Project 2 - Improved Multi-server Network

Introduction

This is an advanced version of project 1 which provides:

- High Available
- Eventually Consistancy'

!!! NOTE: Our implementation for delivering activity to client is synchronous, so that you may need to wait a period of time before you can actually receive an activity (default period is 1 second) !!!

How to start this system

Jar file usage:

Server startup

```
usage: ActivityStreamer.Server [-a <arg>] [-activity_check_interval <arg>]
       [-lh <arg>] [-lp <arg>] [-rh <arg>] [-rp <arg>] [-s <arg>]
       [-sync_interval <arg>] [-time_before_reconnect <arg>]
An ActivityStream Server for Unimelb COMP90015

 -a <arg>                          announce interval in milliseconds

 -lh <arg>                         local hostname
 -lp <arg>                         local port number
 -rh <arg>                            remote hostname
 -rp <arg>                            remote port number
 -s <arg>                             secret for the server to use
 -sync_interval <arg>                 Provide the interval (in milliseconds,
                                      5000 by default) to sync data amoung
                                      servers.
 -time_before_reconnect <arg>         Provide the time (in milliseconds, 0 by
                                      default) to wait before reconnect if a
                                      server crashes, mainly for testing
                                      eventually consistancy
 -activity_check_interval <arg>       Provide the interval (in milliseconds,
                                      1000 by default) to check whether there
                                      is new activity coming in.
```

Client startup

```
usage: ActivityStreamer.Client [-rh <arg>] [-rp <arg>] [-s
       <arg>] [-u <arg>]
An ActivityStream Client for Unimelb COMP90015
 -rh <arg>   remote hostname
 -rp <arg>   remote port number
 -s  <arg>   secret for username, if not provided, run "register" process
 -u  <arg>   username, if not provided, login as "anonymous".
```

Test cases

High Available

Operations

1. Start 4 servers

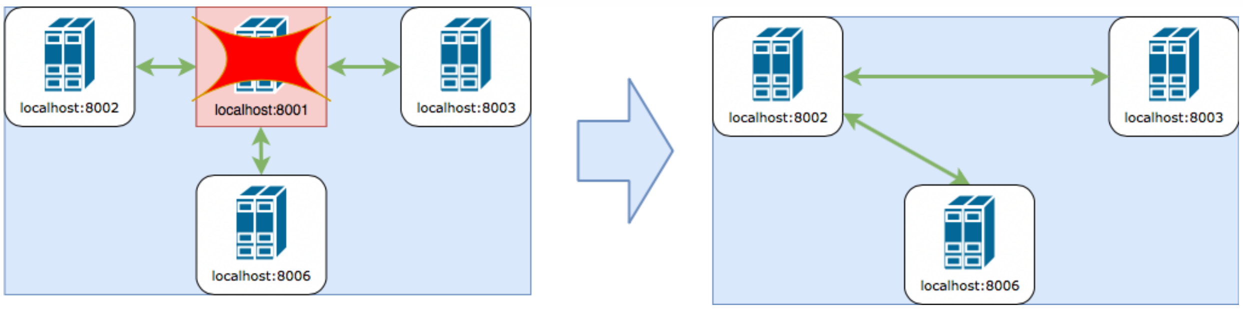
```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001
java -jar ActivityStreamerServer.jar -lh localhost -lp 8003 -s abc -rh
localhost -rp 8001
java -jar ActivityStreamerServer.jar -lh localhost -lp 8006 -s abc -rh
localhost -rp 8001
```

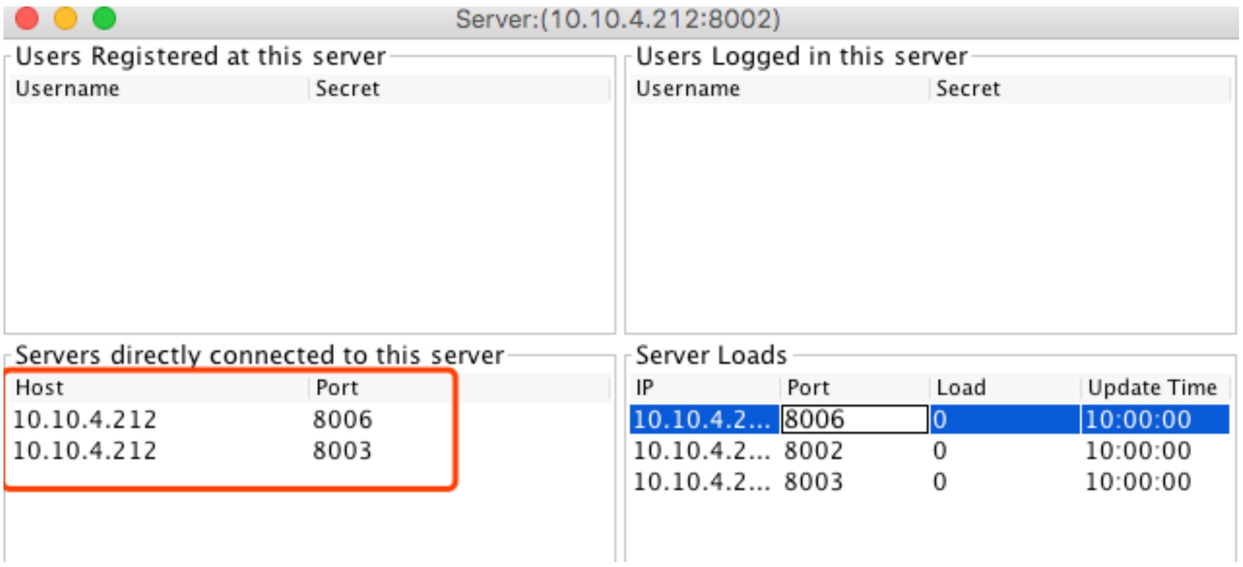
2. Force quit server 8001

Click ***Close*** icon in *server UI* or press ***CTRL+C*** in *command line*

Expected Result

After that you will see server 8002, 8003, 8006 will automatically connected. The picture shows a successful situation (the one, 8002, that takes 8001's place may vary).




Server:(10.10.4.212:8002)

Users Registered at this server

Username	Secret

Users Logged in this server

Username	Secret

Servers directly connected to this server

Host	Port
10.10.4.212	8006
10.10.4.212	8003

Server Loads

IP	Port	Load	Update Time
10.10.4.2...	8006	0	10:00:00
10.10.4.2...	8002	0	10:00:00
10.10.4.2...	8003	0	10:00:00

Message ensure

Operations

In order to simulate message loss case, let us start servers with a parameter to ***delay*** the reconnection function.

1. Start 4 servers with `time_before_reconnect=10000 (10 seconds)`

```
# start the very first server, which will be terminated
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
# start other servers
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001 -time_before_reconnect 10000
java -jar ActivityStreamerServer.jar -lh localhost -lp 8003 -s abc -rh
localhost -rp 8001 -time_before_reconnect 10000
java -jar ActivityStreamerServer.jar -lh localhost -lp 8006 -s abc -rh
localhost -rp 8001 -time_before_reconnect 10000
```

2. Connect 3 clients to 3 different servers

Note: Please record the secret of user1 for future use

```
# !!!! register user1 and record its secret for furture use !!!!
java -jar ActivityStreamerClient.jar -u user1 -rp 8001 -rh localhost
# you can just run below 2 clients and no need to record their secretrs
java -jar ActivityStreamerClient.jar -u user2 -rp 8002 -rh localhost
java -jar ActivityStreamerClient.jar -u user3 -rp 8003 -rh localhost
```

1. Terminate server 8001 and send a message from user2 within 10 seconds

- Click ***Close*** icon in *server UI* or press ***CTRL+C*** in *command line* (user 1 will lose connection)
- Send message `{"a":1}` from user2.
- Wait for reconnection happens (10 seconds)

4. Reconnect user1 to any working server, let's say 8006

Replace `$secret` of below script with the secret from step 2.

```
java -jar ActivityStreamerClient.jar -u user1 -s $secret -rp 8006 -rh
localhost
```

java -jar ActivityStreamerClient.jar -u user1 -s boo02tadp6a1nfq3cc3flk1n3v -rp 8006 -rh localhost

Expected Result

- user3 will receive the activity of user2 after reconection is done (about 10 seconds after disconnection)
- user1 will receive the activity of user2 after relogin to server 8006

> user A is online at the time T, when a activity is sent by some other user B and A loses its connection it can receive this message.
>
> When user A reconnects to any server of this system, it can also receive this lost message.

Message order

In order to simulate message disorder case, let us use a ***telnet session*** to simulate a ***server*** and make the order checking period a littler longer with `activity_check_interval=10000`. Fake messages will be broadcasted by the telnet server with a hooker ***"backTime"*** to set the send time of fake messages to be a time in the past.

> 'timeBack' field is a back door used for this kind of testing. If that field exists in an ActivityBroadcast message, then set the `sendTime` of this activity to `currentTimeInMillis() - timeBack`

Operations

1. Start 1 server with `activity_check_interval=10000 (10 seconds)`

```
java -jar ActivityStreamerServer.jar -activity_check_interval 10000 -lh
localhost -lp 8001 -s abc
```

2. Start a normal client connecting to server 1

```
java -jar ActivityStreamerClient.jar -u user1 -rp 8001 -rh localhost
```

3. Start a terminate and using telnet to simulate a client in following steps

- start telent session

```
telnet localhost 8001
```

- paste below string to authenticate this "server" with server 8001

```
{"command":"AUTHENTICATE","serverId":"serverId01","secret":"abc","host":"lo
calhost","port":8002}
```

- Broadcast 2 "fake" activities (**<u>!!! within 10 seconds !!!</u>**) by pasting below 2 string **separately(one by one)** into telnet session to simulate disordered message.

You can ignore the message telnet session receives. All of them are used by real server to sync data.

Message 1: a "fake" message that was sent 0 second ago

```
{"id":0,"activity":
{"message_num":2,"authenticated_user":"user2"},"isDelivered":false,"command
":"ACTIVITY_BROADCAST","timeBack":0}
```

Message 2: a "fake" message that was sent 10 seconds ago, which is early than preious one.

```
{"id":0,"activity":
{"message_num":1,"authenticated_user":"user2"},"isDelivered":false,"command
":"ACTIVITY_BROADCAST","timeBack":10000}
```

Expected Result

- After waiting 10-20 seconds, user1 (normal client with GUI) will receive 2 activities in order (message_num=1 first and then message_num=2)

In real server, this order checking period can be relately shorter, like 0.5 or 1 second.

Unique Register

Operations

1. start several servers, say 3

```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001
java -jar ActivityStreamerServer.jar -lh localhost -lp 8003 -s abc -rh
localhost -rp 8001
```

2. register user1 at server 8001

```
java -jar ActivityStreamerClient.jar -u user1 -rp 8001 -rh localhost
```

3. try to register user1 at another server, say 8002

```
java -jar ActivityStreamerClient.jar -u user1 -rp 8002 -rh localhost
```

Expected Result

- the registration of step 3 will fail with error like "user already exists".

Client can join and leave any time

Just try...

Server can join at any time

Operations

1. start the very first server

```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
```

2. register a user at this server and remember its secret.

```
java -jar ActivityStreamerClient.jar -u user1 -rp 8001 -rh localhost
```

3. Quit client of step 2
4. start a new server connecting to server 8001

```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001
```

5. Login user1 at the new server (8002) by replace `$secret` of below script

```
java -jar ActivityStreamerClient.jar -u user1 -s $secret -rp 8002 -rh
localhost
```

Expected Result

- user1 should login successfully at new server (8002) and all data of 8002 should be synced with 8001
- From test case Message ensure we can also see that:

  > user A is online at the time T, when a activity is sent by some other user B and A loses its connection it can receive this message.
  >
  > When user A reconnects to any server of this system, it can also receive this lost message.

Load balancing

Operations

1. start 2 servers

```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001
```

2. Register and login 2 clients both to server 8001

```
java -jar ActivityStreamerClient.jar -u user1 -rp 8001 -rh localhost
java -jar ActivityStreamerClient.jar -u user2 -rp 8001 -rh localhost
```

Expected Result

- user2 will be redirected to server 8002

Contributors

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Refer to the idea of this project is ok but **DO NOT COPY**.