Computer Networks Lab 7
TCP Server accepting multiple clients

Arun Ganti

2019A7PS0021G

NOTE: While testing the code, if after running the server once, and you get "Cannot bind -1" error while running again, then wait for some time.
If you run `netstat --tcp --numeric | grep 4444` you will see that the socket on the port 4444 is in TIME_WAIT state. Meaning that connection is closed, so it will be terminated in the timeout specified by the OS. After the timeout expires, the program executes without the error.

1)   Server accepts port number and binds to it

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$
```

The clients accept port and address and there are 3 instances

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:13442]
> New connection [127.0.0.1:13954]
> New connection [127.0.0.1:14466]
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string :
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string :
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string :
```

3) Each client reads line from standard input and sends it to server

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:13442]
> New connection [127.0.0.1:13954]
> New connection [127.0.0.1:14466]
> [127.0.0.1:13442] Client message = revres ot gnidnes 1 eniL
> [127.0.0.1:13954] Client message = racecar
> [127.0.0.1:14466] Client message = tac ocat
> Enter message to send to all clients : []
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : Line 1 sending to server
[]
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : racecar
[]
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : taco cat
[]
```

4) Server receives the lines and sends one line from standard input to all clients

lab7 : server — Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:13442]
> New connection [127.0.0.1:13954]
> New connection [127.0.0.1:14466]
> [127.0.0.1:13442] Client message = revres ot gnidnes 1 eniL
> [127.0.0.1:13954] Client message = racecar
> [127.0.0.1:14466] Client message = tac ocat
> Enter message to send to all clients : I have 3 clients
```

lab7 : client — Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : Line 1 sending to server
> Server response : stneilc 3 evah I

> Enter string : 
```

lab7 : client — Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : racecar
> Server response : stneilc 3 evah I

> Enter string : 
```

lab7 : client — Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : taco cat
> Server response : stneilc 3 evah I

> Enter string : 
```

5) The clients print the message received from server in reverse and are ready for new input

lab7 : server

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:13442]
> New connection [127.0.0.1:13954]
> New connection [127.0.0.1:14466]
> [127.0.0.1:13442] Client message = revres ot gnidnes 1 eniL
> [127.0.0.1:13954] Client message = racecar
> [127.0.0.1:14466] Client message = tac ocat
> Enter message to send to all clients : I have 3 clients
```

lab7 : client

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : Line 1 sending to server
> Server response : stneilc 3 evah I

> Enter string : []
```

lab7 : client

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : racecar
> Server response : stneilc 3 evah I

> Enter string : []
```

lab7 : client

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : taco cat
> Server response : stneilc 3 evah I

> Enter string : []
```

6) The client exits if user types exit

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:13442]
> New connection [127.0.0.1:13954]
> New connection [127.0.0.1:14466]
> [127.0.0.1:13442] Client message = revres ot gnidnes 1 eniL
> [127.0.0.1:13954] Client message = racecar
> [127.0.0.1:14466] Client message = tac ocat
> Enter message to send to all clients : I have 3 clients

> Closing connection for client [127.0.0.1:14466]...
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : Line 1 sending to server
> Server response : stneilc 3 evah I

> Enter string : []
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : racecar
> Server response : stneilc 3 evah I

> Enter string : []
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : taco cat
> Server response : stneilc 3 evah I

> Enter string : exit
> Closing client...
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$
```

lab7 : client   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

lab7 : client   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

samaritan@pop-os: ~/Desktop/3-2/cn/labs/lab7

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:14978]
> New connection [127.0.0.1:15490]
```

lab7 : bash

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []
```

Close terminal

lab7 : bash

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []
```

Close terminal

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : ▯

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : ▯

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./c
> Connected to server IP = 0.0.0.0 and PORT = 44

> Enter string : ▯

samaritan@pop-os: ~/Desktop/3-2/cn/labs/lab7

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:14978]
> New connection [127.0.0.1:15490]
> New connection [127.0.0.1:16002]

lab7 : bash   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ▯

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []

samaritan@pop-os: ~/Desktop/3-2/cn/labs/lab7

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:14978]
> New connection [127.0.0.1:15490]
> New connection [127.0.0.1:16002]
> New connection [127.0.0.1:16514]

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./c   ient 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 44   4

> Enter string : []

lab7 : bash   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []

samaritan@pop-os: ~/Desktop/3-2/cn/labs/lab7

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:14978]
> New connection [127.0.0.1:15490]
> New connection [127.0.0.1:16002]
> New connection [127.0.0.1:16514]

lab7 : client   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client   4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []

                                                 Close terminal

lab7 : bash   Close terminal

samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client
> Server rejected due to too many clients
> Closing client...
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []

7) 4 connections live (rejected one)

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

samaritan@pop-os: ~/Desktop/3-2/cn/labs/lab7

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./server 4444
> Server bound to IP : 0.0.0.0 and PORT : 4444
> New connection [127.0.0.1:14978]
> New connection [127.0.0.1:15490]
> New connection [127.0.0.1:16002]
> New connection [127.0.0.1:16514]
```

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

4444 0.0.0.0

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client
> Server rejected due to too many clients
> Closing client...
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []
```

4444 0.0.0.0

7) All client terminals

Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

lab7 : client   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

lab7 : client   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

lab7 : client   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Connected to server IP = 0.0.0.0 and PORT = 4444

> Enter string : []
```

lab7 : bash   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Server rejected due to too many clients
> Closing client...
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ []
```

lab7 : bash   Close terminal

```
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ ./client 4444 0.0.0.0
> Server rejected due to too many clients
> Closing client...
samaritan@pop-os:~/Desktop/3-2/cn/labs/lab7$ █
```