

Overview:

This C++ code implements a simple client-server chat application using sockets. The client connects to the server, sends a USER command with a username, and enters a chatroom. The server handles multiple client connections, tracks user information, and broadcasts messages between clients. The chat supports basic commands, including QUIT to exit the chat. The client and server use non-blocking sockets and run in separate threads to handle input and communication concurrently. The server maintains a list of connected clients and notifies others when a new client joins or leaves.

Criteria:

At level 1, The implemented client-server application allows anonymous users to chat. The server listens on port 25565. Clients provide a username and server name when starting, using the same port as the server. Usernames are local and not necessarily unique.

The server, at Level 2, handles the USER command for connection, verifying unique names and providing error messages. Clients can disconnect with a QUIT message.

At Level 3, the server maintains a list of unique names and handles multi-user interactions. It sends messages to all clients connected, ensuring a dynamic chat environment. The USER command specifies username, hostname, servername, and real name during connection, with possible server replies for insufficient parameters or existing registrations. The application facilitates real-time communication between multiple clients without the need for channels.

Commands:

USER Command

- Command: USER
- Parameters: <username> <hostname> <servername> <realname>
- Example: USER guest tolmoon tolsun Ronnie Reagan
- Possible numeric server replies:
 - ERR_NEEDMOREPARAMS
 - ERR_ALREADYREGISTERED

The USER message is used at the beginning of connection to specify the username, hostname, servername and realname of the new user. The hostname is the name of the client's machine.

QUIT Command

- Command: QUIT
- Parameters: [<quit message>]

- Example: QUIT got to go, goodbye! A client session is ended with a quit message. The server must close the connection to a client which sends a QUIT message. If a "Quit Message" is given, this will be sent instead of the default message, the nickname.

If, for some other reason, a client connection is closed without the client issuing a QUIT command (e.g. client dies and EOF occurs on socket), the server is required to fill in the quit message with some sort of message reflecting the nature of the event which caused it to happen.

Servers:

The server forms the backbone of Internet Relay Chat, providing a point to which clients may connect to to talk to each other.

Clients:

A client is anything connecting to a server that is not another server. The server **MUST** have the following information about all clients:

1. A unique client identifier (a.k.a. the client "nickname", a string between 1 and 9 characters)
2. The real name of the host that the client is running on
3. The username of the client on that host
4. The server to which the client is connected

How to Run the Application:

- To begin, I ssh and log into into a server where the firewall has been dropped:
 - `ssh aw01`
- Next step is to compile the two programs:
 - `g++ client.cpp -o client -std=c++11`
 - `g++ server.cpp -o server -std=c++11`
- Execute the server program:
 - `./server`
- Execute the client program:
 - `./client <server_ip> <nickname> <real_name> <username>`
- Chat away

Running the Application:

- `ssh/logging into aw01:`

```
@spock:~$ ssh aw01
@aw01's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-37-generic x86_64)
```

- Executing the server program:

```

[ ]@andromeda:~/client-server/c/c+/test$ ./server
Server listening on port 25565...
Client connected: 127.0.0.1
Client connected: 127.0.0.1
Client connected: 127.0.0.1
Client connected: 127.0.0.1
Received from HAdams: Hello?
Received from HAdams: Hello?
Received from HAdams: Hello?
Received from bob456: Hey
Received from bob456: Hey
Received from bob456: Hey
Received from alice123: hi
Received from alice123: hi
Received from alice123: hi
Received from Wilkins345: wassup
Received from Wilkins345: wassup
Received from Wilkins345: wassup
Received from HAdams: Okay this is working for multiple users
Received from HAdams: Okay this is working for multiple users
Received from HAdams: Okay this is working for multiple users
Received from HAdams: Quit
Received from HAdams: Quit
Received from HAdams: Quit
Sending QUIT message to HAdams
Client disconnected: HAdams
Client disconnected
Client disconnected: bob456
Received from alice123: Quitting
Sending QUIT message to alice123
Client disconnected: alice123
^C
[ ]@andromeda:~/client-server/c/c+/test$ 

```

- Executing client 1:

```

[ ]@andromeda:~/client-server/c/c+/test$ ./client 127.0.0.1 Harris "Harris Goldstein" HAdams
Welcome to the chatroom, Type in your desired message followed by the return key
Type in 'QUIT' as the first word in your chat to exit the chatroom
EX: 'QUIT' 'quit' 'Quit this' 'Quitting the session' etc
Start conversing

[Hello?
Received from bob456: Hey
Received from alice123: hi
Received from Wilkins345: wassup
[Okay this is working for multiple users
[Quit
Goodbye!
Server disconnected
[ ]@andromeda:~/client-server/c/c+/test$ 

```

- Executing client 2:

```
@andromeda:~/client-server/c/c+/test$ ./client 127.0.0.1 Bob "Bob Johnson" bob456
Welcome to the chatroom, Type in your desired message followed by the return key
Type in 'QUIT' as the first word in your chat to exit the chatroom
EX: 'QUIT' 'quit' 'Quit this' 'Quitting the session' etc
Start conversing

New client joined: alice123
New client joined: Wilkins345
New client joined: HAdams
Received from HAdams: Hello?
Hey
Received from alice123: hi
Received from Wilkins345: wassup
Received from HAdams: Okay this is working for multiple users
Received from HAdams: QuitClient disconnected: HAdams
^C
@andromeda:~/client-server/c/c+/test$
```

- Executing client 3:

```
@andromeda:~/client-server/c/c+/test$ ./client 127.0.0.1 Noah "Noah Wilk" Wilkins345
Welcome to the chatroom, Type in your desired message followed by the return key
Type in 'QUIT' as the first word in your chat to exit the chatroom
EX: 'QUIT' 'quit' 'Quit this' 'Quitting the session' etc
Start conversing

New client joined: HAdams
Received from HAdams: Hello?
Received from bob456: Hey
Received from alice123: hi
wassup
Received from HAdams: Okay this is working for multiple users
Received from HAdams: QuitClient disconnected: HAdams
Client disconnected: bob456
Received from alice123: QuittingClient disconnected: alice123
Server disconnected

```

Executing client 4:

```
@andromeda:~/client-server/c/c+/test$ ./client 127.0.0.1 Alice "Alice Smith" alice123
Welcome to the chatroom, Type in your desired message followed by the return key
Type in 'QUIT' as the first word in your chat to exit the chatroom
EX: 'QUIT' 'quit' 'Quit this' 'Quitting the session' etc
Start conversing

New client joined: Wilkins345
New client joined: HAdams
Received from HAdams: Hello?
Received from bob456: Hey
hi
Received from Wilkins345: wassup
Received from HAdams: Okay this is working for multiple users
Received from HAdams: QuitClient disconnected: HAdams
Client disconnected: bob456
Quitting
Goodbye!
Server disconnected
@andromeda:~/client-server/c/c+/test$
```