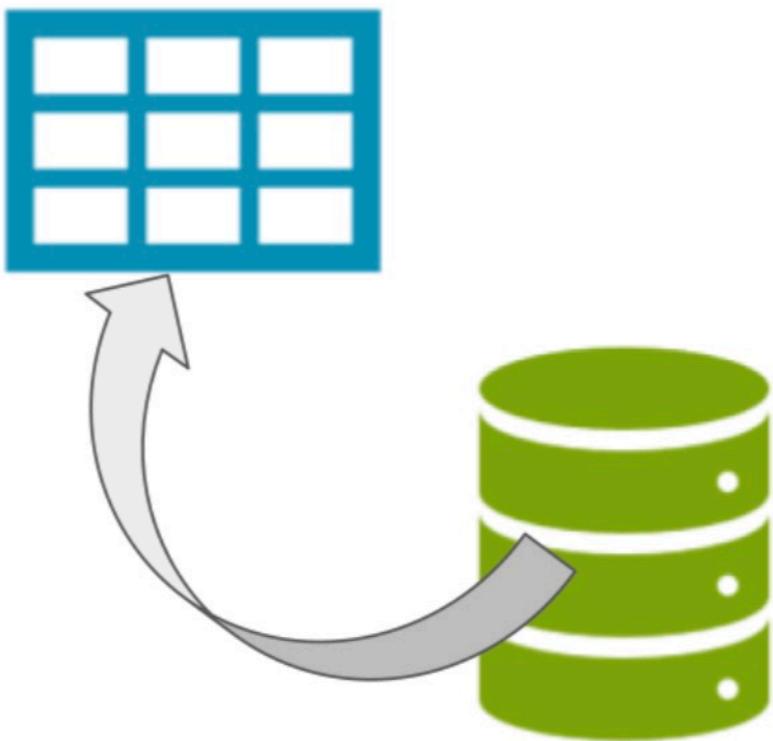


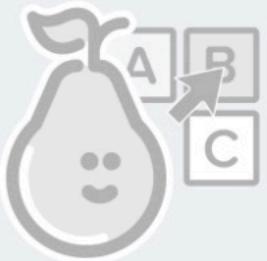


RDB & SQL

Session 4



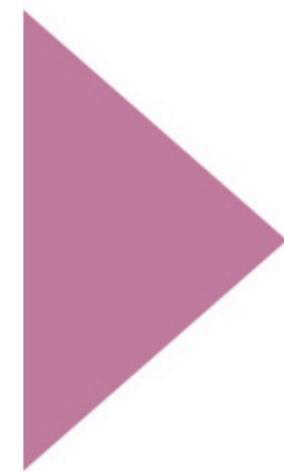
I've completed the pre-class content.



No Multiple Choice Response
You didn't answer this question



Pear Deck Interactive Slide
Do not remove this bar

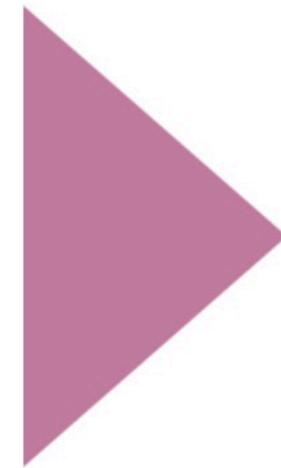


Joins



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- ▶ Introduction to Joins
- ▶ Inner Join
- ▶ Left Join
- ▶ Right Join
- ▶ Full Outer Join
- ▶ Cross Join
- ▶ Self Join



Introduction to Joins

► What is Join?



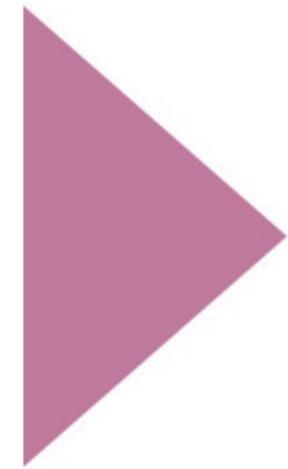
A JOIN clause is used to combine two or more tables into a single table.

This process is carried out based on a related column between tables.

► JOIN Types



- **INNER JOIN:** Returns the common records in both tables.
- **LEFT JOIN:** Returns all records from the left table and matching records from the right table.
- **RIGHT JOIN:** Returns all records from the right table and matching records from the left table.
- **FULL JOIN:** Returns all records of both left and right tables.
- **CROSS JOIN:** Returns the Cartesian product of records in joined tables.
- **SELF JOIN:** A join of a table to itself.



Inner Join

▶ Introduction



INNER JOIN is the most common type of JOINs. It creates a new result table based on the values in common columns from two or more tables.

INNER JOIN returns a table that contains only joined rows that meet the specified join conditions.

Syntax

```
1 SELECT columns  
2 FROM table_A  
3 INNER JOIN table_B ON join_conditions
```



► Syntax

Syntax of Join of Multiple Tables

```
1 SELECT columns  
2   FROM table_A  
3 INNER JOIN table_B  
4     ON join_conditions1 AND join_conditions2  
5 INNER JOIN table_C  
6     ON join_conditions3 OR join_conditions4  
7 ...|
```

▶ Sample Tables



1	emp_id	first_name	last_name	salary	job_title	gender	hire_date
2	-----	-----	-----	-----	-----	-----	-----
3	17679	Robert	Gilmore	110000	Operations Director	Male	2018-09-04
4	26650	Elvis	Ritter	86000	Sales Manager	Male	2017-11-24
5	30840	David	Barrow	85000	Data Scientist	Male	2019-12-02
6	49714	Hugo	Forester	55000	IT Support Speciali	Male	2019-11-22
7	51821	Linda	Foster	95000	Data Scientist	Female	2019-04-29
8	67323	Lisa	Wiener	75000	Business Analyst	Female	2018-08-09
9	70950	Rodney	Weaver	87000	Project Manager	Male	2018-12-20
10	71329	Gayle	Meyer	77000	HR Manager	Female	2019-06-28
11	76589	Jason	Christian	99000	Project Manager	Male	2019-01-21
12	97927	Billie	Lanning	67000	Web Developer	Female	2018-06-25

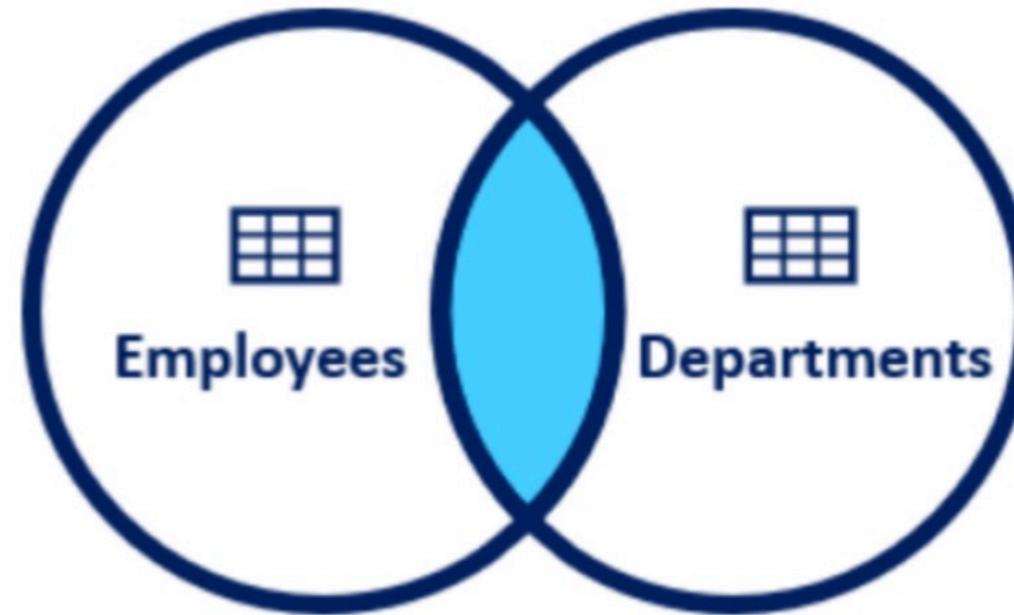
employees

departments

1	emp_id	dept_name	dept_id
2	-----	-----	-----
3	17679	Operations	13
4	26650	Marketing	14
5	30840	Operations	13
6	49823	Technology	12
7	51821	Operations	13
8	67323	Marketing	14
9	71119	Administrative	11
10	76589	Operations	13
11	97927	Technology	12



▶ Inner Join



Visual Representation of Inner JOIN

query:

```
1 SELECT
2   employees.emp_id,
3   employees.first_name,
4   employees.last_name,
5   departments.dept_name,
6   departments.dept_id
7   FROM employees
8   INNER JOIN departments
9     ON employees.emp_id = departments.emp_id;
```

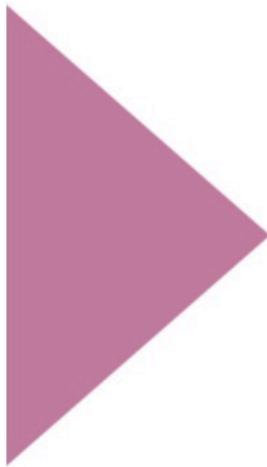
output:

	emp_id	first_name	last_name	dept_name	dept_id
	-----	-----	-----	-----	-----
3	17679	Robert	Gilmore	Operations	13
4	26650	Elvis	Ritter	Marketing	14
5	30840	David	Barrow	Operations	13
6	51821	Linda	Foster	Operations	13
7	67323	Lisa	Wiener	Marketing	14
8	76589	Jason	Christian	Operations	13
9	97927	Billie	Lanning	Technology	12



Query Time

Make a list of products showing the product ID, product name, category ID, and category name.



	product_id	product_name	category_id	category_name
1	1	DENAQ - AC Adapter for T...	4	Computer Accessories
2	2	NS-SP1800BL 5.1-Channel ...	5	Speakers
3	3	Acoustimass 6 Series V Ho...	5	Speakers
4	4	Corsair Vengeance LPX 16...	4	Computer Accessories
5	5	Details About Samsung Gea...	14	Bluetooth
6	6	2TB Red 5400 rpm SATA III ...	4	Computer Accessories
7	7	Details About Alpine 480w 6...	5	Speakers
8	8	Kenwood KFC-1653MRW 6...	5	Speakers

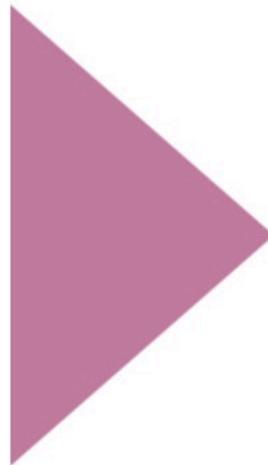
Query executed successfully. (local) (15.0 RTM) DESKTOP-3E95HEO\Datas... SampleRetail 00:00:00 | 520 rows



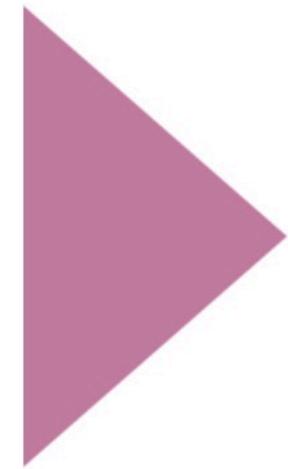
Query Time For You

List employees of stores with their store information.

Select first name, last name, store name



	first_name	last_name	store_name
1	James	Garcia	Davi techno Retail
2	Charles	Cussona	Davi techno Retail
3	Jhon	Setamento	Davi techno Retail
4	Davis	Thomas	Davi techno Retail
5	Williams	Destrey	The BFLO Store
6	Barbara	Rodriguez	The BFLO Store
7	Taylor	Mango	The BFLO Store
8	Elizabeth	Island	Burkes Outlet
9	Brown	Jackson	Burkes Outlet
10	Linda	White	Burkes Outlet



Left Join

▶ Introduction



In this JOIN statement, all the records of the left table and the common records of the right table are returned in the query. If no matching rows are found in the right table during the JOIN operation, these values are assigned as NULL.

Syntax

```
1 | SELECT columns  
2 | FROM table_A  
3 | LEFT JOIN table_B ON join_conditions
```

► Sample Tables



1	emp_id	first_name	last_name	salary	job_title	gender	hire_date
2	-----	-----	-----	-----	-----	-----	-----
3	17679	Robert	Gilmore	110000	Operations Director	Male	2018-09-04
4	26650	Elvis	Ritter	86000	Sales Manager	Male	2017-11-24
5	30840	David	Barrow	85000	Data Scientist	Male	2019-12-02
6	49714	Hugo	Forester	55000	IT Support Speciali	Male	2019-11-22
7	51821	Linda	Foster	95000	Data Scientist	Female	2019-04-29
8	67323	Lisa	Wiener	75000	Business Analyst	Female	2018-08-09
9	70950	Rodney	Weaver	87000	Project Manager	Male	2018-12-20
10	71329	Gayle	Meyer	77000	HR Manager	Female	2019-06-28
11	76589	Jason	Christian	99000	Project Manager	Male	2019-01-21
12	97927	Billie	Lanning	67000	Web Developer	Female	2018-06-25

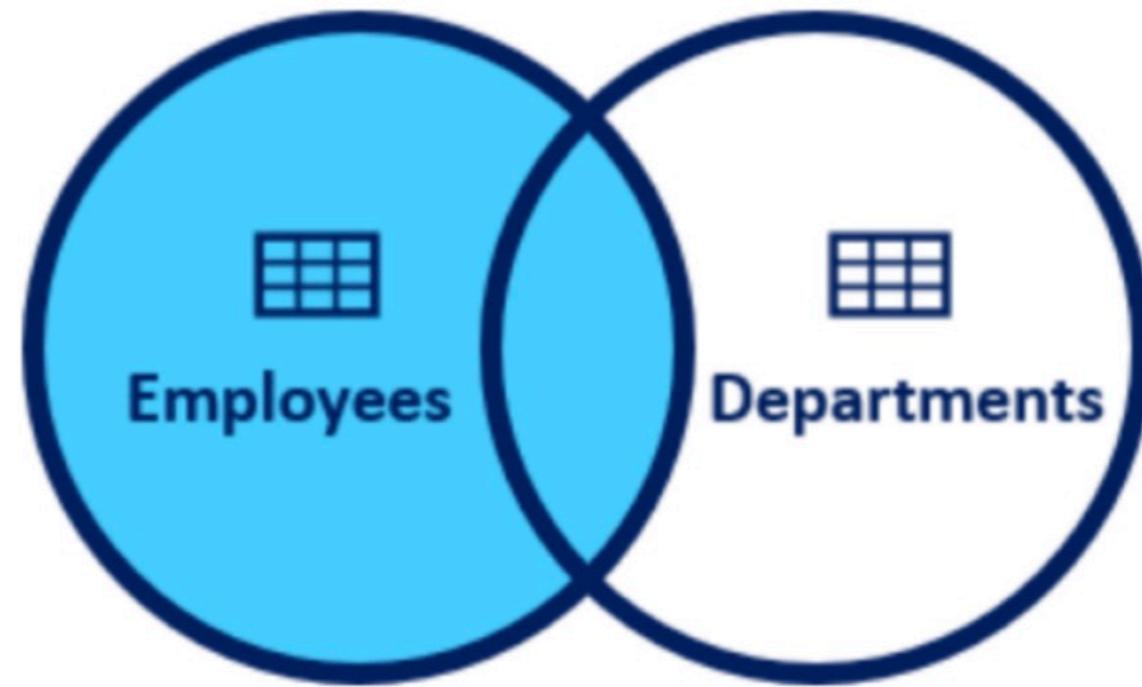
employees

1	emp_id	dept_name	dept_id
2	-----	-----	-----
3	17679	Operations	13
4	26650	Marketing	14
5	30840	Operations	13
6	49823	Technology	12
7	51821	Operations	13
8	67323	Marketing	14
9	71119	Administrative	11
10	76589	Operations	13
11	97927	Technology	12

departments



▶ Left Join



Visual Representation of Left JOIN

query :

```
1 SELECT
2     employees.emp_id,
3     employees.first_name,
4     employees.last_name,
5     departments.dept_name,
6     departments.dept_id
7 FROM employees
8 LEFT JOIN departments
9     ON employees.emp_id = departments.emp_id;
```

output:

	emp_id	first_name	last_name	dept_name	dept_id
	-----	-----	-----	-----	-----
3	17679	Robert	Gilmore	Operations	13
4	26650	Elvis	Ritter	Marketing	14
5	30840	David	Barrow	Operations	13
6	49714	Hugo	Forester	null	null
7	51821	Linda	Foster	Operations	13
8	67323	Lisa	Wiener	Marketing	14
9	70950	Rodney	Weaver	null	null
10	71329	Gayle	Meyer	null	null
11	76589	Jason	Christian	Operations	13
12	97927	Billie	Lanning	Technology	12

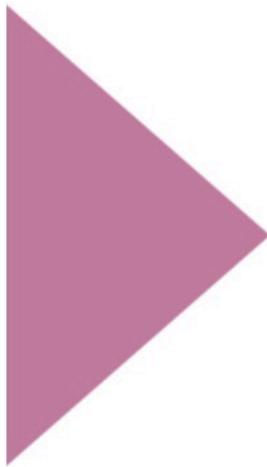


Query Time

Write a query that returns products that have never been ordered

Select product ID, product name, orderID

(Use Left Join)



	product_id	product_name	order_id
1	355	Samsung T5 Portable SSD - 50...	NULL
2	378	Samsung 860 EVO 250GB 2.5 ...	NULL
3	401	Sony MDRXB950N1 Headphon...	NULL
4	501	Polk Audio - 7 3-Way Floor Spe...	NULL
5	361	Yamaha - Natural Sound 5 2-W...	NULL
6	418	WD - Red Pro 4TB Internal SAT...	NULL
7	424	Marantz - 11.2-Ch. Network-Rea...	NULL
8	464	X850F-Series 75-Class HDR U...	NULL
9	438	Apple - iPad Pro 12.9-inch (Late...	NULL
10	507	13.3 MacBook Air (Mid 2017. Sil...	NULL

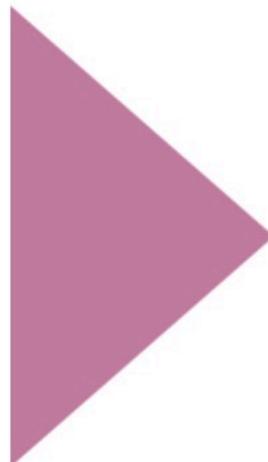
Query executed successfully. | (local) (15.0 RTM) | DESKTOP-3E95HEO\Datas... | SampleRetail | 00:00:00 | 213 rows

Query Time For You



Report the stock status of the products that product id greater than 310 in the stores.

Expected columns: product_id, product_name, store_id, product_id, quantity



	product_id	product_name	store_id	product_id	quantity
154	437	JBL Clip2 Portable Speaker	3	437	9
155	438	Apple - iPad Pro 12.9-inch (Latest Model) with Wi-Fi + ...	3	438	30
156	439	Details About Genuine Used Apple 85w Magsafe Powe...	3	439	8
157	440	Samsung - 88 Class - LED - Q9F Series - 2160p - Sma...	3	440	23
158	441	Chant Sport BT Portable Audio System (Natural)	3	441	18
159	442	Sony - 49 Class - LED - X900E Series - 2160p - Smart ...	3	442	0
160	443	JBL - Everest 110 Wireless In-Ear Headphones - Gunm...	NULL	NULL	NULL
161	444	Details About Asus Q304 13.3 Laptop I5 2.5 Ghz 6gb 1t...	NULL	NULL	NULL
162	445	Details About Razer Blackwidow Chroma V2	NULL	NULL	NULL
163	446	DNY - 10GB (2PK - 500GB) 1.0 Gb/s PBBAL 0-DIMM	NULL	NULL	NULL



4 Right Join

▶ Introduction



In simple terms, **RIGHT JOIN** is the opposite of **LEFT JOIN**.
In this join statement, all the records of the right table and the common records of the left table are returned in the query.

Syntax

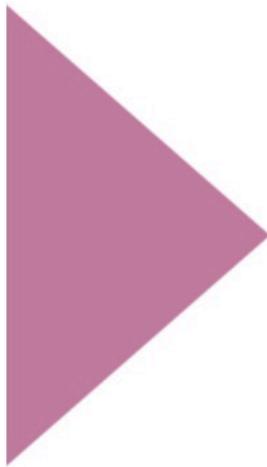
```
1 SELECT columns  
2 FROM table_A  
3 RIGHT JOIN table_B ON join_conditions
```



Query Time

Report (AGAIN WITH RIGHT JOIN) the stock status of the products that product id greater than 310 in the stores.

Expected columns: product_id, product_name, store_id, quantity



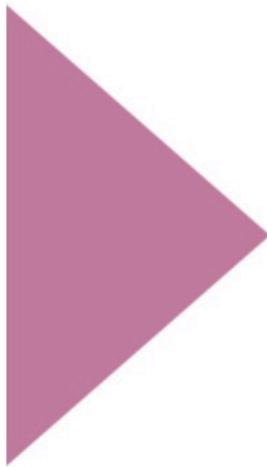
	product_id	product_name	store_id	product_id	quantity
154	437	JBL Clip2 Portable Speaker	3	437	9
155	438	Apple - iPad Pro 12.9-inch (Latest Model) with Wi-Fi + ...	3	438	30
156	439	Details About Genuine Used Apple 85w Magsafe Powe...	3	439	8
157	440	Samsung - 88 Class - LED - Q9F Series - 2160p - Sma...	3	440	23
158	441	Chant Sport BT Portable Audio System (Natural)	3	441	18
159	442	Sony - 49 Class - LED - X900E Series - 2160p - Smart ...	3	442	0
160	443	JBL - Everest 110 Wireless In-Ear Headphones - Gunm...	NULL	NULL	NULL
161	444	Details About Asus Q304 13.3 Laptop I5 2.5 Ghz 6gb 1t...	NULL	NULL	NULL
162	445	Details About Razer Blackwidow Chroma V2	NULL	NULL	NULL
163	446	DIMM - 16 GB (2PK) - DDR4 16 GBL DDR4L 2666MHz	NULL	NULL	NULL



Query Time For You

Report the order information made by all staffs.

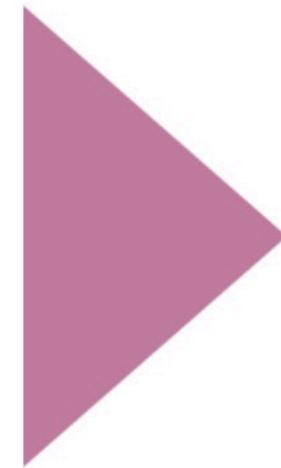
Expected columns: staff_id, first_name, last_name, all the information about orders



	staff_id	first_name	last_name	order_id	customer_id	order_status	order_date	required_date	shipped_date	store_id	staff_id	^
1	1	James	Garcia	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
2	10	Linda	White	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
3	4	Davis	Thomas	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
4	5	Williams	Destrey	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
5	2	Charles	Cussona	1	259	4	2018-01-01	2018-01-03	2018-01-03	1	2	
6	6	Barbara	Rodriguez	2	1212	4	2018-01-01	2018-01-04	2018-01-03	2	6	
7	7	Taylor	Mango	3	523	4	2018-01-02	2018-01-05	2018-01-03	2	7	
8	3	Jhon	Setamento	4	175	4	2018-01-03	2018-01-04	2018-01-05	1	3	
9	6	Barbara	Rodriguez	5	1324	4	2018-01-03	2018-01-06	2018-01-06	2	6	
10	6	Barbara	Rodriguez	6	24	4	2018-01-04	2018-01-07	2018-01-05	2	6	

Query executed successfully.

(local) (15.0 RTM) DESKTOP-3E95HEO\Datas... | SampleRetail | 00:00:00 | 1,619 rows



Full Outer Join

▶ Introduction



A **FULL OUTER JOIN** returns all rows from both tables.

The output table will include rows with null data, so nothing is left out. Null values may be important to detect missing data in tables.

FULL OUTER JOIN is likely to generate large data sets based on the number of rows in the tables you want to join.

Syntax

```
1 SELECT columns  
2 FROM table_A  
3 FULL OUTER JOIN table_B ON join_conditions|
```

► Sample Tables



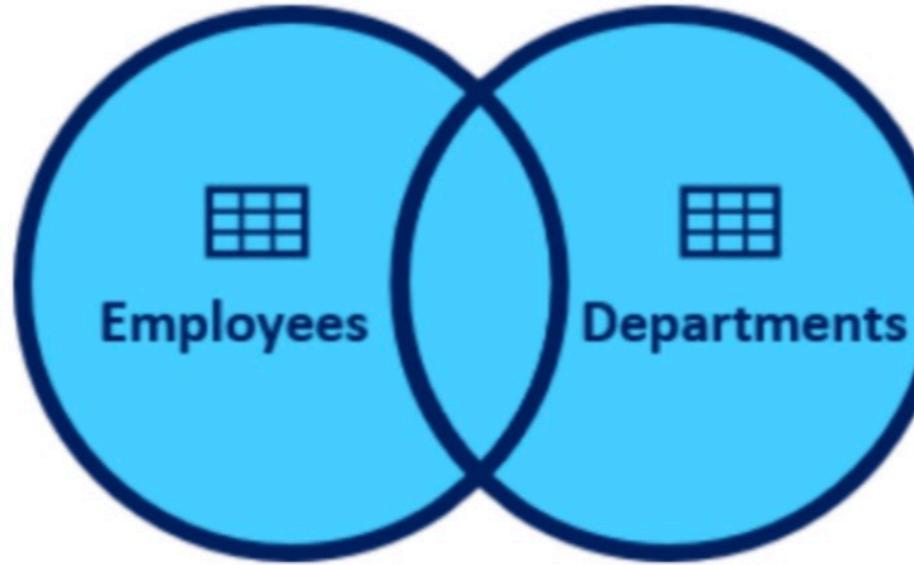
1	emp_id	first_name	last_name	salary	job_title	gender	hire_date
2	-----	-----	-----	-----	-----	-----	-----
3	17679	Robert	Gilmore	110000	Operations Director	Male	2018-09-04
4	26650	Elvis	Ritter	86000	Sales Manager	Male	2017-11-24
5	30840	David	Barrow	85000	Data Scientist	Male	2019-12-02
6	49714	Hugo	Forester	55000	IT Support Speciali	Male	2019-11-22
7	51821	Linda	Foster	95000	Data Scientist	Female	2019-04-29
8	67323	Lisa	Wiener	75000	Business Analyst	Female	2018-08-09
9	70950	Rodney	Weaver	87000	Project Manager	Male	2018-12-20
10	71329	Gayle	Meyer	77000	HR Manager	Female	2019-06-28
11	76589	Jason	Christian	99000	Project Manager	Male	2019-01-21
12	97927	Billie	Lanning	67000	Web Developer	Female	2018-06-25

employees

1	emp_id	dept_name	dept_id
2	-----	-----	-----
3	17679	Operations	13
4	26650	Marketing	14
5	30840	Operations	13
6	49823	Technology	12
7	51821	Operations	13
8	67323	Marketing	14
9	71119	Administrative	11
10	76589	Operations	13
11	97927	Technology	12

departments

▶ Full Outer Join



Visual Representation of Full Outer JOIN

query:

```
1 SELECT
2     employees.emp_id,
3     employees.first_name,
4     employees.last_name,
5     departments.dept_name
6     departments.dept_id
7 FROM employees
8 FULL OUTER JOIN departments
9     ON employees.emp_id = departments.emp_id;
```

output:

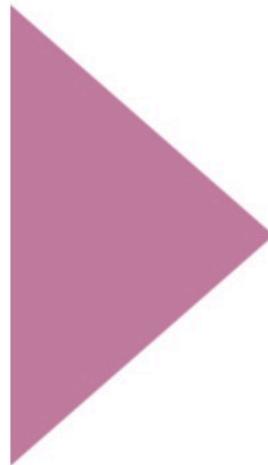
1	emp_id	first_name	last_name	dept_name	dept_id
2	-----	-----	-----	-----	-----
3	26650	Elvis	Ritter	Marketing	14
4	70950	Rodney	Weaver	null	null
5	97927	Billie	Lanning	Technology	12
6	67323	Lisa	Wiener	Marketing	14
7	17679	Robert	Gilmore	Operations	13
8	76589	Jason	Christian	Operations	13
9	51821	Linda	Foster	Operations	13
10	71329	Gayle	Meyer	null	null
11	49714	Hugo	Forester	null	null
12	30840	David	Barrow	Operations	13
13	null	null	null	Technology	12
14	null	null	null	Administrative	11



Query Time

Write a query that returns stock and order information together for all products . Return only top 100 rows.

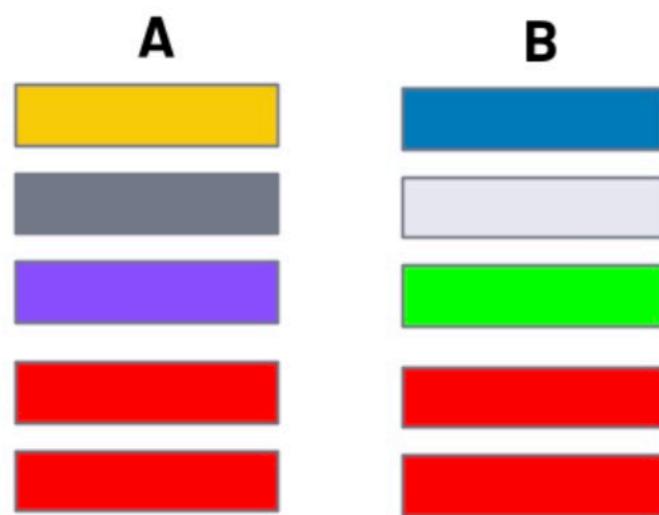
Expected columns: Product_id, store_id, quantity, order_id, list_price



Results Messages

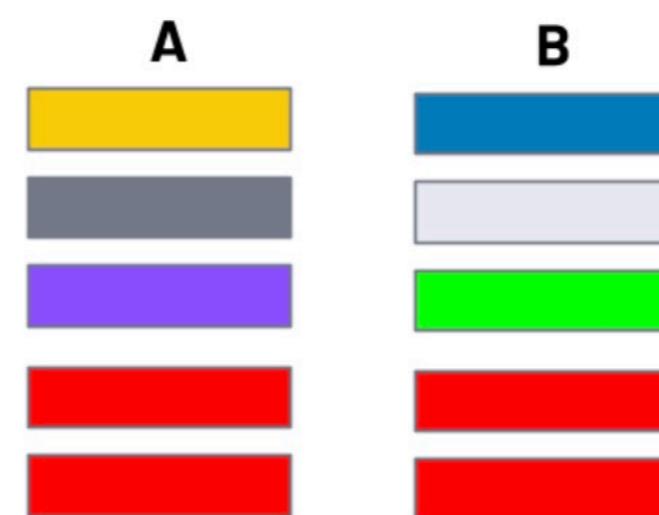
	Product_id	store_id	quantity	order_id	list_price
71	513	NULL	NULL	NULL	NULL
72	514	NULL	NULL	NULL	NULL
73	515	NULL	NULL	NULL	NULL
74	516	NULL	NULL	NULL	NULL
75	517	NULL	NULL	NULL	NULL
76	518	NULL	NULL	NULL	NULL
77	519	NULL	NULL	NULL	NULL
78	520	NULL	NULL	NULL	NULL
79	1	1	27	NULL	NULL
80	2	1	5	4	136.99
81	2	1	5	18	136.99
82	2	1	5	26	136.99
83	2	1	5	59	136.99

Query executed succes... | (local) (15.0 RTM) | DESKTOP-3E95HEO\Datas... | SampleRetail | 00:00:00 | 600 rows



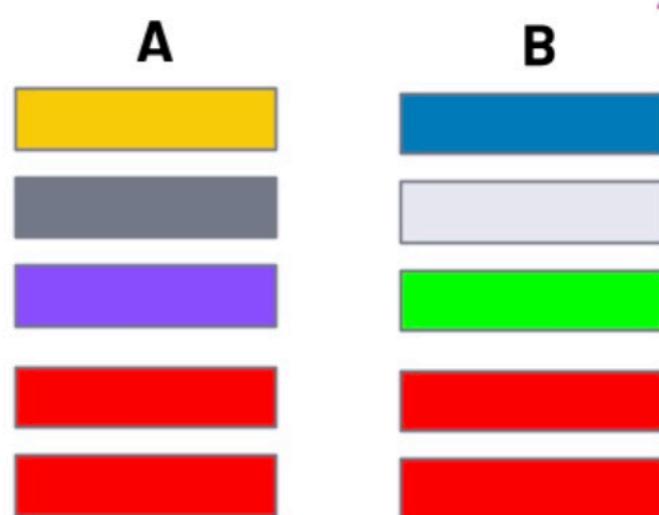
INNER JOIN

A B



LEFT JOIN

A B



FULL OUTER JOIN

A B





6 Cross Join

▶ Introduction



In SQL, the **CROSS JOIN** is used to combine each row of the first table with each row of the second table.

Syntax

```
1 SELECT columns  
2   FROM table_A  
3 CROSS JOIN table_B
```



► Sample Tables

"colors" table:

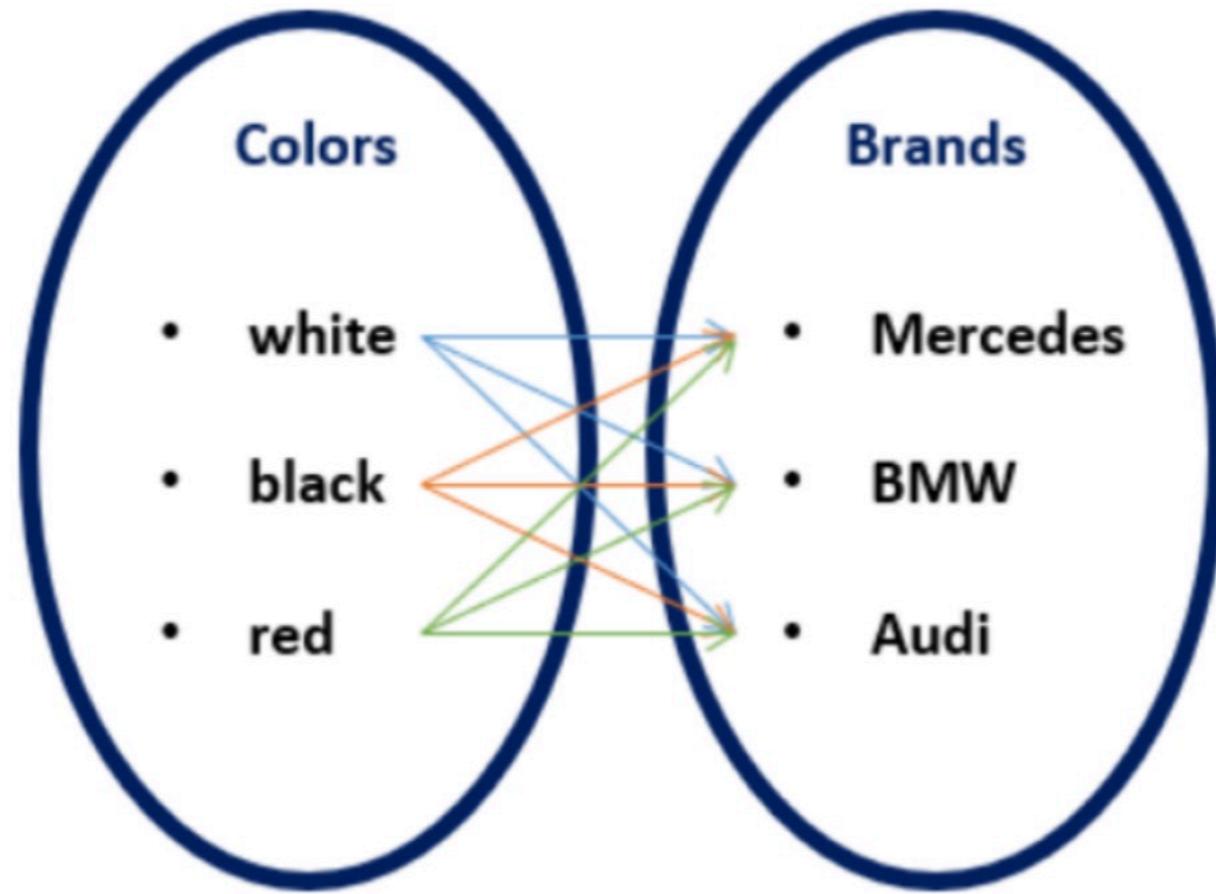
1	id	color
2	--	-----
3	1	white
4	2	black
5	3	red

"brands" table:

1	id	brand
2	--	-----
3	1	Mercedes
4	2	BMW
5	3	Audi



Cross Join



Visual Representation of Cross JOIN

query :

```
1 SELECT colors.color, brands.brand  
2   FROM colors  
3 CROSS JOIN brands;
```

output:

color	brand
white	Mercedes
white	BMW
white	Audi
black	Mercedes
black	BMW
black	Audi
red	Mercedes
red	BMW
red	Audi

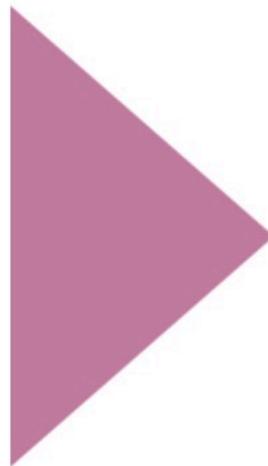


Query Time

In the stocks table, there are not all products store on the product table and you want to insert these products into the stock table.

You have to insert all these products for every three stores with “0 (zero)” quantity.

Write a query to prepare this data.



	store_id	product_id	quantity
1	1	443	0
2	2	443	0
3	3	443	0
4	1	444	0
5	2	444	0
6	3	444	0
7	1	445	0
8	2	445	0
9	3	445	0
10	1	446	0
11	2	446	0
12	3	446	0
13	1	447	0

0 RTM) DESKTOP-3E95HEO\Datas... SampleRetail 00:00:00 | 234 rows



7 Self Join

► Introduction



- **SELF JOIN** is a join of a table to itself. **Joining a table to itself** means that each row of the table is combined with itself and the other rows of the table.
- **SELF JOIN** can be defined as a combination of two copies of the same table.

► Self Join



Modified "employees" table:

	emp_id	first_name	last_name	job_title	reports_to
1	1	Robert	Gilmore	Operations Director	
2	2	Elvis	Ritter	Sales Manager	
3	3	David	Barrow	Data Scientist	1
4	4	Hugo	Forester	IT Support Speciali	2
5	5	Linda	Foster	Data Scientist	1
6	6	Lisa	Wiener	Business Analyst	2
7	7	Rodney	Weaver	Project Manager	
10	8	Gayle	Meyer	HR Manager	7
11	9	Jason	Christian	Project Manager	7
12	10	Billie	Lanning	Web Developer	7
13					

query :

```
1 SELECT
2     A.first_name,
3     A.last_name,
4     A.job_title,
5     B.first_name AS manager_name
6     FROM employees A
7     INNER JOIN employees B ON B.emp_id = A.reports_to;
```

output:

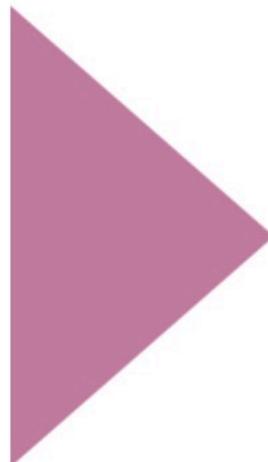
	first_name	last_name	job_title	manager_name
3	David	Barrow	Data Scientist	Robert
4	Hugo	Forester	IT Support Spe	Elvis
5	Linda	Foster	Data Scientist	Robert
6	Lisa	Wiener	Business Analy	Elvis
7	Gayle	Meyer	HR Manager	Rodney
8	Jason	Christian	Project Manage	Rodney
9	Billie	Lanning	Web Developer	Rodney



Query Time

Write a query that returns the staff names with their manager names.

Expected columns: staff first name, staff last name, manager name



Results Messages

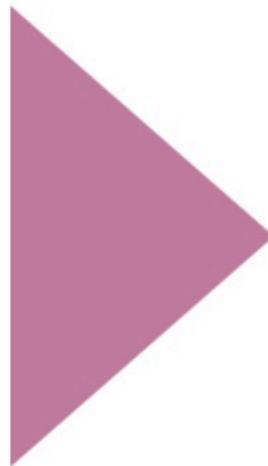
	staff_name	manager_name
1	Jhon	Charles
2	Davis	Charles
3	Charles	James
4	Williams	James
5	Elizabeth	James
6	Brown	Taylor
7	Linda	Taylor
8	Barbara	Williams
9	Taylor	Williams

(TM) | DESKTOP-3E95HEO\DataSc... | SampleRetail | 00:00:00 | 9 rows



Query Time For You

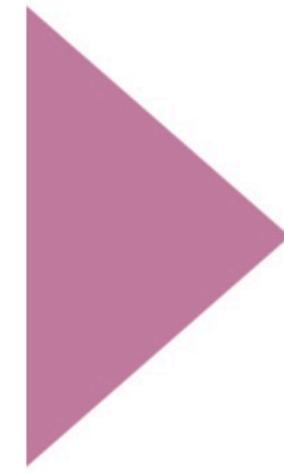
Write a query that returns both the names of staff and the names of their 1st and 2nd managers



Results Messages

	staff_name	manager1_name	manager2_name
1	Jhon	Charles	James
2	Davis	Charles	James
3	Barbara	Williams	James
4	Taylor	Williams	James
5	Brown	Taylor	Williams
6	Linda	Taylor	Williams

✓ Query execute... (local) (15.0 RTM) DESKTOP-3E95HEO\Datas... SampleRetail 00:00:00 6 rows



Views



► Introduction



- ❑ Views are useful tool for accessing multiple data types.
- ❑ Complex queries can be stored within views.
- ❑ We can invoke the view instead of recreating the queries every time we need them.

Syntax

```
1 CREATE VIEW view_name AS  
2   SELECT columns  
3   FROM tables  
4   [WHERE conditions];
```

► Advantages of Views

Advantages of Views:

Performance



Security

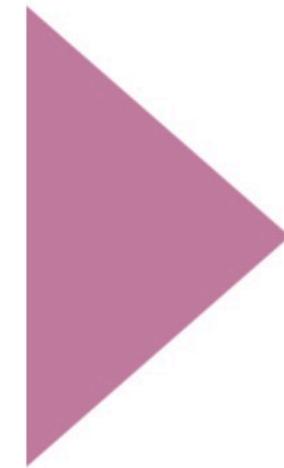


Simplicity



Storage





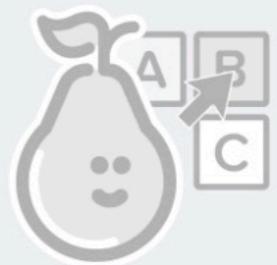
Query Time

Is everything clear so far?



Students choose an option

Pear Deck Interactive Slide
Do not remove this bar



No Multiple Choice Response
You didn't answer this question

How well did you like this lesson?

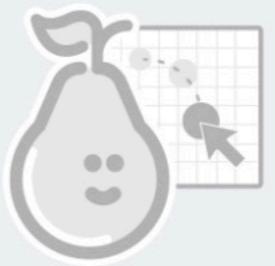


Pear Deck

Pear Deck Interactive Slide
Do not remove this bar



Students, drag the icon!



No Draggable™ Response
You didn't answer this question