Project 4 Part 1

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Implementation of simulator

- Maximum Number of Users simulated?

  10,000 users simulated.

- Simulated periods of live connection and disconnection for users?

  Yes, done. Users are logging in and logging out frequently.

- Simulated 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?

  Done. Zipf distribution was applied for deciding number of subscribers for a particular user. Number of tweets/retweets were increased for users with higher number of subscribers.

What is working

- The client processes were run on a single machine as actors and the engine process was run on a different machine (again using actor model) considering the load it has to handle. (That is, client processes and engine are separate processes)
- Users can register, sign in, and sign out.
- Users can follow another user.
- Users can tweet/retweet.
- Users can receive live updates without querying.
- Users can view timeline (tweets/retweets of users they followed), query based on hashtags and mentions.
- We distributed number of subscribers in a Zipf distribution and recorded results for networks with 1000 users and 10,000 users.
- Use below command to run the client:

  dotnet fsi Client.fsx <no. of users> <IP address of the server>

- Use below command to run the server:

  dotnet fsi Server.fsx

Screenshot

Sample screenshots

Engine:

```
PS C:\Users\s1ddh\Desktop\Project41\twitter> dotnet fsi server.fsx
[INFO][11/30/2021 3:56:35 AM][Thread 0001][remoting (akka://Server)] Starting remoting
[INFO][11/30/2021 3:56:35 AM][Thread 0001][remoting (akka://Server)] Remoting started; listening on addresses : [akka.tcp://Server@10.20.244.195:9
903]
[INFO][11/30/2021 3:56:35 AM][Thread 0001][remoting (akka://Server)] Remoting now listens on addresses: [akka.tcp://Server@10.20.244.195:9903]
Login/Signup request received for user: User_1
Login/Signup request received for user: User_2
Login/Signup request received for user: User_3
Login/Signup request received for user: User_4
Login/Signup request received for user: User_5
UserId 3 wants to follow User_1
UserId 5 wants to follow User_1
UserId 2 wants to follow User_2
Login/Signup request received for user: User_3
Login/Signup request received for user: User_2
Login/Signup request received for user: User_1
Query request received for option 1 filter User_4
Logout request received from UserId 1
UserId 4 wants to view timeline
Query request received for option 2 filter @User_3
Tweet received for userId: 2 with content Random tweet from User_2 on #GatorNation mentioning @User_2
Logout request received from UserId 2
```

```
Login/Signup request received for user: User_5
Tweet received for userId: 3 with content Random tweet from User_3 on #Ufl mentioning @User_2
UserId 5 wants to view timeline
Tweet received for userId: 4 with content Random tweet from User_4 mentioning @User_1
Logout request received from UserId 4
Login/Signup request received for user: User_2
Query request received for option 1 filter User_1
Tweet received for userId: 3 with content Random tweet from User_3 on #Dosp mentioning @User_2
Login/Signup request received for user: User_1
Query request received for option 2 filter #CISE
Query request received for option 1 filter User_3
Login/Signup request received for user: User_1
UserId 1 wants to view timeline
Login/Signup request received for user: User_4
Query request received for option 2 filter #CISE
Tweet received for userId: 2 with content Random tweet from User_2 on #MSinCS mentioning @User_5
UserId 2 wants to view timeline
UserId 2 wants to view timeline
Logout request received from UserId 3
Query request received for option 2 filter #TheHub
Query request received for option 1 filter User_3
Query request received for option 2 filter #Ufl
Logout request received from UserId 2
Login/Signup request received for user: User_3
Logout request received from UserId 2
UserId 5 wants to view timeline
Tweet received for userId: 5 with content Random tweet from User_5 mentioning @User_1
Query request received for option 2 filter #Dosp
Logout request received from UserId 4
Query request received for option 2 filter #Dosp
Query request received for option 1 filter User_4
```

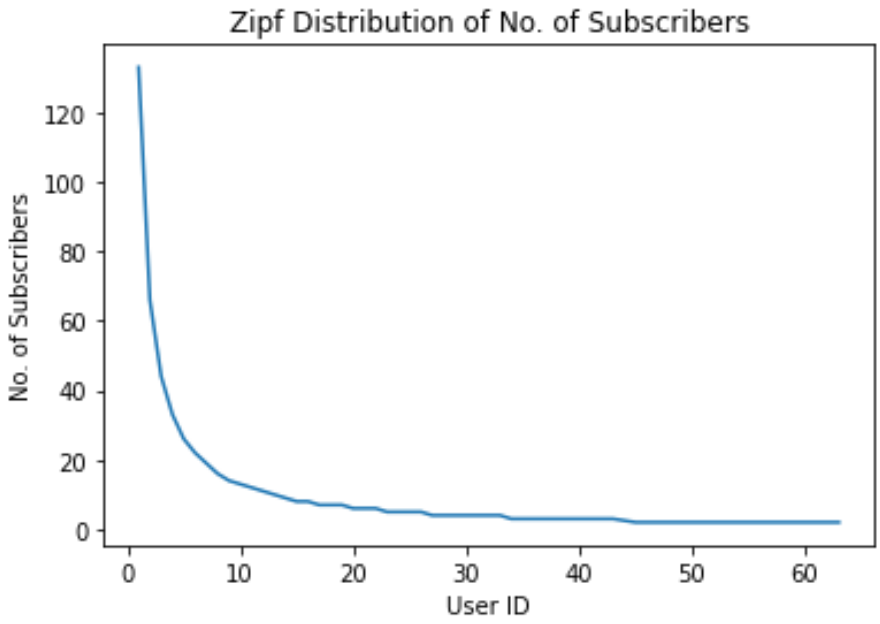
Client:

```
Activities   Terminal ▾                Mon 10:58 PM
                 jarvis@jarvis-HP-250-G3: ~/DoSP/Project4
File  Edit  View  Search  Terminal  Help

[INFO][30/11/2021 3:57:47 AM][Thread 0001][remoting (akka://Client)] Starting remoting
[INFO][30/11/2021 3:57:47 AM][Thread 0001][remoting (akka://Client)] Remoting started; listening on addresses : [akka.tcp://Clien
t@10.20.244.239:5556]
[INFO][30/11/2021 3:57:47 AM][Thread 0001][remoting (akka://Client)] Remoting now listens on addresses: [akka.tcp://Client@10.20.
244.239:5556]
[User_2] [User_3[User_5[User_1] User_1 LOGGED IN
] User_3 LOGGED IN
] User_5User_2 LOGGED IN LOGGED IN

[User_4] User_4 LOGGED IN
[[User_5] User_5 LOGGED IN
User_3] User_3 LOGGED IN
[User_1[User_2] ] User_1 is now FOLLOWING User_1
User_2 is now FOLLOWING User_2
[User_2] User_2 LOGGED IN
[User_1] User_1 is now FOLLOWING User_1
[User_1] User_1 LOGGED IN
[User_4] User_4 PUBLISHED Tweet #1
[User_3] User_3 PUBLISHED Tweet #2
[User_5] User_5 LOGGED OUT
[User_3] User_3 PUBLISHED Tweet #4
[User_3] User_3 QUERYING all tweets that mention @User_3 .....
[User_2] User_2 JUST TWEETED "Random tweet from User_2"
[User_2] User_2 PUBLISHED Tweet #3
[User_3] ------------ User_3 's Search Results ------------
[User_3] ----------------------------------------------
[User_1] ------------ User_1 's Timeline ------------
[User_1] ----------------------------------------
[User_1] User_1 is QUERYING all tweets on #CISE .....
[User_1] User_1 is QUERYING all tweets published by User_4 .....
[User_4] User_4 PUBLISHED Tweet #6
[User_2] User_2 JUST TWEETED "Random tweet from User_2 on #Dosp mentioning @User_5"
[User_2] User_2 PUBLISHED Tweet #5
[User_2] ------------ User_2 's Timeline ------------
[User_3[User_2] ] User_2 tweeted "Random tweet from User_2User_3 PUBLISHED Tweet #7"
```

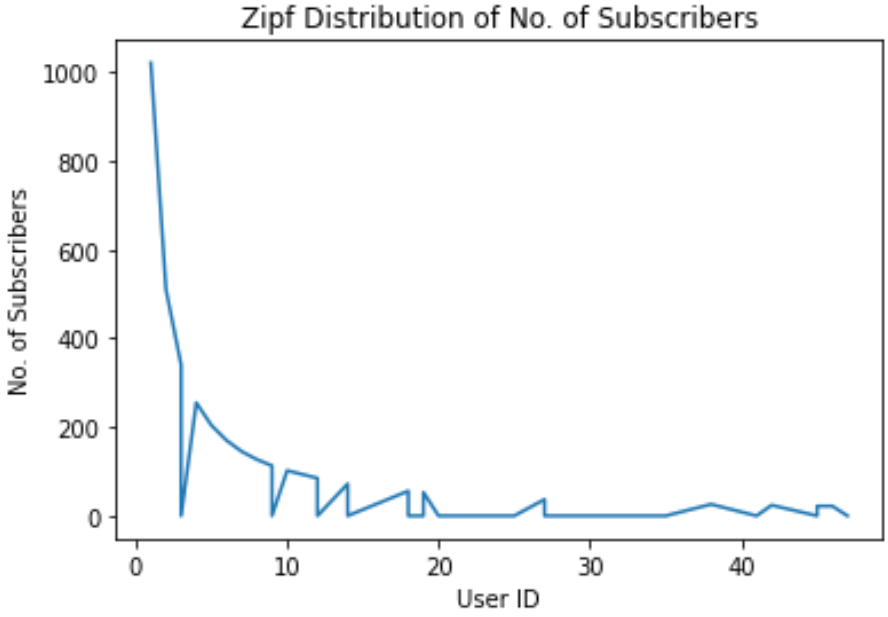
Zipf Plots:

Note: Zipf distribution graphs (User ID vs No. of subscribers) are truncated/zoomed for better visualization.

1,000 users:



10,000 users:

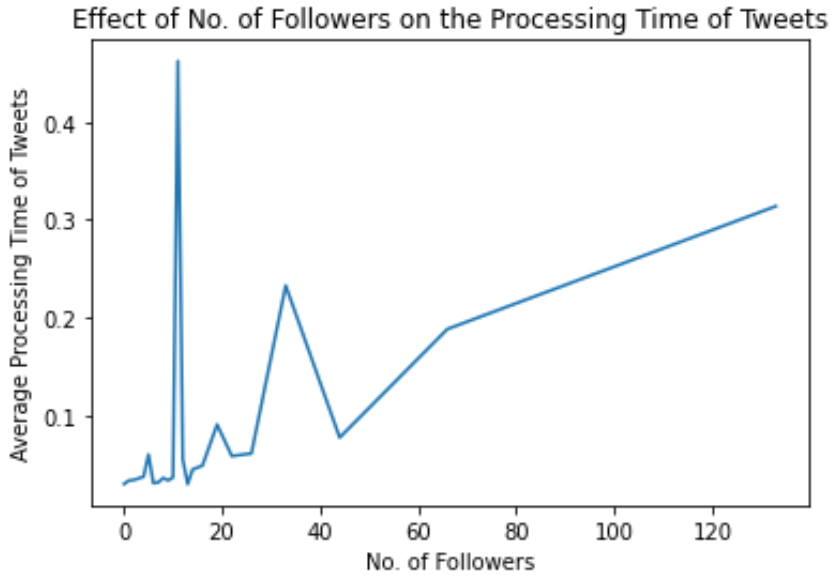


Performance:

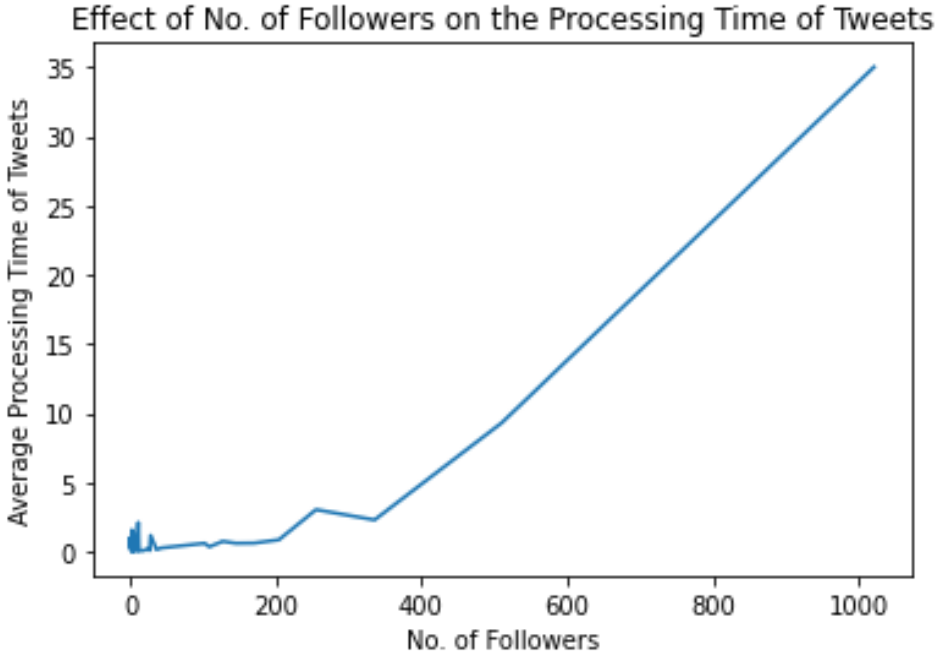
We recorded time taken to process tweets with respect to number of followers.

The processing of a tweets includes making database entries and distributing the tweet to all live subscribers.

1,000 users:



10,000 users:



System Statistics

For 1,000 users:

Maximum number of followers for a given user was 133 (by Zipf distribution)

	LiveUserCount	TimeTaken (ms)
Average	645	0.04
Min	528	0.0069
Max	999	2.69

For 10,000 users:

Maximum number of followers for a given user was 1021 (by Zipf distribution)

	LiveUserCount	TimeTaken (ms)
Average	7572	0.89
Min	3688	0.0045
Max	9436	170.72

Conclusion

We found that propagation time increased as the number of followers increased, because the time to propagate a tweet/re-tweet to followers increase. This also means, there is more activity in the network when there are more followers.