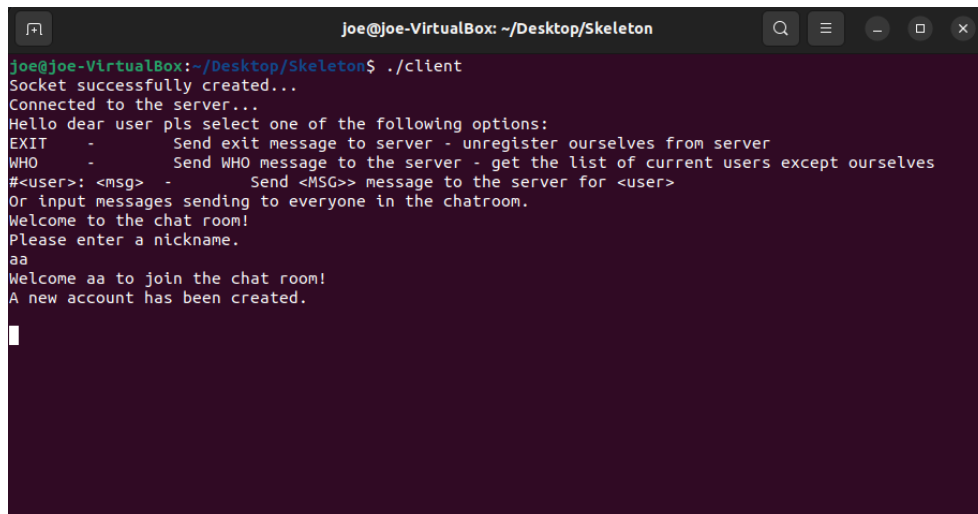


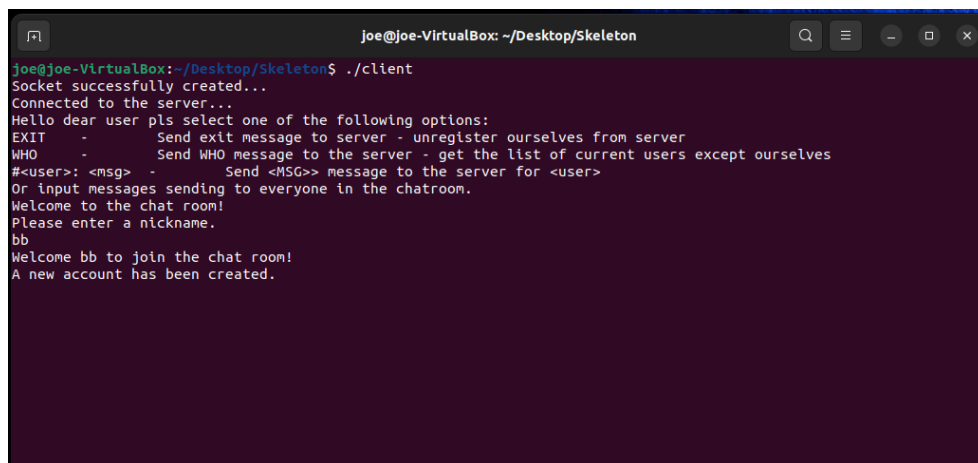
## Implementation of Register



```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.
```

In client side, when user start running the client, program will ask for the nickname. According to the requirement, client side need to send the message REGISTERaa.

In server side, the server found that aa has not existed, so it is a new user, and we need to construct a new user\_info\_t to store user information. Then, we also need to create a text file for message box and broadcast to all users and notify aa a new account has been created.



```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.

Welcome bb to join the chat room!
█
```

It is the same for bb, while aa will receive the broadcasting message.

## Implementation of Direct messages to online users

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.

Welcome bb to join the chat room!

bb to you: Nice to meet you@
█
```

bb sends the message to server, then the server identify the # symbol and know it is direct message. Server side will split the message to send name, destination name, destination socket and message. If aa is found (i.e. the destsock is not -1), and the state is online, server will send to data to aa.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.

Welcome bb to join the chat room!

bb to you: Nice to meet you@

#BB: Nice to meet you,too!
There is no such user. Please check your input formant.
```

Server side does the same thing, but since BB does not exist (destsock = -1), server send the warning message to aa.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.

Welcome bb to join the chat room!

bb to you: Nice to meet you@

#BB: Nice to meet you,too!
There is no such user. Please check your input formant.

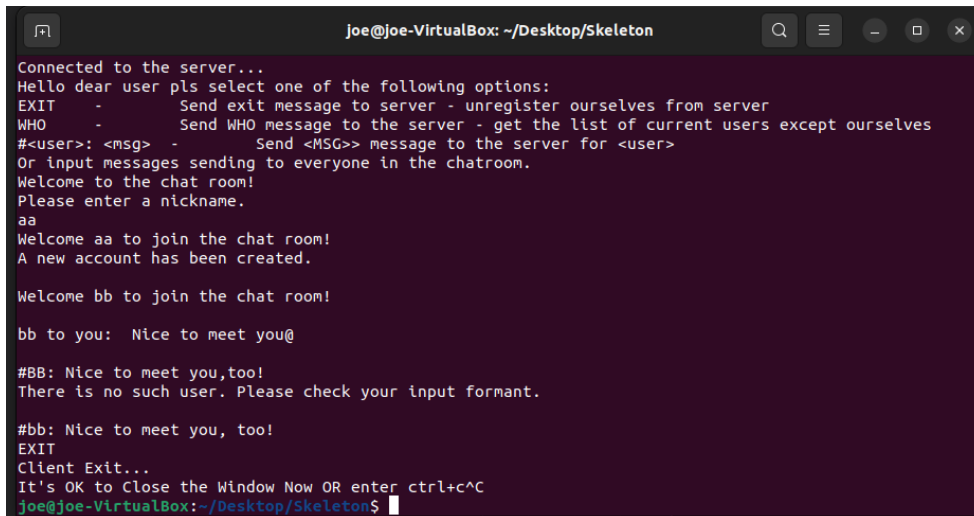
#bb: Nice to meet you, too!
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!
```

This time aa type the name bb correctly. Server and client side do the same thing as bb to aa.

## Implementation of Exit

A screenshot of a terminal window titled "joe@joe-VirtualBox: ~/Desktop/Skeleton". The terminal shows a chat application's interaction. It starts with a connection message, followed by a list of options: EXIT (send exit message), WHO (send WHO message), and #<user>: <msg> (send <MSG> message). The user "aa" enters a nickname and is welcomed. Then "bb" enters a nickname and is welcomed. "bb" sends a message "Nice to meet you@" and receives a response from "BB". Finally, "bb" enters "EXIT", and the client exits. The terminal prompt is "joe@joe-VirtualBox:~/Desktop/Skeleton\$".

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome aa to join the chat room!
A new account has been created.

Welcome bb to join the chat room!

bb to you: Nice to meet you@

#BB: Nice to meet you,too!
There is no such user. Please check your input formant.

#bb: Nice to meet you, too!
EXIT
Client Exit...
It's OK to Close the Window Now OR enter ctrl+c^C
joe@joe-VirtualBox:~/Desktop/Skeleton$
```

aa exits, the server recognize the “EXIT” keyword. Then, server modifies the state and close the socket.

## Implementation of Offline message box

```
Joe@Joe-VirtualBox: ~/Desktop/Skeleton
Joe@Joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG>> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!

aa has left the chatroom

#aa: See you next time.
aa is offline. Leaving message successfully
```

bb receives the broadcast message. bb sends direct message to aa. The message will store in aa.txt because server get the 0 state of aa (i.e. offline). Then, server send message to bb to tell the result.

```
Joe@Joe-VirtualBox: ~/Desktop/Skeleton
Joe@Joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG>> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.
```

```
Joe@Joe-VirtualBox: ~/Desktop/Skeleton
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG>> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!

aa has left the chatroom

#aa: See you next time.
aa is offline. Leaving message successfully

Welcome cc to join the chat room!
```

cc join the chat room and bb receive the broadcast message. It is the same as bb joined the chat room and aa received the message before.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa    bb*
* means this user online
```

cc types WHO keyword to server. The server gets all username from listOfUsers and add \* if the state of user is 1. Each username is separated by \t.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa    bb*
* means this user online
#aa: Hello aa, I am cc.
aa is offline. Leaving message successfully
```

Since aa is offline, cc's message will append to aa.txt. It is the same case as bb sends "See you next time" to aa.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa    bb*
* means this user online
#aa: Hello aa, I am cc.
aa is offline. Leaving message successfully

#bb: Hello bb, I am cc.
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton

Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!

aa has left the chatroom

#aa: See you next time.
aa is offline. Leaving message successfully

Welcome cc to join the chat room!
cc to you: Hello bb, I am cc.
```

cc sends message to bb. The code logic is also the same as bb sends message to aa before.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton

#BB: Nice to meet you,too!
There is no such user. Please check your input formant.

#bb: Nice to meet you, too!
EXIT
Client Exit...
It's OK to Close the Window Now OR enter ctrl+c^C
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome back! The message box contains:
bb to you: See you next time.

cc to you: Hello aa, I am cc.
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton

WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!

aa has left the chatroom

#aa: See you next time.
aa is offline. Leaving message successfully

Welcome cc to join the chat room!
cc to you: Hello bb, I am cc.

aa is online!
```



```
joe@joe-VirtualBox: ~/Desktop/Skeleton
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa bb*
* means this user online
#aa: Hello aa, I am cc.
aa is offline. Leaving message successfully

#bb: Hello bb, I am cc.
aa is online!
```

aa logs in the chatroom. The server finds aa in the listOfUsers, so it is a login process. Then the server gives a different welcome message from registration, and prints out the content of aa.txt. At the same time, server broadcast a notification that aa is online.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa bb*
* means this user online
#aa: Hello aa, I am cc.
aa is offline. Leaving message successfully

#bb: Hello bb, I am cc.
aa is online!

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa* bb*
* means this user online
```

cc checks the user list again. This time, aa and bb are all online, so the states are 1 and therefore they get a \*.

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
There is no such user. Please check your input formant.

#bb: Nice to meet you, too!
EXIT
Client Exit...
It's OK to Close the Window Now OR enter ctrl+c^C
joe@joe-VirtualBox:~/Desktop/Skeleton$ ./client
Socket successfully created...
Connected to the server...
Hello dear user pls select one of the following options:
EXIT - Send exit message to server - unregister ourselves from server
WHO - Send WHO message to the server - get the list of current users except ourselves
#<user>: <msg> - Send <MSG> message to the server for <user>
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
aa
Welcome back! The message box contains:
bb to you: See you next time.

cc to you: Hello aa, I am cc.

Hello all, I'm back
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
Or input messages sending to everyone in the chatroom.
Welcome to the chat room!
Please enter a nickname.
bb
Welcome bb to join the chat room!
A new account has been created.

#aa: Nice to meet you@
aa to you: Nice to meet you, too!

aa has left the chatroom

#aa: See you next time.
aa is offline. Leaving message successfully

Welcome cc to join the chat room!

cc to you: Hello bb, I am cc.

aa is online!

aa: Hello all, I'm back
```

```
joe@joe-VirtualBox: ~/Desktop/Skeleton
Please enter a nickname.
cc
Welcome cc to join the chat room!
A new account has been created.

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa      bb*
  * means this user online
#aa: Hello aa, I am cc.
aa is offline. Leaving message successfully

#bb: Hello bb, I am cc.
aa is online!

WHO
Getting user list, pls hold on...
If you want to send a message to one of the users, pls send with the format: '#username:message'
aa*      bb*
  * means this user online
aa: Hello all, I'm back
```

aa broadcast to all users. Since there is no keyword (e.g., #, WHO, EXIT, REGISTER), the server classifies it as a broadcast message by default. Then, the server gets the sender name, and checks all users and sends the message to online users.