

Internet Relay Chat Project

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1. Introduction:

In the IRC project, we employed protocols to provide multi-client communication that allowed users to create, join, and leave rooms. In addition to this, users can privately message another client. Every client in the room can see every message when there are many clients present.

1.1 Server and Client:

The server and client act as the application's brains. We have chosen a single server to which any number of clients may connect, each with a unique name which may contain both alphanumeric and underscore characters.

1.2 Features:

The application's primary function is facilitating client-to-client communication through server create/join rooms and additional options including giving a list of rooms, exiting a room, and sending private messages.

2. Specifications

2.1 Communication:

Rooms and one-on-one chats are the primary means of communication. The server receives messages sent by users in the room and distributes them to everyone else in the room, except the sender.

2.2 Listing rooms:

The command `$list` that we created delivers a list of all the available rooms. It says "no rooms available" at first when none have been created.

2.3 Create a Room:

At first, there are no rooms available. The first person to start this software can create a room with `$join`. All other users can now join and start speaking in this freshly created area by using the room name.

2.4 Joining a room:

Any client can access the rooms after they have been made available by using the `$join` command to join the room of their choice. Everyone in the room will be aware of the new client once contact has been made, allowing them to start a dialogue.

2.5 Leave room:

Using the `$leave` command, each group member has the ability to leave at any time.

2.6 Messages:

Any message's name, transaction ID, and payload are crucial components. The delimiter, which is the space, divides these components. In this case, the transaction ID is an unsigned integer that increases by 1 each time the client sends a message. For server to client messages, it stays at 0.

2.7 Replies:

The server responds to messages with a numerical response. It includes the transaction ID and the request status. It stands for a 0 for a request that is successful and a non-zero for any problems.

3. Infrastructure :

3.1 Client can connect to a server

Any number of clients can connect to a single server, each of which has its own name and supports underscore and alphanumeric characters.

```
This Project copywrites to Siddhartha, Anoop and Syam
Enter your Name: Bumblebee

You are Connected to the server! Start a convo
```

3.2 Client can create a room

Initially, there are no rooms available. Using the create command, the first user can construct a room. All other users will now be able to join this newly created room and begin using the room name to communicate.

```
This Project copywrites to Siddhartha, Anoop and Syam
Enter your Name: Sid

You are Connected to the server! Start a convo

Application Menu:
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)

create IPProjectroom
IPProjectroom created

Hello
[IPProjectroom] Sid: Hello
[IPProjectroom] OptimusPrime joined the room
[IPProjectroom] OptimusPrime Welcome to the room
[IPProjectroom] OptimusPrime: Hello Sid
[IPProjectroom] OptimusPrime: Assemble
```

3.3 Client can list all rooms

With the command list, a user can view the list of rooms. The join command allows the user to enter a room's name to join it. A list of available rooms is shown if any rooms are available; otherwise, "No rooms available" is displayed.

If no rooms available:

```
Application Menu:
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)

list
I am sorry, No rooms available to join
```

List of rooms available and members in a room

```
This Project copywrites to Siddhartha, Anoop and Syam
Enter your Name: Bumblebee

You are Connected to the server! Start a convo

Application Menu:
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)

list
Below is the List of available rooms and members:

IPProjectroom

['Sid', 'OptimusPrime']
```

3.4 Client can join a room

Any client can view the available rooms once they become available and use the join command to enter the room of their choice. Each client in the room will be informed of the new customer as soon as contact has been established, and they can all begin speaking.

```
You are Connected to the server! Start a convo
```

```
Application Menu:
```

- 1.menu (Navigates to the Main Menu)
- 2.list (It will provide you the lists available rooms)
- 3.create roomname - Usage "create IPProject" (This command will create a new room)
- 4.join roomname - Usage "join IPProject" (This command helps you to join the room)
- 5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
- 6.leave (This command will let you leave from the current room)
- 7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
- 8.exit (exits the client app)

```
list
```

```
Below is the List of available rooms and members:
```

```
IPProjectroom
```

```
['Sid', 'OptimusPrime']
```

```
create IProom2
```

```
IProom2 created
```

```
join IPProjectroom
```

```
[IPProjectroom] Bumblebee joined the room
```

```
[IPProjectroom] Bumblebee Welcome to the room
```

```
□
```

3.5 Client can leave a room

Using the leave command, a user can leave a room at any moment.

The room is still usable for other users if there are still other users present; however, once the last user leaves the room, the room is removed because no one is still within.

- 7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
- 8.exit (exits the client app)

```
list
```

```
Below is the List of available rooms and members:
```

```
IPProjectroom
```

```
['Sid', 'OptimusPrime']
```

```
create IProom2
```

```
IProom2 created
```

```
join IPProjectroom
```

```
[IPProjectroom] Bumblebee joined the room
```

```
[IPProjectroom] Bumblebee Welcome to the room
```

```
[IPProjectroom] Bumblebee:
```

```
switch IProom2
```

```
You are switched to IProom2
```

```
hello
```

```
[IProom2] Bumblebee: hello
```

```
leave
```

```
You left the room
```

3.6 Client can list members of a room

The members of a room can be listed if there is at least one user in the room. Each user gets notified if the other person joins the room. If there is no one in the room then it shows that no one is available.

```
This Project copywrites to Siddhartha, Anoop and Syam
Enter your Name: Bumblebee
```

```
You are Connected to the server! Start a convo
```

```
Application Menu:
```

```
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)
```

```
list
```

```
Below is the List of available rooms and members:
```

```
IPProjectroom
```

```
['sid', 'OptimusPrime']
```

3.7 Switch to another room

A user can switch from one room to another room using the switch command

```
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)
```

```
list
```

```
Below is the List of available rooms and members:
```

```
IPProjectroom
```

```
['sid', 'OptimusPrime']
```

```
create IPRoom2
IPRoom2 created
```

```
join IPProjectroom
```

```
[IPProjectroom] Bumblebee joined the room
```

```
[IPProjectroom] Bumblebee Welcome to the room
```

```
[IPProjectroom] Bumblebee:
```

```
switch IPRoom2
```

```
You are switched to IPRoom2
```

```
hello
```

```
[IPRoom2] Bumblebee: hello
```

```
.
```

3.8 Multiple clients can connect to a server

There can be 'n' number of clients connected to a server. Any client can view the available rooms once the rooms are ready to be joined. Every client gets to know when any new user joins the room.


```
C:\WINDOWS\py.exe
This Project copywrites to Siddhartha, Anoop and Syam
Enter your Name: OptimusPrime

You are Connected to the server! Start a convo

Application Menu:
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)

join IPProject1
[IPProject1] OptimusPrime joined the room
[IPProject1] OptimusPrime Welcome to the room
[IPProject1] Sid: Hello
HI
[IPProject1] OptimusPrime: HI
```

```
C:\WINDOWS\py.exe
You are Connected to the server! Start a convo

Application Menu:
1.menu (Navigates to the Main Menu)
2.list (It will provide you the lists available rooms)
3.create roomname - Usage "create IPProject" (This command will create a new room)
4.join roomname - Usage "join IPProject" (This command helps you to join the room)
5.switch roomname - Usage "switch IPProject" (This command will switch you to another room)
6.leave (This command will let you leave from the current room)
7.personal message - Usage "personal Name_of_reciever hello" (sends personal message)
8.exit (exits the client app)

create IPProject1
IPProject1 created

create IPProject2
IPProject2 created

[IPProject1] OptimusPrime joined the room
[IPProject1] OptimusPrime Welcome to the room
Hello
[IPProject2] Sid: Hello
switch IPProject1
You are switched to IPProject1

Hello
[IPProject1] Sid: Hello
[IPProject1] OptimusPrime: HI
```

3.9 Client can send messages to a room

Users establish a room, enter it, and begin interacting with one another by exchanging messages that are visible to all other users in the room. Many members of the group get the message sent by one individual.

```
personal Sid Hello Sid
Entered personal message function
[personal message] Bumblebee: Hello Sid
█
```

```
[IPProject1room] Bumblebee:
[personal message] Bumblebee: Hello Sid
█
```

3.10 Client can join multiple (selected) rooms

Client can join as many created rooms as possible. The rooms should have at least one user in it. The room can have many clients in it at a time.


```
Below is the List of available rooms and members:
```

```
IPProject1  
['Sid', 'OptimusPrime']  
IPProject2  
['Sid']
```

3.11 Client can send distinct messages to multiple (selected) rooms

The messages can be sent to different rooms by the single client. The client's present in the selected rooms will get the message sent by the client to the rooms. The message sent by one client will be different for the different rooms.

```
[IPProject2] Sid: Hello  
switch IPProject1  
You are switched to IPProject1  
  
Hello  
[IPProject1] Sid: Hello
```

3.12 Client can disconnect from a server

Using the exit command, a client can end a connection. Quite simply, the client terminal is shut off. The user will be informed if they are a member of any rooms. Apart from that, the server is also aware of this compelled disconnect.

```
Below is the List of available rooms and members:
```

```
IPProject1  
  
['Sid']  
  
IPProject2  
  
['Sid']
```

3.13 Server can disconnect from clients

Server gets disconnected from clients after five minutes. Timed out error occurs when the server disconnects from clients.

```

PS D:\Masters\Internetworking Protocol\IP_Project\Project\IP_Project\Original IP> & 'C:\Users\Siddhartha's PC\AppData\Local\Programs\Python\Python310\python.exe' '
c:\Users\Siddhartha's PC\.vscode\extensions\ms-python.python-2022.18.2\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '56296' '--' 'd:\Masters\Inter
networking Protocol\IP_Project\Project\IP_Project\Original IP\server.py'
Copywrites to Siddhartha, Anoop and Syam
Hello I am Server. Handling Clients...
Traceback (most recent call last):
  File "d:\Masters\Internetworking Protocol\IP_Project\Project\IP_Project\Original IP\server.py", line 205, in <module>
    recieve()
  File "d:\Masters\Internetworking Protocol\IP_Project\Project\IP_Project\Original IP\server.py", line 188, in recieve
    client, address = server.accept()
  File "C:\Users\Siddhartha's PC\AppData\Local\Programs\Python\Python310\lib\socket.py", line 293, in accept
    fd, addr = self._accept()
TimeoutError: timed out
PS D:\Masters\Internetworking Protocol\IP_Project\Project\IP_Project\Original IP>

```

3.14 Server can gracefully handle client crashes

Servers, rooms, and clients gets informed when a client crashes. Error handling happens where the existing connection will be closed by the host.

3.15 Client can gracefully handle server crashes

All clients are automatically logged out and given a server unavailable message if the server crashes. The message will be Server not responding

```

personal IPProject1 Hello
Entered personal message function
User not found

list
Below is the List of available rooms and n

IPProject1
['Sid']

IPProject2
['Sid']

Server not responding

```

4. Conclusion and Future work

A unique name can be given after determining whether the names of the rooms or clients are redundant. Cryptographic transport protocols enable the sharing of media. Different rooms can communicate with one another now. Security features and media sharing options can be added to the program to improve it. In the form of broadcast messages or private messages, message sharing has been expanded to include a single server and numerous clients.