Project Milestone #4

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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: saves 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
- 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

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. The bash file runIt.sh is used by scriptClientTCP.sh, scriptClientUDP.sh. and 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, UDP server and client Threads
- 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
    - TCPChildServer.java: programs the function about TCP child server
    - UDPChildServer.java: programs the function about UDP child server
- 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
- 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
- com.cse.np.asn: contains ASN1 related classes provided by Dr. Silaghi

Database Architecture

- Database Name: NPMil4.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 PeerWitnesssServer)

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"

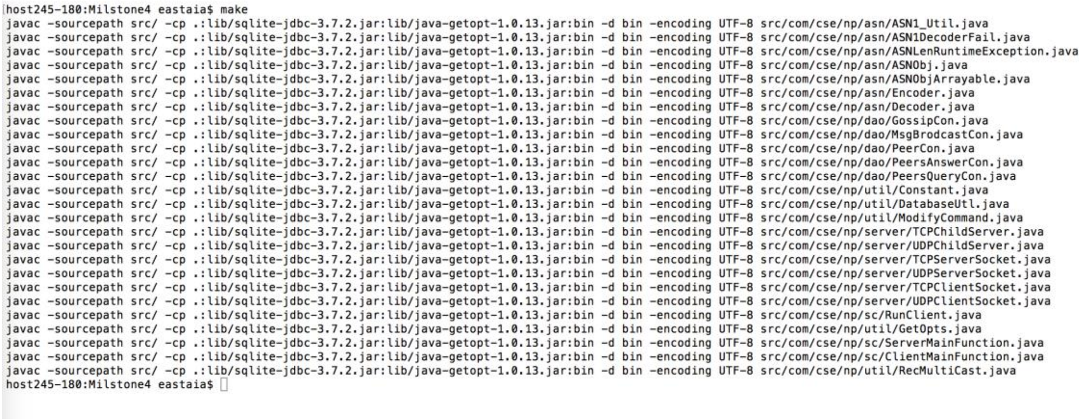
5. Outcome

5.1 Peers and Messages saved

5.2 Messages are broadcasted to all known peers

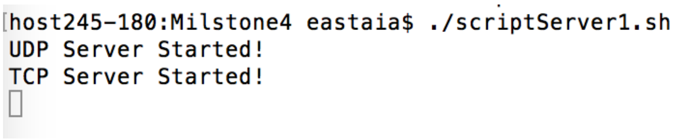
Result Expect

After compiling with makefile:

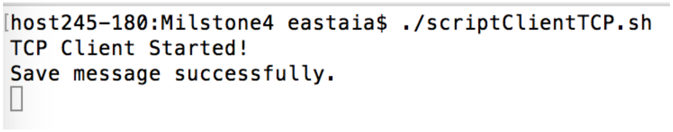


```
host245-180:Milstone4 eastaia$ make
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASN1_Util.java
javac -sourcepath src/ -cp .:lib/sqlite-jdbc-3.7.2.jar:lib/java-getopt-1.0.13.jar:bin -d bin -encoding UTF-8 src/com/cse/np/asn/ASN1DecoderFail.java
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$
```

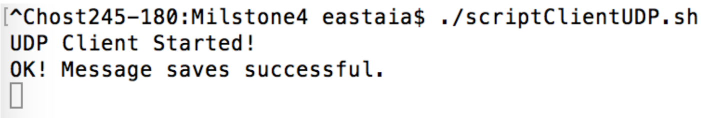
Run the servers and clients:



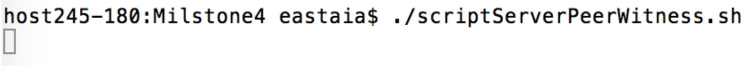
```
host245-180:Milstone4 eastaia$ ./scriptServer1.sh
UDP Server Started!
TCP Server Started!
```



```
host245-180:Milstone4 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
Save message successfully.
```

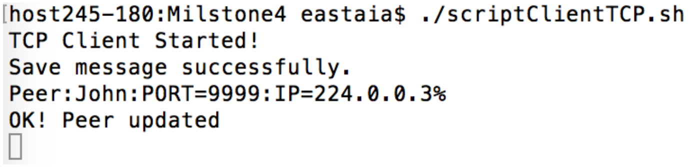


```
^Chost245-180:Milstone4 eastaia$ ./scriptClientUDP.sh
UDP Client Started!
OK! Message saves successful.
```



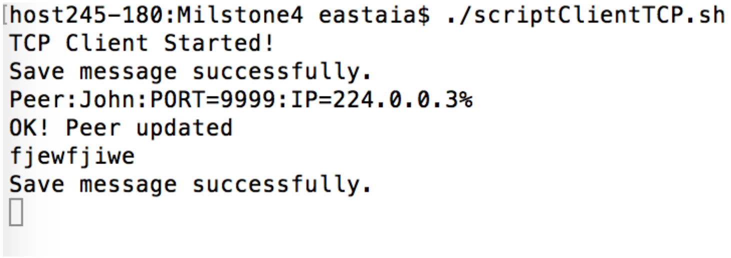
```
host245-180:Milstone4 eastaia$ ./scriptServerPeerWitness.sh
```

Add the peer witness server IP and port to the database

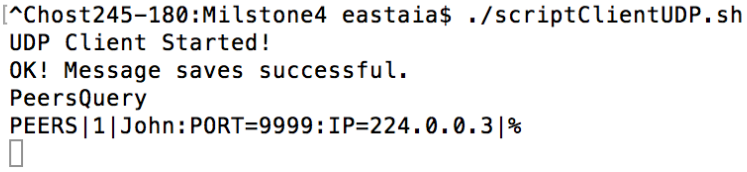


```
host245-180:Milstone4 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
Save message successfully.
Peer:John:PORT=9999:IP=224.0.0.3%
OK! Peer updated
```

Send messages to the server

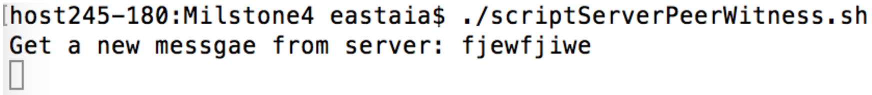


```
host245-180:Milstone4 eastaia$ ./scriptClientTCP.sh
TCP Client Started!
Save message successfully.
Peer:John:PORT=9999:IP=224.0.0.3%
OK! Peer updated
fjewfjiwe
Save message successfully.
```

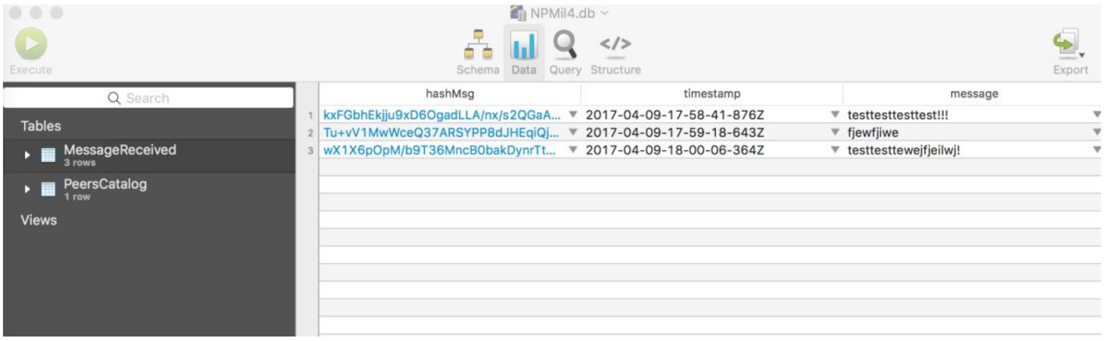


```
^Chost245-180:Milstone4 eastaia$ ./scriptClientUDP.sh
UDP Client Started!
OK! Message saves successful.
PeersQuery
PEERS|1|John:PORT=9999:IP=224.0.0.3|%
```

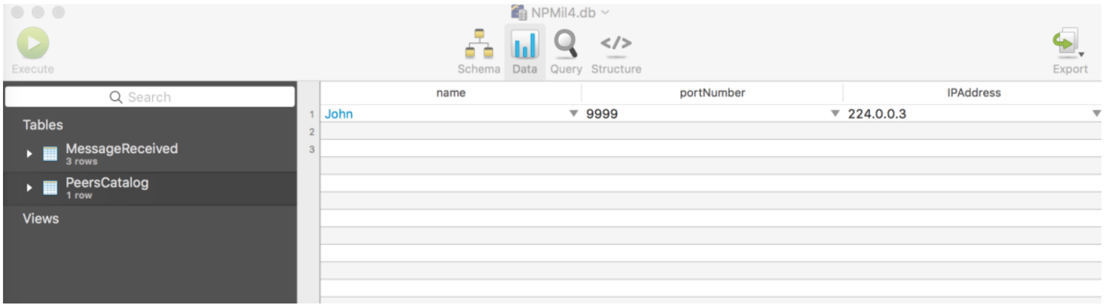
Messages sent by the clients are saved and broadcasted



```
host245-180:Milstone4 eastaia$ ./scriptServerPeerWitness.sh
Get a new messgae from server: fjewfjiwe
```



	hashMsg	timestamp	message
1	kxFGbhEkjju9xD6OgadLLA/nx/s2QGaA...	2017-04-09-17-58-41-876Z	testtesttesttest!!!
2	Tu+vV1MwWceQ37ARSYPP8dJHEqiQj...	2017-04-09-17-59-18-643Z	fjewfjiwe
3	wX1X6pOpM/b9T36MncB0bakDynrTt...	2017-04-09-18-00-06-364Z	testtesttewejfjeilwj!



	name	portNumber	IPAddress
1	John	9999	224.0.0.3
2			
3			