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NetConnect

Project Report

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1 Objectives

The primary objective of the NetConnect Chat Application project is to develop a robust and efficient chat application that facilitates group communication with features including group creation, user management, messaging, file transfer, and administrative functionalities.

- **Create a Chat Application:** The main goal of this project is to make a chat application. Just like when you talk to your friends using a messaging app on your phone, we want to create a program that lets people chat with each other on their computers.
- **Make Group Chats Possible:** We want people to be able to chat in groups, not just one-on-one. This means you can talk to many friends at once in one chat room.
- **Manage Users:** In our chat app, we need to keep track of who's using it. We'll create a system to add new users, remove them, and keep their information safe.
- **Send Messages:** People use chat apps to send messages to each other, so we need to make sure our app can do that smoothly. You type a message, hit send, and it appears in the chat for everyone to see.
- **Handle Files:** Sometimes, people want to send more than just messages. They might want to share pictures, documents, or other files. Our app should be able to handle that too.
- **Admin Features:** For group chats, there should be someone in charge, like a group leader. We'll add features for this person to manage the group, like approving new members or kicking out troublemakers.

2 Methodology

The project follows an iterative development methodology, with frequent testing and feedback loops to ensure continuous improvement. The development process involves the following steps:

2.1 Server

2.1.1 Seriver Initialization

1. The server script initializes a socket and binds it to a specific IP address and port to listen for incoming connections.
2. Upon receiving a connection request from a client, it establishes a connection and spawns a new thread to handle communication with that client.

2.1.2 Group Management

1. The groups dictionary stores information about each group, including its members, pending join requests, and online members.
2. Methods are implemented to create new groups, add/remove members, handle join requests, and manage group administrators.

2.1.3 Message Handling

1. The server listens for messages from clients and processes them accordingly.
2. Messages can include commands such as sending a message to a group, approving a join request, changing group administrators, or transferring files.

2.1.4 File Transfer

1. File transfer functionality allows clients to send files to other members of the group.
2. The server coordinates the file transfer process by receiving the file from the sender and distributing it to the online members of the group.

2.1.5 Threading

1. Threading is utilized to handle multiple client connections concurrently, ensuring that the server can communicate with multiple clients simultaneously without blocking.

2.2 Client

2.2.1 Connection Establishment

1. The client script establishes a connection with the server upon execution, allowing users to interact with the chat application.

2.2.2 User Input Handling

1. User input is captured and processed to execute various commands such as joining a group, sending messages, approving join requests, or transferring files.

2.2.3 Command Execution:

1. Based on user input, the client sends corresponding commands to the server to perform specific actions.
2. For example, typing "/joinGroup" followed by a group name will send a request to the server to join that group.

2.2.4 Message Display

1. Messages received from the server are displayed to the user, allowing them to see the ongoing conversation in the chat room.

2.2.5 Threading

1. Threading is used to separate user input handling from server communication, ensuring that the client can continue to accept user input while waiting for server responses.

3 Tools and Techniques

1. Programming Language: Python
2. Socket Programming for network communication
3. Threading for concurrent execution of tasks
4. Pickle for object serialization
5. Command-line interface for user interaction

4 Snapshots of Design

4.1 Client

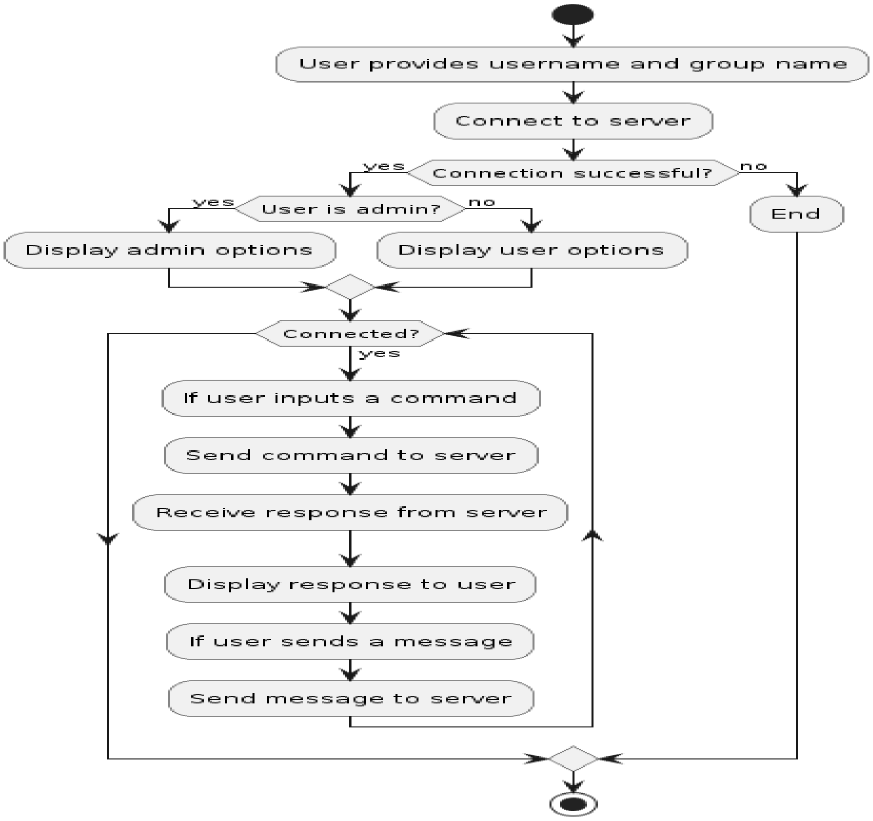


Figure 1: flowchart of client

4.2 Server

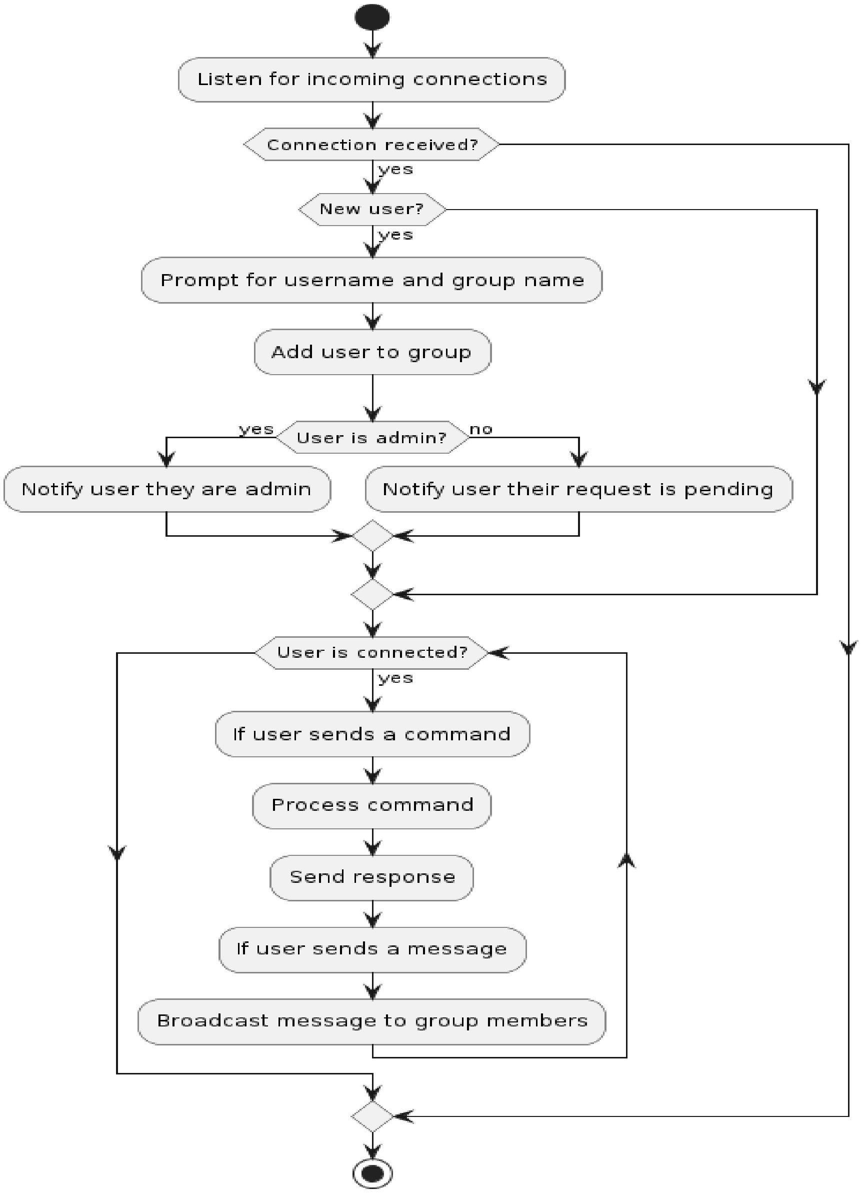
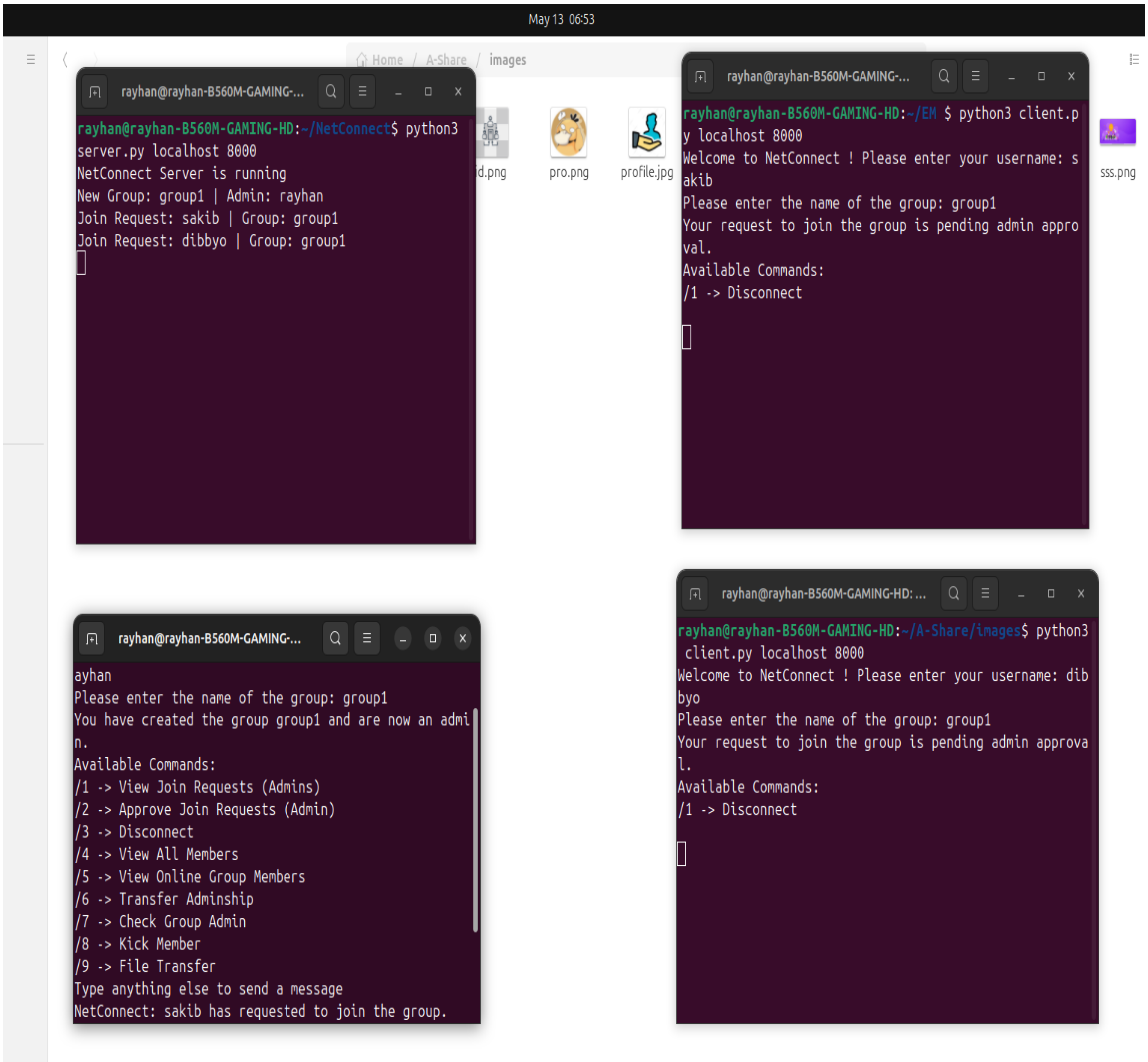


Figure 2: flowchart of server

5 Sample Input and Output

5.1 Group Creation And Member Request



```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
```

```
rayhan@rayhan-B560M-GAMING-HD:~/EM $ python3 client.p
y localhost 8000
Welcome to NetConnect ! Please enter your username: s
akib
Please enter the name of the group: group1
Your request to join the group is pending admin appro
val.
Available Commands:
/1 -> Disconnect
```

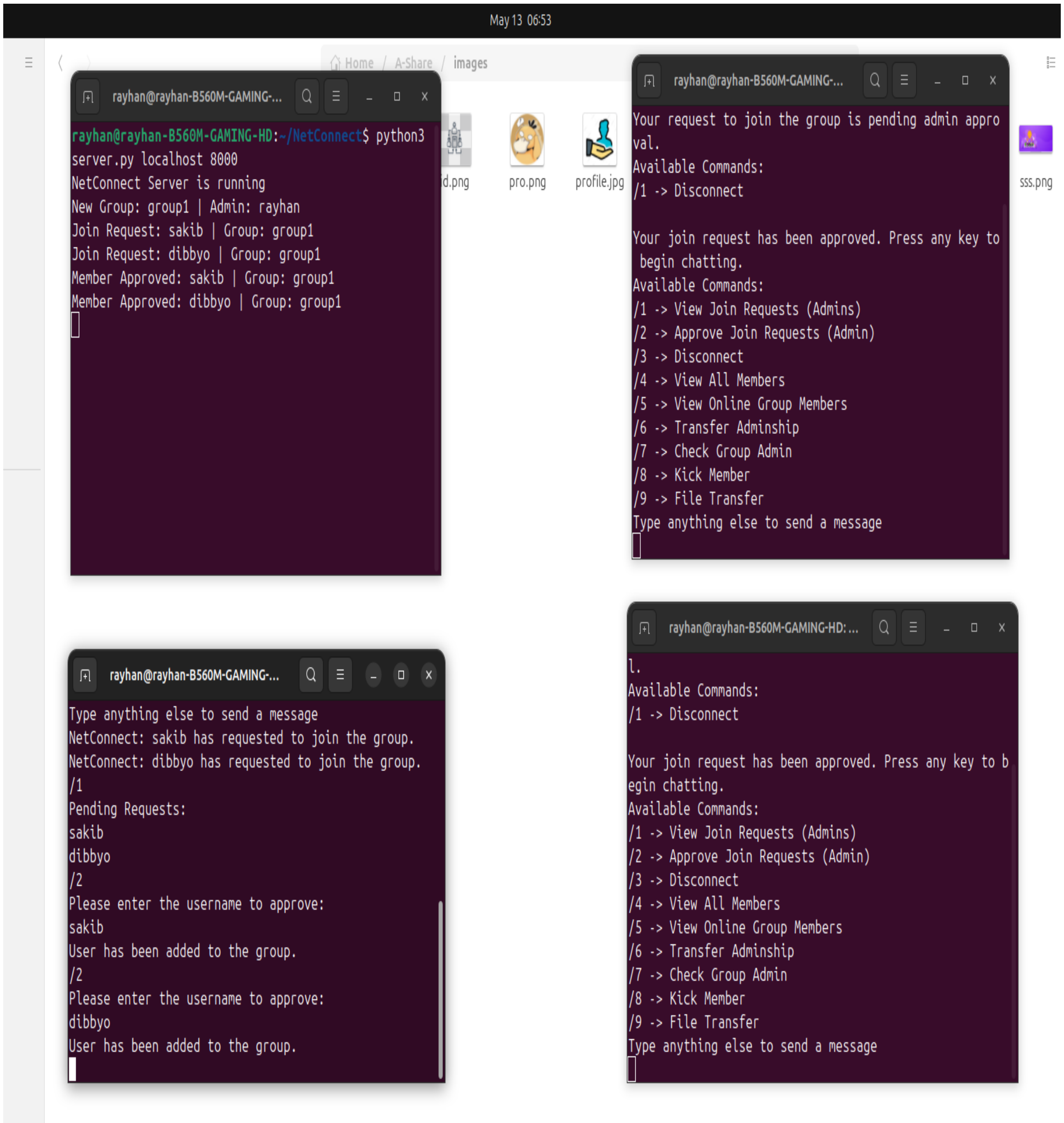
```
ayhan
Please enter the name of the group: group1
You have created the group group1 and are now an admi
n.
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
NetConnect: sakib has requested to join the group.
```

```
rayhan@rayhan-B560M-GAMING-HD:~/A-Share/images$ python3
 client.py localhost 8000
Welcome to NetConnect ! Please enter your username: dib
byo
Please enter the name of the group: group1
Your request to join the group is pending admin approva
l.
Available Commands:
/1 -> Disconnect
```

Figure 3: Status of server and client who requested in new group

In the screenshot we can see rayhan created the group group1 and sakib,dibbyo requested to join in that group.As a result they cant use the group chat functionality.

5.2 Approving request by admin rayhan


May 13 06:53
Home / A-Share / images
d.png
pro.png
profile.jpg
sss.png
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
```

```
Your request to join the group is pending admin appro
val.
Available Commands:
/1 -> Disconnect

Your join request has been approved. Press any key to
 begin chatting.
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
```

```
Type anything else to send a message
NetConnect: sakib has requested to join the group.
NetConnect: dibbyo has requested to join the group.
/1
Pending Requests:
sakib
dibbyo
/2
Please enter the username to approve:
sakib
User has been added to the group.
/2
Please enter the username to approve:
dibbyo
User has been added to the group.
```

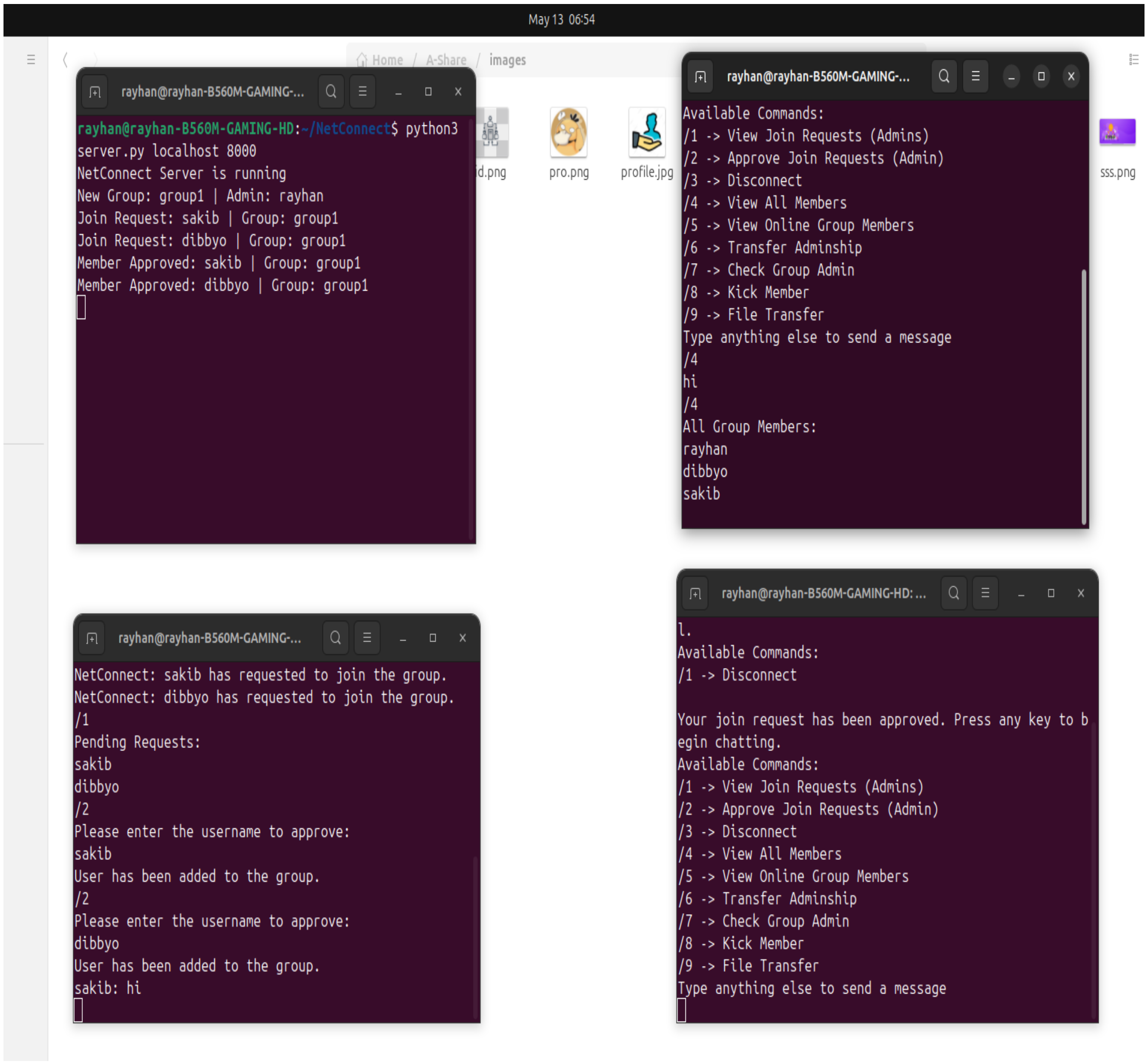
```
l.
Available Commands:
/1 -> Disconnect

Your join request has been approved. Press any key to b
egin chatting.
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
```

Figure 4: Admin approved requet to join group

In the screenshot we can see admin approved sakib and dibbyo's join requet to group1.Now these two member can use group chat functionaility.

5.3 Group Member Sending Message


May 13 06:54
Home / A-Share / images
d.png
pro.png
profile.jpg
sss.png
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
```

```
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
/4
hi
/4
All Group Members:
rayhan
dibbyo
sakib
```

```
NetConnect: sakib has requested to join the group.
NetConnect: dibbyo has requested to join the group.
/1
Pending Requests:
sakib
dibbyo
/2
Please enter the username to approve:
sakib
User has been added to the group.
/2
Please enter the username to approve:
dibbyo
User has been added to the group.
sakib: hi
```

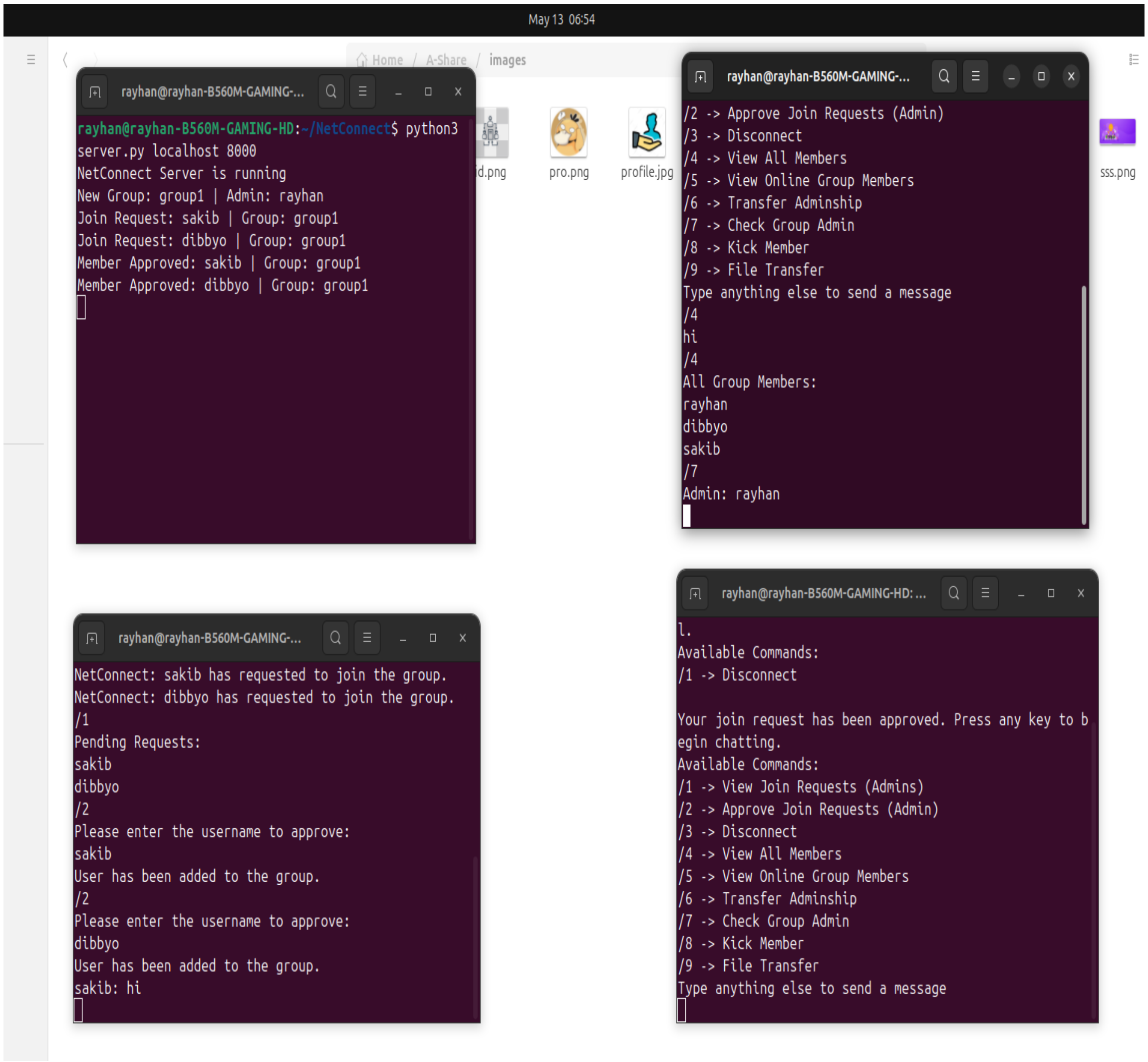
```
l.
Available Commands:
/1 -> Disconnect

Your join request has been approved. Press any key to b
egin chatting.
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
```

Figure 5: Group Chat

In this screenshot we can see group member are chatting in the group and who is sending the message that is also shown.

5.4 Checking Who is Admin


May 13 06:54
Home / A-Share / images
d.png
pro.png
profile.jpg
sss.png
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
```

```
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
/4
hi
/4
All Group Members:
rayhan
dibbyo
sakib
/7
Admin: rayhan
```

```
NetConnect: sakib has requested to join the group.
NetConnect: dibbyo has requested to join the group.
/1
Pending Requests:
sakib
dibbyo
/2
Please enter the username to approve:
sakib
User has been added to the group.
/2
Please enter the username to approve:
dibbyo
User has been added to the group.
sakib: hi
```

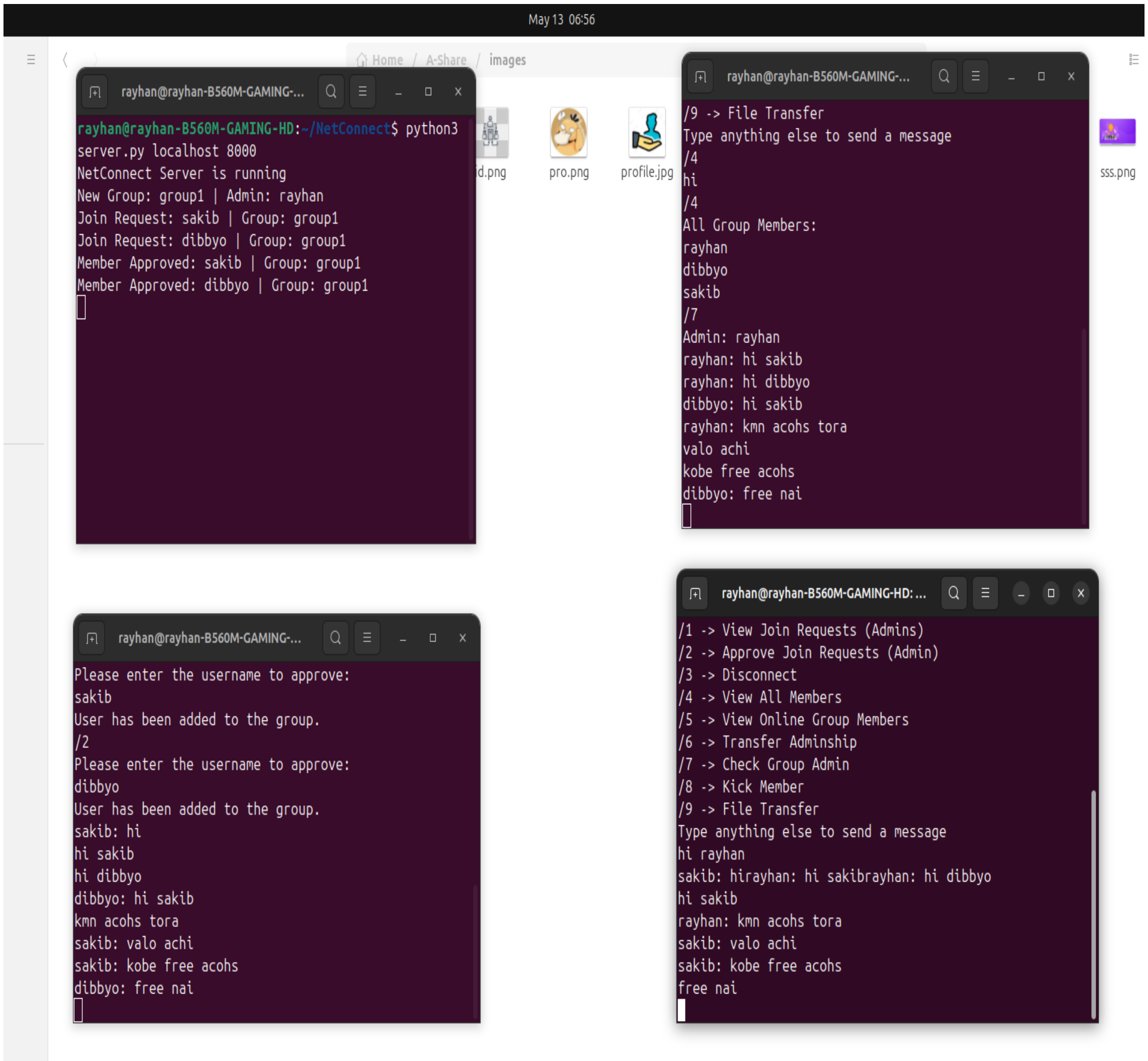
```
l.
Available Commands:
/1 -> Disconnect

Your join request has been approved. Press any key to b
egin chatting.
Available Commands:
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
```

Figure 6: Who is Admin?

There is a option for checking who is admin of the specific group.By inputing /7 a group member can check who is the admin of that group.

5.5 Chatting by group Member


May 13 06:56
Home / A-Share / images
d.png
pro.png
profile.jpg
sss.png
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
```

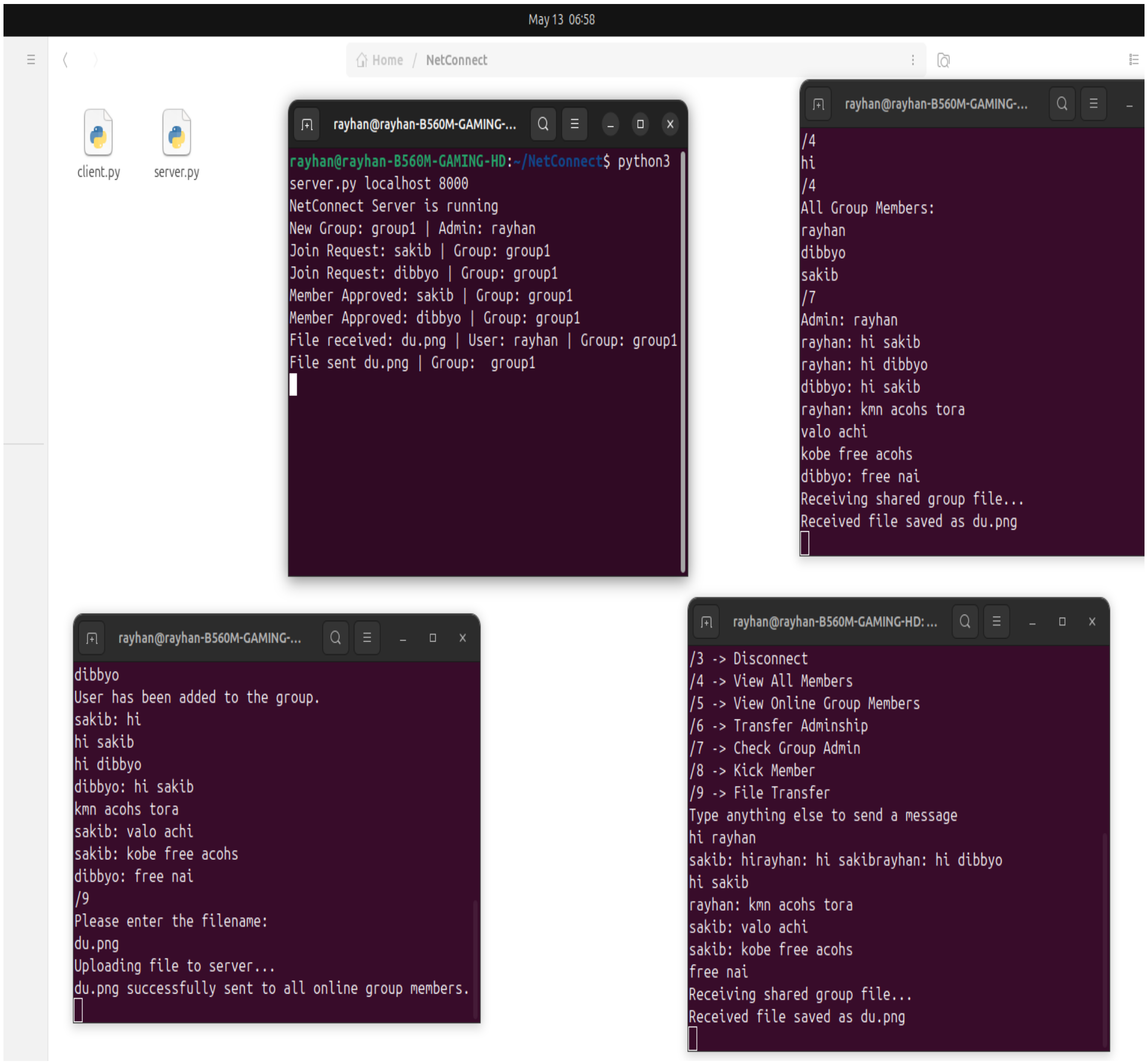
```
/9 -> File Transfer
Type anything else to send a message
/4
hi
/4
All Group Members:
rayhan
dibbyo
sakib
/7
Admin: rayhan
rayhan: hi sakib
rayhan: hi dibbyo
dibbyo: hi sakib
rayhan: kmn acohs tora
valo achi
kobe free acohs
dibbyo: free nai
```

```
Please enter the username to approve:
sakib
User has been added to the group.
/2
Please enter the username to approve:
dibbyo
User has been added to the group.
sakib: hi
hi sakib
hi dibbyo
dibbyo: hi sakib
kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
dibbyo: free nai
```

```
/1 -> View Join Requests (Admins)
/2 -> Approve Join Requests (Admin)
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
hi rayhan
sakib: hirayhan: hi sakibrayhan: hi dibbyo
hi sakib
rayhan: kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
free nai
```

Figure 7: Chatting

5.6 Sending File1


May 13 06:58
Home / NetConnect
client.py
server.py
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
File received: du.png | User: rayhan | Group: group1
File sent du.png | Group:  group1
```

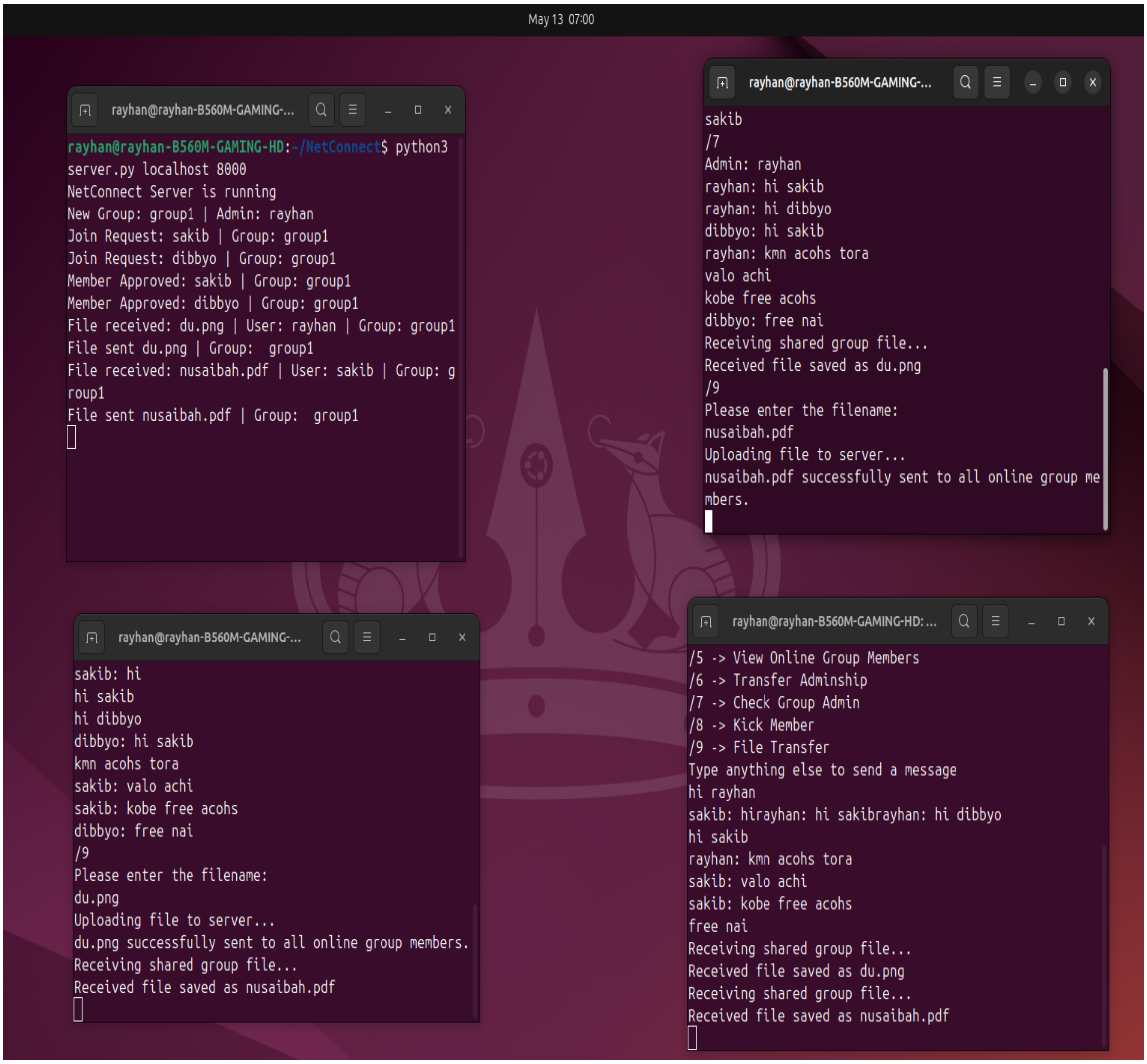
```
/4
hi
/4
All Group Members:
rayhan
dibbyo
sakib
/7
Admin: rayhan
rayhan: hi sakib
rayhan: hi dibbyo
dibbyo: hi sakib
rayhan: kmn acohs tora
valo achi
kobe free acohs
dibbyo: free nai
Receiving shared group file...
Received file saved as du.png
```

```
dibbyo
User has been added to the group.
sakib: hi
hi sakib
hi dibbyo
dibbyo: hi sakib
kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
dibbyo: free nai
/9
Please enter the filename:
du.png
Uploading file to server...
du.png successfully sent to all online group members.
```

```
/3 -> Disconnect
/4 -> View All Members
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
hi rayhan
sakib: hirayhan: hi sakibrayhan: hi dibbyo
hi sakib
rayhan: kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
free nai
Receiving shared group file...
Received file saved as du.png
```

Figure 8: Output of client

5.7 Sending File2


May 13 07:00
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
rayhan@rayhan-B560M-GAMING-HD:~/NetConnect$ python3
server.py localhost 8000
NetConnect Server is running
New Group: group1 | Admin: rayhan
Join Request: sakib | Group: group1
Join Request: dibbyo | Group: group1
Member Approved: sakib | Group: group1
Member Approved: dibbyo | Group: group1
File received: du.png | User: rayhan | Group: group1
File sent du.png | Group:  group1
File received: nusaibah.pdf | User: sakib | Group: g
roup1
File sent nusaibah.pdf | Group:  group1
```

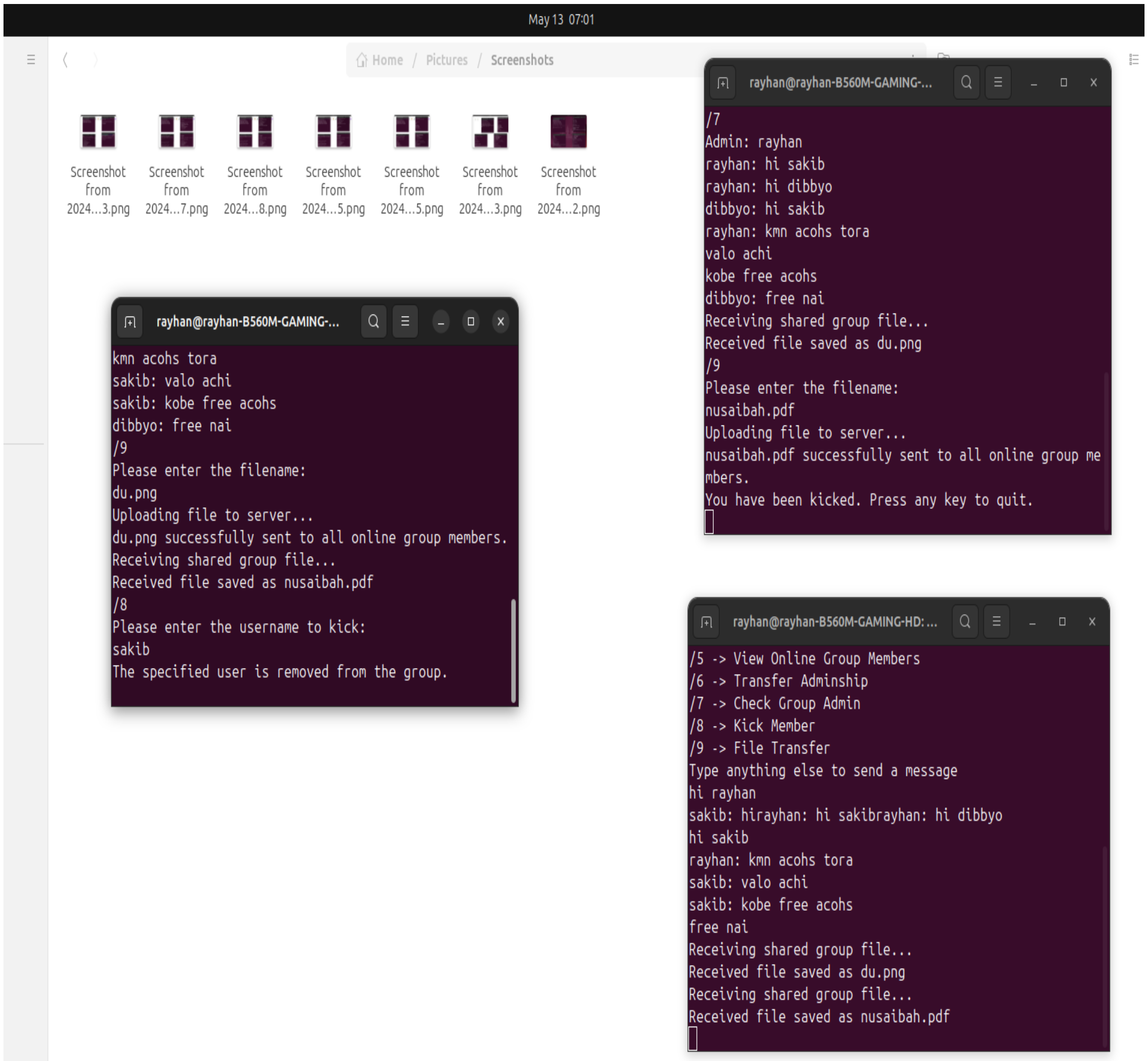
```
sakib
/7
Admin: rayhan
rayhan: hi sakib
rayhan: hi dibbyo
dibbyo: hi sakib
rayhan: kmn acohs tora
valo achi
kobe free acohs
dibbyo: free nai
Receiving shared group file...
Received file saved as du.png
/9
Please enter the filename:
nusaibah.pdf
Uploading file to server...
nusaibah.pdf successfully sent to all online group me
mbers.
```

```
sakib: hi
hi sakib
hi dibbyo
dibbyo: hi sakib
kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
dibbyo: free nai
/9
Please enter the filename:
du.png
Uploading file to server...
du.png successfully sent to all online group members.
Receiving shared group file...
Received file saved as nusaibah.pdf
```

```
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
hi rayhan
sakib: hirayhan: hi sakibrayhan: hi dibbyo
hi sakib
rayhan: kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
free nai
Receiving shared group file...
Received file saved as du.png
Receiving shared group file...
Received file saved as nusaibah.pdf
```

Figure 9: Output of client

5.8 Kick Member


May 13 07:01
Home / Pictures / Screenshots
Screenshot from 2024...3.png
Screenshot from 2024...7.png
Screenshot from 2024...8.png
Screenshot from 2024...5.png
Screenshot from 2024...5.png
Screenshot from 2024...3.png
Screenshot from 2024...2.png
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-...
rayhan@rayhan-B560M-GAMING-HD: ...

```
kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
dibbyo: free nai
/9
Please enter the filename:
du.png
Uploading file to server...
du.png successfully sent to all online group members.
Receiving shared group file...
Received file saved as nusaibah.pdf
/8
Please enter the username to kick:
sakib
The specified user is removed from the group.
```

```
/7
Admin: rayhan
rayhan: hi sakib
rayhan: hi dibbyo
dibbyo: hi sakib
rayhan: kmn acohs tora
valo achi
kobe free acohs
dibbyo: free nai
Receiving shared group file...
Received file saved as du.png
/9
Please enter the filename:
nusaibah.pdf
Uploading file to server...
nusaibah.pdf successfully sent to all online group me
mbers.
You have been kicked. Press any key to quit.
```

```
/5 -> View Online Group Members
/6 -> Transfer Adminship
/7 -> Check Group Admin
/8 -> Kick Member
/9 -> File Transfer
Type anything else to send a message
hi rayhan
sakib: hirayhan: hi sakibrayhan: hi dibbyo
hi sakib
rayhan: kmn acohs tora
sakib: valo achi
sakib: kobe free acohs
free nai
Receiving shared group file...
Received file saved as du.png
Receiving shared group file...
Received file saved as nusaibah.pdf
```

Figure 10: Kicking Member

In this screenshot we can see admin kicked member sakib from the group.

6 Analysis and Report

The NetConnect Chat Application project has been successfully implemented with all specified functionalities. Thorough testing has been conducted to ensure the reliability and efficiency of the application. The use of socket programming and threading has enabled concurrent communication and efficient handling of multiple clients. The application provides a seamless user experience with intuitive commands and clear feedback messages.

7 Conclusion

In conclusion, the NetConnect Chat Application project has achieved its objectives of developing a feature-rich and user-friendly chat application. The application demonstrates the effective use of Python programming language and network communication techniques to facilitate real-time group communication. Further enhancements and refinements can be made based on user feedback and future requirements. Overall, the project showcases the capabilities of modern software development techniques in building scalable and interactive communication platforms.