

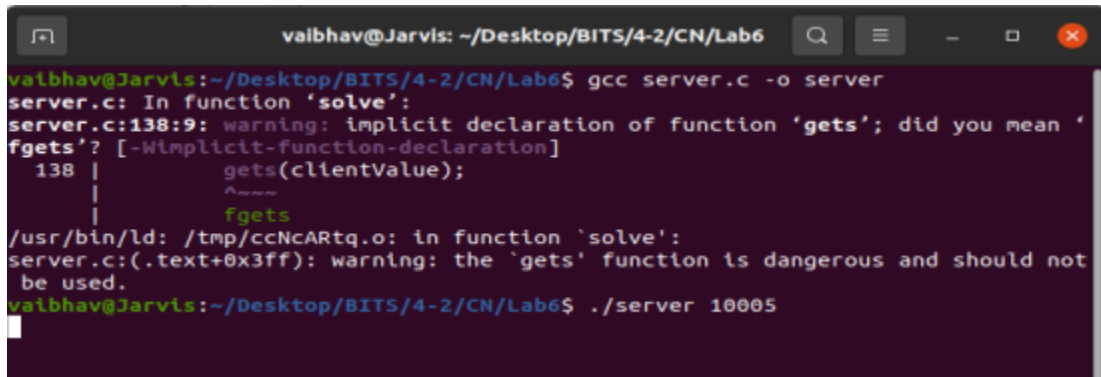
# Computer Networks Lab 6

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Write a TCP server and a client for the following.

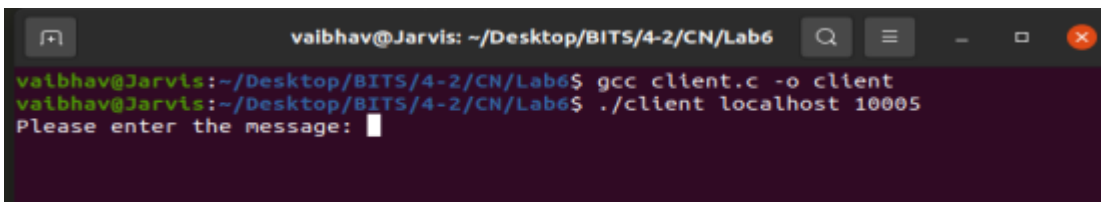
1. The server as a command line argument accepts the port number to which it should bind. (1 mark)



```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc server.c -o server
server.c: In function 'solve':
server.c:138:9: warning: implicit declaration of function 'gets'; did you mean 'fgets'? [-Wimplicit-function-declaration]
   138 |         gets(clientValue);
       |         ^~~~~
       |         fgets
/usr/bin/ld: /tmp/ccNcARTq.o: in function 'solve':
server.c:(.text+0x3ff): warning: the 'gets' function is dangerous and should not be used.
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./server 10005
```

The server accepts 10005 as the port number to which it will bind.

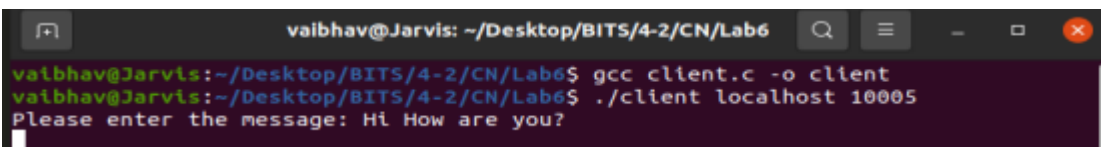
2. The client, as command line arguments, accepts the IP address and the port number at which it will find the server. (1 mark)



```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: 
```

The Client accepts the IP Address as localhost as server running on localhost and port number as 10005 at which server is running.

3. After connecting to the server, the client reads a line from the standard input and sends it to the server. (1 mark)



```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: Hi How are you?
```

4. The server prints the received line in the reverser order (2 marks) and reads a line from the standard input and sends it to the client or all the clients. (1 mark)

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc server.c -o server
server.c: In function 'solve':
server.c:138:9: warning: implicit declaration of function 'gets'; did you mean 'fgets'? [-Wimplicit-function-declaration]
   138 |         gets(clientValue);
       |         ^~~~~~
       |         fgets
/usr/bin/ld: /tmp/ccNcARTq.o: in function 'solve':
server.c:(.text+0x3ff): warning: the 'gets' function is dangerous and should not be used.
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./server 10005
Client 1: ?uoy era woH iH
I'm Good Client. How about you?
```

5. The client prints the received line in the reverse order and is ready to accept a new line from the user. (2 marks)

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: Hi How are you?
Server response: ?uoy tuoba woH .tneilC dooG m'I
Please enter the message: 
```

6. The client exits if the user type "exit". (1 mark)

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: Hi How are you?
Server response: ?uoy tuoba woH .tneilC dooG m'I
Please enter the message: exit
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ 
```

The client exits and sends this info to the server.

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc server.c -o server
server.c: In function 'solve':
server.c:138:9: warning: implicit declaration of function 'gets'; did you mean 'fgets'? [-Wimplicit-function-declaration]
   138 |         gets(clientValue);
       |         ^~~~~~
       |         fgets
/usr/bin/ld: /tmp/ccNcARTq.o: in function 'solve':
server.c:(.text+0x3ff): warning: the 'gets' function is dangerous and should not be used.
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./server 10005
Client 1: ?uoy era woH iH
I'm Good Client. How about you?
Client 1 died!
```

The server shows which client exited.

7. The server at a time accepts at the most four clients. (4 marks) Any client above the limit is rejected. (4 marks) As and when the number is less than the limit, the server accepts the new client. (2 marks)

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc server.c -o server
server.c: In function 'solve':
server.c:138:9: warning: implicit declaration of function 'gets'; did you mean 'fgets'? [-Wimplicit-function-declaration]
   138 |         gets(clientValue);
       |         ^~~~~
       |         fgets
/usr/bin/ld: /tmp/cceFuYn0.o: in function 'solve':
server.c:(.text+0x3ff): warning: the 'gets' function is dangerous and should not be used.
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./server 10005
Client 1: 1 tneilC m'I
Client 2: 2 tneilC m'I
Client 3: 3 tneilC m'I
Client 4: 4 tneilC m'I
HI Client 1
HI Client 2
HI Client 3
HI Client 4
Client 5 Request is Rejected!

```

```
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 3
Server response: 3 tneilC iH
Please enter the message:

```

```
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 1
Server response: 1 tneilC iH
Please enter the message:

```

```
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 4
Server response: 4 tneilC iH
Please enter the message:

```

```
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 2
Server response: 2 tneilC iH
Please enter the message:

```

```
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: HI
Request Denied: 4 Client Limit Reached
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$

```

At most 4 clients are accepted by the server as seen in the above screenshot i.e. Client 1, 2, 3 and 4. The server sends the messages it receives from the standard input to the respective client as seen in the above picture.

When the 5<sup>th</sup> Client denoted by the bottom right terminal wants to join, the server rejects the client as seen in the top left terminal and when the client sends some message, server returns “Request Denied: 4 Client Limit Reached” and the client automatically exits.

```
vaibhav@Jarvis: ~/Desktop/BITS/4-2/CN/Lab6
/usr/bin/ld: /tmp/ccQ8o5lr.o: in function `solve':
server.c:(.text+0x46e): warning: the `gets' function is dangerous and should not be used.
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./server 10005
Client 1: 1 tneilC m'I
Client 2: 2 tneilC m'I
Client 3: 3 tneilC m'I
Client 4: 4 tneilC m'I
Client 5 Request is Rejected!
Hello Client 1
Hello Client 2
Hello Client 3
Hello Client 4
Client 1 died!
Client 6: tneilC wen eht m'I tH
Hello Client 6
Client 6: 1 tneilC fo ecalp nl emac I
Nice to have you
Client 5 Request is Rejected!
Client 2 died!
Client 8: tH

vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 1
Server response: 1 tneilC olleH
Please enter the message: exit
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: HI
Request Denied: 4 Client Limit Reached
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: HI

vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: I'm Client 2
Server response: 2 tneilC olleH
Please enter the message: exit
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$

vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ gcc client.c -o client
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: HI
Request Denied: 4 Client Limit Reached
vaibhav@Jarvis:~/Desktop/BITS/4-2/CN/Lab6$ ./client localhost 10005
Please enter the message: HI I'm the new Client
Server response: 6 tneilC olleH
Please enter the message: I came in place of Client 1
Server response: uoy evah ot eciN
Please enter the message:
```

In this picture, first the 4 clients join and send messages to the server. The server rejects the 5<sup>th</sup> Client that wants to join as seen in bottom right and top left terminal. Then the server sends back the messages to the respective client.

Now we exit using the Client 1 as the server shows that the client 1 died. Now the active clients connected to the server are 3 so we have space for 1 more client. Now the bottom right terminal again connects to the client and is successful as the 6<sup>th</sup> Client. It is able to send and receive the messages from the server. The active client at the moment are Client 2, 3, 4 and 6.

Now the 2<sup>nd</sup> terminal on the left again wants to connect to the client but since 4 clients are already there it is not able to connect as the 7<sup>th</sup> Client. We then exit using the Client 2 as it can be seen from the image above where server shows that Client 2 died. Now the active clients connected to the server are 3 so we have space for 1 more client. Now the 2<sup>nd</sup> terminal on the left again connects to the client and is successful as the 8<sup>th</sup> Client. It is able to send and receive the messages from the server. The active client at the moment are Client 3, 4, 6 and 8.\

THIS CLEARLY SHOWS THAT THE MAXIMUM NUMBER OF CLIENTS AT A MOMENT CAN ONLY BE 4 AND ADDITIONAL CLIENTS ARE REJECTED BY THE SERVER. IF A CLIENT EXITS, THERE IS SPACE FOR A CLIENT AND A DIFFERENT CLIENT CAN JOIN UNTILL THERE ARE MAXIMUM OF 4 CLIENTS AGAIN. THEREFORE, WHEN THE NUMBER OF CLIENTS ARE LESS THAN THE LIMIT, THE SERVER ACCEPTS THE NEW CLIENT.