

## 2018A7PS0624G

### Lab 6

Answers:

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

```
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ gcc server.c -o server -lpthread
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./server 8081
Listening for connections...
```

2) The client, as command line arguments, accepts the IP address and the port number at which it will find the server.

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
```

Enter the text:

█

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

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
```

Enter the text:

Hi this is nupur █

4) The server prints the received line in the reverser order and reads a line from the standard input and sends it to the client.

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./server 8081
Listening for connections...
Reversed text of client(id = 4): rupun si siht iH
Enter the text for client (id = 4):
Hello client
```

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

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.

Enter the text:
Hi this is nupur
Reversed text: tneilc olleH
Enter the text:
█
```

6) The client exits if the user type "exit".

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.

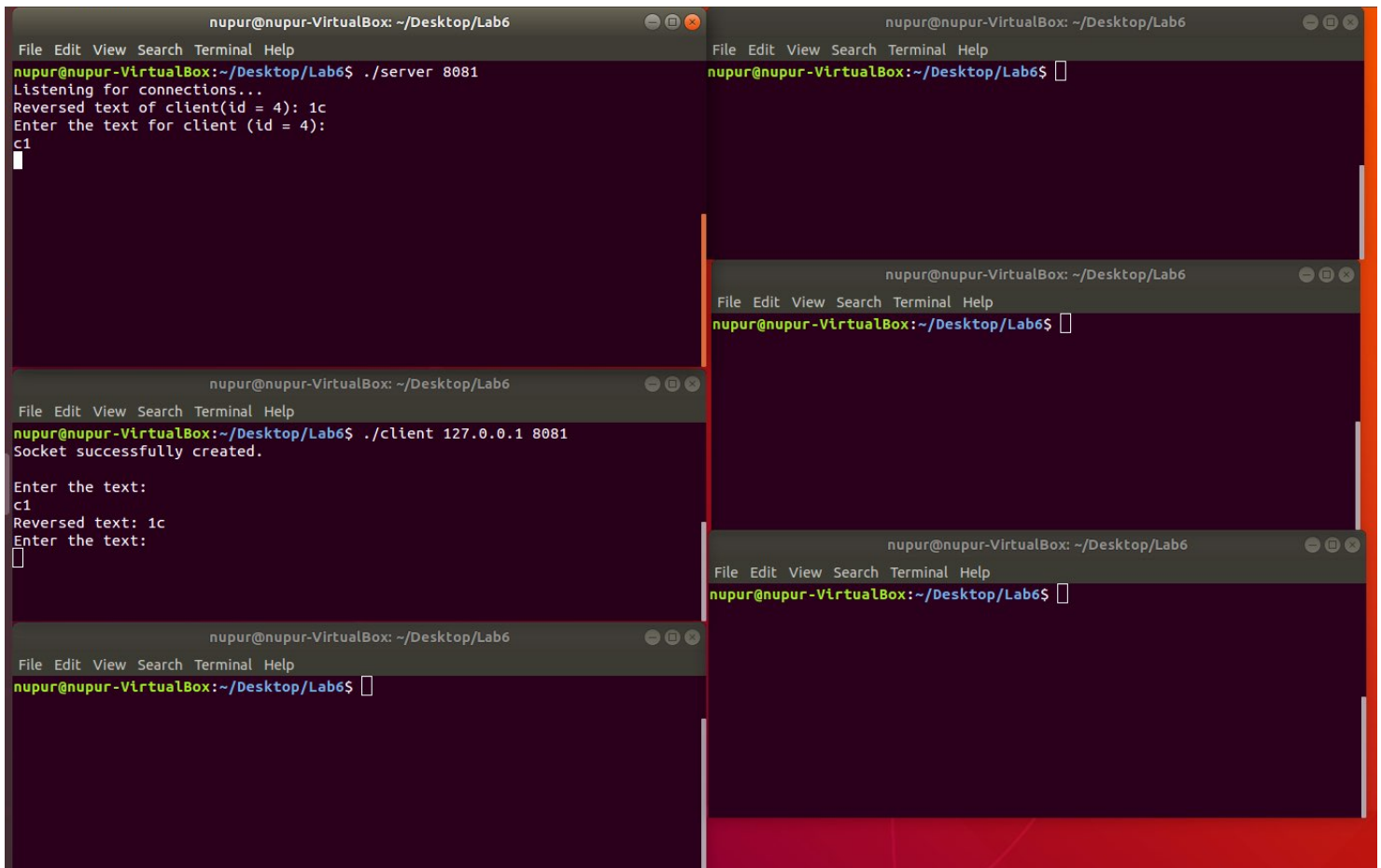
Enter the text:
Hi this is nupur
Reversed text: tneilc olleH
Enter the text:
exit
exiting!
nupur@nupur-VirtualBox:~/Desktop/Lab6$ █
```

The server displays the exit of a particular client (id =4) below

```
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./server 8081
Listening for connections...
Reversed text of client(id = 4): rupun si siht iH
Enter the text for client (id = 4):
Hello client
Exit client (id = 4)
█
```

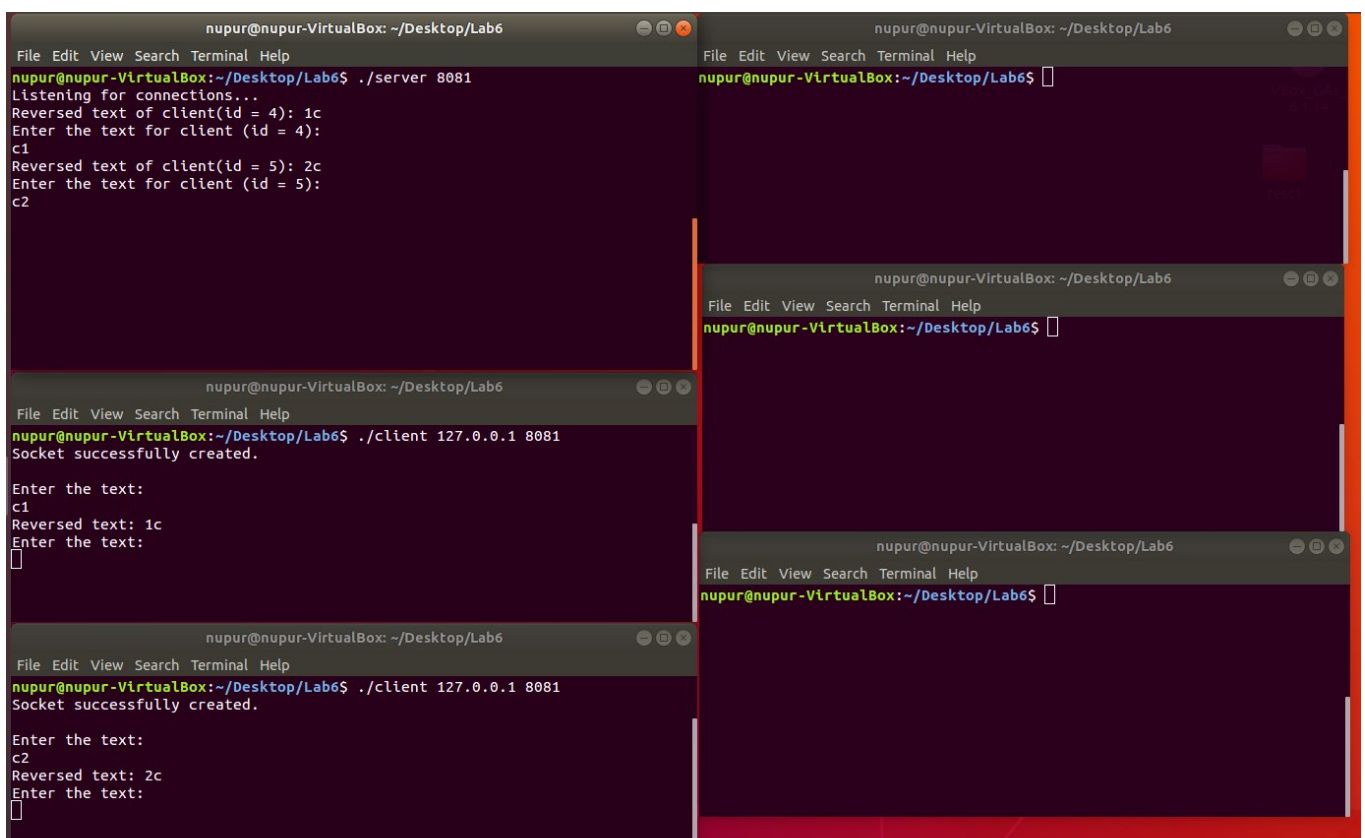
7) The server at a time accepts at the most four clients.

Here we will see that clients one by one connect to server till limit reaches 4. Then a new client cannot join. Once one of the connected client leaves, a new client can join. The top left is server.



The screenshot displays three terminal windows from a virtual machine named 'nupur@nupur-VirtualBox' with the working directory set to '~/Desktop/Lab6'.  
The top-left window shows the server process running './server 8081'. It is listening for connections and has received a message from client ID 4: '1c'. It prompts the user to enter text for this client, and 'c1' has been entered.  
The middle-left window shows a client process running './client 127.0.0.1 8081'. It reports 'Socket successfully created.' and prompts for text. 'c1' has been entered, and the server has responded with 'Reversed text: 1c'.  
The right side of the image shows two more terminal windows, both displaying the prompt 'nupur@nupur-VirtualBox:~/Desktop/Lab6\$' and waiting for input.

For identification purpose, the server shows an id of each client to respond to.



This screenshot shows four terminal windows illustrating the server's ability to handle multiple clients and its identification of each.  
The top-left window shows the server running './server 8081'. It has handled two clients: client ID 4 sent '1c' and client ID 5 sent '2c'. The server prompts for text for each client, and 'c1' and 'c2' were entered respectively.  
The middle-left window shows the first client running './client 127.0.0.1 8081'. It shows the initial 'Socket successfully created.' message and the first interaction where 'c1' was sent and 'Reversed text: 1c' was received.  
The bottom-left window shows the second client running './client 127.0.0.1 8081'. It shows the 'Socket successfully created.' message and the second interaction where 'c2' was sent and 'Reversed text: 2c' was received.  
The right side of the image shows two more terminal windows, both displaying the prompt 'nupur@nupur-VirtualBox:~/Desktop/Lab6\$' and waiting for input.

```
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./server 8081
Listening for connections...
Reversed text of client(id = 4): 1c
Enter the text for client (id = 4):
c1
Reversed text of client(id = 5): 2c
Enter the text for client (id = 5):
c2
Reversed text of client(id = 6): 3c
Enter the text for client (id = 6):
c3
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c2
Reversed text: 2c
Enter the text:
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
```

Below, client with id = 5 sends a message again to show concurrency.

```
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./server 8081
Listening for connections...
Reversed text of client(id = 4): 1c
Enter the text for client (id = 4):
c1
Reversed text of client(id = 5): 2c
Enter the text for client (id = 5):
c2
Reversed text of client(id = 6): 3c
Enter the text for client (id = 6):
c3
Reversed text of client(id = 7): 4c
Enter the text for client (id = 7):
c4
Reversed text of client(id = 5): niaga 2c
Enter the text for client (id = 5):
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:
[]

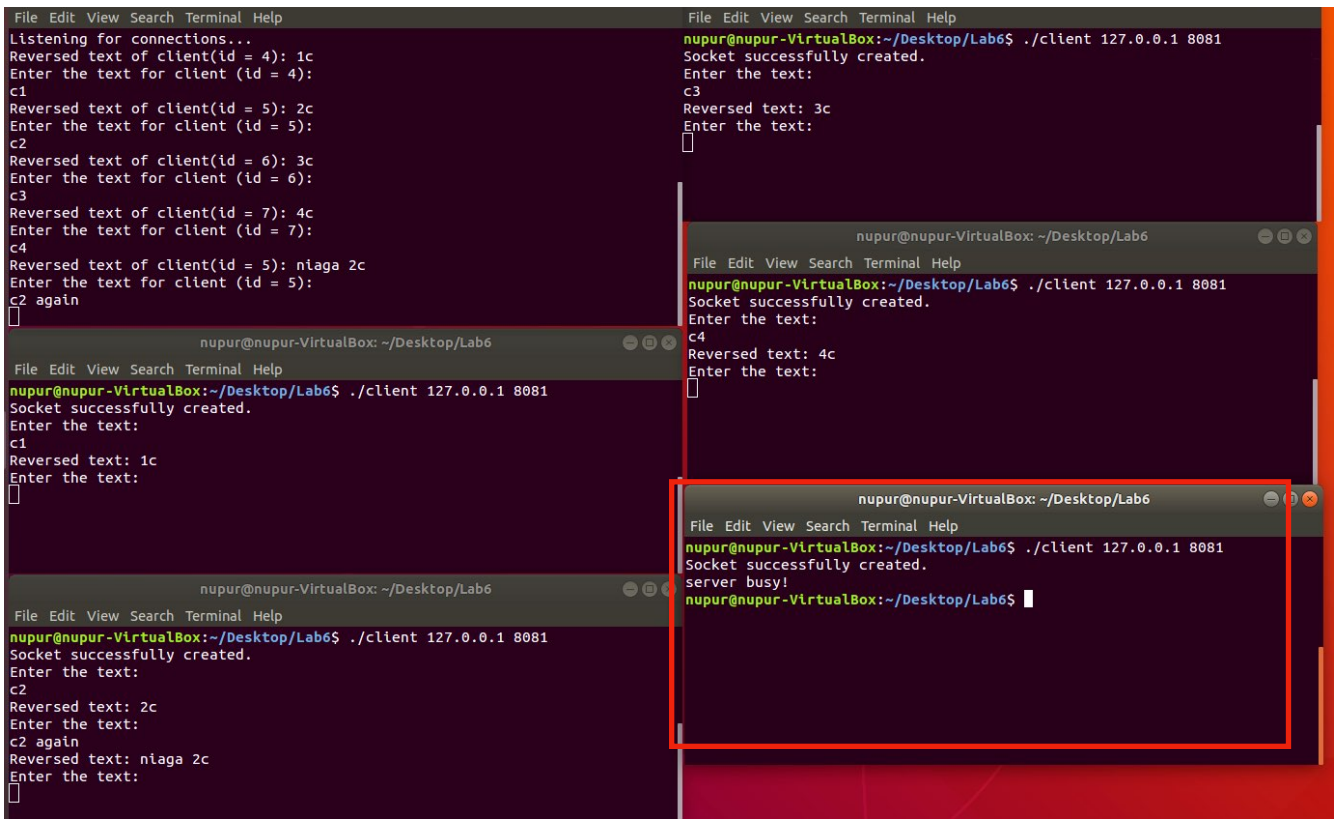
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c2
Reversed text: 2c
Enter the text:
c2 again
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
Reversed text: 4c
Enter the text:
[]

nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$
```



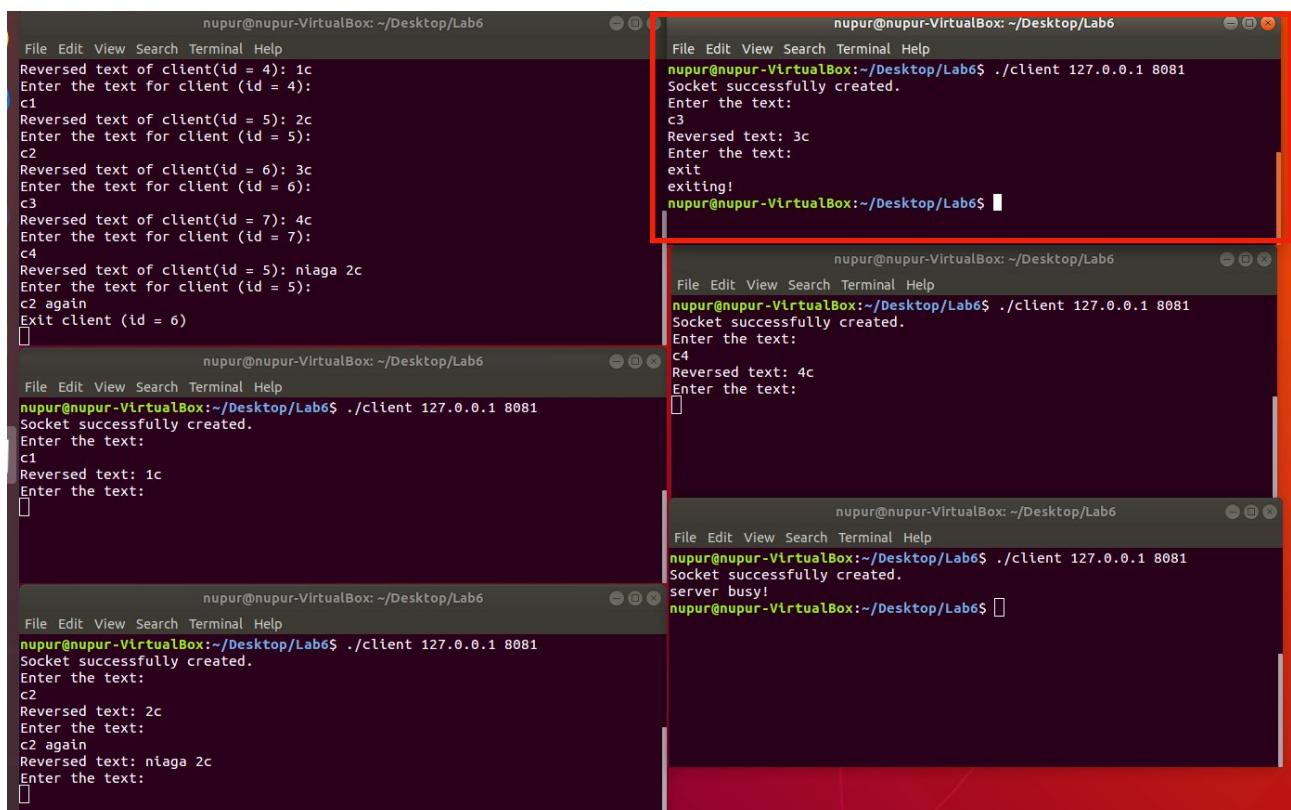
Now already 4 clients are connected with the server. Therefore any new client will not be accepted. It is displayed to any new client that server is busy and made to exit.



```
File Edit View Search Terminal Help
Listening for connections...
Reversed text of client(id = 4): 1c
Enter the text for client (id = 4):
c1
Reversed text of client(id = 5): 2c
Enter the text for client (id = 5):
c2
Reversed text of client(id = 6): 3c
Enter the text for client (id = 6):
c3
Reversed text of client(id = 7): 4c
Enter the text for client (id = 7):
c4
Reversed text of client(id = 5): niaga 2c
Enter the text for client (id = 5):
c2 again
c2 again
Enter the text:
nupur@nupur-VirtualBox: ~/Desktop/Lab6

nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:
nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
Reversed text: 4c
Enter the text:
nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
server busy!
nupur@nupur-VirtualBox: ~/Desktop/Lab6$
```

Now client with id = 6 exits by typing exit. So 3 clients are connected currently to the server.



```
nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:
c2
Reversed text: 2c
Enter the text:
c2 again
Reversed text: niaga 2c
Enter the text:
Exit client (id = 6)
nupur@nupur-VirtualBox: ~/Desktop/Lab6$

nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c3
Reversed text: 3c
Enter the text:
exit
exiting!
nupur@nupur-VirtualBox: ~/Desktop/Lab6$

nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
Reversed text: 4c
Enter the text:
nupur@nupur-VirtualBox: ~/Desktop/Lab6$

nupur@nupur-VirtualBox: ~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
server busy!
nupur@nupur-VirtualBox: ~/Desktop/Lab6$
```

So now a new client can join as there were only 3 clients connected to server.

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
Reversed text of client(id = 5): 2c
Enter the text for client (id = 5):
c2
Reversed text of client(id = 6): 3c
Enter the text for client (id = 6):
c3
Reversed text of client(id = 7): 4c
Enter the text for client (id = 7):
c4
Reversed text of client(id = 5): niaga 2c
Enter the text for client (id = 5):
c2 again
Exit client (id = 6)
Reversed text of client(id = 8): tneilc wen
Enter the text for client (id = 8):
hi

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c2
Reversed text: 2c
Enter the text:
c2 again
Reversed text: niaga 2c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
Reversed text: 4c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
server busy!
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
new client
Reversed text: ih
Enter the text:

```

Now again 4 clients are connected to server. So no other client can join.

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
Reversed text of client(id = 5): 2c
Enter the text for client (id = 5):
c2
Reversed text of client(id = 6): 3c
Enter the text for client (id = 6):
c3
Reversed text of client(id = 7): 4c
Enter the text for client (id = 7):
c4
Reversed text of client(id = 5): niaga 2c
Enter the text for client (id = 5):
c2 again
Exit client (id = 6)
Reversed text of client(id = 8): tneilc wen
Enter the text for client (id = 8):
hi

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c1
Reversed text: 1c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c2
Reversed text: 2c
Enter the text:
c2 again
Reversed text: niaga 2c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
c4
Reversed text: 4c
Enter the text:

```

```
nupur@nupur-VirtualBox: ~/Desktop/Lab6
File Edit View Search Terminal Help
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
server busy!
nupur@nupur-VirtualBox:~/Desktop/Lab6$ ./client 127.0.0.1 8081
Socket successfully created.
Enter the text:
new client
Reversed text: ih
Enter the text:

```