Distributed Operating System
Twitter clone and Simulation
Project 4 Part I

Team Members:

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Description:

Build Twitter Engine and add simulation to test it.

1. Implementation

Client:
Akka.actor is used extensively to develop client.fsx. Client sends messages to server, and receives the response and displays the output.

Server
Server is used to implement the following functionalities:
User:
We can register the user, sign in(active), authenticate and sign out(inactive). Each user has a username and password.

Tweet:
Each user can send a tweet. Time stamp is added to the instance of the tweet.

Twitter:
This singleton instance consists of multiple hashmaps that help the user search for hashtags and mentions.

HashTag:
For every tweet, we parse the tweet to find the word starting with # and add it to the hash map.

Mentions:
For every tweet, we parse the tweet to find the word starting with @ and add it to thehash map.

Display Tweets:
Every second, the actor calls itself to check if there was any new tweet added. If so, it displays the tweet.

2. Run the code

Terminal1: Server: `dotnet fsi --langversion:preview Server.fsx`

Terminal2:
Client: `dotnet fsi --langversion:preview Auto.fsx N`

`Where N is number of users`

3. Output

Terminal1: Server: `dotnet fsi --langversion:preview Server.fsx`

Terminal2:

`dotnet fsi --langversion:preview AUTO.fsx 20000`
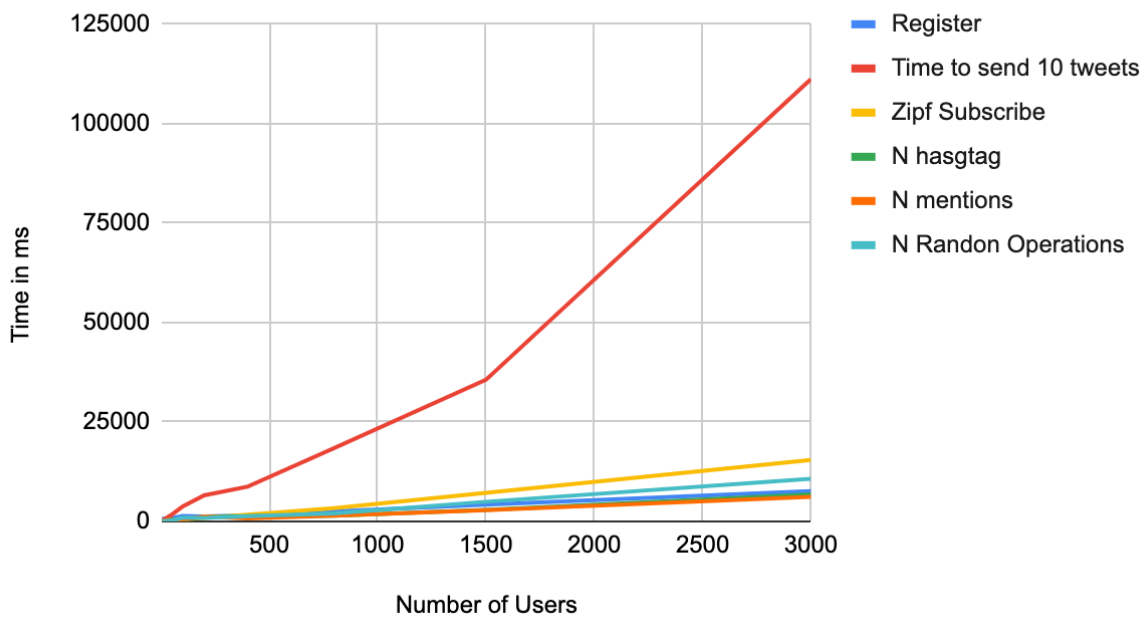`result10.txt` is Performance test result under 20000 users

```
The time of register 20000 users is 21309.168300
The time of send 10 tweets is 21309.168300
The time of Zipf subscribe 20000 users is 21309.168300
The time of query 20000 users is 21309.168300
The time of query 20000 hasgtag is 21309.168300
The time of query 20000 mention is 21309.168300
The time of 20000 random operations is 21309.168300
Total Result: 21309.168300 21309.168300 21309.168300 21309.168300 21309.168300 21309.168300 21309.168300
[DEBUG][12/2/2021 4:42:37 AM][Thread 0025][akka://RemoteFSharp/system/remoting-terminator] Stopped
```

4. Result

We measure the time taken for each of the following for N number of users:
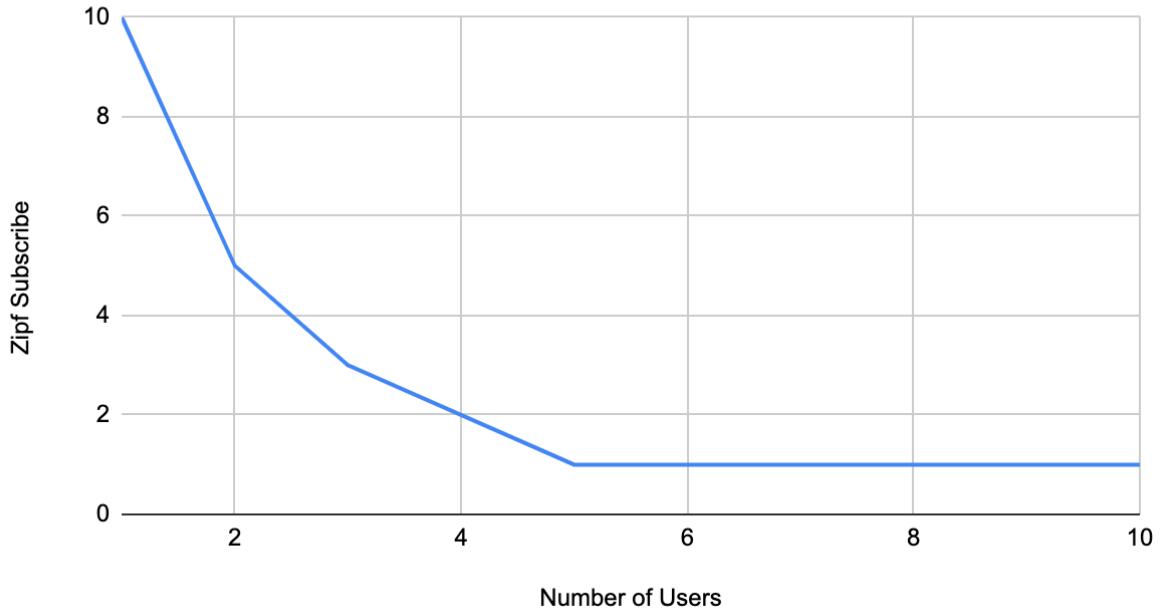- Time to register N users
- Time taken for each user to send 10 tweets
- Zipf Subscribe
- Time to check N hashtags
- Time to check N mentions
- Time to perform N random operations

time taken by users to perform operations

Zipf Subscribe vs Number of Users

Zipf Subscribe vs Number of Users

4.Largest network of users built: 20000

Result:

```
Register 20000 users is 21309.168300
Send 10 tweets is 21309.168300
Zipf subscribe 20000 users is 21309.168300
Query 20000 users is 21309.168300
Query 20000 hasgtag is 21309.168300
Query 20000 mention is 21309.168300
The time of 20000 random operations is 21309.168300
Total Result: 21309.168300 21309.168300 21309.168300 21309.168300
21309.168300 21309.168300 21309.168300
```

5. Conclusion

- Sending a tweet takes the most amount of time among all the operations. Each time a tweet is sent, the tweet is parsed for both hashtags and mentions which consumes a considerable amount of time.
- Zipf Subscribe has the second least performance among all operations since it has to perform 2*N subscribe operations.
- All other operations are dependent on the number of users and run N number of times.