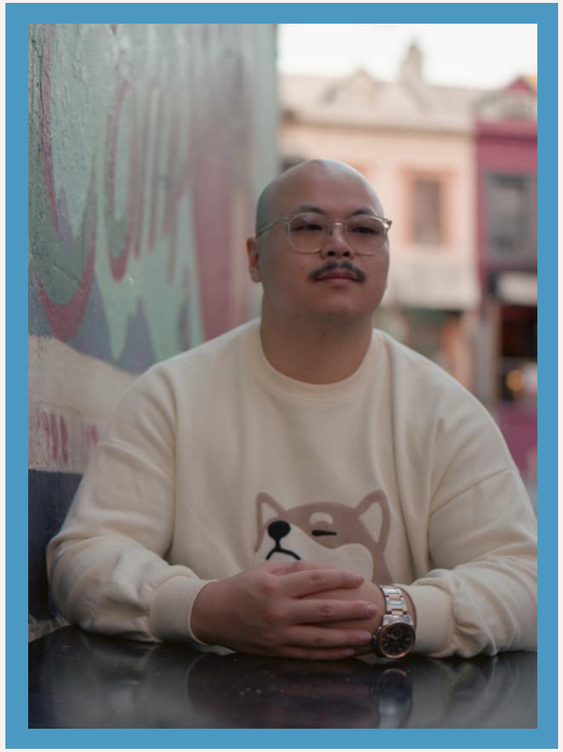
PostgreSQL for Data Analytics

Danny Ma
October 2021

Pearson

About me



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My Data Analytics Journey

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My Data Analytics Journey

2010

Started Bachelors Actuarial Studies & Economics

Excel, Matlab, R

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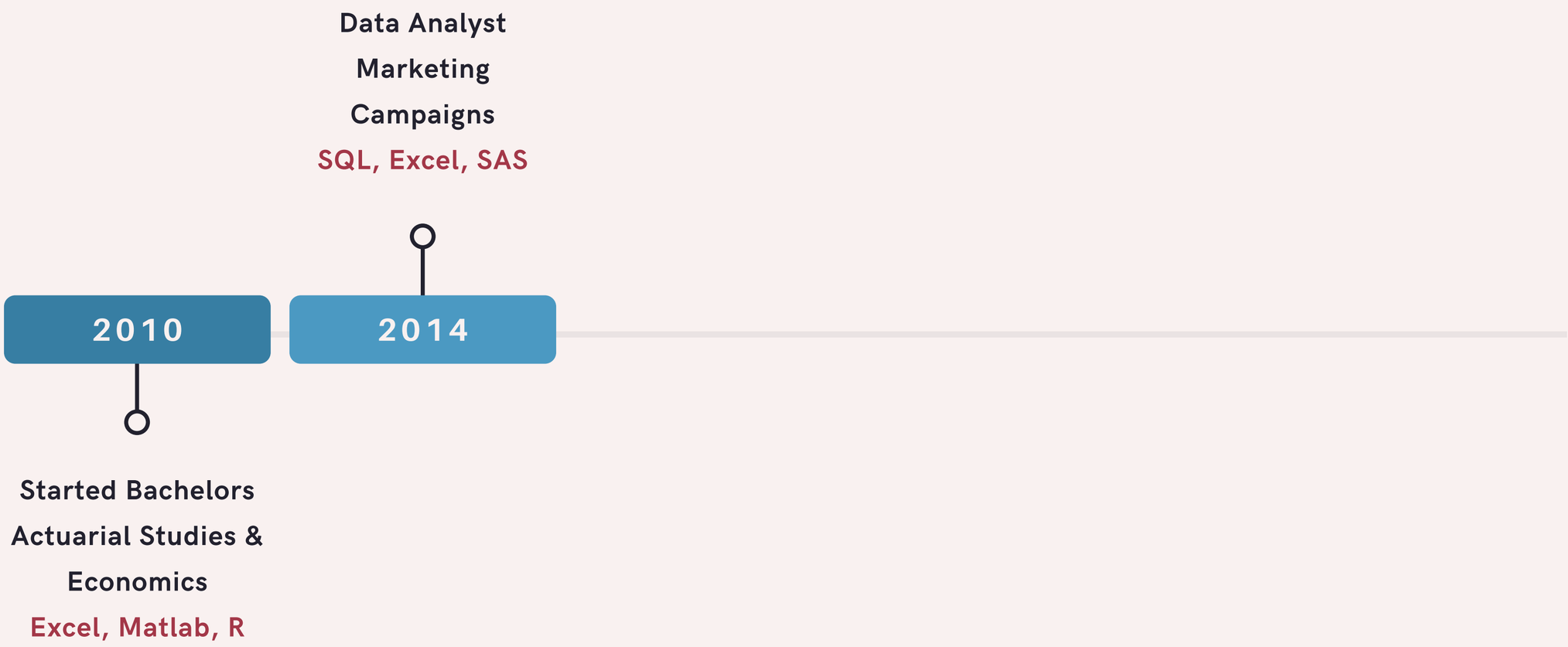

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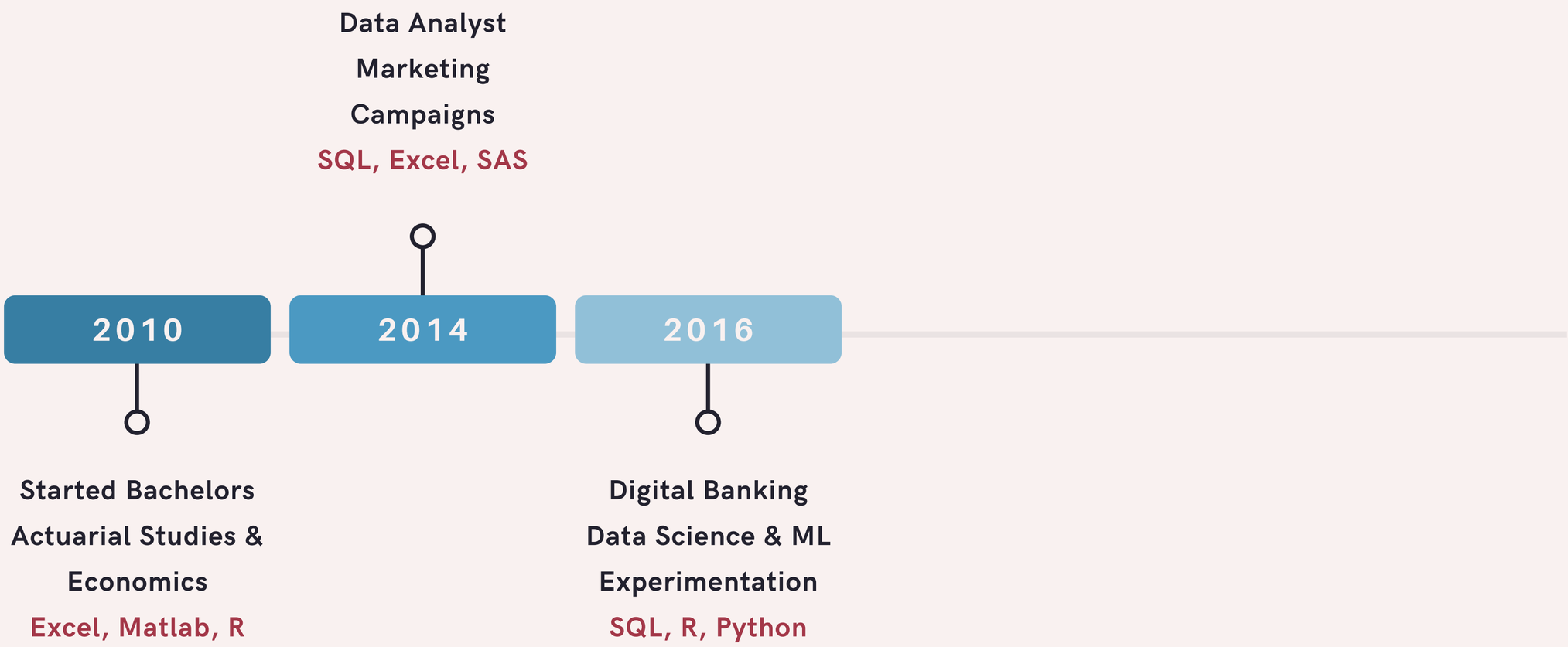

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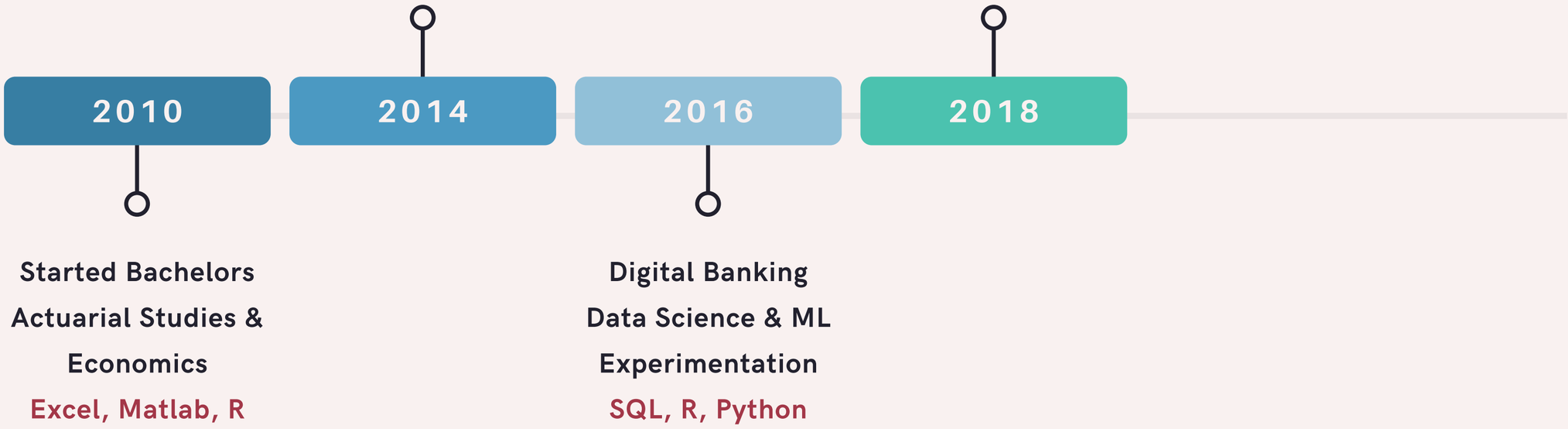

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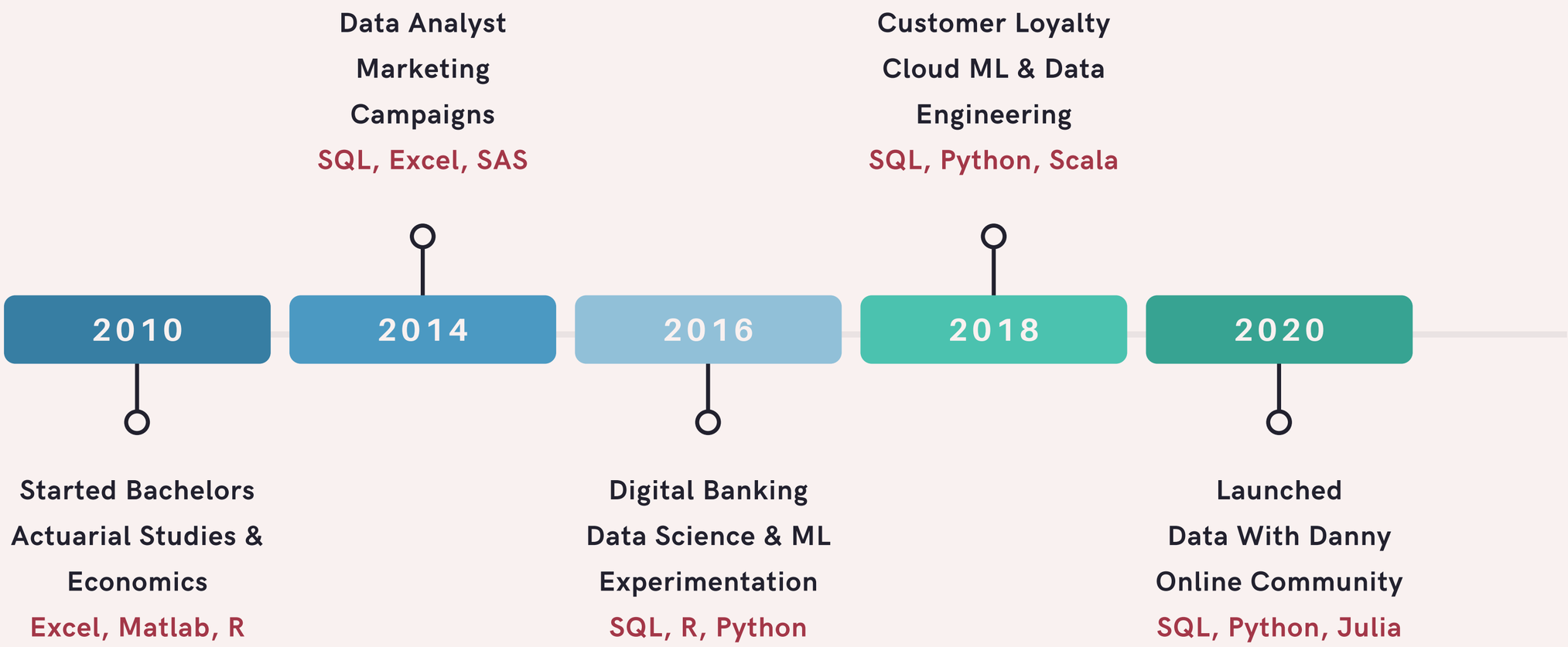

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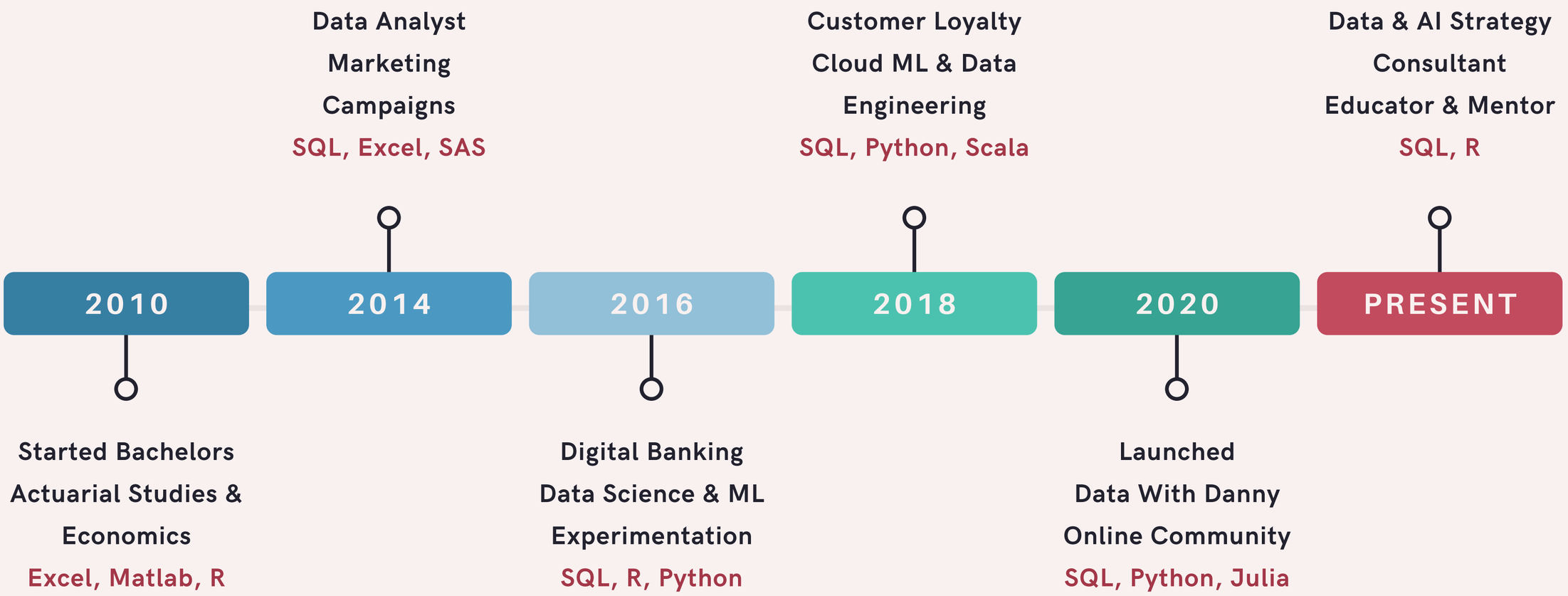

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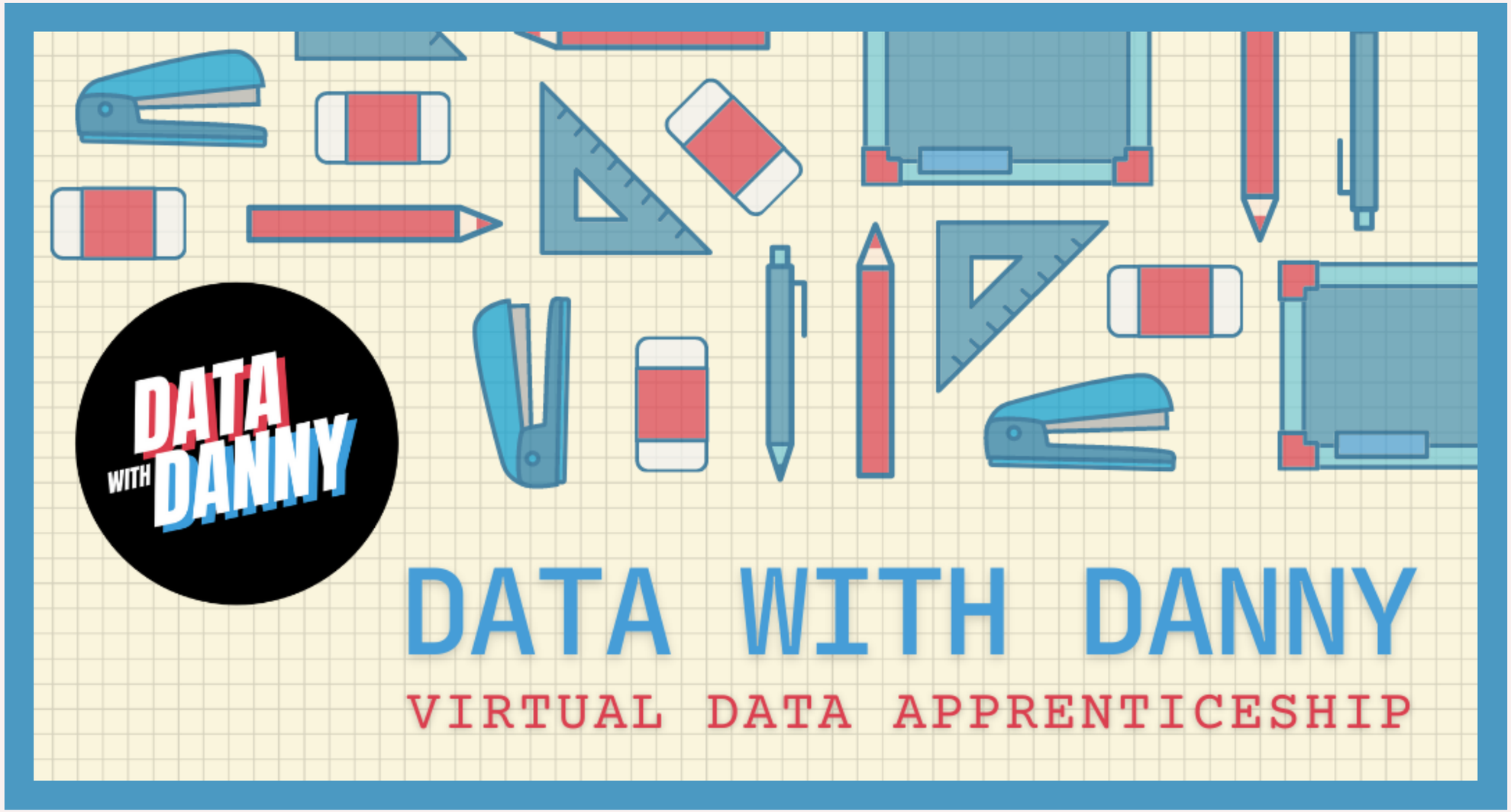
DATA WITH DANNY
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VIRTUAL DATA APPRENTICESHIP

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How can I find out more about Data With Danny?

bit.ly/dwd-info

SQL FACTS






SQL FACTS

SQL appears in over 40% of all data job listings posted on Indeed in 2021

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SQL FACTS

65% of data analysts and data scientists use SQL according to a 2020 Stack Overflow survey

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SQL FACTS

SQL queries can be used with many languages and frameworks via objects and APIs to interact with databases

SQL FACTS

SQL is a standardised language making it a very versatile skill used across different domains and tech environments

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The modern data stack is moving to SQL-centric tools such as Snowflake, Amazon Redshift and Google BigQuery

SQL FACTS

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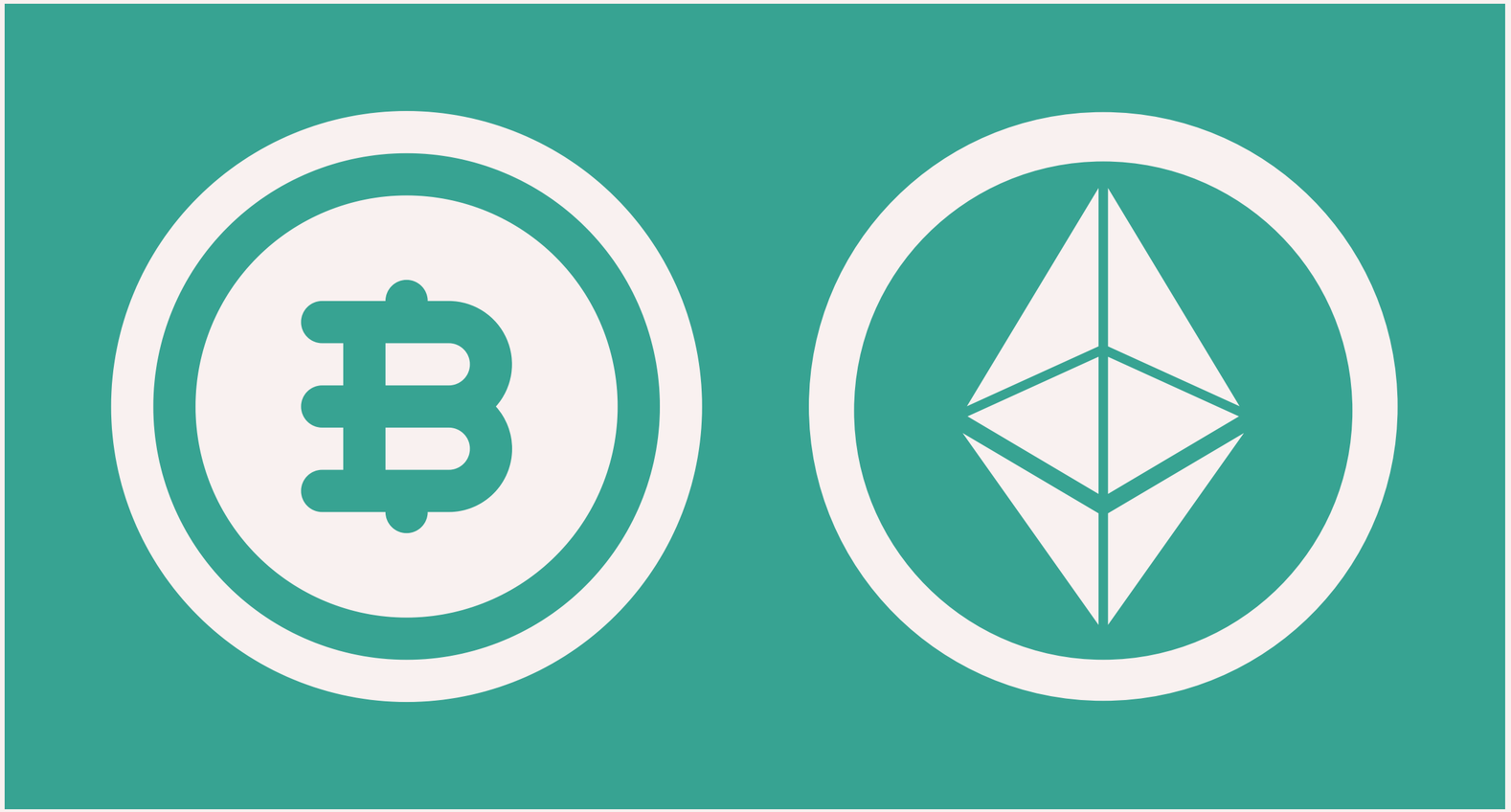
THE PLAN FOR TODAY

SQL
Simplified

General
Q&A

CRYPTO CASE STUDY



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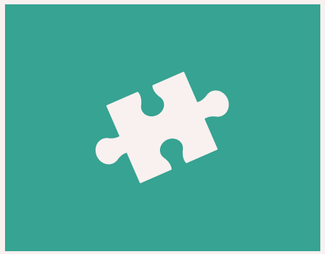
SQL SIMPLIFIED

Session 1
Case Study Introduction



Session 2
Group By & Case When

Session 3
Window Functions

Session 4
Multiple Table Joins

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SQL SIMPLIFIED

Session 1
Case Study Introduction

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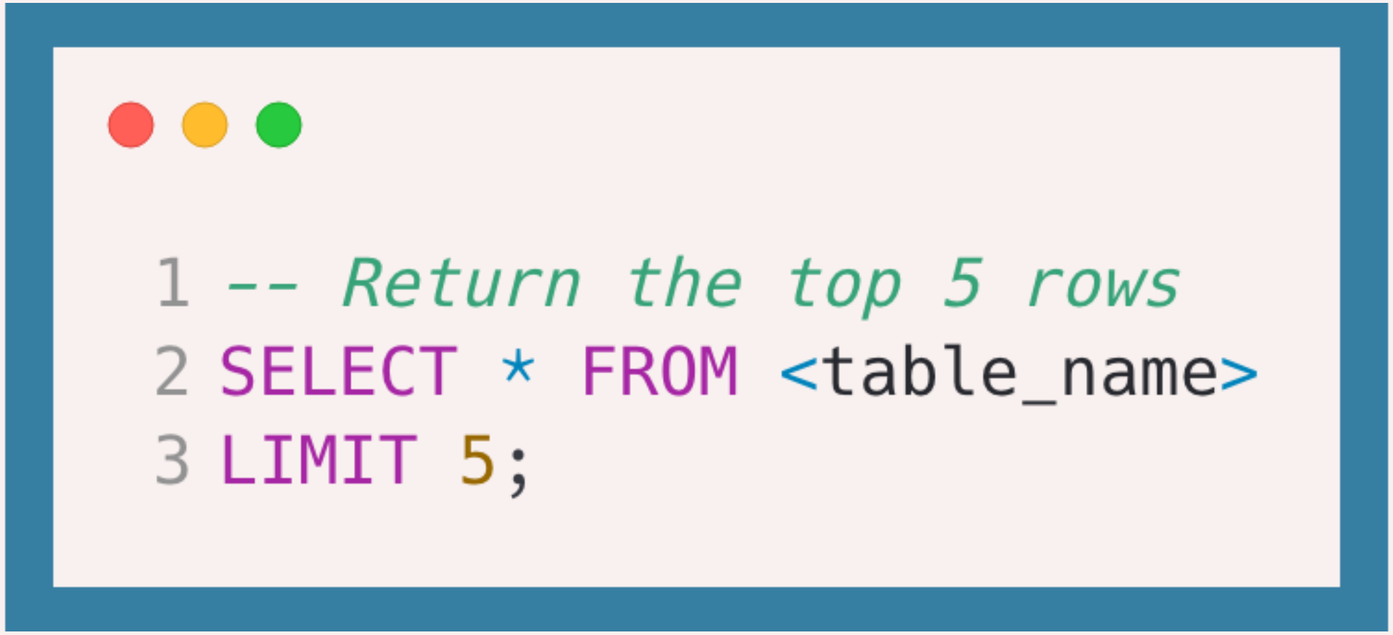
SELECT STATEMENT

```sql
-- Return all columns and rows
SELECT * FROM <table_name>;
```

LIMIT



```sql
-- Return the top 5 rows
SELECT * FROM <table_name>
LIMIT 5;
```

ORDER BY

```sql
-- Order in alphabetical order
SELECT * FROM <table_name>
ORDER BY <string_column>;
```

COUNT

```sql
-- Count all rows including nulls
SELECT COUNT(*) FROM <table_name>;
```

```sql
-- Count non_null records in a column
SELECT COUNT(<column>) FROM <table_name>;
```

WHERE FILTERS

```sql
-- Where filter on string column
SELECT * FROM <table_name>
WHERE <string_column> = '<exact_string>';
```

```sql
-- Where filter to exclude records
SELECT * FROM <table_name>
WHERE <string_column> != '<exact_string>';
```

DISTINCT

```sql
-- Get unique values from a table
SELECT DISTINCT * FROM <table_name>;
```

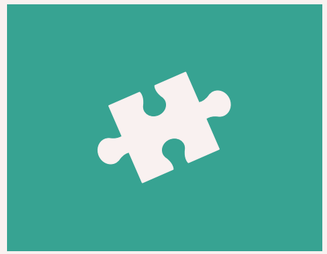
```sql
-- Get unique values from a column
SELECT DISTINCT <column> FROM <table_name>;
```

DISTINCT

```sql
-- Get unique values from 2+ columns
SELECT DISTINCT
  <column_1>,
  ...
  <column_n>
FROM <table_name>;
```

SQL SIMPLIFIED

Session 1
Case Study
Introduction



Session 2
Group By &
Case When

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BETWEEN

```sql
-- Where filter for date ranges
SELECT * FROM <table_name>
WHERE <date_column> BETWEEN '<start_date>' AND '<end_date>';
```

INEQUALITIES

```
1 -- Where filter using inequality
2 SELECT * FROM <table_name>
3 WHERE <column_name> {> or >= or < or <=} <exact_value>;
```

AGGREGATE FUNCTIONS

```sql
-- Min/max/average on a target column
-- using 1 single group by column
SELECT
  <group_by_column>,
  MIN(target_column),
  MAX(target_column),
  AVG(target_column)
FROM <table_name>
GROUP BY <group_by_column>;
```

EXTRACT DATE INFO

```sql
-- Extract a year date part from a date column
SELECT
  EXTRACT(YEAR FROM <date_column>)
FROM <table_name>;
```

DATE TRUNCATION

```sql
-- Extract 1st day of month from date column
SELECT
  DATE_TRUNC('MON', <date_column>)
FROM <table_name>;
```

CAST DATA TYPES

```sql
-- Cast float datatypes for rounding
SELECT
  ROUND(AVG(<numeric_column>)::NUMERIC, 2)
FROM <table_name>;
```

MULTI-LEVEL SORTING

```sql
-- Multi-level sort with more than 1 column
SELECT * FROM <table_name>
ORDER BY <column_1> [desc], <column_2> [desc];
```

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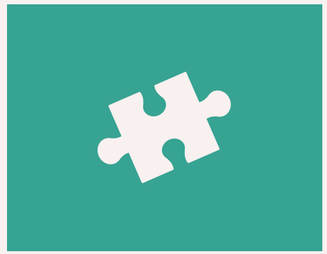

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Group By &
Case When

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BASIC CASE WHEN

```sql
-- Basic case when statement structure
SELECT
  CASE
    WHEN <1st_if_condition> THEN <output_1>
    WHEN <2nd_if_condition> THEN <output_2>
    < Additional If-Then conditions go here >
    ELSE <output_3>
  END AS <alias_name>
```

SUM CASE WHEN: COUNTIF

```sql
-- Countif using sum case when
SELECT
  SUM(
    CASE
      WHEN <if_condition> THEN 1
      ELSE 0
    END
  )
FROM <table_name>;
```

SUM CASE WHEN: SUMIF

```sql
-- Sumif using sum case when
SELECT
  SUM(
    CASE
      WHEN <if_condition> THEN <then_output>
      ELSE 0
    END
  )
FROM <table_name>;
```

LEFT/RIGHT STRINGS

```sql
-- Find the n-th character from the left or right
SELECT
  LEFT(<string_column>, n) AS left_nth,
  RIGHT(<string_column>, n) AS right_nth
FROM <table_name>;
```

CHARACTER LENGTH

```sql
-- Find the character length of column
SELECT LENGTH(<string_column>) FROM <table_name>;
```

REMOVE LAST CHARACTER

```sql
-- Remove the last character from string
SELECT
  LEFT(<string_column>, LENGTH(<string_column>) - 1))
FROM <table_name>;
```

SQL SIMPLIFIED

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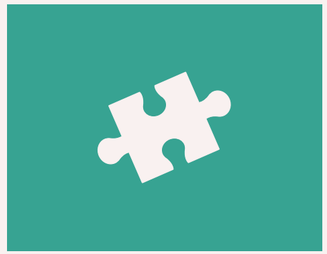

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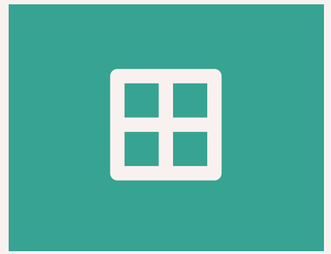

Session 3
Window
Functions

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RANK WINDOW FUNCTION

```sql
-- Ranking window function
SELECT
  RANK() OVER (
    PARTITION BY <partition_column> ...
    ORDER BY <sort_column> ...
  ) AS ranking
FROM <table_name>;
```

7 DAY MOVING AVERAGE

```sql
-- 7 day moving average window function
SELECT
  AVG(<target_column>) OVER (
    PARTITION BY <partition_column> ...
    ORDER BY <date_column>  -- do not use DESC
    RANGE BETWEEN '7 DAYS' PRECEDING AND CURRENT ROW
  ) AS moving_avg
FROM <table_name>;
```

CUMULATIVE SUM

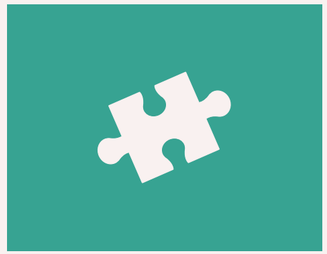
```sql
-- Cumulative sum window function
SELECT
  SUM(<target_column>) OVER (
    PARTITION BY <partition_column> ...
    ORDER BY <date_column>  -- do not use DESC
    RANGE BETWEEN UNBOUNDED PRECEDING AND CURRENT ROW
  ) AS cumulative_sum
FROM <table_name>;
```

LAG WINDOW FUNCTION

```sql
-- Lag window function
SELECT
  LAG(<target_column>) OVER (
    PARTITION BY <partition_column> ...
    ORDER BY <date_column>  -- do not use DESC
  ) AS previus_target_value
FROM <table_name>;
```

SQL SIMPLIFIED

Session 1
Case Study Introduction



Session 2
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Session 4
Multiple Table Joins

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INNER JOIN

```sql
-- Inner Join Between 2 Tables
SELECT
  members.region,
  SUM(transactions.quantity) AS bitcoin_quantity
FROM trading.transactions
INNER JOIN trading.members
  ON transactions.member_id = members.member_id
WHERE transactions.ticker = 'BTC'
  AND transactions.txn_type = 'BUY'
GROUP BY members.region
ORDER BY bitcoin_quantity DESC;
```

LEFT JOIN

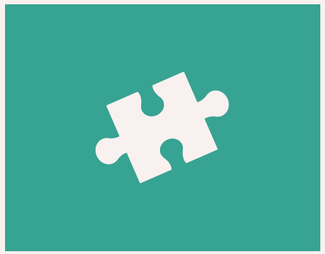
```sql
-- Left Join Between 2 Tables
SELECT
  prices.market_date,
  COUNT(transactions.txn_id) AS transaction_count
FROM trading.prices
LEFT JOIN trading.transactions
  ON prices.market_date = transactions.txn_date
  AND prices.ticker = transactions.ticker
GROUP BY prices.market_date
HAVING COUNT(transactions.txn_id) < 5
ORDER BY prices.market_date DESC;
```

MULTIPLE TABLE JOINS

```sql
-- Multiple Table Joins
SELECT
  members.region,
  SUM(transactions.quantity) AS btc_quantity,
  AVG(prices.price) AS avg_btc_price
FROM trading.transactions
INNER JOIN trading.prices
  ON transactions.ticker = prices.ticker
  AND transactions.txn_date = prices.market_date
INNER JOIN trading.members
  ON transactions.member_id = members.member_id
WHERE transactions.ticker = 'BTC'
  AND transactions.txn_type = 'BUY'
GROUP BY members.region
ORDER BY avg_btc_price DESC;
```

SQL SIMPLIFIED COMPLETED!

Session 1
Case Study Introduction



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General Q&A

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