

ITCS393 Database Systems Lab

Lab06: JOIN

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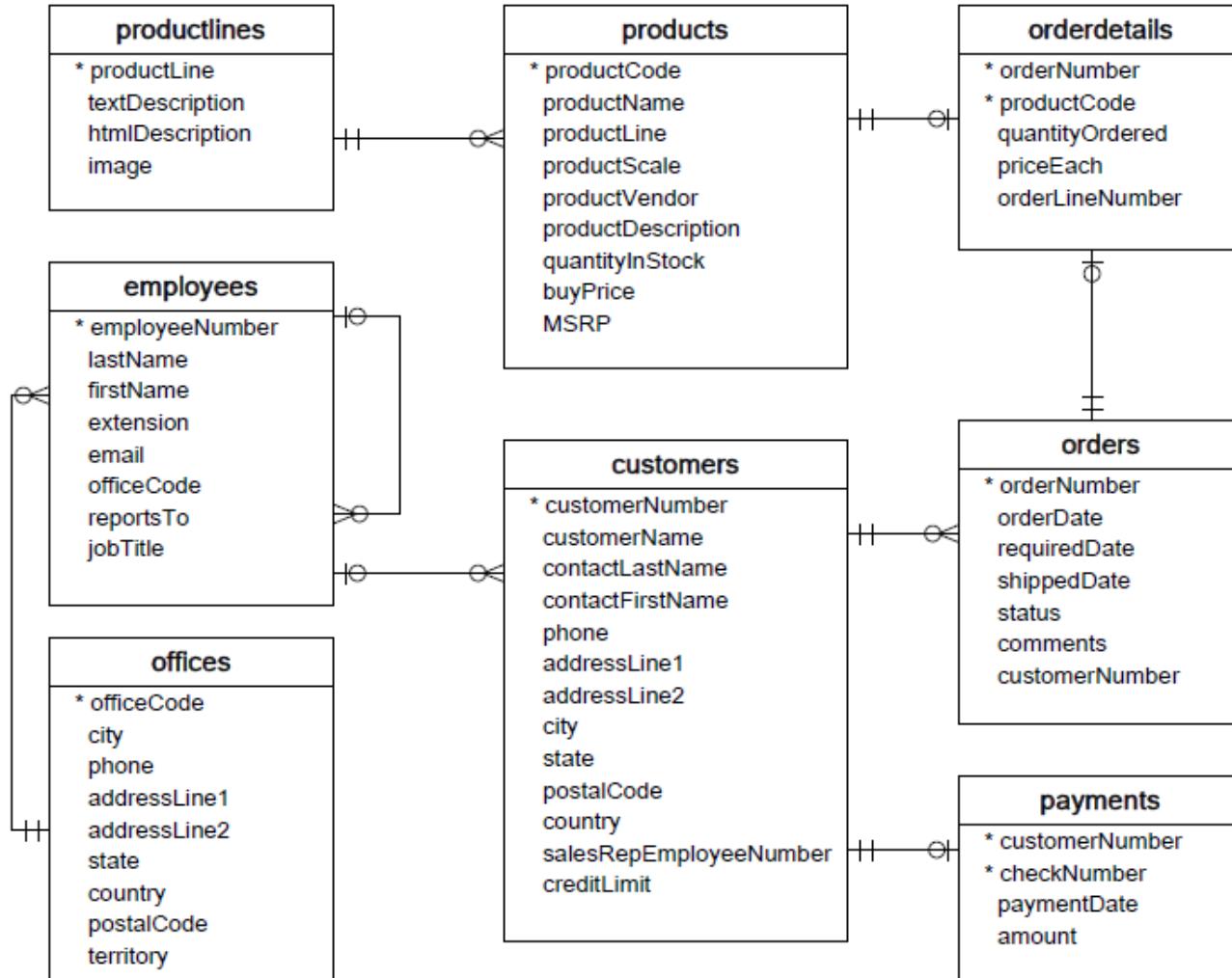
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Class Objectives

- To learn on **JOIN** in SQL, i.e., how two or more tables can be joined together.
- To apply the JOIN in SQL in the given query appropriately

Database: classicmodels



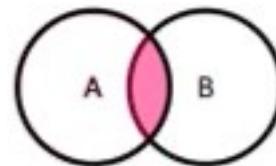
- **Customers**: stores customer's data.
- **Products**: stores a list of scale model cars.
- **ProductLines**: stores a list of product line categories.
- **Orders**: stores sales orders placed by customers.
- **OrderDetails**: stores sales order line items for each sales order.
- **Payments**: stores payments made by customers based on their accounts.
- **Employees**: stores all employee information as well as the organization structure such as who reports to whom.
- **Offices**: stores sales office data.

SQL JOIN

- SQL join clause combines columns from one or more tables in a relational database
- Use when you want to have data from **more than one** tables

```
SELECT [columns]
FROM tablename t1
[INNER|LEFT OUTER|RIGHT OUTER|FULL OUTER|CROSS]
JOIN table2 t2 ON conditions_of_join
[WHERE [conditions] ]
[GROUP BY [columns] ]
[HAVING [conditions] ]
[ORDER BY [columns] ASC|DESC]
[LIMIT N];
```

SQL JOIN – INNER



Return rows when there is **at least one match on the given condition** in both tables

Example: Show the list of the employee that are based in USA

```
SELECT CONCAT(firstName, ' ', lastName) AS Employee
FROM Employees e INNER JOIN Offices o ON
e.officeCode = o.officeCode
WHERE country='USA';
```

Employee
Diane Murphy
Mary Patterson
Jeff Firrelli
Anthony Bow
Leslie Jennings
Leslie Thompson
Julie Firrelli
Steve Patterson
Foon Yue Tseng
George Vanauf

Note: Use table aliases to avoid the ambiguous column names

employees
* employeeNumber
lastName
firstName
extension
email
officeCode
reportsTo
jobTitle

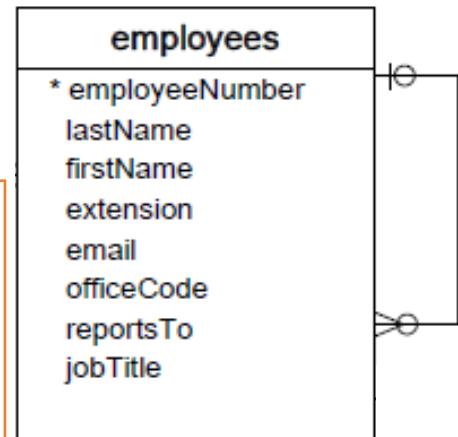
offices
* officeCode
city
phone
addressLine1
addressLine2
state
country
postalCode
territory

SQL JOIN – Self Join

A self join is a regular join, but the table is joined with itself.

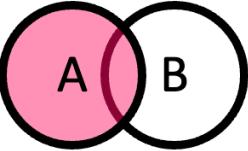
Example: Show the list of the employees under 'Mary Patterson'

```
SELECT emp.employeeNumber,
CONCAT(emp.firstName, ' ', emp.lastName) AS Employee,
CONCAT(boss.firstName, ' ', boss.lastName) AS 'Direct Report (Boss)'
FROM Employees boss INNER JOIN Employees emp
ON emp.reportsTo = boss.employeeNumber
WHERE boss.firstName = 'Mary' AND boss.lastName = 'Patterson'
```



employeeNumber	Employee	Direct Report (Boss)
1088	William Patterson	Mary Patterson
1102	Gerard Bondur	Mary Patterson
1143	Anthony Bow	Mary Patterson
1621	Mami Nishi	Mary Patterson

SQL JOIN – LEFT OUTER JOIN



Return all records from the left table (**A**), and the matched records from the right table (**B**)

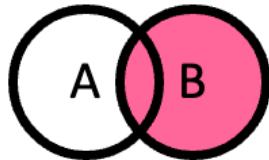
Example: Show the list of the sales representatives and their customers including the ones with no customers

```
SELECT *
FROM Employees e LEFT OUTER JOIN Customers c
ON e.employeeNumber = c.salesRepEmployeeNumber
WHERE e.jobTitle = 'Sales Rep';
```

All employees are returned and the match and no match (NULL) customers

employeeNumber	lastName	firstName	extension	email	officeCode	reportsTo	jobTitle	customerNumber	customerName
1612	Marsn	Peter	x102	pmarsn@classicmodelcars.com	6	1088	Sales Rep	496	Kelly's Gift Shop
1619	King	Tom	x103	tking@classicmodelcars.com	6	1088	Sales Rep	NULL	NULL
1621	Nishi	Mami	x101	mnishi@classicmodelcars.com	5	1056	Sales Rep	148	Dragon Souveniers, Ltd.
1621	Nishi	Mami	x101	mnishi@classicmodelcars.com	5	1056	Sales Rep	177	Osaka Souveniers Co.
1621	Nishi	Mami	x101	mnishi@classicmodelcars.com	5	1056	Sales Rep	211	King Kong Collectables,...
1621	Nishi	Mami	x101	mnishi@classicmodelcars.com	5	1056	Sales Rep	385	Cruz & Sons Co.
1621	Nishi	Mami	x101	mnishi@classicmodelcars.com	5	1056	Sales Rep	398	Tokyo Collectables, Ltd.
1625	Kato	Yoshimi	x102	ykato@classicmodelcars.com	5	1621	Sales Rep	NULL	NULL
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	216	Enaco Distributors
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	298	Vida Sport, Ltd
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	344	CAF Imports
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	376	Precious Collectables
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	458	Corrida Auto Replicas, Ltd
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	484	Iberia Gift Imports, Corp.

SQL JOIN – RIGHT OUTER JOIN



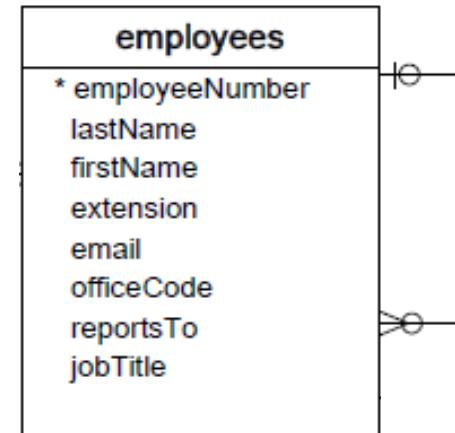
Return all records from the right table (**B**), and the matched records from the left table (**A**)

Example: Show the list of the supervisors-supervisee if any

```
SELECT CONCAT(e1.firstName, ' ', e1.lastName) AS 'Supervisor',
       CONCAT(e2.firstName, ' ', e2.lastName) AS 'Supervisee'
  FROM Employees e1 RIGHT OUTER JOIN Employees e2
 WHERE e1.employeeNumber = e2.reportsTo;
```

Supervisor	Supervisee
NULL	Diane Murphy
Diane Murphy	Mary Patterson
Diane Murphy	Jeff Firrelli
Mary Patterson	William Patterson
Mary Patterson	Gerard Bondur
Mary Patterson	Anthony Bow
Anthony Bow	Leslie Jennings
Anthony Bow	Leslie Thompson
Anthony Bow	Julie Firrelli
Anthony Bow	Steve Patterson
...	

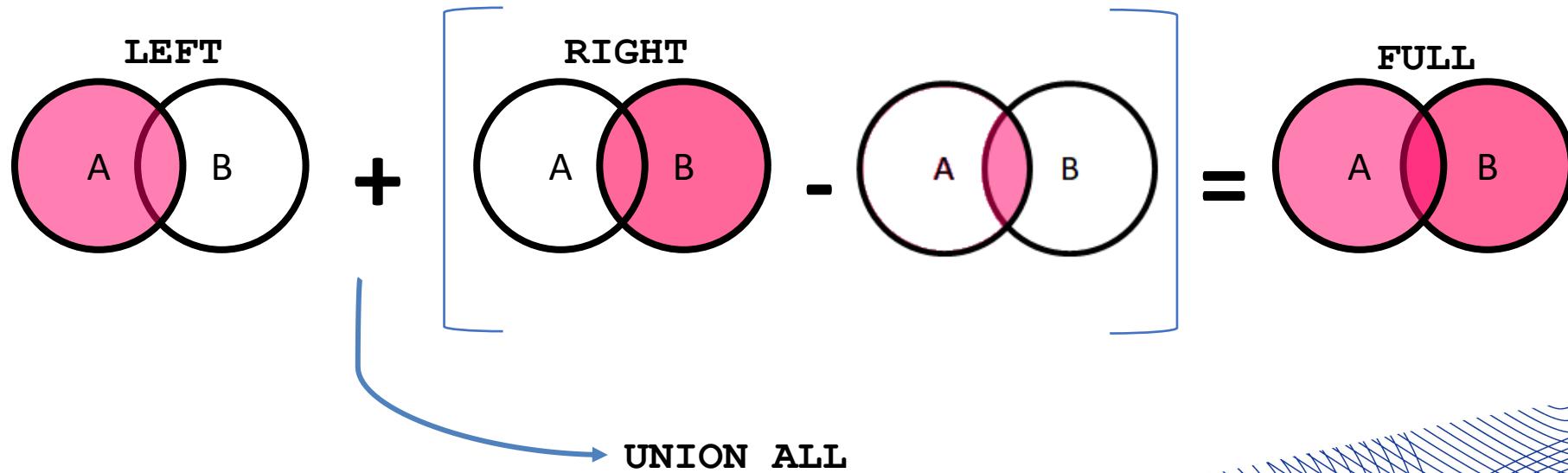
All employees in **e2** are returned and the match and no match (NULL) from **e1**



SQL JOIN – FULL OUTER JOIN

Return all records (matched and unmatched) from both tables, i.e., combines the results from LEFT and RIGHT OUTER JOIN

Note: there is no **FULL OUTER JOIN** function in MySQL



Implement FULL OUTER JOIN

Example: Show the list of the employees and their customers (including the customers who do not have sales representatives and the employees who do not have customers)

```
SELECT *
FROM Employees e LEFT OUTER JOIN Customers c
ON e.employeeNumber = c.salesRepEmployeeNumber
```

Find the **employees** and their **customers** including the ones with no customers

employeeNumber	lastName	firstName	extension	email	officeCode	reportsTo	jobTitle	customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1	addressLine2
1002	Murphy	Diane	x5800	dmurphy@classicmodelcars.com	1	NULL	President	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1056	Patterson	Mary	x4611	mpatterso@classicmodelcars.com	1	1002	VP Sales	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1076	Firrelli	Jeff	x9273	jfirrelli@classicmodelcars.com	1	1002	VP Marketing	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1088	Patterson	William	x4871	wpatterson@classicmodelcars.com	6	1056	Sales Manager (APAC)	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1102	Bondur	Gerard	x5408	gbondur@classicmodelcars.com	4	1056	Sale Manager (EMEA)	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1143	Bow	Anthony	x5428	abow@classicmodelcars.com	1	1056	Sales Manager (NA)	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	124	Mini Gifts Distributors Ltd.	Nelson	Susan	4155551450	5677 Strong St.	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	129	Mini Wheels Co.	Murphy	Julie	650555787	5557 North Pendale Street	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	161	Technics Stores Inc.	Hashimoto	Juri	6505556809	9408 Furth Circle	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	321	Corporate Gift Ideas Co.	Brown	Julie	6505551386	7734 Strong St.	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	450	The Sharp Gifts Wareho...	Frick	Sue	4085553659	3086 Ingle Ln.	NULL
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	487	Signal Collectibles Ltd.	Taylor	Sue	4155554312	2793 Furth Circle	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	112	Signal Gift Stores	King	Jean	7025551838	8489 Strong St.	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	205	Toys4GrownUps.com	Young	Julie	6265557265	78934 Hillside Dr.	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	219	Bands & Toys Co.	Young	Mary	3105552373	4097 Douglas Av.	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	239	Collectable Mini Designs...	Thompson	Valarie	7605558146	361 Furth Circle	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	347	Men 'R' US Retailers, Ltd.	Chandler	Brian	2155554369	6047 Douglas Av.	NULL
1166	Thompson	Leslie	x4065	lthompson@classicmodelcars.com	1	1143	Sales Rep	475	West Coast Collectables...	Thompson	Steve	3105553722	3675 Furth Circle	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	173	Cambridge Collectables...	Tseng	Jerry	6175555555	4658 Baden Av.	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	204	Online Mini Collectables	Barajas	Miguel	6175557555	7635 Spinnaker Dr.	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	320	Mini Creations Ltd.	Huang	Wing	5085559555	4575 Hillside Dr.	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	339	Classic Gift Ideas, Inc	Cervantes	Francisca	2155554695	782 First Street	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	379	Collectables For Less Inc.	Nelson	Allen	6175558555	7825 Douglas Av.	NULL
1188	Firrelli	Julie	x2173	jfirrelli@classicmodelcars.com	2	1143	Sales Rep	495	Diecast Collectables	Franco	Valarie	6175552555	6251 Ingle Ln.	NULL
1216	Patterson	Steve	x4334	spatterson@classicmodelcars.com	2	1143	Sales Rep	157	Diecast Classics Inc.	Leong	Kelvin	2155551555	7586 Pompton St.	NULL
1216	Patterson	Steve	x4334	spatterson@classicmodelcars.com	2	1143	Sales Rep	198	Auto-Moto Classics Inc.	Taylor	Leslie	6175558428	16780 Pompton St.	NULL
1216	Patterson	Steve	x4334	spatterson@classicmodelcars.com	2	1143	Sales Rep	286	Marta's Replicas Co.	Hernandez	Marta	6175558555	39323 Spinnaker Dr.	NULL

Implement FULL OUTER JOIN

Example: Show the list of the employees and their customers (including the customers who do not have sales representatives and the employees who do not have customers)

```
SELECT *
FROM Employees e RIGHT OUTER JOIN Customers c
ON e.employeeNumber = c.salesRepEmployeeNumber
```

Find the **customers** and their **employees** including the ones with no employees

employeeNumber	lastName	firstName	extension	email	officeCode	reportsTo	jobTitle	customerNumber	customerName	contactLastName	contactFirstNa...	phone	addressLine1	addressLine2	city	state	postalCode	country	salesRepEmp
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	125	Havel & Zbyszek Co	Piestrzewicz	Zbyszek	(26) 642-7555	ul. Filtrowa 68	NULL	Warszawa	HULL	01-012	Poland	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	169	Porto Imports Co.	de Castro	Isabel	(1) 356-5555	Estrada da saúde n. 58	NULL	Lisboa	HULL	1756	Portugal	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	206	Asian Shopping Network...	Walker	Brydey	+612 9411 1555	Suntec Tower Three	8 Temasek	Singapore	HULL	038988	Singapore	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	223	Natürlich Autos	Kloss	Horst	0372-555188	Taucherstraße 10	NULL	Cunewalde	HULL	01307	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	237	ANG Resellers	Camino	Alejandra	(91) 745 6555	Gran Via, 1	NULL	Madrid	HULL	28001	Spain	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	247	Messner Shopping Netw...	Messner	Renate	069-0555984	Magazinweg 7	NULL	Frankfurt	HULL	60528	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	273	Franken Gifts, Co	Franken	Peter	089-0877555	Berliner Platz 43	NULL	München	HULL	80805	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	293	BG&E Collectables	Harrison	Ed	+41 26 425 50 01	Rte des Arsenaux 41	NULL	Fribourg	HULL	1700	Switzerland	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	303	Schuyler Imports	Schuyler	Bradley	+31 20 491 9555	Kingsfordweg 151	NULL	Amsterdam	HULL	1043 GR	Netherlands	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	307	Der Hund Imports	Andersen	Mel	030-0074555	Obere Str. 57	NULL	Berlin	HULL	12209	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	335	Cramer Spezialitäten, Ltd	Cramer	Philip	0555-09555	Maubelstr. 90	NULL	Brandenb...	HULL	14776	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	348	Asian Treasures, Inc.	McKenna	Patricia	2967 555	8 Johnstown Road	NULL	Cork	Co....	HULL	Ireland	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	356	SAR Distributors, Co	Kuger	Armand	+27 21 550 3555	1250 Pretorius Street	NULL	Hatfield	Pret...	0028	South Africa	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	361	Kommission Auto	Josephs	Karin	0251-555259	Luisenstr. 48	NULL	Münster	HULL	44087	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	369	Lisboa Souvenirs, Inc	Rodriguez	Lino	(1) 354-2555	Jardim das rosas n. 32	NULL	Lisboa	HULL	1675	Portugal	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	409	Stuttgart Collectable Exc...	Müller	Rita	0711-555361	Adenauerallee 900	NULL	Stuttgart	HULL	70563	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	443	Feuer Online Stores, Inc	Feuer	Alexander	0342-555176	Heerstr. 22	NULL	Leipzig	HULL	04179	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	459	Warburg Exchange	Ottlieb	Sven	0241-039123	Walserweg 21	NULL	Aachen	HULL	52066	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	465	Anton Designs, Ltd.	Anton	Carmen	+34 913 728555	c/ Gobelas, 19-1 Urb...	NULL	Madrid	HULL	28023	Spain	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	477	Mit Vergnügen & Co.	Moos	Hanna	0621-08555	Forsterstr. 57	NULL	Mannheim	HULL	68306	Germany	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	480	Kremlin Collectables, Co.	Semenov	Alexander	+7 812 293 0521	2 Pobedy Square	NULL	Saint Pete...	HULL	196143	Russia	HULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	481	Raanan Stores, Inc	Altagar,G M	Raanan	+ 972 9 959 8555	3 Hagalim Blv.	NULL	Herzlia	HULL	47625	Israel	HULL
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	124		Mini Gifts Distributors Ltd.	Nelson	Susan	4155551450	5677 Strong St.	NULL	San Rafael	CA	97562	USA	1165
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	129		Mini Wheels Co.	Murphy	Julie	6505555787	5557 North Pendale...	NULL	San Franc...	CA	94217	USA	1165
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	161		Technics Stores Inc.	Hashimoto	Juri	6505556809	9408 Furth Circle	NULL	Burlingame	CA	94217	USA	1165
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	321		Corporate Gift Ideas Co.	Brown	Julie	6505551386	7734 Strong St.	NULL	San Franc...	CA	94217	USA	1165
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	450		The Sharp Gifts Wareho...	Frick	Sue	4085553659	3086 Ingle Ln.	NULL	San Jose	CA	94217	USA	1165
1165	Jennings	Leslie	x3291	Ijenn... 1	1143	Sales...	487		Signal Collectibles Ltd.	Taylor	Sue	4155554312	2793 Furth Circle	NULL	Brisbane	CA	94217	USA	1165
1166	Thompson	Leslie	x4065	Itho... 1	1143	Sales...	112		Signal Gift Stores	King	Jean	7025551838	8489 Strong St.	NULL	Las Vegas	NV	83030	USA	1166
1166	Thompson	Leslie	x4065	Itho... 1	1143	Sales...	205		Toys4GrownUps.com	Young	Julie	6265557265	78934 Hillside Dr.	NULL	Pasadena	CA	90003	USA	1166
1166	Thompson	Leslie	x4065	Itho... 1	1143	Sales...	219		Boards & Toys Co.	Young	Mary	3105552373	4097 Douglas Av.	NULL	Glendale	CA	92561	USA	1166

SQL JOIN – FULL OUTER JOIN

Example: Show the list of the employees and their customers (including the customers who do not have sales representatives and the employees who do not have customers)

```
SELECT *
FROM Employees e LEFT OUTER JOIN Customers c
ON e.employeeNumber = c.salesRepEmployeeNumber
```

UNION ALL

```
SELECT *
FROM Employees e RIGHT OUTER JOIN Customers c
ON e.employeeNumber = c.salesRepEmployeeNumber
```

WHERE e.employeeNumber IS NULL;

Emulate the FULL OUTER JOIN with UNION ALL

employeeNumber	lastName	firstName	extension	email	officeCode	reportsTo	jobTitle	customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1	addressLine2	city	state	postalCode	country	salesRepEmployeeNumber	creditLimit
1002	Murphy	Diane	x5800	dmurphy@classicmodelcars.com	1	NULL	President	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1056	Patterson	Mary	x4611	mpatterson@classicmodelcars.com	1	1002	VP Sales	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1076	Firrelli	Jeff	x9273	jfirrelli@classicmodelcars.com	1	1002	VP Marketing	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1088	Patterson	William	x4871	wpatterson@classicmodelcars.com	6	1056	Sales Manager (APAC)	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1102	Bondur	Gerard	x5408	gbondur@classicmodelcars.com	4	1056	Sale Manager (EMEA)	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1143	Bow	Anthony	x5428	abow@classicmodelcars.com	1	1056	Sales Manager (NA)	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	124	Mini Gifts Distributors Ltd.	Nelson	Susan	4155551450	5677 Strong St.	NULL	San Rafael	CA	97562	USA	1165	210500.00
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	129	Mini Wheels Co.	Murphy	Julie	650555787	5557 North Pendale Street	NULL	San Francisco	CA	94217	USA	1165	64600.00
1165	Jennings	Leslie	x3291	ljennings@classicmodelcars.com	1	1143	Sales Rep	161	Technics Stores Inc.	Hashimoto	Juri	6505556809	9408 Furth Circle	NULL	Burlingame	CA	94217	USA	1165	84600.00
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	298	Vida Sport, Ltd	Holz	Mihael	0897-034555	Grenzacherweg 237	NULL	Genève	NULL	1203	Switz...	1702	141300.00
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	344	CAF Imports	Fernandez	Jesus	+34 913 72...	Merchants House	27-30 Merc...	Madrid	NULL	28023	Spain	1702	59600.00
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	376	Precious Collectables	Urs	Braun	0452-076555	Hauptstr. 29	NULL	Bern	NULL	3012	Switz...	1702	0.00
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	458	Corrida Auto Replicas, Ltd	Sommer	Martin	(91) 555 2...	C/ Araquil, 67	NULL	Madrid	NULL	28023	Spain	1702	104600.00
1702	Gerard	Martin	x2312	mgerard@classicmodelcars.com	4	1102	Sales Rep	484	Iberia Gift Imports, Corp.	Roel	José Pedro	(95) 555 8...	C/ Romero, 33	NULL	Sevilla	NULL	41101	Spain	1702	65700.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	125	Havel & Zbyszek Co	Piestrzewicz	Zbyszek	(26) 642-7...	ul. Filtrowa 68	NULL	Warszawa	NULL	01-012	Poland	NULL	0.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	169	Porto Imports Co.	de Castro	Isabel	(1) 356-5555	Estrada da saúde n. 58	NULL	Lisboa	NULL	1756	Portugal	NULL	0.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	206	Asian Shopping Network	Walker	Brydey	+612 9411...	Suntec Tower Three	8 Tomasek	Singapore	NULL	038988	Singa...	0.00	
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	223	Natürlich Autos	Kloss	Horst	0372-555188	Taucherstraße 10	NULL	Cunewalde	NULL	01307	Germ...	NULL	0.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	237	ANG Resellers	Camino	Alejandra	(91) 745 6...	Gran Vía, 1	NULL	Madrid	NULL	28001	Spain	NULL	0.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	247	Messner Shopping Network	Messner	Renate	069-0555984	Magazinweg 7	NULL	Frankfurt	NULL	60528	Germ...	NULL	0.00
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	273	Franken Gifts, Co	Franken	Peter	089-0877555	Berliner Platz 43	NULL	München	NULL	80805	Germ...	NULL	0.00

SQL JOIN – CROSS JOIN

Produce a cartesian product between the two tables, i.e., return **all possible combinations** of all rows

```
SELECT *  
FROM Employees CROSS JOIN Customers;
```

nrow=23

Employees



nrow=122

Customers

nrow=2806

Employees x Customers

Summary of SQL JOIN

SQL JOIN	Description
CROSS JOIN	<p>Return a Cartesian product of t1 and t2</p> <pre>SELECT * FROM t1 CROSS JOIN t2;</pre>
INNER JOIN	<p>Return only matched rows in the conditions</p> <pre>SELECT * FROM t1 INNER JOIN t2 ON t1.attr=t2.attr;</pre> <p>-- (Shorter version)</p> <pre>SELECT * FROM t1 JOIN t2 ON t1.attr=t2.attr;</pre>
LEFT OUTER JOIN	<p>Return all rows in t1 (left table) and matched row in t2</p> <pre>SELECT * FROM t1 LEFT OUTER JOIN t2 ON t1.attr=t2.attr;</pre> <p>-- (Shorter version)</p> <pre>SELECT * FROM t1 LEFT JOIN t2 ON t1.attr=t2.attr;</pre>

Summary of SQL JOIN

SQL JOIN	Description
RIGHT OUTER JOIN	<p>Return all rows in t2 (right table) and matched row in t1</p> <pre>SELECT * FROM t1 RIGHT OUTER JOIN t2 ON t1.atr=t2.atr; -- (Shorter version) SELECT * FROM t1 RIGHT JOIN t2 ON t1.atr=t2.atr;</pre>
FULL OUTER JOIN	<p>Return all records (matched and unmatched) from both tables</p> <pre>-- MySQL Syntax SELECT * FROM t1 LEFT OUTER JOIN t2 ON t1.atr=t2.atr; UNION ALL SELECT * FROM t1 RIGHT OUTER JOIN t2 ON t1.atr=t2.atr; WHERE t1.atr IS NULL;</pre>