# CS 631 Term Project Phase 2

Cs 631-007 Group -1

Shashwat Singh

**BANK PROJECT**

**Changes Made**:

1. Made Loan account as a subclass of account
2. Removed loan payment entity
3. Changed the relationship from Customer ‘Deposited In’ to ‘Holds Account’
4. **Entity-Relationship Diagram**

Map

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1. Diagram

   Description automatically generated**Relational Schema**

SQL Statements to create database and tables using the conceptual design:

**BANK**

CREATE TABLE Bank(

BankName VARCHAR(15) NOT NULL,

PRIMARY KEY (BankName));/

**EMPLOYEE**

CREATE TABLE Employee(

Ssn VARCHAR(9) NOT NULL,

PhoneNo VARCHAR(10),

FName VARCHAR(15),

LName VARCHAR(15),

StartDate Date,

DependentNames VARCHAR(60),

BankName VARCHAR(15),

PRIMARY KEY (Ssn),

FOREIGN KEY (BankName) REFERENCES Bank (BankName)

ON DELETE SET NULL);/

**MANAGER**

CREATE TABLE Manager(

Essn VARCHAR(9) NOT NULL,

PRIMARY KEY (Essn),

FOREIGN KEY (Essn)

              REFERENCES Employee(Ssn)

              ON DELETE CASCADE

);/

**ASST MANAGER**

CREATE TABLE AsstManager(

Essn VARCHAR(9) NOT NULL,

PRIMARY KEY (Essn),

FOREIGN KEY (Essn)

              REFERENCES Employee(Ssn)

              ON DELETE CASCADE

);/

**PERSONAL BANKER**

CREATE TABLE PersonalBanker(

Essn VARCHAR(9) NOT NULL,

PRIMARY KEY (Essn),

FOREIGN KEY (Essn)

             REFERENCES Employee(Ssn)

             ON DELETE CASCADE

);/

**BRANCHES**

CREATE TABLE Branches(

BranchId INT NOT NULL,

BankName VARCHAR(15),

BranchCity VARCHAR(15),

Address VARCHAR(20),

Assets LONG,

PRIMARY KEY(BranchId),

FOREIGN KEY(BankName) REFERENCES  Bank (BankName)

             ON DELETE SET NULL);/

**ACCOUNT**

CREATE TABLE Account(

AccNo INT NOT NULL,

AccBalance FLOAT,

AccType VARCHAR(10),

BranchId INT,

PRIMARY KEY (AccNo),

FOREIGN KEY (BranchId)

REFERENCES Branches(BranchId)

ON DELETE SET NULL);/

**SAVINGS**

CREATE TABLE Savings (

AccNo INT NOT NULL,

Interest FLOAT,

PRIMARY KEY (AccNo),

FOREIGN KEY (AccNo)

REFERENCES Account (AccNo)

ON DELETE CASCADE);/

**CHECKING**

CREATE TABLE Checking(

AccNo INT NOT NULL,

OverdraftFee FLOAT,

PRIMARY KEY (AccNo),

FOREIGN KEY (AccNo)

REFERENCES Account (AccNo)

ON DELETE CASCADE);/

**MONEY MKT**

CREATE TABLE MoneyMkt(

AccNo INT NOT NULL,

VariableInterest FLOAT,

PRIMARY KEY (AccNo),

FOREIGN KEY (AccNo)

REFERENCES Account (AccNo)

ON DELETE CASCADE);/

**CUSTOMER**

CREATE TABLE Customer(

Ssn VARCHAR(9) NOT NULL,

FName VARCHAR(15),

            LName VARCHAR(15),

            PhoneNo VARCHAR(10),

Street VARCHAR(10),

City VARCHAR(10),

State VARCHAR(10),

Zipcode VARCHAR(9),

Pbssn VARCHAR(9),

PRIMARY KEY (Ssn),

FOREIGN KEY (Pbssn)

REFERENCES PersonalBanker(Essn)

ON DELETE SET NULL);/

**TRANSACTION**

CREATE TABLE Transaction(

TransactionId VARCHAR(12) NOT NULL,

DateTime TIMESTAMP,

Type VARCHAR(15),

Amount FLOAT,

AccNo INT NOT NULL,

Charges FLOAT,

PRIMARY KEY(TransactionId, AccNo),

FOREIGN KEY (AccNo)

REFERENCES Account(AccNo)

ON DELETE CASCADE);/

**LOAN ACCOUNT**

CREATE TABLE LoanAccount(

LoanNo VARCHAR(15) NOT NULL,

LoanAmount FLOAT,

Interest FLOAT,

AccNo INT NOT NULL,

PRIMARY KEY (LoanNo, AccNo),

FOREIGN KEY (AccNo) REFERENCES

Account (AccNo)

ON DELETE CASCADE);/

**WORKS IN**

CREATE TABLE WorksIn(

BranchId INT NOT NULL,

Essn VARCHAR(9) NOT NULL,

PRIMARY KEY (BranchId, Essn),

FOREIGN KEY (BranchId) REFERENCES Branches (BranchId) ON DELETE CASCADE,

FOREIGN KEY (Essn) REFERENCES Employee (Ssn) ON DELETE CASCADE);/

**BORROWER**

CREATE TABLE Borrower (

Cssn VARCHAR(9) NOT NULL,

LoanNo VARCHAR(15) NOT NULL,

PRIMARY KEY (Cssn, LoanNo),

FOREIGN KEY (Cssn) REFERENCES Customer (Ssn) ON DELETE CASCADE,

FOREIGN KEY (LoanNo) REFERENCES LoanAccount (LoanNo) ON DELETE CASCADE);/

**HOLDS ACCOUNT**

CREATE TABLE HoldsAccount (

Cssn VARCHAR(9) NOT NULL,

AccNo INT NOT NULL,

PRIMARY KEY(Cssn, AccNo),

FOREIGN KEY (Cssn) REFERENCES Customer (Ssn) ON DELETE CASCADE,

FOREIGN KEY (AccNo) REFERENCES Account (AccNo) ON DELETE CASCADE);/

**MANAGES**

CREATE TABLE Manages(

BranchId INT NOT NULL,

Mssn VARCHAR(9) NOT NULL,

Essn VARCHAR(9) NOT NULL,

NumEmployees INT,

PRIMARY KEY(BranchId, Mssn, Essn),

FOREIGN KEY (BranchId) REFERENCES Branches (BranchId) ON DELETE CASCADE,

  FOREIGN KEY (Mssn) REFERENCES Employee (Ssn) ON DELETE CASCADE,

FOREIGN KEY (Essn) REFERENCES Employee (Ssn) ON DELETE CASCADE);/

Insert 5 rows of Data in each table + show select \* output per table

**BANK**

Insert into Bank values ('JPMorgan');

Insert into Bank values ('Discover');

Insert into Bank values ('CapitalOne');

Insert into Bank values ('CitiBank');

Insert into Bank values ('TDBank');

Graphical user interface, text, application

Description automatically generated

**EMPLOYEE**

Insert into  Employee values ('789126791', '9940903344', 'Rory','Glenn', '22-JUN-2017','Thomas Glenn', 'Discover');

Insert into  Employee values ('689326891', '9940903354', 'Luna','Robbins', '06-AUG-2018','Max Robbins', 'JPMorgan');

Insert into  Employee values ('589456791', '9940909344', 'Riley','Booker', '15-JUL-2016','Gina Booker', 'CapitalOne');

Insert into  Employee values ('489786791', '9940907344', 'Paityn','Dennis', '23-SEP-2017','Vincent Dennis', 'CitiBank');

Insert into  Employee values ('389129691', '9956903364', 'Zaniah','Dominguez', '18-NOV-2016','Robert Dominguez', 'TDBank');

Insert into  Employee values ('572129691', '8146703364', 'Robert','Downey', '18-DEC-2015','Michael Downey', 'Discover');

Insert into  Employee values ('893129591', '7840905664', 'Sherlock','Holmes', '29-SEP-2017','Marvick Holmes', 'JPMorgan');

Insert into  Employee values ('900129691', '6740902984', 'Jack','Sparrow', '23-AUG-2019','Jacy Sparrow', 'CapitalOne');

Insert into  Employee values ('700129691', '9840907594', 'Vincent','Mendonza', '27-FEB-2020','Robert Mendonza', 'CitiBank');

Insert into  Employee values ('348129691', '8740909764', 'James','Watson', '04-JAN-2020','Harry Watson', 'TDBank');

Insert into  Employee values ('890569661', '8146745664', 'Arun','Shreyes', '11-DEC-2021','Michael Downey', 'Discover');

Insert into  Employee values ('243129531', '7840999964', 'Ram','Kumar', '22-MAR-2021','Marvick Holmes', 'JPMorgan');

Insert into  Employee values ('574129611', '6740988884', 'Janani','Krishna', '23-APR-2019','Jacy Sparrow', 'CapitalOne');

Insert into  Employee values ('699129671', '9840955594', 'Shakthi','Reddy', '27-OCT-2020','Robert Mendonza', 'CitiBank');

Insert into  Employee values ('984129961', '8740944064', 'Wayne','Watson', '04-MAY-2020','Jessy Watson', 'TDBank');

A screenshot of a computer

Description automatically generated with medium confidence

**MANAGER**

Insert into Manager values ('572129691');

Insert into Manager values ('893129591');

Insert into Manager values ('900129691');

Insert into Manager values ('700129691');

Insert into Manager values ('348129691');

Graphical user interface, application

Description automatically generated

**ASST MANAGER**

Insert into AsstManager values ('789126791');

Insert into AsstManager values ('689326891');

Insert into AsstManager values ('589456791');

Insert into AsstManager values ('489786791');

Insert into AsstManager values ('389129691');

Graphical user interface, application, table

Description automatically generated

**PERSONAL BANKER**

Insert into PersonalBanker values ('789126791');

Insert into PersonalBanker values ('689326891');

Insert into PersonalBanker values ('589456791');

Insert into PersonalBanker values ('489786791');

Insert into PersonalBanker values ('389129691');

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**BRANCHES**

Insert into Branches values ('4352', 'Discover', 'Newark', '9 North St', '45900.12');

Insert into Branches values ('7452', 'JPMorgan', 'Trenton', '3 West Ave', '78122.90');

Insert into Branches values ('6752', 'CapitalOne', 'Edison', '1 Main St', '23888.21);

Insert into Branches values ('6992', 'CitiBank', 'Piscataway', '5 Wan Dr', '56991.12');

Insert into Branches values ('8952', 'TDBank',  'East Brunswick', ' 12 East Way', '12339.12');

Graphical user interface, application

Description automatically generated

**ACCOUNT**

Insert into Account values ('789156794563', '14500','SAVINGS','4352');

Insert into Account values ('657899562345', '14500','SAVINGS','7452');

Insert into Account values ('756156795453', '14500','SAVINGS','4352');

Insert into Account values ('768515678745', '22750','SAVINGS','6752');

Insert into Account values ('945634504389','89458','SAVINGS','8952');

Insert into Account values ('768515678910', '22850','CHECKING','6992');

Insert into Account values ('897515678913', '13750','CHECKING','6992');

Insert into Account values ('568315678915', '15750','CHECKING','8952');

Insert into Account values ('723115678918', '2750','CHECKING','7452');

Insert into Account values ('459815678919', '9750','CHECKING','7452');

Insert into Account values ('945634502247','7600','MONEY MKT','4352');

Insert into Account values ('935634506847','9850','MONEY MKT','8952');

Insert into Account values ('955634509577','9800','MONEY MKT','8952');

Insert into Account values ('965634503387','1523','MONEY MKT','8952');

Insert into Account values ('945634506747','9777','MONEY MKT','6992');

Insert into Account values ('893478202243', '7000','LOAN','6752');

Insert into Account values ('894478206853', '24500','LOAN','6992');

Insert into Account values ('896578209943', '8500','LOAN','6752');

Insert into Account values ('897578205322', '55000','LOAN','7452');

Insert into Account values ('657899567812', '75000','LOAN','7452');

Application, table, Excel

Description automatically generated

**SAVINGS**

Insert into Savings values ('789156794563','5.5');

Insert into Savings values ('657899562345', '5.2');

Insert into Savings values ('756156795453', '4.3');

Insert into Savings values ('768515678745', '5.5');

Insert into Savings values ('945634504389', '6.3');

Table

Description automatically generated

**CHECKING**

Insert into Checking values ('768515678910', '26');

Insert into Checking values ('897515678913', '50');

Insert into Checking values ('568315678915', '200');

Insert into Checking values ('723115678918', '200');

Insert into Checking values ('459815678919', '50');

Graphical user interface, text

Description automatically generated with medium confidence

**MONEY MKT**

Insert into MoneyMkt values ('945634502247','7.6');

Insert into MoneyMkt values ('935634506847','8.7');

Insert into MoneyMkt values ('955634509577','7.5');

Insert into MoneyMkt values ('965634503387','6.9');

Insert into MoneyMkt values ('945634506747','8.3');

Table

Description automatically generated

**CUSTOMER**

Insert into Customer values ('122334444', 'John', 'Smith', '1236781345', '1 West Way', 'Trenton', 'NJ', '12345', '789126791');

Insert into Customer values ('233445555', 'Wesley', 'Snipes', '7891235647', '3 Main St', 'Newark', 'NJ', '34567', '689326891');

Insert into Customer values ('344556666', 'Tony', 'Stark', '5672347892', '2 North Dr', 'Piscataway', 'NJ', '89123', '589456791');

Insert into Customer values ('455667777', 'Aki', 'Hayakawa', '3456782377', '7 East St', 'Edison', 'NJ', '12889', '489786791');

Insert into Customer values ('566778888', 'Obi wan', 'Kenobi', '9238761278', '882 West Ave', 'Brunswick', 'NJ', '08816', '389129691');

A picture containing table

Description automatically generated

**TRANSACTION**

Insert into Transaction values ('333444555666', TO\_TIMESTAMP( '2020-04-01 06:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Deposit', ' 200.15', '945634504389', '0');

Insert into Transaction values ('888999222333', TO\_TIMESTAMP( '2020-04-02 06:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Withdrawal', '50', '768515678910', '4');

Insert into Transaction values ('444555222999', TO\_TIMESTAMP( '2020-04-03 06:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Deposit', '912.32', '897515678913', '0');

Insert into Transaction values ('888111222333', TO\_TIMESTAMP( '2020-04-04 06:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Deposit', '1500', '756156795453', '0');

Insert into Transaction values ('555666222999', TO\_TIMESTAMP( '2020-04-05 06:00:00', 'YYYY-MM-DD HH24:MI:SS'), 'Withdrawal', '2750', '568315678915', '10');

Table

Description automatically generated with medium confidence

**LOAN ACCOUNT**

Insert into LoanAccount values ('785632', '7000','9.2','893478202243');

Insert into LoanAccount values ('588357', '24500','8.7','894478206853');

Insert into LoanAccount values ('799542', '8500','7.5','896578209943');

Insert into LoanAccount values ('656211', '55000','10.3','897578205322');

Insert into LoanAccount values ('257399', '75000','8.5','657899567812');

Table

Description automatically generated

**WORKS IN**

Insert into WorksIn values ('4352', '789126791');

Insert into WorksIn values ('7452', '689326891');

Insert into WorksIn values ('6752', '589456791');

Insert into WorksIn values ('6992', '489786791');

Insert into WorksIn values ('8952', '389129691');

Table

Description automatically generated

**BORROWER**

Insert into Borrower values('344556666','785632');

Insert into Borrower values('233445555','588357');

Insert into Borrower values('122334444','799542');

Insert into Borrower values('455667777','656211');

Insert into Borrower values('566778888','257399');

Table

Description automatically generated with medium confidence

**HOLDS ACCOUNT**

Insert into HoldsAccount values ('122334444', '945634504389');

Insert into HoldsAccount values ('233445555', '768515678910');

Insert into HoldsAccount values ('344556666', '897515678913');

Insert into HoldsAccount values ('455667777', '756156795453');

Insert into HoldsAccount values ('566778888', '568315678915');

Text

Description automatically generated with medium confidence

**MANAGES**

Insert into Manages values ('4352','572129691','890569661','14');

Insert into Manages values ('7452','893129591','243129531','24');

Insert into Manages values ('6992','900129691','574129611','15');

Insert into Manages values ('8952','700129691','699129671','17');

Insert into Manages values ('6752','348129691','984129961','15');

Graphical user interface, text, application

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Update 1 Column and Delete 1 row per table

**BANK**

Update Bank

Set BankName = ‘BankofAmerica’

Where BankName = ‘Discover’;

Delete From Bank

Where BankName = ‘CitiBank’;

**EMPLOYEE**

Update Employee

Set FName = ‘Joe’

Where Ssn = '789126791';

Delete From Employee

Where Ssn = '789126791';

**MANAGER**

Update Manager

Set Essn = NULL

Where Essn = '572129691';

Delete From Manager

Where Essn = '572129691';

**ASST MANAGER**

Update AsstManager

Set Essn = Null

Where Essn = '789126791';

Delete From AsstManager

Where Essn = '789126791';

**PERSONAL BANKER**

Update PersonalBanker

Set  Essn = Null

Where Essn = '689326891';

Delete From PersonalBanker

Where Essn = '689326891';

**ACCOUNT**

Update Account

Set AccBalance = ‘7890’

Where BranchId = ‘4352’;

Delete From Account

Where AccNo = ‘768515678745’;

**SAVINGS**

Update Savings

Set Interest = ‘5.7’

Where AccNo = ‘789156794563’;

Delete From Savings

Where AccNo = '657899562345';

**CHECKING**

Update Checking

Set OverdraftFee = ‘24’

Where AccNo = ‘723115678918’;

Delete From Checking

Where AccNo = '568315678915';

**MONEY MKT**

Update MoneyMkt

Set VariableInterest= ‘4.5’

Where AccNo = ‘955634509577’;

Delete From MoneyMkt

Where AccNo = '945634506747';

**CUSTOMER**

Update Customer

Set PhoneNo = '8008345000'

Where FName = 'John' And LName = 'Smith'

Delete From Customer

Where Ssn = '455667777'

**TRANSACTION**

Update Transaction

Set Charges = '2'

Where Type = 'Deposit'

Delete From Transaction

Where AccNo = '768515678910'

**LOAN ACCOUNT**

Update LoanAccount

Set LoanAmount = '4500'

Where AccNo = '896578209943'

Delete From LoanAccount

Where LoanNo = '656211'

**BRANCHES**

Update Branches

Set Assets = ‘123123123’

Where BankName = ‘TDBank’;

Delete From Branches

Where BankName = ‘TDBank’;

**WORKS IN**

Update WorksIn

Set BranchId = '6752'

Where Essn = '689326891';

Delete From WorksIn

Where BranchId = '6752';

**BORROWER**

Update Borrower

Set LoanNo = Null

Where Cssn = '122334444';

Delete From Borrower

Where Cssn = '122334444';

**HOLDS ACCOUNT**

Update HoldsAccount

Set AccNo = Null

Where Cssn = '455667777'

Delete From HoldsAccount

Where Cssn = '455667777'

**MANAGES**

Update Manages

Set NumEmployees = ‘1223’

Where BranchId = '6992'

Delete From Manages

Where BranchId = '6992'

Write 4 Queries in English & SQL

**GROUP BY**

Display the largest balance accounts per account type in all banks.

Select MAX(AccBalance),AccType

From Account

Group By AccType;

Table

Description automatically generated

**GROUP BY and HAVING**

Display the largest balance accounts at the CapitalOne Branch 6752.

Select MAX(AccBalance), AccType, BranchId

From Account

Group By AccType, BranchId

Having BranchId = '6752';

Graphical user interface, table

Description automatically generated

**Nested query with ALL**

Display all the loan numbers and loan amount which are less than account balance in all savings type account.

Select LoanNo, LoanAmount

From LoanAccount L, Account A

Where L.AccNo =A.AccNo

AND  LoanAmount < ALL (

Select AccBalance

From Account

Where AccType = 'SAVINGS');

Table

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**Nested query with IN**

Show all the managers and their Bank Name that manage over 15 employees.

Select M.Mssn, B.BankName

From Employee E, Manages M, Branches B

Where E.Ssn = M.Mssn AND M.BranchId = B.BranchId

AND M.Mssn IN ( Select Mssn

From Manages

Where NumEmployees > 15);/

Table

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