Banko

Team 6

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Project Requirements Section:

Functional Requirements

- People need to create accounts - need to have sign up feature
    - Registration functionality for users to be able to create an account
    - Takes in a user's first name, last name, email, phone number, street name, zip code, city, country, username, password, and birthdate.
- Log in feature / log in page
    - Authenticates user with registration details; if correct details, redirects user to the product
    - Takes in a username and a password
- Generates visuals to show your spending patterns such as pie charts, trending graphs, etc.
    - Utilizes your transaction history to produce analysis of how you spend your money; allows users to learn from their spending
    - Utilizes your stored transaction history
- Different ways to split bills (flat amounts, percentages, different groups of roommates)
    - Allows flexibility in how you manage your transactions
    - Takes an input of how you'd like to split a transaction, whether it is per flat amount, or per percentage
- Database stores transactions, user data, banking data, permissions
    - This data is stored in MySQL to authenticate users, produce transaction data, check groups, etc,.
- Store receipts as proof of payment (png, jpeg, pdf)
    - Stores a link to a photo of a receipt, which allows users to store their receipts of the group transactions in a specific place, allowing them convenience and record keeping.
    - Takes in a URL for the photo
- Store bills for record keeping (png, jpeg, pdf)
    - Stores a link to a photo of the bill, allowing more intricate record keeping per transaction
    - Takes in a URL for the photo
- Tag bills with title, keywords, and date to be able to search them
    - Gives users flexibility and increases user experience
    - Search bar with options to choose from for certain keywords in the messages, or for a title that you can search, or by date
- Users can ask for payment from other users in their group
    - This allows users to tell groupmates that there is a new transaction that they must tend to
- Approval system for payments

    - Allows the person who posted the transaction to confirm that people have made their payments
- Add a bill, remove a bill, update a bill
    - Flexibility and user experience when it comes to bill record-keeping
    - Takes a transaction and a URL
- Have a group-management page (shows all groups you're in, members of each group, shows how much each users owes you in each group and how much you owe them)
    - Gives the user quick data on what they may need to tend to
- Create new group
    - Allows users to make as many new groups as they would like
    - Takes in a group name and if it is unique, returns you a success message
- Users can request to join group by utilizing the unique group-id
    - A simple search-based group joining system to allow people to join groups quickly and easily
    - Sends the unique group name into the Join Group functionality
- Users in a group can accept another user into the group if that user requested to join
    - Users can approve a user who would like to join
    - Simple button click
- Users in a group with the right permissions can remove other users in that group
    - Users can remove other users in a group if they have the permissions to do so
    - Simple button click
- Have a home page (small summary of spending, a small feed of recent transactions, side bar with more options) information about all the groups you are in
    - A homepage that shows you any information you need to know; whether you owe money or your spending patterns; a summary page
- Have a Bills page (shows information about all the bills with comment section ordered by date)
    - Shows all the bills with the message appended to them
- Search feature / categorization feature in Bills page based on tag, date, title, etc
    - Gives users a more flexible interface to manage their records and expenses
    - Search bar with options to search the message, the title, or the date
- Have a Transactions page (Shows all the posts people made, whether each person paid their share, and the dates of when people paid)
    - Transactions page shows all the transactions you are a part of, and the information associated with that
- Page that shows user-specific data on their spending patterns in all groups
    - A summary page that tries to analyze your spending information
- Pay button for each bill will be both on homepage transaction feed and in transaction page (only if you have not paid already)
    - Allows a user to show that they have paid a bill
    - Simple button click
- Group page - Information about only a specific group, including transactions, bills and chat box.
    - Gives you information about a specific group, along with a group chatbox!

- Maybe auto-generate venmo requests when asking for payment? ~optional
    - An optional feature that allows users to generate a venmo request that they must confirm on their phones
- Email confirmation ~optional
    - Optional feature to send a confirmation through email to the users when their transaction is accepted or is paid
- Upload profile picture ~optional
    - Optional feature to allow profile pictures for the users

User Interaction

Users would be able to interact with our application in multiple ways: they could make a personal group to manage their own expenses, and see trends in their transactions and use it for record keeping. Users can also utilize our application to upload shared bills with others and request and track payments. Users could also utilize our application to join a group that someone else had made, and access the bills and pay the transactions from there. All groups have a chat box, which allows easy communication between all the users of a group, and gives room for flexibility and clarity.

Project Design Section:

Graphical User Interface

The user interface will be minimalist, with rounded edges and easy to use features. This is an application that you should be able to open, track your finances, and leave. It should be as fast and easy to use as possible; while user retention is important, forcing users to spend extra time utilizing the application would only make it less likely for them to use it.

The home page, without being logged in, should have a graphic in the middle that states exactly what it is we are offering and examples of it. There should also be a ‘sign up now button’.

The sign up page and login page will look very similar, and should be extremely minimalist and plain.

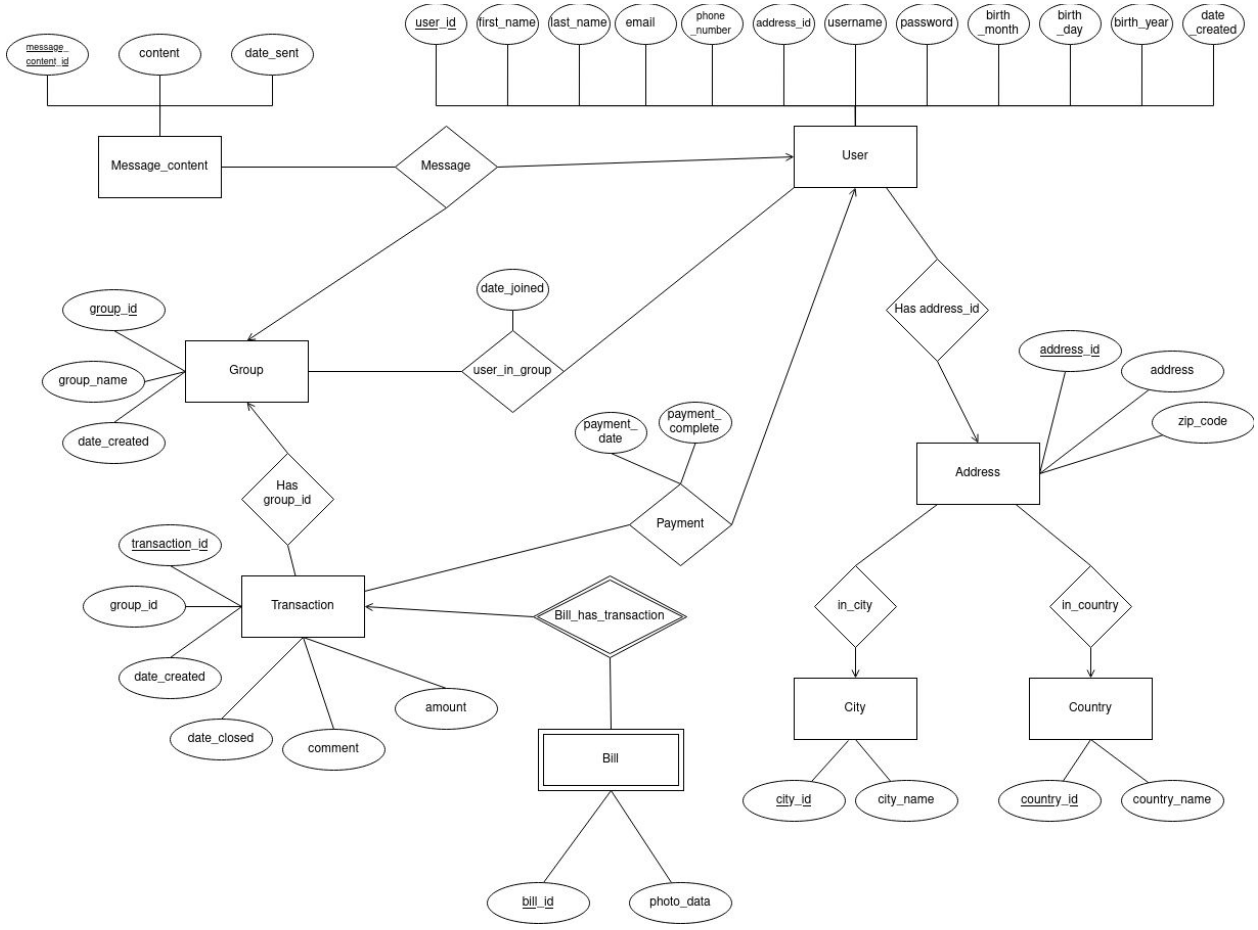
Once logged in, the home page will have a pi-chart showing your spending in the past month, with a list of pending-transactions, or if there are no pending-transactions, then there will be a ‘congratulations on paying everything!’ and then a list of your most recent paid off transactions with a green checkmark. There would be a sidebar with the options ‘bills’, ‘transactions’, ‘group mates’, and ‘switch groups’. This would have information about all the groups you are in

If you click on ‘bills’, then it would take you to a page that lists out each bill that was put into the system for that group, with an ability to expand the document (if there is a document that was submitted) alongside with the tag (bill, grocery, food,..) and the date uploaded and the date paid (if not paid yet, will say ‘unpaid’.

If you click on ‘transactions’, it would take you to a similar page as bills; same layout, same color scheme, but it is all the posts that people made about paying. Each of these posts will link to a bill, will have the tag, and the date made. It will also have who has paid and when. It will also link the actual post itself, which would have comments and whatnot.

If you click on ‘group-list’ it would show you each group you are in, with the name of the group and a tab that you can click to expand the information on that group. The information includes how much you owe/ are owed from each user in that group, and the members of that group.

Entity Relationship Diagram (ERD)



Relational Schema

user (user_id, first_name, last_name, email, phone_number, address_id (f.k), username, hashed_password, birth_month, birth_day, birth_year, date_created)
address (address_id, street_name, zip_code, city_id (f.k), country_id (f.k))
country (country_id, country_name)
city (city_id, city_name)
group_list (group_id, group_name, date_created)
user_in_group (user_id (f.k), group_id (f.k), date_joined)
transaction (transaction_id, group_id (f.k), date_created, date_closed, transaction_content, amount)
bill (bill_id , transaction_id, photo_url)
payment (user_id (f.k), transaction_id (f.k), payment_date, payment_complete)
message_content (message_content_id, content, date_sent)
message (message_content_id (f.k), group_id (f.k), user_id (f.k))

Relationships

Relationship between entities	Left to Right	
user to address	Many	Exactly one
address to city	Many	Exactly one
address to country	Many	Exactly one
group to user	Many	Many
transaction to user	Many	Exactly one
transaction to group	Many	Exactly one
bill to transaction (weak relationship)	Many	Exactly one
message_content to group to user (3-way relationship)	Many : Exactly one : Exactly one	

Entity and Relationship Explanation

User :

The user entity holds information about each individual user. This information includes names, email addresses, phone numbers, and account information such as username and password. Address_id is referenced in this table.

Address :

The address entity contains the address information of each user. This data includes address_id which is referenced to the user table, street_name, zip_code. The code_id and country_id is referenced in this table.

Country :

The country entity contains the country_id which is the primary key and auto increments. Each country_id is mapped to a specific country so it can be used by the address entity for reference.

City :

The city entity contains the city_id which is the primary key and auto increments. Each city_id is mapped to a specific city so it can be used by the address entity for reference.

Group_list :

The Group entity has the group_id as the primary key and auto increments. It also contains the group_name and date_created (date and time).

User_in_group :

The user_in_group relationship is a two way relationship between the user and group entities. The relationship is used to map each user to a group and the relationship is many to many meaning each user can be in multiple groups and two groups can contain the same user.

Transaction :

The transaction entity holds information about each individual transaction. This information includes which group is the transaction from, the amount, what the transaction is about, and the date when the transaction was made and closed.

Bill :

The bill is a weak entity where it relies on the entity transaction. The bill holds information about the photo of each transaction.

Payment :

The payment relationship is a two way relationship between user and transaction entities. The relationship also stores information such as when each payment towards the transaction is made. It also stores when the payment is complete.

Message_content :

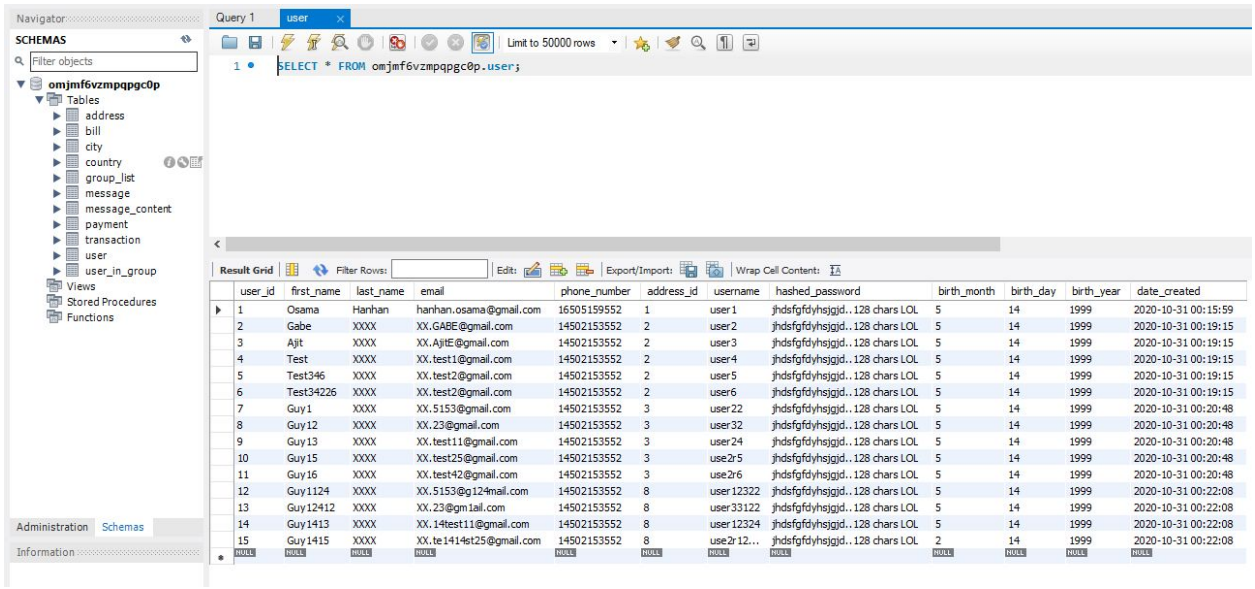
The message_content entity has information about each message. This information is stored individually and has a date specified when sent. This entity has a relationship with the group and user entities.

Message :

The message relationship is a three way relationship between the message_conent, group and user entities. This is a many to exactly one to exactly one relationship because each message_content is written exactly by one user to exactly one group. This means that one user can write many messages, but to only one group. A single group can contain many messages written by one user.

MySQL Table Screenshots

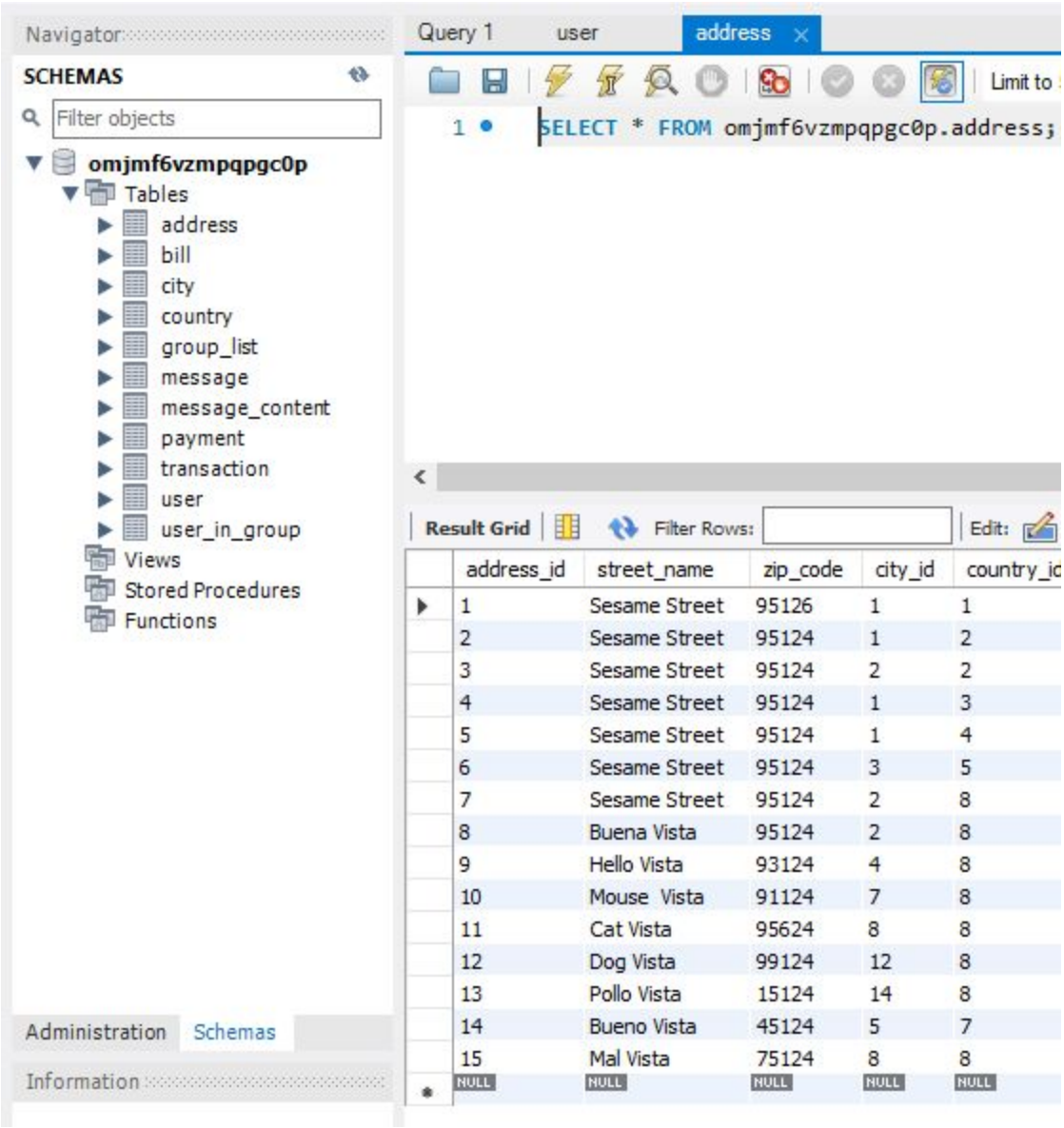
User:



user_id	first_name	last_name	email	phone_number	address_id	username	hashed_password	birth_month	birth_day	birth_year	date_created
1	Osama	Hanhan	hanhan.osama@gmail.com	16505159552	1	user1	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:15:59
2	Gabe	XXXX	XX.GABE@gmail.com	14502153552	2	user2	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:19:15
3	Ajit	XXXX	XX.AjitE@gmail.com	14502153552	2	user3	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:19:15
4	Test	XXXX	XX.test1@gmail.com	14502153552	2	user4	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:19:15
5	Test346	XXXX	XX.test2@gmail.com	14502153552	2	user5	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:19:15
6	Test34226	XXXX	XX.test2@gmail.com	14502153552	2	user6	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:19:15
7	Guy1	XXXX	XX.5153@gmail.com	14502153552	3	user22	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:20:48
8	Guy12	XXXX	XX.23@gmail.com	14502153552	3	user32	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:20:48
9	Guy13	XXXX	XX.test11@gmail.com	14502153552	3	user24	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:20:48
10	Guy15	XXXX	XX.test25@gmail.com	14502153552	3	use2r5	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:20:48
11	Guy16	XXXX	XX.test42@gmail.com	14502153552	3	use2r6	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:20:48
12	Guy1124	XXXX	XX.5153@g124mail.com	14502153552	8	user12322	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:22:08
13	Guy12412	XXXX	XX.23@gm1ail.com	14502153552	8	user33122	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:22:08
14	Guy1413	XXXX	XX.14test11@gmail.com	14502153552	8	user12324	jhdsfgfdyhsjgjd..128 chars LOL	5	14	1999	2020-10-31 00:22:08
15	Guy1415	XXXX	XX.te1414st25@gmail.com	14502153552	8	use2r12...	jhdsfgfdyhsjgjd..128 chars LOL	2	14	1999	2020-10-31 00:22:08

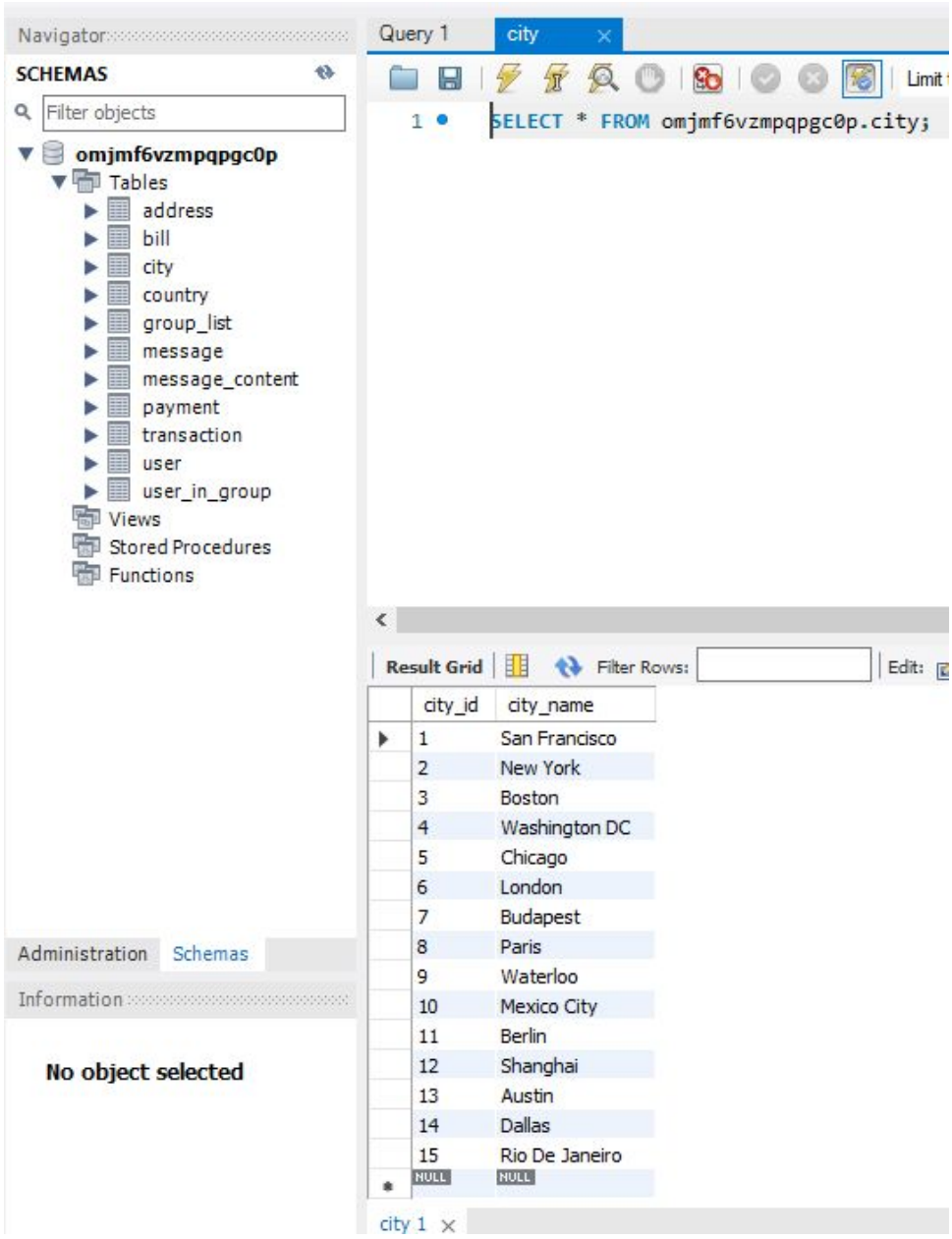
```
mysql> DESCRIBE user;
+-----------------+----------------------+------+-----+---------+----------------+
| Field           | Type                 | Null | Key | Default | Extra          |
+-----------------+----------------------+------+-----+---------+----------------+
| user_id         | int(10) unsigned     | NO   | PRI | NULL    | auto_increment |
| first_name      | varchar(32)          | NO   |     | NULL    |                |
| last_name       | varchar(32)          | NO   |     | NULL    |                |
| email           | varchar(64)          | NO   |     | NULL    |                |
| phone_number    | char(11)             | YES  |     | NULL    |                |
| address_id      | int(10) unsigned     | NO   | MUL | NULL    |                |
| username        | varchar(24)          | NO   |     | NULL    |                |
| hashed_password | char(128)            | NO   |     | NULL    |                |
| birth_month     | tinyint(3) unsigned  | NO   |     | NULL    |                |
| birth_day       | tinyint(3) unsigned  | NO   |     | NULL    |                |
| birth_year      | smallint(5) unsigned | NO   |     | NULL    |                |
| date_created    | datetime             | NO   |     | NULL    |                |
+-----------------+----------------------+------+-----+---------+----------------+
12 rows in set (0.09 sec)

mysql>
```

Address:



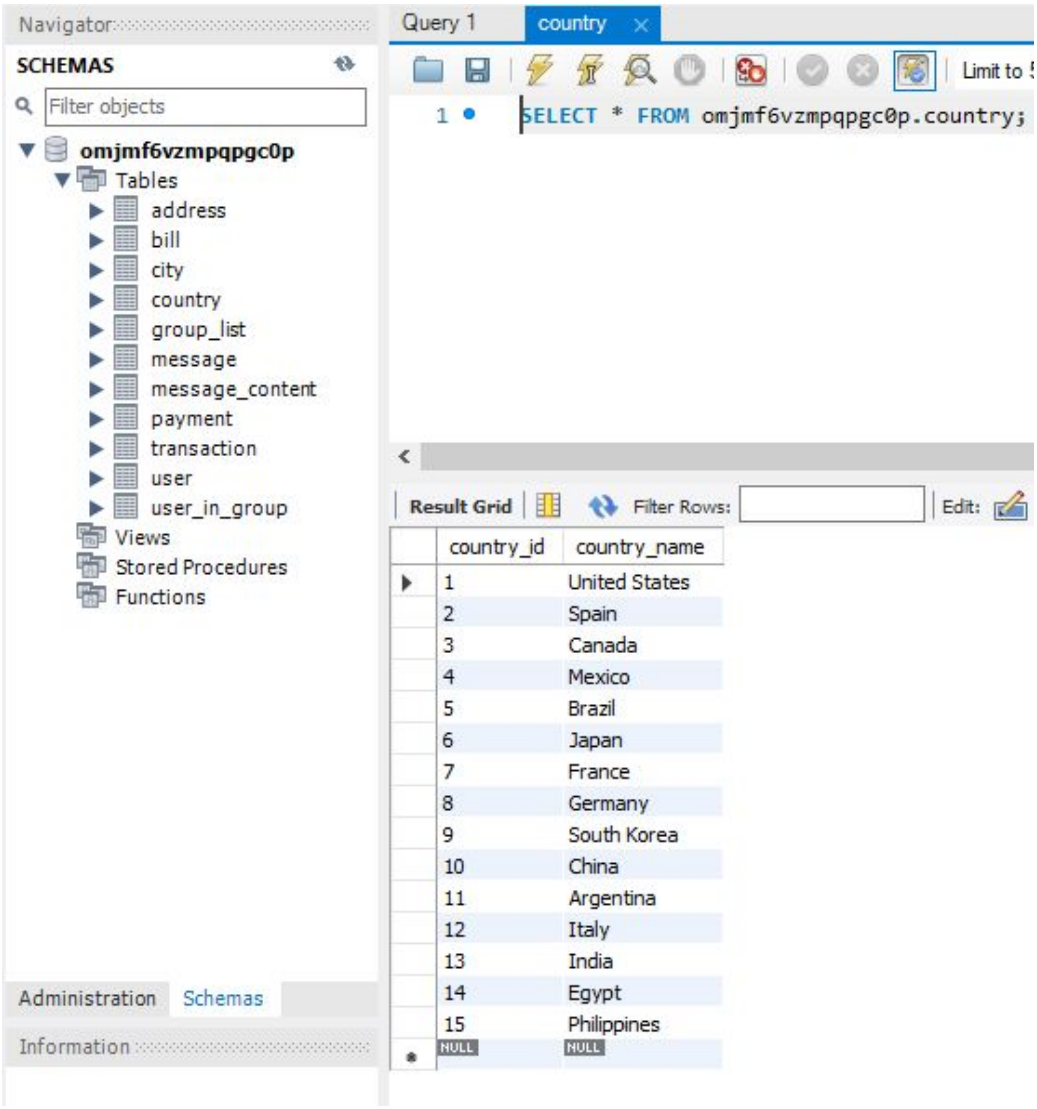

```
mysql> DESCRIBE address;
+------------+-----------------+------+-----+---------+----------------+
| Field      | Type            | Null | Key | Default | Extra          |
+------------+-----------------+------+-----+---------+----------------+
| address_id | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| street_name | varchar(32)     | NO   |     | NULL    |                |
| zip_code   | varchar(16)     | YES  |     | NULL    |                |
| city_id    | int(10) unsigned | NO   | MUL | NULL    |                |
| country_id | int(10) unsigned | NO   | MUL | NULL    |                |
+------------+-----------------+------+-----+---------+----------------+
5 rows in set (0.09 sec)

mysql>
```

City :



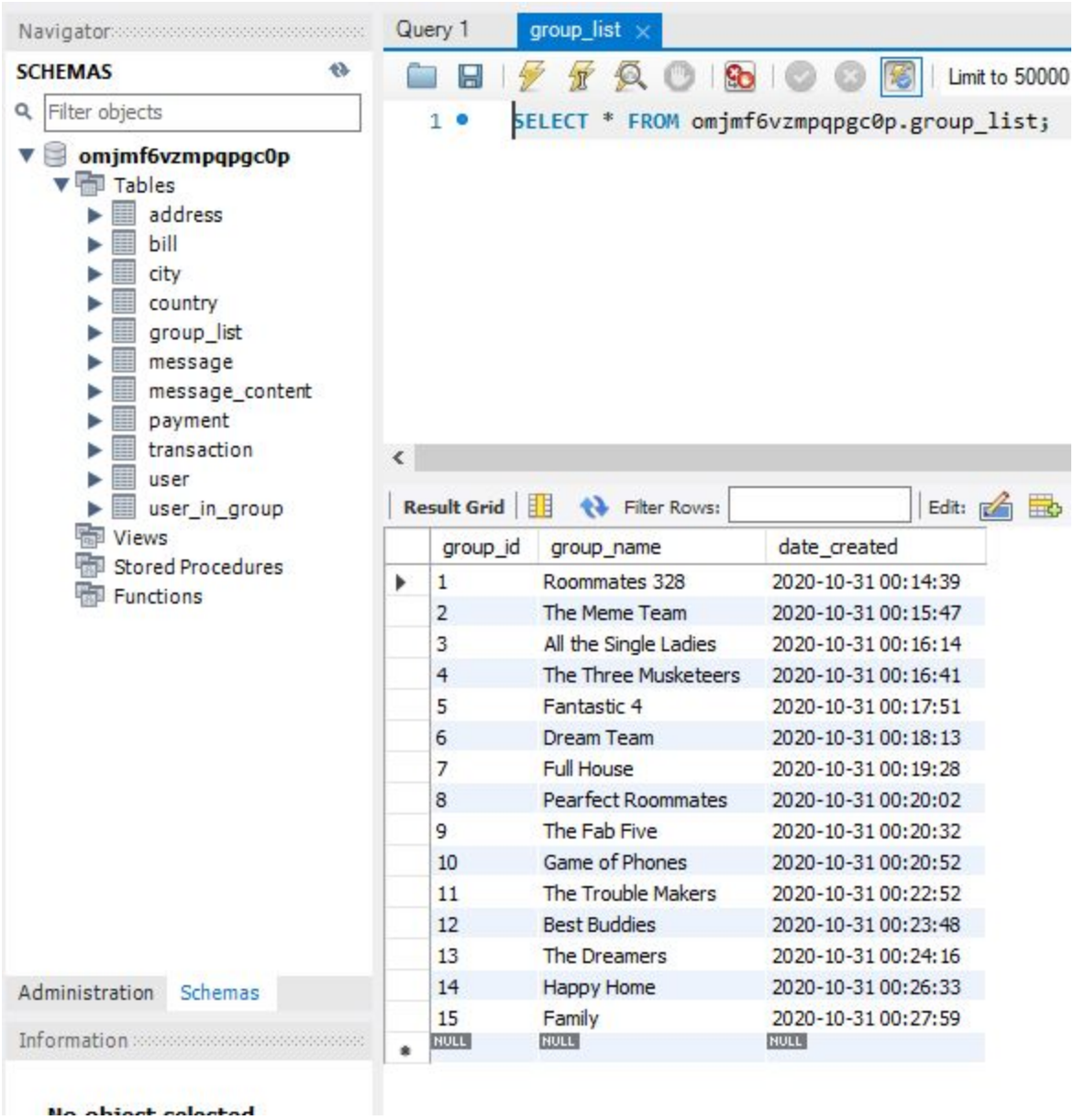

```
mysql> DESCRIBE city;
+-----------+------------------+------+-----+---------+----------------+
| Field     | Type             | Null | Key | Default | Extra          |
+-----------+------------------+------+-----+---------+----------------+
| city_id   | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| city_name | varchar(40)      | NO   |     | NULL    |                |
+-----------+------------------+------+-----+---------+----------------+
2 rows in set (0.10 sec)

mysql>
```

Country :



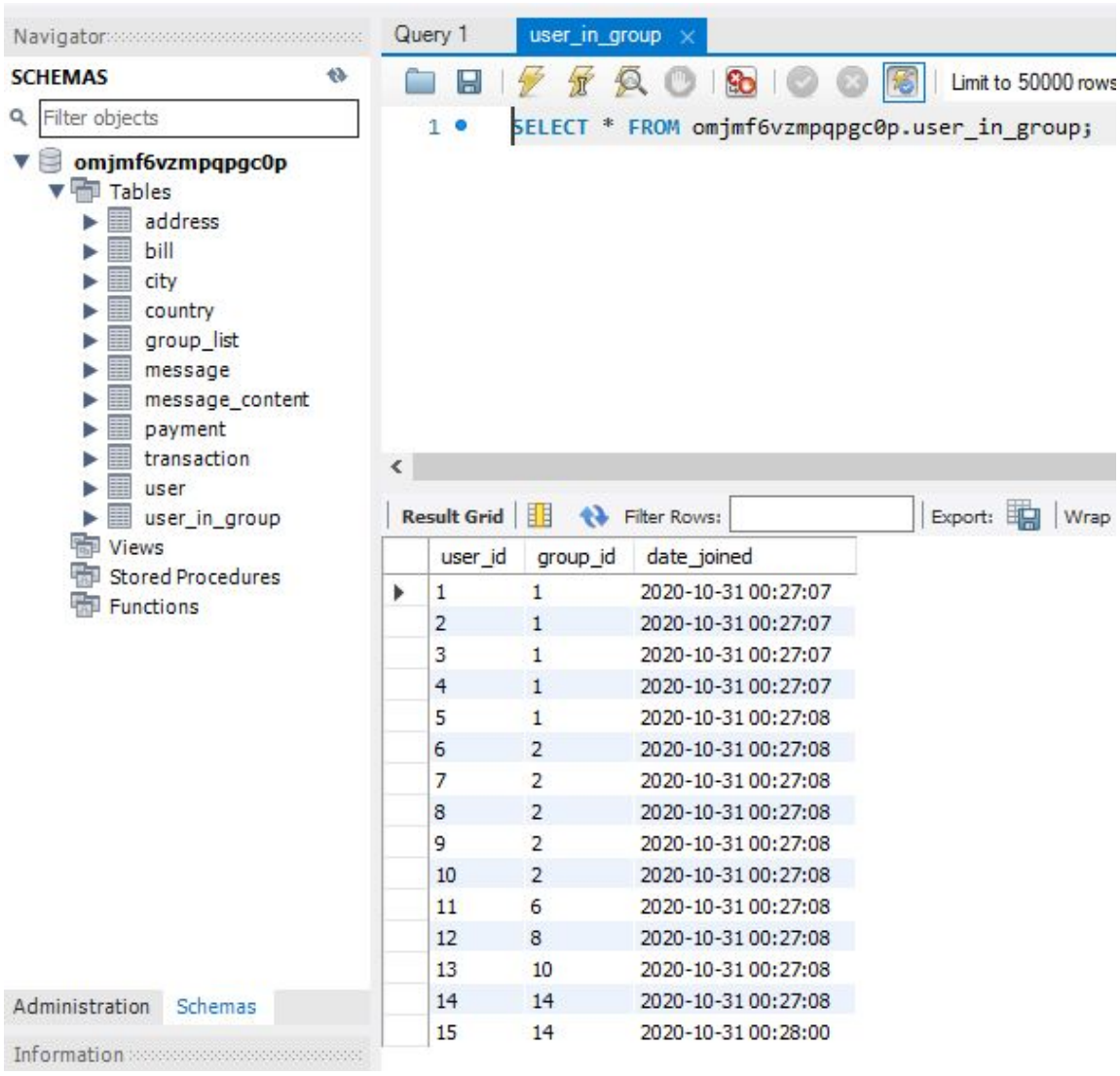

```
mysql> DESCRIBE country;
+--------------+------------------+------+-----+---------+----------------+
| Field        | Type             | Null | Key | Default | Extra          |
+--------------+------------------+------+-----+---------+----------------+
| country_id   | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| country_name | varchar(24)      | NO   |     | NULL    |                |
+--------------+------------------+------+-----+---------+----------------+
2 rows in set (0.09 sec)

mysql>
```

Group_list :



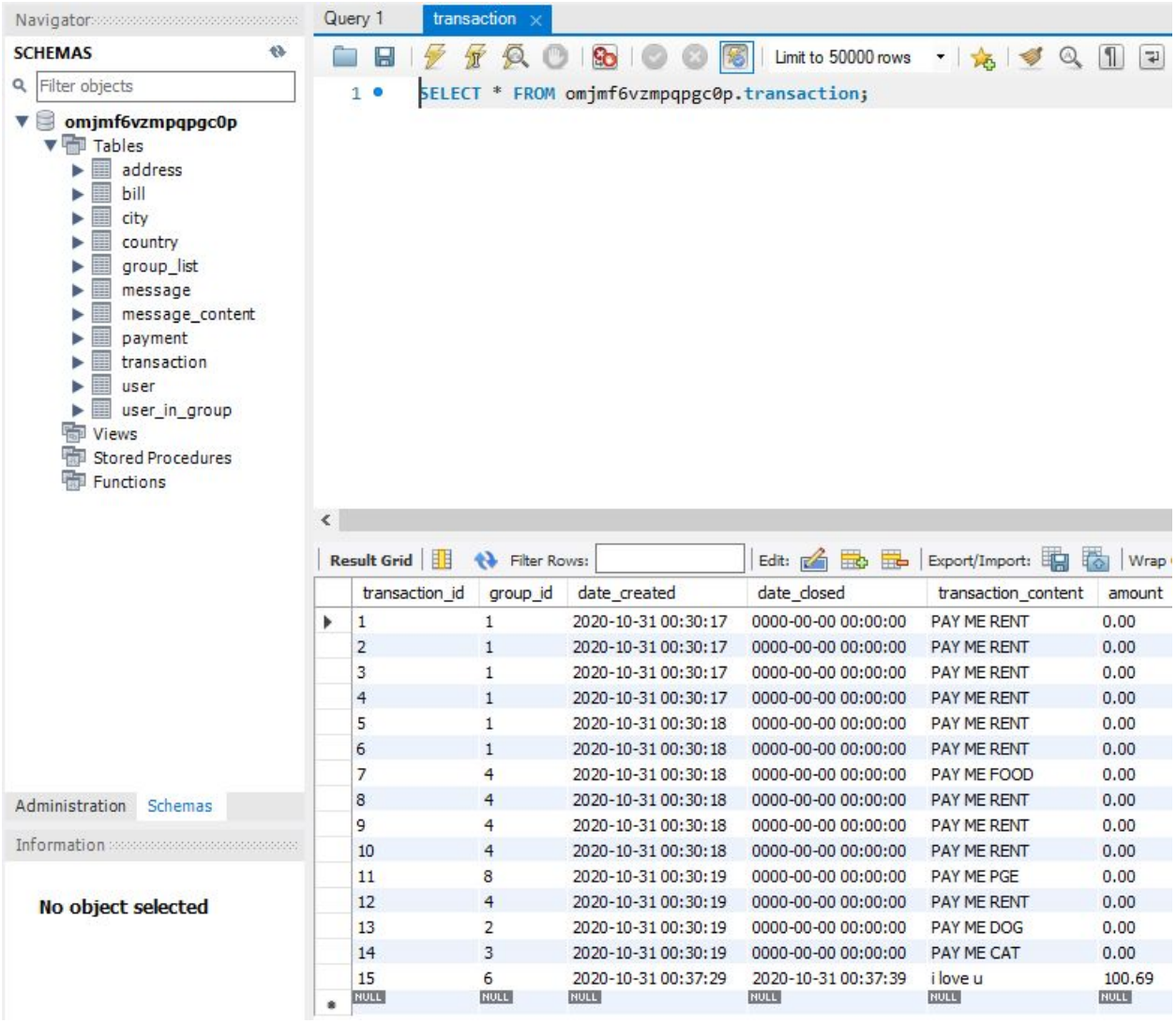

```
mysql> DESCRIBE group_list;
+--------------+------------------+------+-----+---------+----------------+
| Field        | Type             | Null | Key | Default | Extra          |
+--------------+------------------+------+-----+---------+----------------+
| group_id     | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| group_name   | varchar(32)      | NO   |     | NULL    |                |
| date_created | datetime         | NO   |     | NULL    |                |
+--------------+------------------+------+-----+---------+----------------+
3 rows in set (0.09 sec)

mysql>
```

User_in_group :




```
mysql> DESCRIBE user_in_group
    -> ;
+-------------+------------------+------+-----+---------+-------+
| Field       | Type             | Null | Key | Default | Extra |
+-------------+------------------+------+-----+---------+-------+
| user_id     | int(10) unsigned | NO   | MUL | NULL    |       |
| group_id    | int(10) unsigned | NO   | MUL | NULL    |       |
| date_joined | datetime         | NO   |     | NULL    |       |
+-------------+------------------+------+-----+---------+-------+
3 rows in set (0.08 sec)

mysql>
```

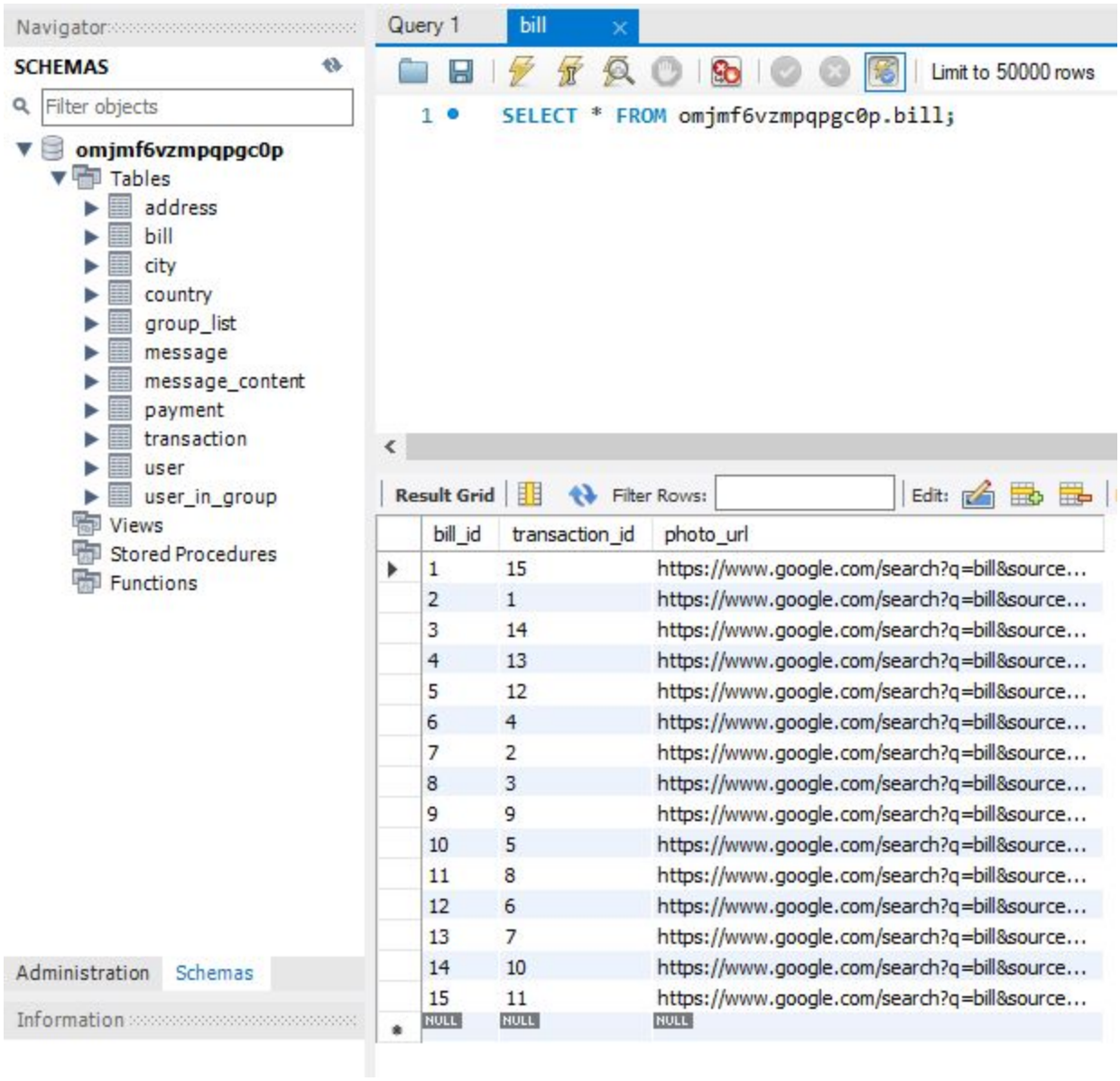
Transaction :



transaction_id	group_id	date_created	date_closed	transaction_content	amount
1	1	2020-10-31 00:30:17	0000-00-00 00:00:00	PAY ME RENT	0.00
2	1	2020-10-31 00:30:17	0000-00-00 00:00:00	PAY ME RENT	0.00
3	1	2020-10-31 00:30:17	0000-00-00 00:00:00	PAY ME RENT	0.00
4	1	2020-10-31 00:30:17	0000-00-00 00:00:00	PAY ME RENT	0.00
5	1	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME RENT	0.00
6	1	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME RENT	0.00
7	4	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME FOOD	0.00
8	4	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME RENT	0.00
9	4	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME RENT	0.00
10	4	2020-10-31 00:30:18	0000-00-00 00:00:00	PAY ME RENT	0.00
11	8	2020-10-31 00:30:19	0000-00-00 00:00:00	PAY ME PGE	0.00
12	4	2020-10-31 00:30:19	0000-00-00 00:00:00	PAY ME RENT	0.00
13	2	2020-10-31 00:30:19	0000-00-00 00:00:00	PAY ME DOG	0.00
14	3	2020-10-31 00:30:19	0000-00-00 00:00:00	PAY ME CAT	0.00
15	6	2020-10-31 00:37:29	2020-10-31 00:37:39	i love u	100.69
NULL	NULL	NULL	NULL	NULL	NULL

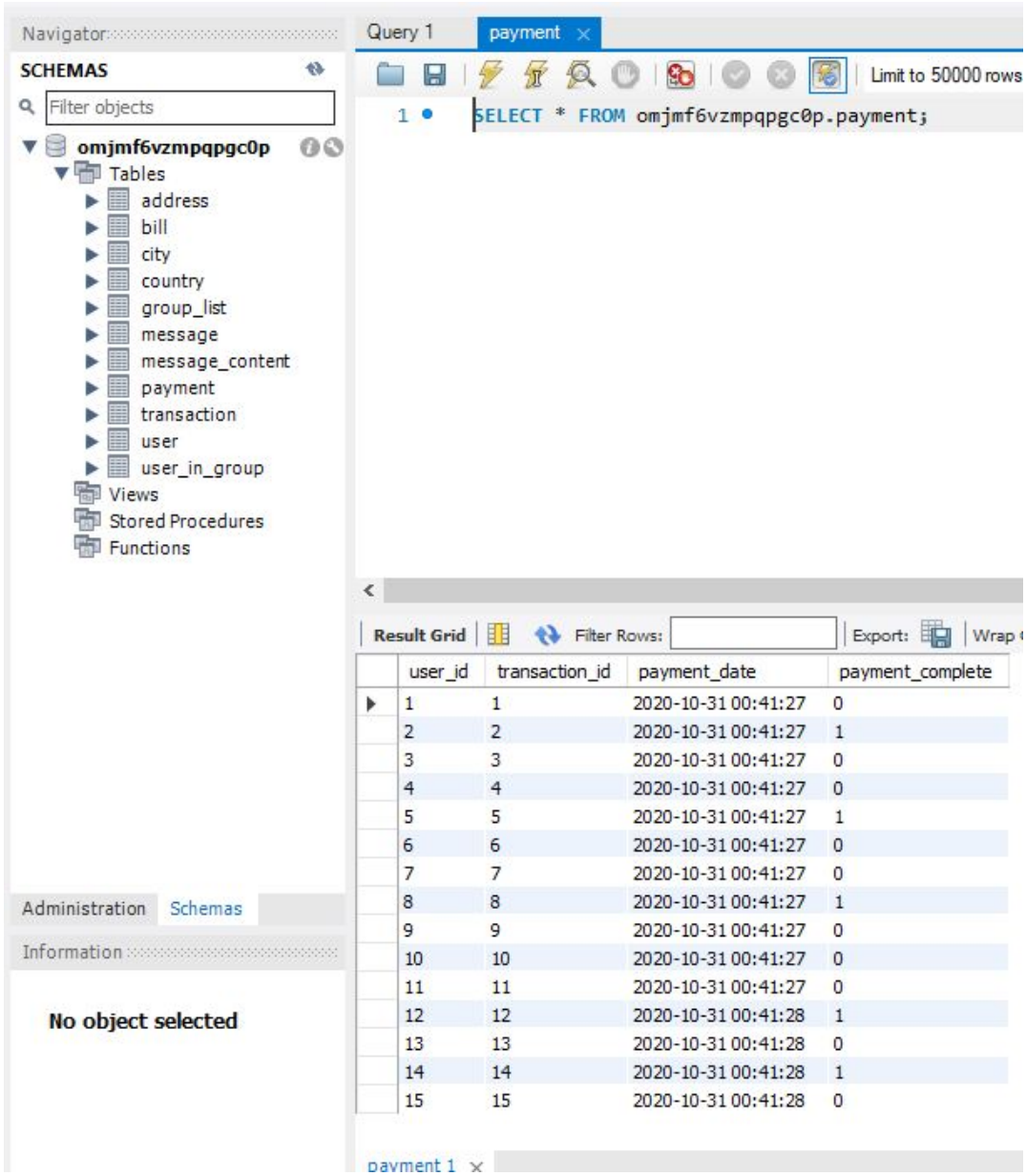
```
mysql> DESCRIBE transaction;
+---------------------+------------------+------+-----+---------+----------------+
| Field               | Type             | Null | Key | Default | Extra          |
+---------------------+------------------+------+-----+---------+----------------+
| transaction_id      | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| group_id            | int(10) unsigned | NO   | MUL | NULL    |                |
| date_created        | datetime         | NO   |     | NULL    |                |
| date_closed         | datetime         | NO   |     | NULL    |                |
| transaction_content | varchar(128)     | YES  |     | NULL    |                |
| amount              | double(8,2)      | NO   |     | NULL    |                |
+---------------------+------------------+------+-----+---------+----------------+
6 rows in set (0.09 sec)
```

Bill :




```
mysql> DESCRIBE bill;
+----------------+------------------+------+-----+---------+----------------+
| Field          | Type             | Null | Key | Default | Extra          |
+----------------+------------------+------+-----+---------+----------------+
| bill_id        | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| transaction_id | int(10) unsigned | NO   | MUL | NULL    |                |
| photo_url      | varchar(512)     | NO   |     | NULL    |                |
+----------------+------------------+------+-----+---------+----------------+
3 rows in set (0.09 sec)

mysql>
```

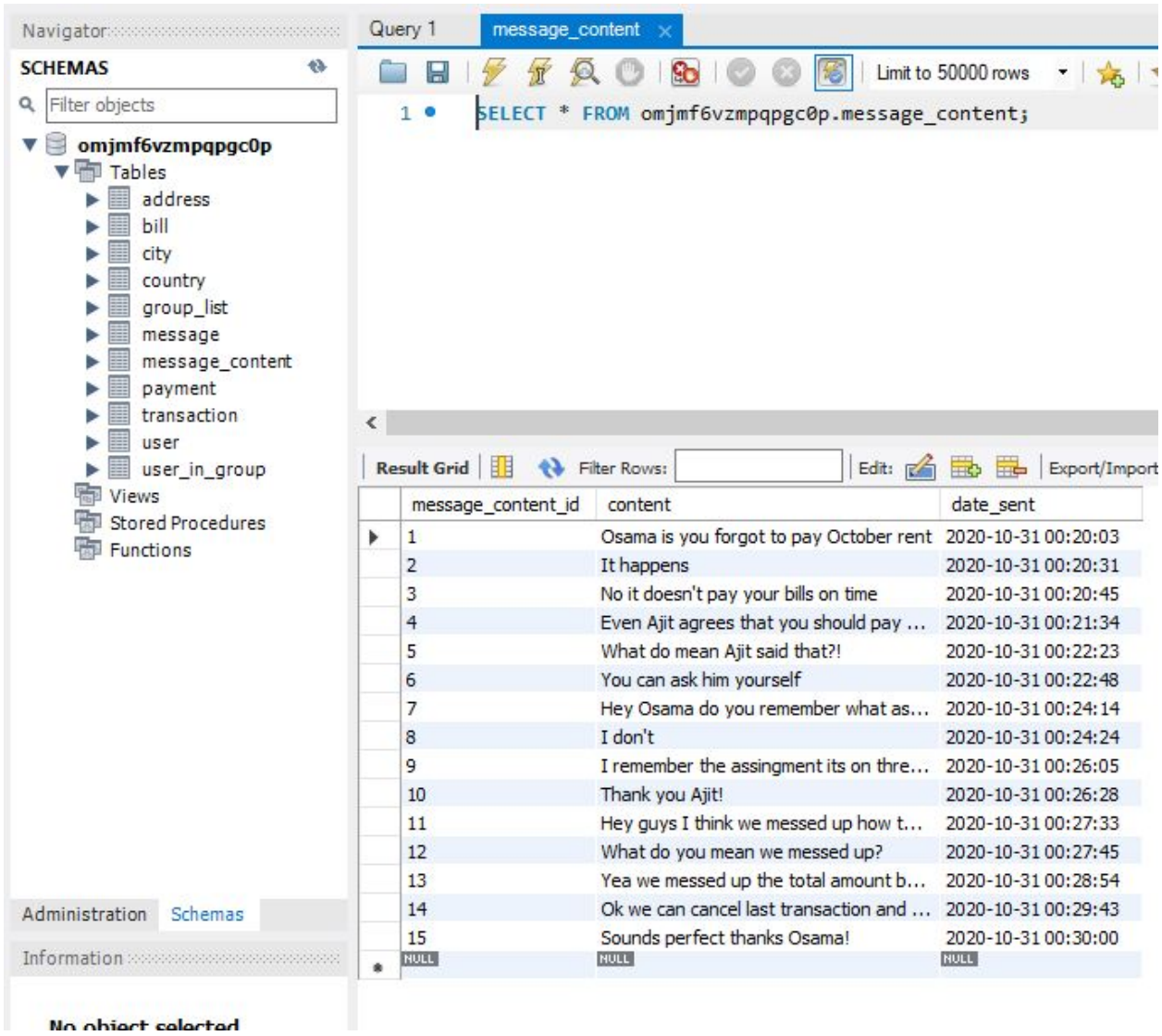
Payment :



user_id	transaction_id	payment_date	payment_complete
1	1	2020-10-31 00:41:27	0
2	2	2020-10-31 00:41:27	1
3	3	2020-10-31 00:41:27	0
4	4	2020-10-31 00:41:27	0
5	5	2020-10-31 00:41:27	1
6	6	2020-10-31 00:41:27	0
7	7	2020-10-31 00:41:27	0
8	8	2020-10-31 00:41:27	1
9	9	2020-10-31 00:41:27	0
10	10	2020-10-31 00:41:27	0
11	11	2020-10-31 00:41:27	0
12	12	2020-10-31 00:41:28	1
13	13	2020-10-31 00:41:28	0
14	14	2020-10-31 00:41:28	1
15	15	2020-10-31 00:41:28	0

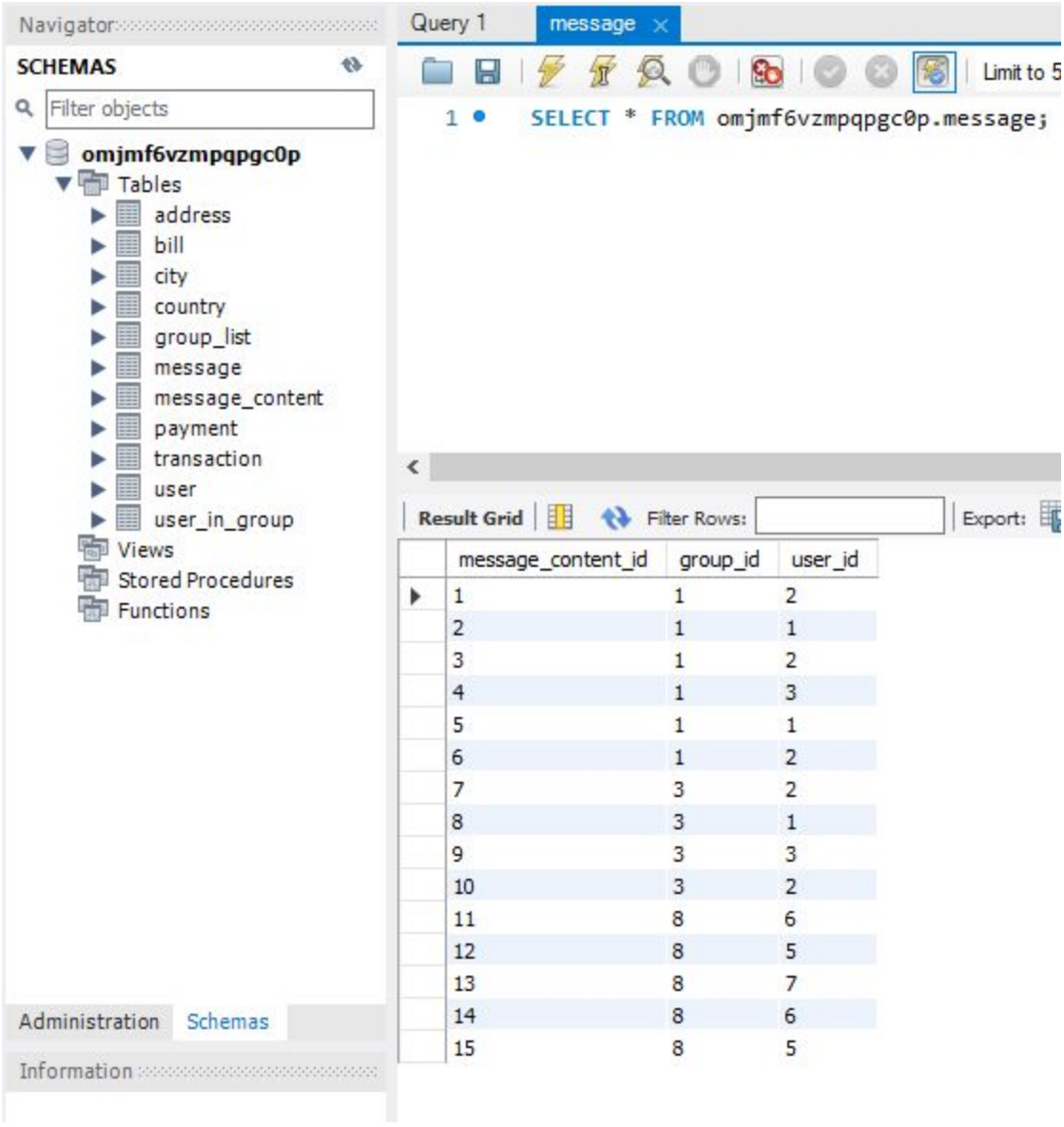
```
mysql> DESCRIBE payment;
+------------------+------------------+------+-----+---------+-------+
| Field            | Type             | Null | Key | Default | Extra |
+------------------+------------------+------+-----+---------+-------+
| user_id          | int(10) unsigned | NO   | MUL | NULL    |       |
| transaction_id   | int(10) unsigned | NO   | MUL | NULL    |       |
| payment_date     | datetime         | YES  |     | NULL    |       |
| payment_complete | tinyint(1)       | YES  |     | NULL    |       |
+------------------+------------------+------+-----+---------+-------+
4 rows in set (0.08 sec)

mysql>
```

Message_content :




```
mysql> DESCRIBE message_content;
+--------------------+------------------+------+-----+---------+----------------+
| Field              | Type             | Null | Key | Default | Extra          |
+--------------------+------------------+------+-----+---------+----------------+
| message_content_id | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| content            | varchar(512)     | NO   |     | NULL    |                |
| date_sent          | datetime         | NO   |     | NULL    |                |
+--------------------+------------------+------+-----+---------+----------------+
3 rows in set (0.09 sec)

mysql>
```

Message :

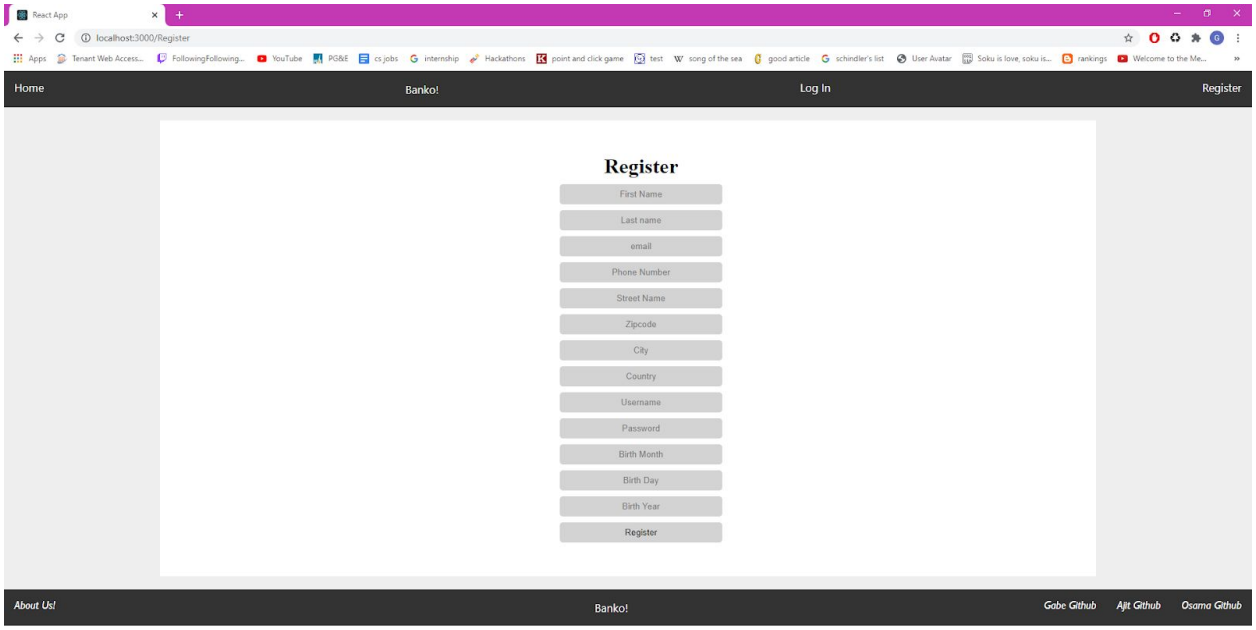



```
mysql> DESCRIBE message;
+--------------------+------------------+------+-----+---------+-------+
| Field              | Type             | Null | Key | Default | Extra |
+--------------------+------------------+------+-----+---------+-------+
| message_content_id | int(10) unsigned | NO   | MUL | NULL    |       |
| group_id           | int(10) unsigned | NO   | MUL | NULL    |       |
| user_id            | int(10) unsigned | NO   | MUL | NULL    |       |
+--------------------+------------------+------+-----+---------+-------+
3 rows in set (0.09 sec)

mysql>
```

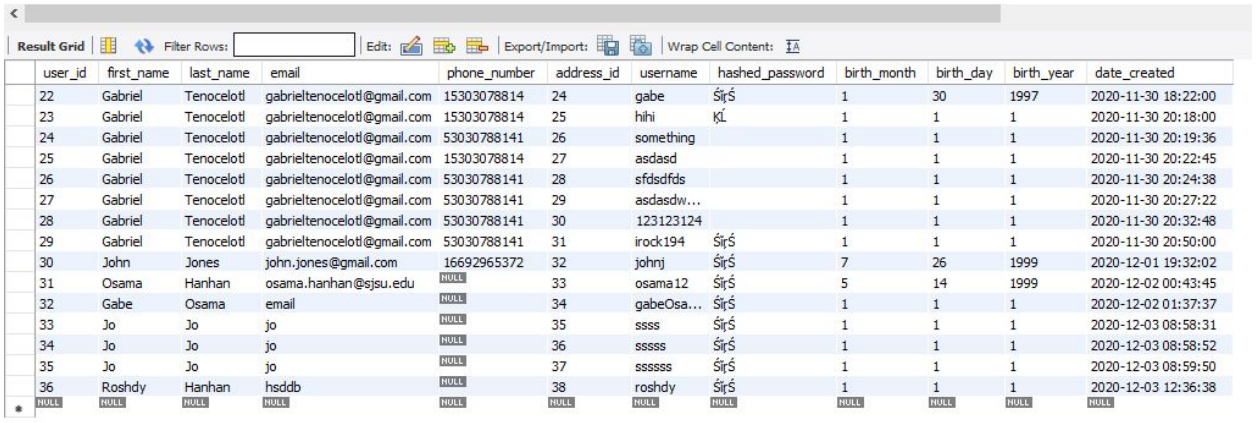
Project Implementation Section:

Register Functionality:

Here is our frontend for our register page.



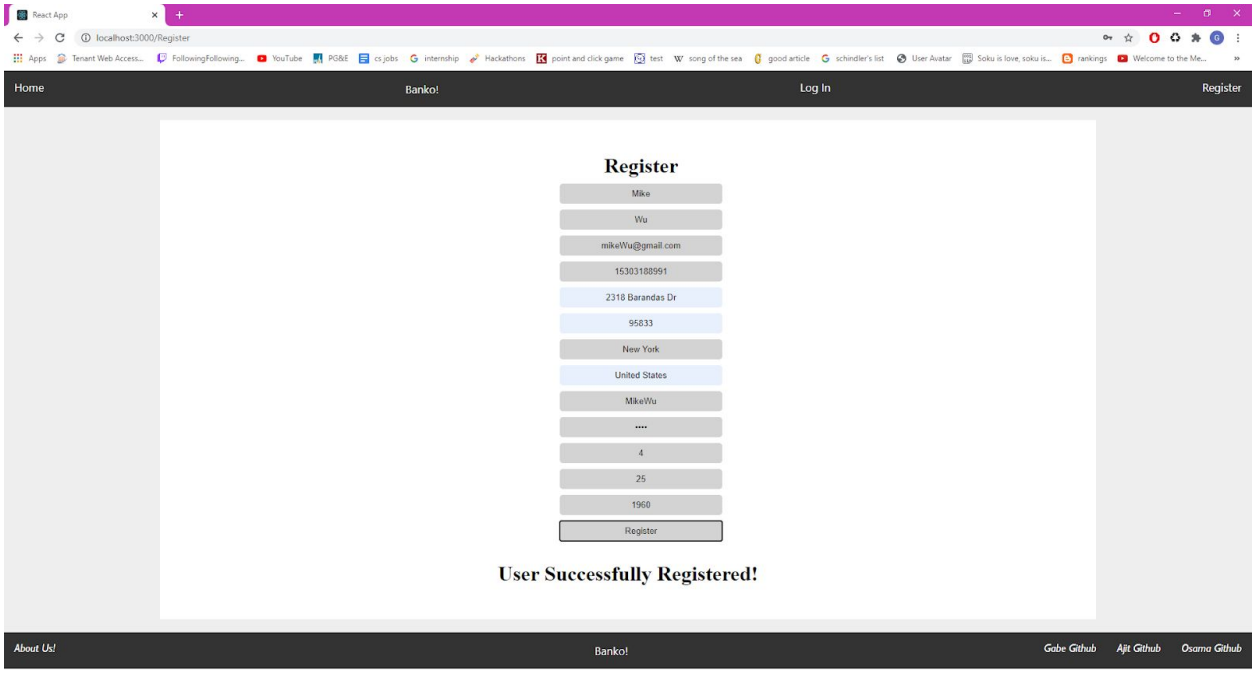
Here is the Users Table before we register a new user.



Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

user_id	first_name	last_name	email	phone_number	address_id	username	hashed_password	birth_month	birth_day	birth_year	date_created
22	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	24	gabe	ŚĭŗŚ	1	30	1997	2020-11-30 18:22:00
23	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	25	hihi	ĶĹ	1	1	1	2020-11-30 20:18:00
24	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	26	something		1	1	1	2020-11-30 20:19:36
25	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	27	asdasd		1	1	1	2020-11-30 20:22:45
26	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	28	sfdsdfds		1	1	1	2020-11-30 20:24:38
27	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	29	asdasdw...		1	1	1	2020-11-30 20:27:22
28	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	30	123123124		1	1	1	2020-11-30 20:32:48
29	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	31	irock194	ŚĭŗŚ	1	1	1	2020-11-30 20:50:00
30	John	Jones	john.jones@gmail.com	16692965372	32	johnj	ŚĭŗŚ	7	26	1999	2020-12-01 19:32:02
31	Osama	Hanhan	osama.hanhan@sjsu.edu	NULL	33	osama12	ŚĭŗŚ	5	14	1999	2020-12-02 00:43:45
32	Gabe	Osama	email	NULL	34	gabeOsa...	ŚĭŗŚ	1	1	1	2020-12-02 01:37:37
33	Jo	Jo	jo	NULL	35	ssss	ŚĭŗŚ	1	1	1	2020-12-03 08:58:31
34	Jo	Jo	jo	NULL	36	sssss	ŚĭŗŚ	1	1	1	2020-12-03 08:58:52
35	Jo	Jo	jo	NULL	37	ssssss	ŚĭŗŚ	1	1	1	2020-12-03 08:59:50
36	Roshdy	Hanhan	hsddb	NULL	38	roshdy	ŚĭŗŚ	1	1	1	2020-12-03 12:36:38
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Here is the information we are inserting from the frontend

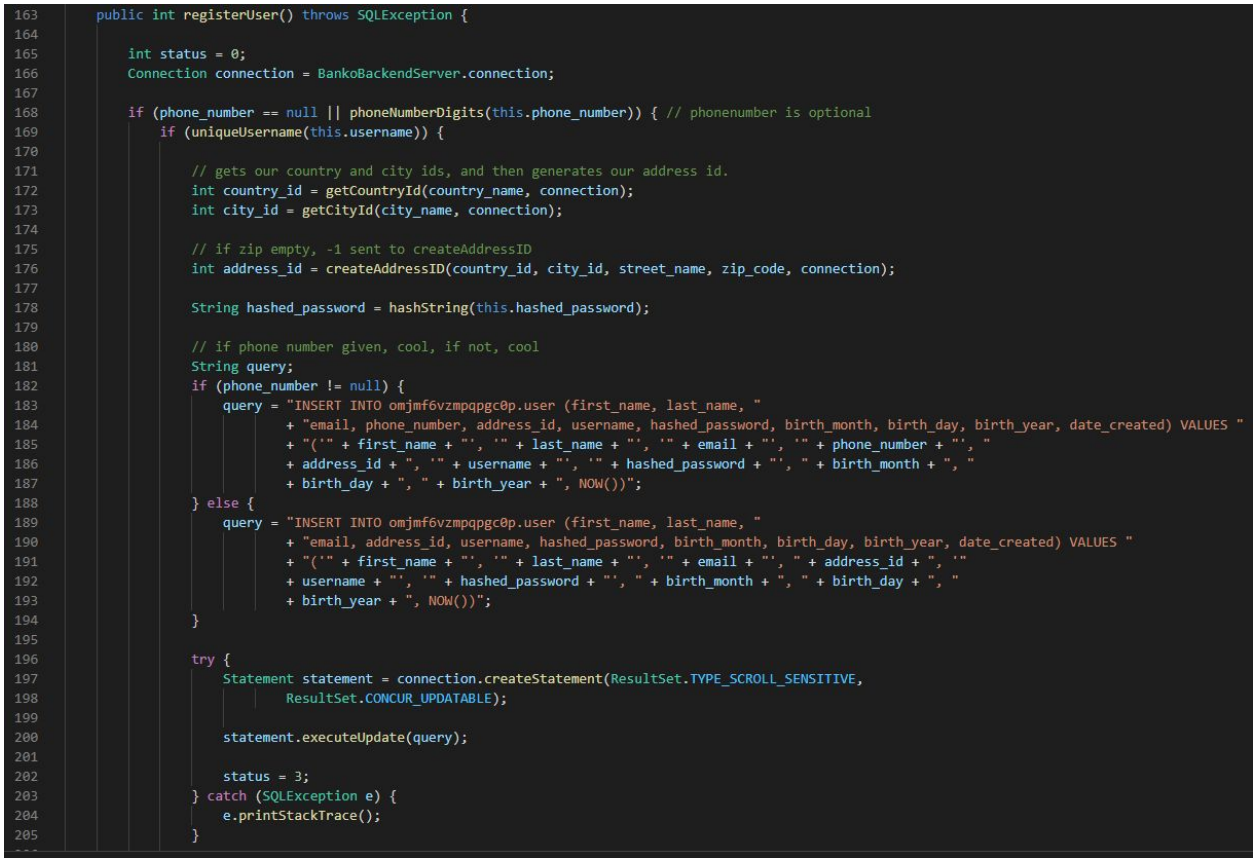


Here is the database after we registered the new user.

user_id	first_name	last_name	email	phone_number	address_id	username	hashed_password	birth_month	birth_day	birth_year	date_created
23	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	25	hihi	ĶĹ	1	1	1	2020-11-30 20:18:00
24	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	26	something		1	1	1	2020-11-30 20:19:36
25	Gabriel	Tenocelo	Tenocelotl ocelotl@gmail.com	15303078814	27	asdasd		1	1	1	2020-11-30 20:22:45
26	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	28	sfdsdfds		1	1	1	2020-11-30 20:24:38
27	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	29	asdasdw...		1	1	1	2020-11-30 20:27:22
28	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	30	123123124		1	1	1	2020-11-30 20:32:48
29	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	31	irock194	ŚĭŗŚ	1	1	1	2020-11-30 20:50:00
30	John	Jones	john.jones@gmail.com	16692965372	32	johnj	ŚĭŗŚ	7	26	1999	2020-12-01 19:32:02
31	Osama	Hanhan	osama.hanhan@sjsu.edu	NULL	33	osama12	ŚĭŗŚ	5	14	1999	2020-12-02 00:43:45
32	Gabe	Osama	email	NULL	34	gabeOsa...	ŚĭŗŚ	1	1	1	2020-12-02 01:37:37
33	Jo	Jo	jo	NULL	35	ssss	ŚĭŗŚ	1	1	1	2020-12-03 08:58:31
34	Jo	Jo	jo	NULL	36	sssss	ŚĭŗŚ	1	1	1	2020-12-03 08:58:52
35	Jo	Jo	jo	NULL	37	ssssss	ŚĭŗŚ	1	1	1	2020-12-03 08:59:50
36	Roshdy	Hanhan	hsddb	NULL	38	roshdy	ŚĭŗŚ	1	1	1	2020-12-03 12:36:38
37	Mike	Wu	mikeWu@gmail.com	15303188991	39	MikeWu	ŚĭŗŚ	4	25	1960	2020-12-11 02:40:42
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

As you can see the new user with the correct information has been updated to the database.

Here is the code to register the User along with the query. This is the User.java file.



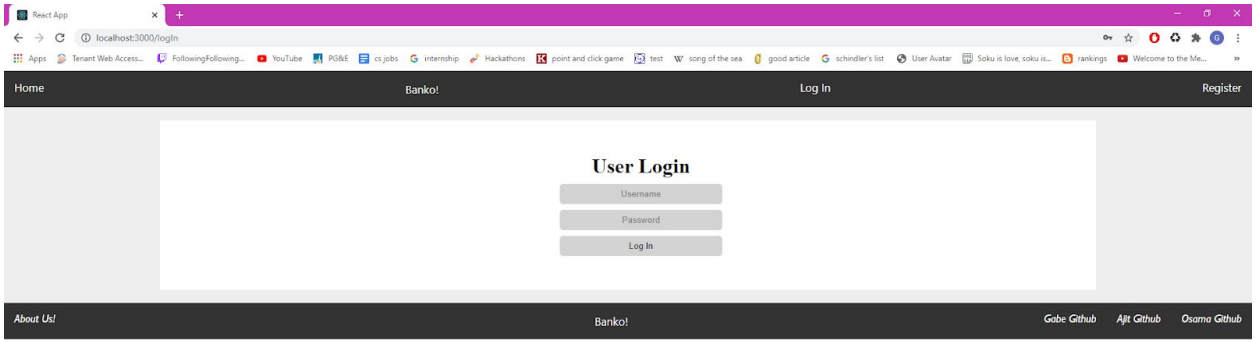
```
163     public int registerUser() throws SQLException {
164
165         int status = 0;
166         Connection connection = BankoBackendServer.connection;
167
168         if (phone_number == null || phoneNumberDigits(this.phone_number)) { // phonenumber is optional
169             if (uniqueUsername(this.username)) {
170
171                 // gets our country and city ids, and then generates our address id.
172                 int country_id = getCountryId(country_name, connection);
173                 int city_id = getCityId(city_name, connection);
174
175                 // if zip empty, -1 sent to createAddressID
176                 int address_id = createAddressID(country_id, city_id, street_name, zip_code, connection);
177
178                 String hashed_password = hashString(this.hashed_password);
179
180                 // if phone number given, cool, if not, cool
181                 String query;
182                 if (phone_number != null) {
183                     query = "INSERT INTO omjmf6vzmpqpgc0p.user (first_name, last_name, "
184                             + "email, phone_number, address_id, username, hashed_password, birth_month, birth_day, birth_year, date_created) VALUES "
185                             + "('" + first_name + "', '" + last_name + "', '" + email + "', '" + phone_number + "', "
186                             + address_id + ", '" + username + "', '" + hashed_password + "', " + birth_month + ", "
187                             + birth_day + ", " + birth_year + ", NOW())";
188                 } else {
189                     query = "INSERT INTO omjmf6vzmpqpgc0p.user (first_name, last_name, "
190                             + "email, address_id, username, hashed_password, birth_month, birth_day, birth_year, date_created) VALUES "
191                             + "('" + first_name + "', '" + last_name + "', '" + email + "', " + address_id + ", '"
192                             + username + "', '" + hashed_password + "', " + birth_month + ", " + birth_day + ", "
193                             + birth_year + ", NOW())";
194                 }
195
196                 try {
197                     Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
198                             ResultSet.CONCUR_UPDATABLE);
199
200                     statement.executeUpdate(query);
201
202                     status = 3;
203                 } catch (SQLException e) {
204                     e.printStackTrace();
205                 }
```

The information is being gathered from the UserRegistrationController.java where we are creating a new User object.

```
66      @PostMapping(value = "/userRegister")
67      public @ResponseBody String addNewUser(@RequestBody User user) {
68          int status = 0;
69          try {
70              status = user.registerUser();
71          } catch (SQLException throwables) {
72              throwables.printStackTrace();
73          }
74          if (status == 1)
75              return "Failed as phoneNumber is not 11 digits!";
76          else if (status == 2)
77              return "Failed as username is not unique!";
78          else if (status == 3)
79              return "User Successfully Registered!";
80          return "Check the userRegister post method (backend)";
81      }
82
83  }
84
```

Login Functionality:

Here is the frontend design of our Login page.

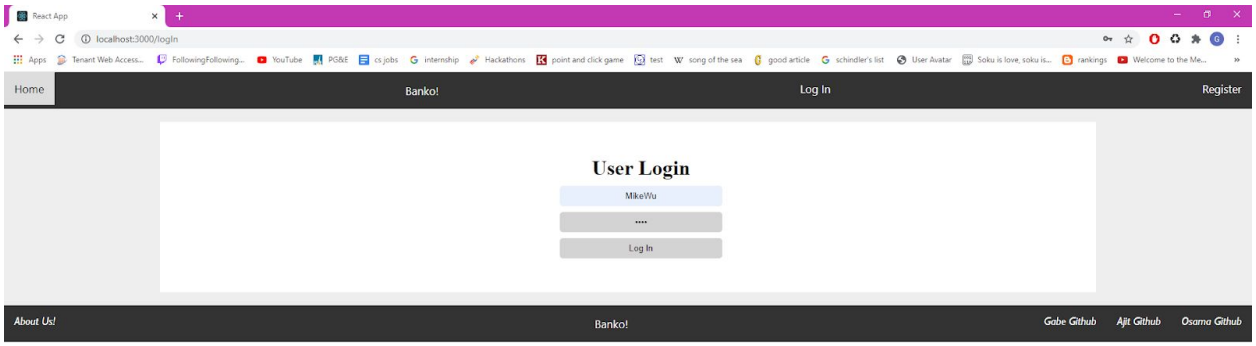


Here is the database with the previously stored User information

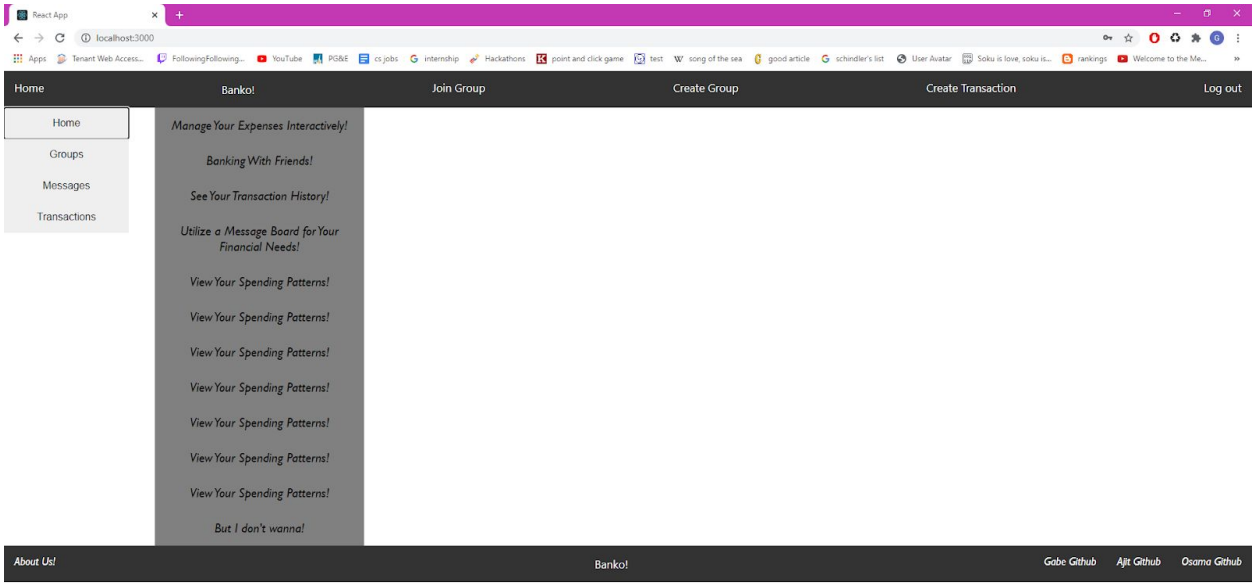
Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

user_id	first_name	last_name	email	phone_number	address_id	username	hashed_password	birth_month	birth_day	birth_year	date_created
23	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	25	hihi	ĶĹ	1	1	1	2020-11-30 20:18:00
24	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	26	something		1	1	1	2020-11-30 20:19:36
25	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	15303078814	27	asdasd		1	1	1	2020-11-30 20:22:45
26	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	28	sfdsdfds		1	1	1	2020-11-30 20:24:38
27	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	29	asdasdw...		1	1	1	2020-11-30 20:27:22
28	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	30	123123124		1	1	1	2020-11-30 20:32:48
29	Gabriel	Tenocelotl	gabrieltenocelotl@gmail.com	53030788141	31	irock194	ŚírŚ	1	1	1	2020-11-30 20:50:00
30	John	Jones	john.jones@gmail.com	16692965372	32	johnj	ŚírŚ	7	26	1999	2020-12-01 19:32:02
31	Osama	Hanhan	osama.hanhan@sjsu.edu	NULL	33	osama12	ŚírŚ	5	14	1999	2020-12-02 00:43:45
32	Gabe	Osama	email	NULL	34	gabeOsa...	ŚírŚ	1	1	1	2020-12-02 01:37:37
33	Jo	Jo	jo	NULL	35	ssss	ŚírŚ	1	1	1	2020-12-03 08:58:31
34	Jo	Jo	jo	NULL	36	sssss	ŚírŚ	1	1	1	2020-12-03 08:58:52
35	Jo	Jo	jo	NULL	37	ssssss	ŚírŚ	1	1	1	2020-12-03 08:59:50
36	Roshdy	Hanhan	hsddb	NULL	38	roshdy	ŚírŚ	1	1	1	2020-12-03 12:36:38
37	Mike	Wu	mikeWu@gmail.com	15303188991	39	MikeWu	ŚírŚ	4	25	1960	2020-12-11 02:40:42
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

We enter the username and password we registered with.



When we enter the correct username and password we are redirected to the homepage for logged in users.

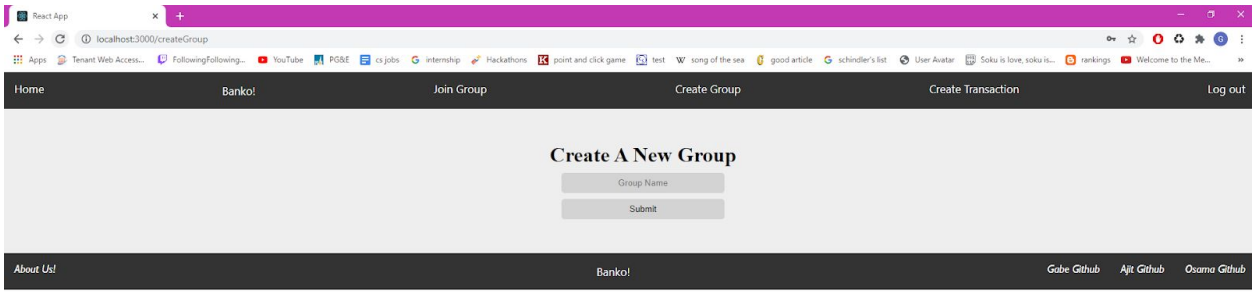


This is called when a user tries to log in; it gets the user's hashed password, and compares it to the hashed inserted password, then returns a boolean value.

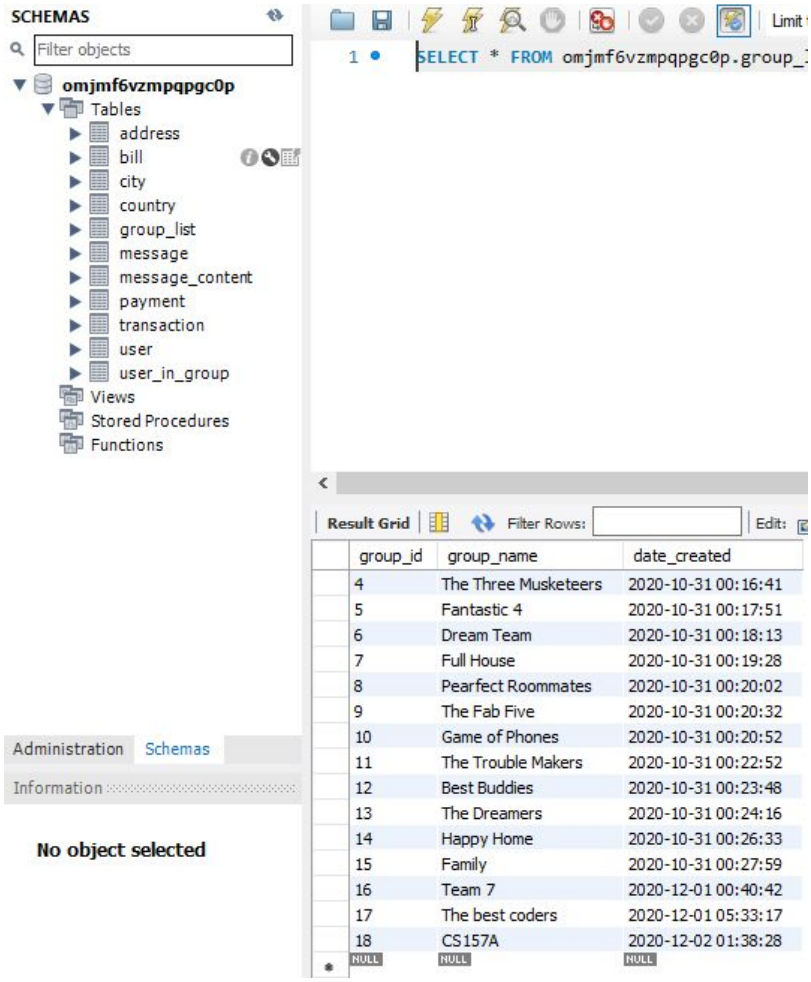
```java
public static boolean authenticatePassword(String username, String password) {
    String tempPw = hashString(password);
    Connection connection = BankoBackendServer.connection;

    String query = "SELECT hashed_password FROM omjmf6vzmpqpgc0p.user WHERE username = '" + username + "'";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);

        ResultSet rs = statement.executeQuery(query);

        // if they are equal, return true
        if (rs.next())
            if (rs.getString("hashed_password").equals(tempPw))
                return true;

        return false;

    } catch (SQLException e) {
        e.printStackTrace();
    }
    return false;
}
```

Creating Group Functionality:

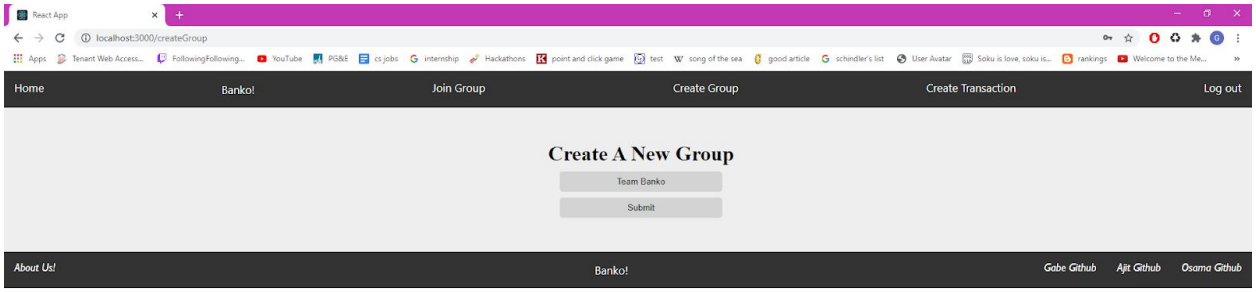
Here is the frontend for creating a new group page. You can click on the navbar to navigate to the create group page.



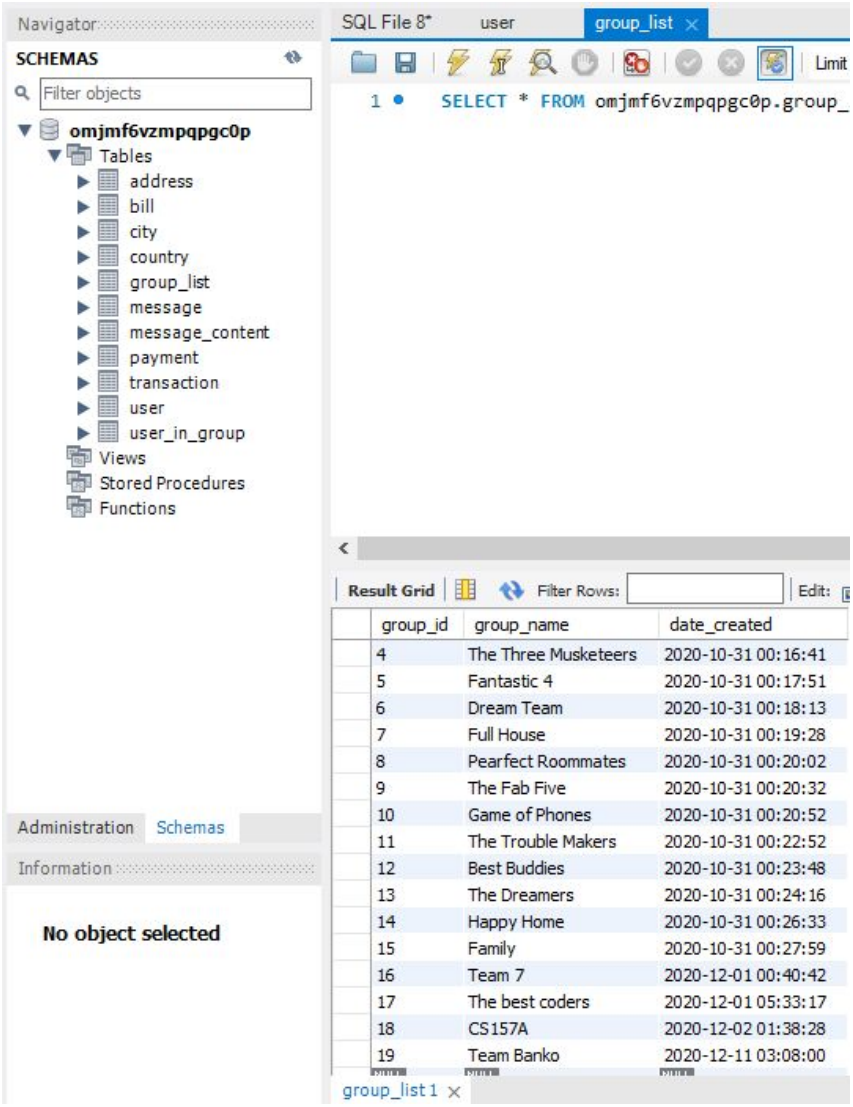
Here is the database before we create a new group.



Here is the frontend when we create a new group.



The new group is now added in the database.



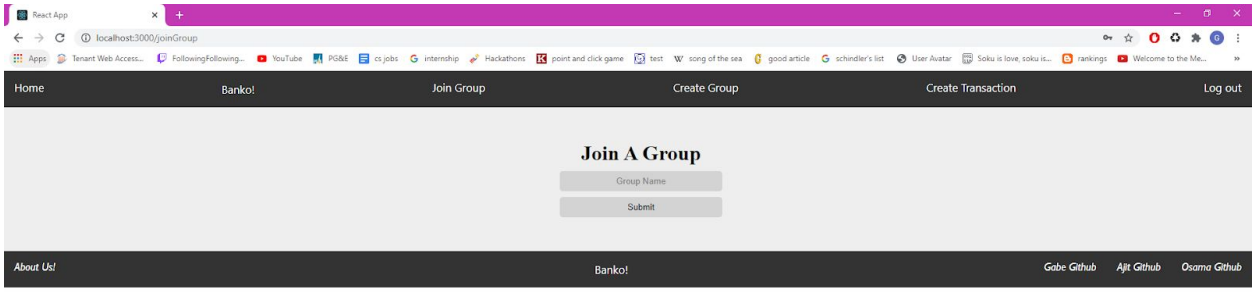
We check to see if the group is unique. If it is, we go on to try to create the group. If the statement passes, then we have the user join the group that they made, and then return with a successful flag.

```
public int createBankGroup() throws SQLException {

    int groupCreated = 0;
    Connection connection = BankoBackendServer.connection;
    if (uniqueGroup(group_name, connection)) {
        // Group is created
        if (createGroup(group_name, connection)) {

            if (userJoinGroup()) {
                // User join the group created
                groupCreated = 1;
            }
        }
    } else {
        // Group name is not unique
        groupCreated = -1;
    }

    return groupCreated;
}
```

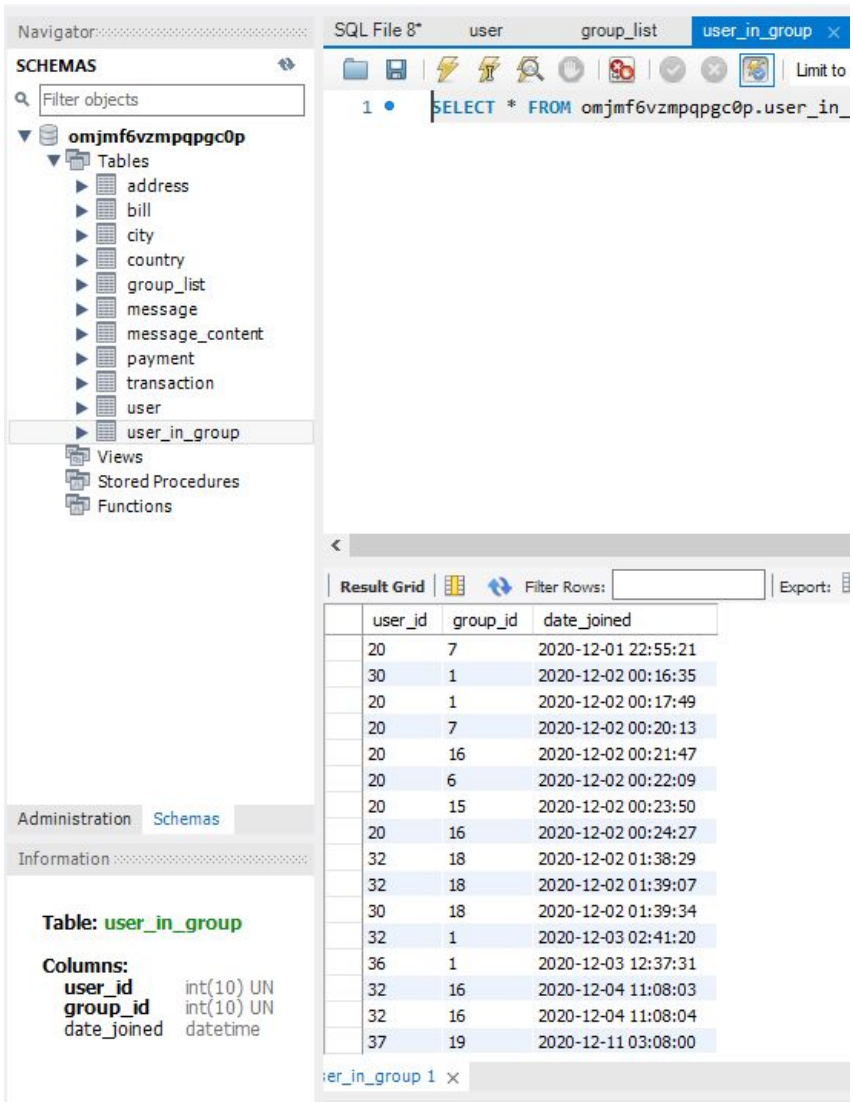
```
private boolean createGroup(String group_name, Connection connection) {
    boolean flag = false;

    String query = "INSERT INTO omjmf6vzmpqpgc0p.group_list (group_name, date_created) VALUES ('" + group_name + "', now())";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);
        statement.executeUpdate(query);
        flag = true;
    } catch (SQLException throwables) {
        throwables.printStackTrace();
    }

    return flag;
}
```

Join Group Functionality:

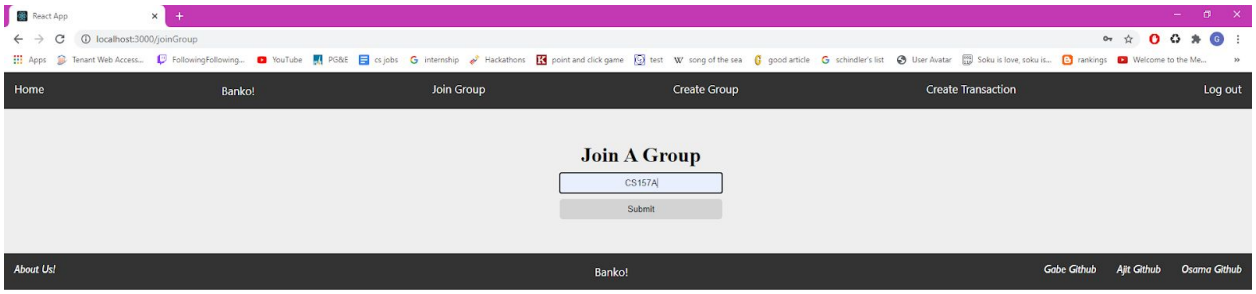
Here is the frontend for the join group page. We can navigate to the page through the navbar by clicking on the join group tab.



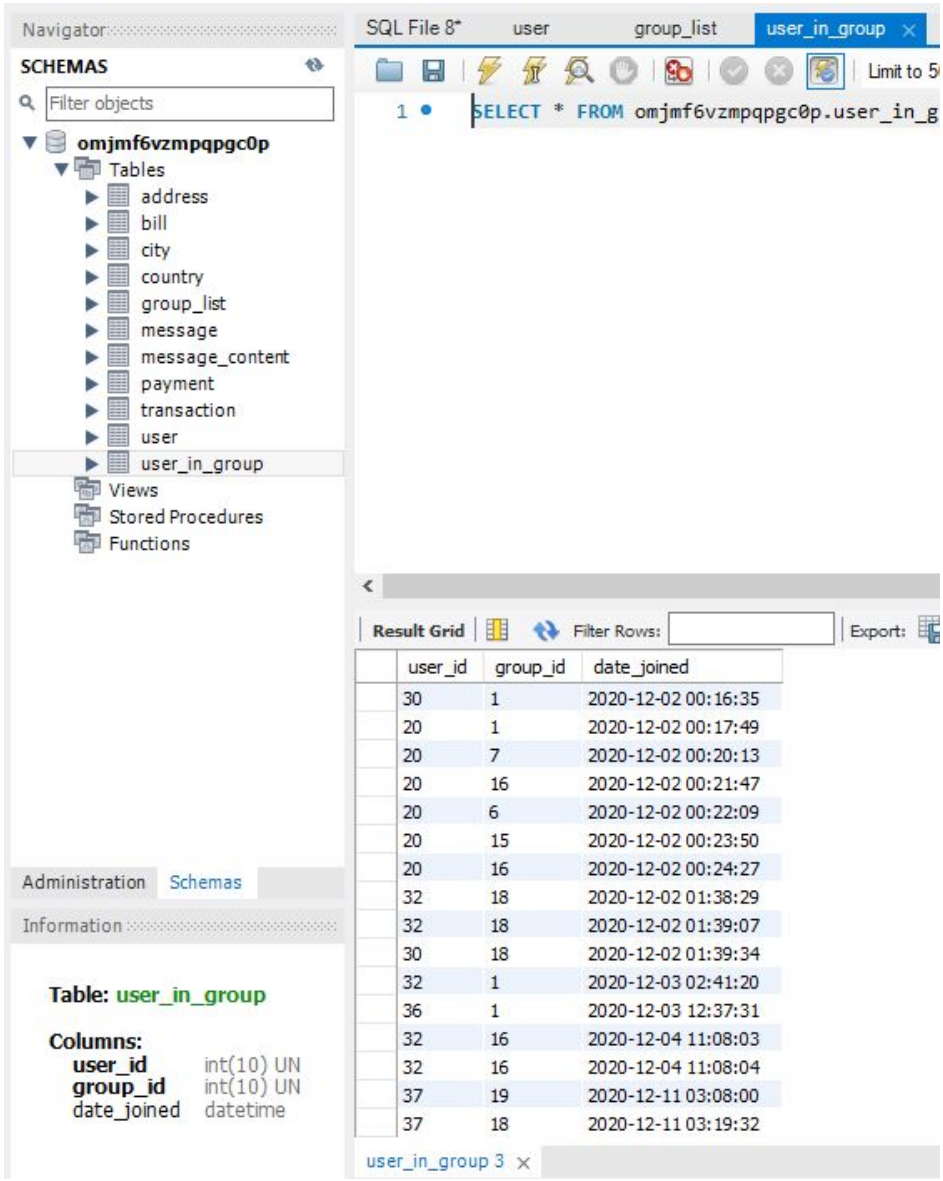
We can join an existing group called 'CS157A'. The group 'CS157A' has the group_id = 18 and the user MikuWu has the user_id = 37. Here is the user_in_group table in our database before we join a group.



In the frontend we are going to join ‘CS157A’.



Here is the database for users_in_group. Now you can see that group_id = 18 and user_id = 37 are now inserted into the table.

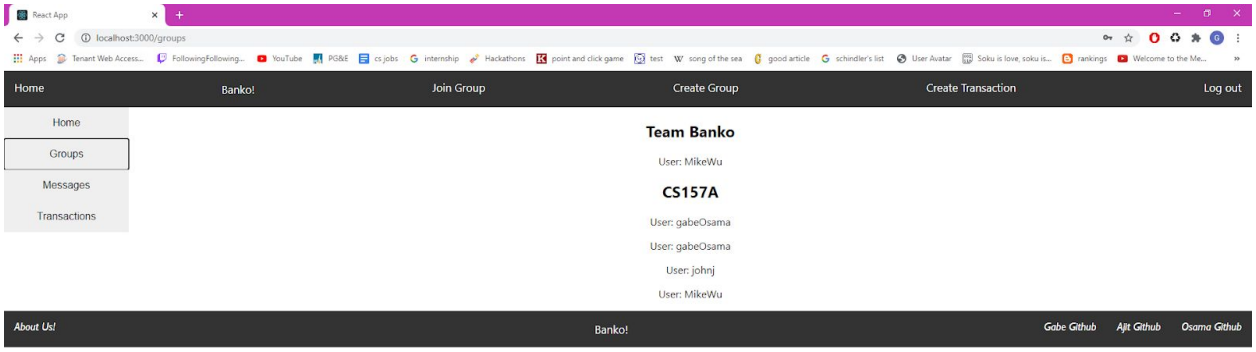


User joins a group by sending a POST with the unique group name and if they are not in the group already, it enters them into the group.

```
public boolean userJoinGroup() throws SQLException {
    Connection connection = BankoBackendServer.connection;
    group_id = getGroupId(group_name, connection);
    String query = "INSERT INTO omjmf6vzmpqpgc0p.user_in_group (user_id, group_id,date_joined) VALUES (" + this.user_id + ","
            + this.group_id + ", now())";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);
        statement.executeUpdate(query);

        return true;
    } catch (SQLException throwables) {
        throwables.printStackTrace();
    }

    return false;
}
```

The Groups Page Functionality:

In the frontend there is a sidebar to navigate to the groups page. In this page it shows the current groups that the user is currently in. Here it shows that we are in the groups Team Banko and CS157A. We create Team Banko and thus we are the only user in the group, but there are multiple members in CS157A.



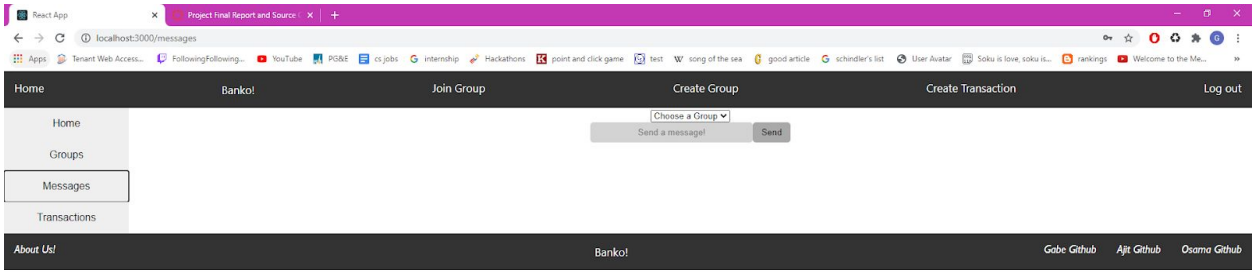
Queries the backend with a GET request, asking for the group information for the user currently logged in. The backend fetches the data and returns it here. We then map each group to a div.

```
function getGroups() {
    $.ajax({
        contentType: "application/json;charset=utf-8",
        url: 'http://localhost:8080/userGroups',
        type: 'get',
        dataType: 'json',
        data: { user_id: state.id },
        success: function (data) {

            var i = 0;
            setGroups(data);
        },
        error: function (request, status, error) {
            console.log(request.responseText);
        }
    });
}
```

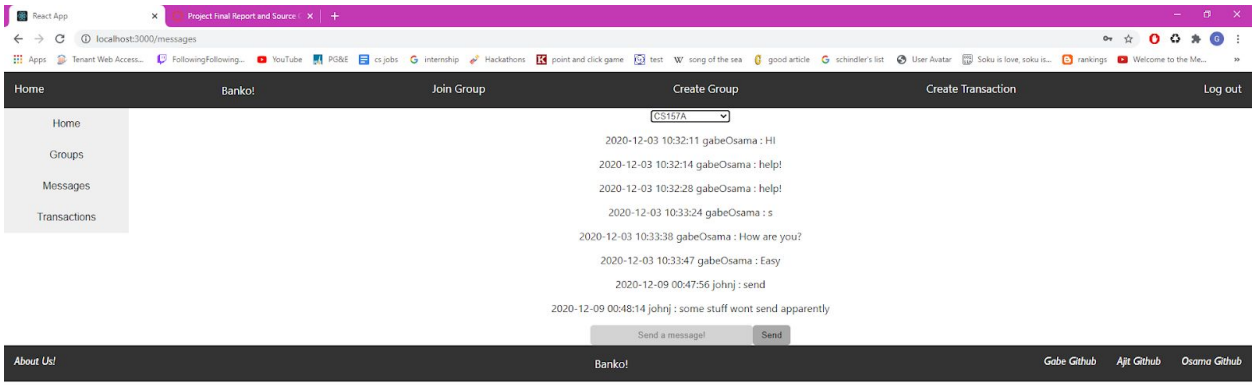
```
if (flag == 0) {
    getGroups();
    setFlag(1);
}

if (flag == 1) {
    return (
        <div className={styles.GroupsFeed}>
            <div className={styles.Groups}>
                {groups.map(group => (
                    <Group group_id={group.group_id} group_name={group.group_name} />
                ))}
            </div>
        </div>
    )
```

Messages Page and Functionality:

In the frontend there is a sidebar to navigate to the Messaging page. In the Messaging page you will see a dropdown box with the current groups you are in.



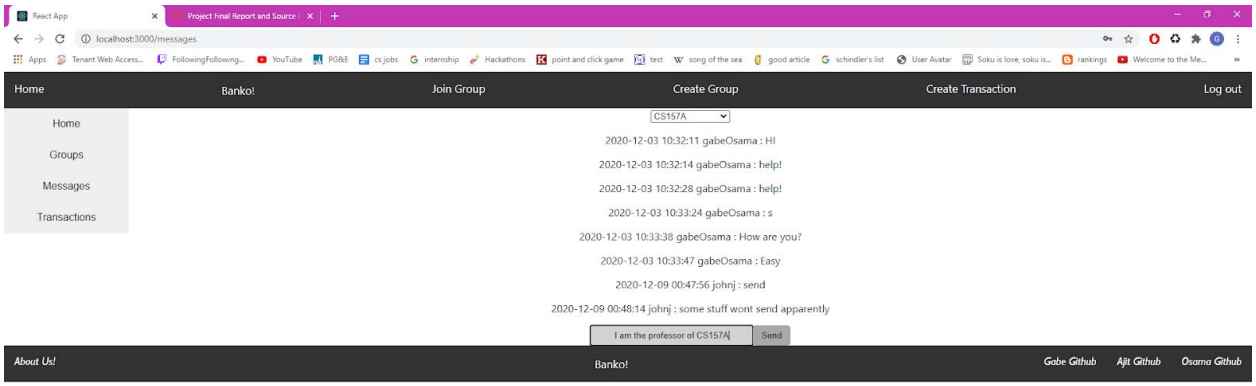
When you click on a specified group in the dropdown box, you will enter the group chat of that group. The Messaging page will indicate which user has sent which message and the time date.



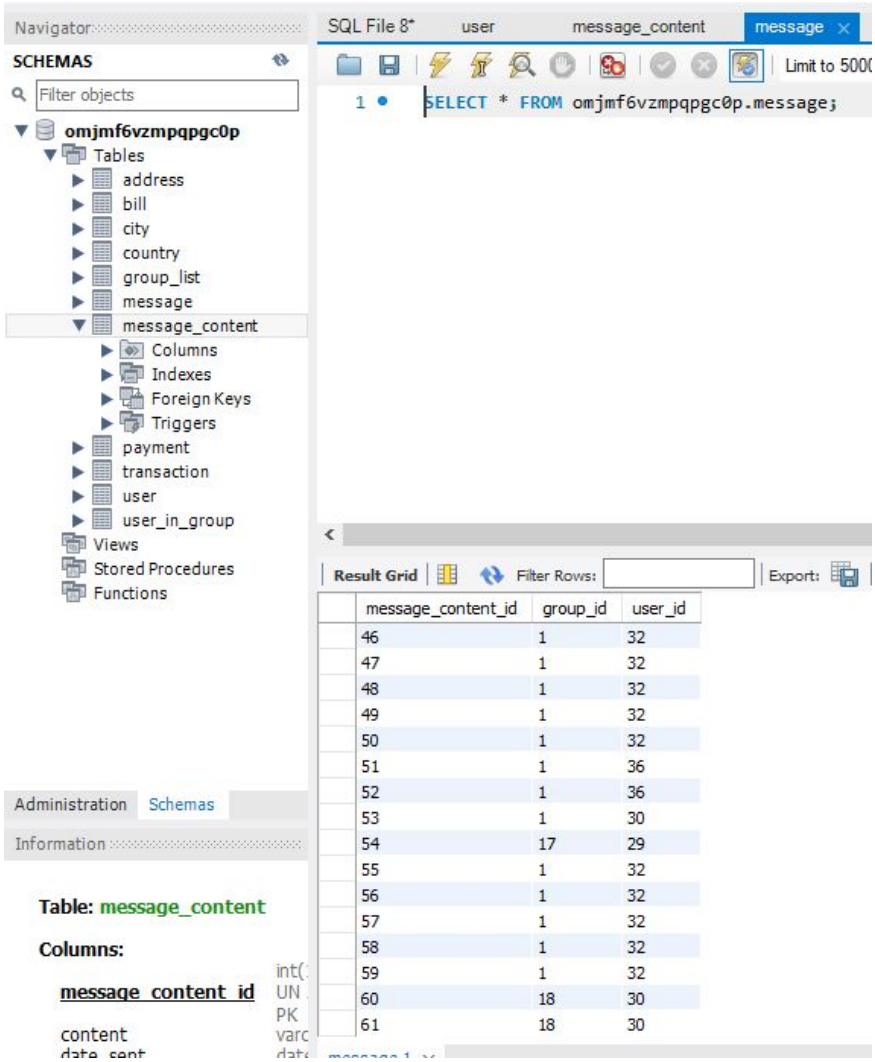
We send a request to get the messages. The backend then gets all the content using a triple join to put all the data that we need together, and a subquery to get the groupid. We then order by the date sent. This data is then stored in an arraylist of hashmaps, which acts as a json object when returning it to the front end.

```
public static ArrayList<HashMap<String, String>> getUserGroupMessage(String group_name) throws SQLException {
    Connection connection = BankoBackendServer.connection;
    ArrayList<HashMap<String, String>> listGroupMessages = new ArrayList<HashMap<String, String>>();

    // nested query for getting group id
    String getGroupID = "(SELECT group_id FROM omjmf6vzmpqpgc0p.group_list WHERE group_name = '" + group_name
            + "')";

    String selectSql = "SELECT message_content_id, content, group_id, user_id, username, date_sent FROM omjmf6vzmpqpgc0p.message "
            + "JOIN omjmf6vzmpqpgc0p.message_content USING (message_content_id) JOIN omjmf6vzmpqpgc0p.user USING (user_id) WHERE (group_id = "
            + getGroupID + ") ORDER BY date_sent ASC";
    Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE, ResultSet.CONCUR_UPDATABLE);
    ResultSet rs = statement.executeQuery(selectSql);
    while (rs.next()) {
        HashMap<String, String> userGroupMessageJSON = new HashMap<String, String>();
        userGroupMessageJSON.put("message_content_id", Integer.toString(rs.getInt("message_content_id")));
        userGroupMessageJSON.put("content", rs.getString("content"));
        userGroupMessageJSON.put("group_id", Integer.toString(rs.getInt("group_id")));
        userGroupMessageJSON.put("user_id", Integer.toString(rs.getInt("user_id")));
        userGroupMessageJSON.put("username", rs.getString("username"));
        userGroupMessageJSON.put("date_sent", (rs.getString("date_sent")));
        listGroupMessages.add(userGroupMessageJSON);
    }
    statement.close();
    return listGroupMessages;
}
```

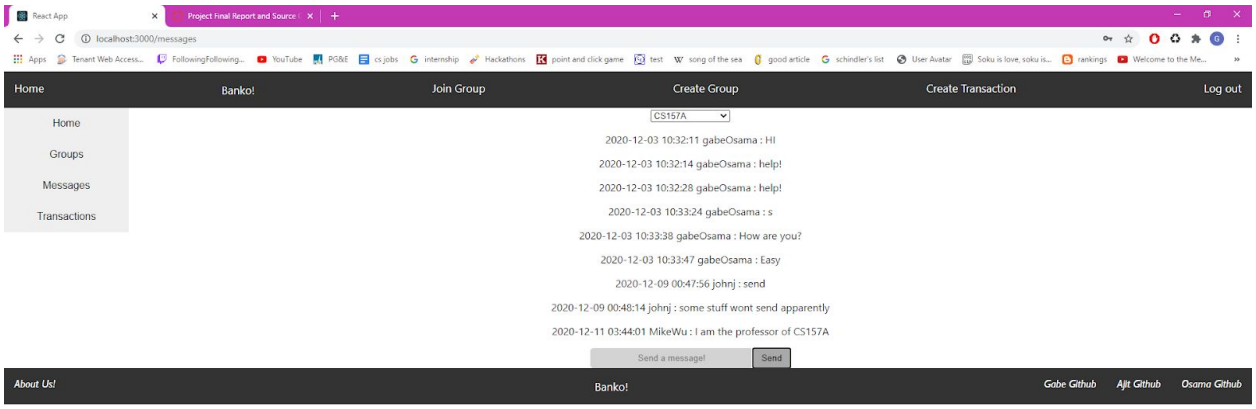
Now in this same page we have the functionality of sending a new message to the group. There is a text box to send a message. In this case we are going to send “I am the professor of CS157A” to the group chat.



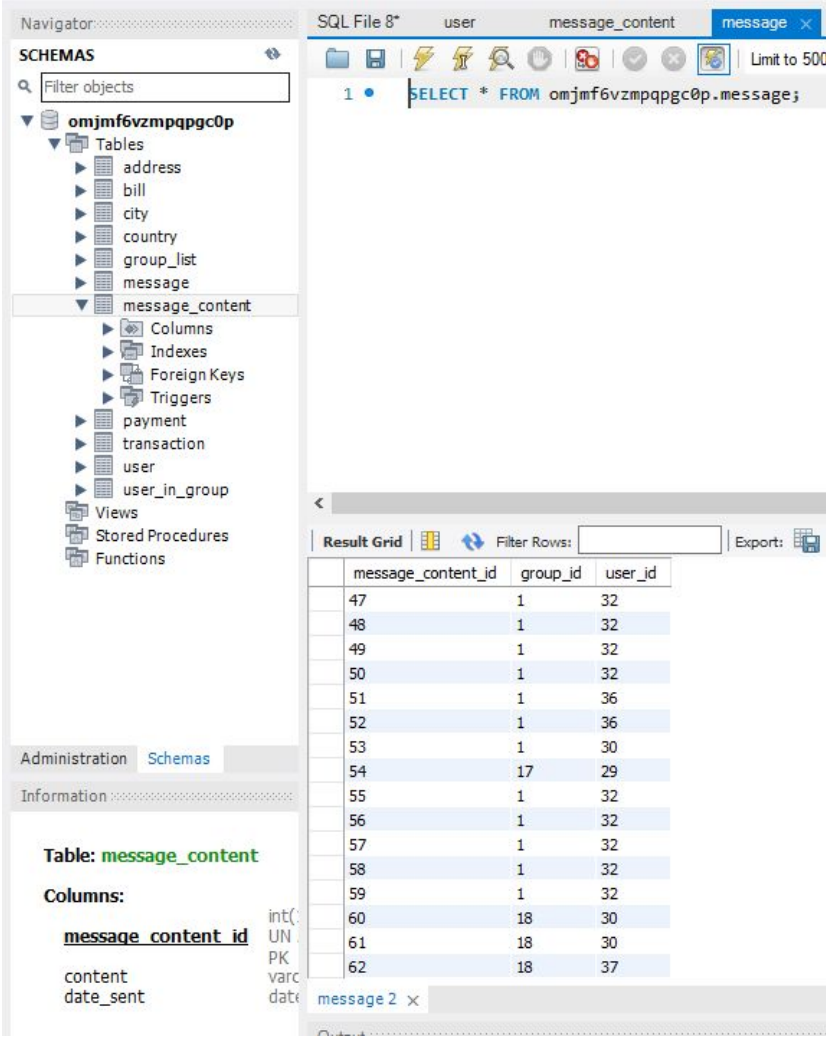
Here is the database before we send an Ajax request to the backend. Here is the message_content table.



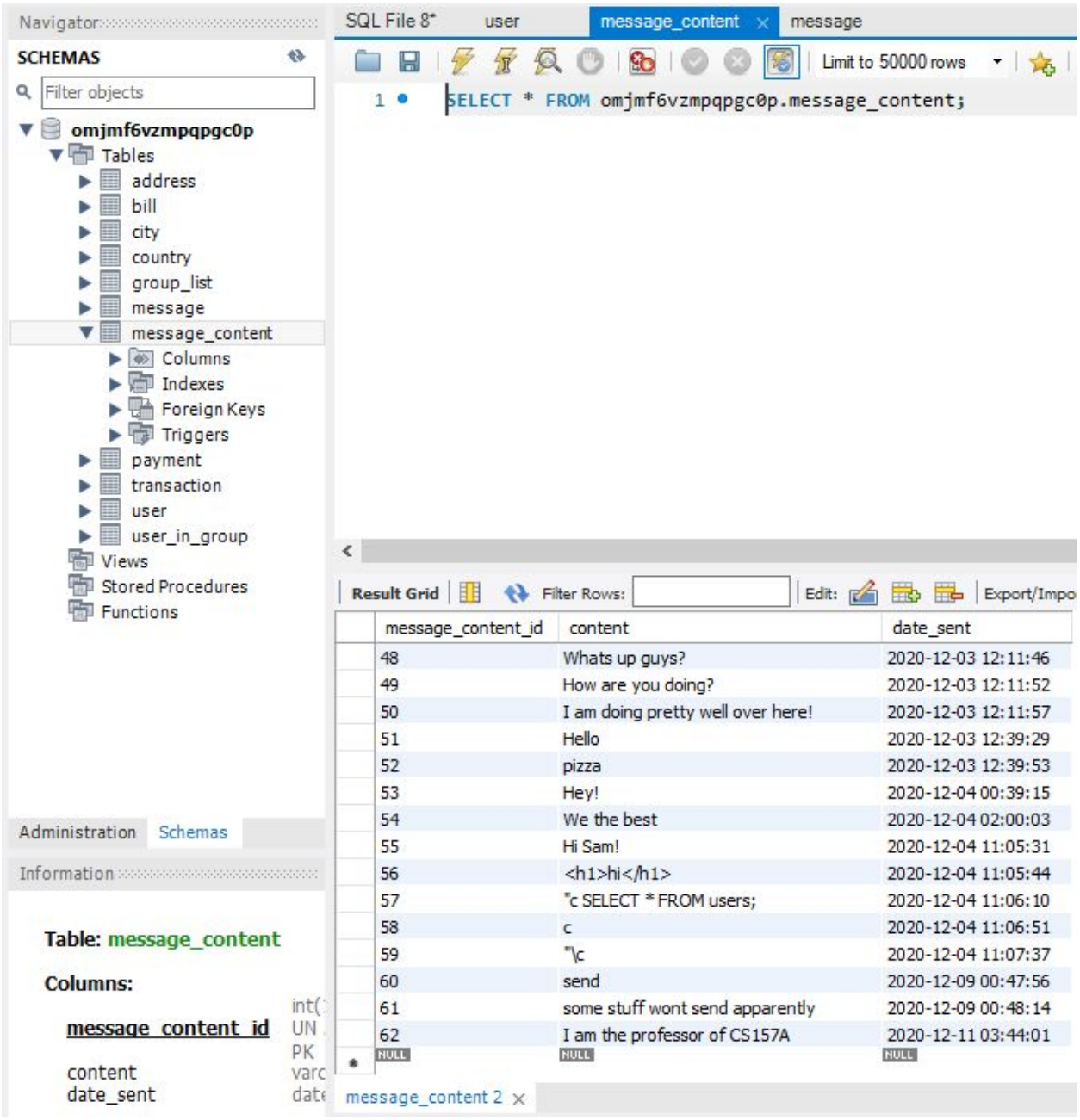
Here is the frontend after we send the message. It now appears in the chat box.



Here is the database after the new message is sent. The group_id for CS157A is 18, the user_id is 37. A new row has been inserted with a new message_content_id.



Here is the database for the message_content table. Here you can see the message_content_id = 62 is now inserted with the message content of “I am the professor of CS157A”.

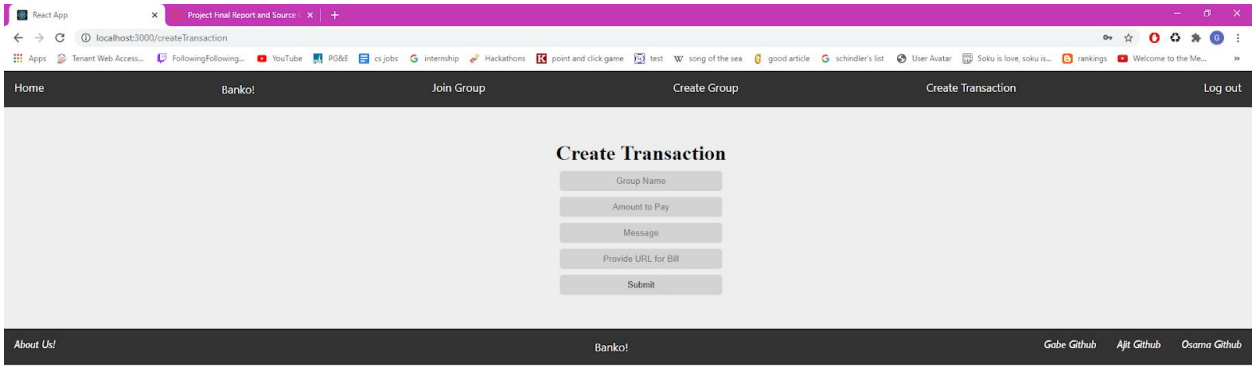


We have the addMessageContent functionality which adds the message content to a content table, and then we add the id for the message content to the message table using addMessage.

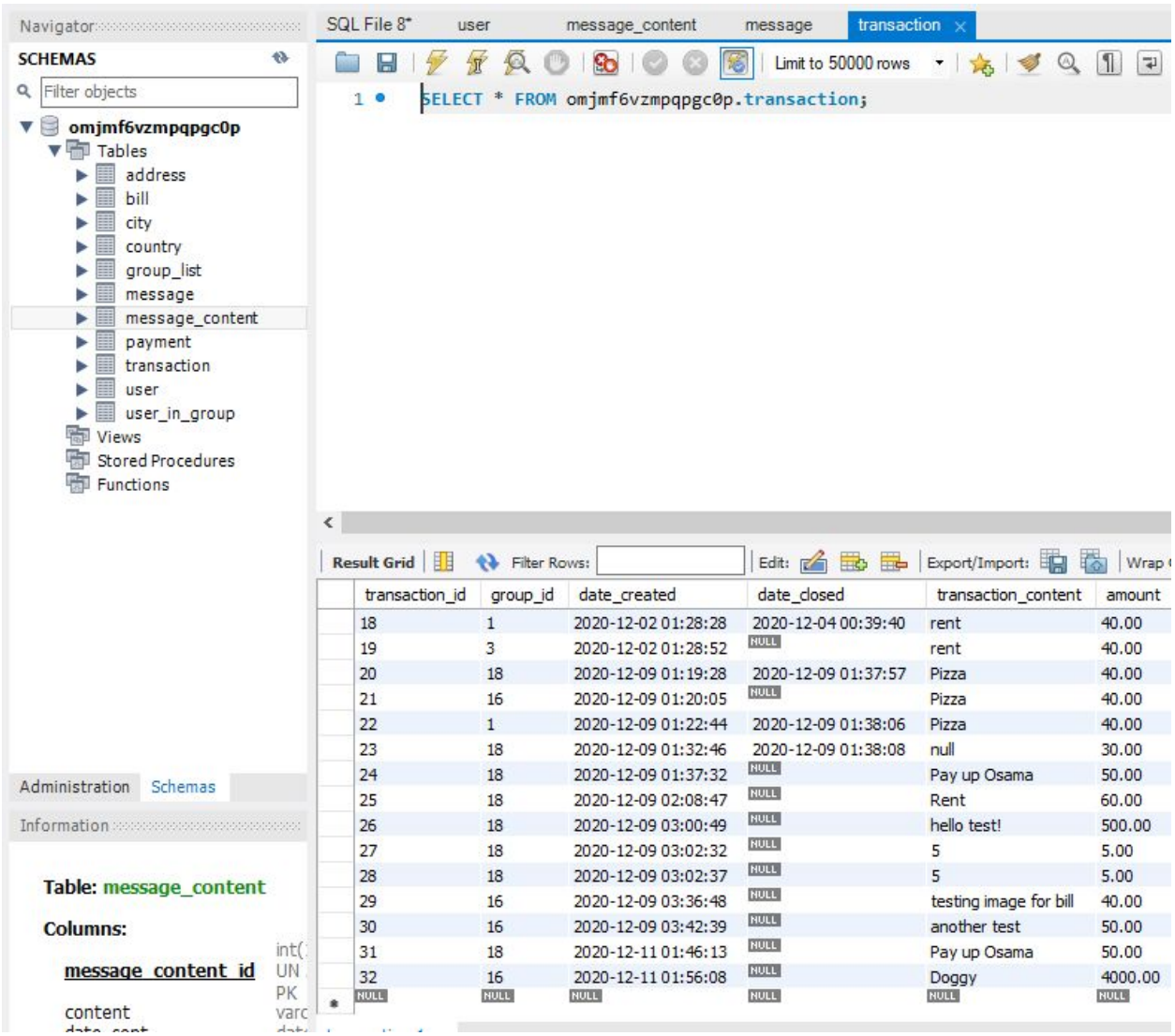
```
private static int addMessageContent(String content, Connection connection) {
    String query;

    query = "INSERT INTO omjmf6vzmpqpgc0p.message_content (content, date_sent) VALUES ('" + content + "', NOW())";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);

        statement.executeUpdate(query);

        query = "SELECT message_content_id FROM omjmf6vzmpqpgc0p.message_content ORDER BY message_content_id DESC LIMIT 1";

        ResultSet rs = statement.executeQuery(query);
        // gets last inserted key, aka the content id we just inserted into the table
        if (rs.next())
            return rs.getInt("message_content_id"); // returns the message content id

    } catch (SQLException e) {
        e.printStackTrace();
    }
    return -1;
}

private static int addMessage(int messageContentID, String group_name, int user_id, Connection connection) {
    String query;
    String groupid = "(SELECT group_id FROM omjmf6vzmpqpgc0p.group_list WHERE group_name = '" + group_name + "')";

    query = "INSERT INTO omjmf6vzmpqpgc0p.message (message_content_id, group_id, user_id) VALUES ("
            + messageContentID + ", " + groupid + ", " + user_id + ")";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);

        statement.executeUpdate(query);

        return 1;
    } catch (SQLException e) {
        e.printStackTrace();
    }
    return -1;
}
```

Create Transaction Functionality:

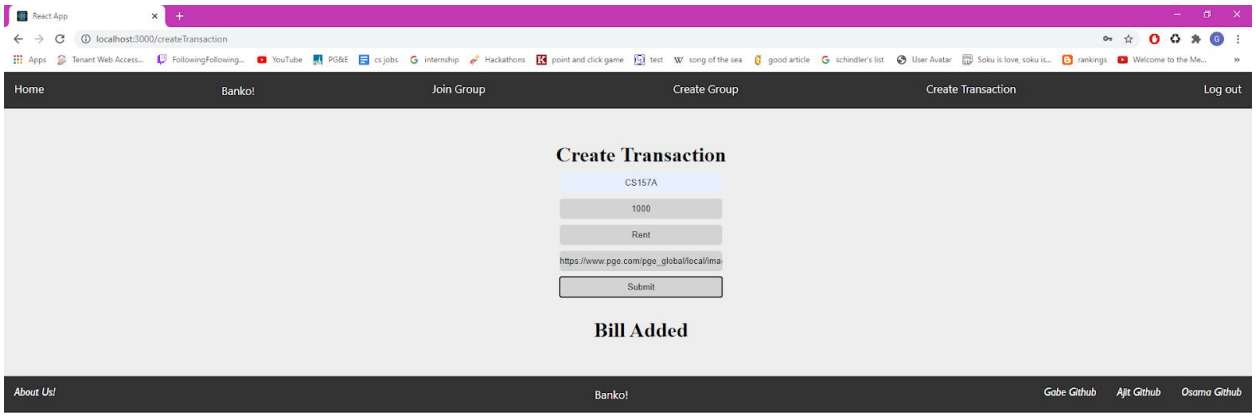
Here is the frontend for our create transaction page. We can navigate to this page by clicking the Create Transaction tab on the navbar on the top.



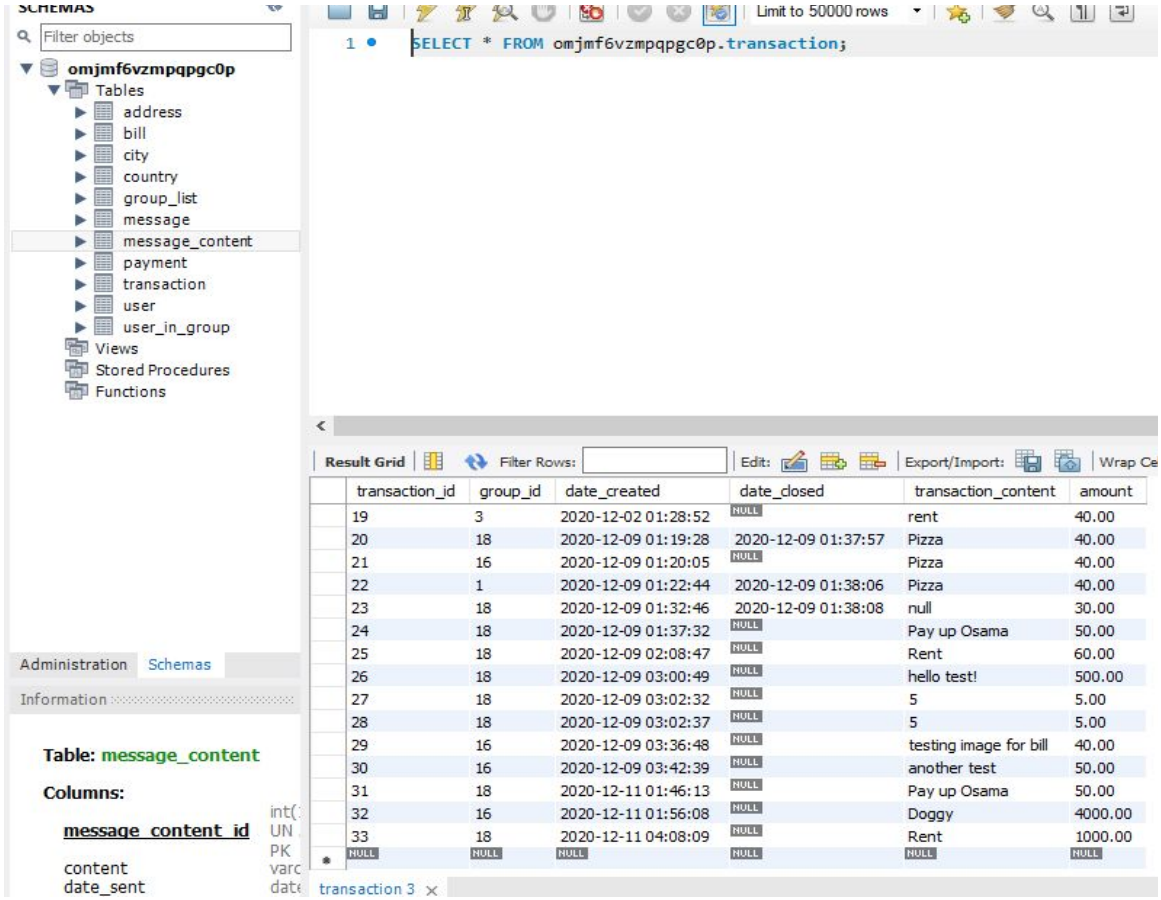
Here is the Transactions table in the database before we insert a new transaction from the frontend.



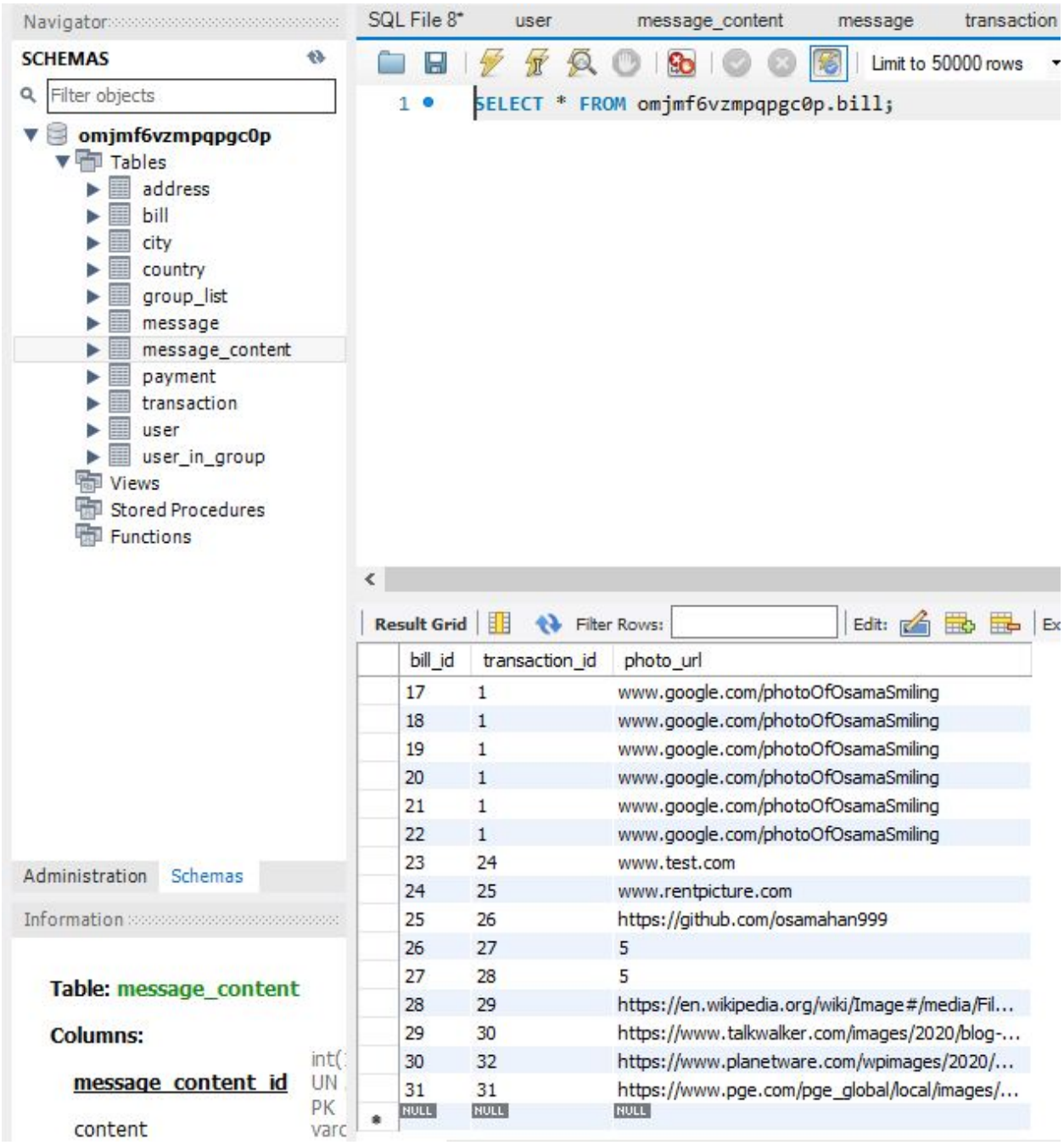
Here is the frontend when you create a new transaction. We are indicating for which group and how much each person pays along with a description of the transaction. We can also provide a url link to the bill and it will store in the bills table.



Here is the transactions table in the database after we created the new transaction. A new row has been created with the transaction_content, group_id and amount.



The bills table has also been updated with the url link for each transaction.



Takes in the transaction details, and makes the transaction itself.

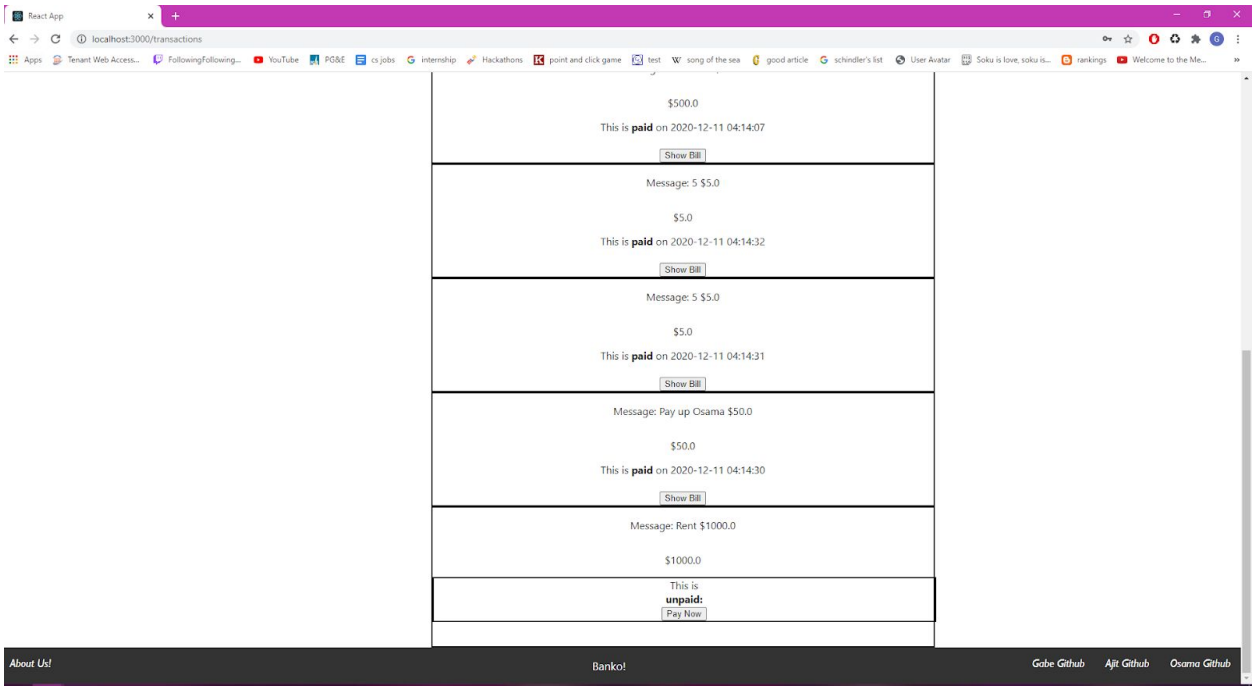
```
public int createTransaction() throws SQLException {
    Connection connection = BankoBackendServer.connection;
    group_id = getGroupId(group_name, connection);
    String query = "INSERT INTO omjmf6vzmpqpgc0p.transaction (group_id, date_created, transaction_content, amount) VALUES("
            + group_id + ", NOW(), '" + transaction_content + "', " + amount + ")";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);

        statement.executeUpdate(query);

        return 1;
    } catch (SQLException e) {
        e.printStackTrace();
    }
    return -1;
}
```

When creating a transaction, it sends back the transaction id and we add the bill to that transaction.

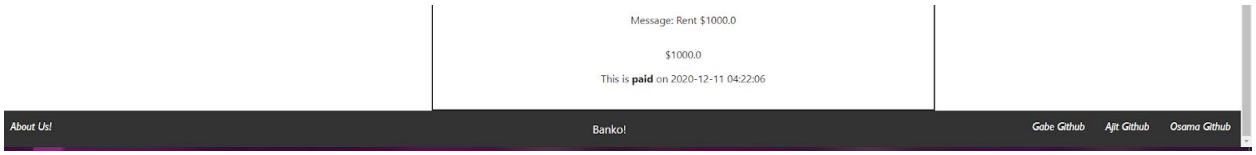
```
/**
 * Adds a bill which is just a photo linked to a certain transaction returns 1
 * for succes, 0 for error
 *
 * @return
 */
public int createBill() throws SQLException {
    Connection connection = BankoBackendServer.connection;
    group_id = getGroupId(group_name, connection);
    transaction_id = getTransactionId(group_id,connection);


    String query = "INSERT INTO omjmf6vzmpqpgc0p.bill (transaction_id, photo_url) VALUES (" + transaction_id + ", '"
            + photo_url + "')";

    try {
        Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                ResultSet.CONCUR_UPDATABLE);

        statement.executeUpdate(query);

        return 1;

    } catch (SQLException e) {
        e.printStackTrace();
    }
    return -1;
}
```

Transaction Page Functionality:

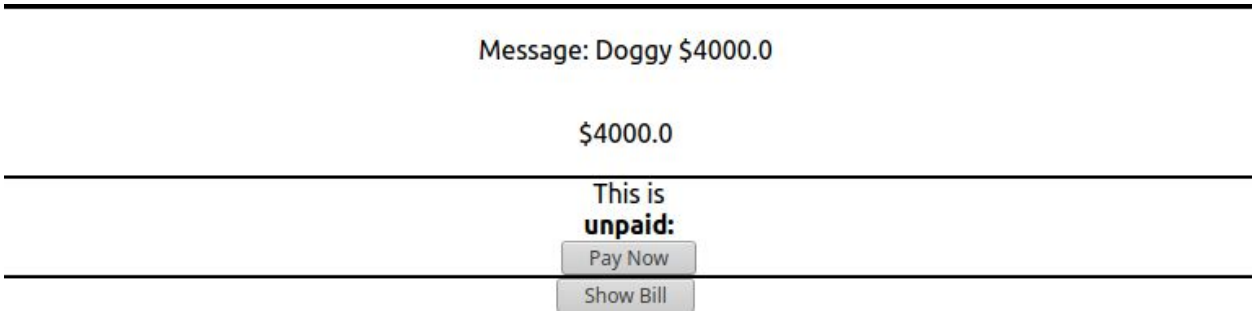
Here is the frontend for the transaction page. To navigate to the transaction page is by clicking the transaction tab on the sidebar on the left. In this page it shows the current transactions for each group you are in. It also shows the new transaction we just made previously.



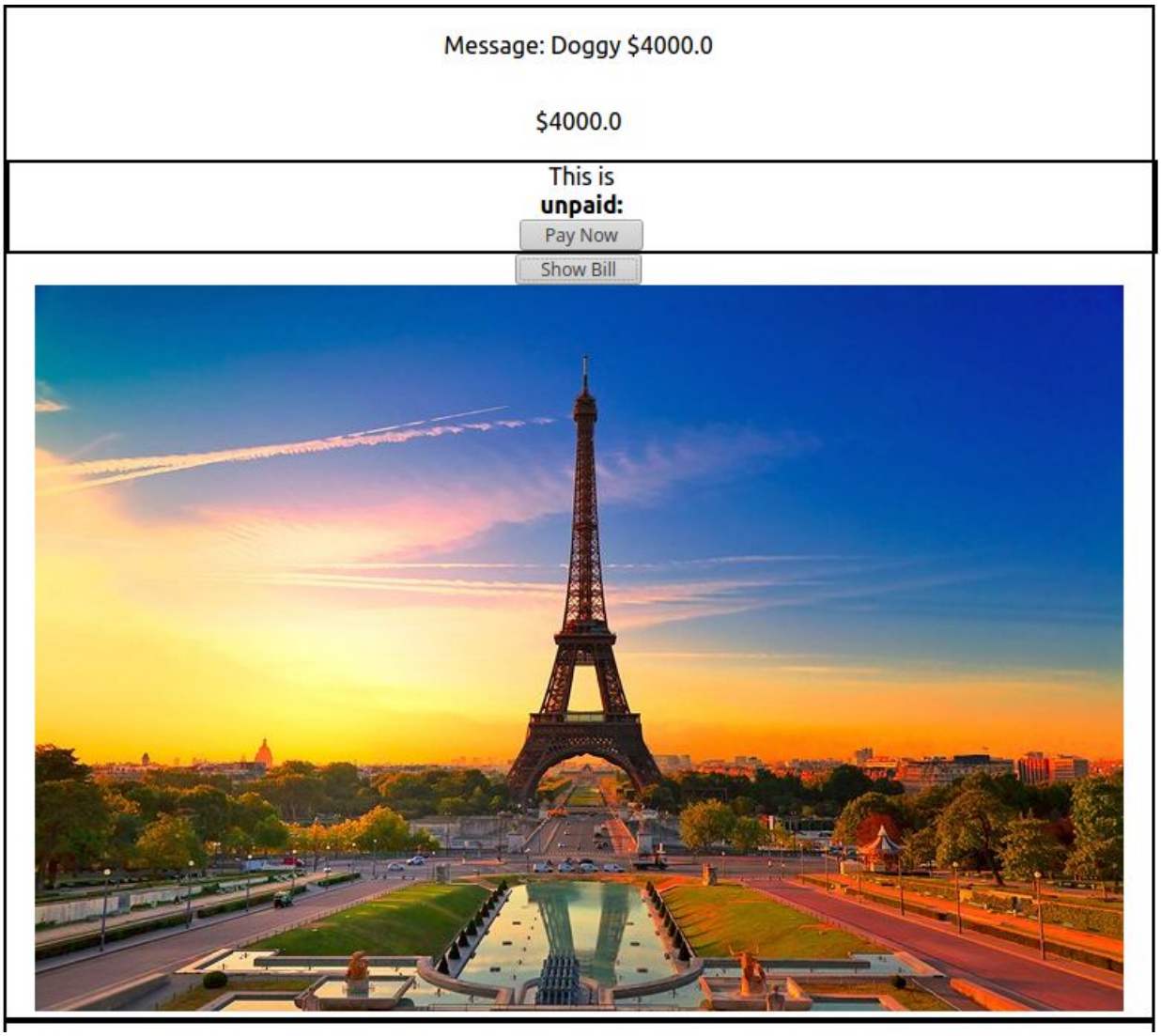
In the frontend, we can pay each transaction by pressing the Pay Now button. After clicking the button it now says the transaction has been paid!



In the frontend, we can also show or hide a bill for a specific transaction.



We can click Show Bill, which renders the image from the database.



We do a full outer join between transaction and bill to get all the transaction data with nulls for where we do not have bills. This allows the parsing in the front end to work much more smoothly.

```
for (HashMap<String, String> map : listTransactions) {
    for (String s : map.keySet()) {
        String group_id = map.get(s);
        int tempGroup_id = Integer.parseInt(group_id);
        String query = "SELECT transaction.transaction_id, group_id, date_created, date_closed, transaction_content,"
                + " amount, photo_url  FROM omjmf6vzmpqpgc0p.transaction LEFT JOIN omjmf6vzmpqpgc0p.bill "
                + " ON transaction.transaction_id = bill.transaction_id WHERE transaction.group_id ="
                + tempGroup_id
                + " UNION SELECT transaction.transaction_id, group_id, date_created, date_closed, transaction_content, amount, photo_url  "
                + "FROM omjmf6vzmpqpgc0p.transaction RIGHT JOIN omjmf6vzmpqpgc0p.bill ON transaction.transaction_id = "
                + "bill.transaction_id WHERE transaction.transaction_id IS NULL";
        try {
            Statement statement = connection.createStatement(ResultSet.TYPE_SCROLL_SENSITIVE,
                    ResultSet.CONCUR_UPDATABLE);

            ResultSet rs = statement.executeQuery(query);
            while (rs.next()) {
                HashMap<String, String> userAllTransactionJSON = new HashMap<String, String>();
                userAllTransactionJSON.put("transaction_id", Integer.toString(rs.getInt("transaction_id")));
                userAllTransactionJSON.put("group_id", Integer.toString(rs.getInt("group_id")));
                userAllTransactionJSON.put("date_created", (rs.getString("date_created")));
                userAllTransactionJSON.put("date_closed", (rs.getString("date_closed")));
                userAllTransactionJSON.put("transaction_content", (rs.getString("transaction_content")));
                userAllTransactionJSON.put("amount", Double.toString(rs.getDouble("amount")));
                userAllTransactionJSON.put("photo_url", (rs.getString("photo_url")));

                listAllGroupTransactions.add(userAllTransactionJSON);
            }
        } catch (SQLException throwables) {
            throwables.printStackTrace();
        }
    }
}
```

The code for showing the bills is quite simple; we use states to show or not show the bill, and change the state based on the button press.

```
<p>{props.transaction_content} ${props.amount}</p>
{(props.date_closed == "0000-00-00 00:00:00" || props.date_closed == null) ?
    <div className={styles.Transaction}>This is <b>unpaid:</b> <form onSubmit={handleSubmit(payTransaction)}>
        <button name="event" value={jsonData} ref={register({ required: true })} > Pay Now</button>
    </form></div> : <div>This is <b>paid</b> on {props.date_closed}
    </div>
}

<br></br>
<div>

    {(props.bill) ? <div> <button onClick={showImg}>Show Bill</button> {(showImage == 1) && <img src={props.bill}></img>}</div> : <p></p>}

</div>
```

Generating Visuals (Pie charts and Graphs):
This functionality was not implemented. This was not done due to lack of time. We found a way to do this using react, but none of us had the knowledge to try to write it initially. This seemed like a specialty feature, and so we pushed it off for more important functionalities.

Splitting the bill Functionality:
This functionality was not implemented. This was not finished simply due to lack of time. This would be a bit complicated to implement as we would need to store how users are paying a certain transaction. Perhaps this could be done using a new table request-for-payment which holds group #, user #, transaction #, and the type of payment. For now though, this is left for the user to do outside of our application.

Store Receipts after payment Functionality:
This functionality was not implemented because we did not have enough time as we struggled with connecting the front-end with back-end. But we would work on it for furfure improvements, we would implement this by storing the user's proof of payment image or the url for the image in the database when the user makes a payment for a transaction.

User Permissions In Groups:
The functionalities for users being able to accept other users or remove other users from a group was not implemented. We simply did not have time, but the implementation would not be very difficult. We would need a table that holds the user permissions, and then a table that holds join requests. If a user tries to accept another user, we would simply need to check whether they have the permissions for that group, and if they do, we put the user into the group. Same thing with removal, except the removal request is sent by the user with the permissions.

Tag bills with title, keywords, and date to be able to search them and filter:
The functionality was not implemented but we would have implemented it by doing a MySQL query and having the search keyword as the condition in the where clause of the query and filter would have been done by selecting specific conditions in the date_created and date_closed. Can also search the content of the bills using a wildcard and whatever the user inputs.

Approval system for payments:
This was not implemented due to a lack of time. How we would have implemented this though, is add an intermediary table between a user paying a transaction, and the transaction being marked as paid. It puts in a request to pay, and sends to the group owner (based on the permissions we had not implemented) that someone is trying to pay. The group owner then either says “ok” and the request goes through, or the owner says “no” and it is denied.

Optional Functionalities:
We simply did not have the time to implement the venmo requests, the email confirmations, nor the profile pictures.

Procedure (Step by Step) of How to Set up and Run Website

- **To run this, you must first clone,**
  - **https://github.com/osamahan999/CS157A-section9-team6.git repo.**
  - **Make sure you have NodeJS, NPM and Java version 8**
- **Front-End Dependencies**
  - **cd into folder '/banko'**
  - **rm node_modules -r**
  - **npm install**
  - **npm install jquery**
  - **npm install react-hook-form**
  - **npm install react-router-dom**

- **Run system**
  - **Open the file in 'banko-backend/BankoBackendServer'**
  - **Run the main method (Backend Server Starts)**
  - **Go into the 'banko' folder**
  - **Run "npm start"**
  - **In your browser go to url:** `http://localhost:3000`

Lessons Learned

Osama :
I learned a lot throughout this project due to the vast technologies we used. It was my first time using Spring Boot, and React Js. Learning to use hooks and controllers and ajax to send requests was both frustrating and exciting. We used postman to make sure our backend worked, and that was also interesting as we learned about HTTP requests and the different kinds of them. I also learned how to write joins, and had a lot of fun trying to figure out a way to write the full outer join for our transaction functionalities.

Gabriel :
For this project I learned how to use multiple technologies to create an application that stores and gets information to a database. It was my first time doing a project of this scale and my first time using Java Spring for the backend and React Js for the frontend. I learned how requests are made using Ajax requests from React to the Java Spring backend. I learned how to manipulate the contents given from each POST and GET requests. I also learned how to use the application Postman to send requests to the backend to make sure that our backend is running correctly. Finally I learned how to set up the different ports for React: 3000 and be able to connect it to the Tomcat server through port 8080. This project was hard, yet it was a great experience.

Ajit :
In this course project, I learnt about setting up 3-tier architecture and how MySQL database interacts with the backend. In this project we used Java Spring which none of us (team members) had prior knowledge about but there were many websites and videos which helped us create the Java Spring project. Our main reason for using Java Spring was for using rest apis to connect data from front-end and back-end. Making GET and POST methods for each java function class. One problem which we encountered was we were running the react.js (front-end) on the same port as Tomcat Server and after some research we found out we had to cross-origin and have them running on different ports. React.js: port 3000 and Tomcat Server: port 8080. Overall I applied my MySQL query knowledge into writing queries in the backend.