Project 4

Contributors

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Problem Definition

Implement a Twitter-like engine with the following functionality:

- 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)

Implement a tester/simulator to test the above

- 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

Steps to run

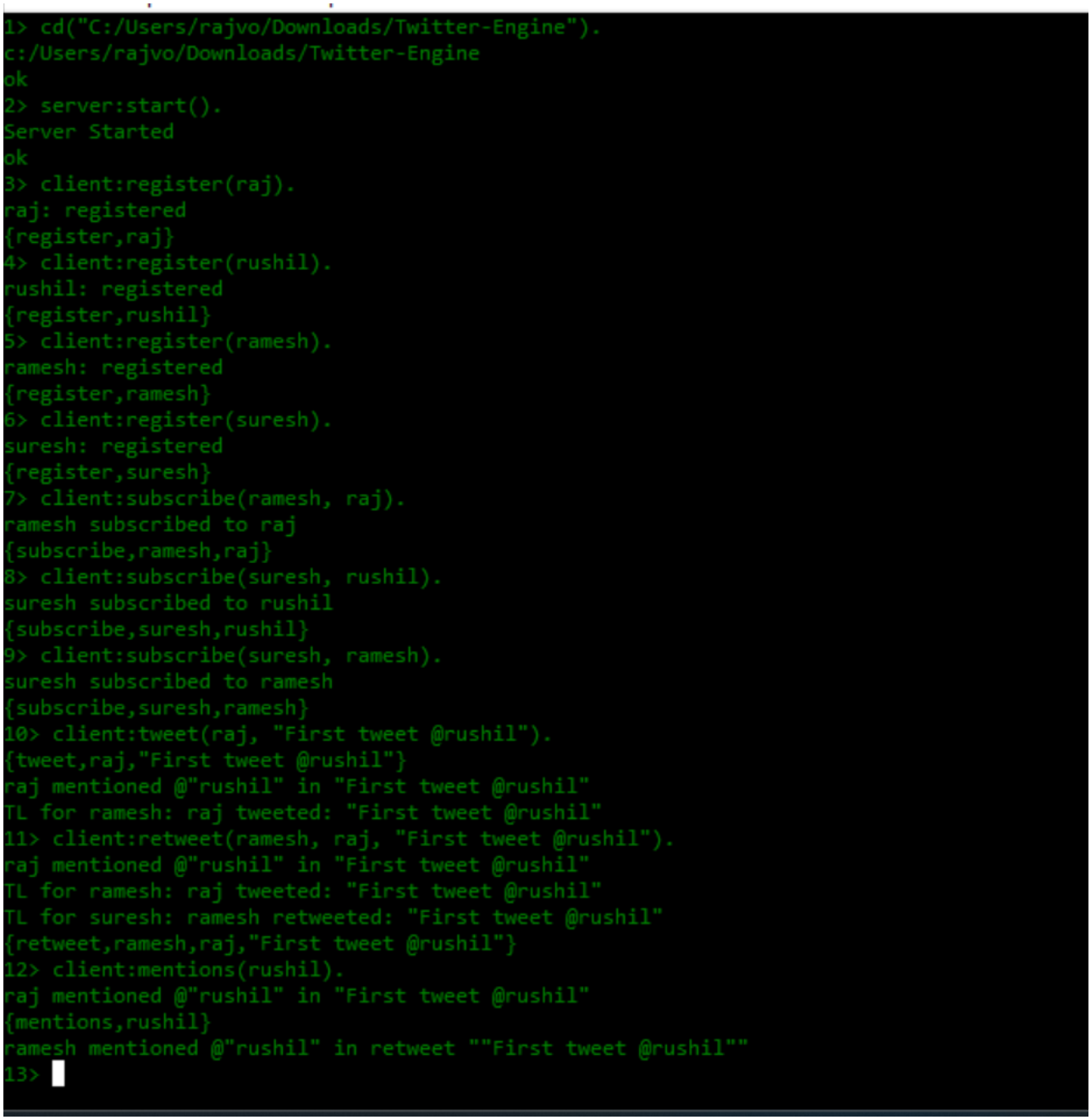
1. Compile all the files to `.beam` with `erlc ./*.erl` command.
2. Then start erlang shell with `.erl`.
3. Start server with command `server:start().`
4. The client has multiple functions for all the above mentioned APIs.
5. Register a user using `client:register(Username)`, the username should be an atom. The user is automatically online when he registers.
6. Then the user can subscriber to another user with the command `client:subscribe(Username, Subscribe_To)` where both usernames have to be atoms.
7. Any user can tweet with the command `client:tweet(Username, Tweet)` where the Tweet is a string and can contain mentions with `@username` and hashtags as `#cop5616isgreat`.
8. User can also retweet another users tweet with `client:retweet(Username, Tweeter, Tweet)`.
9. All these tweets are delivered live to the user if he is online i.e. tweets by users he has subscribed to and tweets in which the given user is mentioned.
10. The user can logout anytime with the command `client:logout(Username)`.
11. We can also query for the subscribed tweets, my mentions and any hashtag with `client:timeline(Username)`, `client:mentions(Username)` and `client:hashtag(Username, Hashtag)`.

Simulator

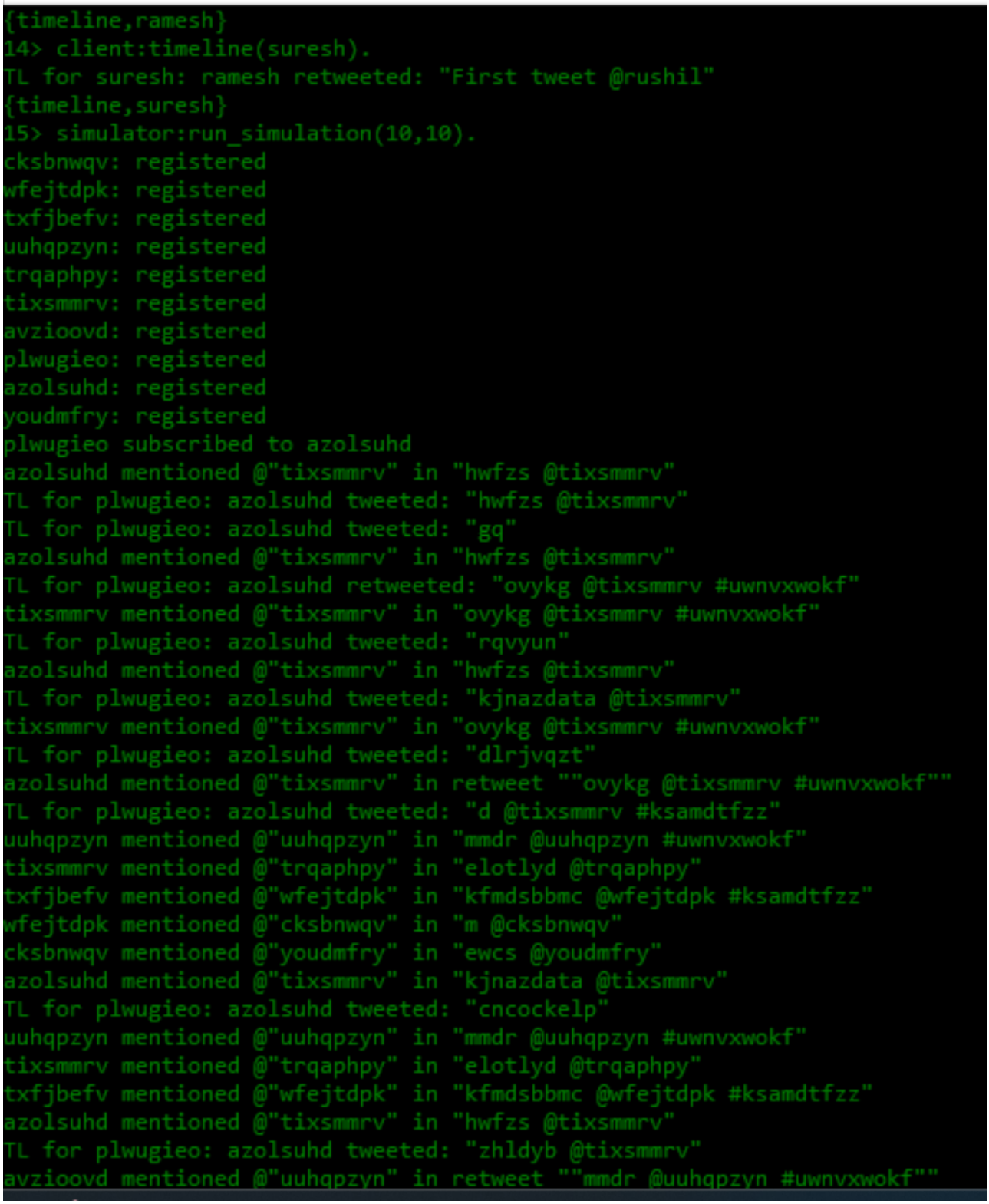
- The simulator takes number of users and number of tweets as input with the command `simulator:run_simulation(No_of_users, No_of_tweets)`.
- It then uses the above commands to register and send tweets with the users.
- We follow zipf law for subscribers which asserts that the frequencies f of certain events are inversely proportional to their rank r. Which means the user with highest rank has (0.1 / rank) x total subscribers.
- The highest ranked user also has largest number of tweets and 1/8th of those tweets are retweets.
- Then each users mentions and timelines are queried.
- There is a fix batch of hashtags which is used in various tweets for simulation. That set of hashtags is queried multiple times by random users.
- We could simulate the whole system with a maximum of 2000 users.

Screenshots

- Direct client usage



- Simulator use



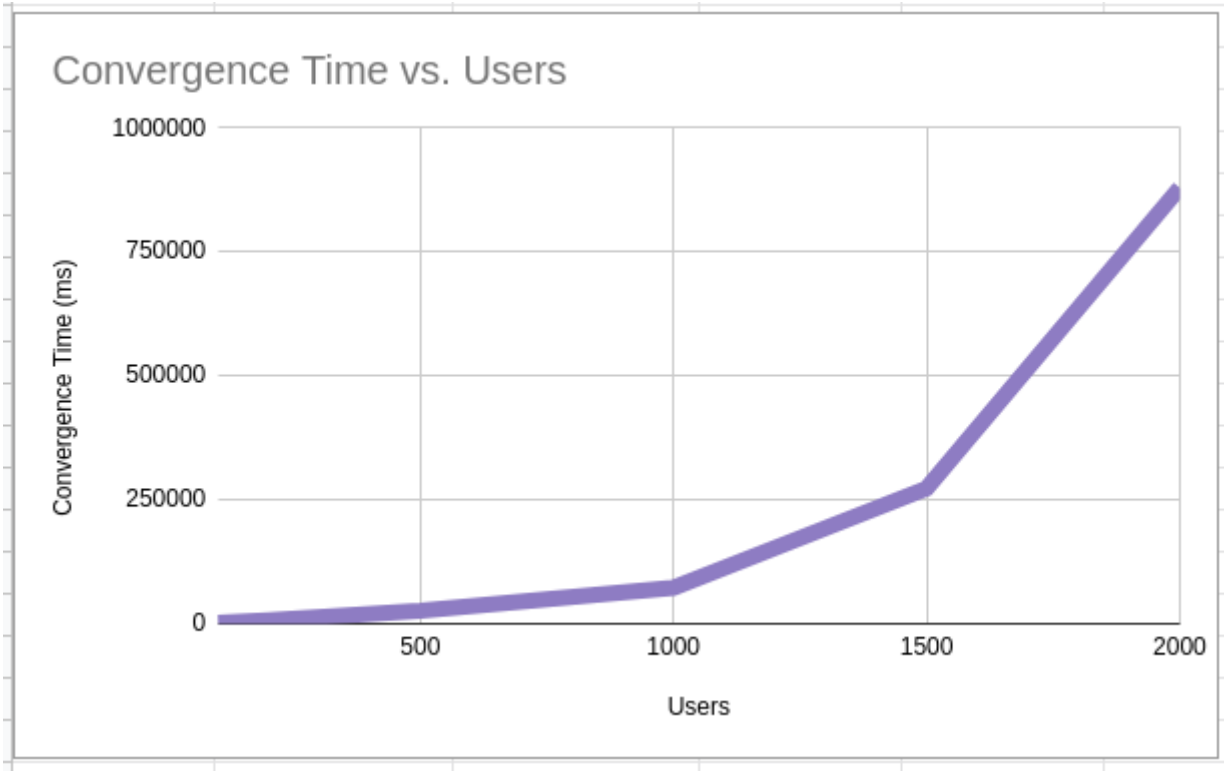
```
avzioovd mentioned @"uuhqpzyn" in "j @uuhqpzyn #rfnmlaxfp"
avzioovd mentioned @"uuhqpzyn" in "ncg @uuhqpzyn"
uuhqpzyn mentioned @"uuhqpzyn" in "dw @uuhqpzyn #ksamdtfzz"
uuhqpzyn mentioned @"uuhqpzyn" in "fanmdcxuok @uuhqpzyn"


Checking mentions

plwugieo mentioned @"plwugieo" in "fbxl @plwugieo #uwnvxwokf"
azolsuhd mentioned @"tixsmmrv" in "hwfzs @tixsmmrv"
tixsmmrv mentioned @"trqaphpy" in "elotlyd @trqaphpy"
uuhqpzyn mentioned @"uuhqpzyn" in "mmdr @uuhqpzyn #uwnvxwokf"
txfjbefv mentioned @"wfejtdpk" in "kfmdsbbmc @wfejtdpk #ksamdtfzz"
wfejtdpk mentioned @"cksbnwqv" in "m @cksbnwqv"
cksbnwqv mentioned @"youdmfry" in "ewcs @youdmfry"
plwugieo mentioned @"plwugieo" in retweet ""fbxl @plwugieo #uwnvxwokf
tixsmmrv mentioned @"tixsmmrv" in "ovykg @tixsmmrv #uwnvxwokf"
tixsmmrv mentioned @"trqaphpy" in "ficqu @trqaphpy #rfnmlaxfp"
avzioovd mentioned @"uuhqpzyn" in retweet ""mmdr @uuhqpzyn #uwnvxwokf
txfjbefv mentioned @"wfejtdpk" in "facxskdw @wfejtdpk"
plwugieo mentioned @"plwugieo" in "oothiwki @plwugieo"
azolsuhd mentioned @"tixsmmrv" in retweet ""ovykg @tixsmmrv #uwnvxwok
tixsmmrv mentioned @"trqaphpy" in "urlcmcw @trqaphpy"
avzioovd mentioned @"uuhqpzyn" in "hobgfte @uuhqpzyn"
plwugieo mentioned @"plwugieo" in "hh @plwugieo #ksamdtfzz"
azolsuhd mentioned @"tixsmmrv" in "kjnazdata @tixsmmrv"
trqaphpy mentioned @"trqaphpy" in "ufx @trqaphpy"
avzioovd mentioned @"uuhqpzyn" in "j @uuhqpzyn #rfnmlaxfp"
plwugieo mentioned @"plwugieo" in "witvbzibwu @plwugieo"
azolsuhd mentioned @"tixsmmrv" in "d @tixsmmrv #ksamdtfzz"
trqaphpy mentioned @"trqaphpy" in "x @trqaphpy #ksamdtfzz"
avzioovd mentioned @"uuhqpzyn" in "ncg @uuhqpzyn"
azolsuhd mentioned @"tixsmmrv" in "zhldyb @tixsmmrv"
trqaphpy mentioned @"trqaphpy" in "nafevqmpn @trqaphpy"
uuhqpzyn mentioned @"uuhqpzyn" in "dw @uuhqpzyn #ksamdtfzz"
uuhqpzyn mentioned @"uuhqpzyn" in "fanmdcxuok @uuhqpzyn"
azolsuhd used #"ksamdtfzz" in "d @tixsmmrv #ksamdtfzz"
tixsmmrv used #"uwnvxwokf" in "ovykg @tixsmmrv #uwnvxwokf"
avzioovd used #"rfnmlaxfp" in "j @uuhqpzyn #rfnmlaxfp"
true
plwugieo used #"ksamdtfzz" in "hh @plwugieo #ksamdtfzz"
azolsuhd  used #"uwnvxwokf" in retweet "ovykg @tixsmmrv #uwnvxwokf"
```

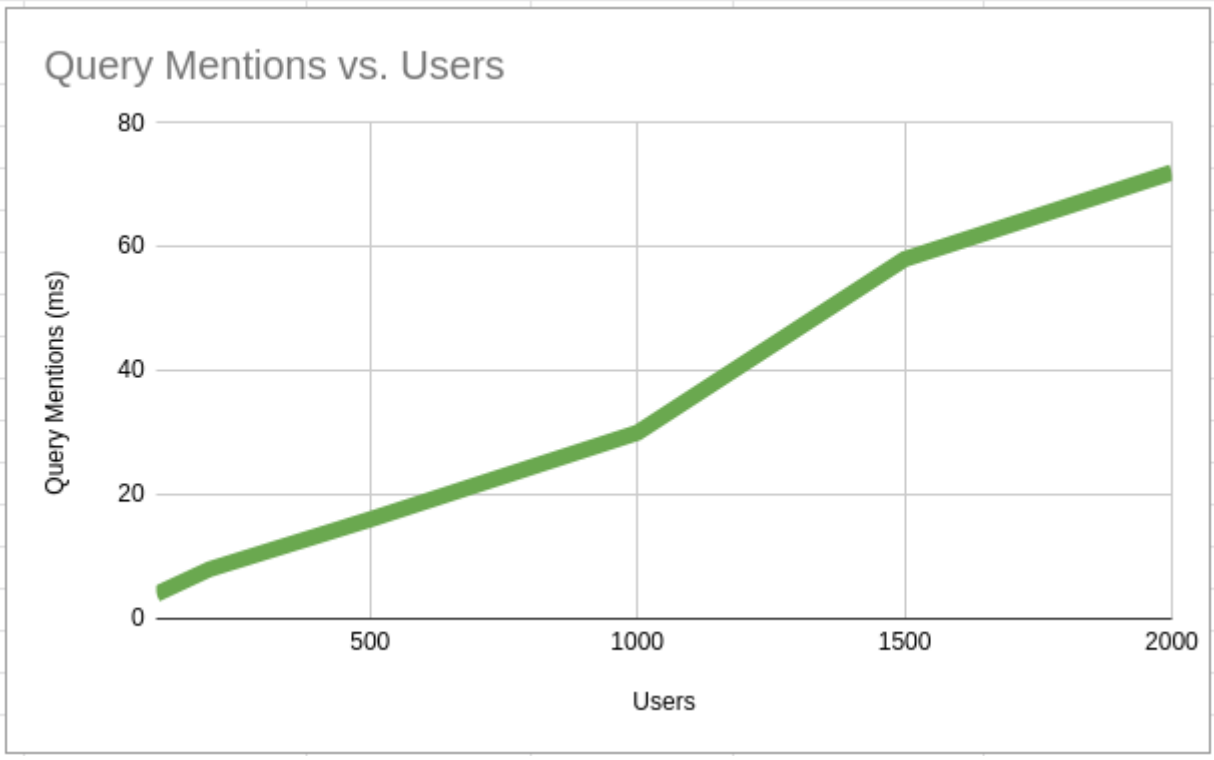
```
trqaphpy mentioned @"trqaphpy" in "x @trqaphpy #ksamdtfzz"
avzioovd mentioned @"uuhqpzyn" in "ncg @uuhqpzyn"
azolsuhd mentioned @"tixsmmrv" in "zhldyb @tixsmmrv"
trqaphpy mentioned @"trqaphpy" in "nafevqmpn @trqaphpy"
uuhqpzyn mentioned @"uuhqpzyn" in "dw @uuhqpzyn #ksamdtfzz"
uuhqpzyn mentioned @"uuhqpzyn" in "fanmdcxuok @uuhqpzyn"
azolsuhd used #"ksamdtfzz" in "d @tixsmmrv #ksamdtfzz"
tixsmmrv used #"uwnvxwokf" in "ovykg @tixsmmrv #uwnvxwokf"
avzioovd used #"rfnmlaxfp" in "j @uuhqpzyn #rfnmlaxfp"
true
plwugieo used #"ksamdtfzz" in "hh @plwugieo #ksamdtfzz"
azolsuhd  used #"uwnvxwokf" in retweet "ovykg @tixsmmrv #uwnvxwokf"
tixsmmrv used #"rfnmlaxfp" in "ficqu @trqaphpy #rfnmlaxfp"
trqaphpy used #"ksamdtfzz" in "x @trqaphpy #ksamdtfzz"
plwugieo used #"uwnvxwokf" in "fbxl @plwugieo #uwnvxwokf"
uuhqpzyn used #"ksamdtfzz" in "dw @uuhqpzyn #ksamdtfzz"
plwugieo  used #"uwnvxwokf" in retweet "fbxl @plwugieo #uwnvxwokf"
txfjbefv used #"ksamdtfzz" in "kfmdsbbmc @wfejtdpk #ksamdtfzz"
uuhqpzyn used #"uwnvxwokf" in "mmdr @uuhqpzyn #uwnvxwokf"
avzioovd  used #"uwnvxwokf" in retweet "mmdr @uuhqpzyn #uwnvxwokf"
TL for plwugieo: azolsuhd tweeted: "hwfzs @tixsmmrv"
TL for plwugieo: azolsuhd tweeted: "gq"
TL for plwugieo: azolsuhd tweeted: "rqvyun"
TL for plwugieo: azolsuhd tweeted: "kjnazdata @tixsmmrv"
TL for plwugieo: azolsuhd tweeted: "dlrjvqzt"
TL for plwugieo: azolsuhd tweeted: "d @tixsmmrv #ksamdtfzz"
TL for plwugieo: azolsuhd tweeted: "cncockelp"
TL for plwugieo: azolsuhd tweeted: "zhldyb @tixsmmrv"
TL for plwugieo: azolsuhd tweeted: "zaifdfpuy"
TL for plwugieo: azolsuhd retweeted: "ovykg @tixsmmrv #uwnvxwokf"
16>
```

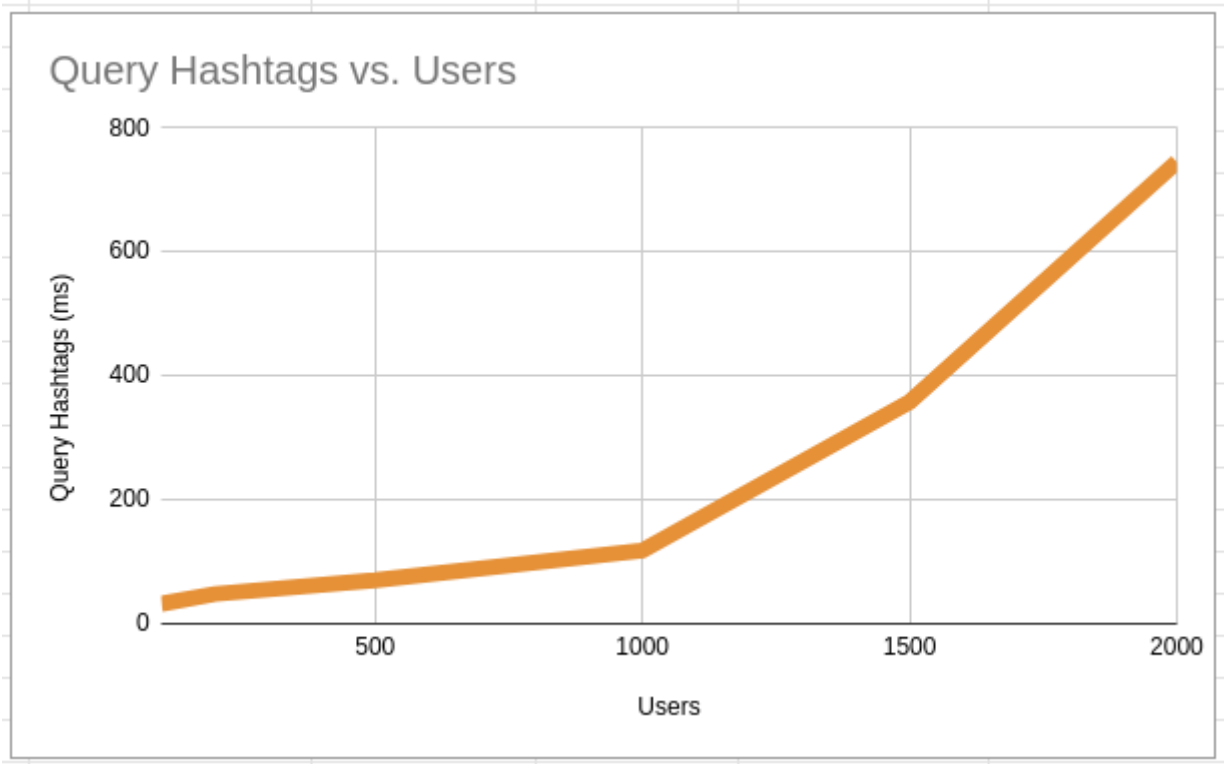
Graphs

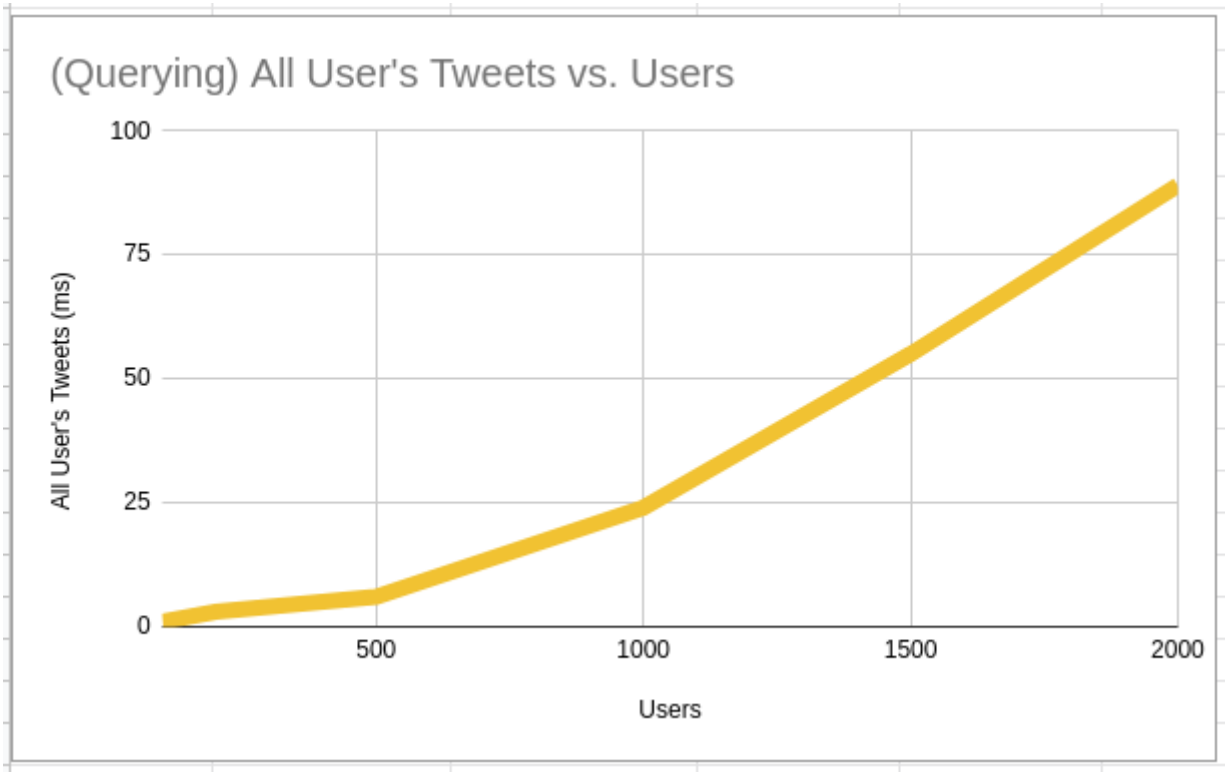
- We plot the time taken for these operations with various number of users and tweets.

Tweets	*Users*	*Convergence Time*	*Total Tweets*	*Total Retweets*	*Query Hashtags*	*Get All User's Tweets*	*Query Mentions*
50	100	1807ms	2188	312	32ms	1ms	4ms
100	200	6701ms	8750	1250	48ms	3ms	8ms
200	500	25867ms	43750	6250	70ms	6ms	16ms
400	1000	72142ms	175000	25000	118ms	24ms	30ms
800	1500	272877ms	525000	75000	358ms	55ms	58ms
1600	2000	879385ms	1400000	200000	745ms	89ms	72ms






Query Hashtags vs. Users
800
600
400
200
0
Query Hashtags (ms)
500
1000
1500
2000
Users


(Querying) All User's Tweets vs. Users
100
75
50
25
0
All User's Tweets (ms)
500
1000
1500
2000
Users