CS 558: COMPUTER SYSTEMS LAB

Assignment – 2: Socket Programming

Submitted by – *GROUP 3*

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Application 3: Base64 encoding system using Client-Server socket programming

As directed in the question we have implemented the required application in C programming language. Below we have briefly explained the workings of the application: -
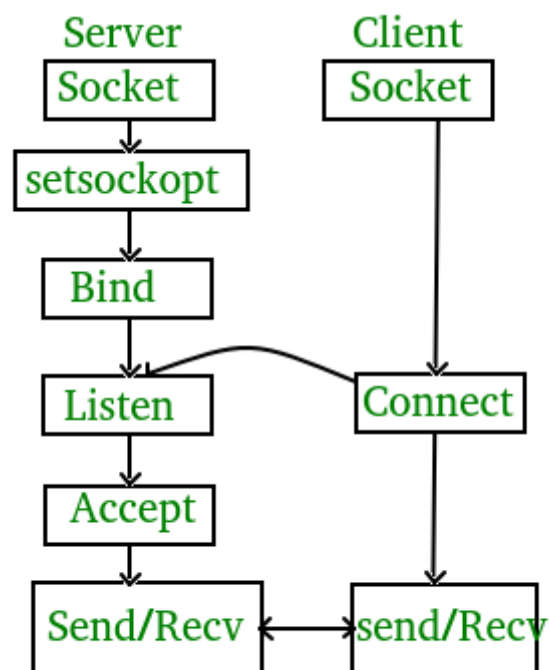

Fig 1: Explains the different states both the server and client goes through in socket programming

Initially, server will be waiting for a TCP connection from the client. Then, client will connect to the server using server's TCP port already known to the client. After successful connection, the client accepts the text input from the user and encodes the input using Base64 encoding system. Once encoded message is computed the client sends the Message (Type 1 message) to the server via TCP port. After receiving the Message, server prints the received and original message by decoding the received message, and sends an ACK (Type 2 message) to the client. The client and server remain in a loop to communicate any number of messages. The programs also allow the server to have multiple connections with different clients at the same time. Once the client wants to close the communication, it sends a Message (Type 3 Message) to the server and the TCP connection on both the server and client end is closed gracefully by releasing the socket resource.

The messages used to communicate contain the following fields:

1. Message_type: integer
2. Message: Character [MSG_LEN], where MSG_LEN (256) is an integer constant
3. 3. <Message> content of the message in Type 3 message can be anything

Different types of messages that can be exchanged between server and client are as follows:

1. Type-1: 1<Message_content> (No space between 1 and message content, any space added will be considered a part of message).
2. Type-2: Acknowledgement message sent by server on successful delivery of the Type-1 message.
3. Type-3: 3<Enter or anything> (Will disconnect the client with the server)

❖ *Steps to execute the program*
1. Compile the codes
   - For server: - gcc server.c -o server
   - For client: -gcc client.c -o client
2. Run the code
   - For server: -./server <Server port number>
   - For client: -./client <Server IP Address><Server Port number>

❖ *Sample output*

Terminal ▾   Apr 8 12:04

Top-left terminal:
```
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$ ./s 8000
Server waiting for requests !!!
New connection , socket fd is 4 , ip is : 127.0.0.1 , port : 50766
Adding to list of sockets as 0
New connection , socket fd is 5 , ip is : 127.0.0.1 , port : 50768
Adding to list of sockets as 1
New connection , socket fd is 6 , ip is : 127.0.0.1 , port : 50770
Adding to list of sockets as 2
Here is the message : aGVsbG8=
Decoded output: hello
Here is the message : aGk=
Decoded output: hi
Here is the message : b2s=
Decoded output: ok
Host disconnected , ip 127.0.0.1 , port 0
Host disconnected , ip 127.0.0.1 , port 0
Here is the message : a2FkZA==
Decoded output: kadd
Host disconnected , ip 127.0.0.1 , port 0
```

Top-right terminal:
```
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$ ./c 127.0.0.1 8000
Welcome to team
Please enter the message :
1hello
2 Here is the Acknowledgement for your previous message
Please enter the message :
1kadd
2 Here is the Acknowledgement for your previous message
Please enter the message :
3add
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$
```

Bottom-left terminal:
```
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$ ./c 127.0.0.1 8000
Welcome to team
Please enter the message :
1ok
2 Here is the Acknowledgement for your previous message
Please enter the message :
3adad
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$
```

Bottom-right terminal:
```
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$ ./c 127.0.0.1 8000
Welcome to team
Please enter the message :
1hi
2 Here is the Acknowledgement for your previous message
Please enter the message :
3ed
anamitra@anamitra:~/Downloads/System Lab Assignment 2 (CN)$
```