Florida Institute of Technology

CSE 5232
Network Programming
Spring 2017

Gossip System Final Report
(Milestone 5)

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1. Introduction

This program creates TCP and UDP servers to receive messages from the clients. It has a command line user interface allowing users to send following four types of message:

1. Gossips message: unsaved messages from the clients would be saved to the database and broadcasted to all known peers;
2. Peer message: saves unknown peers to the database;
3. Peer request: returns all known peers;
4. Leave message: forgets a specific peer.

The TCP and UDP servers are implemented concurrently, which means they're capable of receiving messages from a number of different clients at the same time and handling these messages properly.

In addition, it has a mechanism to forget peers that were not seen in for some time. In our scripts, we set the delay time as 5 seconds and wrote a script checkLeave.sh (stored in "scripts" folder in the root directory) to test if an expired peer can be removed successfully.

2. Technology

This project is based on the following major technologies:

Term	Description
JAVA	to build the server
ASN1	ASN1 java classes for encoding and decoding (Provided by Dr. Silaghi)
SQLite	to save the data
Make	to compile the file
bash	to run the program and send command

3. Architecture

3.1 Directory Architecture

Directory	Description
root	contains the scriptServer1.sh, scriptClientTCP.sh, scriptClientUDP.sh, scriptServerPeerWitness.sh, a makefile, a READ.ME file, database, and a project presentation
lib	contains the external libraries for compile the program
scripts	contains the scripts. hashGossip.sh is called by Java program to generate SHA-256 message. runIt.sh is used by scriptClientTCP.sh, scriptClientUDP.sh. and scriptServer1.sh. runWitness.sh is used by scriptServerPeerWitness.sh. checkLeave.sh is executed when a client is created
src	contains the .java files

3.2 Java Architecture

In src directory, there are several java files:

Package	Description	Classes
com.cse.np.sc	contains the file coding for main function	➢ ClientMainFunction.java: gets arguments from command line ➢ RunClient.java: runs the TCP or UDP client ➢ MainFunction.java: runs the TCP, UDP server and client Threads
com.cse.np.server	contains the classes to realize the TCP/UDP server/client	➢ TCPServerSocket.java: programs the function about TCP server ➢ UDPServerSocket.java: programs the function about UDP server ➢ TCPClientSocket.java: programs the function about TCP client ➢ UDPClientSocket.java: programs the function about UDP client

Package	Description	Classes
		➢ TCPChildServer.java: programs the function about TCP child server ➢ UDPChildServer.java: programs the function about UDP child server
com.cse.np.util	contains the classes that provide basic methods/ services for other classes	➢ Constant.java: contains the constant used in the project ➢ Database.java: contains the function of database ➢ GetOpts.java: contains the method to process the command line ➢ ModifyCommand.java: contains the method to process the input message ➢ RecMultiCast.java: contains the methods to create a peer witness server
com.cse.np.dao	contains the message classes used to communicated between server and client.	➢ GossipCon.java: ASN1 object class to take Gossip sequence ➢ MsgBroadcastCon.java: ASN1 object class to handle broadcast request ➢ PeerCon.java: ASN1 object class to take Peer sequence ➢ PeersAnswerCon.java: ASN1 object class to take PeersAnswer sequence ➢ PeersQueryCon.java: ASN1 object class to query the known peers ➢ Leave.java: ASN1 object class to forget specified peers
com.cse.np.asn	contains ASN1 related classes provided by Dr. Silaghi	

3.3 Database Architecture

Database Name: **NPProject.db**

Table Name	Attributes – Data type
MessageReceived	hashMsg - varchar timestamp - varchar message - varchar
PeersCatalog	name - varchar portNumber - varchar IPAddress - varchar

3.4 User Manual

Steps to run:

1. Unzip the file
2. Open the terminal and input following command:
    2.1. “cd <project directory path>”
    2.2. “make build”
3. Run the scripts
    3.1 Run scriptServer1.sh
    3.2 Run scriptServerPeerWitness.sh
    3.3 Run scriptClientTCP.sh (checkLeave.sh is executed when clients are initialized)
4. Outcome
    4.1 TCP and UDP servers are started
    4.2 Peer witness server are started
    4.3 TCP client are started (checkLeave.sh is executed)
    4.4 Test message is sent and saved
    4.5 Broadcast message 0 is sent and saved
    4.6 Peer witness server is saved to peer list (ready to receive broadcasted messages)
    4.7 Broadcast message 1 is sent, saved and seen by witness server

4.8 Delay time is up, peer witness server is removed from peer list

4.9 Broadcast message 2 is sent and saved. (not seen by peer witness server)

4. Running Results

The test was run on TCP connection. Here's the checkLeave.sh script to test whether a peer is removed from the system after it expires. It is located in the "\scripts" directory.

```
#!/bin/bash

echo "broadCastMessage0000"
sleep 1
echo "Peer:John:PORT=9999:IP=224.0.0.3"
sleep 2
echo "broadCastMessage11111"
sleep 7
echo "broadCastMessage22222"
```

After compiling with makefile:

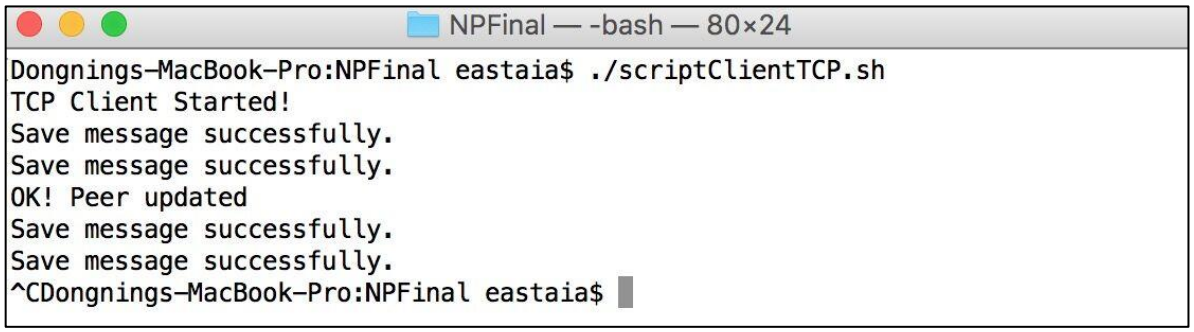
```
host245-180:Milstone4 eastaia$ make
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASN1_Util.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASN1DecoderFail.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASNLenRuntimeException.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASNObj.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASNObjArrayable.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/Encoder.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/Decoder.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/dao/GossipCon.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/dao/MsgBrodcastCon.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/dao/PeerCon.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/dao/PeersAnswerCon.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/dao/PeersQueryCon.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/util/Constant.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/util/DatabaseUtl.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/util/ModifyCommand.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/TCPChildServer.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/UDPChildServer.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/TCPServerSocket.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/UDPServerSocket.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/TCPClientSocket.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/server/UDPClientSocket.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/sc/RunClient.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/util/GetOpts.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/sc/ServerMainFunction.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/sc/ClientMainFunction.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/util/RecMultiCast.java
host245-180:Milstone4 eastaia$
```

TCP and UDP started. A new added peer was removed from the peer list after it was expired.

```
NPFinal — -bash — 80×24
Dongnings-MacBook-Pro:NPFinal eastaia$ ./scriptServer1.sh
TCP Server Started!
UDP Server Started!
Delete peer not seen for a while.
^CDongnings-MacBook-Pro:NPFinal eastaia$
```

Peer witness server started. Broadcast message sent after the witness server added to the peer list was received. A notification message of being kicked out was received.

All messages sent were sent and saved to the database. Peers have been updated. Only broadcast message 1 was seen by peer witness server.



At the end, all 4 messages were saved. Peer witness server was removed from table “PeerCatalog”.