

State of the UNION

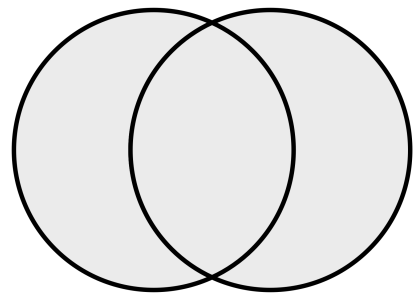
JOINING DATA IN SQL



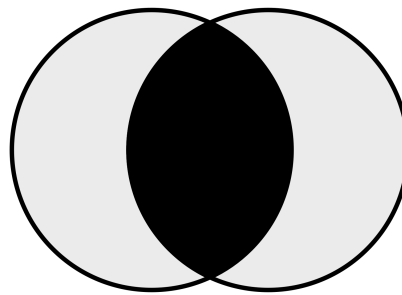
Chester Ismay

Data Science Evangelist, DataRobot

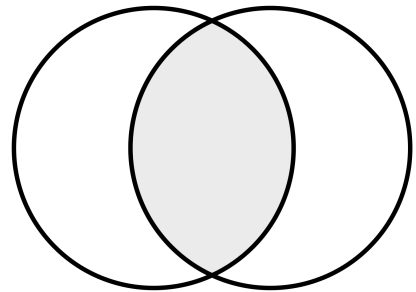
Set Theory Venn Diagrams



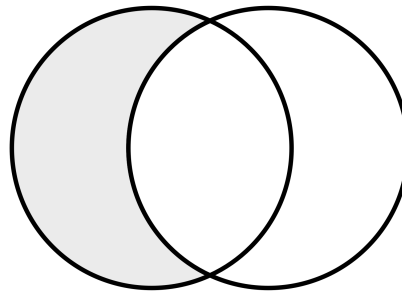
UNION



UNION ALL



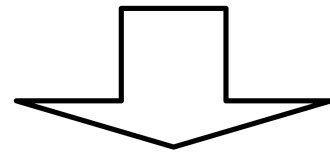
INTERSECT



EXCEPT

left_one right_one

id	id
1	1
2	4
3	5
4	6

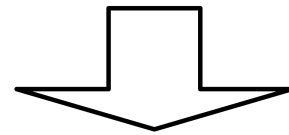


UNION

id
1
2
3
4
5
6

left_one right_one

id	id
1	1
2	4
3	5
4	6



UNION ALL

id
1
1
2
3
4
4
5
6

monarchs table

```
SELECT *  
FROM monarchs;
```

country	continent	monarch
Brunei	Asia	Hassanal Bolkiah
Oman	Asia	Qaboos bin Said al Said
Norway	Europe	Harald V
Spain	Europe	Felipe VI

All prime ministers and monarchs

```
SELECT prime_minister AS leader, country
FROM prime_ministers
UNION
SELECT monarch, country
FROM monarchs
ORDER BY country;
```

Resulting table from UNION

leader	country
Malcolm Turnbull	Australia
Hassanal Bolkiah	Brunei
Sherif Ismail	Egypt
Jack Guy Lafontant	Haiti
Narendra Modi	India
Harald V	Norway
Erna Solberg	Norway
Qaboos bin Said al Said	Oman
Antonio Costa	Portugal
Mariano Rajoy	Spain
Felipe VI	Spain
Nguyen Xuan Phuc	Vietnam

UNION ALL with leaders

```
SELECT prime_minister AS leader, country
FROM prime_ministers
UNION ALL
SELECT monarch, country
FROM monarchs
ORDER BY country
LIMIT 10;
```

leader	country
Malcolm Turnbull	Australia
Hassanal Bolkiah	Brunei
Hassanal Bolkiah	Brunei
Sherif Ismail	Egypt
Jack Guy Lafontant	Haiti
Narendra Modi	India
Erna Solberg	Norway
Harald V	Norway
Qaboos bin Said al Said	Oman
Qaboos bin Said al Said	Oman

Let's practice!

JOINING DATA IN SQL

INTERSECTional data science

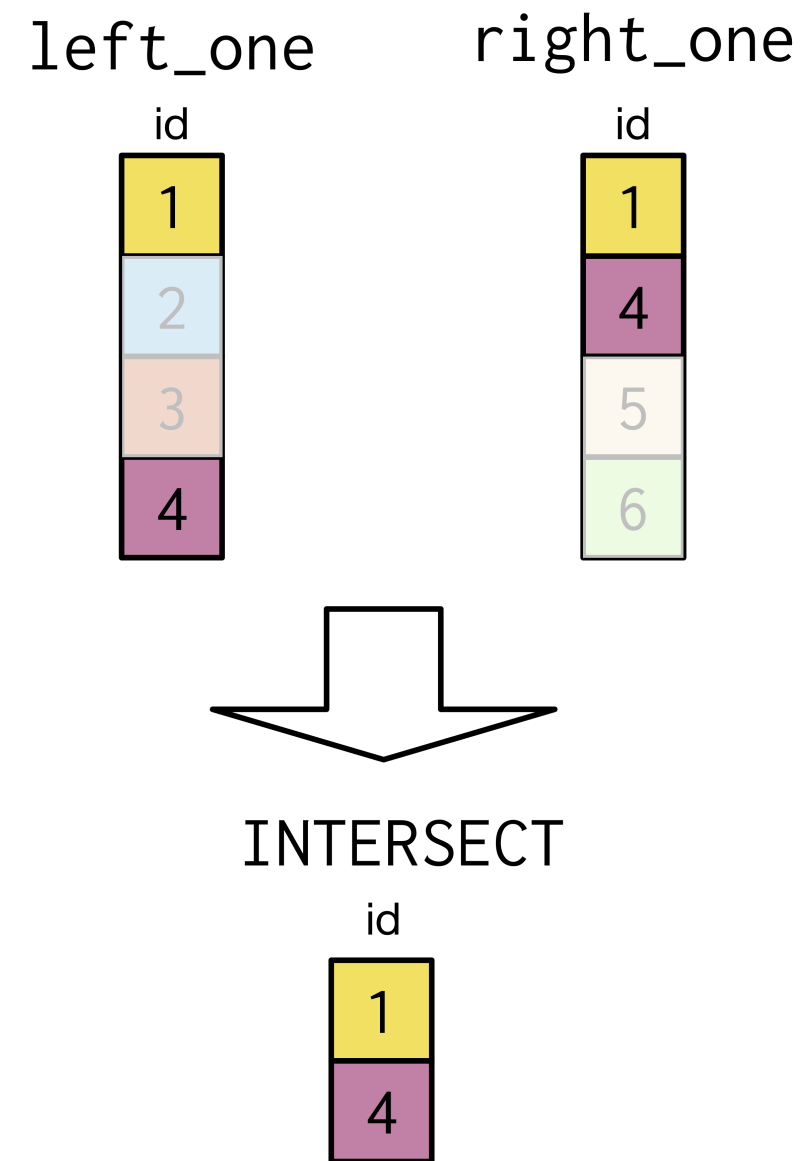
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Chester Ismay

Data Science Evangelist, DataRobot

INTERSECT diagram and SQL code



```
SELECT id
FROM left_one
INTERSECT
SELECT id
FROM right_one;
```

Prime minister and president countries

```
SELECT country
FROM prime_ministers
INTERSECT
SELECT country
FROM presidents;
```

```
+-----+
| country |
+-----+
| Portugal |
| Vietnam  |
| Haiti    |
| Egypt    |
+-----+
```

INTERSECT on two fields

```
SELECT country, prime_minister AS leader
FROM prime_ministers
INTERSECT
SELECT country, president
FROM presidents;
```

```
+-----+-----+
| country | leader |
+-----+-----+
+-----+-----+
```

Let's practice!

JOINING DATA IN SQL

EXCEPTional

JOINING DATA IN SQL



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Monarchs that aren't prime ministers

```
SELECT monarch, country
FROM monarchs
EXCEPT
SELECT prime_minister, country
FROM prime_ministers;
```

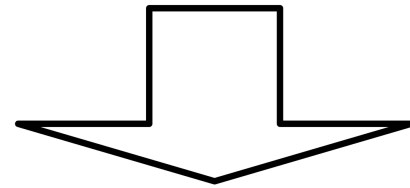
```
+-----+-----+
| monarch | country |
+-----+-----+
| Harald V | Norway  |
| Felipe VI | Spain   |
+-----+-----+
```


left_one

id
1
2
3
4

right_one

id
1
4
5
6



EXCEPT

id
2
3

Let's practice!

JOINING DATA IN SQL

Semi-joins and Anti-joins

JOINING DATA IN SQL



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Building up to a semi-join

```
SELECT name
FROM states
WHERE indep_year < 1800;
```

```
+-----+
| name   |
|-----|
| Portugal |
| Spain   |
+-----+
```

Another step towards the semi-join

```
SELECT president, country, continent
FROM presidents;
```

president	country	continent
Abdel Fattah el-Sisi	Egypt	Africa
Marcelo Rebelo de Sousa	Portugal	Europe
Jovenel Moise	Haiti	North America
Jose Mujica	Uruguay	South America
Ellen Johnson Sirleaf	Liberia	Africa
Michelle Bachelet	Chile	South America
Tran Dai Quang	Vietnam	Asia

Finish the semi-join (an intro to subqueries)

```
SELECT president, country, continent
FROM presidents
WHERE country IN
    (SELECT name
     FROM states
     WHERE indep_year < 1800);
```

+	-----	+	-----	+	-----	+
	president		country		continent	
	-----	+	-----	+	-----	
	Marcelo Rebelo de Sousa		Portugal		Europe	
+	-----	+	-----	+	-----	+

An anti-join

```
SELECT president, country, continent
FROM presidents
WHERE ___ LIKE '___'
      AND country ___ IN
      (SELECT name
       FROM states
       WHERE indep_year < 1800);
```

```
SELECT president, country, continent
FROM presidents
WHERE continent LIKE '%America'
      AND country NOT IN
      (SELECT name
       FROM states
       WHERE indep_year < 1800);
```

The result of the anti-join

```
+-----+-----+-----+
| president | country | continent |
+-----+-----+-----+
| Jovenel Moise | Haiti | North America |
| Jose Mujica | Uruguay | South America |
| Michelle Bachelet | Chile | South America |
+-----+-----+-----+
```

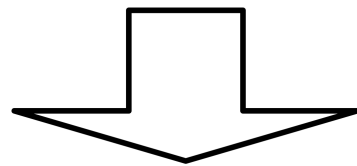

Semi-join and anti-join diagrams

left_table

id	val
1	L1
2	L2
3	L3
4	L4

right_table

id	val
1	R1
4	R2
5	R3
6	R4



Semi-join

L_id L_val

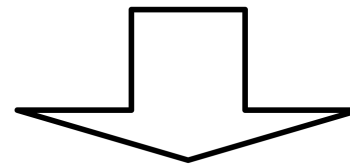
1	L1
4	L4

left_table

id	val
1	L1
2	L2
3	L3
4	L4

right_table

id	val
1	R1
4	R2
5	R3
6	R4



Anti-join

L_id L_val

2	L2
3	L3

Let's practice!

JOINING DATA IN SQL