# CS3530: Computer Networks-1

# Socket Programming


**Team Members:**

Uppala Sehouriey - CS19BTECH11015

Danda Sarat Chandra Sai - CS19BTECH11003

Ambati Sanjay Krishna - CS19BTECH11013

Langaru Likitha - CS19BTECH11008

Narayana Sreehitha Reddy- CS19BTECH11016

Lakshmi Sravya K - CS19BTECH11017

# Software Overview - Multimedia Chat:

## Multimedia Group Chat:

This Multimedia chat app is developed using python3. The important components involved in this app are client and server(communicated using socket programming), GUI (implemented using kivy).

Clients on the same network can chat and share files with each other. The files and text messages are shared using socket programming.

## Client:

The Client represents the end user who connects to other clients with the server being the intermediate transmitter. Instead of peer-to-peer communication of clients, all the clients are connected by the server.

## Server:

Server transmits the message received from one client to all other clients connected to the server at that instant  reinforcing the idea behind Multimedia Group chat.

Along with above components, key features like file transfering, GUI, audio and image transfering are supported by the software.

## Graphic user interface:

The GUI is added to provide a better interface . GUI gives more functionality than CLI in terms of providing buttons and controlling thread processes efficiently.

## The system design with block diagram or flowchart:

The baseline implementation consists of group text chats between all clients connected to the server in a client-server mannered connection. The server socket is first established and is open for listening requests from clients in the same local area network. The clients can then establish their own socket and connect to the server using the server address.

For group chat, the client needs to connect to the server instead of all other chats. This reduces the number of connections from n*(n-1)/2 to ‘n’ connections.(n - the number of clients).

Messages to be transferred from a sender client are sent to the server first, and then the server sends the message to all other receiver clients. Any client connected to the server can act as both sender and receiver.

Basic send(), recv() functions are used to transfer messages between client and server in both ways.

### Threading:

#### In server:

- Once the server socket is established and activated, it is open for connection requests from clients.
- Each client connection creates a new thread in the server. Disconnecting the client from the server results in the ending of this thread.
- The server can be terminated by using a keyboard interruption. The server will still be active when all clients disconnect. try,

except methods are used for detecting keyboard interrupts and taking necessary actions.

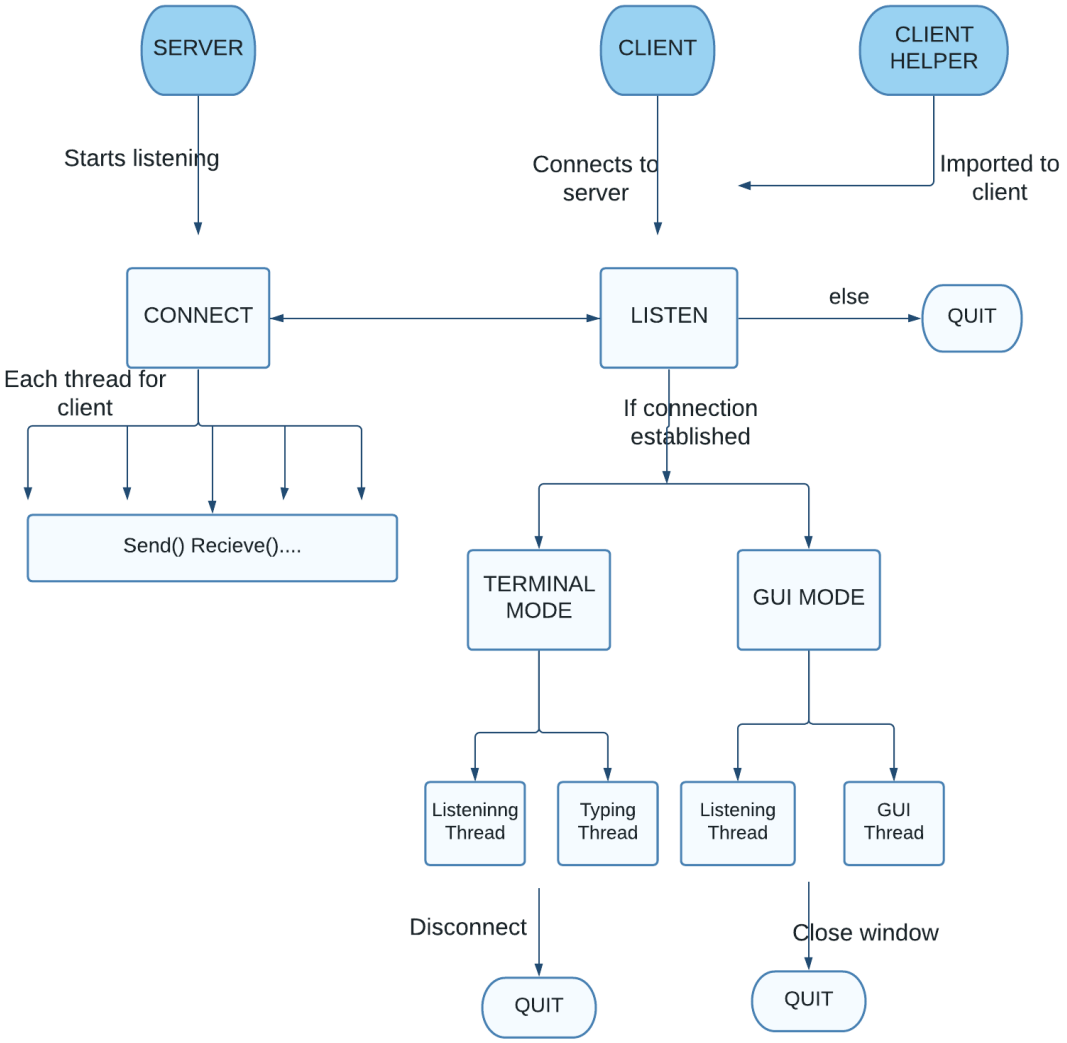
**In client:**

To establish a two way communication, two threads( namely listening thread and typing thread) are forked from the main thread of the client. When a successful connection is established, the client gets an option for either CLI or GUI.  Both interfaces allow you to chat, and share files of multiple formats. !q cmd is used to disconnect from server in CLI and closing of the pop-up box in GUI will disconnect the client from server.

## Features:

- Text chat
- File attachments
- Image, Audio and Video sharing
- Graphic User Interface

## Block Diagram of System Design:




# References:


1. *Kivy tutorials*
2. *Socket Programming in Python*

## Screenshots of Results of our working Software:

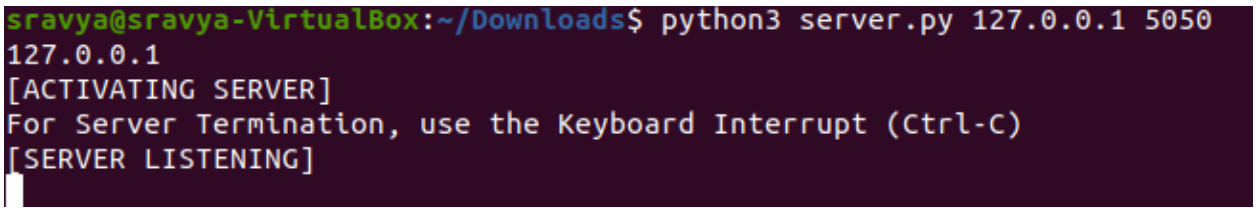
1. **Initializing server for first time**

   The Server gets started by the command -

   **$ python3  server.py <ipv4address> <portNo>**

   in which <ipv4address> implies the ipv4 address of the host where the server.py file resides and <portNo> implies port through which it listens. In the terminal, it displays “Activating Server” and shows that, use the command “ctrl+c” - for server termination. Along all of this, it shows “Server Listening” implying that the server is currently open and any client within the same network or host can join/connect to the server.

   Server:




2. **Client Joining the server**

   The Client can join the server given the IP address of server host and Port Number, by the command -

   **$ python3 client.py <ipv4address> <portNo>**

   A. On choosing Correct Address

   For Client, it then displays “Would you like to join (yes/no)”, on typing “yes”, “Press 1 for CLI and 2 for GUI”, and it asks the Client to “Enter your name” , finally, showing “<Client_name> has joined the chat”

```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_5.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
```

Client:

CLI:

```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_5.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sravya
Total No of Clients:  1
Client  1   :  sravya
```

GUI:

Server:

```
sravya@sravya-VirtualBox:~/Downloads$ python3 server.py 127.0.0.1 5050
127.0.0.1
[ACTIVATING SERVER]
For Server Termination, use the Keyboard Interrupt (Ctrl-C)
[SERVER LISTENING]
sravya
```

** On typing “no”, it directly gets terminated. (No Change in the server)

Client:

```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 192.168.0.101 5050
[INFO    ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_6.txt
[INFO    ] [Kivy        ] v2.0.0
[INFO    ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO    ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO    ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO    ] [Factory     ] 186 symbols loaded
[INFO    ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO    ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? no
sravya@sravya-VirtualBox:~/Downloads$
```

B. On choosing Wrong Address

Client:

If Wrong IP Address/ if the server is not currently active, then it puts the message “No route to host”.

### 3. Another Client joining the server

Client:

It then displays the names of the clients present in the group chat in the following manner.

CLI:

Client1:

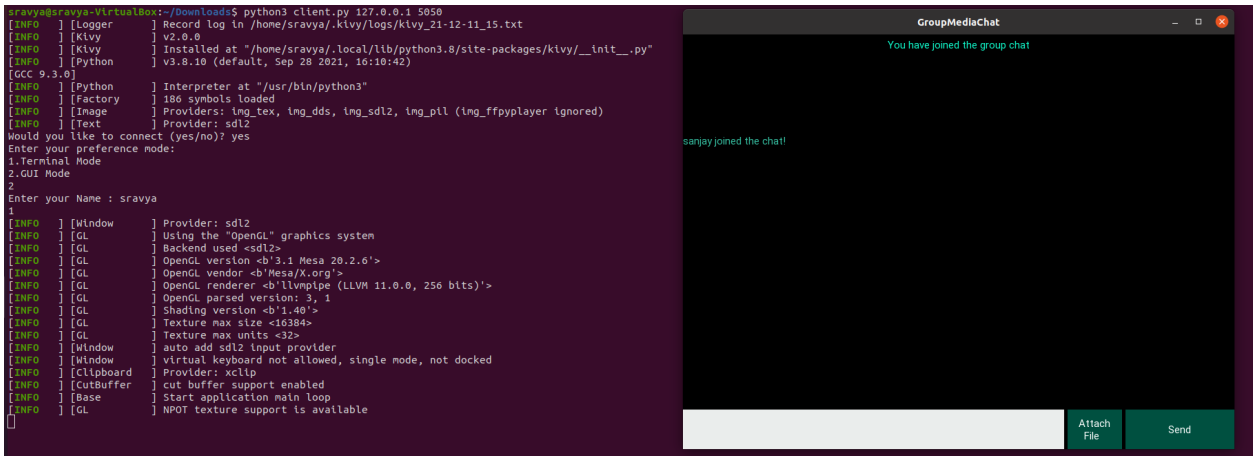
```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO    ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_13.txt
[INFO    ] [Kivy        ] v2.0.0
[INFO    ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO    ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO    ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO    ] [Factory     ] 186 symbols loaded
[INFO    ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO    ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sravya
Total No of Clients:  1
Client  1  :  sravya
sanjay joined the chat!
```

Client2:

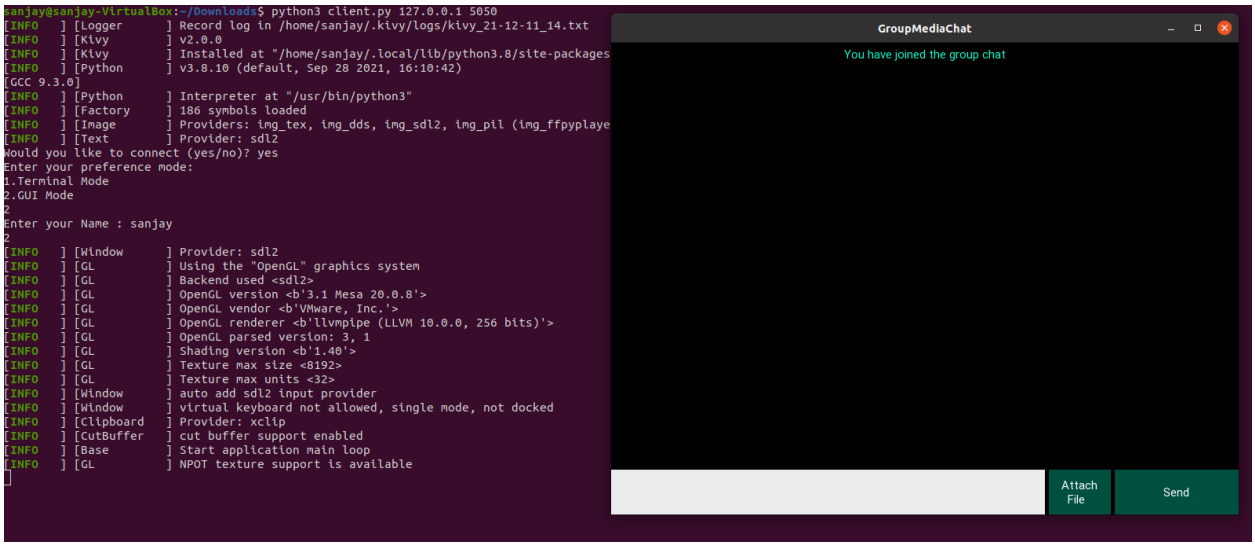
```
sanjay@sanjay-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO    ] [Logger      ] Record log in /home/sanjay/.kivy/logs/kivy_21-12-11_12.txt
[INFO    ] [Kivy        ] v2.0.0
[INFO    ] [Kivy        ] Installed at "/home/sanjay/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO    ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO    ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO    ] [Factory     ] 186 symbols loaded
[INFO    ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO    ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sanjay
Total No of Clients:  2
Client  1  :  sravya
Client  2  :  sanjay
```

GUI:

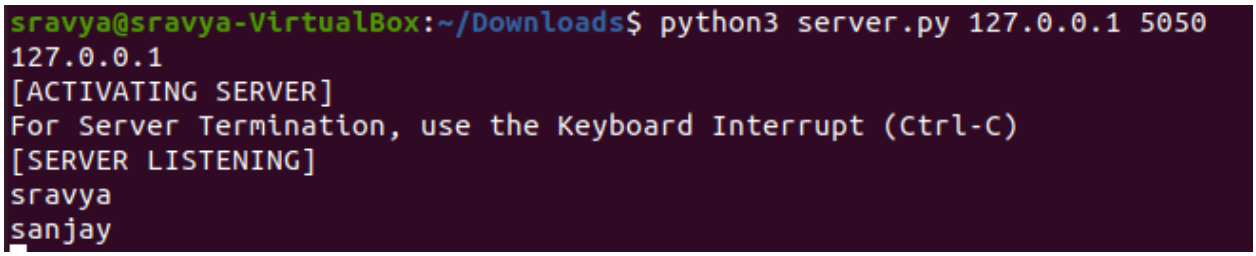
Client1:



Client2:




Server:




## 4. Sending text messages

CLI: By directly texting the message and pressing “enter”, a client can send a message to all other clients present in the group chat.

Client1:

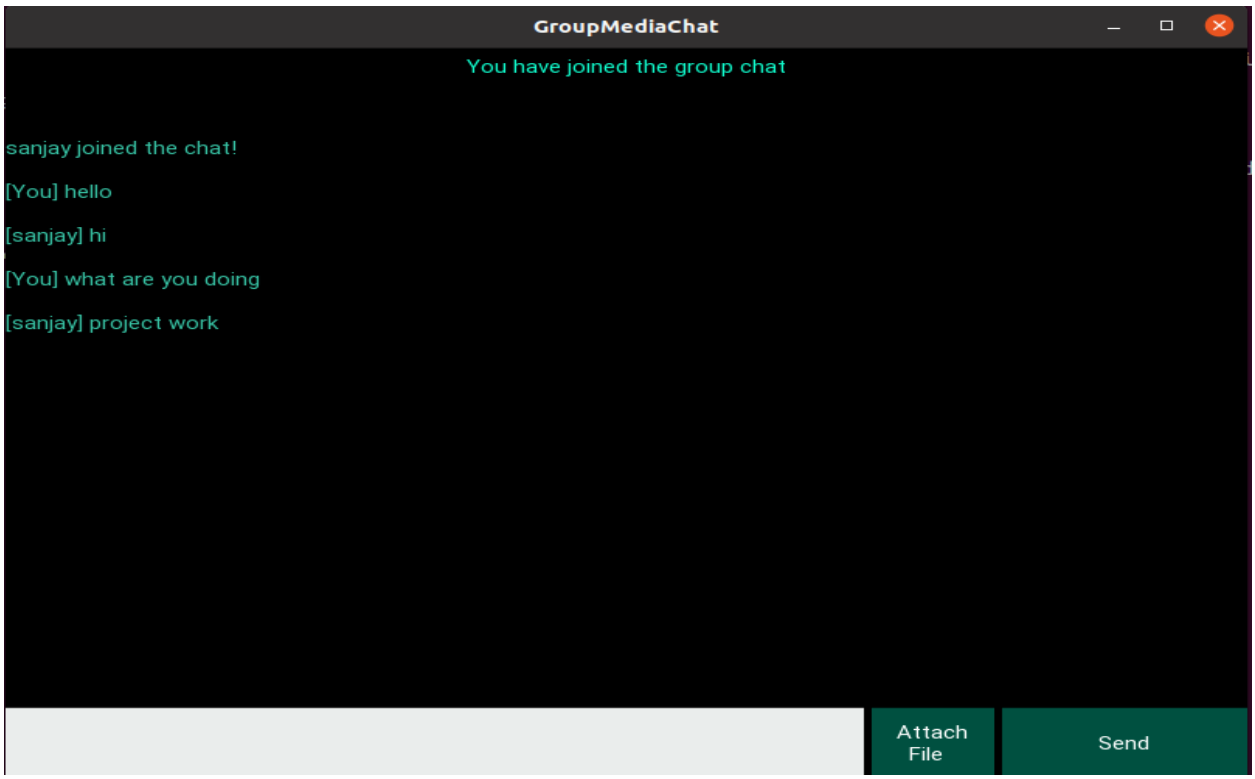
```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_17.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sravya
Total No of Clients:  1
Client  1  :  sravya
sanjay joined the chat!
hello
[sanjay] hi
what are you dng
[sanjay] project work
```

Client2:

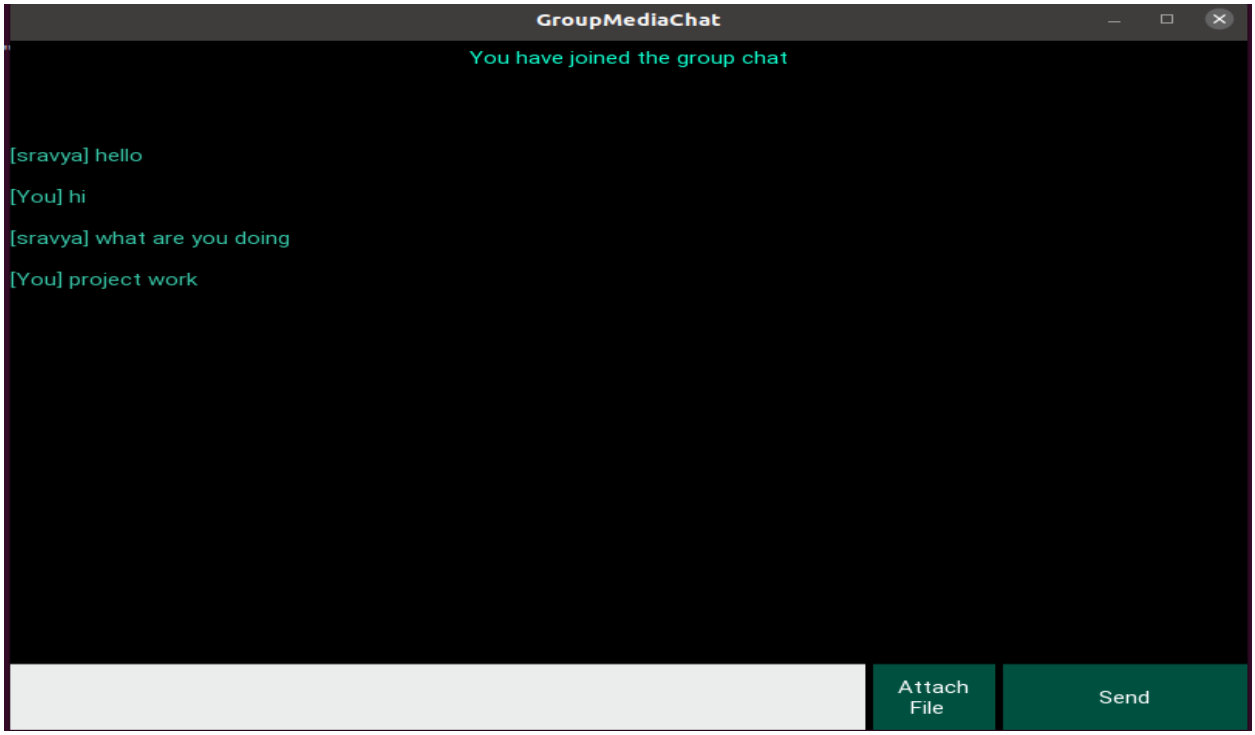
```
sanjay@sanjay-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sanjay/.kivy/logs/kivy_21-12-11_16.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sanjay/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sanjay
Total No of Clients:  2
Client  1  :  sravya
Client  2  :  sanjay
[sravya] hello
hi
[sravya] what are you dng
project work
```

GUI: A client should type the message in the given chat box and then by clicking the “send” button, it will be sent to all other clients.

Client1:




Client 2:



Server:

```
sravya@sravya-VirtualBox:~/Downloads$ python3 server.py 127.0.0.1 5050
127.0.0.1
[ACTIVATING SERVER]
For Server Termination, use the Keyboard Interrupt (Ctrl-C)
[SERVER LISTENING]
sravya
sanjay
[sravya] hello
[sanjay] hi
[sravya] what are you doing
[sanjay] project work
```

## 5. Sending different file formats (choosing files)

CLI: A Client can send any file formats like .pdf, .mp4, .jpg etc., to all other clients in the group chat, by using the command “!send <filename>”.

Client1:

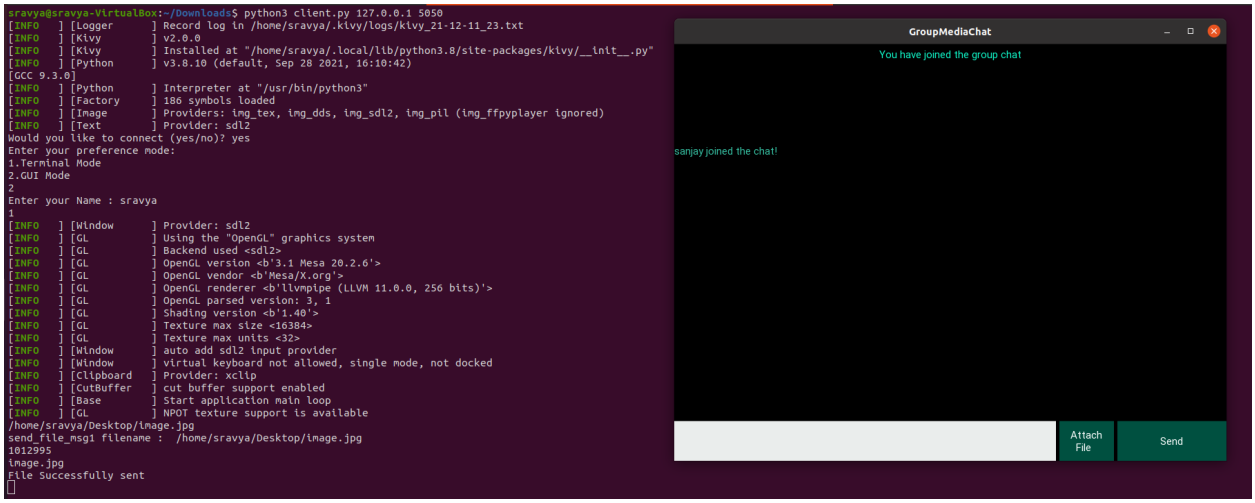
```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_21.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sravya
Total No of Clients:  1
Client  1  :  sravya
sanjay joined the chat!
!send image.jpg
send_file_msg1 filename :  image.jpg
24576
image.jpg
File Successfully sent
```

Client2:

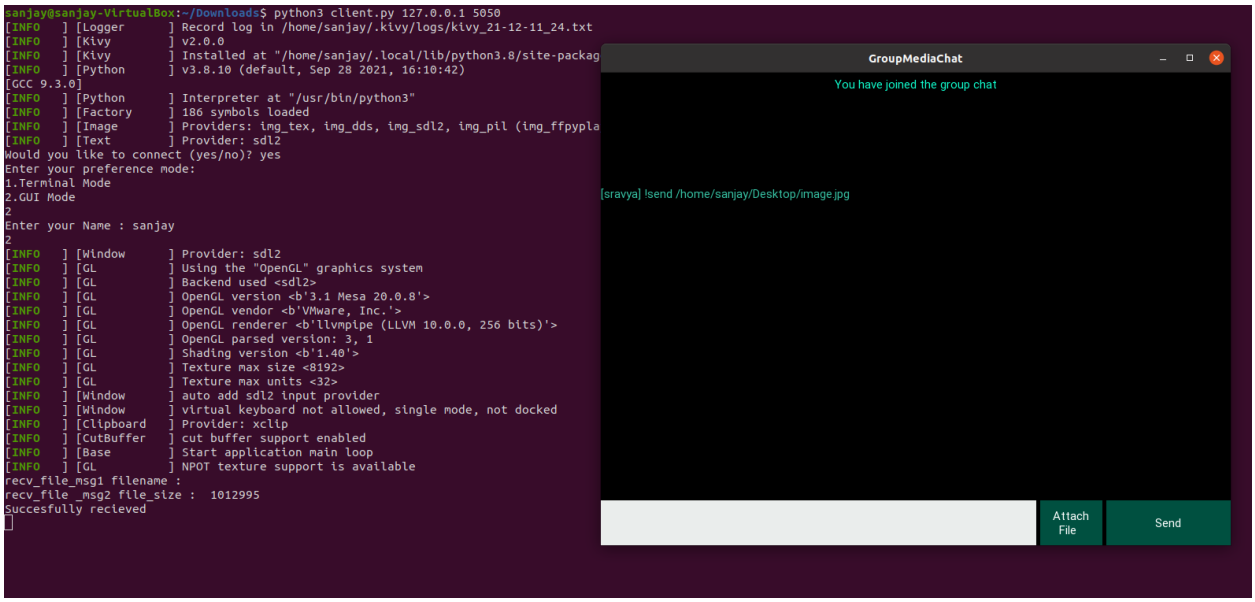
```
sanjay@sanjay-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO    ] [Logger      ] Record log in /home/sanjay/.kivy/logs/kivy_21-12-11_22.txt
[INFO    ] [Kivy        ] v2.0.0
[INFO    ] [Kivy        ] Installed at "/home/sanjay/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO    ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO    ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO    ] [Logger      ] Purge log fired. Analysing...
[INFO    ] [Logger      ] Purge finished!
[INFO    ] [Factory     ] 186 symbols loaded
[INFO    ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO    ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sanjay
Total No of Clients:  2
Client  1  :  sravya
Client  2  :  sanjay
[sravya] !send image.jpg
recv_file_msg1 filename :
recv_file _msg2 file_size :  1012995
```

GUI: A client should choose a file and then by clicking the “select” button, it will be sent to all other clients.

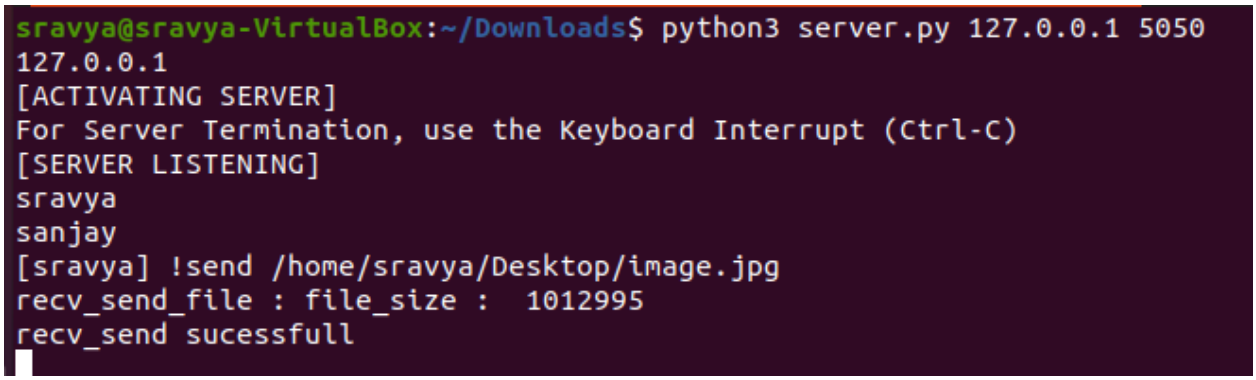
Client1:



Client2:




Server:




## 6. Getting disconnected from the server

CLI: A client can choose to exit from the group chat by using the command “!q”

Client1:

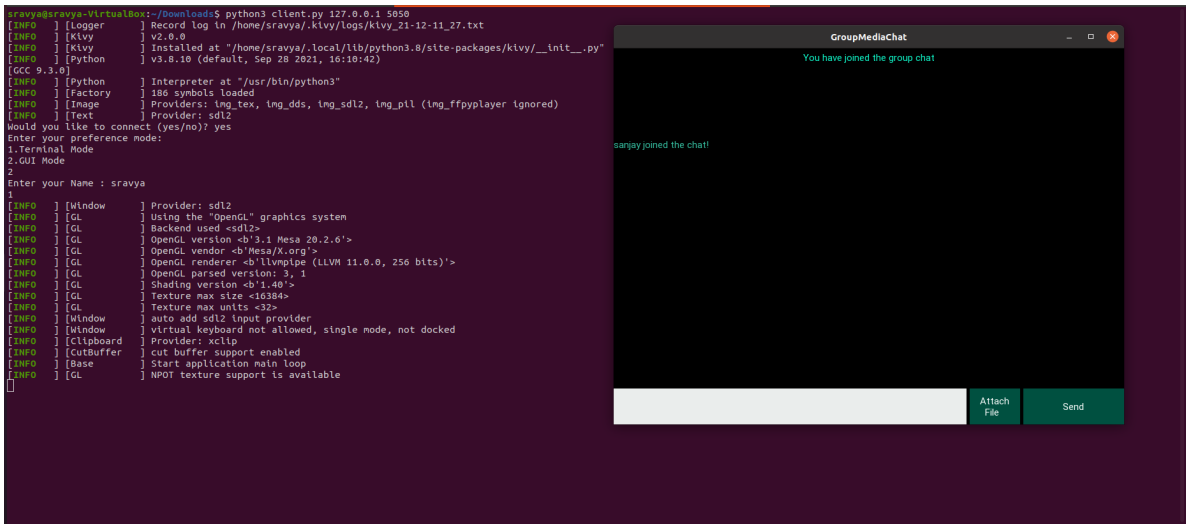
```
sravya@sravya-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sravya/.kivy/logs/kivy_21-12-11_25.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sravya/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sravya
Total No of Clients:  1
Client  1  :  sravya
sanjay joined the chat!
!q
Disconnected
```

Client2:

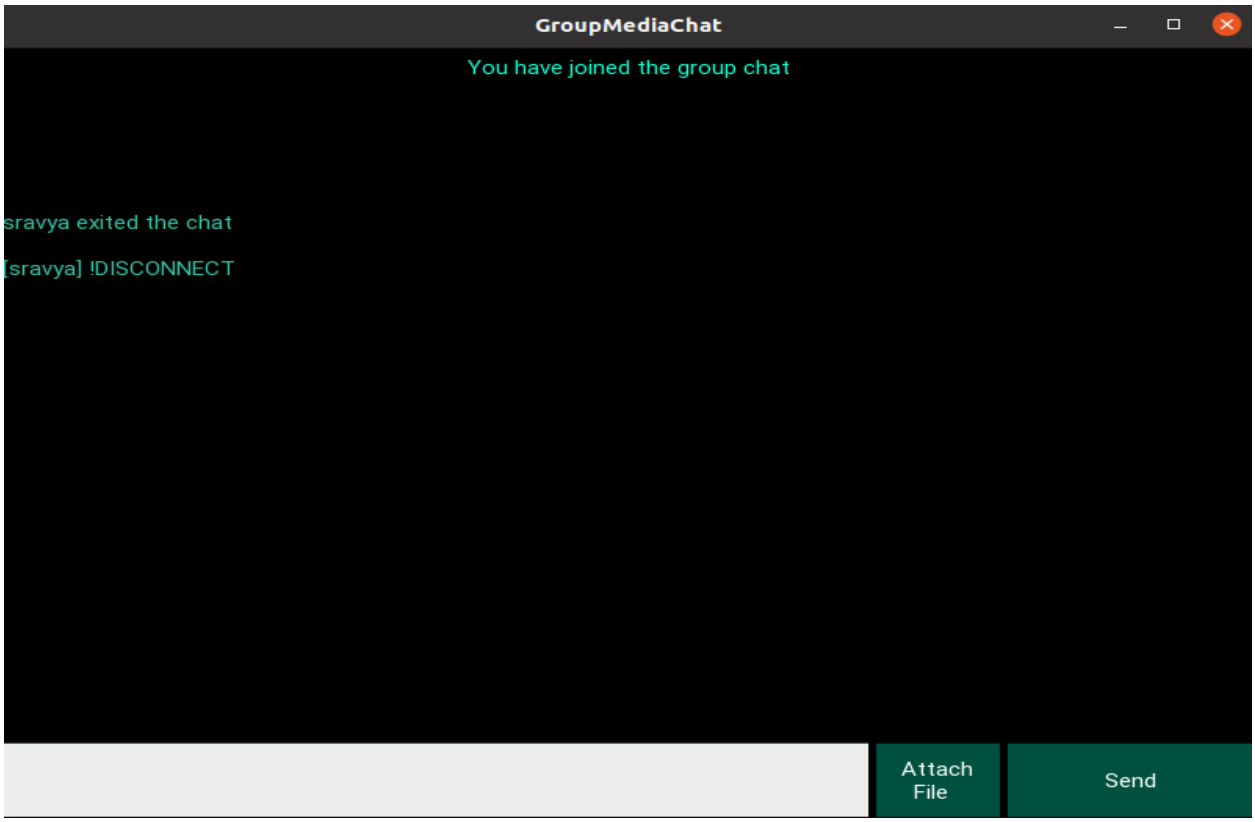
```
sanjay@sanjay-VirtualBox:~/Downloads$ python3 client.py 127.0.0.1 5050
[INFO   ] [Logger      ] Record log in /home/sanjay/.kivy/logs/kivy_21-12-11_26.txt
[INFO   ] [Kivy        ] v2.0.0
[INFO   ] [Kivy        ] Installed at "/home/sanjay/.local/lib/python3.8/site-packages/kivy/__init__.py"
[INFO   ] [Python      ] v3.8.10 (default, Sep 28 2021, 16:10:42)
[GCC 9.3.0]
[INFO   ] [Python      ] Interpreter at "/usr/bin/python3"
[INFO   ] [Factory     ] 186 symbols loaded
[INFO   ] [Image       ] Providers: img_tex, img_dds, img_sdl2, img_pil (img_ffpyplayer ignored)
[INFO   ] [Text        ] Provider: sdl2
Would you like to connect (yes/no)? yes
Enter your preference mode:
1.Terminal Mode
2.GUI Mode
1
Enter your Name : sanjay
Total No of Clients:  2
Client  1  :  sravya
Client  2  :  sanjay
sravya exited the chat
[sravya] !DISCONNECT
```

GUI: A Client can choose to exit from the group chat by clicking the “X” button present at the right most top of the interface.

Client1:




Client2:



Server:

```
sravya@sravya-VirtualBox:~/Downloads$ python3 server.py 127.0.0.1 5050
127.0.0.1
[ACTIVATING SERVER]
For Server Termination, use the Keyboard Interrupt (Ctrl-C)
[SERVER LISTENING]
sravya
sanjay
[sravya] !DISCONNECT
```

## PSEUDO CODE :

### Server:

```
GroupChatClient :
    ClientList.append(ClientName)

    for clients in ClientList:
        send_message(ClientName joined)

    while connection = True :
        msg = recv_message()
        if msg == DISCONNECT :
            Connection = False
        for clients in ClientList:
            send_message(msg)
        if msg[0:6] == '!send ' :
            recv_send_file()


StartServer :
    While true :
        conn,  addr = server.listen()
        thread = new thread (new client)
        thread.call()
    exit ← Keyboard Interrupt
```

### Client:

```
TypingThread:
    while True :
```

```
        msg = std.input()
        if msg == DISCONNECT :
            break
        send_message()

        if msg ← starts with '!send ' :
            send_file()

    sys.exit()


ListenThread :
    while True :
        msg = recv_message()
        print(msg)

        if msg ← starts with '!send ' :
            recv_file()

TerminalModeStart :
    make connection.
    Clientlist ← recv_message()

    print(Clientlist)

    thread1 ← ListenThread()
    thread2 ← TypingThread()
```