Distributed Operating Systems

Project 4 – Part 1

Implementation of Twitter Clone and a client tester/simulator.

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## How to Run:

Server : dotnet fsi –langversion:preview twitter_engine.fsx

Client : dotnet fsi –langversion:preview twitter_simulator.fsx <server_ip> <server_port> <number_of_clients>

## Architecture:

Server:

- Request Handler: This actor will handle all the requests made by the client. Depending on the request from the client Request Handler will delegate work to specific actors in the server and will print the statistics after serving every 10000 requests.
- Tweet Handler: This actor will handle all the tweet requests delegated by the request handler actor. It has two main functions one to handle the new tweet message and the other to handle the retweets. It will also send the tweet to the active subscribers of this client and will print the statistics after processing every 10000 requests.
- Registration Handler: This Actor is responsible to perform Registration, Login, and Logout requests delegated by the request handler.
- Get Handler: This actor is responsible to operate all the get tweets, get mentions, and get hashtags requests that are delegated by the request handler and will print the statistics after managing every 100 requests.
- Followers Handler: This actor is responsible to carry out add followers and send a tweet to followers operations delegated by the request handler and tweet handler
- Tweet Parser: This actor is responsible to manage the parsing of the tweet and extracting hashtags and mentions from tweets given by the tweet handler.

Simulator:

- Simulator: This actor is responsible to create clients and performs registration with the server. After this simulator will allow the client to perform activities with the server in a Zipf distribution manner.
- Client: This actor will send tweets, re-tweets, follow, subscribe, get tweets, etc requests to the server and accepts the response from the server. Out of every 1000 requests made by the client 1 will be a get tweet request, 1 will be a get mention request and 1 will be a get mentions request, out of every 100 requests 1 will be a logout request, 1 will be a login request and out of every 10 requests 1 will be a retweet request, and the rest all will be the tweet requests.

## Zipf Distribution:

Each client is ranked from 1 – N where N is the total number of clients simulated by the simulator. Each client will make 1/rank number of requests per millisecond to the server. Please look fig1 to see the distribution of client activity according to its rank. The number of followers to each client is inversely proportional to the rank of the client.

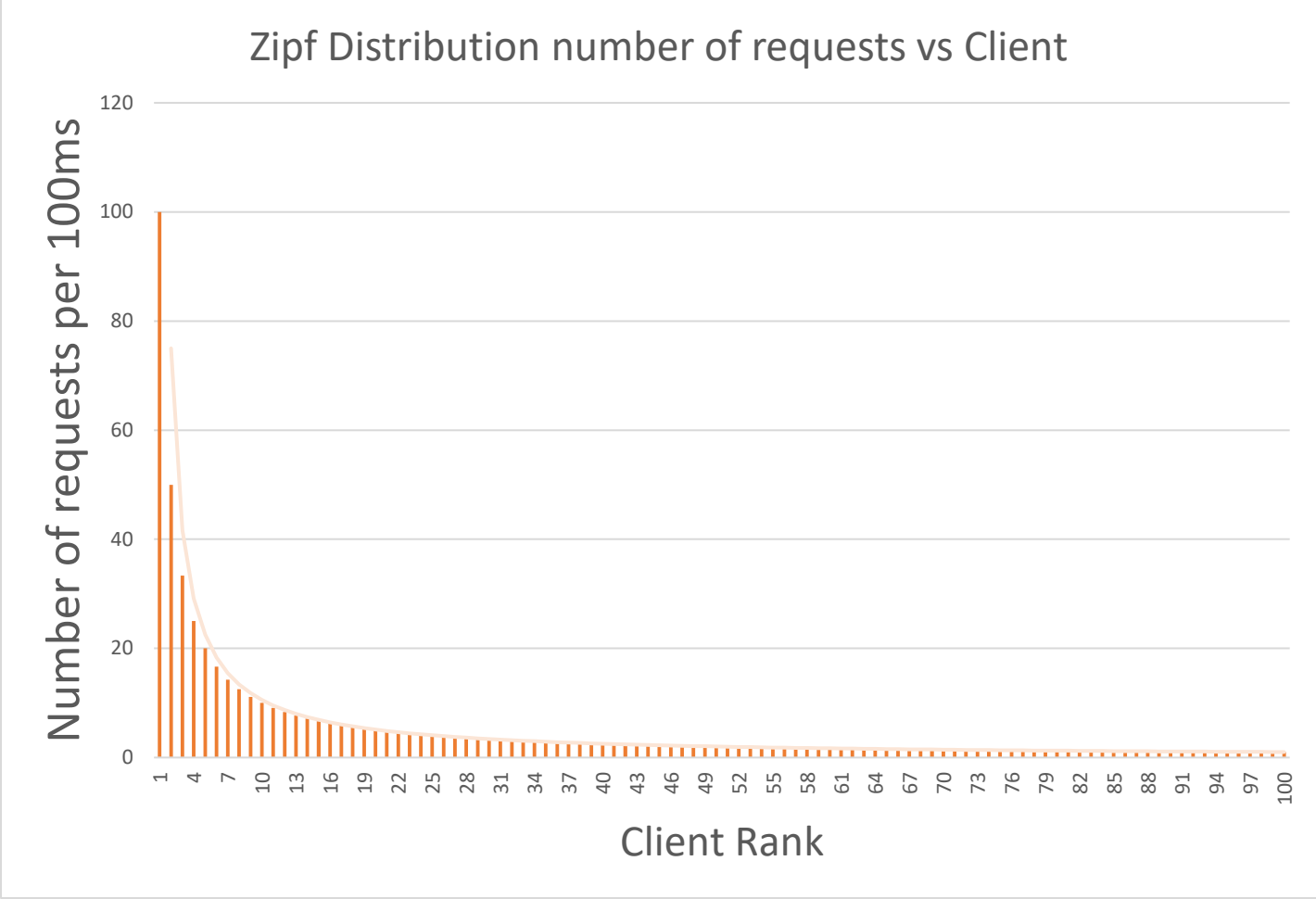


*Figure 1: Zipf Distribution*

Results:

```
PS C:\Users\Sanjay\OneDrive - University of Florida\Fall 2020\DOS\Fall20-DOS-Fsharp\Project4> dotnet fsi --langversion:preview .\twitter_engine.fsx
[INFO][12/4/2020 3:59:22 AM][Thread 0001][remoting (akka://TwitterEngine)] Starting remoting
[INFO][12/4/2020 3:59:22 AM][Thread 0001][remoting (akka://TwitterEngine)] Remoting started; listening on addresses : [akka.tcp://TwitterEngine@192.168.0.96:8777]
[INFO][12/4/2020 3:59:22 AM][Thread 0001][remoting (akka://TwitterEngine)] Remoting now listens on addresses: [akka.tcp://TwitterEngine@192.168.0.96:8777]
Server Started
Time taken to handle 10000 requests from clients is 58.9677 milliseconds
Average time taken to process get tweets is 33.12 microseconds after 100 gettweets Request
Average time taken to process get mentions is 46.91 microseconds after 100 gettweets Request
Average time taken to process get hashtags is 15.992 microseconds after 100 gettweets Request
Average Tweet processing after 10000 tweets is 33.45232 microseconds and total 334.5232 milliseconds
Time taken to handle 20000 requests from clients is 91.2973 milliseconds
Average time taken to process get tweets is 65.315 microseconds after 200 gettweets Request
Average time taken to process get mentions is 86.5425 microseconds after 200 gettweets Request
Average Tweet processing after 20000 tweets is 30.87374 microseconds and total 617.4748 milliseconds
Average time taken to process get hashtags is 9.8345 microseconds after 200 gettweets Request
Time taken to handle 30000 requests from clients is 133.0571 milliseconds
Average time taken to process get tweets is 113.5896667 microseconds after 300 gettweets Request
Average time taken to process get hashtags is 8.427666667 microseconds after 300 gettweets Request
Average time taken to process get mentions is 117.845 microseconds after 300 gettweets Request
Average Tweet processing after 30000 tweets is 31.83204667 microseconds and total 954.9614 milliseconds
Time taken to handle 40000 requests from clients is 180.5389 milliseconds
Average time taken to process get tweets is 224.8125 microseconds after 400 gettweets Request
```

Server Console

```
"Tweet|Subscribe|Hello @100_Client_20 ##twitter""Tweet|Subscribe|Hello @100_Client_35 ##twitter"
"Tweet|Subscribe|Hello @100_Client_5 #Gainesville""Tweet|Subscribe|Hello @100_Client_46 ##twitter"


"Tweet|Subscribe|Hello @100_Client_27 #sanjay""Tweet|Subscribe|Hello @100_Client_9 ##AKKA"


"Tweet|Subscribe|Hello @100_Client_75 ##Fall2020"

"Tweet|Subscribe|Hello @100_Client_14 ##AKKA""Tweet|Subscribe|Hello @100_Client_88 #COP5615"

"Tweet|Subscribe|Hello @100_Client_23 #Gainesville""Tweet|Subscribe|Hello @100_Client_87 ##FSharp"

"Tweet|Subscribe|Hello @100_Client_38 #UF""Tweet|Subscribe|Hello @100_Client_21 ##Fall2020"
"Tweet|Subscribe|Hello @100_Client_89 #Gainesville""Tweet|Subscribe|Hello @100_Client_80 ##AKKA"

"Tweet|Subscribe|Hello @100_Client_99 ##deepthi""Tweet|Subscribe|Hello @100_Client_84 ##FSharp"
"Tweet|Subscribe|Hello @100_Client_5 #Gainesville"

"Tweet|Subscribe|Hello @100_Client_8 ##twitter"

"Tweet|Subscribe|Hello @100_Client_91 #UF"

"Tweet|Subscribe|Hello @100_Client_94 ##twitter""Tweet|Subscribe|Hello @100_Client_56 ##AKKA"
"Tweet|Subscribe|Hello @100_Client_64 #Gainesville""Tweet|Subscribe|Hello @100_Client_42 #Gainesville"
```

Simulator Console

Statistics:

| Number of Clients | Time taken to solve following number of requests in milliseconds | | | | |
|---|---|---|---|---|---|
| | 10000 of all Requests | 10000 of Tweets and Re-Tweets | 10000 of Get Tweets | 10000 of Get Mentions | 10000 of Get Hashtags |
| 10 | 50.9212 | 189.2086 | 1023.96 | 1444.34 | 1131.17 |
| 100 | 52.6182 | 486.5787 | 1302.53 | 1261.55 | 2394.60 |
| 500 | 50.8525 | 3651.0233 | 1562.37 | 1977.65 | 2286.24 |
| 1000 | 57.3172 | 7564.5482 | 3101.90 | 1286.29 | 3232.70 |
| 2000 | 40.2402 | 18494.0132 | 2020.87 | 2702.97 | 2115.63 |