

Saket Kumar Baranwal

RA1911003010414

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Aim:- To study for Full Duplex Using TCP/IP.

Codes:-

Server:-

```
#include <sys/types.h>
```

```
#include <sys/socket.h>
```

```
#include <netinet/in.h>
```

```
#include <arpa/inet.h>
```

```
#include <netdb.h>
```

```
#include <stdio.h>
```

```
#include <unistd.h>
```

```
#include <strings.h>
```

```
#include <string.h>
```

```
#define MAX_MSG 100
```

```
#define SERVER_ADDR "127.0.0.1"
```

```
#define SERVER_PORT 3786
```

```
main ( ) {
```

```
int sd, newSd, cliLen, n,num1,num2,sum;
```

```
struct sockaddr_in cliAddr, servAddr;
```

```
char line[MAX_MSG],line1[MAX_MSG],line2[MAX_MSG];
```

```
bzero((char *)&servAddr, sizeof(servAddr));
```

```
servAddr.sin_family = AF_INET;
```

```
servAddr.sin_addr.s_addr = inet_addr(SERVER_ADDR);
servAddr.sin_port = htons(SERVER_PORT);
sd = socket(AF_INET, SOCK_STREAM, 0);
printf("successfully created stream socket \n");
bind(sd, (struct sockaddr *) &servAddr, sizeof(servAddr));
printf("bound local port successfully\n");
listen(sd,5);
while(1) {
printf("waiting for client connection on port TCP %u\n",SERVER_PORT);
cliLen = sizeof(cliAddr);
newSd = accept(sd, (struct sockaddr *) &cliAddr, &cliLen);
printf("received connection from host [IP %s ,TCP port %d]\n",
inet_ntoa(cliAddr.sin_addr), ntohs(cliAddr.sin_port));
do{
memset(line,0x0,MAX_MSG);
n=recv(newSd, line, MAX_MSG, 0);
num1=atoi(line);
n=recv(newSd, line, MAX_MSG, 0);
num2=atoi(line);
sum=num1+num2;
sprintf(line1,"%d",sum);
printf("received from host [IP %s ,TCP port %d] : %s\n",
inet_ntoa(cliAddr.sin_addr), ntohs(cliAddr.sin_port), line1);
send(newSd, line1, strlen(line1) + 1, 0);
```

```
}while(abs(strcmp(line, "quit")));  
printf("closing connection with host [IP %s ,TCP port %d]\n",  
inet_ntoa(cliAddr.sin_addr), ntohs(cliAddr.sin_port));  
close(newSd);  
}  
}
```

Client:-

```
#include <sys/types.h>  
#include <sys/socket.h>  
#include <netinet/in.h>  
#include <arpa/inet.h>  
#include <netdb.h>  
#include <stdio.h>  
#include <unistd.h>  
#include <string.h>  
#include <strings.h>  
#define MAX_MSG 100  
#define SERVER_ADDR "127.0.0.1"  
#define CLIENT_ADDR "127.0.0.1"  
#define SERVER_PORT 3786  
#define CLIENT_PORT 8229  
main () {  
int sd, rc, i,n;
```

```
struct sockaddr_in clientAddr, servAddr;
char line[MAX_MSG];
bzero((char *)&servAddr, sizeof(servAddr));
servAddr.sin_family = AF_INET;
servAddr.sin_addr.s_addr = inet_addr(SERVER_ADDR);
servAddr.sin_port = htons(SERVER_PORT);
bzero((char *)&clientAddr, sizeof(clientAddr));
clientAddr.sin_family = AF_INET;
clientAddr.sin_addr.s_addr = INADDR_ANY;
clientAddr.sin_port = htons(0);
sd = socket(AF_INET, SOCK_STREAM, 0);
printf("successfully created stream socket \n");
bind(sd, (struct sockaddr *) &clientAddr, sizeof(clientAddr));
printf("bound local port successfully\n");
connect(sd, (struct sockaddr *) &servAddr, sizeof(servAddr));
printf("connected to server successfully\n");
do{
printf("Enter 1st number : ");
scanf("%s", line);
send(sd, line, strlen(line) + 1, 0);
printf("data sent (%s)\n", line);
printf("Enter 2nd number : ");
scanf("%s", line);
send(sd, line, strlen(line) + 1, 0);
```

```

printf("data sent (%s)\n", line);

n=recv(sd, line, MAX_MSG, 0);

printf("received from server %s\n", line);

}while(strcmp(line, "quit"));

printf("closing connection with the server\n");

close(sd);

}

```

Output Screenshot:-

Server:

```

1 #include <sys/types.h>
2 #include <sys/socket.h>
3 #include <netinet/in.h>
4 #include <arpa/inet.h>
5 #include <netdb.h>
6 #include <stdio.h>
7 #include <unistd.h>
8 #include <string.h>
9 #include <string.h>
10 #define MAX_MSG 100
11 #define SERVER_ADDR "127.0.0.1"
12 #define SERVER_PORT 3786
13 main ( ) {
14     int sd, newdd, clien; n, num1, num2, sum;
15     struct sockaddr_in cliAddr, servAddr;
16     char line[MAX_MSG], line1[MAX_MSG], line2[MAX_MSG];
17     bzero((char *)servAddr, sizeof(servAddr));
18     servAddr.sin_family = AF_INET;
19     servAddr.sin_addr.s_addr = inet_addr(SERVER_ADDR);
20     servAddr.sin_port = htons(SERVER_PORT);
21     sd = socket(AF_INET, SOCK_STREAM, 0);
22     printf("successfully created stream socket \n");
23     bind(sd, (struct sockaddr *) &servAddr, sizeof(servAddr));
24     printf("bound local port successfully\n");
25     listen(sd, 5);
26     while(1) {
27         printf("waiting for client connection on port TCP %u\n", SERVER_PORT);
28         clien = sizeof(cliAddr);
29         newdd = accept(sd, (struct sockaddr *) &cliAddr, &clilen);

```

414/exp7server.c - Runnig

bound local port successfully  
waiting for client connection on port TCP 3786  
received connection from host [IP 127.0.0.1 ,TCP port 33487]  
received from host [IP 127.0.0.1 ,TCP port 33487] : 11

Client:-

