Project 4 Part 1: Twitter Clone and Client Simulator

January 6, 2018

1 Installation

1.1 Twitter Installation

To setup our project, we need to run (on Linux) as follows. Besides, we provide a demo website at http://128.227.246.42:3000/ for readers to try our demo.

- sudo apt-get install postgresql postgresql-contrib
- sudo -u postgres createdb phoenix twitter dev
- sudo -u postgres psql -c "ALTER USER postgres PASSWORD 'postgres';"
- sudo apt-get install build-essential checkinstall
- ullet sudo apt-get install libssl-dev
- curl -o- https://raw.githubusercontent.com/creationix/nvm/v0.31.0/install.sh | bash
- source /.bashrc
- nvm install 8.9
- mix deps.get
- mix ecto.create
- mix ecto.migrate
- npm install
- mix phoenix.server

The above steps can setup the Phoenix Twitter well. If visiting to the website localhost:3000, we will see the homepage of Twitter.

1.2 Client Simulator

In order to run the client simulator, we can use the command

• mix test

2 Functionality to Implement

In this project, we have implemented Twitter functions as follows.

- Register account.
- Send tweet. Tweets can have hashtags (e.g. #COP5615isgreat) and mentions (@bestuser)
- Subscribe to user's tweets
- Re-tweets (so that your subscribers get an interesting tweet you got by other means)

- Allow querying tweets subscribed to, tweets with specific hashtags, tweets in which the user is mentioned (my mentions)
- If the user is connected, deliver the above types of tweets live (without querying)

For the client simulator part, the functions are as follows.

- Simulate as many users as you can
- Simulate periods of live connection and disconnection for users
- Simulate a Zipf distribution on the number of subscribers. For accounts with a lot of subscribers, increase the number of tweets. Make some of these messages re-tweets

3 Introduction

This Twitter Clone project is based on Phoenix framework, Node.js, and postgresql database. The user-interaction webpage is also included. The postgresql database is used to store the user informations and tweets informations. They include user id, user name, user password, user image, tweet id, tweet text and so on. A user using this website can sign up, log in, post tweets, follow other users, make certain tweets its favorite, and search some users, tweets or hashtags from the search box. To simulate the whole project, we write test driver with Phoenix Integration https://github.com/boydm/phoenix_integration

4 Experiment Result

4.1 Twitter Clone

Here we will show some screen shots when we first visit the website, sign up as a user, posts some tweets and so on.

Homepage. Figure 1 shows the homepage when we first access the http://localhost:3000 website. One the left side of the homepage, there is a list of the latest 5 users and on the right side, it shows the latest tweets. On the upper right corner of the website, the users can search the users, tweets, hashtags in the "search" text box. There some hyperlinks to show all the list of users, all the list of tweets, sign up page and log in page by clicking "Users", "Tweets", "Signup" and "Login", correspondingly.

Search. Figure 2 shows the result of searching "aa". As we can see from the figure, this result contains all the tweets, hashtags and users that have the substring "aa".

Signup. Figure 3 shows the webpage when a user wants to sign up. The user's name, login name, and password are required.

Users. If we want to know which users have registered on this website, we can click on the "Users" and all the users will be listed as shown in Figure 4.

Tweets. If we want to know all the tweets that have been posted by all the users, we can click on the "Tweets" and all the tweets will be listed according to the decreasing order of the posted time as shown in Figure 5.

Login. Figure 6 shows the website when a user wants to log in. The required fields are login name and password.

User homepage. Figure 7 shows the homepage after a user has logged in. The tweets shown on this page is the tweets the user has posted and the tweets posted by the users subscribed by this user. They are ordered by the time posted. Besides, the user can also see how many tweets he has posted, how many users is following him, how many users he is following on the upper left of the homepage.

Post tweets with hashtags and mentions. A user can post tweets by typing texts in the textbox. As we can see from Figures 8 and 9, after the user has posted the tweet with hashtag and mention, it can be shown on the homepage immediately.

Subscribe to user's tweets. A user can subscribe other user's tweets by going to that user's homepage and clicking "Follow" as shown in Figure 10. After that, this user will see the subscribed user's tweets in its homepage as shown in Figure 11.

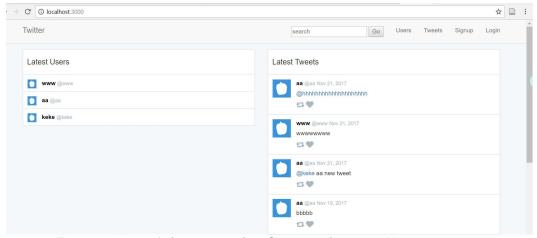


Figure 1: Twitter's homepage when first visit the http://localhost:3000

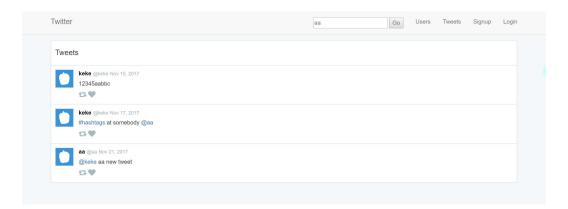


Figure 2: An example of twitter's search function when searching all the users or tweets that containing "aa".

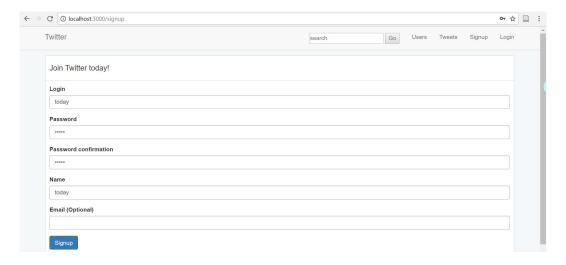


Figure 3: The screen shot of signing up for users.

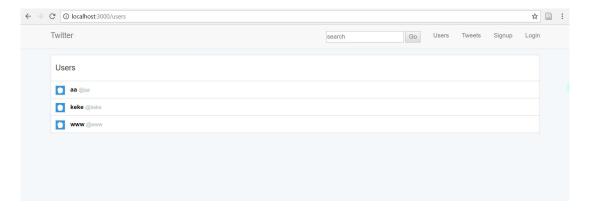


Figure 4: The "Users" page shows all the users registered.

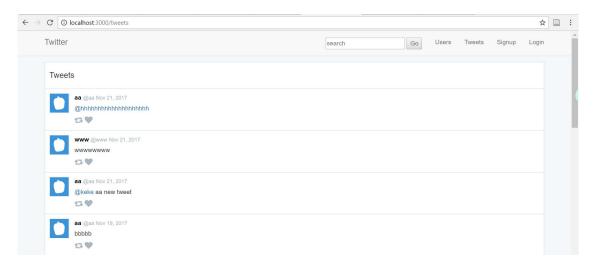


Figure 5: The "Tweets" page shows all the tweets posted by users sorted by the posted time.

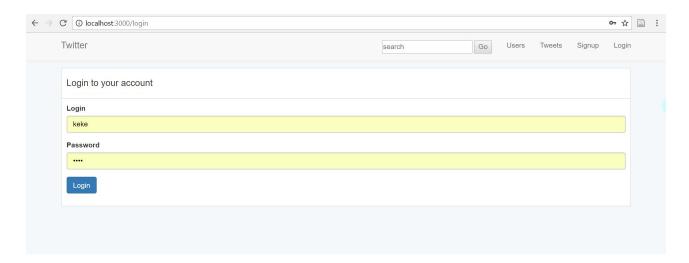


Figure 6: The "Login" page to allow users to log in to the Twitter.

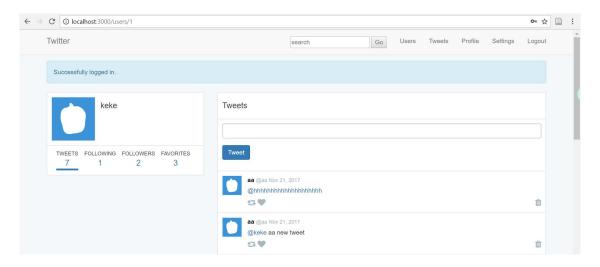


Figure 7: The user's homepage once it is logged in to the website.

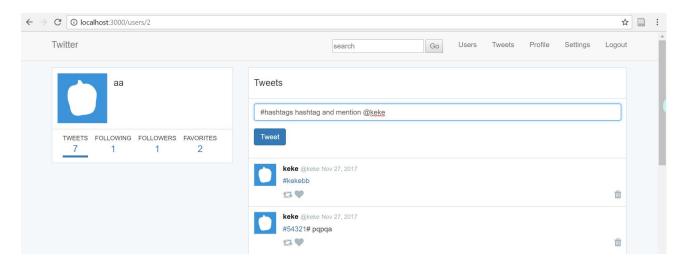


Figure 8: The user "aa" is going to post a tweet on Twitter with hashtag and mention.

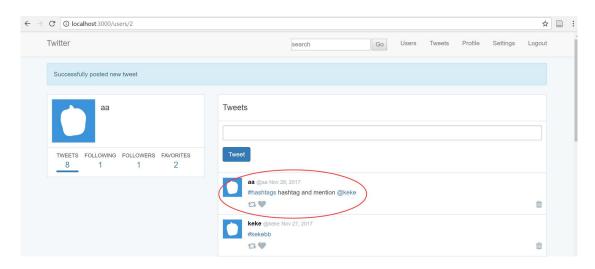


Figure 9: After the user "aa" has posted a tweet, it can be shown on the user's homepage as circled by the red line.

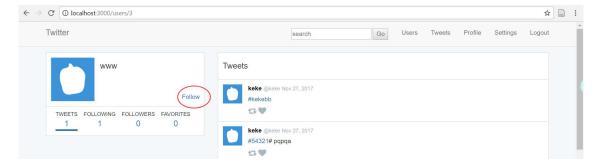


Figure 10: User can subscribe other user's tweets by "following" that user.

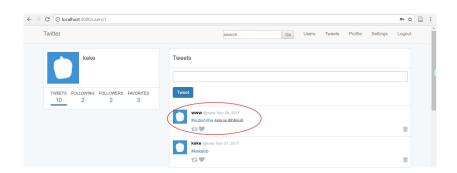


Figure 11: The subscribed user's tweets are shown on the user's homepage.

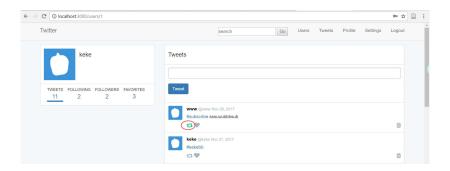


Figure 12: The user can retweet other's tweet by clicking the red circled area. And that icon will become green.

Table 1: The performance of the Twitter website when different number of users log in, post tweets, follow other users and retweet tweets.

Number of Clients	1	10	50	100	200	400
Time	0.7	1.4	3.4	6.7	14	31.2

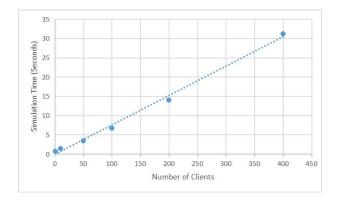


Figure 13: Performance of different number of clients. The times are recorded with a series of activates (logging in the website, post tweets, subscribe to other users).

Retweet. The user can retweet other's tweet by clicking the red circled area shown in Figure 12. The icon showing green means that it has been retweeted. The other users that has subscribed to this user will see this tweet as well.

4.2 Client Simulator

For the client simulator, we have simulated as many as 400 clients to log in this website at the same time. For each user logging in, we will calculate the possibility of this user being followed by other users according to the Zipf distribution, and the parameter is set as 1.5. The total number of twitters for each users is set according the Zipf distribution(a user has more subscribers will send more twitter). According to this probability, the number of subscribers for him is also known. Then this user will post the same number of tweets as subscribers. After that, he will randomly pick up some messages to retweet. Table 1 and Figure 13 have shown the performance when different number of users is doing the above operations at the same time. As we can see from the figure, the total time taken by all the users to complete these operations increases linearly with the number of clients. We didn't try more clients since our implementation of simulation is more complicated to support more functions (including web communication, user interface, database transactions), comparing to the requirement of the project (a simple in-memory implementation).