Report

How to run?

First make sure you are in parent folder of 'src', typically (3331_ass1_messager).

To run server, type
'python3 -m src.server.main SERVER_PORT MAX_CLIENT'.

To run client, open another terminal, type
'python3 -m src.client.main SERVER_IP SERVER_PORT CLIENT_UDP_PORT'

NOTE: client1 folder does not to do anything with the functionality, it is for your convivence to test p2pvideo command. It is simply a duplicate of client. (testing mentioned p2pvideo will be tested in different folder for different client).

How it works?

Client talks to Server via TCP and receive private/group message and file. Server holds different Thread for different client, process command and send response.

Program Design

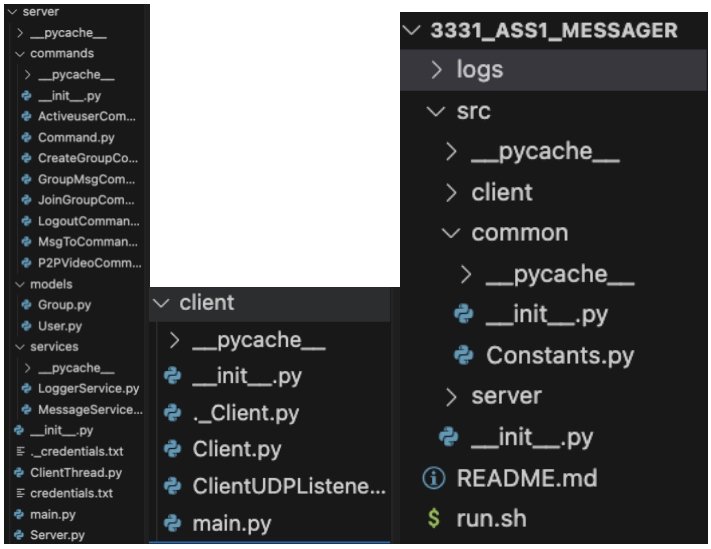
Structure

My program uses Object Oriented Design.

In src folder, there are server and client, which each has a main. Server and client shares the Constants in common folder.

In client folder, main.py is to boot the client and control the run. clientUDPlistener will handle all incoming private or group message.

In server folder, main.py is to boot the server, Server.py in charge of welcomeSocket and create thread for each client. ClientThread.py is to handle client command. In models folder, we have Group class and User class, these two are for building object. In services folder, logger has all logging methods and messenger has all sending message methods
I used command pattern design here. In commands folder, command.py is a super class, the rest specific commands are subclasses. Each command is corresponded to a class and has method 'execute'. The client thread will create command class based on incoming command and invoke execute. Then, command will process user request and send response.



Variable Storage

In server.py, it contains three Sets. ApprovedUserSet is for storing the active Users. BannedUserSet is for temporarily store banned user, the reason please see *login* section. GroupSet is to store all groups created. Each group will contain a list named groupMembers, this list will store user who joined the group.

Login and Logout

One important notice is resetting after ten seconds is based on user request other than timer. The user is not banned until MAX_ATTEMPTS reached. if user closed the terminal, attempts reset. if user typed two times wrong and waited for 10 seconds, attempts won't reset. if user reached the limit, get banned and get unbanned when user send a new request after 10 seconds.
Logout will remove user from all groups joined.

Application Layer Message Format

Sample format for user log:
1; 14 Oct 2023 22:51:09; username; 127.0.0.1; 57025

Sample format for /activeuser:
username, 2023-10-15 11:34:05.625095, 127.0.0.1, 56846

Sample format for sending confirmation:
PRIVATE_MSG - No: 1, Timestamp: 15 Oct 2023 11:35:31
GROUP_MSG - No: 1, Timestamp: 15 Oct 2023 11:36:28

***Sample format for* private Message**
15/10/2023 11:35, username: hello

***Sample format for* group message**
15/10/2023 11:36, groupname: hello

Design Trade-off

Although OOP design is much more complex than putting everything in client.py and server.py, it is much handier to maintain and add new features. E.g., I just need to add a new class when creating a new command instead of going deep down to the code and change. Message sending, I simply used the specific header without statues code. That is because this program is relatively small and no need to consider further.

Potential Improvements

My structure is a bit messy. I should abstract more methods into corresponding class. E.g., user can have joingroup and sendmessage methods. These can be encapsulated into User class. For future design, state pattern might be needed for active and inactive user state.