EMERTXE TRAINING PROJECT DOCUMENTATION FRAMEWORK

REQUIREMENTS & DESIGN DOCUMENT

Module – Linux Internals

TCP/IP Chat

Contents

1 Abstract

Web based chat applications is one of the more commonly used tool for effective two way communication. It was originally started off as a IRC based chat-rooms which has eventually emerged as multiple formats like Google Hangout, WhatsApp, Skype etc. As time progressed these chat applications also started supporting various data types like plain text, images, videos and offering advanced functionalities like recording. Internally these applications use TCP/IP based client-server mechanism designed in large scale to handle multiple users. The idea of this project is to implement a chat room with minimal functionality using TCP/IP based sockets in Linux environment. Even though the implementation is minimal, it will expose developers to build a complete solution building in future.

2 Requirements

In this project implementation, there are two major players that is server and client. Their individual requirements are provided as follows

Server requirements

- The server creates a TCP socket by binding itself to port 6333
- It should be a concurrent server allowing individual clients to establish new connections
- Server should provide client with a user-name & password upon successful connection
- Registered users are stored in a file by the server as a database
- Server should allow a registered user to login the service
- When incorrect user credentials are sent, the server should deny the service
- When an authorized user is connected, server should send back list of on-line users
- When a user joins or leaves, the server should notify this event to other online users
- Client should send a logout, upon which their entry will get deleted from database
- When the client is connected, all messages sent from all clients should be sent to all. This will provide them with a chat-room experience, similar to a WhatsApp group

Client requirements

- Allow the user to register on the server
- Allow the user to login to the service
- Allow the user to display current on-line users
- Allow the user to logout from the service

User interfaces

Refer the Sample Output Section

3 Prerequisites

- Socket Programming

4 Design

Client request format

User name	password	Sign-up/sign-in
Login name	password	Option

User name and password will be a predefined length. Option value changes up-on sign-in or sign-up.

Server reply format

Success messages:

1. Logged in successfully
2. Registered successfully

Error messages:

1. Duplicate user-name
2. user-name not found
3. Password not matching

Client message format

In chat option

1. Single chat
2. Group chat
3. logout

Client Message multi-casting

Sender	Receiver	Message	Chat option

In chat option

1. Single chat
2. Group chat
3. logout

Client request format (logout)

Sender	Receiver	Message	Chat option

Server reply format (logout)

Error/ success message

Success messages:

1. Logged out successfully

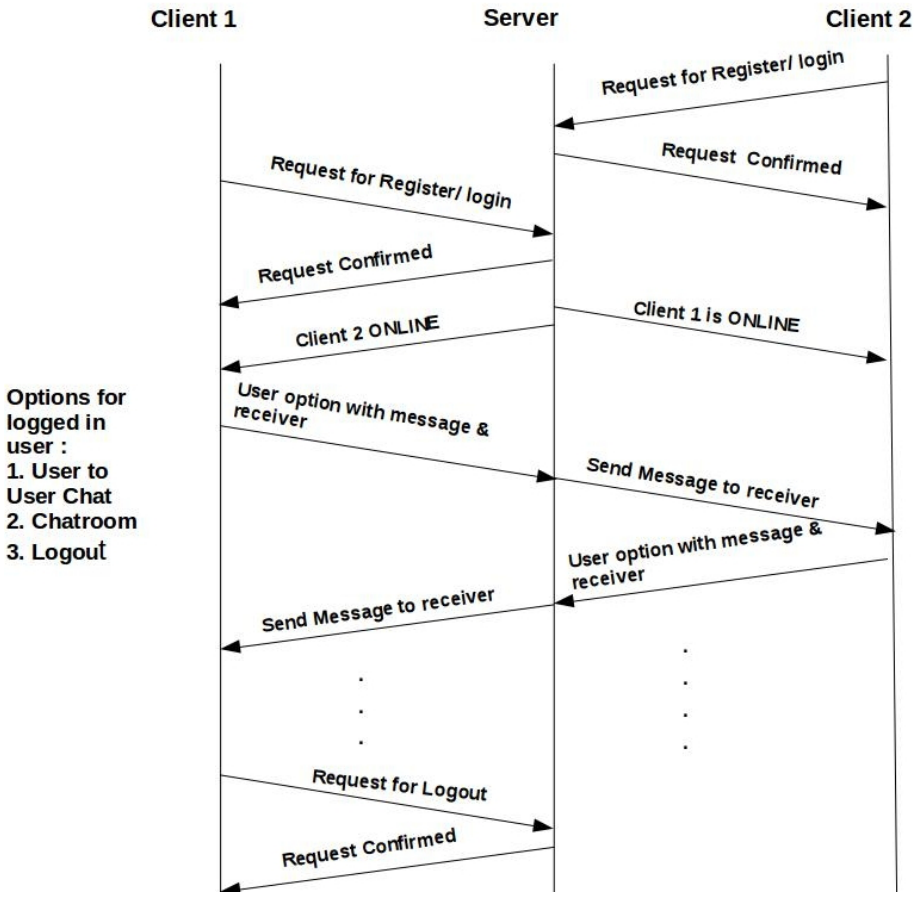
Error messages:

1. Couldn't logged out

Database Format

User name	password	Status	Sock fd

Message exchange sequence diagram



5 Sample Output

```
user@emertxe] ./server
Chat Server: Port Informantion: 127.0.0.1:6330
```

Fig 5 1: The server code waiting for client. Should run unless the user terminates it

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 2
```

Fig 5 2: The first client trying to connect to the server. The main screen to Login (if already registered) or Register and login. Proceeding to Register option

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 2

Enter User Name: Adil
Enter Password:

INFO: User Registartion Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

]
```

Fig 5 3: Registration Success. Observe the INFO from server. Upon registration the client program should provide different Chat Options. Proceeding to Multi-chat Option. Note no other user is Online yet

```
user@emertxe] ./server
Chat Server: Server Port Informantion: 127.0.0.1:6330
Chat Server: Incoming Registation Request at 127.0.0.1:41606
Chat Server: Adil joined the Chat Room at 127.0.0.1:41606
Chat Server: Adil selected Multi User Chat
```

Fig 5 4: Updated Server messages with First user's activities

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 1

Enter User Name: Binish
Enter Password:

INFO: User Login Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

INFO: Adil is Online
]
```

Fig 5 5: Login from second user. Note info from server on existing Online users

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 2

Enter User Name: Adil
Enter Password:

INFO: User Registartion Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

Binish joined Chat Room
]
```

Fig 5 6: Update on the First users screen.

```
user@emertxe] ./server
Chat Server: Server Port Informantion: 127.0.0.1:6330
Chat Server: Incoming Registation Request at 127.0.0.1:41606
Chat Server: Adil joined the Chat Room at 127.0.0.1:41606
Chat Server: Adil selected Multi User Chat
Chat Server: Incoming Login Request at 127.0.0.1:43532
Chat Server: Binish joined the Chat Room at 127.0.0.1:43532
Chat Server: Binish selected Multi User Chat
```

Fig 5 7: Updated Server messages with Second user's activities

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 2

Enter User Name: Adil
Enter Password:

INFO: User Registartion Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

Binish joined Chat Room
Binish: Hi
] Hello
] Where is Bilal
Binish: He will join in a while
Bilal joined Chat Room
Bilal: Hey all, I am sorry for the delay
Binish: Hi Bilal
] Hi
] Yes, you delayed, I have another meeting, you guys continue
Bilal: Sorry. Ok
Binish: OK
]^C
user@emertxe]
```

Fig 5 8: Chat Screen of First User. Observe the login information of Third User and chat messages from other users and how the First User logged out

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 1

Enter User Name: Binish
Enter Password:

INFO: User Login Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

INFO: Adil is Online
] Hi
Adil: Hello
Adil: Where is Bilal?
] He will join in a while
Bilal joined Chat Room
Bilal: Hey all, I am sorry for the delay
] Hi Bilal
Adil: Hi
Adil: Yes, you delayed, I have another meeting, you guys continue
Bilal: Sorry. Ok
] OK
INFO: Adil is Offline
]
```

Fig 5 9: Second Users Chat Window. Observe the logout information of First User.

```
user@emertxe] ./client
INFO: Connected to the Server

1. Login
2. Register
3. Exit

Enter your Option: 1

Enter User Name: Bilal
Enter Password:

INFO: User Login Successful

Chat Options:
1. Single User Chat
2. Multi User Chat
3. Logout

Select what you would like to proceed with: 2

INFO: Adil is Online
INFO: Binish is Online
] Hey all, I am sorry for the delay
Binish: Hi Bilal
Adil: Hi
Adil: Yes, you delayed, I have another meeting, you guys continue
] Sorry. Ok
INFO: Adil is Offline
]
```

Fig 5 10: The Third Users Chat Window

```
user@emertxe] ./server
Chat Server: Server Port Informantion: 127.0.0.1:6330
Chat Server: Incoming Registation Request at 127.0.0.1:41606
Chat Server: Adil joined the Chat Room at 127.0.0.1:41606
Chat Server: Adil selected Multi User Chat
Chat Server: Incoming Login Request at 127.0.0.1:43532
Chat Server: Binish joined the Chat Room at 127.0.0.1:43532
Chat Server: Binish selected Multi User Chat
Chat Server: Incoming Login Request at 127.0.0.1:44276
Chat Server: Bilal joined the Chat Room at 127.0.0.1:44276
Chat Server: Bilal selected Multi User Chat
Chat Server: Adil left the Chat Room
```

Fig 5 11: Updated Server Log

6 Artifacts

Skeleton Code

- TBD

References

- Beej Guide – Network programming
- TCP/IP – FAQ
- Socket programming – Reference Materials