

Nested query

DATA-DRIVEN DECISION MAKING IN SQL



Irene Ortner

Data Scientist at Applied Statistics

Nested query

- SELECT block in WHERE or HAVING clauses
- Inner query returns single or multiple values
- Use result from the inner query to select specific rows in another query

The inner query

Step 1: The inner query

```
SELECT DISTINCT customer_id  
FROM renting  
WHERE rating <= 3
```

```
| customer_id |  
|-----|  
| 28          |  
| 41          |  
| 86          |  
| 120         |
```

Result in the WHERE clause

```
SELECT name  
FROM customers  
WHERE customer_id IN (28, 41, 86, 120);
```

The outer query

Step 2: The outer query

```
SELECT name
FROM customers
WHERE customer_id IN
  (SELECT DISTINCT customer_id
   FROM renting
   WHERE rating <= 3);
```

```
| name          |
|-----|
| Sidney G n reux |
| Zara Mitchell  |
```

Nested query in the HAVING clause

Step 1: The inner query

```
SELECT MIN(date_account_start)
FROM customers
WHERE country = 'Austria';
```

```
| min          |
|-----|
| 2017-11-22  |
```

Nested query in the HAVING clause

Step 2: The outer query

```
SELECT country, MIN(date_account_start)
FROM customers
GROUP BY country
HAVING MIN(date_account_start) <
    (SELECT MIN(date_account_start)
     FROM customers
     WHERE country = 'Austria');
```

| country | min |
|---------------|------------|
| Spain | 2017-02-14 |
| Great Britain | 2017-03-31 |

Who are the actors in the movie Ray?

```
SELECT name
FROM actors
WHERE actor_id IN
  (SELECT actor_id
   FROM actsin
   WHERE movie_id =
     (SELECT movie_id
      FROM movies
      WHERE title='Ray'));
```

```
| name          |
|-----|
| Jamie Foxx    |
| Kerry Washington |
| Regina King   |
```


Let's practice!

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Correlated nested queries

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Bart Baesens

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Correlated queries

- Condition in the WHERE clause of the inner query.
- References some column of a table in the outer query.

Example correlated query

- Number of movie rentals more than 5

```
SELECT *  
FROM movies as m  
WHERE 5 <  
    (SELECT COUNT(*)  
     FROM renting as r  
     WHERE r.movie_id=m.movie_id);
```

Evaluate inner query

```
SELECT COUNT(*)  
FROM renting as r  
WHERE r.movie_id = 1;
```

```
| count |  
|-----|  
| 8     |
```

Evaluate outer query

Number of movie rentals larger than 5

```
SELECT *  
FROM movies as m  
WHERE 5 <  
      (SELECT COUNT(*)  
       FROM renting as r  
       WHERE r.movie_id = m.movie_id);
```

| movie_id | title | genre | runtime | year_of_release | renting_price |
|----------|-----------------------|--------|---------|-----------------|---------------|
| 1 | One Night at McCool's | Comedy | 93 | 2001 | 2.09 |
| 2 | Swordfish | Drama | 99 | 2001 | 2.19 |

Less than 5 movie rentals

Select movies with less than 5 movie rentals.

```
SELECT *
FROM movies as m
WHERE 5 >
    (SELECT COUNT(*)
     FROM renting as r
     WHERE r.movie_id = m.movie_id);
```

| movie_id | title | genre | runtime | year_of_release | renting_price |
|----------|-----------------|--------------------|---------|-----------------|---------------|
| 17 | The Human Stain | Mystery & Suspense | 106 | 2003 | 1.99 |
| 20 | Love Actually | Comedy | 135 | 2003 | 2.29 |

Let's practice!

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Queries with EXISTS

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EXISTS

- Special case of a correlated nested query.
- Used to check if result of a correlated nested query is empty.
- It returns: TRUE or FALSE
- TRUE = not empty -> row of the outer query is selected.
- FALSE = empty
- Columns specified in SELECT component not considered - use `SELECT *`

Movies with at least one rating

```
SELECT *  
FROM movies AS m  
WHERE EXISTS  
  (SELECT *  
   FROM renting AS r  
   WHERE rating IS NOT NULL  
   AND r.movie_id = m.movie_id);
```

Movies with at least one rating

```
SELECT *  
FROM renting AS r  
WHERE rating IS NOT NULL  
AND r.movie_id = 11;
```

```
| renting_id | customer_id | movie_id | rating | renting_price |  
|-----|-----|-----|-----|-----|
```

Movies with at least one rating

```
SELECT *  
FROM renting AS r  
WHERE rating IS NOT NULL  
AND r.movie_id = 1;
```

| renting_id | customer_id | movie_id | rating | renting_price |
|------------|-------------|----------|--------|---------------|
| 71 | 111 | 1 | 5 | 2018-07-21 |
| 170 | 36 | 1 | 10 | 2018-10-18 |

EXISTS query with result

```
SELECT *  
FROM movies AS m  
WHERE EXISTS  
  (SELECT *  
   FROM renting AS r  
   WHERE rating IS NOT NULL  
   AND r.movie_id = m.movie_id);
```

| movie_id | title | genre | runtime | year_of_release | renting_price |
|----------|-----------------------|--------|---------|-----------------|---------------|
| 1 | One Night at McCool's | Comedy | 93 | 2001 | 2.09 |
| 2 | Swordfish | Drama | 99 | 2001 | 2.19 |

NOT EXISTS

- TRUE = table is empty -> row of the outer query is selected.

```
SELECT *  
FROM movies AS m  
WHERE NOT EXISTS  
  (SELECT *  
   FROM renting AS r  
   WHERE rating IS NOT NULL  
   AND r.movie_id = m.movie_id);
```

| movie_id | title | genre | runtime | year_of_release | renting_price |
|----------|----------|--------|---------|-----------------|---------------|
| 11 | Showtime | Comedy | 95 | 2002 | 1.79 |

Let's practice!

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Queries with UNION and INTERSECT

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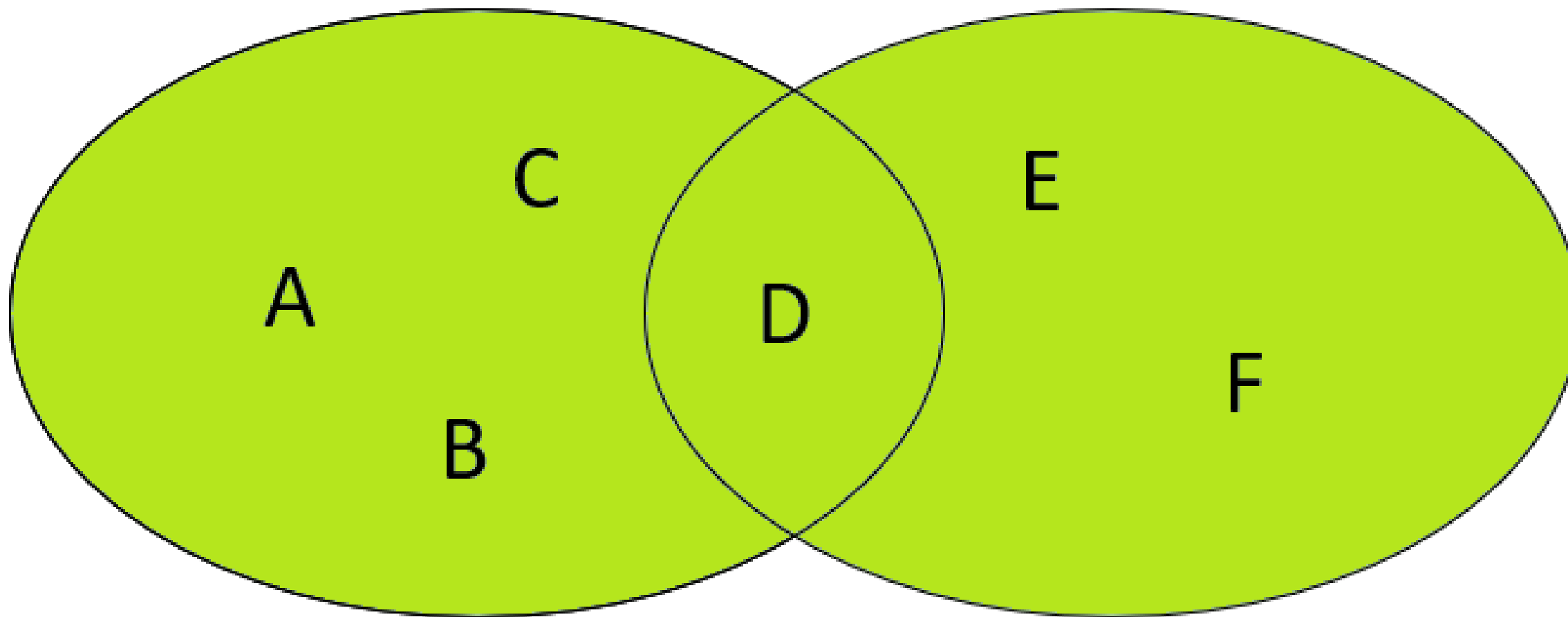
SQL

Tim Verdonck

Professor Statistics and Data Science

UNION

UNION



Example - UNION

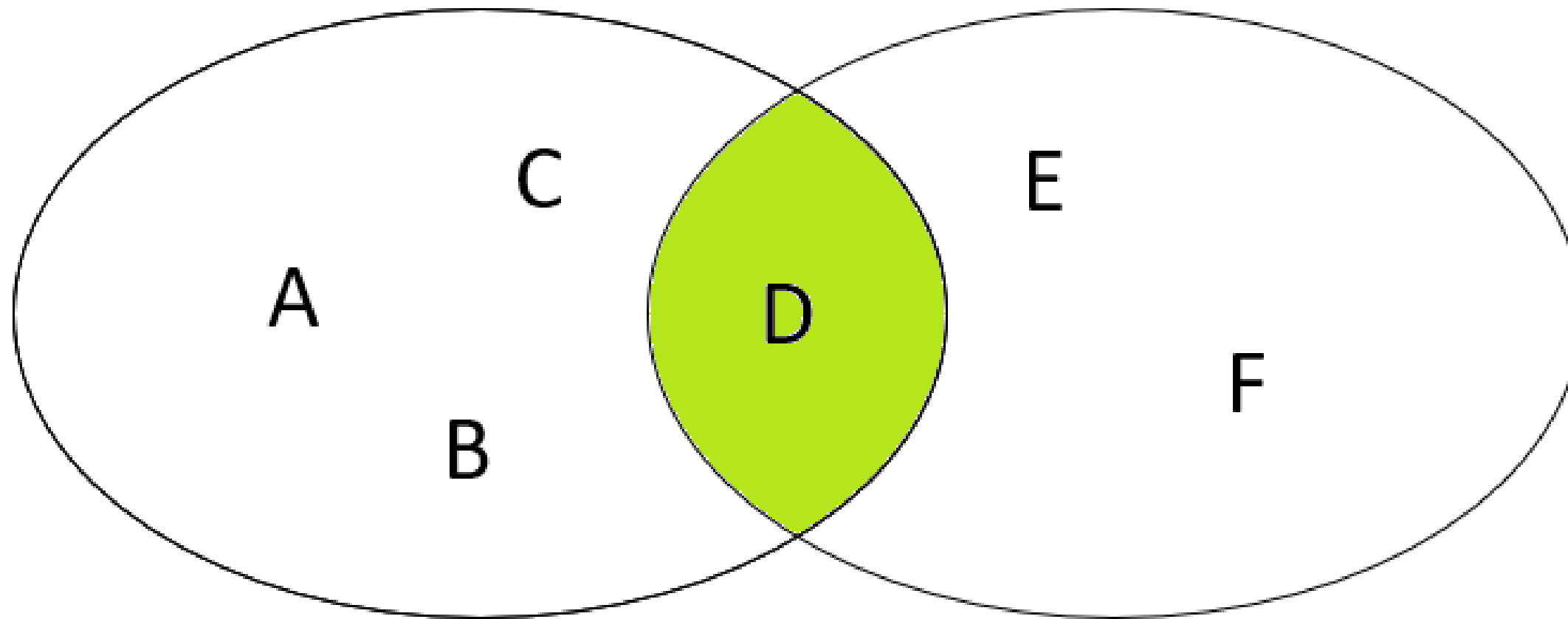
```
SELECT title,  
        genre,  
        renting_price  
FROM movies  
WHERE renting_price > 2.8  
UNION  
SELECT title,  
        genre,  
        renting_price  
FROM movies  
WHERE genre = 'Action & Adventure';
```

```
SELECT title,  
       genre,  
       renting_price  
FROM movies  
WHERE renting_price > 2.8  
UNION  
SELECT title,  
       genre,  
       renting_price  
FROM movies  
WHERE genre = 'Action & Adventure';
```

| title | genre | renting_price |
|-------------|--------------------|---------------|
| Fool's Gold | Action & Adventure | 2.69 |
| Astro Boy | Action & Adventure | 2.89 |
| Fair Game | Drama | 2.89 |

INTERSECT

INTERSECT



Example - INTERSECT

```
SELECT title,  
       genre,  
       renting_price  
FROM movies  
WHERE renting_price > 2.8  
INTERSECT  
SELECT title,  
       genre,  
       renting_price  
FROM movies  
WHERE genre = 'Action & Adventure';
```

| title | genre | renting_price |
|-----------|--------------------|---------------|
| Astro Boy | Action & Adventure | 2.89 |

Let's practice!

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