Group 7： “Flower bottle" vases

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# Chat System function introduce

This is a simple socket-based chat system based on python programming language that supports the following features:

- Broadcast messages
- Private messages
- File transfer （Not yet implemented）
- List online users
- List groups
- Group chat
- Group file transfer （Not yet implemented）
- List group members （Not yet implemented）
- User exit from the chat system

# Commands Overview

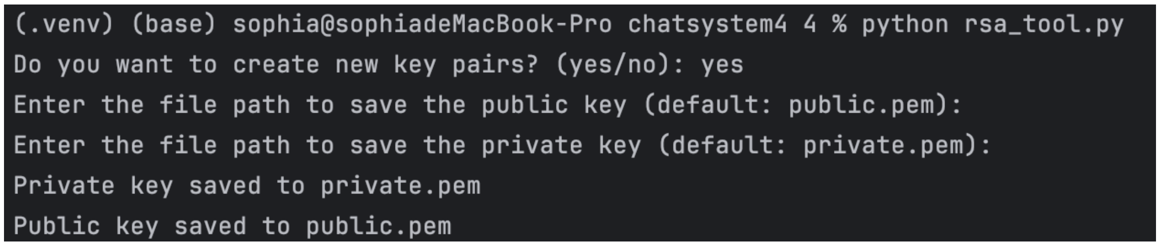
- **Public Message**: Just type the message and press Enter.
- **Private Message**: /msg <username> <message>
- **File Transfer**: /file <username> <filename>
- **List Online Users**: /list
- **List Groups**: /showgroups
- **Create a Group**: /create <groupname>
- **Join a Group**: /join <groupname>
- **Send a Group Message**: /group <groupname> <message>
- **Quit**: /quit
- **List group members name:** /showgroupmembers <groupname> （Not yet implemented）
- **Send a file within the group:** /groupfile <groupname> <filename> （Not yet implemented）

# Prepare

1. Clone or download the project files, including `server.py` and `client.py` etc.
2. Ensure `server.py` and `client.py` are in the same directory.
3. Run the chat system from the terminal or select other appropriate environment (VS Code, PyCharm etc.).
4. Ensure you have all the needed libraried:
```
pip install websocket
pip install cryptography
pip install pycryptodome
pip install aioconsole
```
5. Generate RSA keys in the same directory:

python rsa_tool.py

--------- As following --------



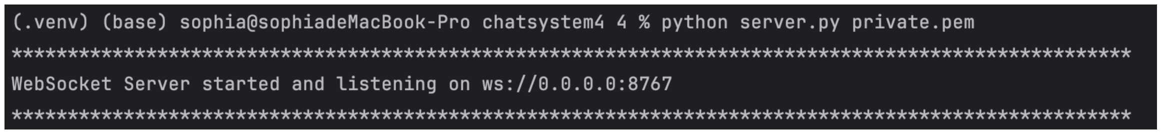
```
(.venv) (base) sophia@sophiadeMacBook-Pro chatsystem4 4 % python rsa_tool.py
Do you want to create new key pairs? (yes/no): yes
Enter the file path to save the public key (default: public.pem):
Enter the file path to save the private key (default: private.pem):
Private key saved to private.pem
Public key saved to public.pem
```

6. Check your own IP address, the following use 192.168.1.104 as example.

# Instruction

- **Starting the Server**
  - **Start the Server**: Run the server script (server.py) use following code:
    python server.py private.pem
  - You should see a message indicating that: WebSocket server started and listening on ws://0.0.0.0:8767.

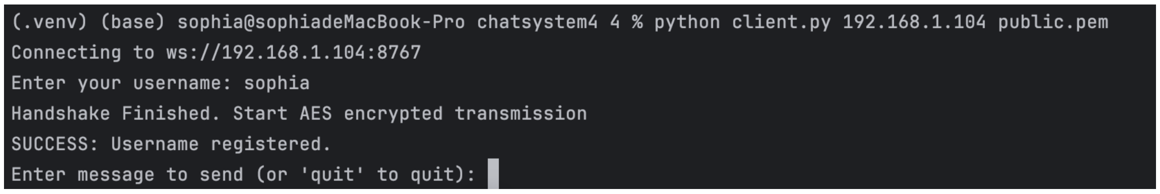
--------- As following --------



```
(.venv) (base) sophia@sophiadeMacBook-Pro chatsystem4 4 % python server.py private.pem
****************************************************************************************************
WebSocket Server started and listening on ws://0.0.0.0:8767
****************************************************************************************************
```

- **Connecting Clients**
  - **Start Client for User sophia**: Run the client script (client1.py) for the first user:
    python client.py 192.168.1.104 public.pem (change to your server IP address)
  - **Enter the username when prompted:** Enter your username: sophia
  - **Start Client for User jojo**: Run another instance of the client script for the second user: python client.py 192.168.1.104 public.pem
  - **Enter the username when prompted:** Enter your username: jojo

--------- As following --------



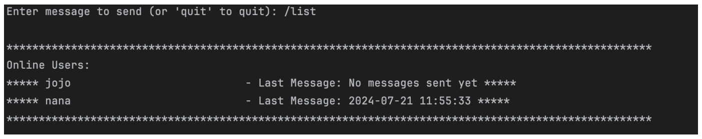
```
(.venv) (base) sophia@sophiadeMacBook-Pro chatsystem4 4 % python client.py 192.168.1.104 public.pem
Connecting to ws://192.168.1.104:8767
Enter your username: sophia
Handshake Finished. Start AES encrypted transmission
SUCCESS: Username registered.
Enter message to send (or 'quit' to quit):
```

- **Using the Chat System**

Once both clients are connected, you can use the following commands to interact:

➢ **Check online users**

✓ Show all active online users: Use ***/list*** command. Example:



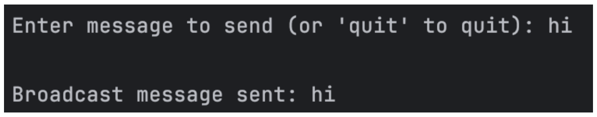
```
Enter message to send (or 'quit' to quit): /list

****************************************************************************************************
Online Users:
***** jojo                           - Last Message: No messages sent yet *****
***** nana                           - Last Message: 2024-07-21 11:55:33 *****
****************************************************************************************************
```

➢ Public Messages

✓ **Send a Public Message**: Any message that does not start with a command (/msg, /file, /list, /group, /create, /join, /quit.) will be broadcast to all connected users. Example:

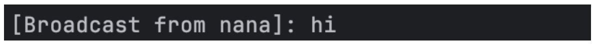
- User nana types： hi
- All other users should see: [Broadcast from nana]: hi



```
Enter message to send (or 'quit' to quit): hi

Broadcast message sent: hi
```

（nana send）



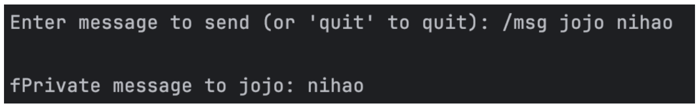
```
[Broadcast from nana]: hi
```

（others receive）

➢ Private Messages

✓ **Send a Private Message**: Use the '/msg receive_client_name message' command to send a private message to a specific user. Example:

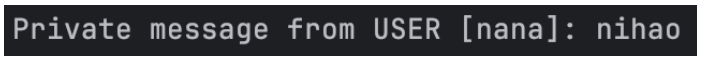
- User sophia types: ***/msg*** jojo How are you?
- Only User jojo should see: Private message from sophia: How are you?
- User sophia will see a confirmation: Private message to jojo: How are you?



```
Enter message to send (or 'quit' to quit): /msg jojo nihao

fPrivate message to jojo: nihao
```

（nana send）



```
Private message from USER [nana]: nihao
```

（jojo receive）

➢ File Transfer （Not yet implemented）

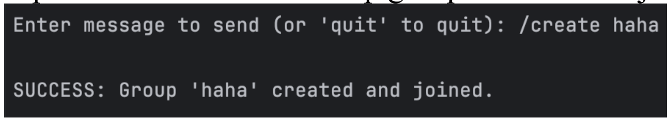
✓ **Send a File**: Use the '***/file*** receive_client_name path/file_name' command to send a file to a specific user. Example:

- User sophia wants to send a file named example.txt to User jojo. User sophia types: /file jojo example.txt
- User sophia will see a confirmation: File example.txt sent to jojo successfully.
- User jojo will receive the file, automatically download in her computer and open the file in a separate window and receive a notification： You received file 'example.txt' from sophia.

➢ Group Chat

✓ **Create a group**: Use the ***/create*** command to create a chat group. Example:

- User sophia wants to create a chat-group groupa. User sophia types the following command and will automatically join the group herself: */create groupa*
  sophia should receive: Group groupa created and joined.

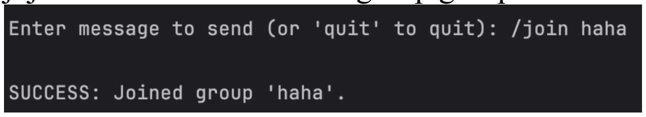


```
Enter message to send (or 'quit' to quit): /create haha

SUCCESS: Group 'haha' created and joined.
```

✓ **Join a group**: Use the ***/join*** command to join a chat group. Example:

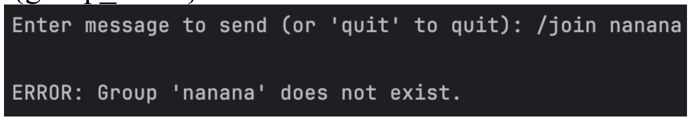
- Anyone else that wants to chat with all the members in groupa at the same time need to join the group. If jojo wants to join the group, she types: */join groupa.*
  jojo should receive: Joined group groupa.



```
Enter message to send (or 'quit' to quit): /join haha

SUCCESS: Joined group 'haha'.
```

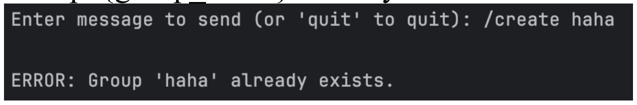
- If clients join some group does not exit, they should receive: Group '{group_name}' does not exist.



```
Enter message to send (or 'quit' to quit): /join nanana

ERROR: Group 'nanana' does not exist.
```

- If clients create a group using the exiting group name, they should receive: Group '{group_name}' already exists.

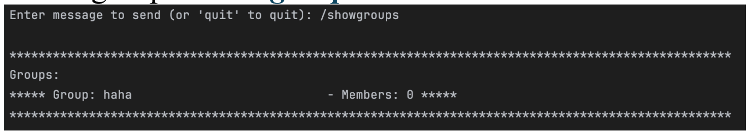


```
Enter message to send (or 'quit' to quit): /create haha

ERROR: Group 'haha' already exists.
```

✓ **Show group details**. Example:

- If clients want to check what groups are there, need to type the following to show all the groups: ***/showgroups***



```
Enter message to send (or 'quit' to quit): /showgroups

****************************************************************************************************
Groups:
***** Group: haha                           - Members: 0 *****
****************************************************************************************************
```

- If clients joined groupa and want to check the name of all the members in the groupa, need to type: ***/showgroupmembers*** （Not yet implemented）

✓ **Send a group message(Not yet implemented).** Example:

- User sophia types '***/group*** *group_name message*': */group gourpa Hi.*
- Only group member in groupa should see: [Receive group groupa message from sophia]: Hi.

✓ **Send a file within the group (Not yet implemented).** Example:

- User sophia types '***/groupfile*** *group_name path/file_name*': /groupfile gourpa file.txt.
- All the group members in groupa should receive the file, automatically download in their computer and open the file in a separate window and receive a notification: [Receive file.txt from Group groupa sophia].

# Example Chat Session

Here is an example chat session with the commands, sophia and jojo are the only clients connected with server1 at the moment:

1 **Public Message**:
- **Sophia** types: Hello everyone!
- **Jojo** sees: [Broadcast from sophia]: Hello everyone!

2 **List clients**:
- **Sophia** types: /list
- **Sophia** sees: sophia, jojo

3 **Private Message**:
- **Sophia** types: /msg jojo How are you?
- **Jojo** sees: Private message from sophia: How are you?
- **Sophia** sees: Private message to jojo: How are you?

4 **File Transfer**:
- **Sophia** types: /file jojo example.txt
- **Sophia** sees a notification: File example.txt sent to jojo successfully.
- **Jojo** receives the file, file download in jojo's computer and opened in a separate window, and jojo sees a notification: You received file example.txt from sophia.

5 **Group Message**:
- **Sophia** types: /create haha
- **Sophia** sees: Group haha created and joined.
- **Jojo** types: /showgroups
- **Jojo** sees: haha
- **Jojo** types: /join haha
- **Jojo** sees: Joined group haha
- **Jojo** types: /showgroupmembers
- **Jojo** sees: jojo sophia
- **Jojo** types: /group haha Hello there!
- **Sophia** sees: [Receive group haha message from jojo]: Hello there!
- **Sophia** types: /groupfile haha file.txt
- **Jojo** sees: [Receive file.txt from Group haha sophia].

If client nana is in the group, she should receive the message and file same as jojo and sophia at the same time.