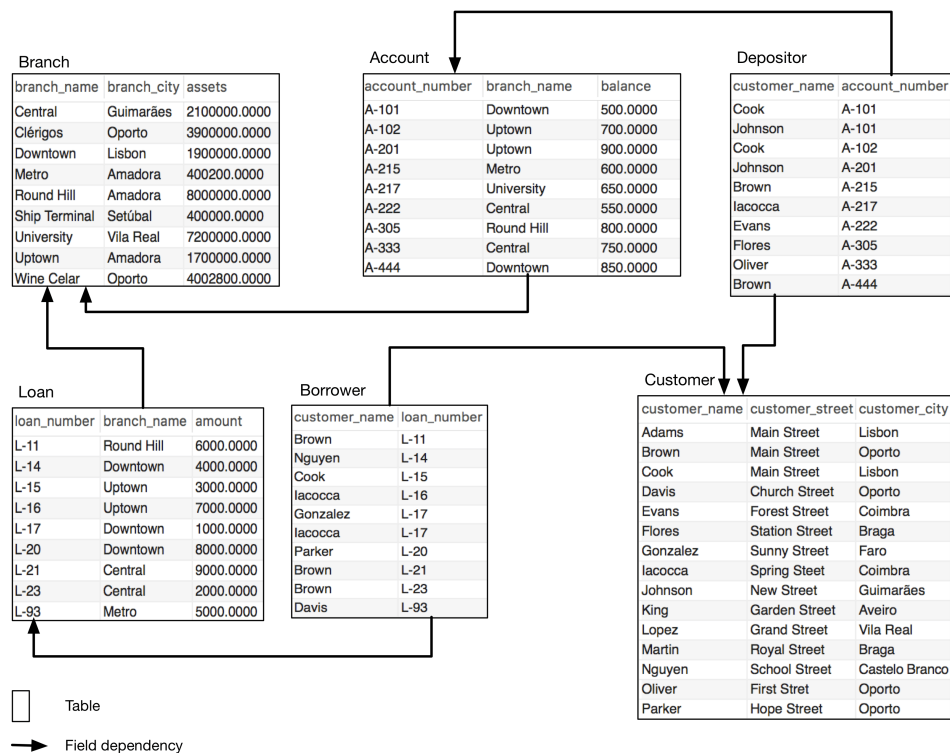


queries-practice-1

August 18, 2025

1 SQL Queries (Part I)

Table Diagram for the BANK Example



NOTE: Values are only illustrative. The actual database can be different.

```
[48]: %load_ext sql
      %config SqlMagic.displaycon = 0
      %config SqlMagic.displaylimit = 100
      %sql postgresql+psycpg://bank:bank@postgres/bank
```

The sql extension is already loaded. To reload it, use:

```
%reload_ext sql
```

Connecting and switching to connection 'postgresql+psycopg://bank:***@postgres/
↳bank'

1.1 1. Simple Queries

(a) Who are the customers that live in Lisbon?

```
[3]: %%sql
SELECT DISTINCT
    customer_name
FROM
    customer
WHERE
    customer_city = 'Lisbon';
```

3 rows affected.

```
[3]: +-----+
| customer_name |
+-----+
|      Adams   |
|      Cook    |
|      Parker   |
+-----+
```

(b) What would be the new account balances at Downtown branch if it offered a 27.7% bonus on the current balance of the customers?

```
[15]: %%sql
SELECT
    account_number, (balance*1.277) AS new_balance
FROM
    account
WHERE
    branch_name = 'Downtown';
```

2 rows affected.

```
[15]: +-----+-----+
| account_number | new_balance |
+-----+-----+
|      A-101     | 638.500000  |
|      A-444     | 1085.450000  |
+-----+-----+
```

1.2 2. Join Queries

(a) In which cities do the customers with loans between 1000€ and 2000€ live?

```
[19]: %%sql
SELECT DISTINCT
  c.customer_city
FROM
  customer AS c
  NATURAL JOIN borrower AS b
  NATURAL JOIN loan AS l
WHERE
  l.amount >= 1000
  AND l.amount <= 2000;
```

3 rows affected.

```
[19]: +-----+
| customer_city |
+-----+
|      Coimbra      |
|         Faro       |
|        Oporto      |
+-----+
```

(b) Who are the customers that live in cities that have bank branches?

```
[20]: %%sql
SELECT DISTINCT
  customer_name,
  customer_city
FROM
  customer c
  JOIN branch b ON c.customer_city = b.branch_city;
```

8 rows affected.

```
[20]: +-----+-----+
| customer_name | customer_city |
+-----+-----+
|      Brown      |      Oporto      |
|     Johnson     |     Cascais     |
|      Davis      |      Oporto      |
|     Lopez       |    Vila Real    |
|      Cook       |      Lisbon     |
|     Parker      |      Lisbon     |
|     Adams       |      Lisbon     |
|     Oliver      |      Oporto      |
+-----+-----+
```

1.3 3. More Complex General Queries

(a) Who are the customers who live in cities where there are no bank branches?

```
[22]: %%sql
SELECT
    customer_name
FROM
    customer
WHERE
    customer_city NOT IN (
        SELECT DISTINCT
            branch_city
        FROM
            branch
    );
```

7 rows affected.

```
[22]: +-----+
| customer_name |
+-----+
|      Evans    |
|      Flores   |
|   Gonzalez    |
|     Iacocca   |
|       King    |
|      Martin   |
|     Nguyen    |
+-----+
```

(b) What is the total amount of account balances in branches in the city of Lisbon ('Lisbon')?

```
[23]: %%sql
SELECT
    SUM(balance)
FROM
    account
    NATURAL JOIN branch
WHERE
    branch_city = 'Lisbon';
```

1 rows affected.

```
[23]: +-----+
|      sum      |
+-----+
| 2950.0000     |
+-----+
```

(c) What are the names and addresses of clients who have a bank account but no loans?

[24]: %%sql

```
SELECT
    customer_name,
    customer_street,
    customer_city
FROM
    customer
WHERE
    customer_name IN (
        SELECT
            customer_name
        FROM
            depositor)
    AND customer_name NOT IN (
        SELECT
            customer_name
        FROM
            borrower);
```

4 rows affected.

[24]:

customer_name	customer_street	customer_city
Evans	Forest Street	Coimbra
Flores	Station Street	Braga
Johnson	New Street	Cascais
Oliver	First Street	Oporto

(d) Who are the clients who have a loan at a branch in the same city where they live?

[13]: %%sql

```
SELECT customer_name, l.loan_number, c.customer_city AS city
FROM borrower b
    NATURAL JOIN loan l
    NATURAL JOIN customer c
    NATURAL JOIN branch r
WHERE branch_city = c.customer_city;
```

2 rows affected.

[13]:

customer_name	loan_number	city
Cook	L-15	Lisbon
Parker	L-20	Lisbon

+-----+-----+-----+

(e) What is the total amount of account balances in branches of the city of Amadora?

```
[14]: %%sql

SELECT sum(balance) AS sum_balance_amadora
FROM branch b
      NATURAL JOIN account a
WHERE branch_city = 'Amadora';
```

1 rows affected.

```
[14]: +-----+
| sum_balance_amadora |
+-----+
|          1400.0000   |
+-----+
```

(f) How many clients have at least one bank account and no loan?

```
[18]: %%sql

SELECT COUNT(DISTINCT customer_name) AS clients_with_account_and_no_loan
FROM depositor d
WHERE d.customer_name NOT IN (
      SELECT b.customer_name
      FROM borrower b
);
```

1 rows affected.

```
[18]: +-----+
| clients_with_account_and_no_loan |
+-----+
|                4                  |
+-----+
```

(g) What is the number of accounts on each city that has a branch?

```
[25]: %%sql

SELECT branch_city, COUNT(*)
FROM branch b
      NATURAL JOIN account a
GROUP BY branch_city;
```

4 rows affected.

```
[25]: +-----+-----+
| branch_city | count |
+-----+-----+
|    Lisbon   |    4   |
| Vila Real   |    1   |
|   Amadora   |    2   |
|   Cascais   |    2   |
+-----+-----+
```

(h) List, alphabetically, the names of customers who have more than two bank accounts.

```
[31]: %%sql

SELECT
    customer_name,
    COUNT(account_number) AS number_of_accounts
FROM
    depositor
GROUP BY
    customer_name
HAVING
    COUNT(account_number) >= 2
ORDER BY
    customer_name ASC;
```

3 rows affected.

```
[31]: +-----+-----+
| customer_name | number_of_accounts |
+-----+-----+
|    Brown      |          2          |
|    Cook       |          2          |
|   Johnson     |          2          |
+-----+-----+
```

(i) Which branches have fewer real assets (sum of all balances of all accounts) than liabilities (total amount of loans)?

```
[49]: %%sql

SELECT
    a.branch_name,
    a.real_assets,
    l.liabilities
FROM
    (SELECT branch_name, SUM(balance) AS real_assets
     FROM account
     GROUP BY branch_name) AS a
JOIN
```

```

        (SELECT branch_name, SUM(amount) AS liabilities
        FROM branch
        NATURAL JOIN loan
        GROUP BY branch_name) AS l
ON a.branch_name = l.branch_name
WHERE l.liabilities > a.real_assets;

```

5 rows affected.

```

[49]: +-----+-----+-----+
| branch_name | real_assets | liabilities |
+-----+-----+-----+
|    Uptown   | 1600.0000  | 10000.0000 |
| Round Hill  | 800.0000   | 6000.0000  |
|    Metro    | 600.0000   | 5000.0000  |
|    Central  | 1300.0000  | 11000.0000 |
|    Downtown | 1350.0000  | 13000.0000 |
+-----+-----+-----+

```

- (j) What are the branch names and the difference between the total balance of their accounts and the total amount of their loans?

```

[3]: %%sql

SELECT
    branch_name,
    COALESCE(total_assets, 0) - COALESCE(total_liabilities, 0) AS difference
FROM
    branch
    LEFT JOIN (
        SELECT
            branch_name,
            SUM(balance) AS total_assets
        FROM
            account
        GROUP BY
            branch_name) a USING (branch_name)
    LEFT JOIN (
        SELECT
            branch_name,
            SUM(amount) AS total_liabilities
        FROM
            loan
        GROUP BY
            branch_name) l USING (branch_name);

```

9 rows affected.


```
[3]: +-----+-----+
| branch_name | difference |
+-----+-----+
| Downtown   | -11650.0000 |
| Central    | -9700.0000  |
| Uptown     | -8400.0000  |
| Metro      | -4400.0000  |
| Round Hill | -5200.0000  |
| Ship Terminal | 0          |
| Bolsa      | 0           |
| University | 650.0000    |
| Wine Celar | 0           |
+-----+-----+
```

- (k) Who are the customers whose total of their debts (loans) is greater than the total of their assets (accounts)?

```
[22]: %%%sql

SELECT
    x.customer_name,
    assets,
    debts
FROM
    (SELECT d.customer_name, SUM(balance) AS assets
     FROM depositor d
     LEFT JOIN account a USING (account_number)
     GROUP BY d.customer_name) AS x
JOIN
    (SELECT b.customer_name, SUM(amount) AS debts
     FROM borrower b
     LEFT JOIN loan l USING (loan_number)
     GROUP BY b.customer_name) AS y
ON x.customer_name = y.customer_name
WHERE y.debts > x.assets;
```

3 rows affected.

```
[22]: +-----+-----+-----+
| customer_name | assets | debts |
+-----+-----+-----+
| Iacocca       | 650.0000 | 8000.0000 |
| Cook          | 1200.0000 | 3000.0000 |
| Brown         | 1450.0000 | 17000.0000 |
+-----+-----+-----+
```

- (l) Which branch has the highest account average balance (among all agencies)?

[23]: %%sql

```
SELECT
    branch_name
FROM
    account
GROUP BY
    branch_name
HAVING
    AVG(balance) >= ALL (
        SELECT
            AVG(balance)
        FROM
            account
        GROUP BY
            branch_name);
```

2 rows affected.

[23]: +-----+
| branch_name |
+-----+
| Uptown |
| Round Hill |
+-----+

(m) How many customers exist per branch city (considering all branches)?

[44]: %%sql

```
SELECT branch_city, COUNT(DISTINCT customer_name) AS total_customers
FROM (
    SELECT d.customer_name, b.branch_city
    FROM depositor d
    JOIN account a ON d.account_number = a.account_number
    JOIN branch b ON a.branch_name = b.branch_name

    UNION

    SELECT br.customer_name, b.branch_city
    FROM borrower br
    JOIN loan l ON br.loan_number = l.loan_number
    JOIN branch b ON l.branch_name = b.branch_name
) AS combined
GROUP BY branch_city;
```

4 rows affected.

```
[44]: +-----+-----+
| branch_city | total_customers |
+-----+-----+
| Amadora    | 3               |
| Cascais    | 3               |
| Lisbon     | 7               |
| Vila Real  | 1               |
+-----+-----+
```

(n) What is the name and address of the customer who has the greatest total balance?

```
[45]: %%sql

SELECT
    customer_name,
    customer_city,
    customer_street
FROM
    customer
WHERE
    customer_name IN (
        SELECT
            customer_name
        FROM
            depositor
        JOIN account USING (account_number)
        GROUP BY
            customer_name
        HAVING
            SUM(balance) >= ALL (
                SELECT
                    SUM(balance)
                FROM
                    depositor
                JOIN account USING (account_number)
                GROUP BY
                    customer_name));
```

1 rows affected.

```
[45]: +-----+-----+-----+
| customer_name | customer_city | customer_street |
+-----+-----+-----+
| Brown        | Oporto        | Main Street     |
+-----+-----+-----+
```

(o) Which cities have a branch?

[46]: %%sql

```
SELECT DISTINCT
    branch_city
FROM
    branch b;
```

5 rows affected.

[46]: +-----+
| branch_city |
+-----+
| Lisbon |
| Vila Real |
| Oporto |
| Amadora |
| Cascais |
+-----+

(p) Which branches have an account with more than one owner?

[47]: %%sql

```
SELECT
    branch_name
FROM
    branch b
WHERE
    EXISTS (
        SELECT
            *
        FROM
            account a
        WHERE
            a.branch_name = b.branch_name
            AND 1 < (
                SELECT
                    COUNT(*)
                FROM depositor d
                WHERE
                    d.account_number = a.account_number));
```

1 rows affected.

[47]: +-----+
| branch_name |
+-----+
| Downtown |
+-----+

(q) Who are the clients who have accounts at all branches in the same city where they live?

```
[51]: %%sql

SELECT DISTINCT
    c.customer_name
FROM
    depositor d
    JOIN customer c USING (customer_name)
WHERE
    NOT EXISTS (
        SELECT
            branch_name
        FROM
            branch
        WHERE
            branch_city = c.customer_city
        EXCEPT
        SELECT
            branch_name
        FROM
            depositor d
            JOIN account USING (account_number)
        WHERE
            d.customer_name = c.customer_name);
```

4 rows affected.

```
[51]: +-----+
| customer_name |
+-----+
|      Cook     |
|      Evans    |
|      Flores   |
|      Iacocca  |
+-----+
```