Advanced DataBases C4 Group

Bank Management System

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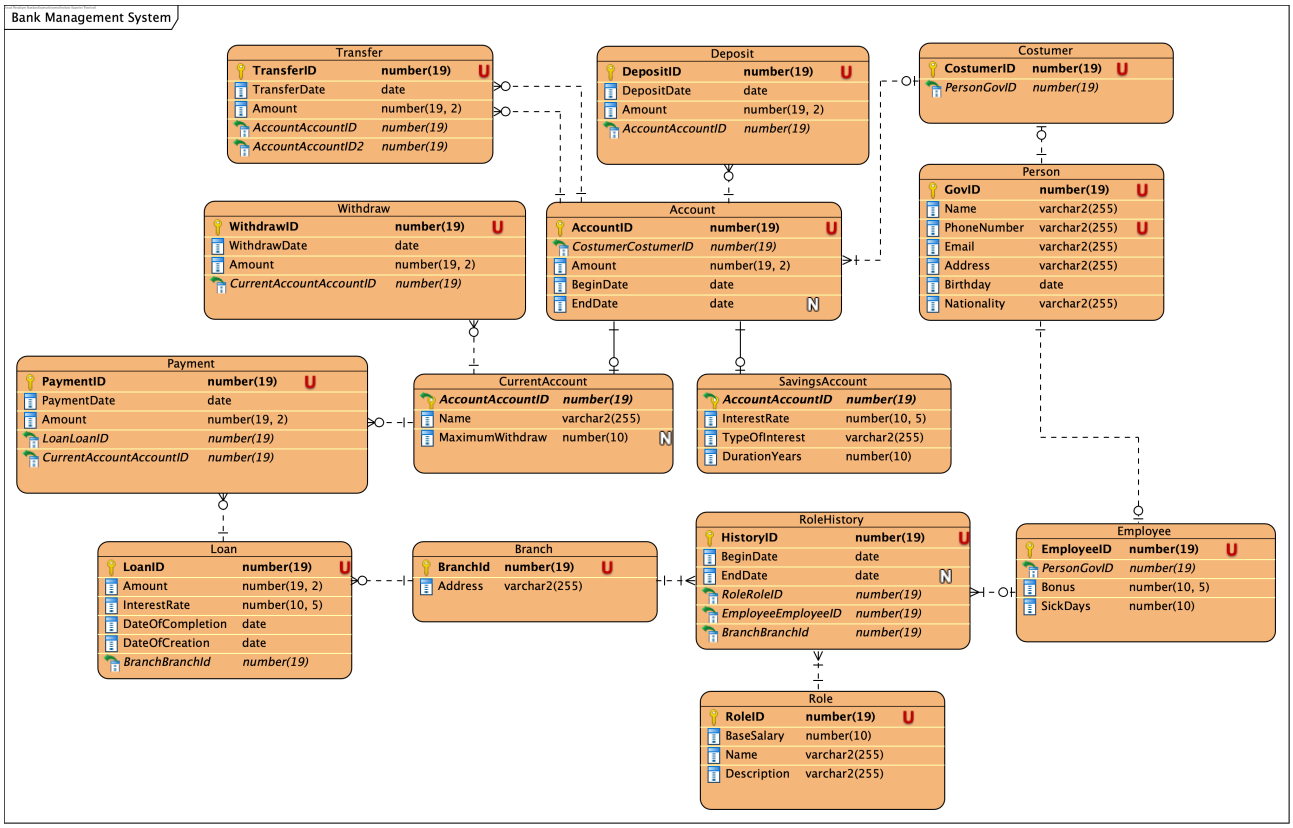
Short Description

This database models a bank with Accounts that can either be a SavingsAccount or a CurrentAccount. There are some operations that are permitted, Withdraw from the CurrentAccount, Transfer between accounts, Loan, Pay the loan, Deposit on Account. There are employees that work in a branch that have roles, this database tracks the history of theall the employees on every branch, and the previous roles that some particular employee has had and which branch he has working at.

ERD



Schema

```
CREATE TABLE Person (
  GovID number(19) GENERATED AS IDENTITY,
  Name varchar2(255) NOT NULL,
  PhoneNumber varchar2(255) NOT NULL UNIQUE,
  Email varchar2(255) NOT NULL,
  Address varchar2(255) NOT NULL,
  Birthday date NOT NULL,
  Nationality varchar2(255) NOT NULL,
  PRIMARY KEY (GovID));

CREATE TABLE Costumer (
  CostumerID number(19) GENERATED AS IDENTITY,
  PersonGovID number(19) NOT NULL,
  PRIMARY KEY (CostumerID));

CREATE TABLE Employee (
  EmployeeID number(19) GENERATED AS IDENTITY,
  PersonGovID number(19) NOT NULL,
  Bonus number(3, 5) NOT NULL CHECK(Bonus>=0),
  SickDays number(10) NOT NULL CHECK(SickDays<10),
  PRIMARY KEY (EmployeeID));

CREATE TABLE Account (
  AccountID number(19) GENERATED AS IDENTITY,
  CostumerCostumerID number(19) NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>=0),
  BeginDate date NOT NULL,
  EndDate date,
  PRIMARY KEY (AccountID));

CREATE TABLE Branch (
  BranchId number(19) GENERATED AS IDENTITY,
  Address varchar2(255) NOT NULL,
  PRIMARY KEY (BranchId));

CREATE TABLE RoleHistory (
  HistoryID number(19) GENERATED AS IDENTITY,
  BeginDate date NOT NULL,
  EndDate date,
  RoleRoleID number(19) NOT NULL,
  EmployeeEmployeeID number(19) NOT NULL,
  BranchBranchId number(19) NOT NULL,
  PRIMARY KEY (HistoryID));

CREATE TABLE Role (
  RoleID number(19) GENERATED AS IDENTITY,
  BaseSalary number(10) NOT NULL CHECK(BaseSalary>0),
  Name varchar2(255) NOT NULL,
  Description varchar2(255) NOT NULL,
  PRIMARY KEY (RoleID));

CREATE TABLE Loan (
  LoanID number(19) GENERATED AS IDENTITY,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  InterestRate number(3, 5) NOT NULL,
  DateOfCompletion date NOT NULL,
  DateOfCreation date NOT NULL,
  BranchBranchId number(19) NOT NULL,
  PRIMARY KEY (LoanID));

```

```
CREATE TABLE Payment (
  PaymentID number(19) GENERATED AS IDENTITY,
  PaymentDate date NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  LoanLoanID number(19) NOT NULL,
  CurrentAccountAccountID number(19) NOT NULL,
  PRIMARY KEY (PaymentID));

CREATE TABLE SavingsAccount (
  AccountAccountID number(19) NOT NULL,
  InterestRate number(3, 5) NOT NULL CHECK(InterestRate>0),
  TypeOfInterest varchar2(255) NOT NULL,
  DurationYears number(10) NOT NULL CHECK(DurationYears>0),
  PRIMARY KEY (AccountAccountID));

CREATE TABLE Deposit (
  DepositID number(19) GENERATED AS IDENTITY,
  DepositDate date NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  AccountAccountID number(19) NOT NULL,
  PRIMARY KEY (DepositID));

CREATE TABLE Transfer (
  TransferID number(19) GENERATED AS IDENTITY,
  TransferDate date NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  AccountAccountID number(19) NOT NULL,
  AccountAccountID2 number(19) NOT NULL,
  PRIMARY KEY (TransferID));

CREATE TABLE Withdraw (
  WithdrawID number(19) GENERATED AS IDENTITY,
  WithdrawDate date NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  CurrentAccountAccountID number(19) NOT NULL,
  PRIMARY KEY (WithdrawID));

CREATE TABLE CurrentAccount (
  AccountAccountID number(19) NOT NULL,
  Name varchar2(255) NOT NULL,
  MaximumWithdraw number(10),
  PRIMARY KEY (AccountAccountID));

ALTER TABLE Costumer ADD CONSTRAINT FKCostumer923053 FOREIGN KEY (PersonGovID) REFERENCES Person (
    ↪ GovID);

ALTER TABLE Employee ADD CONSTRAINT FKEmployee249023 FOREIGN KEY (PersonGovID) REFERENCES Person (
    ↪ GovID);

ALTER TABLE Account ADD CONSTRAINT FKAccount895601 FOREIGN KEY (CostumerCostumerID) REFERENCES
    ↪ Costumer (CostumerID);

ALTER TABLE RoleHistory ADD CONSTRAINT FKRoleHistor647811 FOREIGN KEY (RoleRoleID) REFERENCES Role (
    ↪ RoleID);

ALTER TABLE RoleHistory ADD CONSTRAINT FKRoleHistor516821 FOREIGN KEY (EmployeeEmployeeID) REFERENCES
    ↪ Employee (EmployeeID);

ALTER TABLE RoleHistory ADD CONSTRAINT FKRoleHistor171832 FOREIGN KEY (BranchBranchId) REFERENCES
    ↪ Branch (BranchId);

```

```
116 ALTER TABLE Loan ADD CONSTRAINT FKLoan357293 FOREIGN KEY (BranchBranchId) REFERENCES Branch (BranchId)
    ↪ ;
117
118 ALTER TABLE SavingsAccount ADD CONSTRAINT FKSavingsAcc25288 FOREIGN KEY (AccountAccountID) REFERENCES
    ↪ Account (AccountID);
119
120 ALTER TABLE Payment ADD CONSTRAINT FKPayment955503 FOREIGN KEY (LoanLoanID) REFERENCES Loan (LoanID);
121
122 ALTER TABLE Deposit ADD CONSTRAINT FKDeposit626030 FOREIGN KEY (AccountAccountID) REFERENCES Account (
    ↪ AccountID);
123
124 ALTER TABLE Transfer ADD CONSTRAINT FKTranfer816388 FOREIGN KEY (AccountAccountID) REFERENCES Account
    ↪ (AccountID);
125
126 ALTER TABLE Transfer ADD CONSTRAINT FKTranfer299653 FOREIGN KEY (AccountAccountID2) REFERENCES Account
    ↪  (AccountID);
127
128 ALTER TABLE Payment ADD CONSTRAINT FKPayment25568 FOREIGN KEY (CurrentAccountAccountID) REFERENCES
    ↪ CurrentAccount (AccountAccountID);
129
130 ALTER TABLE Withdraw ADD CONSTRAINT FKWithdraw546165 FOREIGN KEY (CurrentAccountAccountID) REFERENCES
    ↪ CurrentAccount (AccountAccountID);
131
132 ALTER TABLE CurrentAccount ADD CONSTRAINT FKCurrentAcc16041 FOREIGN KEY (AccountAccountID) REFERENCES
    ↪ Account (AccountID);
```

Transactions

1:Changing Query

Description

There is 5 CurrentAccount in the system. This transaction doubles the amount of the account that has the biggest value in the database.

SQL

```
1  BEGIN TRANSACTION
2  UPDATE Account
3  SET amount = amount*2
4  WHERE AccountID = (
5      SELECT AccountID
6      FROM Costumer c
7      INNER JOIN Person p
8          ON p.GovID = c.PersonGovID
9      INNER JOIN Account
10         ON CostumerID = CostumerCostumerID
11     INNER JOIN CurrentAccount
12         ON AccountAccountID = AccountID
13     WHERE amount >= ALL(
14         SELECT MAX(amount)
15         FROM Account
16     )
17 );
18 COMMIT
```

2:Changing Query

Description

This transaction preforms a withdraw of 100 units on the CurrentAccount with the AccountAccountID 1. To do this we must first check if the amount we want to withdraw is smaller than the CurrentAccount MaximumWithdraw, after that we update the amount and add an entry to the Withdraw ledger.

SQL

```
BEGIN TRANSACTION
UPDATE Account
SET amount =
    CASE
        WHEN 100<(
            SELECT MaximumWithdraw
            FROM CurrentAccount
            WHERE AccountAccountID=1)
          THEN amount - 100
        ELSE amount
    END
WHERE AccountID=(
    SELECT AccountID
    FROM CurrentAccount INNER JOIN Account
        ON AccountID=AccountAccountID
    WHERE AccountAccountID=1);

UPDATE Account
SET EndDate =
    CASE
        WHEN amount=0 THEN CURRENT_DATE
        ELSE null
    END
WHERE AccountID = (
    SELECT AccountID
    FROM CurrentAccount INNER JOIN Account
        ON AccountID=AccountAccountID
    WHERE AccountAccountID=1);

INSERT INTO Withdraw(WithdrawDate, Amount, CurrentAccountAccountID) VALUES(CURRENT_DATE, 100, 1);
COMMIT
```

3:Changing Query

Description

This transaction preforms a transaction between the SavingsAccount 6 and the CurrentAccount 1, it checks if the period of the SavingsAccount has passed and if so transfers the amount plus interest, if not only the amount. To do this we first add the amount to the CurrentAccount then we add a entry to the Transaction ledger and then we update the amount on the SavingsAccount

SQL

```
BEGIN TRANSACTION
UPDATE Account
SET amount =
  CASE
      WHEN (
      SELECT EXTRACT(YEAR FROM CURRENT_DATE) - EXTRACT(YEAR FROM (
          SELECT BeginDate
```

```
        FROM Account INNER JOIN SavingsAccount
          ON AccountID=AccountAccountID
        WHERE AccountAccountID=7))
      AS year FROM dual) > (
        SELECT DurationYears
        FROM SavingsAccount
        WHERE AccountAccountID=7)
    THEN amount + (
        SELECT (amount+1)*12*DurationYears*InterestRate
        FROM SavingsAccount INNER JOIN Account
        ON AccountID=AccountAccountID
        WHERE AccountAccountID=7)
    ELSE amount + (
    SELECT amount
    FROM SavingsAccount INNER JOIN Account
    ON AccountID=AccountAccountID
    WHERE AccountAccountID=7)
  END
WHERE AccountID = (
   SELECT AccountID
   FROM CurrentAccount INNER JOIN Account
       ON AccountID=AccountAccountID
   WHERE AccountAccountID=1);

INSERT INTO Transfer(TransferDate, Amount, AccountAccountID, AccountAccountID2) VALUES (CURRENT_DATE,
    ↪ (
Select
  CASE
    WHEN (
        SELECT EXTRACT(YEAR FROM CURRENT_DATE) - EXTRACT(YEAR FROM (
            SELECT BeginDate
            FROM Account INNER JOIN SavingsAccount
              ON AccountID=AccountAccountID WHERE AccountAccountID=7))
        AS year FROM dual) > (
            SELECT DurationYears
            FROM SavingsAccount
            WHERE AccountAccountID=7)
    THEN amount*12*DurationYears*InterestRate
    ELSE amount
  END
FROM SavingsAccount INNER JOIN Account
       ON AccountID=AccountAccountID
   WHERE AccountAccountID=7), '7', '1');

UPDATE Account
SET amount = 0
WHERE AccountID = (
   SELECT AccountID
   FROM SavingsAccount INNER JOIN Account
       ON AccountID=AccountAccountID
   WHERE AccountAccountID=7);
COMMIT
```

4:Changing Query

Description

This transaction upgrades the role of the employee that has been working as a 4 Role for the longest time and upgrades him to a 5

SQL

```
BEGIN TRANSACTION
UPDATE RoleHistory
       SET EndDate = CURRENT_DATE
              WHERE EmployeeEmployeeID = (
                            SELECT EmployeeEmployeeID
                            FROM RoleHistory
                            WHERE BeginDate = (
         SELECT MIN(BeginDate)
                              FROM roleHistory
                              WHERE RoleRoleID = '4' AND EndDate = NULL)
       AND RoleRoleID = '4' AND EndDate = NULL

INSERT INTO RoleHistory VALUES('10004',CURRENT_DATE,NULL,'5','84972','16516');
COMMIT
```

5:Changing Query

Description

This transaction doubles the amount of every Account belonging to a Portuguese or a Spanish person

SQL

```
BEGIN TRANSACTION
UPDATE RoleHistory
  SET EndDate = CURRENT_DATE
  WHERE EmployeeEmployeeID = (
    SELECT EmployeeEmployeeID
    FROM RoleHistory
    WHERE BeginDate = (
      SELECT MIN(BeginDate)
      FROM roleHistory
        WHERE RoleRoleID = '4'
          AND EndDate = NULL)
      AND RoleRoleID = '4'
      AND EndDate = NULL

INSERT INTO RoleHistory VALUES('10004',CURRENT_DATE,NULL,'5','84972','16516');
COMMIT
```

6:Selecting Query

Description

This query selects the AccountAccountID that made the transactions with the most total value

SQL

```
Select AccountAccountID, MAX(total) as TotalTransfer
FROM (
       Select TransferID,
       SUM (Amount) as total,
       From Transfer
       Group by AccountAccountID
)
```

7:Selecting Query

Description

This query finds the biggest amount that a costumer has on the bank

SQL

```
SELECT MAX(SUM(amount))
FROM Costumer INNER JOIN Account
  ON CostumerCostumerID = CostumerID
GROUP BY CostumerID
```