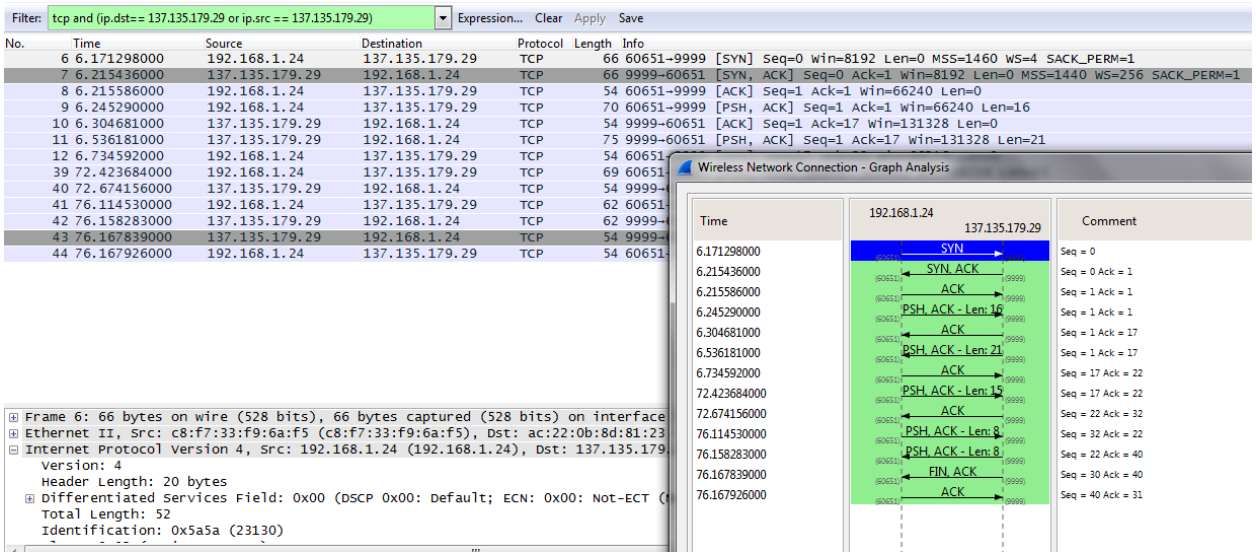
GitHub

We've made the whole project source codes available on github, it can be found at this link: https://github.com/theIncredibleMarek/CA1_Chat_Program/
Still, we had problems with merging our branches, so we stopped using the master branch, and now the final version of our project is Marek's branch actually.

Description

In our application design we tried to utilize as many OOP principles as we could.Not only did we use getters and setters, but we tried to make the system have high cohesion by creating classes that would contain the methods associated only with that particular class. That is why we have separate classes for GUI and the Chat client. It would not make sense to put these together since the GUI is only supposed to display the information. It does not have to know the connection to the server. We kept the coupling as low as we could but of course we have to have classes that know about others. Good example of this is the GUI class which knows the client but the client has no knowledge about the GUI. To make the GUI display the messages we used the Observer pattern which allowed us to create an illusion that the client knew the GUI, when in fact it only knows the method from the interface which is implemented in the GUI class. This solved the blocking issue on the client side if the GUI would be waiting for a message from the server and it would not be arriving. The client does not communicate directly with the server, it is handled by a ClientHandler class which is stored in a HashMap in the server. We chose hashmap because it is very efficient and the keys are the usernames, which will always be nonrepeating. Each time a new client connects a new client handler is created and a new thread is started by the client handler class. This way the client would not block the server. We made the chat server a singleton but we have not used double locking this time since we are sure that only the main method in the Webserver class will try to instantiate this object so no other threads have access to it. That of course means that we decided to have the Webserver as the top class that starts everything therefor it must know about the ChatServer class.
Smara was responsible for the Webserver class, she made the website and made it functional.
Cristi developed the GUI and he handled deployment of the program to the server.
Marek did the Chat server with the client and the testing.
In our design we had to think about how to differentiate between the states of the clients and the server itself because if we hadn't done that we would be stuck with clients and the chat server that would exist forever. Therefor we decided that the server will run on a loop while the Boolean keepRunning will be true. This will allow us to turn the chat server off. To know active clients and know when to stop their threads we created a Boolean isActive which would tell us the state of the client. In case the client disconnected the state of the Boolean would be changed and the thread that run that client would be finished.

Wireshark sample



As requested, we made a wireshark capture of the communication between one of the clients (IP 192.168.1.24, port 60651) and the server (IP 137.135.179.29, port 9999), ignoring all other routers IPs in between. On the first 3 lines you can see the initial three way handshake:
first - the synchronize, with sequence number 0 sent to the server;
second - the response from the server, with sequence number 0, acknowledgment number 1 (value 1 because the server already received the 1st request, which is counted with size 1);
third - the acknowledgment from the client to the server, with sequence number 1 and acknowledgment number 1.
The 4th line displays a package with 16 bytes of data, containing the message “CONNECT#Cristi”, so, on the 5th line, we can see the response from the server that it acknowledged 17 bytes in total.
On the 8th line we can see how “SEND#*#Hello!” was sent from the client to the server, with the sequence number 17 and acknowledgement number 22.
On the 10th line we can see the message “CLOSE#” being sent to the server, and in the last 2 lines how the connection was closed.