

Chat

TCP based chat server implemented for the course IS_F462 Network Programming at BITS Pilani

Run

```
gcc -o chat chat.c -pthread  
  
./chat  
  
telnet 127.0.0.1 <port>
```

Features / Commands implemented

- Login/Join and Logout

User is logged in with entered username if no other client with same user name is online.
If this username is used for the first time, a new profile is created.

```
logout
```

- Individual messaging

Send a message to any specific user, either online or offline

```
send <username> <message>  
send pranjal hi! Harsh this side
```

- Broadcasting

Send message to all users.

```
sendall This is an example of a broadcast message
```

- Get list of all registered users, offline or online along with last seen information

```
get_users
```

- Block and unblock upto 10 users

```
block pranjā  
unblock pranjā
```

- Leave the chat server

```
leave
```

Assumptions

For simplicity, following assumptions have been made

- Maximum number of registered users is 517
- Maximum length of username is 15 with no whitespace
- Maximum length of a message is 1005 characters

Design Features

A total of three message queues have been used.

- Queue 1 is for sending the messages from one user to another. Each user is allotted a unique integer identifier using which it retrieves message from queue 1
- Queue 2 is used for sending control messages to the process maintaining a hash table which sends back messages on Queue 3. All messages sent on queue 2 are received by the hashtable process.
- Queue 3 is used for sending back replies to control messages. Message type is pid of the recipient process

Joining and Leaving the server or logging out

- When the user connects to the server, they are asked for a username. It is checked if any other client with same username is online and if not the current user is marked online. If a fresh username is provided, a new entry is created.
- Information for each user is managed by a common process which maintains a hashtable storing users' info. Each fresh username is provided a unique integer identifier.
- If a user disconnects, it is marked offline and the corresponding child process exits. If a user issues the command `leave`, the user entry is marked as deleted in the hashtable.

Obtaining list of users with status

- When a user issues the command `get_users`, a control message is sent to the hashtable process by the child handling the corresponding user.
- The hashtable process iterates over the hashtable and creates a list of users with status. This list is sent on Queue 1.
- This list is received by the client's child and sent to the user.

Sending messages

- For each individual message, user id of the receiver process is requested from the hashtable process (received on queue 3). Sender process sends a message on queue 1 with message type = user id.
- For broadcast message, the entire message is sent to the hashtable process. This process sends one message on queue 1 for each registered user.

Communication between child process and about TCP connection

- For each new connection, a new child process is created. Child processes use message queues for communicating among each other. Each child spawns a thread for reading the message queue. So, the main thread waits on socket and the second threads waits on message queue.

Additional Features

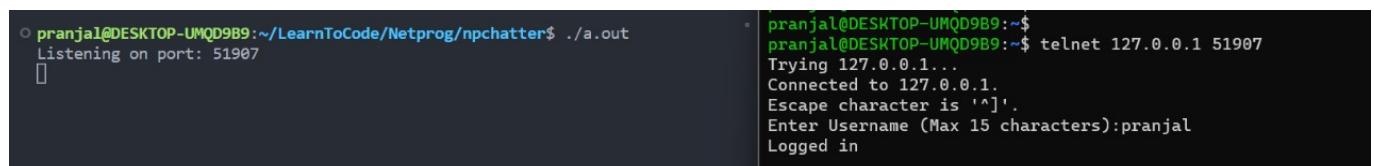
Last Seen

- For offline users, last seen information is maintained in the hashtable.
- This can be viewed using `get_users` command.

Temporarily block users

- Upto 10 users can be blocked.
- Maintained a list of blocked user. Message sent to a blocked user are permanently lost.

Screenshots



The image contains two side-by-side terminal screenshots. The left terminal shows a server process running `./a.out` and listening on port 51907. The right terminal shows a telnet client connecting to 127.0.0.1 on port 51907, entering the username 'pranjal', and being logged in.

```

pranjal@DESKTOP-UMQD9B9:~/LearnToCode/Netprog/npchatter$ ./a.out
Listening on port: 51907
[]

pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):pranjal
Logged in

```

Connecting to the server

```
pranjal@DESKTOP-UMQD989: ~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):pranjal
Logged in
get_users
Server::
harsh: online
sir: online
pranjal: online
sendall This is an example of a broadcast message
Connection closed by foreign host.
pranjal@DESKTOP-UMQD989:~$ telnet 127.0.0.1 51181
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):pranjal
Logged in
get_users
Server::
harsh: offline, Last seen: Fri Oct 28 19:13:05 2022
singhal: online
pranjal: online

pranjal@DESKTOP-UMQD989:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):harsh
Logged in
send sir hello sir
sir: hello harsh
pranjal: This is an example of a broadcast message
Connection closed by foreign host.
pranjal@DESKTOP-UMQD989:~$ telnet 127.0.0.1 51181
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):singhal
Logged in

pranjal@DESKTOP-UMQD989:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):sir
Logged in
harsh: hello sir
send harsh hello harsh
pranjal: This is an example of a broadcast message
Connection closed by foreign host.
pranjal@DESKTOP-UMQD989:~$ telnet 127.0.0.1 51181
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):harsh
Logged in
logout
Connection closed by foreign host.
pranjal@DESKTOP-UMQD989:~$
```

Get List of users

```
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):harsh
Logged in
send sir hello sir
sir: hello harsh
|
```

```
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):sir
Logged in
harsh: hello sir
send harsh hello harsh
```

Sending a message

```

pranjal@DESKTOP-UMQD9B9:~$
pranjal@DESKTOP-UMQD9B9:~$
pranjal@DESKTOP-UMQD9B9:~$
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):pranjal
Logged in
get_users
Server::
harsh: online
sir: online
pranjal: online
sendall This is an example of a broadcast message

```

```

pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):harsh
Logged in
send sir hello sir
sir: hello harsh
pranjal: This is an example of a broadcast message

```

```

pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 51907
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters):sir
Logged in
harsh: hello sir
send harsh hello harsh
pranjal: This is an example of a broadcast message

```

Broadcasting a message

```

block pra
send pra hi
unblock pra
send pra hi
pra: hi
sendall hiiiii
sendall tester
^C
logout
Connection closed by foreign host.
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 46621
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters): pranjal
Logged in
singhal: hi
harsh: hello there
block harsh
unblock harsh
Connection closed by foreign host.
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 58767
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters): pra
Logged in
har: hi there
block har
unblock har
har: helloo
har: testererr
send har tetsfds
send sin fsdfs
send sin fsdfs
^C
logout
Connection closed by foreign host.
pranjal@DESKTOP-UMQD9B9:~$ |

```

```

sendall lessgo
sendall heheheheh
Connection closed by foreign host.
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 58767
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters): har
Logged in
send all hi there
Invalid username
sendall hi there
sendall testing
sendall helloo
sendall testererr
pra: tetsfds
^]
telnet> Connection closed.
pranjal@DESKTOP-UMQD9B9:~$

```

```

Enter Username (Max 15 characters): sin
Logged in
har: hi there
har: testing
har: helloo
block pra
har: testererr
logout
Connection closed by foreign host.
pranjal@DESKTOP-UMQD9B9:~$ telnet 127.0.0.1 58767
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
Enter Username (Max 15 characters): sin
Logged in
pra: fsdfs
^]
telnet> Connection closed.
pranjal@DESKTOP-UMQD9B9:~$

```

Blocking users