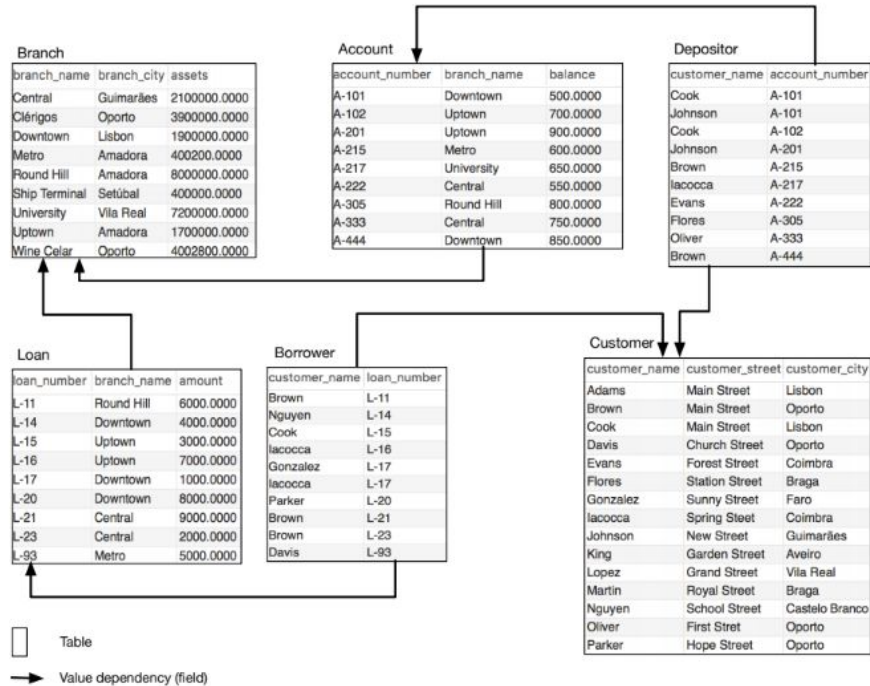


SQL Avançado

Slides e Soluções do Laboratório 8

Base de Dados Bank



Consultas à Base de Dados

- a. Quem são os clientes que moram em cidades onde existem agências do banco?

```
SELECT customer_name
FROM customer WHERE customer_city IN
    (SELECT branch_city FROM branch);
```

ou

```
SELECT DISTINCT customer_name
FROM customer
    JOIN branch ON (branch_city = customer_city);
```

ou

```
SELECT DISTINCT customer_name
FROM customer, branch
WHERE branch_city = customer_city;
```

Consultas à Base de Dados

- b. Quem são os clientes que têm um empréstimo numa agência da cidade onde moram?

```
SELECT customer_name
FROM customer
    JOIN borrower USING (customer_name)
    JOIN loan USING (loan_number)
    JOIN branch USING (branch_name)
WHERE branch_city = customer_city;
```

Consultas à Base de Dados

- c. Quais são os nomes e moradas dos clientes que têm conta no banco, mas não tem empréstimos?

```
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);
```

ou

```
SELECT c.customer_name, customer_street, customer_city
FROM customer c
WHERE EXISTS (SELECT * FROM depositor WHERE customer_name = c.customer_name)
AND NOT EXISTS (SELECT * FROM borrower WHERE customer_name = c.customer_name);
```

ou

```
SELECT DISTINCT customer_name, customer_street, customer_city
FROM depositor JOIN customer USING (customer_name)
EXCEPT
SELECT DISTINCT customer_name, customer_street, customer_city
FROM customer JOIN borrower USING (customer_name);
```

Consultas à Base de Dados

d. Quantos clientes moram na mesma cidade de uma agência onde têm conta?

```
SELECT COUNT(DISTINCT (customer_name)) AS num_cli
FROM customer
      JOIN depositor USING (customer_name)
      JOIN account  USING (account_number)
      JOIN branch   USING (branch_name)
WHERE branch_city = customer_city;
```

Consultas à Base de Dados

- e. Quantos clientes têm pelo menos uma conta e um empréstimo no banco?

```
SELECT COUNT(DISTINCT(customer_name)) AS num_cli  
FROM depositor JOIN borrower USING (customer_name);
```

ou

```
SELECT COUNT(DISTINCT(customer_name)) AS num_cli  
FROM depositor  
WHERE customer_name IN  
  (SELECT customer_name FROM borrower);
```

Consultas à Base de Dados

f. Qual o nome dos clientes que têm mais do que um empréstimo?

```
SELECT customer_name  
FROM borrower  
GROUP BY customer_name  
HAVING COUNT(*) > 1;
```

ou

```
SELECT DISTINCT(customer_name)  
FROM borrower b1  
JOIN borrower b2 USING (customer_name)  
WHERE b1.loan_number!=b2.loan_number;
```


Consultas à Base de Dados

- g. Liste por ordem alfabética os nomes dos clientes que têm mais de duas contas no banco.

```
SELECT customer_name
FROM depositor
GROUP BY customer_name
HAVING COUNT(*) > 2
ORDER BY customer_name ASC;
```

Consultas à Base de Dados

h. Qual o **nome do cliente** que **mais dinheiro deve** ao banco (no total dos seus empréstimos)?

GROUP BY customer_name

SUM(amount)

```
SELECT customer_name
FROM loan JOIN borrower USING (loan_number)
GROUP BY customer_name
HAVING SUM(amount) >= ALL
    (SELECT SUM(amount)
     FROM loan JOIN borrower USING (loan_number)
     GROUP BY customer_name);
```

Consultas à Base de Dados

- i. Qual é o **nome e morada do cliente** que tem o **maior saldo no total das suas contas**?

GROUP BY customer_name

SUM(balance)

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

Consultas à Base de Dados

j. Qual a **agência do banco** que tem **mais contas**?



GROUP BY branch_name



COUNT(*)

```
SELECT branch_name
FROM account
GROUP BY branch_name
HAVING COUNT(*) >= ALL
  (SELECT COUNT(*)
   FROM account
  GROUP BY branch_name);
```

Consultas à Base de Dados

k. Qual é a **agência** cujo **saldo médio das contas** é o **maior** de todas as agências?



GROUP BY branch_name



AVG(balance)

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

Consultas à Base de Dados

- I. Liste o número de clientes por cada cidade onde existe pelo menos uma agência.

```
SELECT branch_city, COUNT(DISTINCT customer_name)
FROM
  (SELECT customer_name, branch_city
   FROM depositor
     JOIN account USING (account_number)
     JOIN branch USING (branch_name)
   UNION
   SELECT customer_name, branch_city
   FROM borrower
     JOIN loan USING (loan_number)
     JOIN branch USING (branch_name)
  ) AS customer_contracts
GROUP BY branch_city;
```

Consultas à Base de Dados

m. Qual é a **cidade** com **mais clientes**?



GROUP BY branch_city

COUNT(DISTINCT customer_name)

```
WITH customer_contracts AS
  (SELECT customer_name, branch_city
   FROM depositor JOIN account USING (account_number) JOIN branch USING (branch_name)
   UNION
   SELECT customer_name, branch_city
   FROM borrower JOIN loan USING (loan_number) JOIN branch USING (branch_name))
SELECT branch_city
FROM customer_contracts
GROUP BY branch_city
HAVING COUNT(DISTINCT customer_name) >= ALL
  (SELECT COUNT(DISTINCT customer_name)
   FROM customer_contracts
   GROUP BY branch_city);
```

Consultas à Base de Dados

n. Quais são os **nomes dos clientes** que **têm contas** em **todas as agências do banco**?



Quociente



Dividendo



Divisor

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

Quociente (points to `customer_name`)

Divisor (points to `branch_name`)

Dividendo (points to `account_number`)

Consultas à Base de Dados

n. Quais são os **nomes dos clientes** que **têm contas** em **todas as agências do banco**?



Evitar!



```
SELECT customer_name
FROM depositor JOIN account USING (account_number)
GROUP BY customer_name
HAVING COUNT(DISTINCT (branch_name)) =
    (SELECT COUNT(*) FROM branch);
```

Consultas à Base de Dados

- o. Quais são os **nomes dos clientes** que **têm contas** em **todas as agências da cidade onde moram**?



Quociente



Dividendo



Divisor

```
SELECT DISTINCT customer_name
FROM customer c
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);
```

← Quociente

← Divisor

← Dividendo