COSC 4301 – Database Theory and Practice
Lab 03

Create the banking database given the following schema:

branch

branch_name, branch_city, assets

customers

ID, name, address (Use Identity or Auto_Increment for ID)

loan

Loan_number, branch_name (FK to branch), amount, type

borrower

ID (FK to customers), loan_number (FK to loan) (composite PK of ID & loan number)

account

account_number, branch_name (FK to branch), balance

depositor

ID (FK to customers), account_number (FK to account) (composite PK of ID & account number)

1. Add the following constraints to the database:

a. Branch city data must be provided and must be distinct.
b. The loan type must be either Personal, Student or Auto.
c. Foreign keys that reference branch.branch_name must be set to null upon deletion and update.
d. Name data must be provided.
e. Loan amount must be at least $5000.
f. Foreign keys that reference customers.ID, account.account_number, and loan.loan_number must be set to cascade upon deletion and update.

2. Attempt to insert the data found in L03data.sql. State the errors along with the constraint that is being violated and insert the remaining data.

Errors:

```
Msg 2627, Level 14, State 1, Line 89
Violation of UNIQUE KEY constraint 'UQ__branch__A688DAC3D117E8F7'. Cannot insert duplicate
key in object 'dbo.branch'. The duplicate key value is (Houston).
Msg 515, Level 16, State 2, Line 92
Cannot insert the value NULL into column 'branch_city', table 'Banking.dbo.branch'; column
does not allow nulls. INSERT fails.
Msg 544, Level 16, State 1, Line 104
Cannot insert explicit value for identity column in table 'customers' when IDENTITY_INSERT
is set to OFF.
Msg 547, Level 16, State 0, Line 112
The INSERT statement conflicted with the CHECK constraint "CHK_loan_amount". The conflict
occurred in database "Banking", table "dbo.loan", column 'amount'.
Msg 547, Level 16, State 0, Line 115
```

```
The INSERT statement conflicted with the CHECK constraint "CHK_loan_type". The conflict
occurred in database "Banking", table "dbo.loan", column 'type'.
Msg 547, Level 16, State 0, Line 126
The INSERT statement conflicted with the FOREIGN KEY constraint "FK_loan_number". The
conflict occurred in database "Banking", table "dbo.loan", column 'Loan_number'.
Msg 547, Level 16, State 0, Line 130
The INSERT statement conflicted with the FOREIGN KEY constraint "FK_ID". The conflict
occurred in database "Banking", table "dbo.customers", column 'ID'.
Msg 547, Level 16, State 0, Line 137
The INSERT statement conflicted with the FOREIGN KEY constraint "FK_branch_name2". The
conflict occurred in database "Banking", table "dbo.branch", column 'branch_name'.
Msg 547, Level 16, State 0, Line 150
The INSERT statement conflicted with the FOREIGN KEY constraint "FK_account_number". The
conflict occurred in database "Banking", table "dbo.account", column 'account_number'.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
The statement has been terminated.
```

Constraints Being Violated:

UNIQUE KEY constraint for branch_city,

NOT NULL KEY constraint for branch_city,

IDENTITY is auto updating ID, so ID cannot be inserted,

CHECK constraint CHK_loan_amount,

CHECK constraint CHK_loan_type,

FOREIGN KEY FK_loan_number constraint,

FOREIGN KEY FK_ID constraint,

FOREIGN KEY FK_branch_name2 constraint,

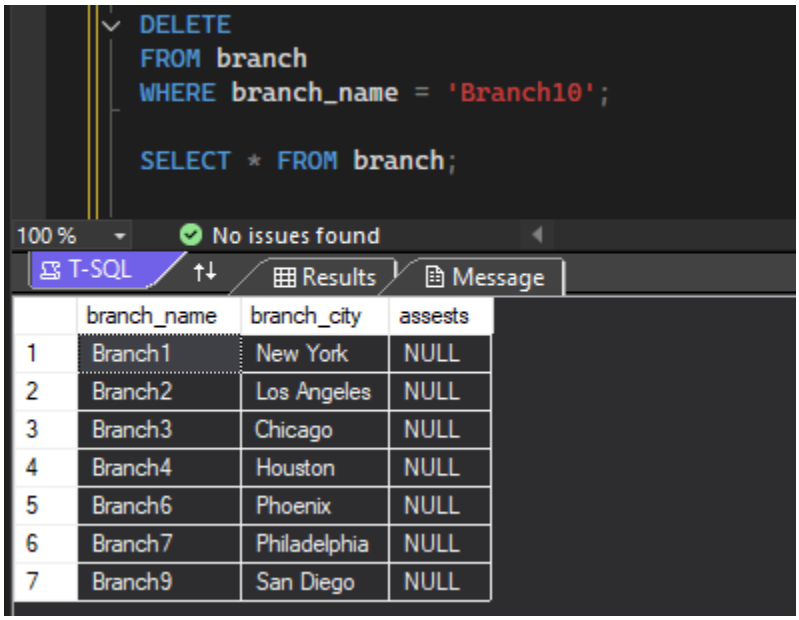
FOREIGN KEY FK_account_number constraint

3. Perform deletion and screenshot the result in a referencing table:

a. Delete branch name “Branch10” from the branch table.

```
DELETE
FROM branch
WHERE branch_name = 'Branch10';

SELECT * FROM branch;
```

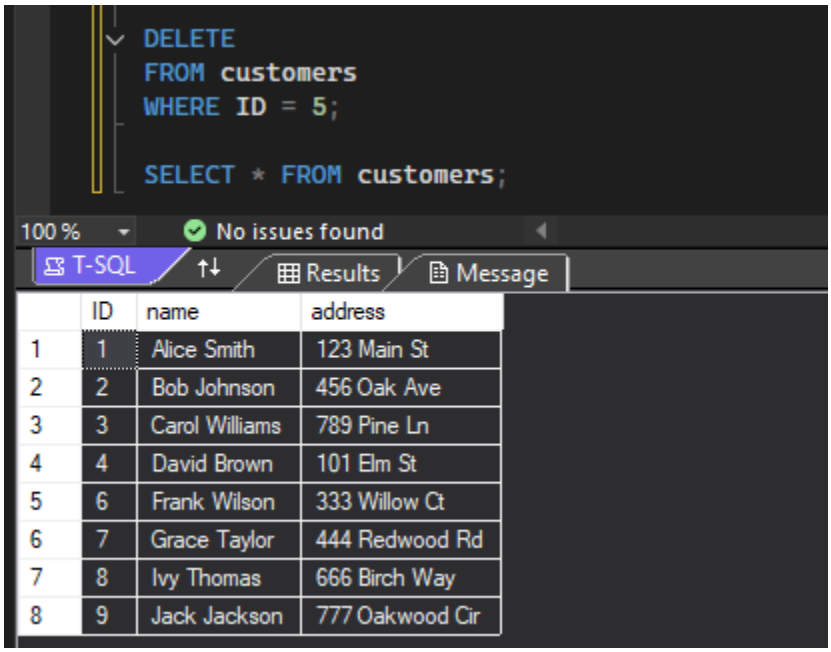


	branch_name	branch_city	assests
1	Branch1	New York	NULL
2	Branch2	Los Angeles	NULL
3	Branch3	Chicago	NULL
4	Branch4	Houston	NULL
5	Branch6	Phoenix	NULL
6	Branch7	Philadelphia	NULL
7	Branch9	San Diego	NULL

b. Delete ID 5 from the customer table.

```
DELETE
FROM customers
WHERE ID = 5;

SELECT * FROM customers;
```



	ID	name	address
1	1	Alice Smith	123 Main St
2	2	Bob Johnson	456 Oak Ave
3	3	Carol Williams	789 Pine Ln
4	4	David Brown	101 Elm St
5	6	Frank Wilson	333 Willow Ct
6	7	Grace Taylor	444 Redwood Rd
7	8	Ivy Thomas	666 Birch Way
8	9	Jack Jackson	777 Oakwood Cir

```sql
USE Banking

--branch table
CREATE TABLE branch(
	branch_name VARCHAR(255),
	branch_city VARCHAR(255) NOT NULL UNIQUE,
	assests VARCHAR(255)
	PRIMARY KEY (branch_name)
);

--customers table
CREATE TABLE customers(
	ID INT IDENTITY(1,1), --auto increments
	name VARCHAR(255) NOT NULL,
	address VARCHAR(255),
	PRIMARY KEY (ID)
);

--loan table
CREATE TABLE loan(
	Loan_number INT,
	branch_name VARCHAR(255),
	amount DECIMAL(15,2),
	type VARCHAR(8),
	PRIMARY KEY (Loan_number),
	CONSTRAINT FK_branch_name
	FOREIGN KEY (branch_name) REFERENCES branch(branch_name)
		ON DELETE SET NULL
		ON UPDATE SET NULL,
	CONSTRAINT CHK_loan_amount
		CHECK(amount >= 5000),
	CONSTRAINT CHK_loan_type
		CHECK(type IN('Personal', 'Student', 'Auto'))
);

--borrower table
CREATE TABLE borrower(
	ID INT,
	loan_number INT,
	PRIMARY KEY (ID, loan_number),
	CONSTRAINT FK_ID
	FOREIGN KEY (ID) REFERENCES customers(ID)
		ON DELETE CASCADE
		ON UPDATE CASCADE,
	CONSTRAINT FK_loan_number
	FOREIGN KEY (loan_number) REFERENCES loan(loan_number)
		ON DELETE CASCADE
		ON UPDATE CASCADE
);

--account table
CREATE TABLE account(
	account_number INT,
	branch_name VARCHAR(255),
	balance DECIMAL(15,2)
	PRIMARY KEY (account_number),
	CONSTRAINT FK_branch_name2
	FOREIGN KEY (branch_name) REFERENCES branch(branch_name)
		ON DELETE SET NULL
		ON UPDATE SET NULL
);
```

```sql
--depositor table
CREATE TABLE depositor(
	ID INT,
	account_number INT,
	PRIMARY KEY (ID, account_number),
	CONSTRAINT FK_ID2
	FOREIGN KEY (ID) REFERENCES customers(ID)
		ON DELETE CASCADE
		ON UPDATE CASCADE,
	CONSTRAINT FK_account_number
	FOREIGN KEY (account_number) REFERENCES account(account_number)
		ON DELETE CASCADE
		ON UPDATE CASCADE
);

delete from account;
delete from borrower;
delete from branch;
delete from customers;
delete from depositor;
delete from loan;
-- Branch Table Inserts
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch1', 'New York');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch2', 'Los Angeles');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch3', 'Chicago');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch4', 'Houston');
--INSERT INTO branch (branch_name, branch_city) VALUES ('Branch5', 'Houston');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch6', 'Phoenix');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch7', 'Philadelphia');
--INSERT INTO branch (branch_name) VALUES ('Branch8');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch9', 'San Diego');
INSERT INTO branch (branch_name, branch_city) VALUES ('Branch10', 'Dallas');

-- Customers Table Inserts
INSERT INTO customers (name, address) VALUES ('Alice Smith', '123 Main St');
INSERT INTO customers (name, address) VALUES ('Bob Johnson', '456 Oak Ave');
INSERT INTO customers (name, address) VALUES ('Carol Williams', '789 Pine Ln');
INSERT INTO customers (name, address) VALUES ('David Brown', '101 Elm St');
INSERT INTO customers (name, address) VALUES ('Eve Davis', '222 Maple Dr');
INSERT INTO customers (name, address) VALUES ('Frank Wilson', '333 Willow Ct');
INSERT INTO customers (name, address) VALUES ('Grace Taylor', '444 Redwood Rd');
--INSERT INTO customers (ID, address) VALUES (8, '555 Cedar Pl');
INSERT INTO customers (name, address) VALUES ('Ivy Thomas', '666 Birch Way');
INSERT INTO customers (name, address) VALUES ('Jack Jackson', '777 Oakwood Cir');

-- Loan Table Inserts
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (101, 'Branch1', 6000,
'Personal');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (102, 'Branch2', 10000,
'Auto');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (103, 'Branch3', 15000,
'Student');
--INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (104, 'Branch4', 4000,
'Personal');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (105, 'Branch6', 12000,
'Auto');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (106, 'Branch6', 18000,
'Student');
--INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (107, 'Branch7', 7000,
'Mortgage');
```

```
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (108, 'Branch9', 11000,
'Auto');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (109, 'Branch9', 16000,
'Student');
INSERT INTO loan (Loan_number, branch_name, amount, type) VALUES (110, 'Branch10', 9000,
'Personal');

-- Borrower Table Inserts
INSERT INTO borrower (ID, loan_number) VALUES (1, 101);
INSERT INTO borrower (ID, loan_number) VALUES (2, 102);
INSERT INTO borrower (ID, loan_number) VALUES (3, 103);
INSERT INTO borrower (ID, loan_number) VALUES (3, 105);
INSERT INTO borrower (ID, loan_number) VALUES (5, 105);
--INSERT INTO borrower (ID, loan_number) VALUES (6, 100);
INSERT INTO borrower (ID, loan_number) VALUES (7, 108);
INSERT INTO borrower (ID, loan_number) VALUES (8, 108);
INSERT INTO borrower (ID, loan_number) VALUES (9, 109);
--INSERT INTO borrower (ID, loan_number) VALUES (11, 110);

-- Account Table Inserts
INSERT INTO account (account_number, branch_name, balance) VALUES (201, 'Branch1',
1000.00);
INSERT INTO account (account_number, branch_name, balance) VALUES (202, 'Branch2',
5000.50);
INSERT INTO account (account_number, branch_name, balance) VALUES (203, 'Branch4',
2500.75);
INSERT INTO account (account_number, branch_name, balance) VALUES (204, 'Branch4',
7500.25);
--INSERT INTO account (account_number, branch_name, balance) VALUES (205, 'Branch55',
12000.99);
INSERT INTO account (account_number, branch_name, balance) VALUES (206, 'Branch6',
3000.00);
INSERT INTO account (account_number, branch_name, balance) VALUES (207, 'Branch6',
9000.50);
INSERT INTO account (account_number, branch_name, balance) VALUES (208, 'Branch9',
6000.25);
INSERT INTO account (account_number, branch_name, balance) VALUES (209, 'Branch9',
15000.75);
INSERT INTO account (account_number, branch_name, balance) VALUES (210, 'Branch10',
4500.99);

-- Depositor Table Inserts
INSERT INTO depositor (ID, account_number) VALUES (1, 201);
INSERT INTO depositor (ID, account_number) VALUES (2, 202);
INSERT INTO depositor (ID, account_number) VALUES (3, 203);
INSERT INTO depositor (ID, account_number) VALUES (4, 204);
INSERT INTO depositor (ID, account_number) VALUES (5, 206);
--INSERT INTO depositor (ID, account_number) VALUES (6, 222);
INSERT INTO depositor (ID, account_number) VALUES (7, 207);
INSERT INTO depositor (ID, account_number) VALUES (8, 208);
INSERT INTO depositor (ID, account_number) VALUES (9, 209);
INSERT INTO depositor (ID, account_number) VALUES (9, 210);

DELETE
FROM branch
WHERE branch_name = 'Branch10';

SELECT * FROM branch;

DELETE
FROM customers
```

```
WHERE ID = 5;

SELECT * FROM customers;
```