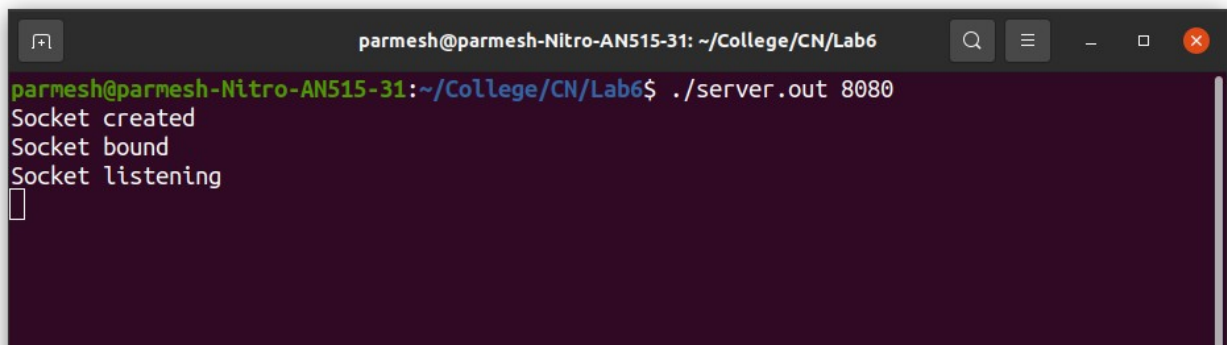


Lab 6

Parmesh Mathur

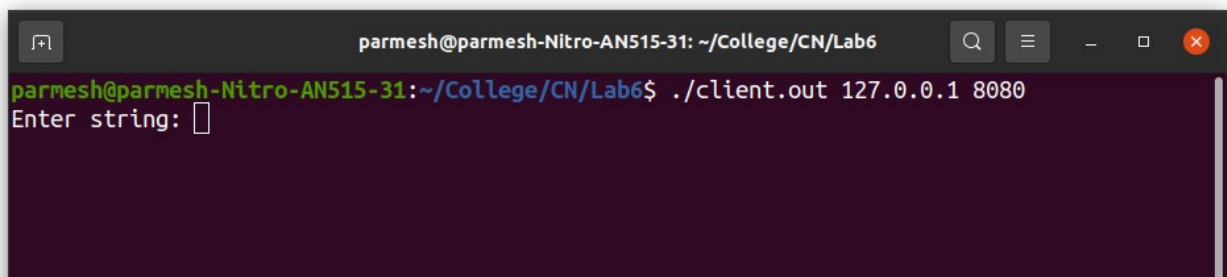
2018A7PS0133G

1. The server accepts the port number it should bind to as a command line argument.

A terminal window with a dark purple background. The title bar shows 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6'. The prompt is 'parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6\$'. The command './server.out 8080' has been entered. The output shows 'Socket created', 'Socket bound', and 'Socket listening' on three separate lines. A cursor is visible on the line following the last output.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
█
```

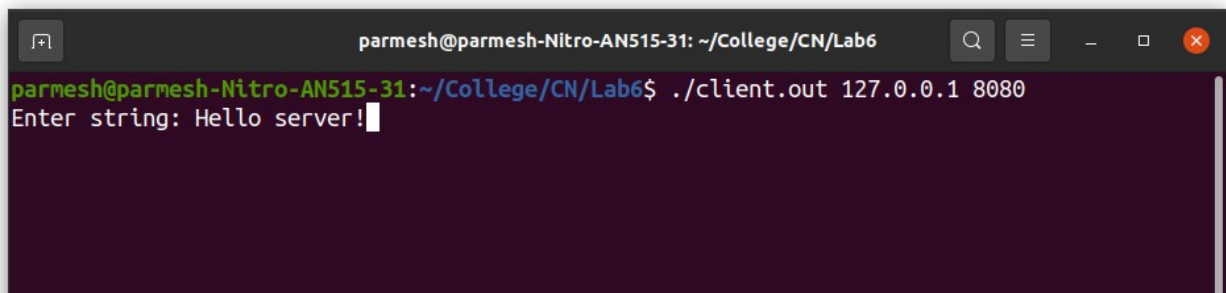
2. The client accepts the IP address and port number (in that particular order) where it will find the server.

A terminal window with a dark purple background. The title bar shows 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6'. The prompt is 'parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6\$'. The command './client.out 127.0.0.1 8080' has been entered. The output is 'Enter string:'. A cursor is visible on the line following the prompt.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: █
```

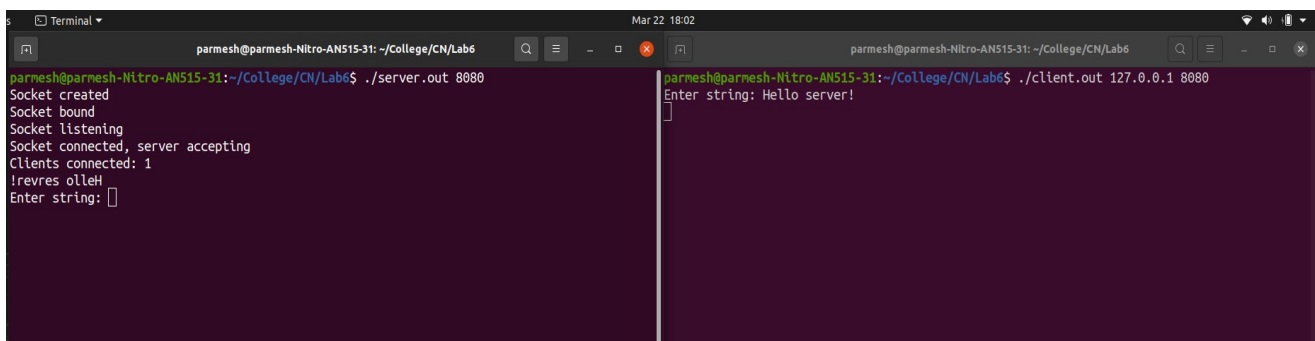
P.T.O.

3. After connecting to the server, the client reads a line from standard input (user) and sends it to the client.

A terminal window titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6'. The prompt is 'parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6\$'. The user has entered './client.out 127.0.0.1 8080'. Below the prompt, it says 'Enter string: Hello server!' with a cursor at the end of the line.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server!
```

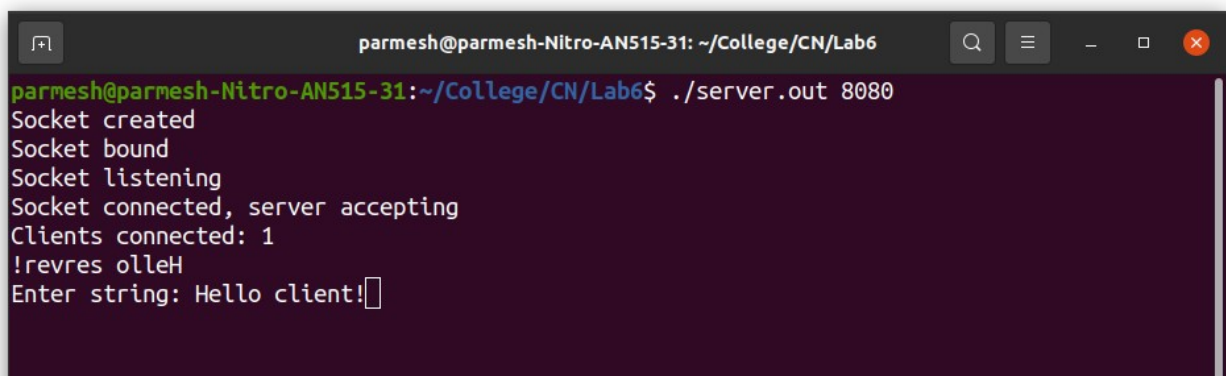
4. The server prints the received line from the client in reverse order.

Two terminal windows are shown side-by-side. The left window is titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6' and shows the server's output: 'Socket created', 'Socket bound', 'Socket listening', 'Socket connected, server accepting', 'Clients connected: 1', '!revres olleH', and 'Enter string:'. The right window is titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6' and shows the client's output: 'parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6\$./client.out 127.0.0.1 8080' and 'Enter string: Hello server!' with a cursor at the end of the line.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
!revres olleH
Enter string:

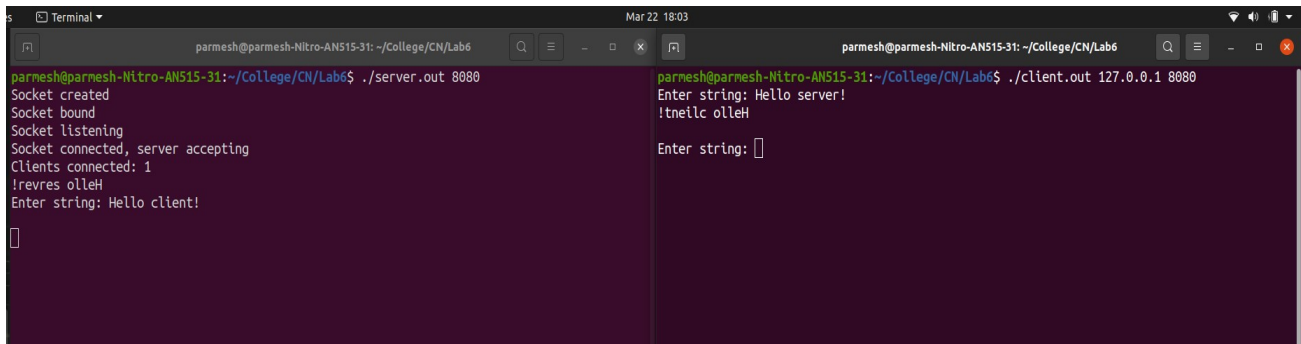
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server!
```

It reads a line from standard input (user) and sends it to the client.

A terminal window titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6'. The prompt is 'parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6\$'. The user has entered './server.out 8080'. Below the prompt, it shows the server's output: 'Socket created', 'Socket bound', 'Socket listening', 'Socket connected, server accepting', 'Clients connected: 1', '!revres olleH', and 'Enter string: Hello client!' with a cursor at the end of the line.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
!revres olleH
Enter string: Hello client!
```

5. The client prints the received line in reverse order and is ready to accept a new line from the user.



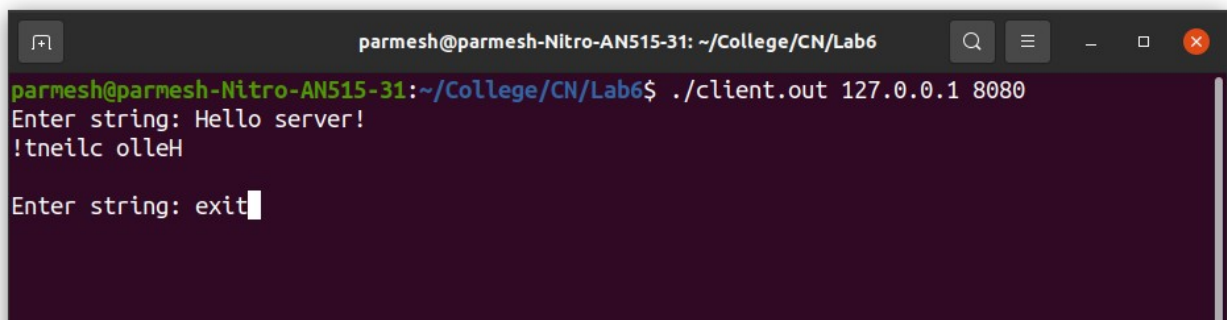
```
Terminal
Mar 22 18:03

parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
!revres olleH
Enter string: Hello client!

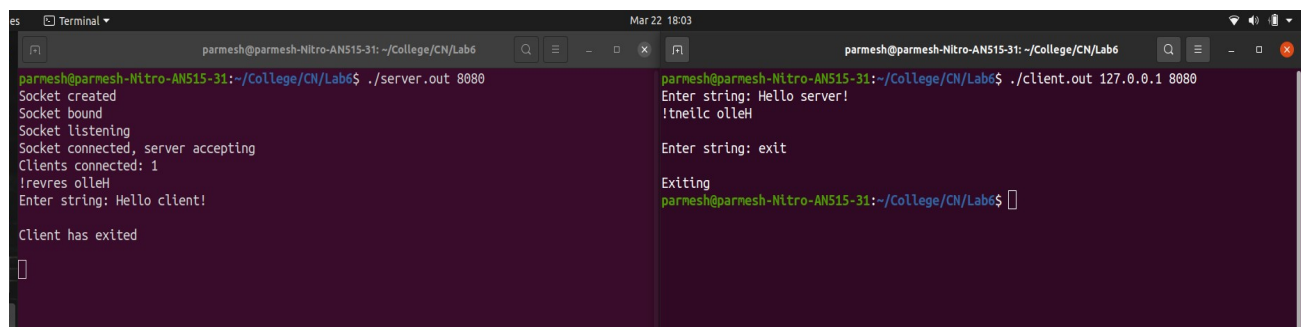
```

```
parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server!
!tneilc olleH
Enter string: 
```

6. The client exits if the user types in “exit”.



```
parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server!
!tneilc olleH
Enter string: exit
```



```
Terminal
Mar 22 18:03

parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
!revres olleH
Enter string: Hello client!
Client has exited

```

```
parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server!
!tneilc olleH
Enter string: exit
Exiting
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ 
```

7. The server can accept upto four clients at a time.

1 Client

The screenshot shows a terminal window with three panes. The left pane shows the server's output: `8080`, `Socket created`, `Socket bound`, `Socket listening`, `Socket connected, server accepting`, `Clients connected: 1`, `revres olleH`, and `Enter string: Hello client`. The middle pane shows the client's output: `7.0.0.1 8080`, `Enter string: Hello server`, `tnelc olleH`, and `Enter string:` . The right pane is empty.

2 Clients

The screenshot shows a terminal window with three panes. The left pane shows the server's output: `8080`, `Socket created`, `Socket bound`, `Socket listening`, `Socket connected, server accepting`, `Clients connected: 1`, `revres olleH`, `Enter string: Hello client`, `Socket connected, server accepting`, `Clients connected: 2`, `revres iH`, and `Enter string: Hi client`. The middle pane shows the first client's output: `7.0.0.1 8080`, `Enter string: Hello server`, `tnelc olleH`, and `Enter string:` . The right pane shows the second client's output: `7.0.0.1 8080`, `Enter string: Hi server`, `tnelc iH`, and `Enter string:` .

3 Clients

```
Activities Terminal Mar 22 18:17
parmesh@parmesh-Nitro-ANS15-31: ~/College/...
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out
8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
revres olleH
Enter string: Hello client

Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: Hi client

Socket connected, server accepting
Clients connected: 3
revres yohA
Enter string: Ahoy client

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hello server
tnelhc olleH
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hi server
tnelhc iH
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
```

4 Clients

```
Activities Terminal Mar 22 18:17
parmesh@parmesh-Nitro-ANS15-31: ~/College/...
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out
8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
revres olleH
Enter string: Hello client

Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: Hi client

Socket connected, server accepting
Clients connected: 3
revres yohA
Enter string: Ahoy client

Socket connected, server accepting
Clients connected: 4
revres etsamaN
Enter string: Namaste client

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hello server
tnelhc olleH
Enter string:

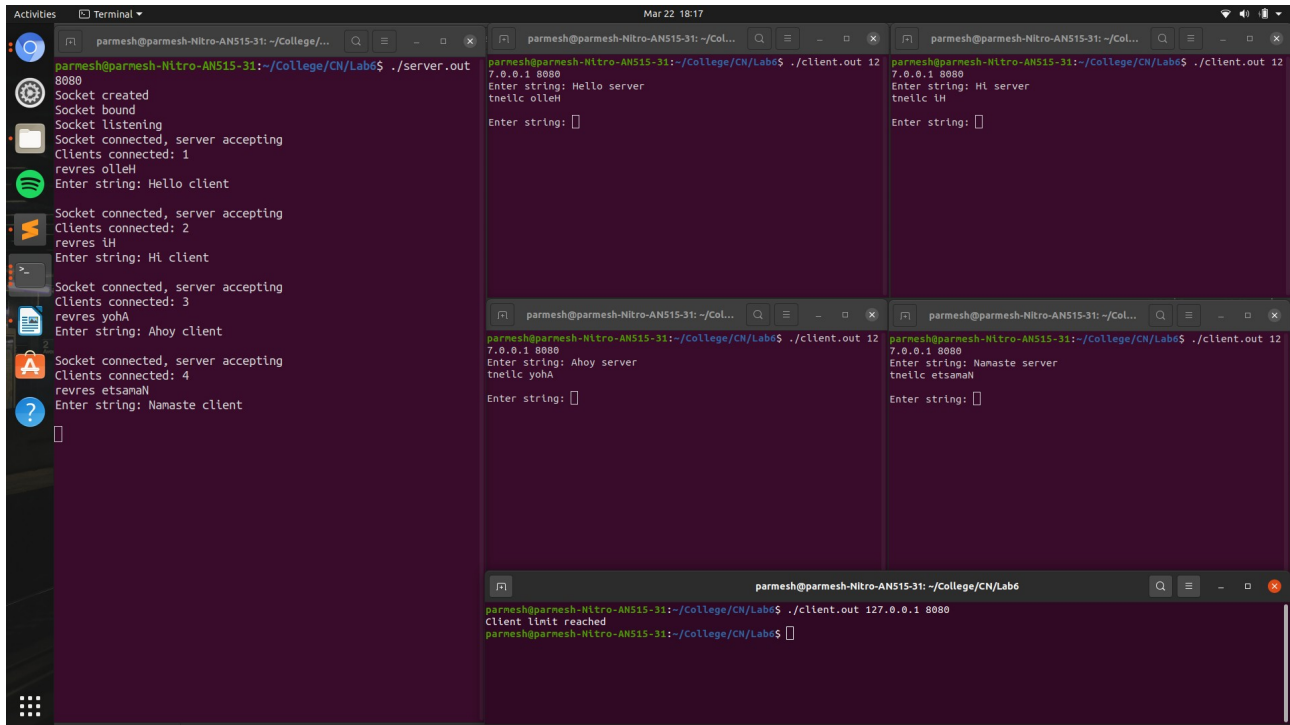
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hi server
tnelhc iH
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Namaste server
tnelhc etsamaN
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
```

Any client above the limit is rejected.

5th client is rejected.



```
Activities Terminal Mar 22 18:17
parmesh@parmesh-Nitro-ANS15-31: ~/College/...
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./server.out
8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
revres olleH
Enter string: Hello client

Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: Hi client

Socket connected, server accepting
Clients connected: 3
revres yohA
Enter string: Ahoy client

Socket connected, server accepting
Clients connected: 4
revres etsamaN
Enter string: Namaste client

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hello server
tnellic olleH
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Hi server
tnellic iH
Enter string:

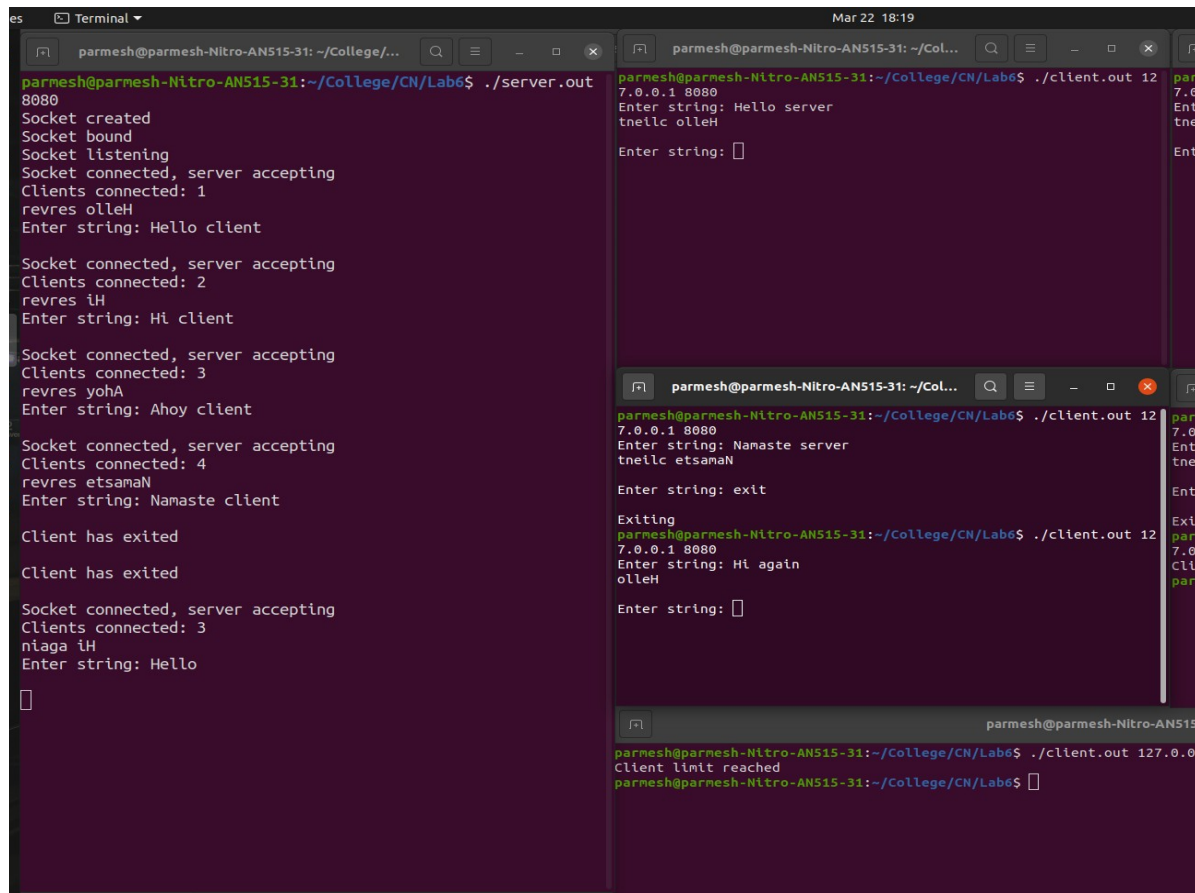
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Ahoy server
tnellic yohA
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 12
7.0.0.1 8080
Enter string: Namaste server
tnellic etsamaN
Enter string:

parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Client limit reached
parmesh@parmesh-Nitro-ANS15-31:~/College/CN/Lab6$
```

P.T.O.

As long as the number of clients is lesser than the limit, the summer accepts new clients. For example when a client exits, another can join.



```
es Terminal Mar 22 18:19
parmesh@parmesh-Nitro-AN515-31: ~/College/...
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./server.out
8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
revres olleH
Enter string: Hello client

Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: Hi client

Socket connected, server accepting
Clients connected: 3
revres yohA
Enter string: Ahoy client

Socket connected, server accepting
Clients connected: 4
revres etsamaN
Enter string: Namaste client

Client has exited

Client has exited

Socket connected, server accepting
Clients connected: 3
niaga iH
Enter string: Hello

[]

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
7.0.0.1 8080
Enter string: Hello server
tnelc olleH

Enter string: []

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
7.0.0.1 8080
Enter string: Namaste server
tnelc etsamaN

Enter string: exit

Exiting
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
7.0.0.1 8080
Enter string: Hi again
olleH

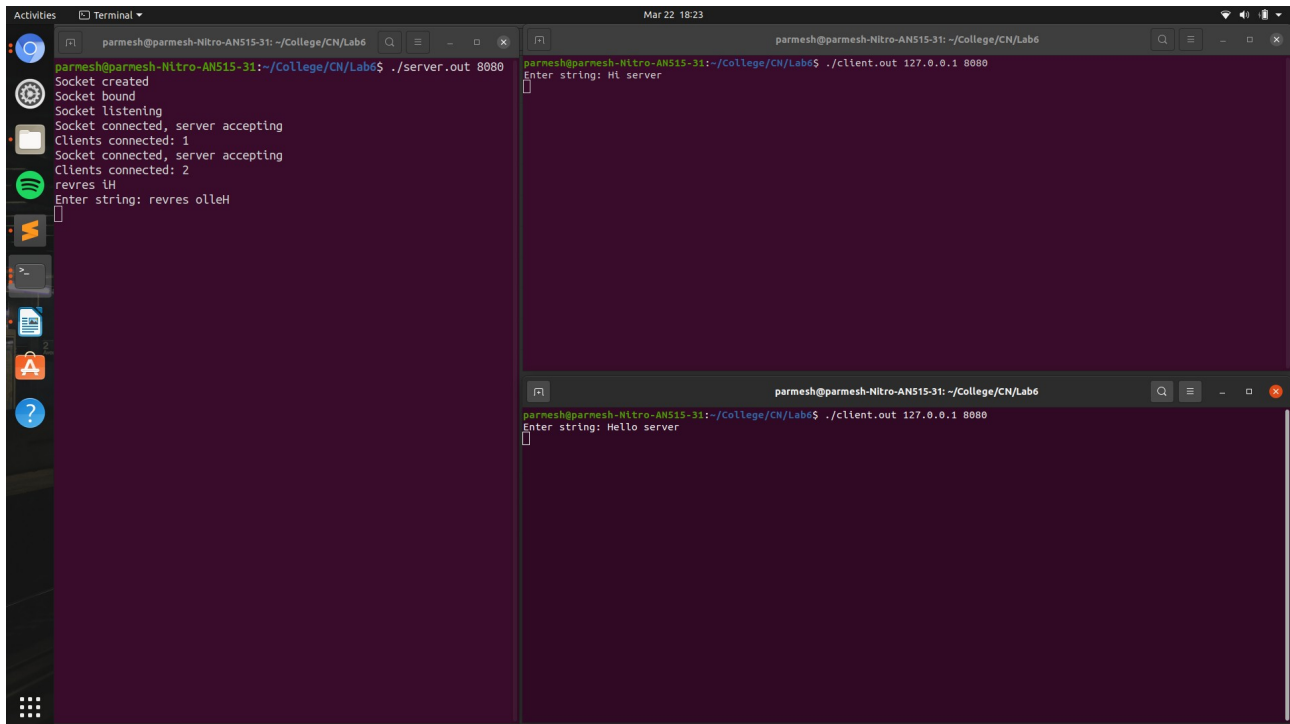
Enter string: []

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Client limit reached
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ []
```

For example when a client exits (in the above case 2 clients exit), another can join.

P.T.O.

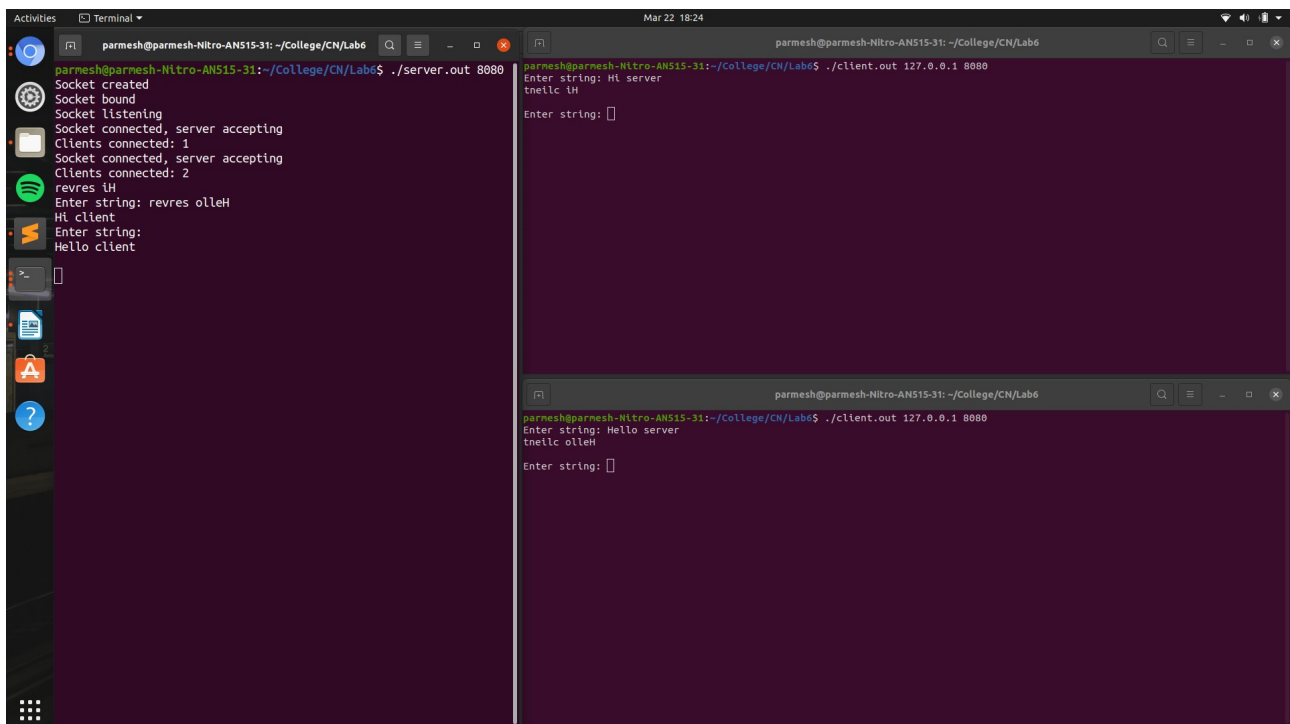
If another client sends a message to the server before it can reply to the previous client, the lines messages from the server are sent to the clients in which they contacted the server.



```
parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: revres olleH

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hi server

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server
```

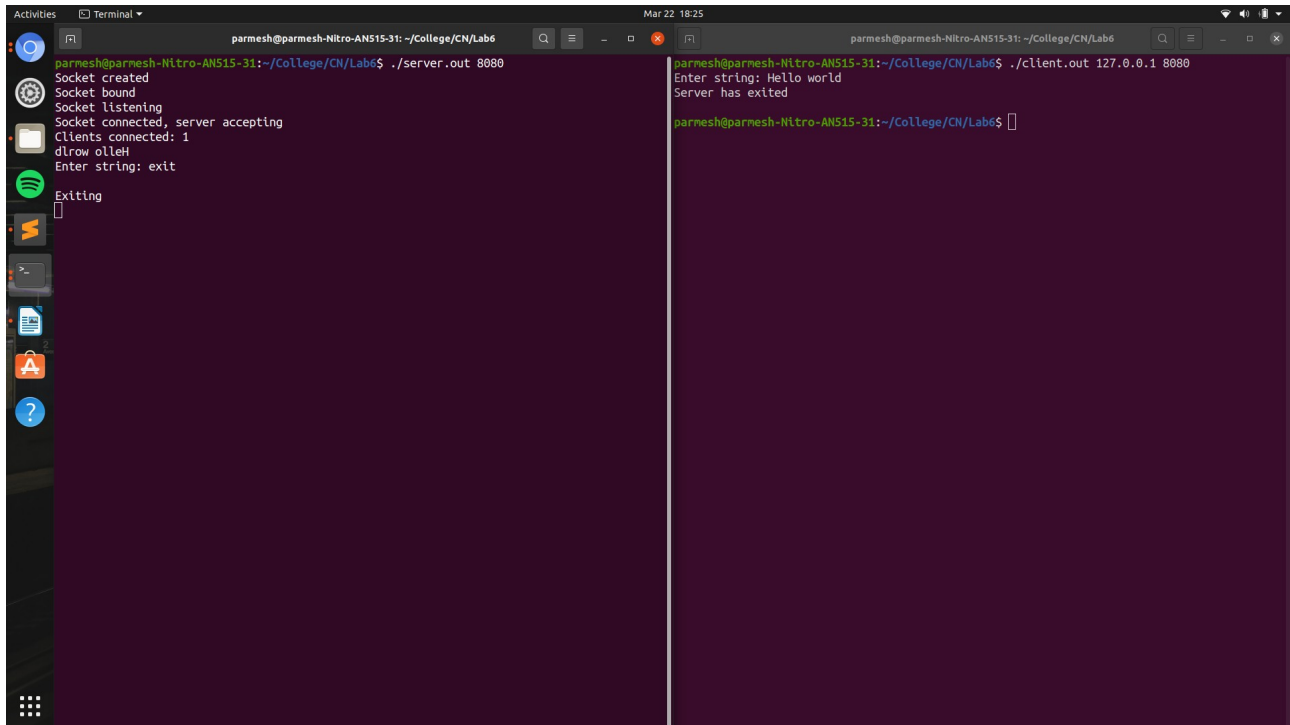


```
parmesh@parmesh-Nitro-AN515-31: ~/College/CN/Lab6
parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
Socket connected, server accepting
Clients connected: 2
revres iH
Enter string: revres olleH
Hi client
Enter string:
Hello client

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hi server
tnetic iH
Enter string:

parmesh@parmesh-Nitro-AN515-31:~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello server
tnetic olleH
Enter string:
```


When the user types “exit” in the server’s standard input on its turn to enter a string, that particular connection with that client is terminated and that client exits.



The image shows two terminal windows side-by-side. The left window is titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6' and shows the execution of a server program. The right window is titled 'parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6' and shows the execution of a client program.

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6$ ./server.out 8080
Socket created
Socket bound
Socket listening
Socket connected, server accepting
Clients connected: 1
drow o!leh
Enter string: exit
Exiting

```

```
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6$ ./client.out 127.0.0.1 8080
Enter string: Hello world
Server has exited
parmesh@parmesh-Nitro-ANS15-31: ~/College/CN/Lab6$

```

Refer to the README file for instructions on how to run the code.