

Final Project Phase III

Bank Database

Group #7

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CS331-003

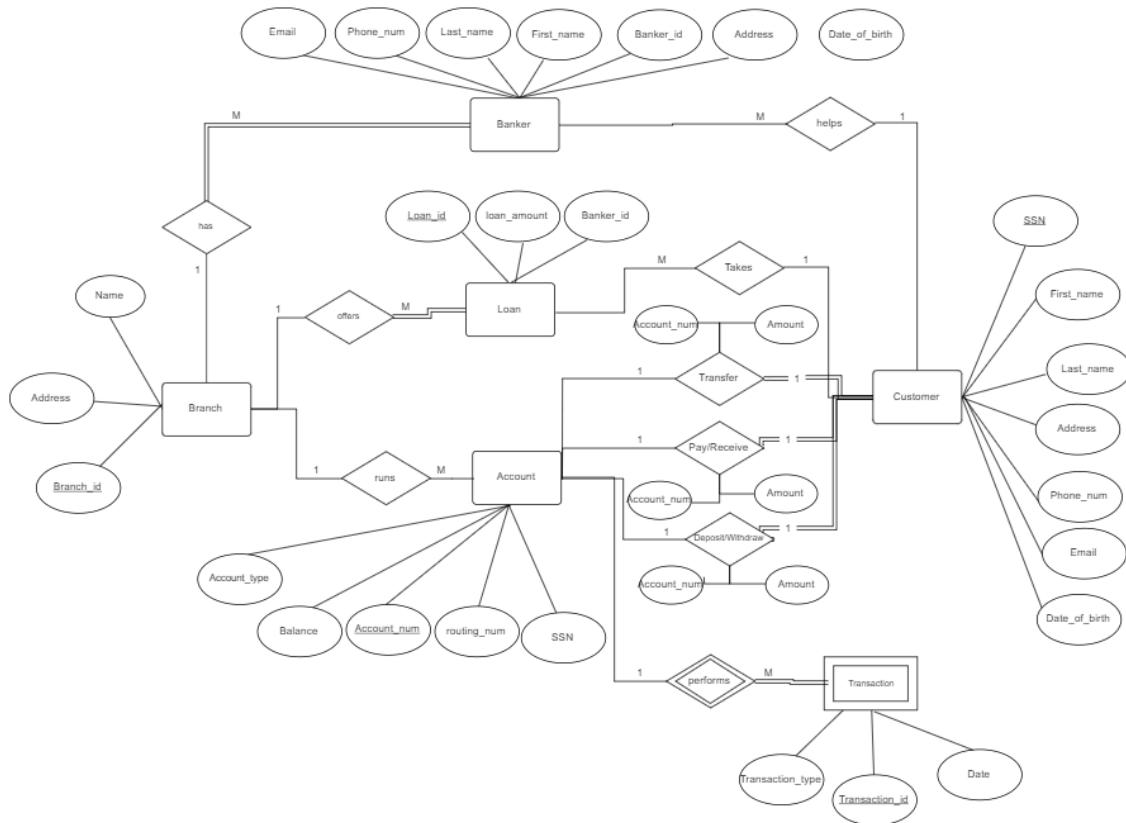
Professor Renda

12/7/2022

System Requirements (Summary)

- Every branch in the bank has a name, branch_id , and address.
- Every branch has customers that are identified by their SSN. They have a first_name, last_name, address, email, date_of_birth and phone number.
- Customers can open two accounts, either a checking or savings account. Every account has an account_number and a routing_number and a balance.
- Customers can freely authorize transactions on their checking account. Every transaction has a transaction_id, date and transaction_type.
- Cash can be freely deposited and withdrawn from either a checking or savings account, however withdrawing from a savings account is limited to six free withdrawals a month. Cash can also be transferred from a customer's checking account to their savings and vice versa.
- Customers can take multiple personal loans through a branch. Every loan has a loan_amount, loan_id, and is approved by a banker. Once a loan is approved the cash is deposited into the customer's checking account balance.
- Every banker has a banker_id, first_name, last_name, SSN, email, address, date_of_birth and phone number. A banker can also be a customer and open accounts but can not approve their own loans.
- Customers can receive cash from and pay other customers even from other banks. This requires the checking account number and the receivers checking account number, and amount.

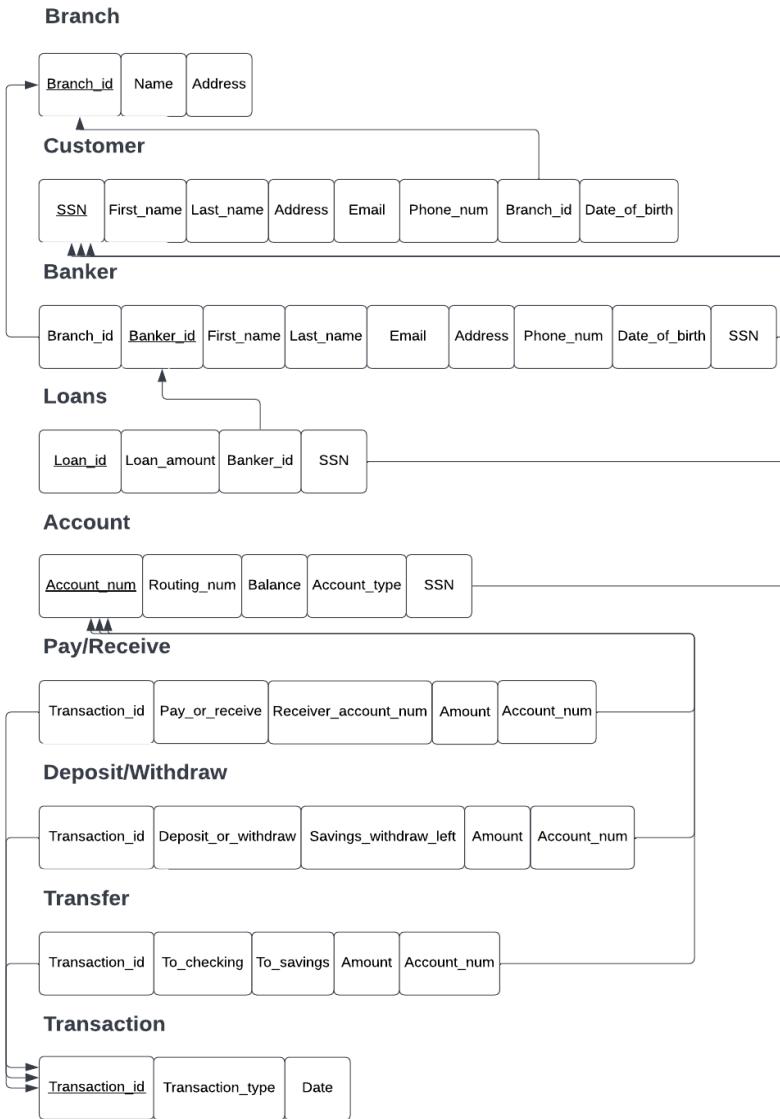
Entity Relationship Diagram



Design Decisions

We decided the best way to connect the customer with the bank would be through the account and not the banker because not every customer goes to a banker. We decided to connect the banker to the loan entity through a foreign key because the bank needs to know which banker is responsible for giving out the loan. The biggest obstacle during the design process was figuring out how to connect transactions to the loans and to the relationships between Account and the customer. Connecting Transaction to the Account entity would solve it since every transaction has to be connected to an account.

(Relational) Logical Database Design



Design Decisions

The biggest design decision we faced when designing the logical database was organizing and combining related entities to keep the database simplistic and allow for a more effective workflow when creating the database in our Database Management System (DBMS). In our final iteration of the logical model, we combined the **checking_account** and **savings_account** entities

into one **Account** entity with the attribute ‘Account_type’ to make the process of creating accounts more streamlined.

Relation (schema) including attributes



Sample Data

BRANCH

MySQL Workbench

Local instance MySQL80

File Edit View Query Database Server Tools Scripting Help

Navigator: SCHEMAS

bank Tables: account, banker, branch, Columns, Indexes, Foreign Keys, Triggers, customer, deposit_or_withdraw, loans, pay_or_receive, transaction, transfer, Views, Stored Procedures, Functions, sys

Query 1: select * from branch

Branch_id	Name	Address
23895	Woodbridge	221 Glenwood Ave Woodbridge 08830
45632	Farmington	130 Grandview Way 06032
75632	Hartford	61 Block Drive 07102
87345	Edison	32 Inman Ave 08810
89064	Edison	42 Kansas Drive 06043

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Administration Schemas

Information: Index: PRIMARY

Definition:

- Type: BTREE
- Unique: Yes
- Visible: Yes
- Columns: Branch_id

Action Output:

#	Time	Action	Message	Duration / Fetch
16	18:17:32	SELECT * FROM Branch LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
17	18:18:46	INSERT INTO branch (Branch_id, Name, Address) VALUES (87345, 'Edison', '32 Inman Ave 08810')	1 row(s) affected	0.047 sec
18	18:19:30	INSERT INTO branch (Branch_id, Name, Address) VALUES (45632, 'Farmington', '130 Grandview Way 06032...')	1 row(s) affected	0.000 sec
19	18:19:53	INSERT INTO Branch (Branch_id, Name, Address) VALUES (75632, 'Hartford', '61 Block Drive 07102')	1 row(s) affected	0.000 sec
20	18:20:20	INSERT INTO Branch (Branch_id, Name, Address) VALUES (89064, 'Edison', '42 Kansas Drive 06043')	1 row(s) affected	0.015 sec
21	18:20:35	select * from branch LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

Object Info Session

CUSTOMER

MySQL Workbench

Local instance MySQL80 (bank) Local instance MySQL80 (bank) Local instance MySQL80 (ban...)

File Edit View Query Database Server Tools Scripting Help

Navigator: SCHEMAS

banker Columns: Branch_id, Banker_id, First_name, Last_name, Address, Email, Phone_num, Date_of_birth, SSN

branch Tables: customer, deposit_or_withdraw, loans, pay_or_receive, transaction, transfer, Views, Stored Procedures

Query 1: select * from customer

SSN	First_name	Last_name	Address	Email	Phone_num	Branch_id	Date_of_birth
238873631	John	Doe	42 Glenwood Ave 09301	abcdef@gmail.com	901-616-6274	23895	2003-02-19
238873632	Glen	Doe	42 Inman Ave 09302	heloworld@gmail.com	902-616-6274	23895	1998-02-19
238873633	Sam	Doe	42 Kennedy Drive 09302	starbucks@gmail.com	903-616-6274	23895	1997-02-19
238873635	Kee	Doe	42 Samuel 09302	6331@gmail.com	904-616-6274	23895	1996-02-19
238873637	Shiva	Modugus	42 Street Driver 09302	helton_trembl@gmail.com	905-616-6274	23895	2003-02-19

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

customer 14: No object selected

Action Output:

#	Time	Action	Message	Duration / Fetch
58	20:37:24	select * from customer LIMIT 0, 1000	1 row(s) returned	0.000 sec / 0.000 sec
59	20:37:57	INSERT INTO customer(SSN,First_name,Last_name,Address,Email,Phone_num,Date_of_birth,Branch_id) SE...	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.047 sec
60	20:38:30	INSERT INTO customer(SSN,First_name,Last_name,Address,Email,Phone_num,Date_of_birth,Branch_id) SE...	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
61	20:39:00	INSERT INTO customer(SSN,First_name,Last_name,Address,Email,Phone_num,Date_of_birth,Branch_id) SE...	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.000 sec
62	20:39:27	INSERT INTO customer(SSN,First_name,Last_name,Address,Email,Phone_num,Date_of_birth,Branch_id) SE...	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.000 sec
63	20:39:40	select * from customer LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

Object Info Session

BANKER

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from banker

Branch_id	Banker_id	First_name	Last_name	Address	Email	Phone_num	Date_of_birth	SSN
23895	11111	John	Doe	42 Glenwood Ave 09301	abcdef@gmail.com	901-616-6274	2003-02-19	238873631
23895	11112	Glen	Doe	42 Inman Ave 09302	helloworld@gmail.com	902-616-6274	1998-02-19	238873632
23895	11113	Sam	Doe	42 Kennedy Drive 09302	starbucks@gmail.com	903-616-6274	1997-02-19	238873633
23895	11114	Kee	Doe	42 Samuel 09302	cs31@gmail.com	904-616-6274	1996-02-19	238873635
23895	11115	Shiva	Modugus	42 Street Driver 09302	kelton_trembl@gmail.com	908-616-6274	2003-02-19	238873637
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

SQL Additions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

No object selected

Action Output:

- 70 20:49:53 INSERT INTO banker(Banker_id,First_Name,Last_Name,Address,Email,Phone_num,Date_of_birth,Branch_id,SSN) VALUES(11111,'John','Doe','42 Glenwood Ave 09301','abcdef@gmail.com','901-616-6274','2003-02-19',238873631)
- 71 20:50:00 INSERT INTO banker(Banker_id,First_Name,Last_Name,Address,Email,Phone_num,Date_of_birth,Branch_id,SSN) VALUES(11112,'Glen','Doe','42 Inman Ave 09302','helloworld@gmail.com','902-616-6274','1998-02-19',238873632)
- 72 20:50:44 INSERT INTO banker(Banker_id,First_Name,Last_Name,Address,Email,Phone_num,Date_of_birth,Branch_id,SSN) VALUES(11113,'Sam','Doe','42 Kennedy Drive 09302','starbucks@gmail.com','903-616-6274','1997-02-19',238873633)
- 73 20:51:48 INSERT INTO banker(Banker_id,First_Name,Last_Name,Address,Email,Phone_num,Date_of_birth,Branch_id,SSN) VALUES(11114,'Kee','Doe','42 Samuel 09302','cs31@gmail.com','904-616-6274','1996-02-19',238873635)
- 74 20:52:09 select * from banker LIMIT 0, 1000

LOANS

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from loans

Loan_id	Loan_amount	Banker_id	SSN
4523121	20300	11111	238873633
4523122	20500	11111	238873635
4523123	40500	11111	238873637
4523124	40400	11115	238873631
4523129	9550	11111	238873632
NULL	NULL	NULL	NULL

SQL Additions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

No object selected

Action Output:

- 76 20:54:00 INSERT INTO Loans(Loan_id, Loan_Amount,Banker_id,SSN) SELECT '4523121';'20300';'b';Banker_id,c.SSN.. 1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0
- 77 20:54:10 INSERT INTO Loans(Loan_id, Loan_Amount,Banker_id,SSN) SELECT '4523122';'20500';'b';Banker_id,c.SSN.. 1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0
- 78 20:54:22 INSERT INTO Loans(Loan_id, Loan_Amount,Banker_id,SSN) SELECT '4523123';'40500';'b';Banker_id,c.SSN.. 1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0
- 79 20:54:34 INSERT INTO Loans(Loan_id, Loan_Amount,Banker_id,SSN) SELECT '4523124';'40400';'b';Banker_id,c.SSN.. 1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0
- 80 20:54:40 select * from loans LIMIT 0, 1000

ACCOUNT

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from account

Result Grid:

Account_num	Routing_num	Balance	Checking_or_savings	SSN
12341	873248973	238794.12	checking	238873635
12342	873248974	28374.98	checking	238873633
12343	873248975	237648.98	checking	238873632
12344	873248976	89572.98	savings	238873631
12345	873248972	283794.12	checking	238873637
NULL	NULL	NULL	NULL	NULL

Action Output:

#	Time	Action	Message	Duration / Fetch
84	21:02:33	INSERT INTO account(Account_num,Routing_num,Balance,Checking_or_savings,SSN) SELECT '12341','873248973',238794.12,'checking',238873635	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.063 sec
85	21:02:56	INSERT INTO account(Account_num,Routing_num,Balance,Checking_or_savings,SSN) SELECT '12342','873248974',28374.98,'checking',238873633	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
86	21:03:15	INSERT INTO account(Account_num,Routing_num,Balance,Checking_or_savings,SSN) SELECT '12343','873248975',237648.98,'checking',238873632	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
87	21:03:34	INSERT INTO account(Account_num,Routing_num,Balance,Checking_or_savings,SSN) SELECT '12344','873248976',89572.98,'savings',238873631	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
88	21:03:42	select * from account LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

TRANSACTION

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from transaction

Result Grid:

Transaction_id	Transaction_type	Date
1	pay	2022-11-18
2	pay	2022-11-18
3	pay	2022-11-18
4	receive	2022-11-18
5	receive	2022-11-18
6	deposit	2022-11-18
7	deposit	2022-11-18
8	deposit	2022-11-18
9	deposit	2022-11-18
10	withdraw	2022-11-18
11	transfer	2022-11-18
12	transfer	2022-11-18
13	transfer	2022-11-18
14	transfer	2022-11-18
15	transfer	2022-11-18
NULL	NULL	NULL

Action Output:

#	Time	Action	Message	Duration / Fetch
164	21:40:58	INSERT INTO Transaction(Transaction_id, Transaction_type, Date) VALUES ('13','transfer','2022-11-18')	1 row(s) affected	0.016 sec
165	21:41:00	INSERT INTO Transaction(Transaction_id, Transaction_type, Date) VALUES ('14','transfer','2022-11-18')	1 row(s) affected	0.000 sec
166	21:41:13	select * from transaction LIMIT 0, 1000	14 row(s) returned	0.000 sec / 0.000 sec
167	21:41:26	INSERT INTO Transaction(Transaction_id, Transaction_type, Date) VALUES ('15','transfer','2022-11-18')	1 row(s) affected	0.031 sec
168	21:41:32	select * from transaction LIMIT 0, 1000	15 row(s) returned	0.000 sec / 0.000 sec

PAY_OR_RECEIVE

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from pay_or_receive

Result Grid:

Transaction_id	Pay_or_receive	Receiver_account_num	Amount	Account_num
1	pay	23346	2000	12341
2	pay	23346	2000	12341
3	pay	23312	2000	12345
4	receive	23311	73.31	12342
5	receive	23311	200.23	12342

Action Output:

#	Time	Action	Message	Duration / Fetch
152	21:34:36	select * from pay_or_receive LIMIT 0, 1000	Error Code: 1146. Table 'bank.pay_or_receive' doesn't exist	0.000 sec
153	21:34:40	select * from pay_or_receive LIMIT 0, 1000	3 row(s) returned	0.016 sec / 0.000 sec
154	21:35:41	INSERT INTO pay_or_receive (Pay_or_receive, Receiver_account_num, Amount, Transaction_id, Account_num)	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.031 sec
155	21:36:00	INSERT INTO pay_or_receive (Pay_or_receive, Receiver_account_num, Amount, Transaction_id, Account_num)	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.000 sec
156	21:36:11	select * from pay_or_receive LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

DEPOSIT_OR_WITHDRAW

MySQL Workbench

File Edit View Query Database Server Tools Scripting Help

Navigator: Schemas

Query 1: select * from deposit_or_withdraw

Result Grid:

Transaction_id	Deposit_or_withdraw	Savings_withdraw_left	Amount	Account_num
6	deposit	5	789.32	12342
7	deposit	5	789.32	12342
8	deposit	5	789.32	12342
9	deposit	5	999.99	12342
10	withdraw	4	2000	999.99

Action Output:

#	Time	Action	Message	Duration / Fetch
177	21:48:16	SELECT first_name From customer Where SSN = ALL (SELECT SSN FROM Account Where balance >1000)	0 row(s) returned	0.000 sec / 0.000 sec
178	21:48:41	SELECT first_name From customer Where SSN = ALL (SELECT SSN FROM Account Where Balance >1000)	0 row(s) returned	0.016 sec / 0.000 sec
179	21:49:16	SELECT first_name From customer Where SSN = ALL (SELECT SSN FROM account Where Balance >1000)	0 row(s) returned	0.016 sec / 0.000 sec
180	21:49:40	SELECT first_name From customer Where SSN = ALL (SELECT SSN FROM account Where Balance >2387)	1 row(s) returned	0.015 sec / 0.000 sec
181	21:50:24	select * from deposit_or_withdraw LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

TRANSFER

The screenshot shows the MySQL Workbench interface. In the top navigation bar, there are three tabs: "Local instance MySQL80 (bank)" (selected), "Local instance MySQL80 (bank)", and "Local instance MySQL80 (ban...". The menu bar includes File, Edit, View, Query, Database, Server, Tools, Scripting, Help.

The Navigator pane on the left shows the schema "bank" with tables: account, banker, branch, customer, deposit_or_withdraw, loans, pay_or_receive, transaction, and transfer. It also lists Views, Stored Procedures, and Functions under the bank schema, and sys.

The main area contains a "Query 1" tab with the SQL query: "select * from transfer". Below the query is a "Result Grid" showing the following data:

Transaction_id	To_checking	To_savings	Amount	Account_num
11	y	n	6529.12	12343
12	y	n	6529.12	12343
13	y	n	6529.12	12343
14	n	y	4231.88	12344
15	n	y	492.73	12344

The bottom section shows the "transfer 45" session history with the following log entries:

#	Time	Action	Message	Duration / Fetch
183	21:53:19	INSERT INTO transfer (To_checking, To_savings, Amount, Transaction_id, Account_num) SELECT 'y', 'n', 6529.12, 12343, 12343	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.000 sec
184	21:53:21	INSERT INTO transfer (To_checking, To_savings, Amount, Transaction_id, Account_num) SELECT 'y', 'n', 6529.12, 12343, 12343	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.000 sec
185	21:53:47	INSERT INTO transfer (To_checking, To_savings, Amount, Transaction_id, Account_num) SELECT 'y', 'n', 6529.12, 12343, 12343	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
186	21:54:02	INSERT INTO transfer (To_checking, To_savings, Amount, Transaction_id, Account_num) SELECT 'y', 'n', 4231.88, 12344, 12344	1 row(s) affected Records: 1 Duplicates: 0 Warnings: 0	0.016 sec
187	21:54:12	select * from transfer LIMIT 0, 1000	5 row(s) returned	0.000 sec / 0.000 sec

Keys for the relations and functional dependencies

FD set for:

BRANCH

{Branch_id->Name, Branch_id->Address, Address->Name, Address->Branch_id}

Keys - Branch_id, Address

CUSTOMER

{SSN->First_name, SSN->Last_name, SSN->Address, SSN->Email, SSN->Phone_num, SSN->Branch_id, SSN->Date_of_birth, Email->SSN, Email->First_name, Email->Last_name, Email->Address, Email->Phone_num, Email->Branch_id, Email->Date_of_birth, Phone_num->SSN, Phone_num->First_name, Phone_num->Last_name, Phone_num->Address, Phone_num->Email, Phone_num->Branch_id, Phone_num->Date_of_birth}

Keys - SSN, Email, Phone_num

BANKER

{Banker_id->Branch_id, Banker_id->First_name, Banker_id->Last_name, Banker_id->Address,
Banker_id->Email, Banker_id->Phone_num, Banker_id->Date_of_birth, Banker_id->SSN,
Email->Branch_id, Email->Banker_id, Email->First_name, Email->Last_name,
Email->Address, Email->Phone_num, Email->Date_of_birth, Email->SSN,
Phone_num->Branch_id, Phone_num->Banker_id, Phone_num->First_name,
Phone_num->Last_name, Phone_num->Address, Phone_num->Email,
Phone_num->Date_of_birth, Phone_num->SSN, SSN->Branch_id, SSN->Banker_id,
SSN->First_name, SSN->Last_name, SSN->Address, SSN->Email, SSN->Phone_num,
SSN->Date_of_birth}

Keys - Banker_id, Email, Phone_num, SSN

LOANS

{Loan_id->Loan_amount, Loan_id->Banker_id, Loan_id->SSN, SSN->Loan_id,
SSN->Loan_amount, SSN->Banker_id}

Keys - Loan_id, SSN

ACCOUNT

{Account_num->Routing_num, Account_num->Balance, Account_num->Account_type,
Account_num->SSN, Routing_num->Account_num, Routing_num->Balance,
Routing_num->Account_type, Routing_num->SSN}

Keys - Account_num, Routing_num

TRANSACTION

{Transaction_id->Transaction_type, Transaction_id->Date}

Keys - Transaction_id

PAY_OR_RECEIVE

{Transaction_id->Pay_or_receive, Transaction_id->Receive_account_num,
Transaction_id->Amount, Transaction_id->Account_num}

Keys - Transaction_id

DEPOSIT_OR_WITHDRAW

{Transaction_id->Deposit_or_withdraw, Transaction_id->Savings_withdraw_left,
Transaction_id->Amount, Transaction_id->Account_num}

Keys - Transaction_id

TRANSFER

{Transaction_id->To_checking, Transaction_id->To_savings, Transaction_id->Amount,
Transaction_id->Account_num}

Keys - Transaction_id

State if this relation is 3NF

For a relation to be 3NF, there are a few characteristics that need to be followed and that it has to be in 2NF and there has to be no transitive dependencies for non-prime. It also has to meet the requirements of both 1NF and 2NF. Also, to make sure there are no transitive dependencies this would mean that there should be no non-prime attributes that determine another non-prime attribute. Overall, after understanding the rules for 3NF is it clear that there are no non-prime attributes that determine another non-prime attribute for any of the data. There are no attributes that depend on a non prime attribute.

SQL Queries

GROUP BY

```
SELECT COUNT(loan_id), Banker_id  
FROM Loans
```

```
GROUP BY Banker_id
```

The screenshot shows the MySQL Workbench interface. In the top query editor, the following SQL code is entered:

```
1 • SELECT COUNT(loan_id), Banker_id  
2   FROM Loans  
3   GROUP BY Banker_id  
4
```

The results are displayed in the 'Result Grid' tab:

COUNT(banker_id)	Banker_id
4	11111
1	11115

Below the result grid, the 'Result 62' tab shows the execution log:

Action	Time	Message
236 22:21:37	SELECT COUNT(loan_id), Banker_id	FROM Loans GROUP BY Banker_id LIMIT 0, 1000
237 22:22:09	SELECT AVG(Balance), Checking_or_savings	FROM Account GROUP BY Checking_or_savings HAVING AVG(Balance) > 2000;
238 22:22:09	INSERT INTO customer(SSN,First_name,Last_name,Address,Email,Phone_num,Date_of_birth,Branch_id)	SELECT * FROM account LIMIT 0, 1000
239 22:23:06	select * from account	LIMIT 0, 1000
240 22:24:19	SELECT COUNT(banker_id)	FROM Loans GROUP BY Banker_id LIMIT 0, 1000

GROUP BY and HAVING

```
SELECT AVG(Balance), Checking_or_savings
```

```
FROM Account
```

```
GROUP BY Checking_or_savings
```

```
HAVING AVG(Balance) > 2000;
```

```

MySQL Workbench
File Edit View Query Database Server Tools Scripting Help
Navigator: Schemas Administration Information Object Info Session
Query 1 x
SELECT AVG(Balance), Checking_or_savings
FROM Account
GROUP BY Checking_or_savings
HAVING AVG(Balance) > 2000;

```

Result Grid:

Avg(Balance)	Checking_or_savings
10000	Checking

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Nested Query with ALL

SELECT Account_num

From Pay_or_receive

Where Amount > 1999

AND Pay_or_receive = ALL

(SELECT Pay_or_receive

FROM Pay_or_receive

Where Receiver_account_num > 23312);

```

MySQL Workbench
File Edit View Query Database Server Tools Scripting Help
Navigator: Schemas Administration Information Object Info Session
Query 1 x
SELECT Account_num
FROM Pay_or_receive
Where Amount > 1999
AND Pay_or_receive = ALL
(SELECT Pay_or_receive
FROM Pay_or_receive
Where Receiver_account_num > 23312);

```

Result Grid:

Account_num
12345
12345

SQLAdditions: Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

Nested Query with IN:

```
SELECT count(Last_Name)
```

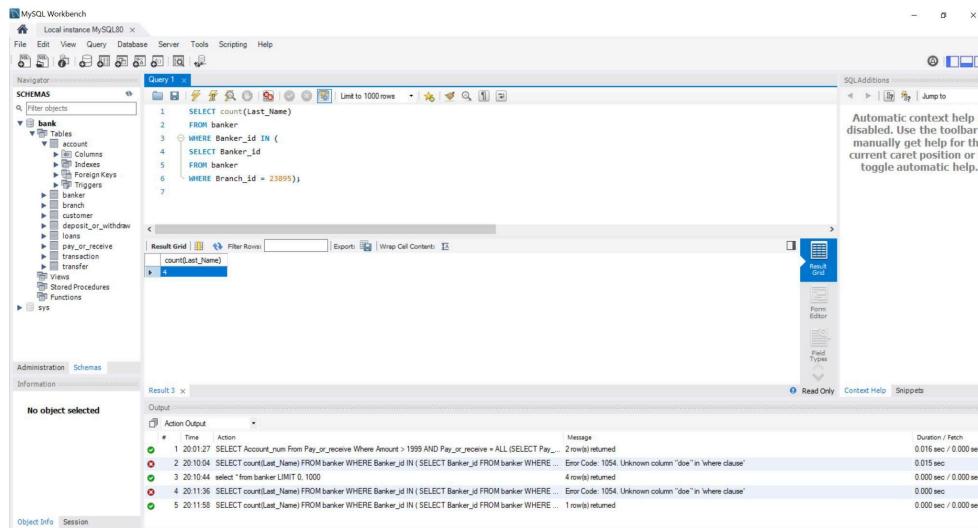
```
FROM banker
```

```
WHERE Banker_id IN (
```

```
SELECT Banker_id
```

```
FROM banker
```

```
WHERE Branch_id = 23895);
```



```
MySQL Workbench - Local instance MySQL80
```

```
File Edit View Query Database Server Tools Scripting Help
```

```
Navigator
```

```
SCHEMAS
```

```
bank
```

```
Tables
```

```
account
```

```
columns
```

```
indexes
```

```
foreign keys
```

```
triggers
```

```
branch
```

```
customer
```

```
deposit_or_withdraw
```

```
loans
```

```
pay_or_receive
```

```
transaction
```

```
transfer
```

```
View
```

```
Stored Procedures
```

```
Functions
```

```
sys
```

```
Query 1
```

```
1 SELECT count(Last_Name)
2 FROM banker
3 WHERE Banker_id IN (
4   SELECT Banker_id
5   FROM banker
6   WHERE Branch_id = 23895);
7
```

```
Result Grid | Filter Rows: [ ] | Export: [ ] | Wrap Cell Content: [ ]
```

```
count(Last_Name)
```

```
1
```

```
SQLAdditions
```

```
Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.
```

```
Result 3
```

```
Action Order
```

Time	Action	Message	Duration / Fetch
1 20:01:27	SELECT `Account_num` FROM `Pay_or_receive` WHERE `Amount` > 1999 AND `Pay_or_receive` = ALL (SELECT `Pay_...	2 rows returned	0.016 sec / 0.000 sec
2 20:10:46	SELECT `count(Last_Name)` FROM `banker` WHERE `Banker_id` IN (SELECT `Banker_id` FROM `banker` WHERE ...	Error Code: 1054. Unknown column "doe" in 'where clause'	0.015 sec
3 20:10:47	select * from `banker` LIMIT 0, 1000	4 rows returned	0.000 sec / 0.000 sec
4 20:11:36	SELECT `count(Last_Name)` FROM `banker` WHERE `Banker_id` IN (SELECT `Banker_id` FROM `banker` WHERE ...	Error Code: 1054. Unknown column "doe" in 'where clause'	0.000 sec
5 20:11:58	SELECT `count(Last_Name)` FROM `banker` WHERE `Banker_id` IN (SELECT `Banker_id` FROM `banker` WHERE ...	1 rows returned	0.000 sec / 0.000 sec

```
Object Info Session
```

Conclusion:

Our group's experience with the project was overall good and informative as we were able to put everything we had learned from the class into this project. The group members were able to get to know each other as well. The steps that were the hardest would have to be with the SQL statements in Phase II, as most of our group members had trouble with this. The steps that were the easiest for this project was the collaboration. Our group was able to communicate with one another effectively and communicate on how to distribute the workload based on the group members strengths.

If we had to do this project again, something that we would do differently would be asking for additional help when needed. We could have benefited from working closer with the professor and TA on some steps we are confused with before submitting our projects.