Advanced DataBases C4 Group

Bank Management System

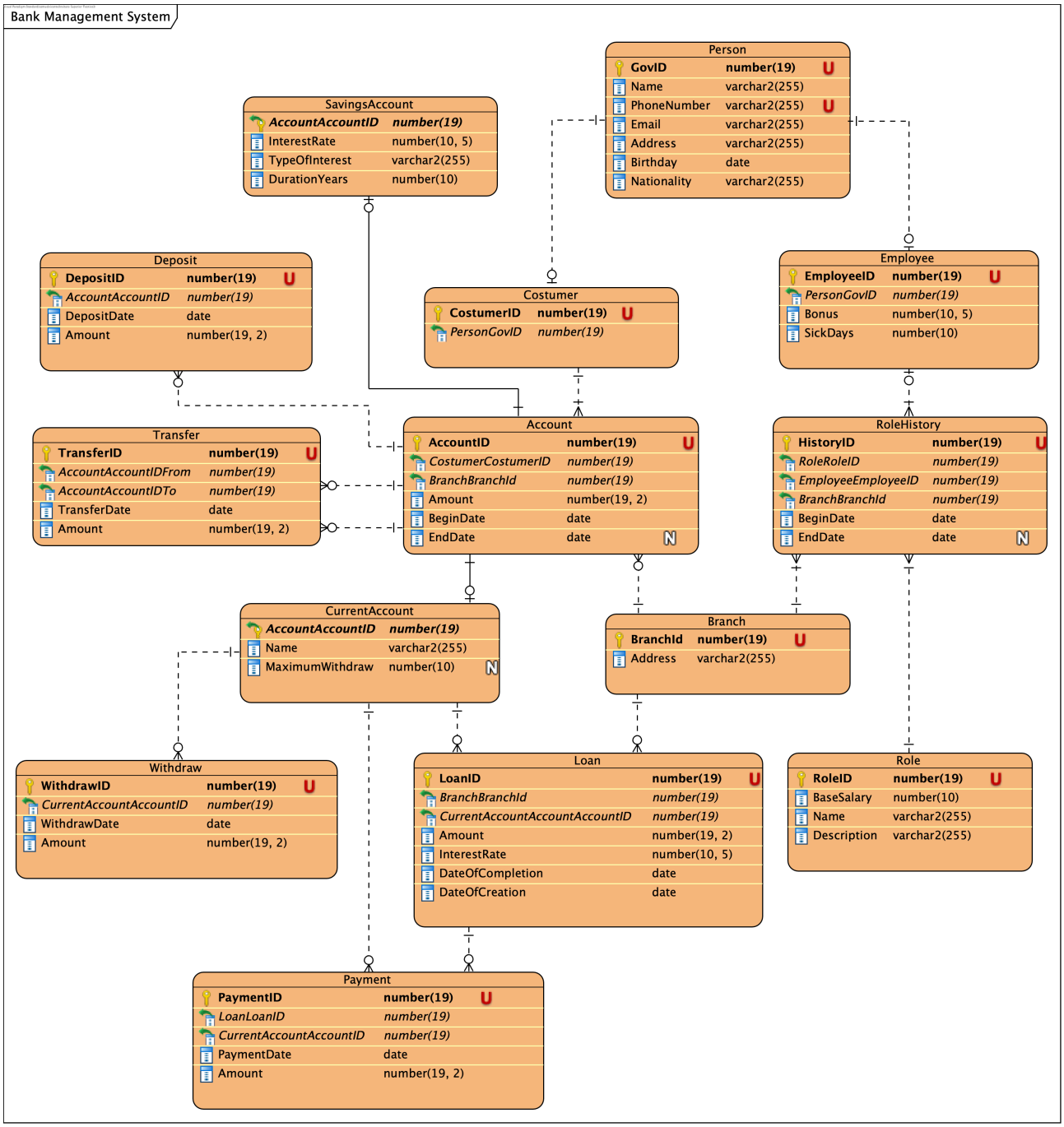
Samuel Lúcio Vicente, 251720 Daniel Silva, 251702
Jorge Marrero Camiruaga, 251438

Politechnika Wrocławska
today

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) NOT NULL,
  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));
```

```
10
11 CREATE TABLE Costumer (
12   CostumerID number(19) GENERATED AS IDENTITY,
13   PersonGovID number(19) NOT NULL,
14   PRIMARY KEY (CostumerID));
15
16 CREATE TABLE Employee (
17   EmployeeID number(19) GENERATED AS IDENTITY,
18   PersonGovID number(19) NOT NULL,
19   Bonus number(10, 5) NOT NULL CHECK(Bonus>=0),
20   SickDays number(10) NOT NULL CHECK(SickDays<10),
21   PRIMARY KEY (EmployeeID));
22
23 CREATE TABLE Account (
24   AccountID number(19) GENERATED AS IDENTITY,
25   CostumerCostumerID number(19) NOT NULL,
26   BranchBranchId number(19) NOT NULL,
27   Amount number(19, 2) NOT NULL CHECK(Amount>=0),
28   BeginDate date NOT NULL,
29   EndDate date,
30   PRIMARY KEY (AccountID));
31
32 CREATE TABLE Branch (
33   BranchId number(19) GENERATED AS IDENTITY,
34   Address varchar2(255) NOT NULL,
35   PRIMARY KEY (BranchId));
36
37 CREATE TABLE RoleHistory (
38   HistoryID number(19) GENERATED AS IDENTITY,
39   RoleRoleID number(19) NOT NULL,
40   EmployeeEmployeeID number(19) NOT NULL,
41   BranchBranchId number(19) NOT NULL,
42   BeginDate date NOT NULL,
43   EndDate date,
44   PRIMARY KEY (HistoryID));
45
46 CREATE TABLE Role (
47   RoleID number(19) GENERATED AS IDENTITY,
48   BaseSalary number(10) NOT NULL CHECK(BaseSalary>0),
49   Name varchar2(255) NOT NULL,
50   Description varchar2(255) NOT NULL,
51   PRIMARY KEY (RoleID));
52
53 CREATE TABLE Loan (
54   LoanID number(19) GENERATED AS IDENTITY,
55   BranchBranchId number(19) NOT NULL,
56   CurrentAccountAccountAccountID number(19) NOT NULL,
57   Amount number(19, 2) NOT NULL CHECK(Amount>0),
58   InterestRate number(10, 5) NOT NULL,
59   DateOfCompletion date NOT NULL,
60   DateOfCreation date NOT NULL,
61   PRIMARY KEY (LoanID));
62
63 CREATE TABLE Payment (
64   PaymentID number(19) GENERATED AS IDENTITY,
65   LoanLoanID number(19) NOT NULL,
66   CurrentAccountAccountID number(19) NOT NULL,
67   PaymentDate date NOT NULL,
68   Amount number(19, 2) NOT NULL CHECK(Amount>0),
69   PRIMARY KEY (PaymentID));
70
71 CREATE TABLE SavingsAccount (
```

```
  AccountAccountID number(19) NOT NULL,
  InterestRate number(10, 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,
  AccountAccountID number(19) NOT NULL,
  DepositDate date NOT NULL,
  Amount number(19, 2) NOT NULL CHECK(Amount>0),
  PRIMARY KEY (DepositID));

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

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

ALTER TABLE Loan ADD CONSTRAINT FKLoan357293 FOREIGN KEY (BranchBranchId) REFERENCES Branch (BranchId)
    ↪ ;

ALTER TABLE SavingsAccount ADD CONSTRAINT FKSavingsAcc25288 FOREIGN KEY (AccountAccountID) REFERENCES
    ↪ Account (AccountID);

ALTER TABLE Payment ADD CONSTRAINT FKPayment955503 FOREIGN KEY (LoanLoanID) REFERENCES Loan (LoanID);

ALTER TABLE Deposit ADD CONSTRAINT FKDeposit626030 FOREIGN KEY (AccountAccountID) REFERENCES Account (
    ↪ AccountID);
```

```
125
126 ALTER TABLE Transfer ADD CONSTRAINT FKTransfer731892 FOREIGN KEY (AccountAccountIDFrom) REFERENCES
        ↪ Account (AccountID);
127
128 ALTER TABLE Transfer ADD CONSTRAINT FKTransfer432158 FOREIGN KEY (AccountAccountIDTo) REFERENCES
        ↪ Account (AccountID);
129
130 ALTER TABLE Payment ADD CONSTRAINT FKPayment25568 FOREIGN KEY (CurrentAccountAccountID) REFERENCES
        ↪ CurrentAccount (AccountAccountID);
131
132 ALTER TABLE Withdraw ADD CONSTRAINT FKWithdraw546165 FOREIGN KEY (CurrentAccountAccountID) REFERENCES
        ↪ CurrentAccount (AccountAccountID);
133
134 ALTER TABLE CurrentAccount ADD CONSTRAINT FKCurrentAcc16041 FOREIGN KEY (AccountAccountID) REFERENCES
        ↪ Account (AccountID);
135
136 ALTER TABLE Account ADD CONSTRAINT FKAccount396299 FOREIGN KEY (BranchBranchId) REFERENCES Branch (
        ↪ BranchId);
137
138 ALTER TABLE Loan ADD CONSTRAINT FKLoan522632 FOREIGN KEY (CurrentAccountAccountAccountID) REFERENCES
        ↪ CurrentAccount (AccountAccountID);
```

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 = (
```

```
8           SELECT MIN(BeginDate)
9                               FROM roleHistory
10                              WHERE RoleRoleID = '4' AND EndDate = NULL)
11          AND RoleRoleID = '4' AND EndDate = NULL
12
13  INSERT INTO RoleHistory VALUES('10004',CURRENT_DATE,NULL,'5','84972','16516');
14  COMMIT
```

5:Changing Query

Description

SQL

6:Selecting Query

Description

SQL

7:Selecting Query

Description

SQL