

Lab 2 report

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1 Overview

This program includes a server and one or more clients. The server process is letting one or more clients connect to it through socket programming. When a connection between the server and client is established, they can send data to each other through the network e.g., the client process can take user input and send it to the server which will print it out on the screen. Since multiple clients can be connected to the server at the same time, when a new client is connected, the server broadcasts a message to all other connected clients, informing them about the new client. The server also has the ability to ban an IP-address, making that specific client unable to connect.

2 How it works

The server creates a socket and assigns it a name and an address. The socket created gets put in a state where it listens for incoming connections. When a client wants to connect, the server notices that there is some data/input on its socket and accepts the request. Since the server is not expecting any messages on this socket, it knows that if there is data on it, it is a client trying to connect. From the `accept()` function, a new socket is created, different from the original socket, which then is used for communicating with the client. At this point the server can notice the client's IP-address and decide whether it wants to keep or reject the connection, based on if that specific IP-address is 'banned' or not. This is done by comparing the two strings with `strcmp()`. If the server chooses to keep the connection, the server informs the client by sending a message 'I hear you, dude...' which gets routed to `stdout` by the receiving client, else the server sends a message saying 'You are banned' to the client, closes the socket which stops the connection. The server has two sets of file descriptors/sockets, a read-set and an active-set. The active-set contains the file descriptors of all active sockets i.e., the server socket and the client sockets produced when a client is accepted. Each time a client successfully connects, the server is broadcasting out to all the other clients that a new client has connected. This is done by looping through all sockets in the active-set (except the server socket) and writing a message to that socket.

The client creates a socket and initializes its address depending on the hostname-argument the user put in and the port number. It then tries to connect to the address given which in this case is the server. If the server accepts its connection, it creates a thread which is continuously listening for input on its socket. When there is data to read, it is read and printed out on the screen. The main thread waits for input from the user which it will then send via the socket connected to the server. If the user inputs 'quit' the client closes the socket and terminates.

3 Program outputs

- Server's output when two clients connect.

```
[waiting for connections...]  
Server: Connect from client 127.0.0.1, port 57220  
>Incoming message: hej  
  
Server: Connect from client 127.0.0.1, port 57222  
>Incoming message: hej2
```

- The first client's output when first connecting to the server and a second client connects. The server sends a message 'I hear you, dude...' to the client

```
Type 'quit' to nuke this program.  
>Server: I hear you, dude...  
>Server: Client 127.0.0.1 connected
```

- The second client's output when connecting to the server

```
Type something and press [RETURN] to send it to the server.  
Type 'quit' to nuke this program.  
>Server: I hear you, dude...
```

- Output of a client whos name/IP-address is banned in the server.
(The program lost connection and terminated after the last line)

```
Type something and press [RETURN] to send it to the server.  
Type 'quit' to nuke this program.  
>Server: You are banned
```

- The server's output from when the banned client tries to connect.

```
[waiting for connections...]  
Server: client 127.0.0.1 rejected
```