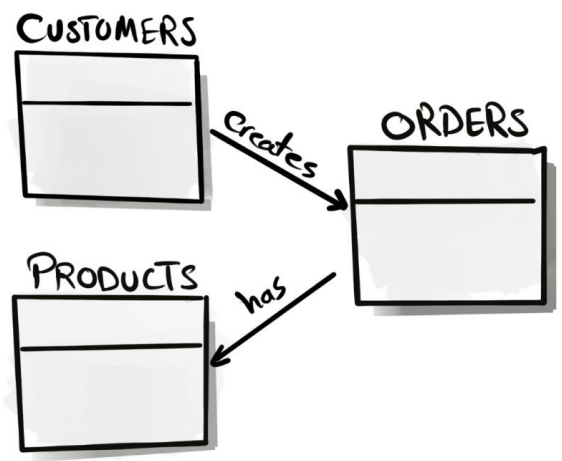
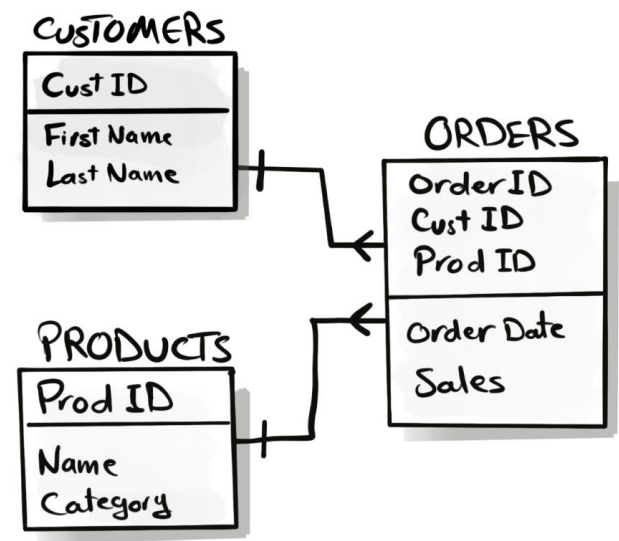


# 3 Types of Data Models

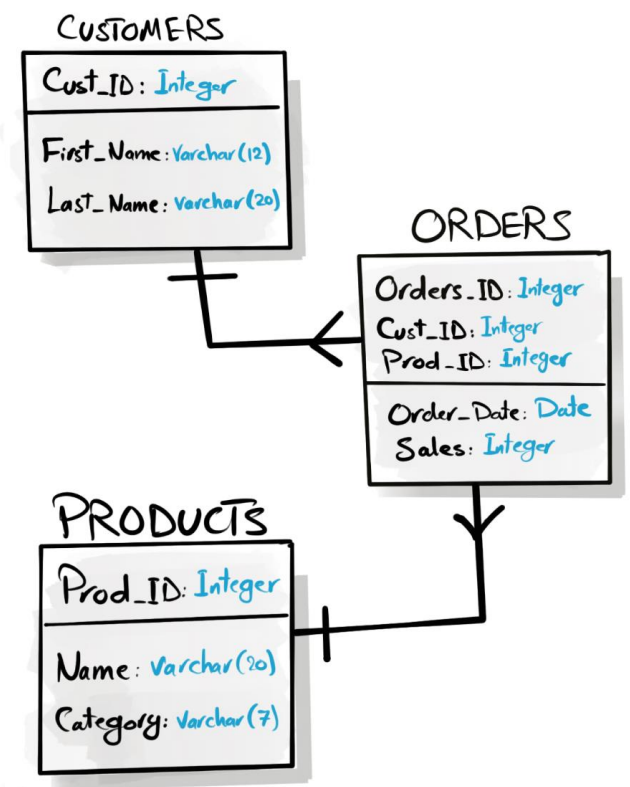
## Conceptual Data Model



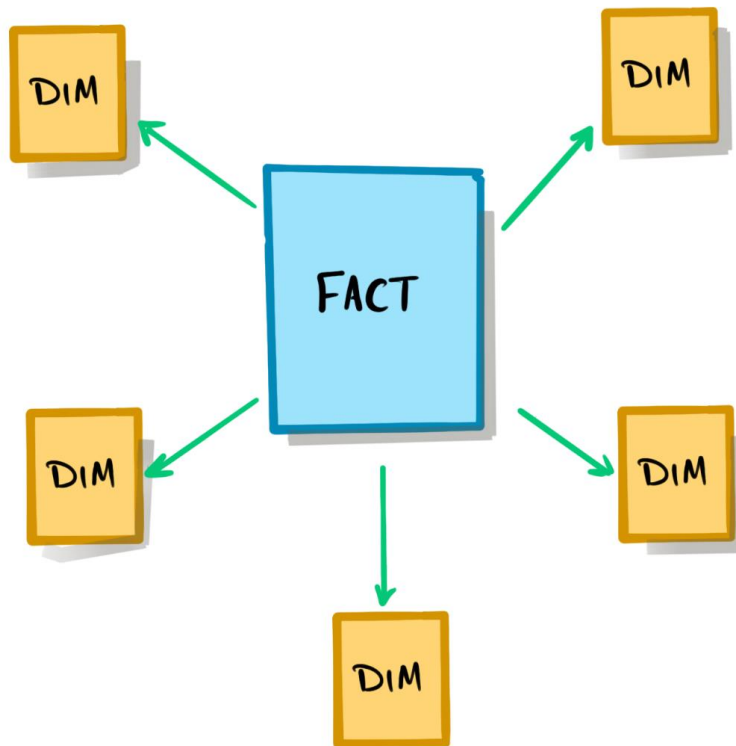
## Logical Data Model



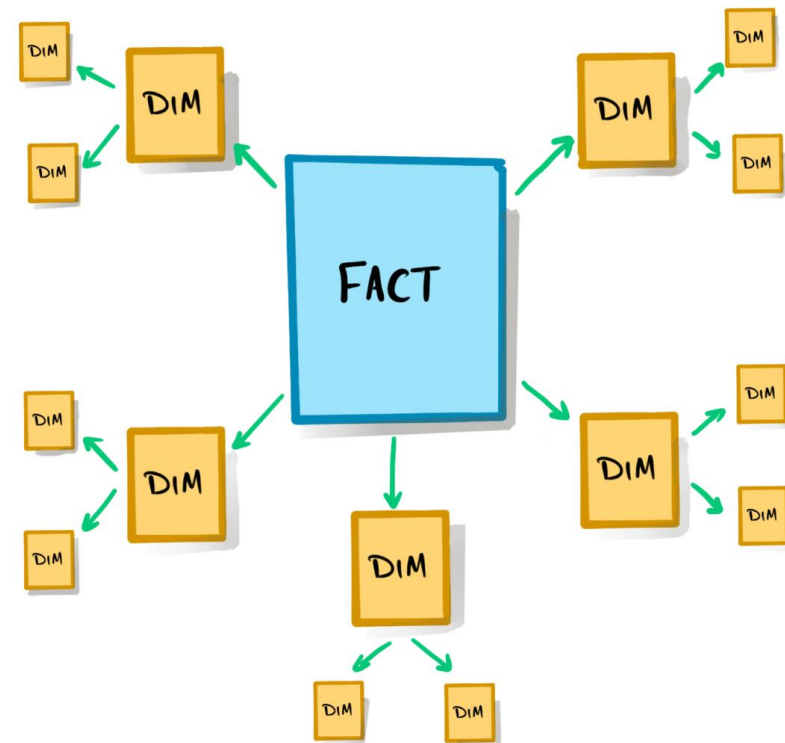
## Physical Data Model



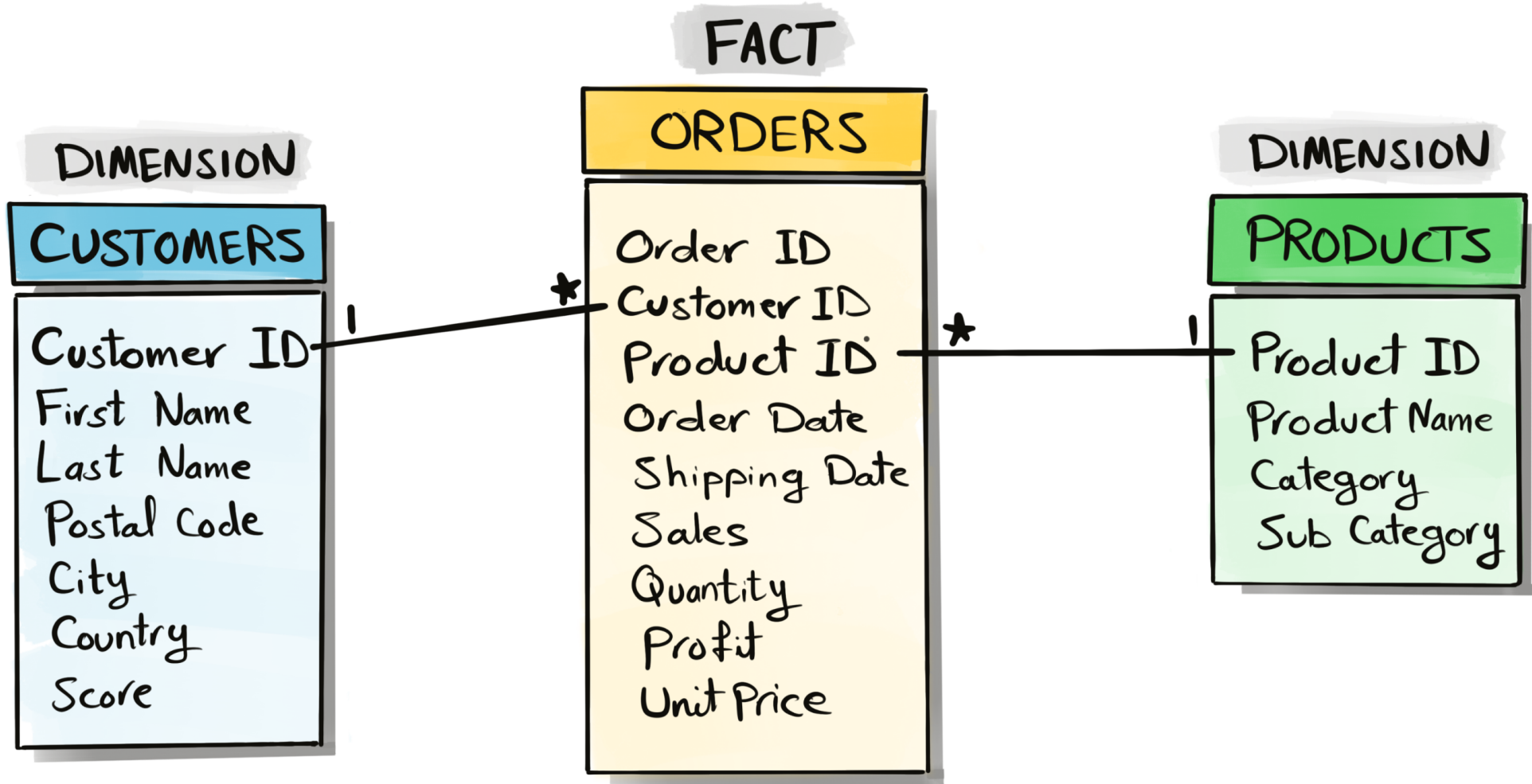
## STAR SCHEMA

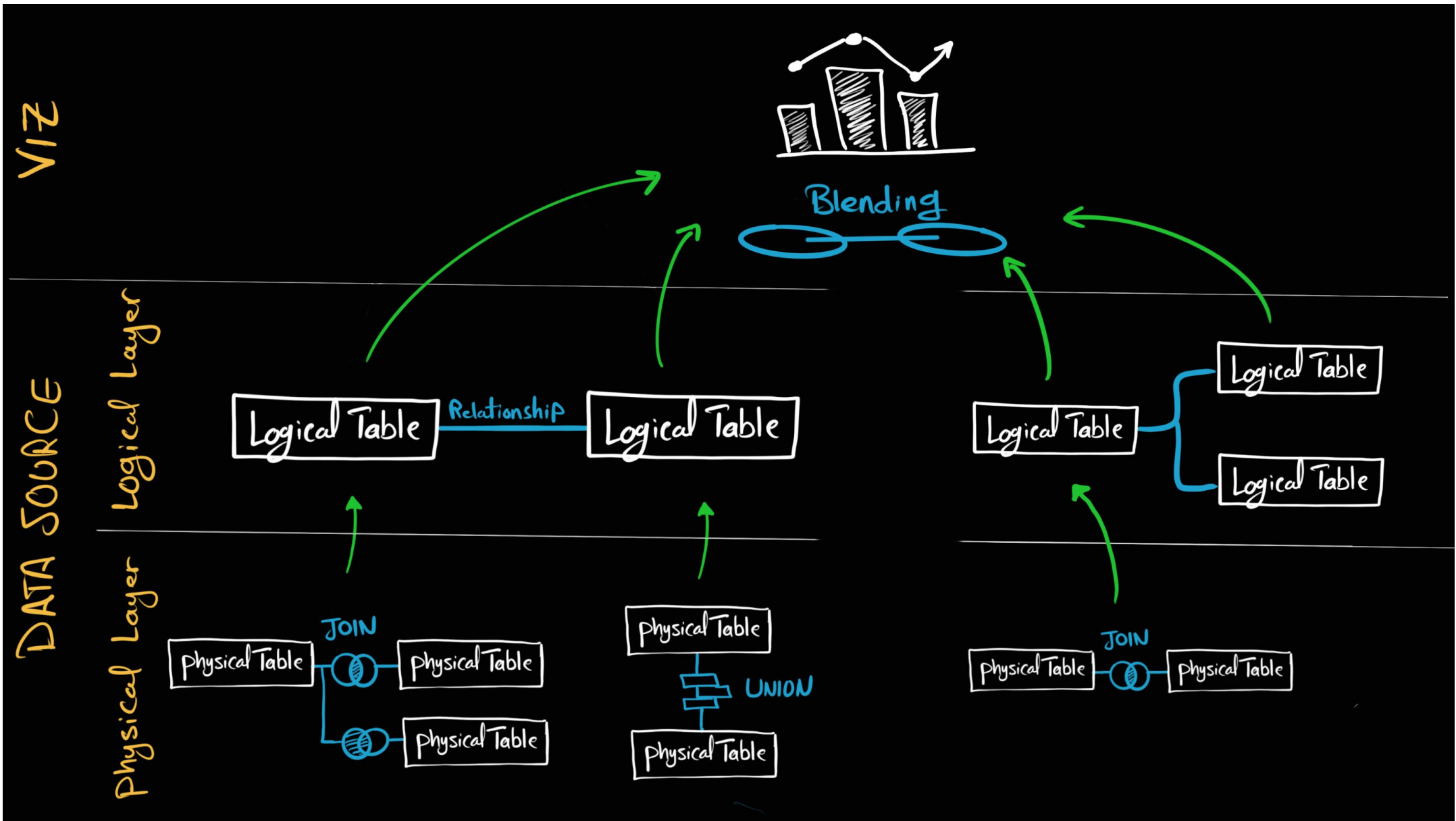


## SNOWFLAKE SCHEMA



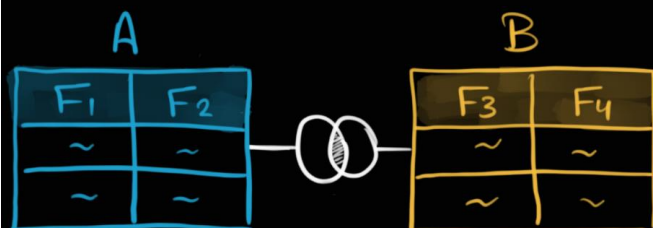
## STAR SCHEMA





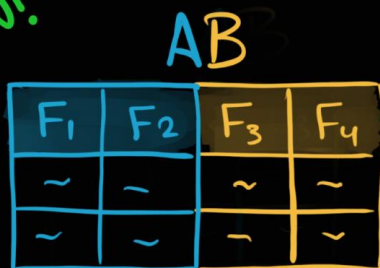
## DATA SOURCE

Physical Layer



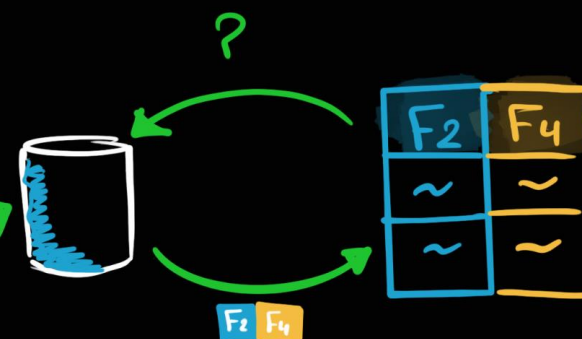
NEW!

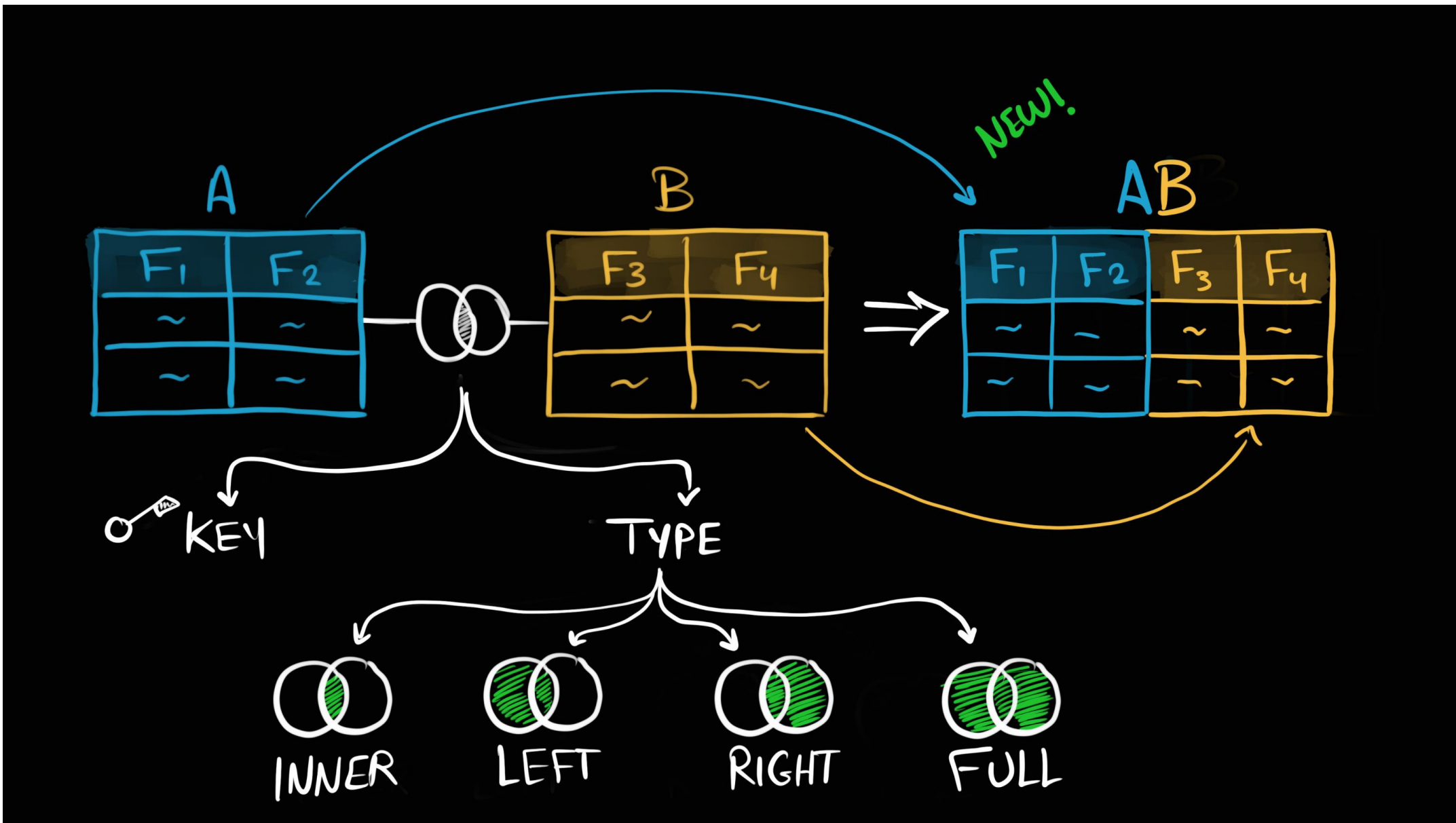
Logical Layer

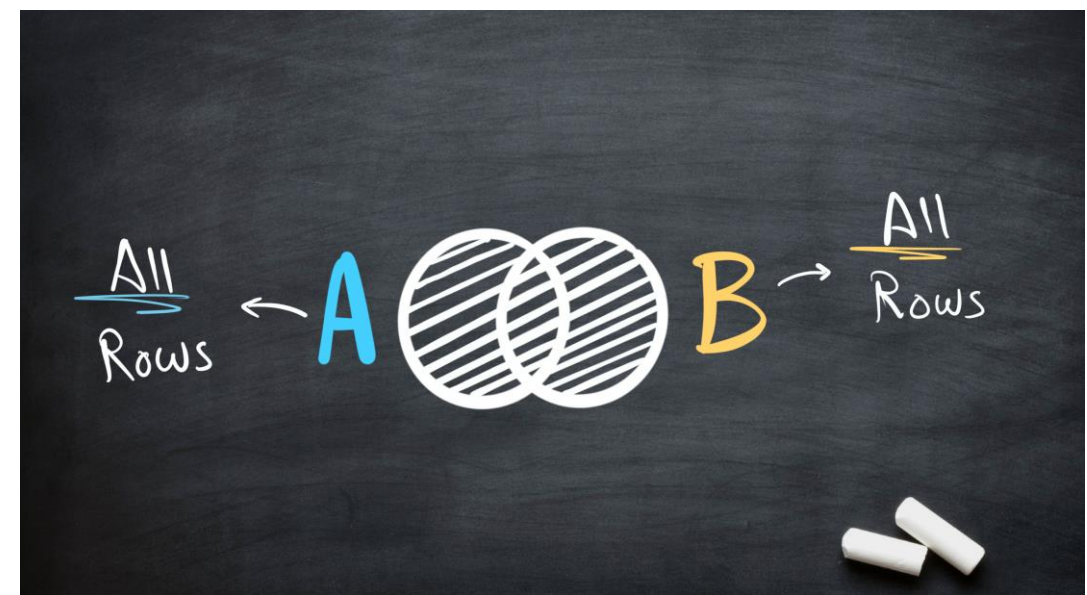
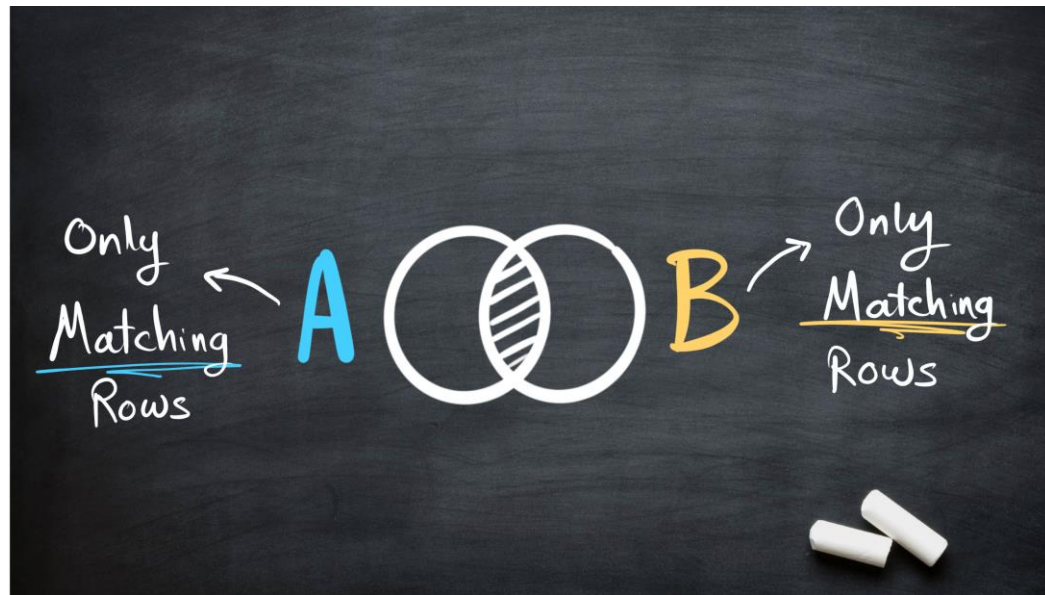
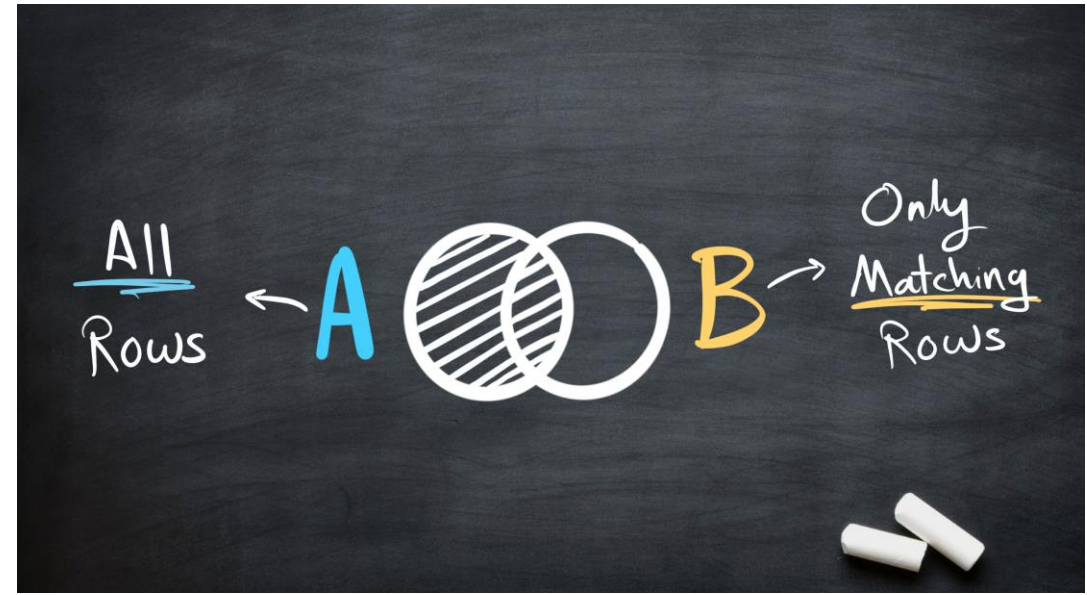
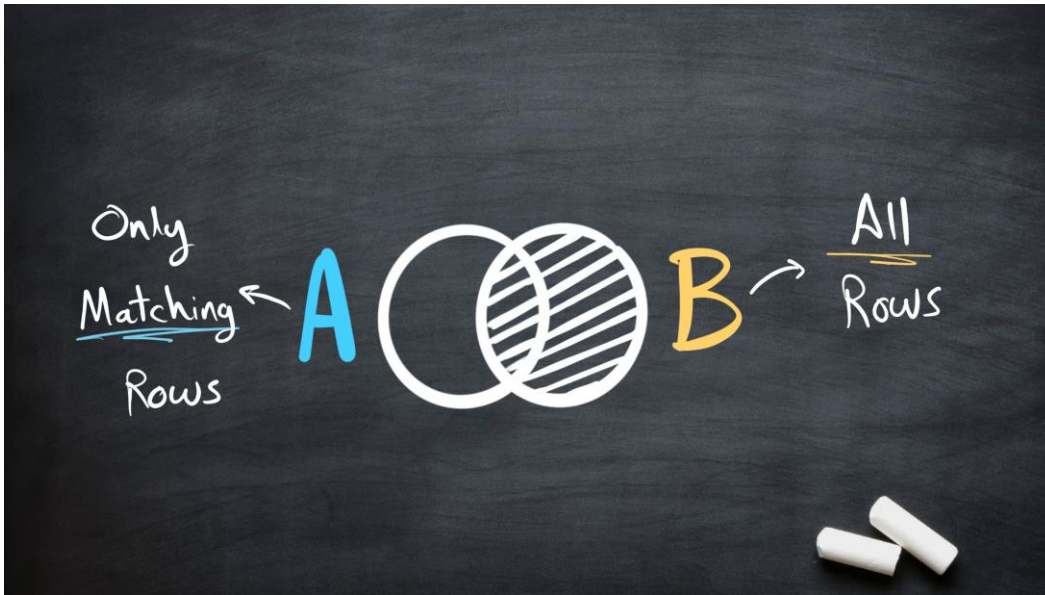


## Visualization

Visualization









# JOIN | How it Works

CustomerNames

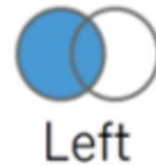
ID	Name
1	Maria
2	John

CustomerAges

ID	Age
1	20
3	35



ID	Name	ID	Age
1	Maria	1	20



ID	Name	ID	Age
1	Maria	1	20
2	John	NULL	NULL



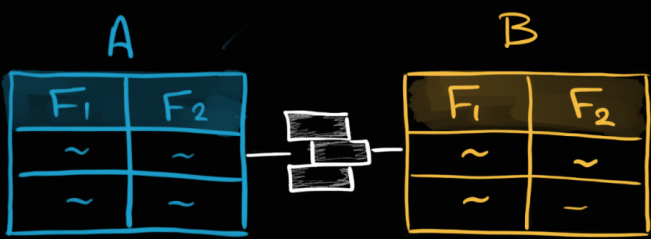
ID	Name	ID	Age
1	Maria	1	20
NULL	NULL	3	35



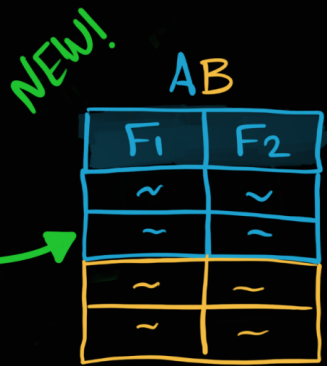
ID	Name	ID	Age
1	Maria	1	20
2	John	NULL	NULL
NULL	NULL	3	35

## DATA SOURCE

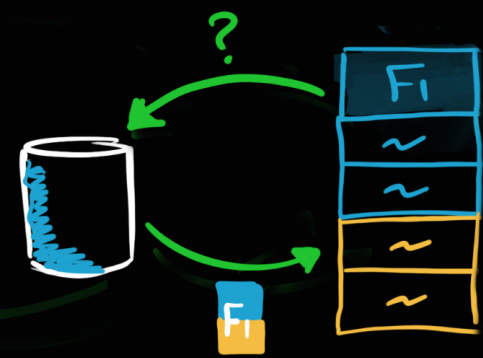
Physical Layer



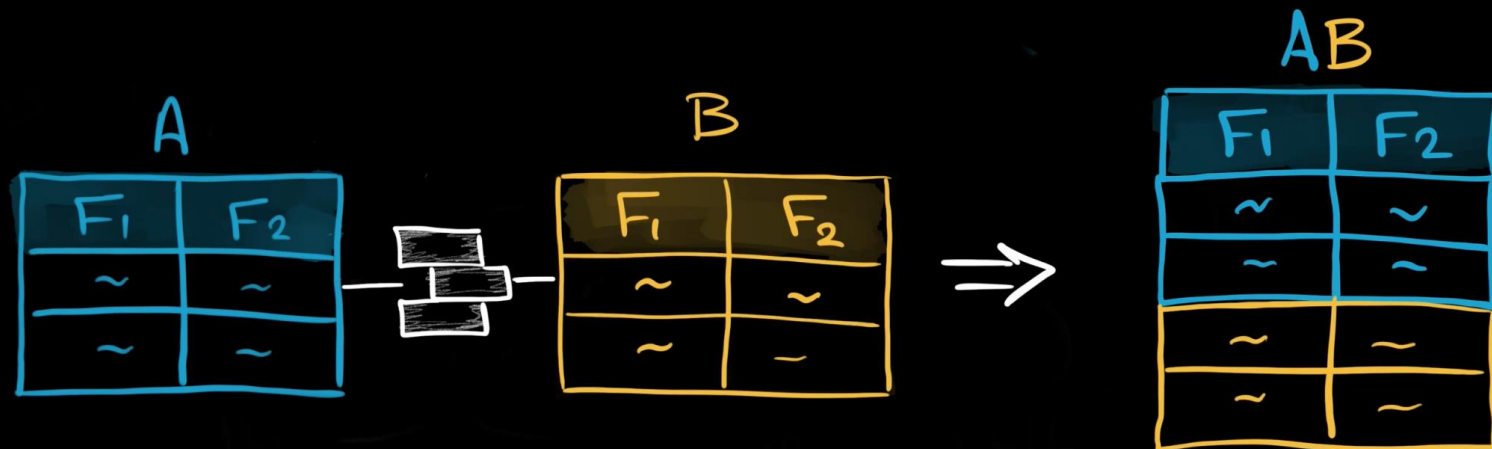
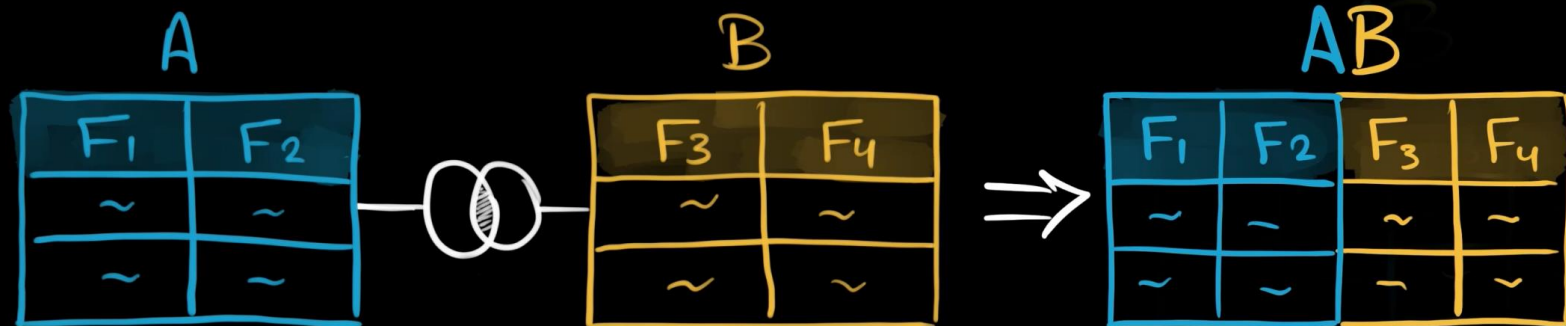
Logical Layer



## Visualization




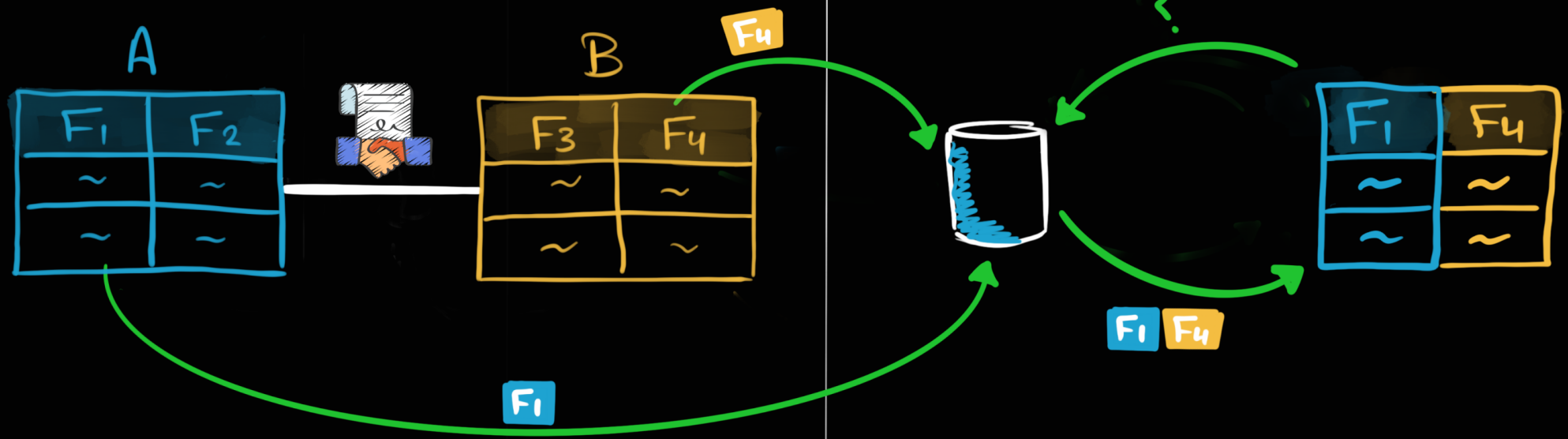
*JOIN Combine the FIELDS of two Tables*







*UNION Combine the ROWS of two Tables*

 DATA SOURCE  
Logical Layer

 Visualization



LEFT TABLE	RIGHT TABLE	JOIN TYPES
Some Record Match	Some Record Match	
All Record Match	Some Record Match	
Some Record Match	All Record Match	
All Record Match	All Record Match	

# Relationships | How it Works

Orders		Customers	
CustomerID	Sales	CustomerID	Name
1	50	1	Maria
2	20	2	John
2	10	3	Georg
1	30		

MANY-MANY

CustomerID	Sum(Sales)	Name
1	80	Maria
2	30	John

MANY-ONE

CustomerID	Sum(Sales)	Name
1	80	Maria
2	30	John

ONE-MANY

CustomerID	Sum(Sales)	Name
1	50	Maria
2	20	John

ONE-ONE

CustomerID	Sum(Sales)	Name
1	50	Maria
2	20	John

Correctness Performance		Cardinality	
OK	NOK	MANY	MANY
OK	OK	MANY	ONE
NOK	NOK	ONE	MANY
NOK	OK	ONE	ONE

DATA SOURCE  
Logical Layer

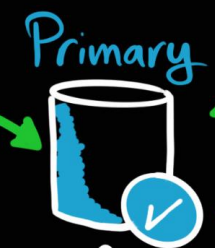
A

F <sub>1</sub>	F <sub>2</sub>
~	~
~	~

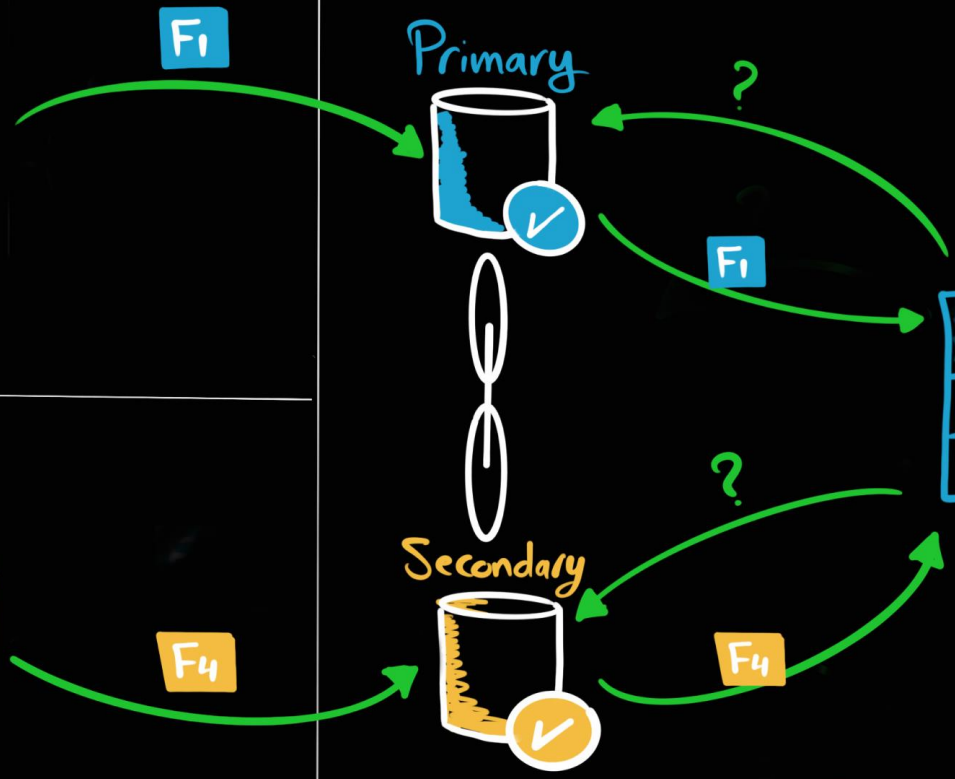
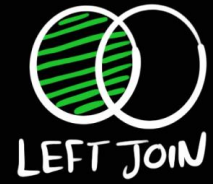
B

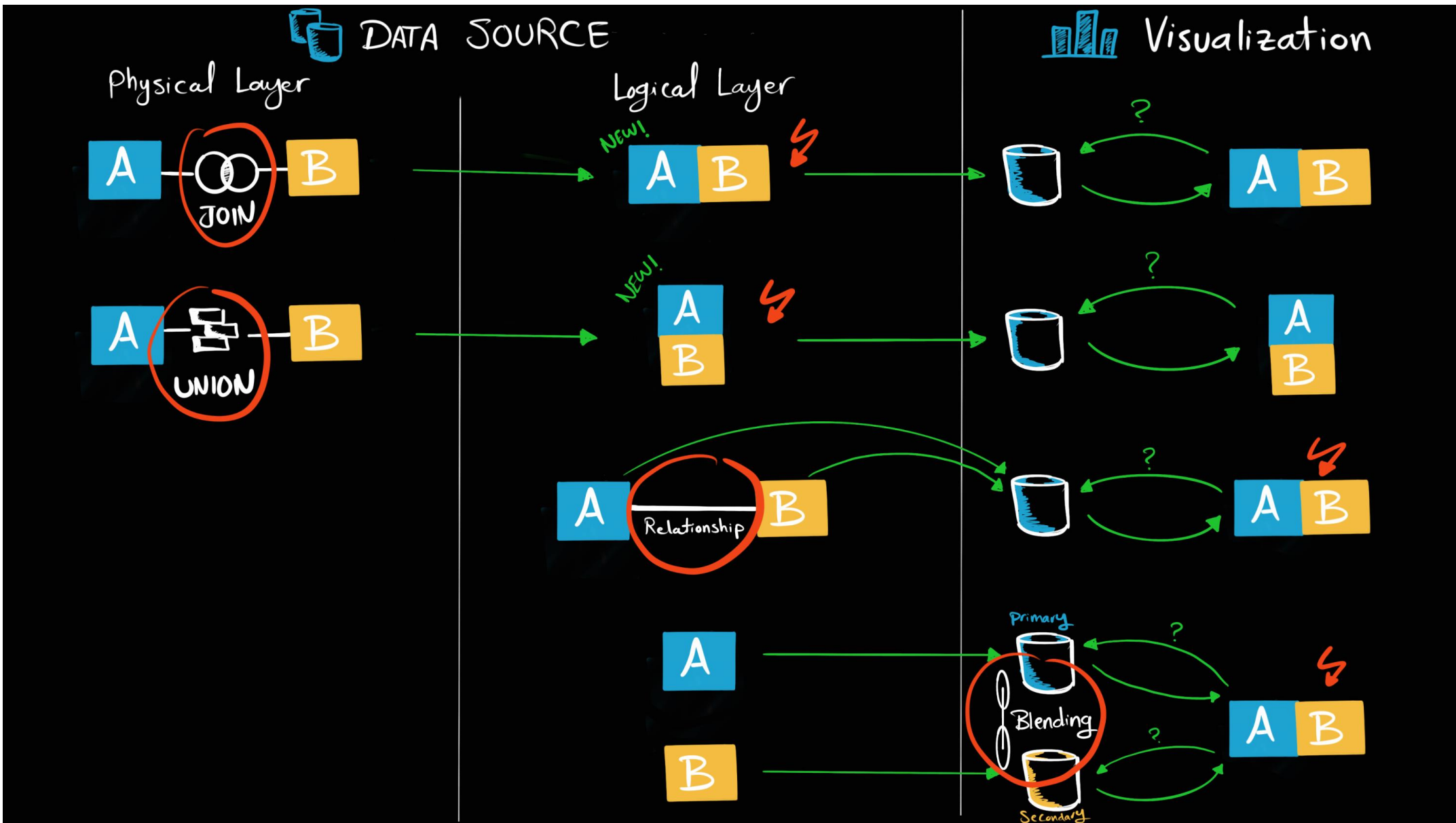
F <sub>3</sub>	F <sub>4</sub>
~	~
~	~

Visualization









F <sub>1</sub>	F <sub>4</sub>
~	~
~	~









 Layer	Physical Layer	Physical Layer	Logical Layer	Visualization Level
 Multi-Data Sources	✗	✗	✗	✓
 Merge Tables?	✓	✓	✗	✗
 Flexibility	Static	Static	Flexible	Very Flexible (Page by Page)
 Join Types	n/a	Inner, Left, Right, Full	All	Left
 Rank	n/a	3	1 (Default)	2