

“Client-Server Chat Application”

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Design:

The chat application consists of two main components: a client-side and a server-side. The client-side allows users to register, login, create/join/leave chat rooms, send and receive messages, and log out. The server-side stores user registration information, manages chat rooms, and handles messaging between clients. The communication between the client and server is served through sockets.

- **Server:**
 - a. The server handles the registration and login records of the users.
 - b. The username has to be unique for each user.
 - c. The rooms' names are also unique, if a room name already exists that room will be opened otherwise a new one will be created.
- **Client**
 - a. The client has to first either register or login to the chat application using username and password.
 - b. The username has to be unique, if you have already created one account then you can use those credentials to log in.
 - c. The password while entering is hidden for security purposes.
 - d. You can join or create a room, if the name already exists then you join that room otherwise a new room will be created.

Implementation:

- **Server**

- a. Server has a dictionary which stores the username and password when the user is registered.
- b. While logging in the credentials are matched for authentication.
- c. The rooms are also stored in a dictionary where users of that room are also stored, when a user leaves the room he is deleted from the list of users in a room.
- d. It is also displayed in the chat rooms with how many people are currently in the room.
- e. If the user logs out, he is deleted from all the rooms he had been, he can rejoin when he logs in again.
- f. Various colors have been added to the command line for displaying the content properly.

- **Client**

- a. Command line interface with different colors.
- b. Runs on a localhost and port 5000.
- c. Supports multiple clients at the same time.
- d. Create or join or leave chat rooms.
- e. List active users in the current channel.
- f. Can easily register/login/logout from the chat application.

Screenshots:

- **Server**

```
mittal@CASE:~/cp/Task 2$ python3 server.py
Running chat server at localhost:5000
prashant joined room [room1] from <127.0.0.1:37528>
prachi joined room [room1] from <127.0.0.1:37530>
prashant left room [room1].
█
```

- Client

```

Enter username: prashant
Enter password:
Registered successfully.
<---- CHAT ROOMS ---->
* default <0>

Join a Chat Room or Create New: room1
Joined room1 group as prashant
INFO> Connected to host. Start sending messages
.
LIST => to get list of people online
LEAVE => to leave the chat room
LOGOUT => logout.
INFO> prachi joined room [room1] from <127.0.0.1:37530>
prashant> [14:51:16] hello prachi
prachi> [14:51:31] hii prashant
prashant> [14:51:31] how are you
prachi> [14:51:43] i'm fine how are you
prashant> [14:51:43] great
prashant> [14:51:47] LEAVE
Left room1 group
hi
<---- CHAT ROOMS ---->
* default <0>
* room1 <1>

Join a Chat Room or Create New: LOGOUT
Bye, prashant
mittal@CASE:~/cp/Task 2$

mittal@CASE:~/cp/Task 2$ python3 client.py
Press 1 to register
Press 2 to login
Command: 1
Enter username: prachi
Enter password:
Registered successfully.
<---- CHAT ROOMS ---->
* default <0>
* room1 <1>

Join a Chat Room or Create New: room1
Joined room1 group as prachi
INFO> Connected to host. Start sending messages.
LIST => to get list of people online
LEAVE => to leave the chat room
LOGOUT => logout.
prachi> [14:51:16] LIST
<---- PEOPLE ONLINE ---->
* prashant <127.0.0.1:37528>
* prachi <127.0.0.1:37530>

prashant> [14:51:28] hello prachi
prachi> [14:51:28] hii prashant
prashant> [14:51:35] how are you
prachi> [14:51:35] i'm fine how are you
prashant> [14:51:47] great
INFO> prashant left room [room1].
prachi> [14:51:52]

```

Code Snippets:

- Server

```

File Edit Selection View Go Run Terminal Help
server.py - cp - Visual Studio Code

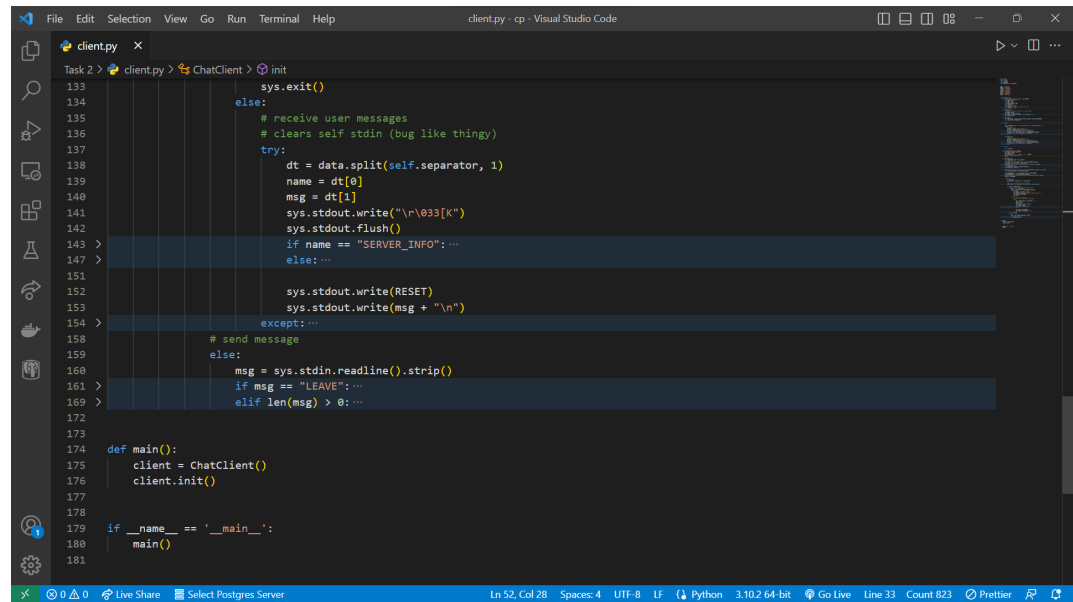
client.py server.py X
Task 2 > server.py > ChatServer > init
1 import socket
2 import select
3
4
5
6 class ChatServer():
7     def __init__(self, host="localhost", port=5000):
8         self.network = {}
9         self.users = {}
10        self.RECV_BUFFER = 4096
11        self.HOST = host
12        self.PORT = port
13        self.server_socket = 0
14        self.separator = "###" # same as client
15
16        # initialize server and handle requests
17        def init(self):
18            self.server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
19            self.server_socket.setsockopt(socket.SOL_SOCKET, socket.SO_REUSEADDR, 1)
20            self.server_socket.bind((self.HOST, self.PORT))
21            self.server_socket.listen(2)
22
23            # add server socket to the list of readable connections
24            self.network["default"]["connections"].append(self.server_socket)
25            self.network["default"]["names"].append("<server>")
26
27            print("Running chat server at {}:{}".format(self.HOST, self.PORT))
28
29            while True:
30                # get the list all sockets which are ready to be read through select
31                all_connections = []
32                for key in self.network:
33                    read_sockets, write_sockets, error_sockets = select.select(...)

```

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File Edit Selection View Go Run Terminal Help server.py - cp - Visual Studio Code
client.py server.py X ChatServer > init
Task 2 > server.py > ChatServer > init
42 for sock in read_sockets:
43     # new connection recieved through self.server_socket
44     if sock == self.server_socket:
45         sockfd, addr = self.server_socket.accept()
46
47 >
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52     # register user
53 >     if ("REGISTER"+self.separator) in data: ...
54 >
55 >
56     # login user
57 >     elif("LOGIN"+self.separator) in data: ...
58 >
59 >
60
61     # send list of available chat rooms to client
62 >     roomsList = ""
63 >     for group in self.network.keys():...
64 >     roomsList = roomsList[:-2]
65 >
66 >
67     try: ...
68 >
69 >
70     except: ...
71 >
72 >
73
74     sockfd.send(roomsList.encode())
75 >     # client sends the chat room name he wants to join
76 >     group = sockfd.recv(32).decode()
77 >
78 >
79
80     if group == "":...
81 >     elif group not in self.network.keys():...
82 >
83 >
84
85     # client sends his name (identifier in group)
86 >     clientName = sockfd.recv(100).decode()
87 >
88 >
89     if clientName == "":...
90 >     elif clientName not in self.network[group]["names":1:...
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- Client

```
client.py
Task 2 > client.py > ChatClient > init
1 import sys
2 import select
3 import socket
4 import getpass
5 from datetime import datetime
6
7
8 RED = "\033[91m"
9 GREEN = "\033[92m"
10 YELLOW = "\033[93m"
11 BLUE = "\033[94m"
12 PURPLE = "\033[95m"
13 CYAN = "\033[96m"
14 RESET = "\033[0;0m"
15 BOLD = "\033[1m"
16
17
18 class ChatClient():
19     def __init__(self, host="localhost", port=5000):
20         self.new_socket = None
21         self.HOST = host
22         self.PORT = port
23         self.RECV_BUFFER = 4096
24         self.username = ""
25         self.group = "default"
26         self.separator = "&&" # same as of server
27         self.helpMsg = ""
28
29
30     def prompt(self):
31         # prompt for current active user to type message
32         sys.stdout.flush()
33         sys.stdout.write("\n\033[K")
34
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36
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42
43
44 > try: ...
45 > except: ...
46 >
47
48 cmd = int(input("Press 1 to register\nPress 2 to login\nCommand: "))
49
50 if cmd == 1:
51     # register user
52     username = input("Enter username: ")
53     password = getpass.getpass("Enter password: ")
54     self.new_socket.send(("REGISTER"+self.separator+username+password))
55     response = self.new_socket.recv(self.RECV_BUFFER).decode()
56     if ("SERVER_FAIL"+self.separator) in response:
57         # server fail
58     else:
59         # register success
60
61
62 elif cmd == 2:
63     # login user
64     username = input("Enter username: ")
65     password = getpass.getpass("Enter password: ")
66     self.new_socket.send(("LOGIN"+self.separator+username+password))
67     response = self.new_socket.recv(self.RECV_BUFFER).decode()
68     if ("SERVER_FAIL"+self.separator) in response:
69         # server fail
70     else:
71         # login success
72
73
74 else:
75     # invalid command
76
77
78 self.joinroom()
79
80
81
82
83
84 def printlist(self, msg, response):
85     sys.stdout.write("\n\033[K")
86     sys.stdout.flush()
87     print(YELLOW + "----- " + msg + " -----", RESET)
88     for p in response.split("::"):
89         print(p)
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```
client.py
Task 2 > client.py > ChatClient > init
133 sys.exit()
134 else:
135     # receive user messages
136     # clears self.stdin (bug like thingy)
137     try:
138         dt = data.split(self.separator, 1)
139         name = dt[0]
140         msg = dt[1]
141         sys.stdout.write("\n\033[K")
142         sys.stdout.flush()
143         if name == "SERVER_INFO": ...
144         else: ...
145     except: ...
146     # send message
147     else:
148         msg = sys.stdin.readline().strip()
149         if msg == "LEAVE": ...
150         elif len(msg) > 0: ...
151
152 def main():
153     client = ChatClient()
154     client.init()
155
156 if __name__ == '__main__':
157     main()
158
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```

Explanation:

- **Server**

- a. The server stores the users in a dictionary in the object called.
- b. The dictionary stores username as key and password as value.
- c. Another dictionary which stores rooms with the value which has a list of users in the room.
- d. It easily tells how many users are inside and if anybody leaves a message for it is displayed.

- **Client**

- a. I have used various colors to make the chat application look more informative.
- b. The user can easily register/login and logout from the application.
- c. The username should be unique and the password entered is hidden using the library specially to take the password from the terminal.
- d. The current time is also displayed before sending any message to the other users.
- e. If you want to get the list of users you can type LIST and it will display all users in that room.
- f. If you wish to leave the room type LEAVE in capitals.
- g. If you want to logout from the system enter LOGOUT and you'll be logged out easily.