

ClassChat System - Project Report

Date: November 28, 2025

Implementation Description

I implemented ClassChat, a client-server chat system using Python. The system uses raw TCP sockets for network communication and multithreading to handle multiple concurrent users.

Server (`server.py`):

- Uses TCP sockets on port 5555
- Creates a new thread for each client connection
- Maintains dictionaries to track connected clients and chat rooms
- Routes messages based on JSON format (private, group, create, join)
- Handles errors when users or rooms don't exist

Client (`client.py`):

- Connects to the server using TCP sockets
- Uses two threads: one for sending messages, one for receiving
- Parses user commands and converts them to JSON format
- Displays messages with appropriate formatting

Message Format: All messages use JSON with four fields: status, sender, receiver, and text.

Four Message Modes:

1. `/private <username> <message>` - Private messaging
2. `/create <room_name>` - Create chat rooms
3. `/join <room_name>` - Join existing rooms
4. `/group <room_name> <message>` - Group messaging

Instructions to Run the Code

Requirements

- Python 3.7 or higher
- No external libraries needed

Starting the Server

1. Open a terminal
2. Navigate to the project folder
3. Run: `python3 leoul_meaza_901063668_server.py`
4. Server starts on 127.0.0.1:5555

Starting Clients

1. Open a new terminal for each client
2. Navigate to the project folder
3. Run: `python3 leoul_meaza_901063668_client.py`
4. Enter a unique username when prompted

Available Commands

- `/private <username> <message>` - Send private message
- `/create <room_name>` - Create a chat room
- `/join <room_name>` - Join a room
- `/group <room_name> <message>` - Send group message
- `/quit` - Exit

Screenshots

1. Server Running with Multiple Clients

```
leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_server.py
ClassChat Server
[SERVER] Server started on 127.0.0.1:5555
[SERVER] Waiting for connections...
[SERVER] New connection from ('127.0.0.1', 50541)
[SERVER] Alice has joined the chat
[SERVER] New connection from ('127.0.0.1', 50542)
[SERVER] Bob has joined the chat
[SERVER] New connection from ('127.0.0.1', 50543)
[SERVER] Charlie has joined the chat
```

The server successfully started and is handling connections from three clients.

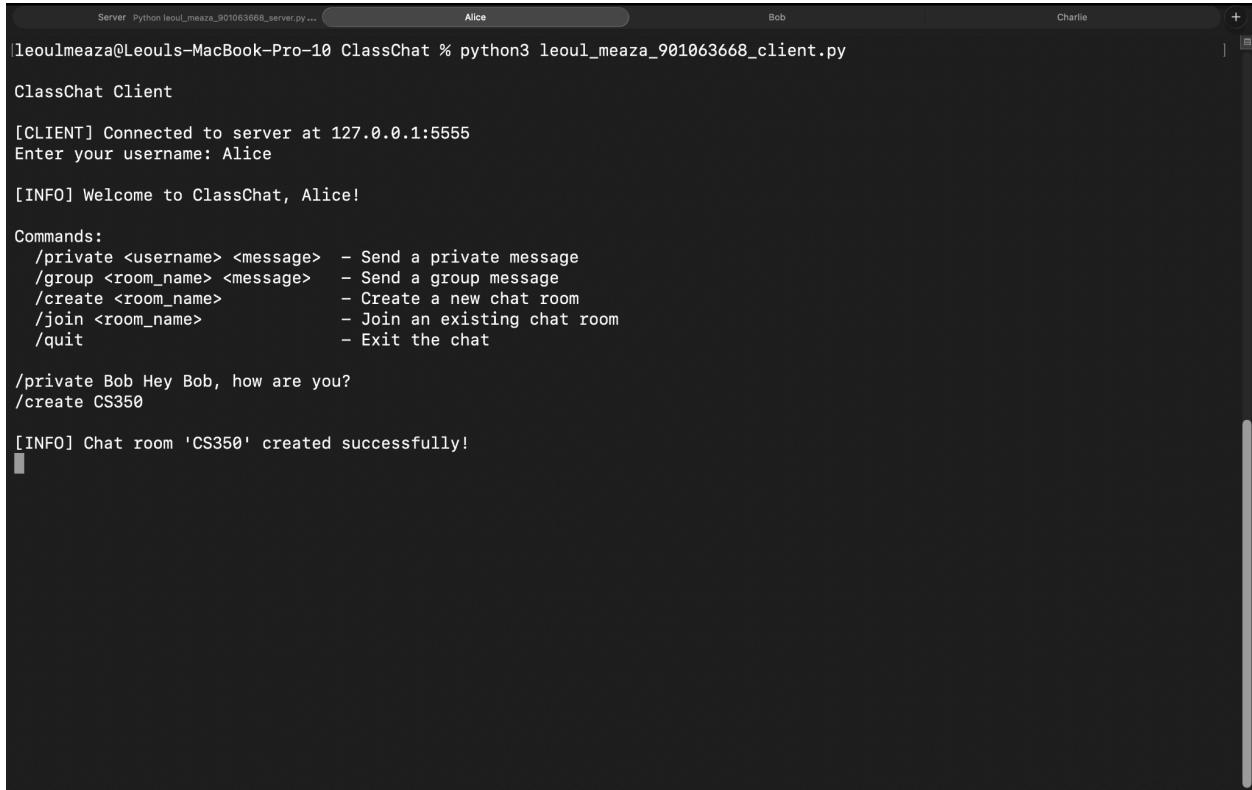
2. Private Messaging

```
Server Python leoul_meaza_901063668_server.py... Alice Bob Charlie + |  
|leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py  
ClassChat Client  
[CLIENT] Connected to server at 127.0.0.1:5555  
Enter your username: Alice  
[INFO] Welcome to ClassChat, Alice!  
Commands:  
/private <username> <message> - Send a private message  
/group <room_name> <message> - Send a group message  
/create <room_name> - Create a new chat room  
/join <room_name> - Join an existing chat room  
/quit - Exit the chat  
/private Bob Hey Bob, how are you?  
|
```

```
Server Python leoul_meaza_901063668_server.py... Alice Bob Charlie + |  
|leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py  
ClassChat Client  
[CLIENT] Connected to server at 127.0.0.1:5555  
Enter your username: Bob  
[INFO] Welcome to ClassChat, Bob!  
Commands:  
/private <username> <message> - Send a private message  
/group <room_name> <message> - Send a group message  
/create <room_name> - Create a new chat room  
/join <room_name> - Join an existing chat room  
/quit - Exit the chat  
[PRIVATE] Alice: Hey Bob, how are you?  
|
```

Alice sends a private message to Bob using [/private Bob Hey Bob, how are you?](#). Bob receives it as [PRIVATE] Alice: Hey Bob, how are you?.

3. Creating and Joining Chat Rooms



The screenshot shows a terminal window with three tabs at the top: 'Server Python leoul_meaza_901063668_server.py ...', 'Alice', and 'Bob'. The 'Alice' tab is active, displaying the following text:

```
|leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py
ClassChat Client
[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Alice
[INFO] Welcome to ClassChat, Alice!
Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>        - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat
/private Bob Hey Bob, how are you?
/create CS350
[INFO] Chat room 'CS350' created successfully!
```

```
Server Python leoul_meaza_901063668_server.py ...
Alice Python leoul_meaza_901063668_client.py ...
Bob
Charlie + [leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py

ClassChat Client

[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Bob

[INFO] Welcome to ClassChat, Bob!

Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>       - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat

[PRIVATE] Alice: Hey Bob, how are you?
/join CS350

[INFO] You joined 'CS350'.
```

```
Server
Alice
Bob
Charlie + [leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py

ClassChat Client

[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Alice

[INFO] Welcome to ClassChat, Alice!

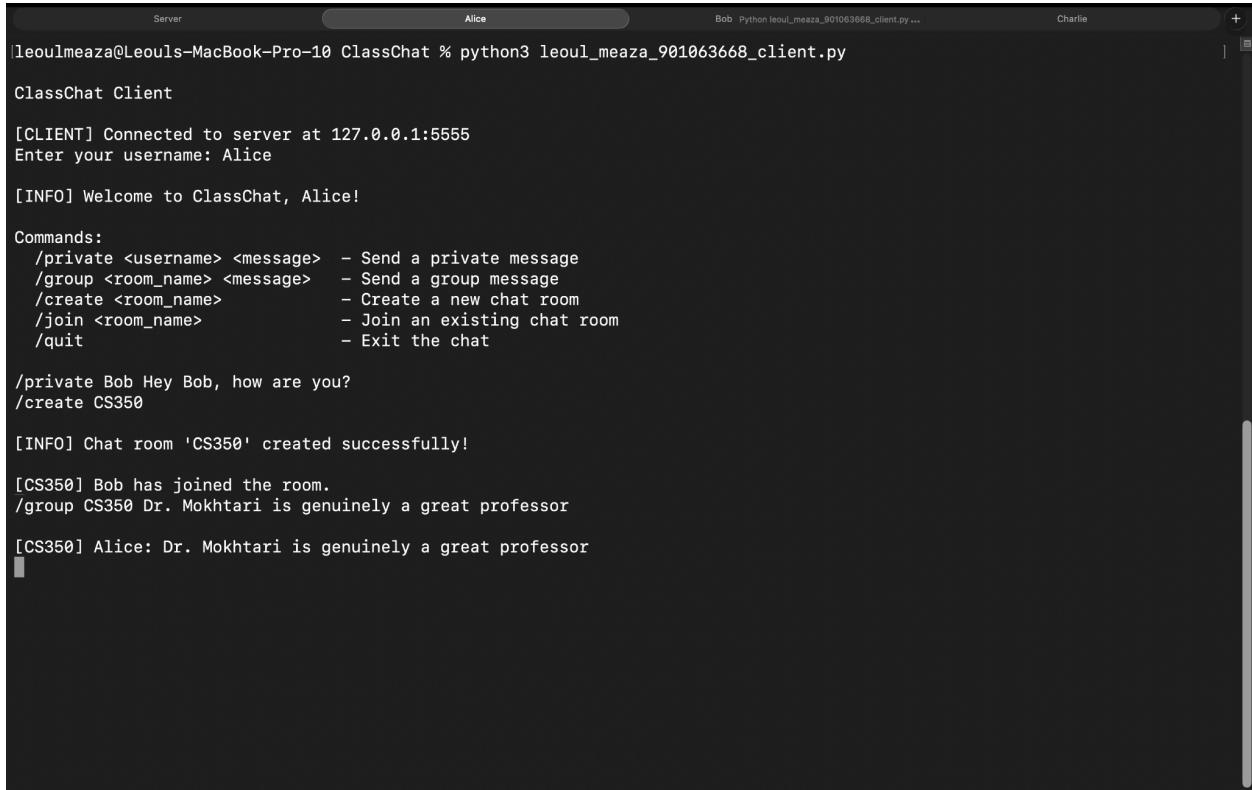
Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>       - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat

/private Bob Hey Bob, how are you?
/create CS350

[INFO] Chat room 'CS350' created successfully!
[CS350] Bob has joined the room.
```

Alice creates a room called "CS350" using **/create CS350**. Bob joins using **/join CS350** and Alice receives a notification.

4. Group Chat



The screenshot shows a terminal window with four tabs: 'Server' (disabled), 'Alice', 'Bob Python leoul_meaza_901063668_client.py ...', and 'Charlie'. The 'Alice' tab contains the following text:

```
leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py ...
ClassChat Client
[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Alice
[INFO] Welcome to ClassChat, Alice!
Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>        - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat
/private Bob Hey Bob, how are you?
/create CS350
[INFO] Chat room 'CS350' created successfully!
[CS350] Bob has joined the room.
/group CS350 Dr. Mokhtari is genuinely a great professor
[CS350] Alice: Dr. Mokhtari is genuinely a great professor
```

```
Server Python leoul_meaza_901063668_server.py ...
Alice Python leoul_meaza_901063668_client.py ...
Bob ...
Charlie ...

[leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py

ClassChat Client

[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Bob

[INFO] Welcome to ClassChat, Bob!

Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>        - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat

[PRIVATE] Alice: Hey Bob, how are you?
/join CS350

[INFO] You joined 'CS350'.

[CS350] Alice: Dr. Mokhtari is genuinely a great professor
/group CS350 I absolutely agree!

[CS350] Bob: I absolutely agree!
```

```
Server Python leoul_meaza_901063668_server.py ...
Alice ...
Bob ...
Charlie ...

[leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py

ClassChat Client

[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Alice

[INFO] Welcome to ClassChat, Alice!

Commands:
/private <username> <message>      - Send a private message
/group <room_name> <message>        - Send a group message
/create <room_name>                  - Create a new chat room
/join <room_name>                   - Join an existing chat room
/quit                                - Exit the chat

/private Bob Hey Bob, how are you?
/create CS350

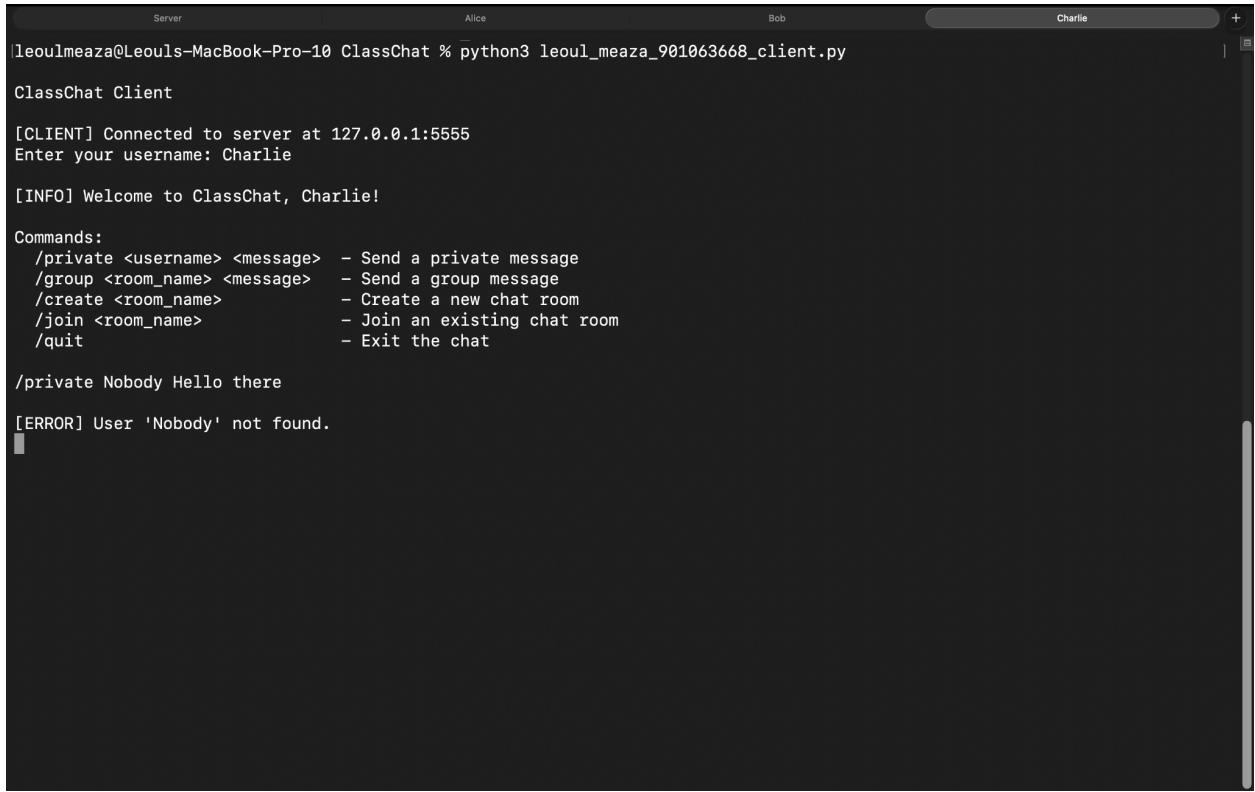
[INFO] Chat room 'CS350' created successfully!

[CS350] Bob has joined the room.
/group CS350 Dr. Mokhtari is genuinely a great professor

[CS350] Alice: Dr. Mokhtari is genuinely a great professor
[CS350] Bob: I absolutely agree!
```

Alice and Bob exchange messages in the room "CS350". All room members see all messages.

5. Error Handling



The screenshot shows a terminal window with four tabs at the top: 'Server', 'Alice', 'Bob', and 'Charlie'. The 'Charlie' tab is active, displaying the following text:

```
[leoulmeaza@Leouls-MacBook-Pro-10 ClassChat % python3 leoul_meaza_901063668_client.py
ClassChat Client
[CLIENT] Connected to server at 127.0.0.1:5555
Enter your username: Charlie
[INFO] Welcome to ClassChat, Charlie!
Commands:
/private <username> <message>  - Send a private message
/group <room_name> <message>  - Send a group message
/create <room_name>          - Create a new chat room
/join <room_name>            - Join an existing chat room
/quit                         - Exit the chat
/private Nobody Hello there
[ERROR] User 'Nobody' not found.
```

When Charlie tries to message a non-existent user with `/private Nobody Hello there`, the system displays: **[ERROR] User 'Nobody' not found.**