

Project Milstone #3

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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 three 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: saved unknown peers to the database.
3. Peer request: returns all known peers.

In addition, a peer witness server is created to receive the forwarded messages from clients to the servers.

Technology

This project bases on following major technologies:

- JAVA: to build the server
- SQLite: to save the data
- Make: to compile the file
- bash: to run the program and send command

Architecture

Directory Architecture

- root: contains the scriptServer1.sh, scriptClientTCP.sh, scriptClientUDP.sh, scriptServerPeerWitness.sh, makefile, read.me, and database.
- lib: contains the external libraries for compile the program
- scripts: contains the .sh files. hashGossip.sh is called by Java program to generate SHA-256 message. runClient.sh is used by scriptClientTCP.sh and scriptClientUDP.sh. runServer.sh is used by scriptServer1.sh. And runWitness.sh is used by scriptServerPeerWitness.sh.
- src: contains the .java files

Java Architecture

In src directory, there are couples of java file:

- 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.
 - ServerMainFunction.java: runs the TCP and UDP servers.
- com.cse.np.sc: 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
- com.cse.np.util: contains the file could be used by other file often
 - 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

Database Architecture

- Database Name: NPMil3.db
- Table Name:
 - MessageReceived
 - PeersCatalog
- MessageReceived:
 - hashMsg
 - timestamp
 - message
- PeersCatalog:
 - name
 - portNumber
 - IPAddress

User Manual

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 scriptClientTCP.sh
 - 3.3 Run scriptClientUDP.sh
 - 3.4 Run scriptServerPeerWitness.sh
4. Input Messages
 - 4.1 Turn to the TCP client terminal
 - 4.1.1 Input any messages
 - 4.1.2 Input "PEER:John:PORT=9999:IP=224.0.0.3%" (IP and Port of PeerWitnessServer)
 - 4.1.3 Input random messages in order to verify that the message is broadcasted
 - 4.2 Turn to the UDP client terminal
 - 4.2.1 Input any messages

4.2.2 Try "Peers?\n"

5. Outcome

5.1 Peers and Messages saved

5.2 Messages are broadcasted to all known peers

Result Expect

After compiling with makefile:

```
host245-243:NPMilestone3 eastaia$ make build
javac -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 -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 -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 -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 -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 -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 -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 -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 -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 -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 -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 -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
```

Run the servers and clients:

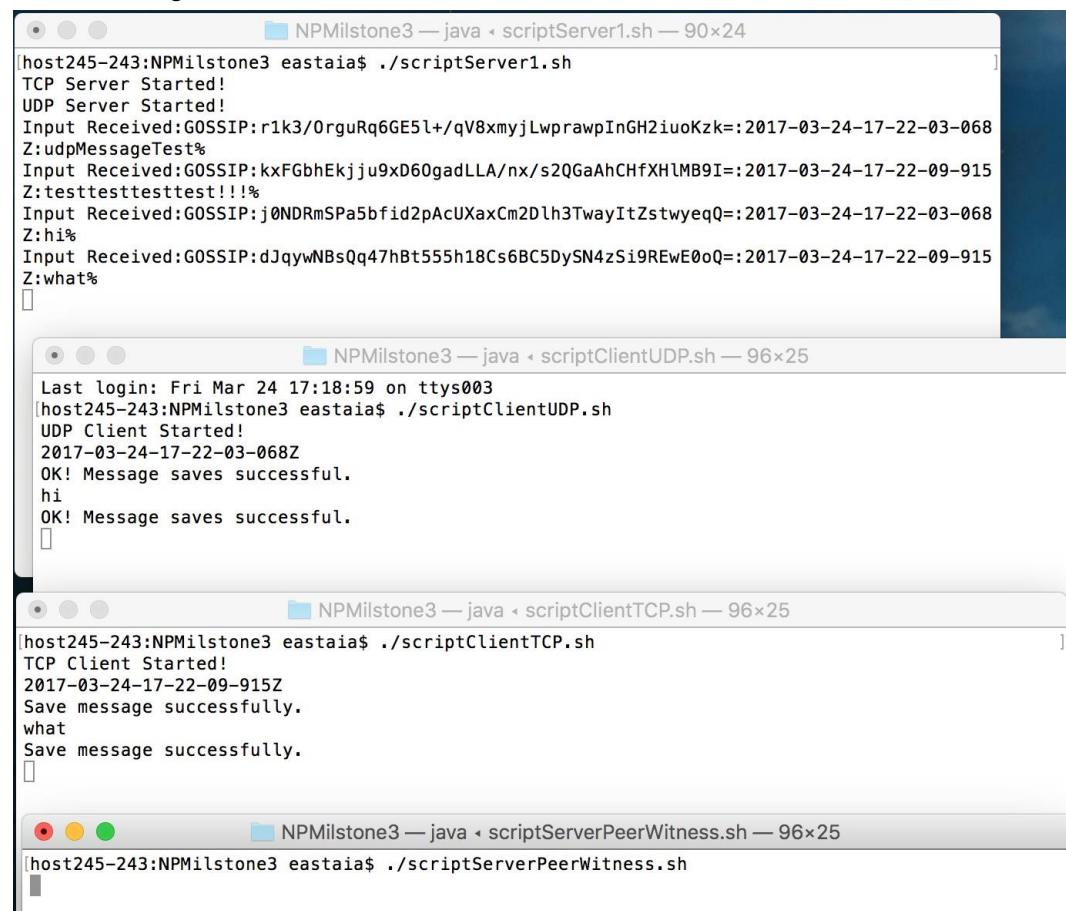
```
NPMilestone3 — java • scriptServer1.sh — 90x24
host245-243:NPMilestone3 eastaia$ ./scriptServer1.sh
TCP Server Started!
UDP Server Started!
Input Received:G0SSIP:r1k3/0rguRq6GE5l+/qV8xmyjLwprawpInGH2iuoKzk=:2017-03-24-17-22-03-068
Z:udpMessageTest%
Input Received:G0SSIP:kxFGbhEkjju9xD60gadLLA/nx/s2QGaAhCHfXHlMB9I=:2017-03-24-17-22-09-915
Z:testtesttesttest!!!%
█
```

```
NPMilestone3 — java • scriptClientTCP.sh — 96x25
host245-243:NPMilestone3 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
2017-03-24-17-22-09-915Z
Save message successfully.
█
```

```
NPMilestone3 — java • scriptClientUDP.sh — 96x25
Last login: Fri Mar 24 17:18:59 on ttys003
host245-243:NPMilestone3 eastaia$ ./scriptClientUDP.sh
UDP Client Started!
2017-03-24-17-22-03-068Z
OK! Message saves successful.
█
```

```
NPMilestone3 — java • scriptServerPeerWitness.sh — 96x25
host245-243:NPMilestone3 eastaia$ ./scriptServerPeerWitness.sh
█
```

Send messages to the server



```
host245-243:NPMilestone3 eastaia$ ./scriptServer1.sh
TCP Server Started!
UDP Server Started!
Input Received:G0SSIP:r1k3/0rguRq6GE5L+/qV8xmyjLwprawpInGH2iuoKzk=:2017-03-24-17-22-03-068
Z:udpMessageTest%
Input Received:G0SSIP:kxFGbhEkjju9xD60gadLLA/nx/s2QGaAhCHfXHlMB9I=:2017-03-24-17-22-09-915
Z:testtesttesttest!!!%
Input Received:G0SSIP:j0NDRmSPa5bfd2pAcUXaxCm2Dlh3TwayItZstwyeqQ=:2017-03-24-17-22-03-068
Z:hi%
Input Received:G0SSIP:dJqywNBsQq47hBt555h18Cs6BC5DySN4zSi9REwE0oQ=:2017-03-24-17-22-09-915
Z:what%
█

Last login: Fri Mar 24 17:18:59 on ttys003
host245-243:NPMilestone3 eastaia$ ./scriptClientUDP.sh
UDP Client Started!
2017-03-24-17-22-03-068Z
OK! Message saves successful.
hi
OK! Message saves successful.
█

host245-243:NPMilestone3 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
2017-03-24-17-22-09-915Z
Save message successfully.
what
Save message successfully.
█

host245-243:NPMilestone3 eastaia$ ./scriptServerPeerWitness.sh
█
```

Add the peer witness server IP and port to the database

```
NPMilestone3 — java • scriptServer1.sh — 90x24
host245-243:NPMilestone3 eastaia$ ./scriptServer1.sh
TCP Server Started!
UDP Server Started!
Input Received:GOSSIP:r1k3/0rguRq6GE5l+/qV8xmyjLwprawpInGH2iuoKzk=:2017-03-24-17-22-03-068
Z:udpMessageTest%
Input Received:GOSSIP:kxFGbhEkjju9xD60gadLLA/nx/s2QGaAhCHfXHlMB9I=:2017-03-24-17-22-09-915
Z:testtesttesttest!!!%
Input Received:GOSSIP:j0NDRmSPa5bfid2pAcUXaxCm2Dlh3TwayItZstwyeqQ=:2017-03-24-17-22-03-068
Z:hi%
Input Received:GOSSIP:dJqywnBsQq47hBt555h18Cs6BC5DySN4zSi9REwE0oQ=:2017-03-24-17-22-09-915
Z:what%
Input Received:PEER:John:PORT=9999:IP=224.0.0.3%
]

NPMilestone3 — java • scriptClientUDP.sh — 96x25
Last login: Fri Mar 24 17:18:59 on ttys003
host245-243:NPMilestone3 eastaia$ ./scriptClientUDP.sh
JDP Client Started!
2017-03-24-17-22-03-068Z
OK! Message saves successful.
hi
OK! Message saves successful.
]

NPMilestone3 — java • scriptClientTCP.sh — 96x25
host245-243:NPMilestone3 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
2017-03-24-17-22-09-915Z
Save message successfully.
what
Save message successfully.
PEER: John:PORT=9999:IP=224.0.0.3%
OK! Peer updated
]

NPMilestone3 — java • scriptServerPeerWitness.sh — 96x25
host245-243:NPMilestone3 eastaia$ ./scriptServerPeerWitness.sh
]
```

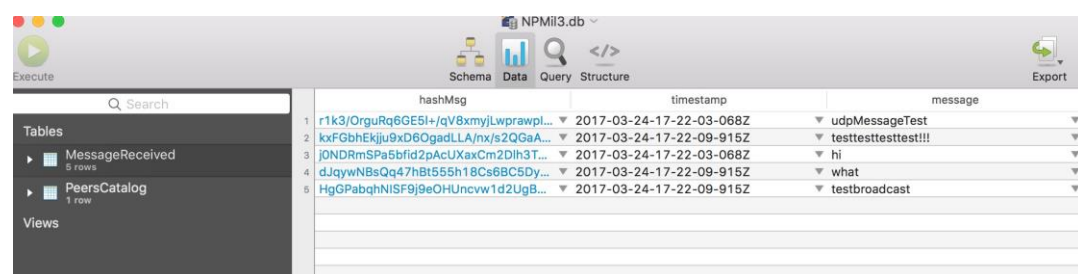
Messages sent by the clients are saved and broadcasted

```
NPMilstone3 — java • scriptServer1.sh — 90x24
[host245-243:NPMilstone3 eastaia$ ./scriptServer1.sh
TCP Server Started!
UDP Server Started!
Input Received:G0SSIP:r1k3/OrguRq6GE5l+/qV8xmyjLwprawpInGH2iuoKzk=:2017-03-24-17-22-03-068Z
Z:udpMessageTest%
Input Received:G0SSIP:kxFGbhEkju9xD60gadLLA/nx/s2QGaAhCHfXHlMB9I=:2017-03-24-17-22-09-915Z
Z:testtesttesttest!!!%
Input Received:G0SSIP:j0NDRmSPa5bfid2pAcUXaxCm2Dlh3TwayItZstwyeqQ=:2017-03-24-17-22-03-068Z
Z:hi%
Input Received:G0SSIP:dJqywNBsQq47hBt555h18Cs6BC5DySN4zSi9REwE0oQ=:2017-03-24-17-22-09-915Z
Z:what%
Input Received:PEER:John:PORT=9999:IP=224.0.0.3%
Input Received:G0SSIP:HgGPabqhNISF9j9e0HUncvw1d2UgB00M7V6CNkXyMz0=:2017-03-24-17-22-09-915Z
Z:testbroadcast%
]

NPMilstone3 — java • scriptClientUDP.sh — 96x25
Last login: Fri Mar 24 17:18:59 on ttys003
[host245-243:NPMilstone3 eastaia$ ./scriptClientUDP.sh
UDP Client Started!
2017-03-24-17-22-03-068Z
OK! Message saves successful.
hi
OK! Message saves successful.
]

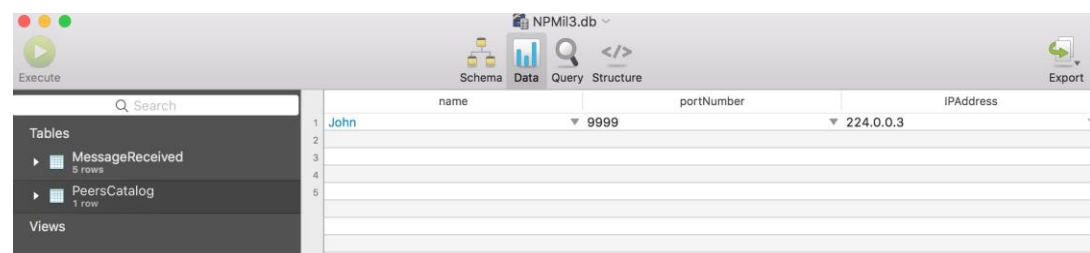
NPMilstone3 — java • scriptClientTCP.sh — 96x25
[host245-243:NPMilstone3 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
2017-03-24-17-22-09-915Z
Save message successfully.
what
Save message successfully.
PEER:John:PORT=9999:IP=224.0.0.3%
OK! Peer updated
testbroadcast
Save message successfully.
]

NPMilstone3 — java • scriptServerPeerWitness.sh — 96x25
[host245-243:NPMilstone3 eastaia$ ./scriptServerPeerWitness.sh
Get a new messgae from server: testbroadcast
]
```



The screenshot shows a database management interface with a table containing 5 rows of data. The table has three columns: hashMsg, timestamp, and message. The data is as follows:

hashMsg	timestamp	message
r1k3/OrguRq6GE5l+/qV8xmyjLwprawpInGH2iuoKzk=	2017-03-24-17-22-03-068Z	udpMessageTest
kxFGbhEkju9xD60gadLLA/nx/s2QGaAhCHfXHlMB9I=	2017-03-24-17-22-09-915Z	testtesttesttest!!!
j0NDRmSPa5bfid2pAcUXaxCm2Dlh3TwayItZstwyeqQ=	2017-03-24-17-22-03-068Z	hi
dJqywNBsQq47hBt555h18Cs6BC5DySN4zSi9REwE0oQ=	2017-03-24-17-22-09-915Z	what
HgGPabqhNISF9j9e0HUncvw1d2UgB00M7V6CNkXyMz0=	2017-03-24-17-22-09-915Z	testbroadcast



The screenshot shows a database management interface with a table containing 1 row of data. The table has three columns: name, portNumber, and IPAddress. The data is as follows:

name	portNumber	IPAddress
John	9999	224.0.0.3