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

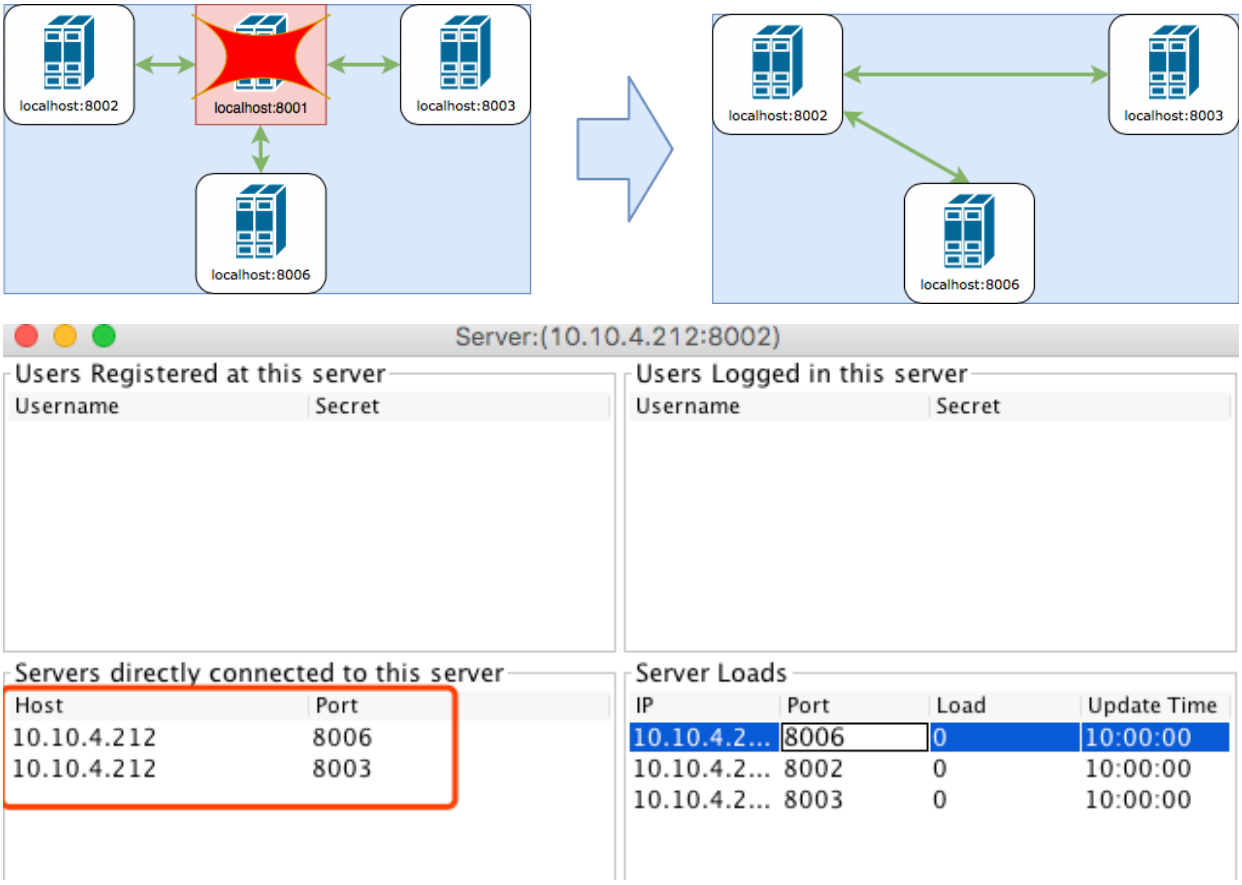
```
java -jar ActivityStreamerServer.jar -lh localhost -lp 8001 -s abc
java -jar ActivityStreamerServer.jar -lh localhost -lp 8002 -s abc -rh
localhost -rp 8001
java -jar ActivityStreamerServer.jar -lh localhost -lp 8003 -s abc -rh
localhost -rp 8001
java -jar ActivityStreamerServer.jar -lh localhost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



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
```

3. 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 6gte017ngmi9dmsbv4pgjsiidj -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=5000`.

Operations

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

```
java -jar ActivityStreamerServer.jar -activity_check_interval 5000 -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 useing 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 (**!!! within 5 seconds !!!**) by pasting below 2 string **separately(one by one)** into telnet session to simulate disordered message.

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

> 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`

Message 1: a "fake" message that send 1 second ago

```
{"id":0,"activity":
{"message_num":2,"authenticated_user":"user2"},"isDelivered":false,"command
":"ACTIVITY_BROADCAST","timeBack":1000}
```

Message 2: a "fake" message that send 5 second ago, which is early than preious one.

```
{"id":0,"activity":
{"message_num":1,"authenticated_user":"user2"},"isDelivered":false,"command
":"ACTIVITY_BROADCAST","timeBack":5000}
```


Expected Result

- After waiting 5 seconds, user1 (normal client with GUI) will receive 2 activities in order (message_num=1 first and then message_num=2)

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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