Computer Networks-1

Socket Programming Project

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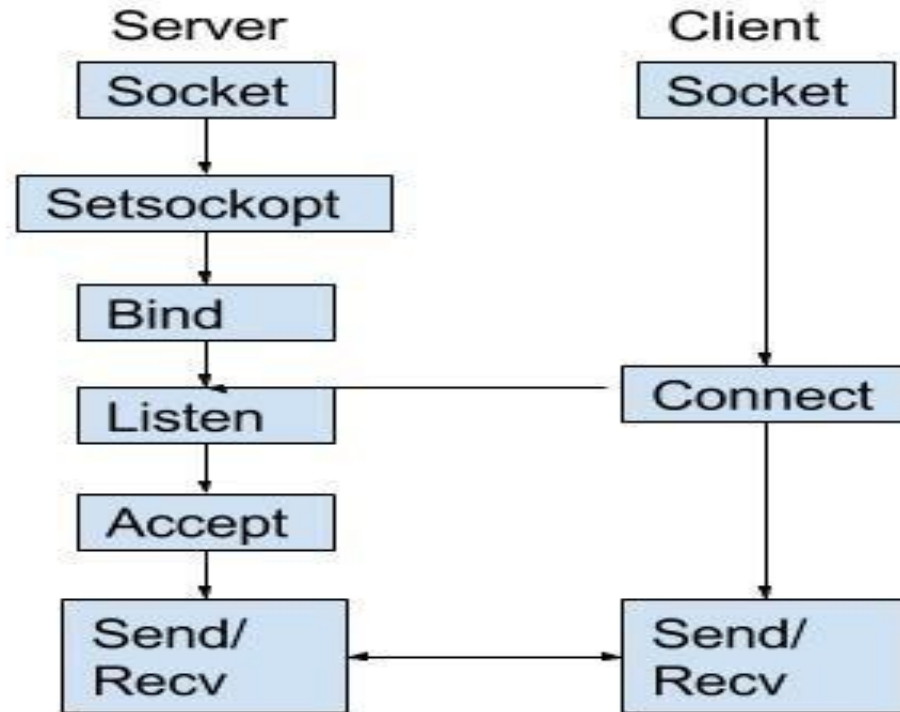Sanjana Reddipalli- MA19BTECH11002

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Group Chat Application

- We built a Group Chat Application using socket programming in python.

- This Application allows its users to chat together interactively with many features included.

- More on the features in later slides…..

Socket Programming

- The basic idea of Socket programming is to establish connection & communication between two systems in a network.
- In this project, We use socket programming with TCP as to ensure reliable transmission of data.
- Initially, a connection is established between server and client. One end of TCP is attached to client socket and other end is attached to server socket.We used client-server architecture, one server, many clients.
- Then, Data can be transferred between server and client via sockets.

System Design Block Diagram

Working of our model

- We used localhost(127.0.0.1) and port=55555 to demonstrate our results.
- Any number of clients can join the server and chat here.
- The running server listens for connections from clients and whenever a client requests a connection, the running server checks and accepts the connection, if it is valid and the client can start chatting .

Features

- It is a group chat, so Messages are broadcasted to all the users/clients.
- Can send messages as well as files.
- Has a feature of Admin, who can remove or block any other user and no other user has this power.
- On server side we can see the date and time of every message sent by every client.

- So the Admin has to login with his password and it is checked on server side for protection.
- The user Removed by Admin can join the chat again but a blocked user cannot rejoin the chat and this is achieved by server maintaining the list of all users blocked by Admin and such users are refused for connection.

Commands and Messages

- General text messages can be typed directly and they will be broadcasted to all clients in group.
- As soon as some new client joins the chat every client is notified of it
- 'Bye' messages lets you quit the chat and all users will be notified that you left the chat.
- '/remove user_name' is a command which can be executed only by Admin and it removes the client with user_name from the chat but client can rejoin any time.

Commands and Messages

- '/block user_name' is a command which can be executed only by Admin and it removes the client with user_name from the chat and the client cannot rejoin the chat.If he attempts to join he will be notified that he has been blocked by the Admin.All the blocked users are maintained in a list.
- 'File' message helps you transfer files via sockets, bytes by bytes.
- if a non-admin user tries to use '/remove.' or '/block' he will be notified that only admins can executed these commands.

In the next slide, you can see
A sample Chat between three clients
Hazel, John, Alex

```
The default interactive shell is now zsh.                          The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.  To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.  For more details, please visit https://support.apple.com/kb/HT208050.
Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads          Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 server_project.py  Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.py
Waiting for clients to join on server, 127.0.0.1:55555...        Enter Username: Hazel
Accepted new connection from 127.0.0.1:54338, username: Hazel      Connected to server!
Accepted new connection from 127.0.0.1:54340, username: John       John joined!
Message from  John: Hi Guys! I am John  , Time: Sat Dec 11 11:29:24 2021  John: Hi Guys! I am John
Message from  Hazel: Hello! I am Hazel  , Time: Sat Dec 11 11:29:34 2021  Hello! I am Hazel
Accepted new connection from 127.0.0.1:54341, username: Alex      Alex joined!
Message from  Alex: Hey Guys! Alex here  , Time: Sat Dec 11 11:29:55 2021  Alex: Hey Guys! Alex here
Message from  John: Shall we meet this evening for project discussion?  , Time  John: Shall we meet this evening for project discussion?
Sat Dec 11 11:30:29 2021                                          Yes! How about 4:30PM?
Message from  Hazel: Yes! How about 4:30PM?  , Time: Sat Dec 11 11:30:47 2021  Alex: Yeah sure
Message from  Alex: Yeah sure  , Time: Sat Dec 11 11:30:55 2021    John: Well then see you soon
Message from  John: Well then see you soon  , Time: Sat Dec 11 11:31:15 2021  Bye
Hazel:  has left the chat! ,  Time:  Sat Dec 11 11:31:19 2021      You Quit
John:  has left the chat! ,  Time:  Sat Dec 11 11:31:23 2021       Harshithas-MacBook-Air:downloads harshithasagiraju$ 
```

● ○ ○   Downloads — client2 — -bash — 80×24   ● ○ ○   Downloads — client3 — Python client_project.py — 80×24

```
Last login: Sat Dec 11 11:27:53 on ttys002                        Last login: Sat Dec 11 11:23:07 on ttys008

The default interactive shell is now zsh.                         The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.  To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.  For more details, please visit https://support.apple.com/kb/HT208050.
Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads          Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.py  Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.py
Enter Username: John                                              Enter Username: Alex
Hi Guys! I am John                                                Hey Guys! Alex here
Hazel: Hello! I am Hazel                                          John: Shall we meet this evening for project discussion?
Alex joined!                                                      Hazel: Yes! How about 4:30PM?
Alex: Hey Guys! Alex here                                         Yeah sure
Shall we meet this evening for project discussion?               John: Well then see you soon
Hazel: Yes! How about 4:30PM?                                     Hazel left!
Alex: Yeah sure                                                   John left!
Well then see you soon
Hazel left!
Bye
You Quit
```

In next slide,

You can see, a sample chat in which an anonymous client is blocked by Admin and when the blocked client tries to re-enter the chat, he is not able to enter and is notified that he is been blocked by the Admin.

```
st login: Sat Dec 11 11:40:03 on ttys002

he default interactive shell is now zsh.
 update your account to use zsh, please run `chsh -s /bin/zsh`.
r more details, please visit https://support.apple.com/kb/HT208050.
arshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
arshithas-MacBook-Air:downloads harshithasagiraju$ python3 server_project.py
iting for clients to join on server, 127.0.0.1:55555...
ccepted new connection from 127.0.0.1:54413, username: Admin
ccepted new connection from 127.0.0.1:54415, username: Anonymous
ssage from  Anonymous: jhkasak  , Time: Sat Dec 11 11:41:37 2021
ssage from  Anonymous: bajsjkk  , Time: Sat Dec 11 11:41:40 2021
nonymous was removed by Admin
nonymous is blocked!.
```

```
                 Downloads — Admin — Python client_project.py — 80×24
st login: Sat Dec 11 11:40:02 on ttys001

e default interactive shell is now zsh.
 update your account to use zsh, please run `chsh -s /bin/zsh`.
r more details, please visit https://support.apple.com/kb/HT208050.
rshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
rshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.py
ter Username: Admin
ter your Admin password: computer-networks
nnected to server!
onymous joined!
onymous: jhkasak
onymous: bajsjkk
lock Anonymous
onymous was removed by Admin!
```

```
                 Downloads — Anonymous — -bash — 80×24
Last login: Sat Dec 11 11:35:41 on ttys003

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
[Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
[Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.p
Enter Username: Anonymous
jhkasak
bajsjkk
You were removed by admin
[Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.p
Enter Username: Anonymous
You are Blocked by admin. No connection possible.
Harshithas-MacBook-Air:downloads harshithasagiraju$
```

In the next slide,

You can see the file transfer taking place between client and server bytes by bytes and we tracked the progress of transfer and when the transfer is complete, it just prints "Done" to notify us.

Server Terminal

```
Last login: Sat Dec 11 11:40:04 on ttys003

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 server_project.py
Waiting for clients to join on server, 127.0.0.1:55555...
Accepted new connection from 127.0.0.1:54426, username: John
Receiving test_file.txt:   0%|                    | 0.00/31.0 [00:00<?, ?B/s]
Receiving test_file.txt: 100%|████████████| 31.0/31.0 [00:00<00:00, 2.41kB/s]
Done
```

Client Terminal

```
Last login: Sat Dec 11 11:44:34 on ttys001

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
Harshithas-MacBook-Air:~ harshithasagiraju$ cd downloads
Harshithas-MacBook-Air:downloads harshithasagiraju$ python3 client_project.py
Enter Username: John
Connected to server!
File
Sending /Users/harshithasagiraju/Library/Mobile Documents/com~apple~TextEdit/D
Sending /Users/harshithasagiraju/Library/Mobile Documents/com~apple~TextEdit/D
Done
```

References

- Course slides on socket programming
- https://www.neuralnine.com/tcp-chat-in-python/
- https://www.tutorialspoint.com/simple-chat-room-using-python/
- https://www.geeksforgeeks.org/socket-programming-python/

Thank You!!