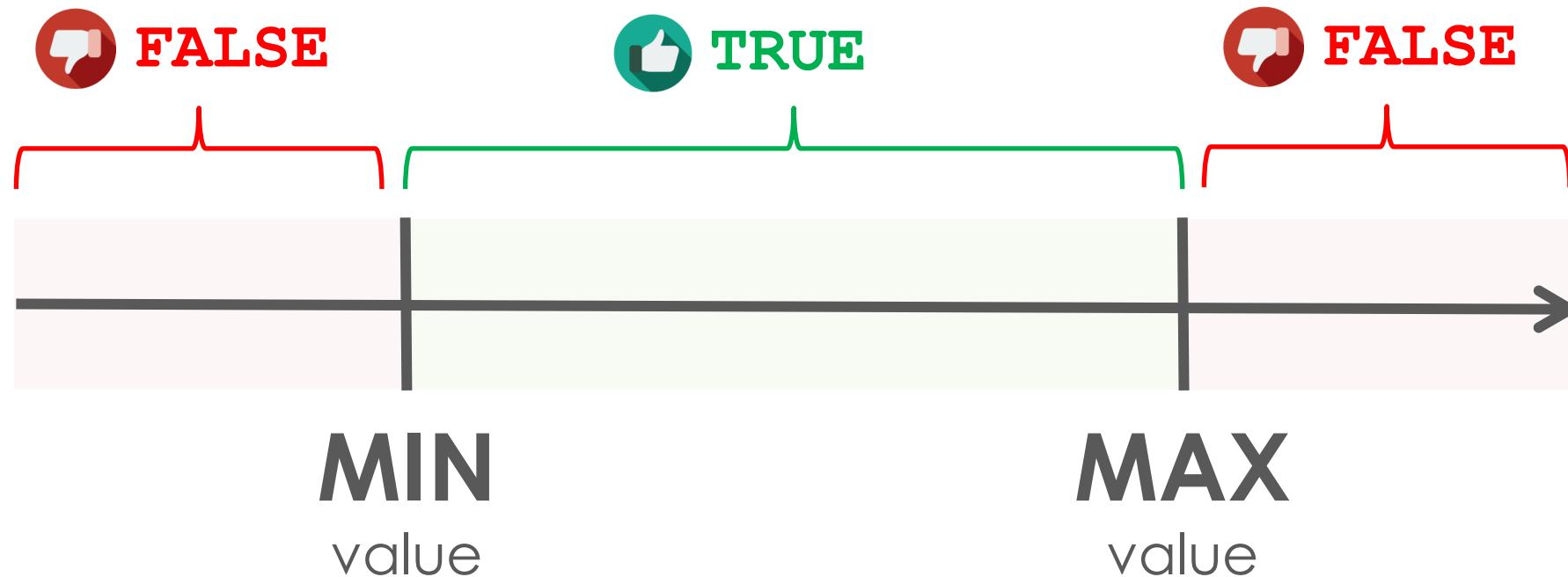
OR- Return True if one of conditions is true



NOT - Reverse the result of any Boolean operator



BETWEEN- Return True if a value falls within a specific range



IN - Return True if a value is in a list of values

Customers				
customer_id	first_name	last_name	country	score
1	Maria	Cramer	Germany	350
2	John	Steel	USA	900
3	Georg	Pipps	UK	750
4	Martin	Müller	Germany	500
5	Peter	Franken	USA	NULL

Value in the List?



TRUE

YES



FALSE

NO

Checklist

Value 1

Value 2

Value 3

...

Value N



LIKE - Return True if a value matches a pattern

- Percent `%` matches anything
- Underscore `_` matches exactly one character

	<u>Pattern</u>
Find names <u>begins</u> with 'M'	<code>M%</code>
Find names <u>ends</u> with 'n'	<code>%n</code>
Find names <u>containing</u> the 'r'	<code>%r%</code>
Find names <u>containing</u> the 'r' at 3d position	<code>__r%</code>

Find names begins with 'M'

Pattern	M%
Maria	M aria
John	J ohn
Georg	G eorg
Martin	M artin
Peter	P eter

Find names ends with 'n'

Pattern	%	n
Maria	Mari	a
John	John	n
Georg	Geor	g
Martin	Marti	n
Peter	Pete	r

Find names containing the 'r'

Pattern	% r %
Maria	Ma  ia
John	
Georg	Geo  g
Martin	Ma  tin
Peter	Pete 

Find names containing the 'r' at 3d position

Pattern	— — r %
Maria	Ma[r]ia
John	Jo[h]n
Georg	Ge[o]rg
Martin	Ma[r]tin
Peter	Pe[t]er

SQL JOINS



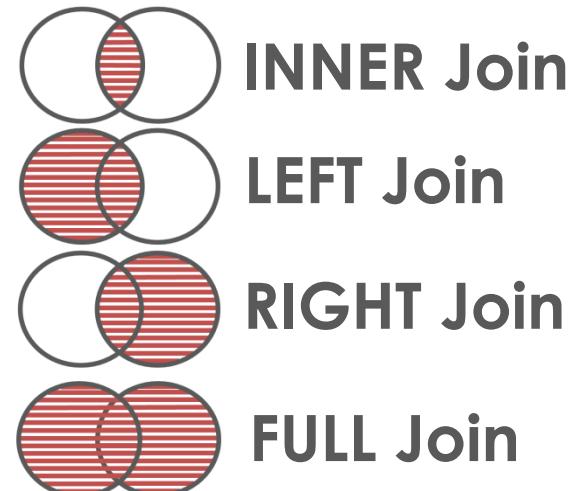
Customers

customer_id	first_name	last_name	country	score
1	Maria	Cramer	Germany	350
2	John	Steel	USA	900
3	Georg	Pipps	UK	750
4	Martin	Müller	Germany	500
5	Peter	Franken	USA	NULL

Join Key



Join Type



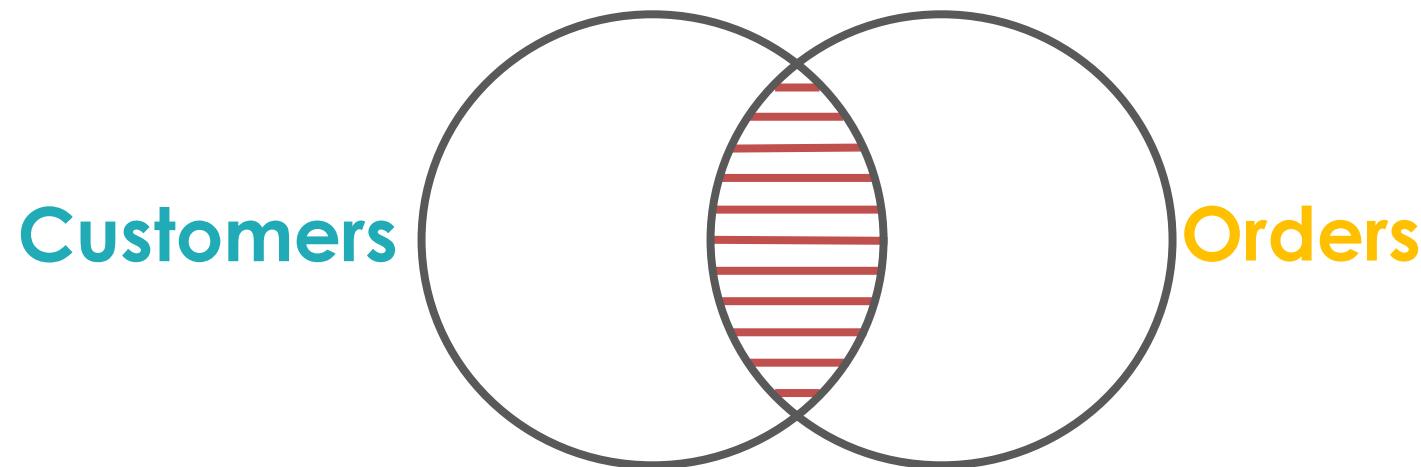
Orders

order_id	customer_id	order_date	quantity
1001	1	2021-01-21	250
1002	2	2021-04-05	1150
1003	3	2021-06-18	500
1004	6	2021-08-31	750

INNER JOIN



LEFT Table
Only matching Rows



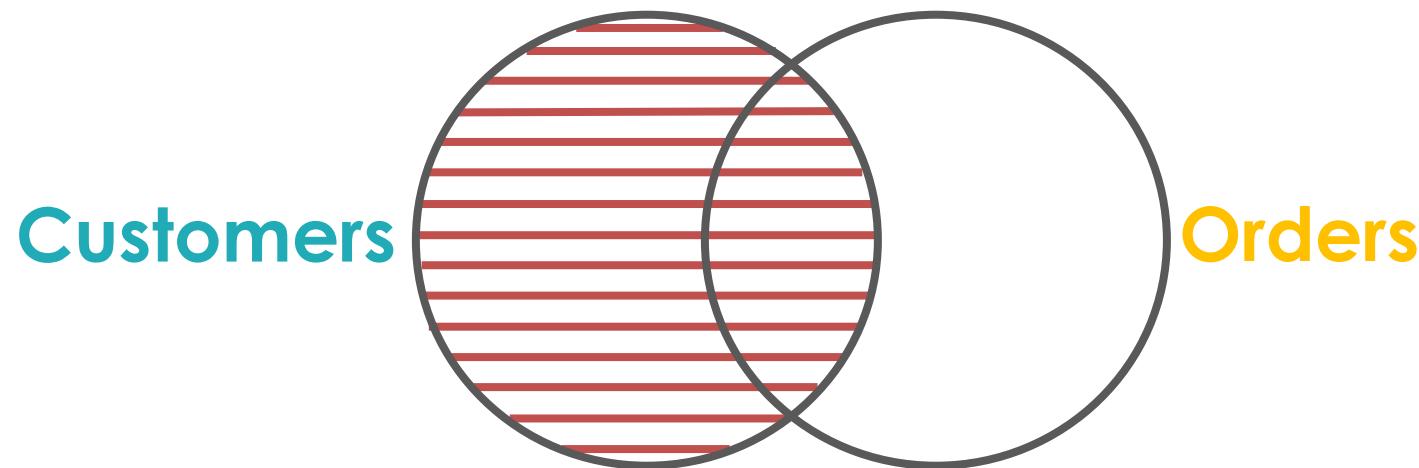
RIGHT Table
Only matching Rows

LEFT JOIN



LEFT Table
Return ALL Rows

RIGHT Table
Only matching Rows

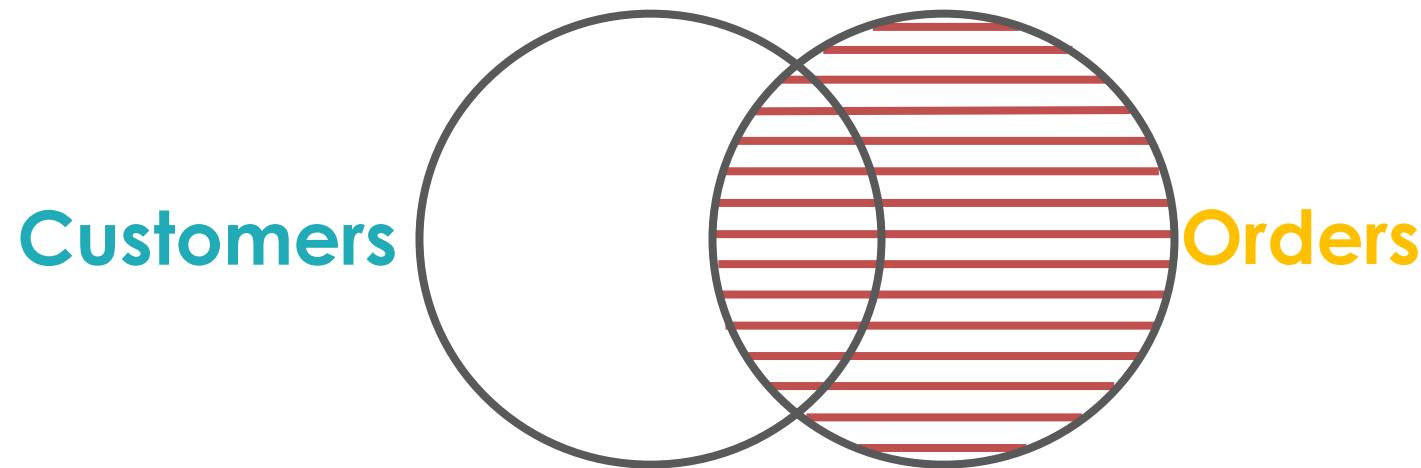


RIGHT JOIN



LEFT Table
Only matching Rows

RIGHT Table
Return ALL Rows

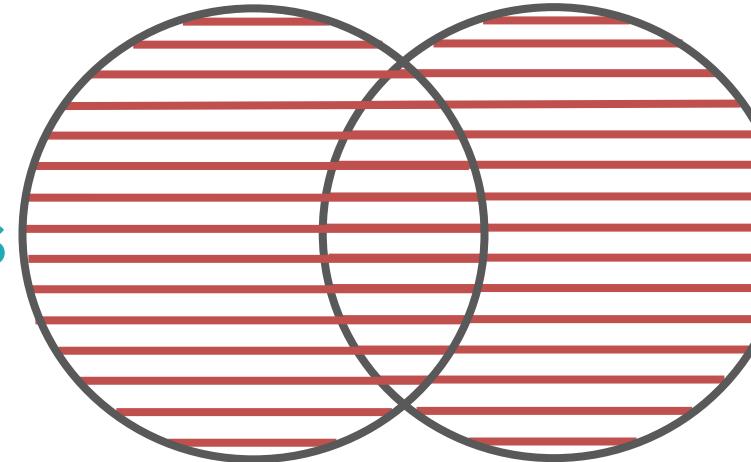


FULL JOIN



LEFT Table
Return ALL Rows

Customers



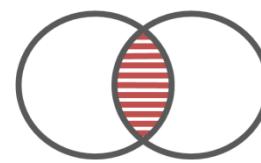
RIGHT Table
Return ALL Rows

Orders

JOINS

Customers

Col1	col2
Rows	Rows



Orders

Col1	col2
Rows	Rows

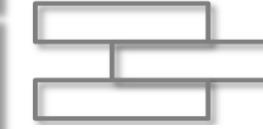


Col1	col2	Col1	col2
Rows	Rows	Rows	Rows

UNION

Customers

Col1	col2
Rows	Rows



Orders

Col1	col2
Rows	Rows



Col1	col2
Rows	Rows
Rows	Rows

SQL Aggregate Functions

COUNT ()

Returns the number of rows in a result set

SUM ()

Returns the sum of values

AVG ()

Returns the average of values

MAX ()

Returns the maximum value

MIN ()

Returns the minimum value

SQL String Functions

CONCAT ()

Returns a string by concatenating two or more string values.

LOWER ()

Converts a string to lowercase.

UPPER ()

Converts a string to uppercase.

TRIM ()

Remove leading and trailing spaces from a string.

LENGTH ()

Returns the length of a string

SUBSTRING ()

Returns a substring from string.

SQL Date Functions

NOW ()

Returns the current date and time.

DAY ()

Returns the day of the month (0-31).

MONTH ()

Returns the month from the date passed (1-12).

YEAR ()

Returns the year.

DATE_ADD ()

Adds a specified time value (or interval) to a date value.

DATE_SUB ()

Subtracts a specified time value (or interval) from a date value.

DATEDIFF ()

Returns the number of days between two dates

Subqueries

Customers

customer_id	first_name	last_name	country	score
1	Maria	Cramer	Germany	350
2	John	Steel	USA	900
3	Georg	Pipps	UK	750
4	Martin	Müller	Germany	500
5	Peter	Franken	USA	NULL

Query

Customers

customer_id	first_name	last_name	country	score
1	Maria	Cramer	Germany	350
2	John	Steel	USA	900
3	Georg	Pipps	UK	750
4	Martin	Müller	Germany	500
5	Peter	Franken	USA	NULL

Result

Query 1

Query 2

(Subquery)

TRIM



LTRIM()

RTRIM()

LEFT
SPACE

RIGHT
SPACE

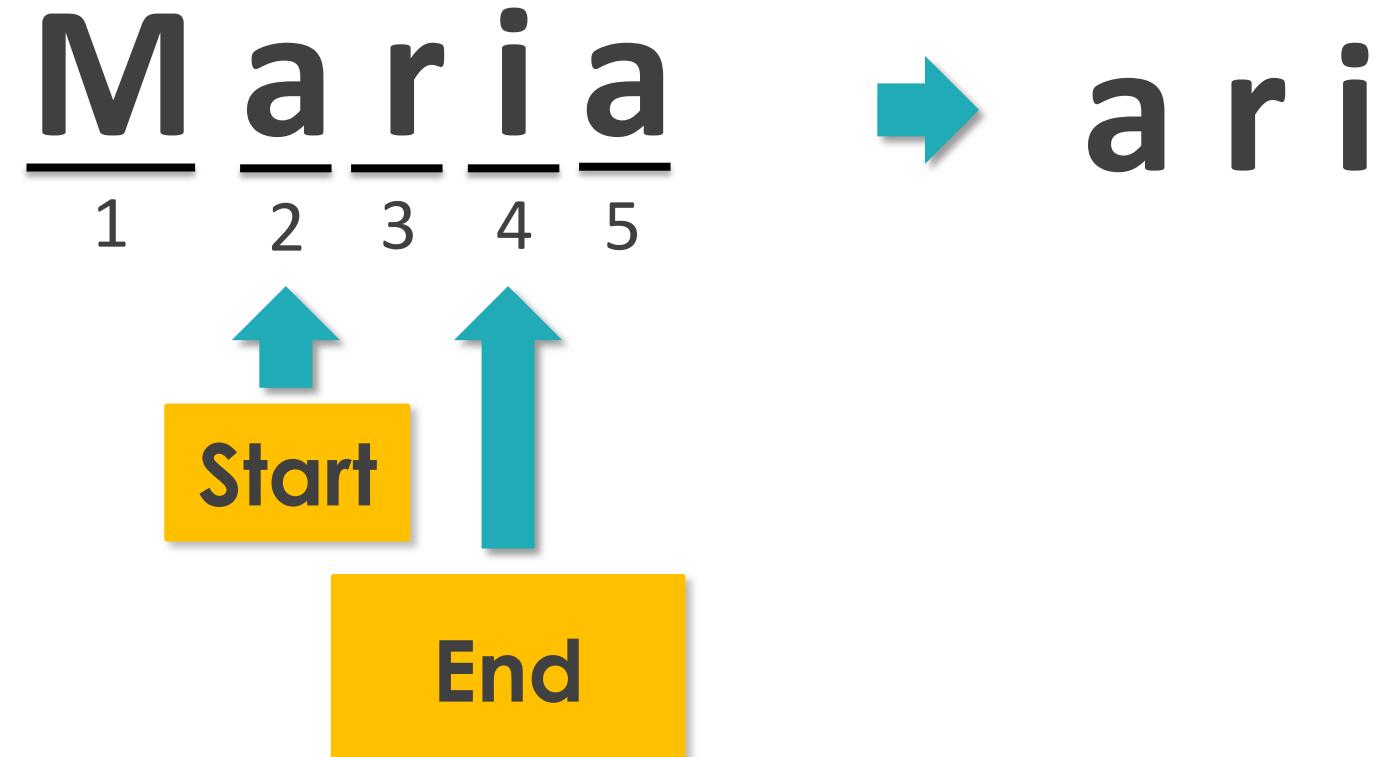
TRIM()
(LTRIM + RTRIM)

SUBSTRING



SUBSTRING(Column ,Start ,Length)

SUBSTRING ('Maria' ,2 ,3)



COLUMN Definition



Column Name

Could be
Anything

Data Type

INT

VARCHAR

DATE

CHAR

...

Constraints

PRIMARY KEY

NOT NULL

UNIQUE

DEFAULT

...