

# A SIMPLE DATABASE FOR A FINANCIAL INSTITUTION

Warm-up Project

Group ID: **tdc\_comp353\_2**

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# 1 Database Design

## 1.1 Assumptions

In developing and designing this database, certain assumptions have been made. The goal of this section is to list them in order to help clarify why the database is created the way it is.

### 1.1.1 Branch

A branch has a unique ID that allows for the distinction of if multiple branches are in the same area. A branch needs to have one manager at all times. In relational terms, it means the attribute cannot be null in the Branch table. All the branches of the bank, including the head office, should be in this table. The head office is denoted by a flag that is set to 1 for the record of the head office. Furthermore, the manager of the head office represents the president of the bank. Following this assumption, the president of the bank is also an employee and has an equivalent entry in the Employee table. Moreover, it was assumed that the address of the branch as well as its opening date must contain a value (i.e. they cannot be null), while the phone and fax number can initially be void.

### 1.1.2 Employee

Every employee has a unique identifier. Basic assumptions about employees are that each record must have their first name, last name, starting date and a branch ID that cannot be null at the onset. Employee only works at one branch and that branch has to be open. That means that the branch ID for in the Employee table cannot be null at any time. However, the email and phone fields for a particular employee can hold null values, whereas the salary, while not nullable, can still hold a default value of 0. All service general managers work at the head office. In order to know the general manager of each service, the Service table needs to be looked up.

### 1.1.3 Client

Clients also have unique identifier. Like employees, clients have a first name, a last name and a branch attributes that cannot be null. A client needs to be associated with one branch at all

times.

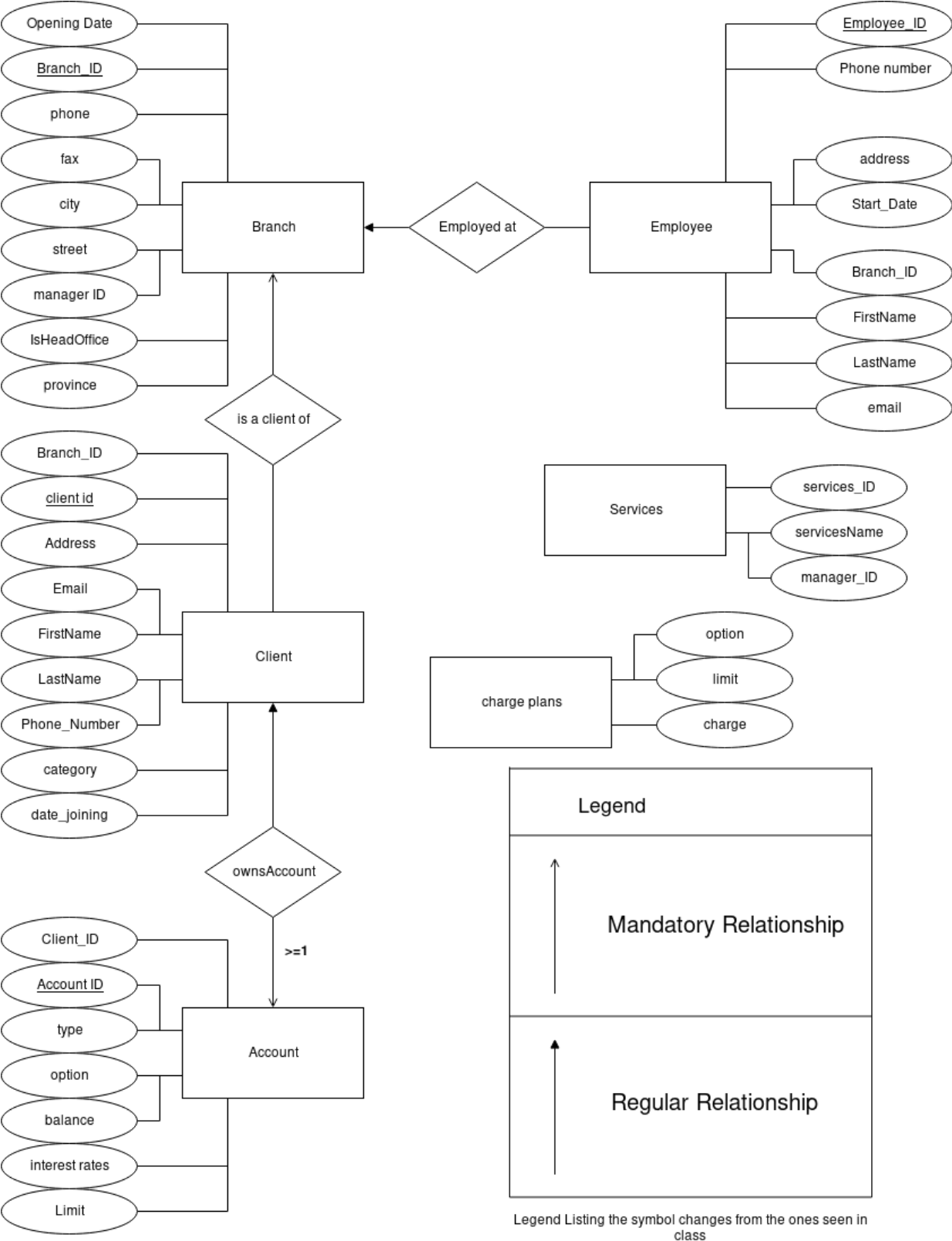
#### **1.1.4 Account**

Accounts belong to a specific client and may not be shared. Clients, however, may have multiple accounts linked to them. An account has to be associated with a current client of the bank. An account can only have one option associated with it. Credit limits are associated with accounts rather than clients. Reason being is that a client may have a business account and a personal account, but the credit limit for either account might be different. A similar situation occurs with the interest rate, they can vary depending on multiple factors and may hold a range of values.

#### **1.1.5 Services**

As stated previously, the services contain a list of services that the bank offers as well as the ID of the general manager for said service. Therefore, the value of the manager id cannot be null. All general managers are thus also considered employees.

1.2 E/R Diagram



## 2 Schema

*/\* Employee \*/*

```
CREATE TABLE IF NOT EXISTS Employee (  
    employee_id      int not null auto_increment ,  
    firstName        varchar(255) not null ,  
    lastName         varchar(255) not null ,  
    addr             varchar(255) ,  
    start_date       date not null ,  
    salary            decimal(14,2) default 0 ,  
    email            varchar(255) ,  
    phone            varchar(255) ,  
    branch_id        int ,  
    primary key(employee_id)  
);
```

*/\* Branch \*/*

```
CREATE TABLE IF NOT EXISTS Branch (  
    branch_id        int not null auto_increment ,  
    province         varchar(255) not null ,  
    city             varchar(255) not null ,  
    street           varchar(255) not null ,  
    phone            varchar(255) ,  
    fax              varchar(255) ,  
    opening_date     date not null ,  
    manager_id       int ,  
    isHeadOffice     tinyint(1) ,  
    FOREIGN KEY (manager_id) REFERENCES Employee(employee_id) ,  
    primary key(branch_id)
```

```
);
```

```
ALTER TABLE Employee ADD FOREIGN KEY (branch_id)  
REFERENCES Branch(branch_id);
```

```
/* Client */
```

```
CREATE TABLE IF NOT EXISTS Client (  
    client_id          int not null auto_increment ,  
    firstName          varchar(255) not null ,  
    lastName           varchar(255) not null ,  
    addr               varchar(255) not null ,  
    dob               date not null ,  
    joining_date       date not null ,  
    email              varchar(255) ,  
    phone              varchar(255) ,  
    category           varchar(255) default 'Regular' ,  
    branch_id          int not null ,  
    foreign key(branch_id) references Branch(branch_id) ,  
    primary key(client_id)  
);
```

```
/* Account */
```

```
CREATE TABLE IF NOT EXISTS Account (  
    account_id         int not null auto_increment ,  
    client_id          int not null ,  
    account_type       varchar(255) not null ,  
    account_option     varchar(255) not null ,  
    balance            decimal(14,2) ,
```

```
        credit_limit    decimal(14,2),
        interest_rate   float ,
        foreign key(client_id) references Client(client_id),
        primary key(account_id)
);

/* Services */
CREATE TABLE IF NOT EXISTS Services (
        service_id       int not null auto_increment ,
        service_name     char(50),
        manager_id       int not null ,
        foreign key(manager_id) references Employee(employee_id),
        primary key(service_id)
);

/* Charge plans */
CREATE TABLE IF NOT EXISTS ChargePlan (
        charge_id        int not null ,
        draw_limit       float ,
        charge_value     float ,
        primary key(charge_id)
);
```

### 3 Queries

1. All of the tables

SHOW tables;

```

+-----+
| Tables_in_tdc353_2 |
+-----+
| Account             |
| Branch              |
| ChargePlan          |
| Client              |
| Employee            |
| Services             |
+-----+
6 rows in set (0.01 sec)

```

```

mysql> select * from Branch
-> ;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| branch_id | province | city      | street      | phone      | fax      | opening_date | manager_id | isHeadOffice |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1         | Quebec   | Montreal  | William     | 514-365-2589 | 514-258-2656 | 2001-02-22   | 1          | 1            |
| 2         | Quebec   | Montreal  | Berlioz     | 514-365-2345 | 514-258-8765 | 2003-05-20   | 3          | 0            |
| 3         | Ontario  | Toronto   | Canadian    | 450-365-7658 | 450-453-8899 | 2004-08-21   | 5          | 0            |
| 4         | Ontario  | Toronto   | Ford        | 450-365-3433 | 450-453-6677 | 2005-11-29   | 7          | 0            |
| 5         | Quebec   | Montreal  | Cote Des Neiges | 514-555-1515 | 514-555-5151 | 2002-03-10   | 9          | 0            |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

```

```

mysql> select * from Client;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| client_id | firstName | lastName | addr          | dob      | joining_date | email          | phone      | category | branch_id |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1         | Ricky     | Martin   | 342 rue Cote Des Neiges | 1980-02-22 | 2003-01-12 | bnose@gmail.com | 514-222-3456 | Regular | 2          |
| 2         | Roberto   | Yuan     | 111 rue Young | 1990-03-11 | 2003-12-24 | trdhge@gmail.com | 514-222-6544 | Regular | 2          |
| 3         | Tina      | Ita      | 675 rue William | 1983-02-22 | 2004-12-26 | bnose@gmail.com | 450-222-9877 | Regular | 3          |
| 4         | Bob       | Bush     | 456 rue Young | 1995-03-11 | 2005-12-28 | trdhge@gmail.com | 450-222-5675 | Regular | 4          |
| 5         | Tina      | Turner   | 675 rue Ontario | 1983-02-22 | 2003-10-16 | bgsdos@gmail.com | 450-222-9877 | Regular | 5          |
| 6         | billy     | Bush     | 456 rue Sherbrooke | 1995-03-11 | 2003-12-22 | asdae@gmail.com | 450-222-5675 | Regular | 5          |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
6 rows in set (0.01 sec)

```

```

mysql> select * from Account;
+-----+-----+-----+-----+-----+-----+-----+
| account_id | client_id | account_type | account_option | balance | credit_limit | interest_rate |
+-----+-----+-----+-----+-----+-----+-----+
| 1          | 1         | saving       | high interest   | 8000.32 | 9000.00      | 0.02          |
| 2          | 1         | chequing     | regular         | 5432.32 | 20000.00     | 0.03          |
| 3          | 2         | saving       | enhanced interest | 65432.11 | 30000.00     | 0.03          |
| 4          | 2         | chequing     | premium        | 7655.23 | 25000.00     | 0.02          |
| 5          | 3         | saving       | high interest   | 20065.32 | 25000.00     | 0.04          |
| 6          | 3         | chequing     | regular         | 45333.32 | 30000.00     | 0.04          |
| 7          | 4         | saving       | enhanced interest | 43544.11 | 50000.00     | 0.05          |
| 8          | 4         | chequing     | premium        | 76554.23 | 40000.00     | 0.05          |
| 9          | 5         | saving       | enhanced interest | 1000000.00 | 50000.00     | 0.08          |
| 10         | 6         | chequing     | regular         | 7655.23 | 40000.00     | 0.05          |
+-----+-----+-----+-----+-----+-----+-----+
10 rows in set (0.00 sec)

```

```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| employee_id | firstName | lastName | addr          | start_date | salary | email          | phone      | branch_id |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1           | John      | Smith    | 210 Rue Berlioz | 2001-02-22 | 56188.12 | awoeif@gmail.com | 514-345-3340 | 1          |
| 2           | Michelle  | Green    | 233 Rue Gika    | 2001-02-23 | 58188.12 | regtyj@gmail.com | 514-455-8988 | 1          |
| 3           | Dim       | Jones    | 111 Rue Rigo    | 2003-05-20 | 65444.11 | tyjdrhge@gmail.com | 514-455-6576 | 2          |
| 4           | Kim       | Howard   | 453 Rue Tika    | 2003-05-21 | 76666.21 | jyrthe@gmail.com | 514-455-3333 | 2          |
| 5           | Ann       | Roger    | 210 Trudeau    | 2004-08-21 | 59321.34 | jythr@gmail.com | 450-345-3340 | 3          |
| 6           | Tim       | King     | 233 Tilan      | 2004-08-22 | 61222.11 | iusd@gmail.com | 450-455-8988 | 3          |
| 7           | Jack     | Atheia   | 111 frank      | 2005-11-29 | 63324.61 | mnbv@gmail.com | 450-455-6576 | 4          |
| 8           | Kim       | Stefen   | 453 Demo       | 2005-11-30 | 63333.22 | zxcvds@gmail.com | 450-455-3333 | 4          |
| 9           | Kilian    | Karl     | 453 Demo       | 2003-11-29 | 63333.22 | zsadas@gmail.com | 450-555-5533 | 5          |
| 10          | Karlito   | kilimanjaro | 453 Demo       | 2003-11-29 | 63333.22 | as3ds@gmail.com | 450-555-3355 | 5          |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
10 rows in set (0.00 sec)

```

mysql>

```

mysql> Select * from Services;
+-----+-----+-----+
| service_id | service_name | manager_id |
+-----+-----+-----+
| 1          | saving       | 2          |
| 2          | chequing     | 4          |
| 3          | line of credit | 6          |
| 4          | loan         | 8          |
+-----+-----+-----+
4 rows in set (0.00 sec)

```

2. List of all the branches grouped by city and ordered by oldest branch.



```
SELECT * FROM Branch ORDER BY city ASC, opening_date ASC;
```

branch_id	province	city	street	phone	fax	opening_date	manager_id	isHeadOffice
1	Quebec	Montreal	William	514-365-2589	514-258-2656	2001-02-22	1	1
5	Quebec	Montreal	Cote Des Neiges	514-555-1515	514-555-5151	2002-03-10	9	0
2	Quebec	Montreal	Berlioz	514-365-2345	514-258-8765	2003-05-20	3	0
3	Ontario	Toronto	Canadian	450-365-7658	450-453-8899	2004-08-21	5	0
4	Ontario	Toronto	Ford	450-365-3433	450-453-6677	2005-11-29	7	0

5 rows in set (0.00 sec)

3. List of all clients with DOB between 1990 and 2017.

```
SELECT client_id , dob FROM Client WHERE
DATE(dob) > '1990-01-01' AND DATE(dob) < '2018-01-01';
```

client_id	dob
2	1990-03-11
4	1995-03-11
6	1995-03-11

3 rows in set (0.00 sec)

4. List all clients of a branch who has either a checking or savings account of balance more than CND 10,000.00.

```
SELECT c.firstName , c.lastName , a.balance FROM Client c ,
Account a WHERE a.balance >= 10000.00 AND
a.account_type = 'saving' AND a.client_id = c.client_id
AND c.branch_id = 3;
```

```
mysql> SELECT c.firstName, c.lastName, a.balance FROM Client c, Account a WHERE a.balance >= 10000.00 AND a.account_type = 'saving' AND a.client_id = c.client_id AND c.branch_id = 3;
```

firstName	lastName	balance
Tina	Ita	20065.32

1 row in set (0.00 sec)

5. List of all clients of a branch who has a line of credit of limit CND 25,000.00 with an interest rate of 7.5% or below.

```
SELECT c.firstName , c.lastName , a.credit_limit , a.interest_rate
FROM Client c , Account a WHERE a.credit_limit = 25000.00
```

```
AND a.interest_rate <= 0.075 AND a.client_id = c.client_id
AND c.branch_id = 2;
```

```
+-----+-----+-----+-----+
| firstName | lastName | credit_limit | interest_rate |
+-----+-----+-----+-----+
| Roberto  | Yuan    | 25000.00    | 0.02          |
+-----+-----+-----+-----+
1 row in set (0.00 sec)
```

6. List details of a client named Roberto.

```
SELECT * FROM Client WHERE
    firstName = 'Roberto' OR lastName = 'Roberto';
```

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| client_id | firstName | lastName | addr          | dob       | joining_date | email          | phone       | category | branch_id |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 2         | Roberto  | Yuan    | 111 rue Young | 1990-03-11 | 2003-12-24  | trdhge@gmail.com | 514-222-6544 | Regular  | 2         |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
1 row in set (0.00 sec)
```

7. List of all clients of 'Cote Des Neiges' branch.

```
SELECT client_id FROM Client WHERE branch_id IN (
    SELECT branch_id FROM Branch WHERE street LIKE
        '%Cote_Des_Neiges%');
```

```
+-----+
| client_id |
+-----+
| 5         |
| 6         |
+-----+
```

8. List of clients who have at least 1,000,000 CDN dollar in their savings account.

```
SELECT DISTINCT client_id FROM Account WHERE
    account_type = 'saving' AND balance >= 1000000;
```

```
+-----+
| client_id |
+-----+
| 5         |
+-----+
```

9. List of all the services along with the general manager for each service.

```

SELECT e.employee_id, s.service_name, e.firstName, e.lastName
FROM Services s, Employee e WHERE s.manager_id = e.employee_id;

```

```

mysql> SELECT e.employee_id, s.service_name, e.firstName, e.lastName FROM Services s, Employee e
+-----+-----+-----+-----+
| employee_id | service_name | firstName | lastName |
+-----+-----+-----+-----+
|          2 | saving      | Michelle | Green    |
|          4 | chequing    | Kim      | Howard   |
|          6 | line of credit | Tim      | King     |
|          8 | loan        | Kim      | Stefen   |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

```

10. Complete details of the president of the bank.

```

SELECT * FROM Employee WHERE employee_id = (
    SELECT manager_id FROM Branch WHERE isHeadOffice = 1);

```

```

mysql> SELECT * FROM Employee WHERE employee_id = (
    -> SELECT manager_id FROM Branch WHERE isHeadOffice = 1 );
+-----+-----+-----+-----+-----+-----+-----+-----+
| employee_id | firstName | lastName | addr          | start_date | salary  | email              | phone          | branch_id |
+-----+-----+-----+-----+-----+-----+-----+-----+
|          1 | John      | Smith    | 219 Rue Berlioz | 2001-02-22 | 56188.12 | awoeif@gmail.com | 514-345-3349 |          |
+-----+-----+-----+-----+-----+-----+-----+-----+
1 row in set (0.00 sec)

```