

# Welcome to Intermediate SQL!

INTERMEDIATE SQL



**Mona Khalil**

Data Scientist, Greenhouse Software

# Topics covered:

- CASE statements
- Simple subqueries
- Correlated subqueries
- Window functions

# Prerequisites

- Selecting, filtering, and grouping data

```
SELECT user_id, SUM(sales)
FROM sales_data
WHERE user_id BETWEEN 300 AND 400
GROUP BY user_id;
```

- Using joins

```
SELECT c.country, c.team, SUM(m.goals)
FROM countries AS c
LEFT JOIN matches AS m
ON c.team_id = m.home_team_id
WHERE m.year > 1990
GROUP BY c.country, c.team;
```

# Selecting from the European Soccer Database

```
SELECT
    l.name AS league,
    COUNT(m.country_id) as matches
FROM league AS l
LEFT JOIN match AS m
ON l.country_id = m.country_id
GROUP BY l.name;
```

league	total_matches
Belgium Jupiler League	732
England Premier League	1520
France Ligue 1	1520
Germany 1. Bundesliga	1224

# Selecting from the European Soccer Database

```
SELECT
    date,
    id,
    home_goal,
    away_goal
FROM match
WHERE season = '2013/2014';
```

date	id	home_goal	away_goal	
-----	-----	-----	-----	
2014-03-29 00:00:00	1237	2	0	
2014-03-29 00:00:00	1238	0	1	
2014-04-05 00:00:00	1239	1	0	
2014-04-05 00:00:00	1240	0	0	

# Selecting from the European Soccer Database

```
SELECT
    date,
    id,
    home_goal,
    away_goal
FROM match
WHERE season = '2013/2014'
    AND home_team_goal > away_team_goal;
```

date	id	home_goal	away_goal	
-----	-----	-----	-----	
2014-03-29 00:00:00	1237	2	0	
2014-04-05 00:00:00	1239	1	0	
2014-04-12 00:00:00	1241	2	1	
2014-04-12 00:00:00	1242	2	0	

# CASE statements

- Contains a `WHEN` , `THEN` , and `ELSE` statement, finished with `END`

```
CASE WHEN x = 1 THEN 'a'  
      WHEN x = 2 THEN 'b'  
      ELSE 'c' END AS new_column
```

# CASE WHEN

```
SELECT
  id,
  home_goal,
  away_goal,
  CASE WHEN home_goal > away_goal THEN 'Home Team Win'
        WHEN home_goal < away_goal THEN 'Away Team Win'
        ELSE 'Tie' END AS outcome
FROM match
WHERE season = '2013/2014';
```

id	home_goal	away_goal	outcome
1237	2	0	Home Team Win
1238	0	1	Away Team Win
1239	1	0	Home Team Win
1240	0	0	Tie



**Let's practice!**  
INTERMEDIATE SQL

# In CASE things get more complex

INTERMEDIATE SQL

SQL

**Mona Khalil**

Data Scientist, Greenhouse Software

# Reviewing CASE WHEN

```
SELECT
    date,
    season,
    CASE WHEN home_goal > away_goal THEN 'Home team win!'
         WHEN home_goal < away_goal THEN 'Away team win!'
         ELSE 'Tie' END AS outcome
FROM match;
```

date	season	outcome	
-----	-----	-----	
2011-08-09	2011/2012	Home team win!	
2011-09-01	2011/2012	Away team win!	
2011-09-14	2011/2012	Tie	
2011-10-04	2011/2012	Home team win!	

# CASE WHEN ... AND then some

- Add multiple logical conditions to your `WHEN` clause!

```
SELECT date, hometeam_id, awayteam_id,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
             THEN 'Chelsea home win!'  
             WHEN awayteam_id = 8455 AND home_goal < away_goal  
             THEN 'Chelsea away win!'  
             ELSE 'Loss or tie :( ' END AS outcome  
FROM match  
WHERE hometeam_id = 8455 OR awayteam_id = 8455;
```

date	hometeam_id	awayteam_id	outcome
2011-08-14	10194	8455	Loss or tie :(
2011-08-20	8455	8659	Chelsea home win!
2011-08-27	8455	9850	Chelsea home win!
2011-09-10	8472	8455	Chelsea away win!

# What ELSE is being excluded?

- What's in your `ELSE` clause?

```
SELECT date, hometeam_id, awayteam_id,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
            THEN 'Chelsea home win!'  
            WHEN awayteam_id = 8455 AND home_goal < away_goal  
            THEN 'Chelsea away win!'  
            ELSE 'Loss or tie :( ' END AS outcome  
FROM match;
```

date	hometeam_id	awayteam_id	outcome
2011-07-29	1773	8635	Loss or tie :(
2011-07-30	9998	9985	Loss or tie :(
2011-07-30	9987	9993	Loss or tie :(
2011-07-30	9991	9984	Loss or tie :(

# Correctly categorize your data with CASE

```
SELECT date, hometeam_id, awayteam_id,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
            THEN 'Chelsea home win!'  
            WHEN awayteam_id = 8455 AND home_goal < away_goal  
            THEN 'Chelsea away win!'  
            ELSE 'Loss or tie :(' END AS outcome  
FROM match  
WHERE hometeam_id = 8455 OR awayteam_id = 8455;
```

date	hometeam_id	awayteam_id	outcome
2011-08-14	10194	**8455**	Loss or tie :(
2011-08-20	**8455**	8659	Chelsea home win!
2011-08-27	**8455**	9850	Chelsea home win!
2011-09-10	8472	**8455**	Chelsea away win!

# What's NULL?

```
SELECT date,  
CASE WHEN date > '2015-01-01' THEN 'More Recently'  
      WHEN date < '2012-01-01' THEN 'Older'  
      END AS date_category  
FROM match;  
  
SELECT date,  
CASE WHEN date > '2015-01-01' THEN 'More Recently'  
      WHEN date < '2012-01-01' THEN 'Older'  
      ELSE NULL END AS date_category  
FROM match;
```

date	date_category	
-----	-----	
2011-11-18	Older	
2012-02-11	NULL	
2014-11-07	NULL	
2015-02-14	More Recently	

# What are your NULL values doing?

```
SELECT date, season,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
            THEN 'Chelsea home win!'  
            WHEN awayteam_id = 8455 AND home_goal < away_goal  
            THEN 'Chelsea away win!'  
            END AS outcome  
FROM match  
WHERE hometeam_id = 8455 OR awayteam_id = 8455;
```

date	season	outcome
2011-08-14	2011/2012	NULL
2011-12-22	2011/2012	NULL
2012-12-08	2012/2013	Chelsea away win!
2013-03-02	2012/2013	Chelsea home win!



# Where to place your CASE?

```
SELECT date, season,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
            THEN 'Chelsea home win!'  
            WHEN awayteam_id = 8455 AND home_goal < away_goal  
            THEN 'Chelsea away win!' END AS outcome  
FROM match;
```

# Where to place your CASE?

```
SELECT date, season,  
       CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
            THEN 'Chelsea home win!'   
       WHEN awayteam_id = 8455 AND home_goal < away_goal  
            THEN 'Chelsea away win!' END AS outcome  
FROM match  
WHERE CASE WHEN hometeam_id = 8455 AND home_goal > away_goal  
        THEN 'Chelsea home win!'   
        WHEN awayteam_id = 8455 AND home_goal < away_goal  
        THEN 'Chelsea away win!' END IS NOT NULL;
```

date	season	outcome
2011-11-05	2011/2012	Chelsea away win!
2011-11-26	2011/2012	Chelsea home win!
2011-12-03	2011/2012	Chelsea away win!

**Let's practice!**  
INTERMEDIATE SQL

# CASE WHEN with aggregate functions

INTERMEDIATE SQL

SQL

**Mona Khalil**

Data Scientist, Greenhouse Software

# In CASE you need to aggregate

- CASE statements are great for
  - Categorizing data
  - Filtering data
  - Aggregating data

# COUNTing CASES

- How many home and away goals did Liverpool score in each season?

season	home_wins	away_wins
-----	-----	-----
2011/2012		
2012/2013		
2013/2014		
2014/2015		

# CASE WHEN with COUNT

```
SELECT
    season,
    COUNT(CASE WHEN hometeam_id = 8650
               AND home_goal > away_goal
               THEN id END) AS home_wins
FROM match
GROUP BY season;
```

# CASE WHEN with COUNT

```
SELECT
  season,
  COUNT(CASE WHEN hometeam_id = 8650 AND home_goal > away_goal
    THEN id END) AS home_wins,
  COUNT(CASE WHEN awayteam_id = 8650 AND away_goal > home_goal
    THEN id END) AS away_wins
FROM match
GROUP BY season;
```

season	home_wins	away_wins
2011/2012	6	8
2012/2013	9	7
2013/2014	16	10
2014/2015	10	8



# CASE WHEN with COUNT

```
SELECT
  season,
  COUNT(CASE WHEN hometeam_id = 8650 AND home_goal > away_goal
    THEN 54321 END) AS home_wins,
  COUNT(CASE WHEN awayteam_id = 8650 AND away_goal > home_goal
    THEN 'Some random text' END) AS away_wins
FROM match
GROUP BY season;
```

season	home_wins	away_wins
2011/2012	6	8
2012/2013	9	7
2013/2014	16	10
2014/2015	10	8

# CASE WHEN with SUM

```
SELECT
  season,
  SUM(CASE WHEN hometeam_id = 8650
        THEN home_goal END) AS home_goals,
  SUM(CASE WHEN awayteam_id = 8650
        THEN away_goal END) AS away_goals
FROM match
GROUP BY season;
```

season	home_goals	away_goals
2011/2012	24	23
2012/2013	33	38
2013/2014	53	48
2014/2015	30	22

# The CASE is fairly AVG...

```
SELECT
  season,
  AVG(CASE WHEN hometeam_id = 8650
    THEN home_goal END) AS home_goals,
  AVG(CASE WHEN awayteam_id = 8650
    THEN away_goal END) AS away_goals
FROM match
GROUP BY season;
```

season	avg_homegoals	avg_awaygoals
2011/2012	1.26315789473684	1.21052631578947
2012/2013	1.73684210526316	2
2013/2014	2.78947368421053	2.52631578947368
2014/2015	1.57894736842105	1.15789473684211

# A ROUNDeD AVG

```
ROUND(3.141592653589, 2)
```

```
3.14
```

# A ROUNDeD AVG

```
SELECT
  season,
  ROUND(AVG(CASE WHEN hometeam_id = 8650
    THEN home_goal END),2) AS home_goals,
  ROUND(AVG(CASE WHEN awayteam_id = 8650
    THEN away_goal END),2) AS away_goals
FROM match
GROUP BY season;
```

season	avg_homegoals	avg_awaygoals
2011/2012	1.26	1.21
2012/2013	1.73	2
2013/2014	2.78	2.52
2014/2015	1.57	1.15

# Percentages with CASE and AVG

```
SELECT
  season,
  AVG(CASE WHEN hometeam_id = 8455 AND home_goal > away_goal THEN 1
        WHEN hometeam_id = 8455 AND home_goal < away_goal THEN 0
        END) AS pct_homewins,
  AVG(CASE WHEN awayteam_id = 8455 AND away_goal > home_goal THEN 1
        WHEN awayteam_id = 8455 AND away_goal < home_goal THEN 0
        END) AS pct_awaywins
FROM match
GROUP BY season;
```

season	pct_homewins	pct_awaywins
2011/2012	0.75	0.5
2012/2013	0.85714285714286	0.66666666666667
2013/2014	0.9375	0.66666666666667
2014/2015	1	0.78571428571429

# Percentages with CASE and AVG

```
SELECT
  season,
  ROUND(AVG(CASE WHEN hometeam_id = 8455 AND home_goal > away_goal THEN 1
               WHEN hometeam_id = 8455 AND home_goal < away_goal THEN 0
               END),2) AS pct_homewins,
  ROUND(AVG(CASE WHEN awayteam_id = 8455 AND away_goal > home_goal THEN 1
               WHEN awayteam_id = 8455 AND away_goal < home_goal THEN 0
               END),2) AS pct_awaywins
FROM match
GROUP BY season;
```

season	pct_homewins	pct_awaywins
2011/2012	0.75	0.5
2012/2013	0.86	0.67
2013/2014	0.94	0.67
2014/2015	1	0.79

**Let's practice!**  
INTERMEDIATE SQL