



COMPUTER NETWORKS

EXP 6



HALF DUPLEX

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Aim:

To implement a half duplex application, where the Client establishes a connection with the Server. The Client can send and the server will receive messages at the same time.

Procedure:

Server:

- > Include the necessary header files.
- > Create a socket using socket function with family AF_INET, type as SOCK_STREAM.
- > Initialize server address to 0 using the bzero function.
- > Assign the sin_family to AF_INET, sin_addr to INADDR_ANY, sin_port to dynamically assigned port number.
- > Bind the local host address to socket using the bind function.
- > Listen on the socket for connection request from the client.
- > Accept connection request from the Client using accept function.
- > Fork the process to receive message from the client and print it on the console.
- > Read message from the console and send it to the client.

Client:

- > Include the necessary header files.
- > Create a socket using socket function with family AF_INET, type as SOCK_STREAM.
- > Initialize server address to 0 using the bzero function.
- > Assign the sin_family to AF_INET.
- > Get the server IP address and the Port number from the console.
- > Using gethostbyname function assign it to a hostent structure, and assign it to sin_addr of the server address structure.
- > Request a connection from the server using the connect function.
- > Fork the process to receive message from the server and print it on the console.
- > Read message from the console and send it to the server.

Code:

SERVER.C

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

```

#include<stdio.h>
#include<netdb.h>
#include<sys/socket.h>
#include<arpa/inet.h>
#include<unistd.h>
#include<netinet/in.h>
#include<string.h>
int main(int argc,char *argv[])
{
int n,sd,ad;
struct sockaddr_in servaddr,cliaddr;
socklen_t clilen,servlen;
char buff[10000],buff1[10000];
bzero(&servaddr,sizeof(servaddr));
/*Socket address structure*/
servaddr.sin_family=AF_INET;
servaddr.sin_addr.s_addr=htonl(INADDR_ANY);
servaddr.sin_port=htons(5001);
/*TCP socket is created, an Internet socket address structure is filled with
wildcard address & server's well known port*/
sd=socket(AF_INET,SOCK_STREAM,0);
/*Bind function assigns a local protocol address to the socket*/
bind(sd,(struct sockaddr*)&servaddr,sizeof(servaddr));
/*Listen function specifies the maximum number of connections that kernel
should queue for this socket*/
listen(sd,5);
printf("%s\n","server is running...");
/*The server to return the next completed connection from the front of the
completed connection Queue calls it*/
ad=accept(sd,(struct sockaddr*)&cliaddr,&clilen);
while(1)
{

```

```

bzero(&buff,sizeof(buff));

/*Receiving the request from client*/
recv(ad,buff,sizeof(buff),0);

printf("Receive from the client:%s\n",buff);

n=1;
while(n==1)
{
bzero(&buff1,sizeof(buff1));

printf("%s\n","Enter the input data:");

/*Read the message from client*/
fgets(buff1,10000,stdin);

/*Sends the message to client*/
send(ad,buff1,strlen(buff1)+1,0);

printf("%s\n","Data sent");

n=n+1;
}
}

return 0;
}

```

CLIENT.C

```

#include<sys/types.h>
#include<sys/socket.h>
#include<arpa/inet.h>
#include<netinet/in.h>
#include<unistd.h>
#include<stdio.h>
#include<netdb.h>
#include<string.h>

int main(int argc,char *argv[])
{

```

```

int n,sd,cd;
struct sockaddr_in servaddr,cliaddr;
socklen_t servlen,clilen;
char buff[10000],buff1[10000];
bzero(&servaddr,sizeof(servaddr));
/*Socket address structure*/
servaddr.sin_family=AF_INET;
servaddr.sin_addr.s_addr=inet_addr(argv[1]);
servaddr.sin_port=htons(5001);
/*Creating a socket, assigning IP address and port number for that socket*/
sd=socket(AF_INET,SOCK_STREAM,0);
/*Connect establishes connection with the server using server IP address*/
cd=connect(sd,(struct sockaddr*)&servaddr,sizeof(servaddr));
while(1)
{
bzero(&buff,sizeof(buff));
printf("%s\n","Enter the input data:");
/*This function is used to read from server*/
fgets(buff,10000,stdin);
/*Send the message to server*/
send(sd,buff,strlen(buff)+1,0);
printf("%s\n","Data sent");
n=1;
while(n==1)
{
bzero(&buff1,sizeof(buff1));
/*Receive the message from server*/
recv(sd,buff1,sizeof(buff1),0);
printf("Received from the server:%s\n",buff1);
n=n+1;
}
}

```

```

return 0;

}

```

OUTPUT:

The screenshot shows a C++ IDE with two files: `server.c` and `client.c`. The `server.c` file contains the following code:

```

13 struct sockaddr_in servaddr, cliaddr;
14 socklen_t servlen, clien;
15 char buff[10000], buff1[10000];
16 bzero(&servaddr, sizeof(servaddr));
17 /*socket address structure*/
18 servaddr.sin_family = AF_INET;
19 servaddr.sin_addr.s_addr = inet_addr(argv[1]);
20 servaddr.sin_port = htons(5001);
21 /*Creating a socket, assigning IP address and port number for that socket*/
22 sd = socket(AF_INET, SOCK_STREAM, 0);
23 /*Connect establishes connection with the server using server IP address*/
24 cd = connect(sd, (struct sockaddr*)&servaddr, sizeof(servaddr));
25 while(1)
26 {
27     bzero(buff, sizeof(buff));

```

The `client.c` file contains the following code:

```

13 struct sockaddr_in servaddr, cliaddr;
14 socklen_t servlen, clien;
15 char buff[10000], buff1[10000];
16 bzero(&servaddr, sizeof(servaddr));
17 /*socket address structure*/
18 servaddr.sin_family = AF_INET;
19 servaddr.sin_addr.s_addr = inet_addr(argv[1]);
20 servaddr.sin_port = htons(5001);
21 /*Creating a socket, assigning IP address and port number for that socket*/
22 sd = socket(AF_INET, SOCK_STREAM, 0);
23 /*Connect establishes connection with the server using server IP address*/
24 cd = connect(sd, (struct sockaddr*)&servaddr, sizeof(servaddr));
25 while(1)
26 {
27     bzero(buff, sizeof(buff));

```

The IDE shows the execution of the `server.c` and `client.c` files. The output of the `server.c` execution is as follows:

```

./a.out - "ip-172-31-9-200" x
server is running...
Receive from the client:10
Enter the input data:
50
Data sent
Receive from the client:1
Enter the input data:
Data sent

```

The output of the `client.c` execution is as follows:

```

./a.out - "ip-172-31-9-200" x
Enter the input data:
10
RA1911033010025:~/environment/RA1911033010017/half_duplex $ ^C
RA1911033010025:~/environment/RA1911033010017/half_duplex $ cc client.c
RA1911033010025:~/environment/RA1911033010017/half_duplex $ ./a.out
127.0.0.1
Enter the input data:
10
Data sent
Received from the server:50
Enter the input data:
1
Data sent
Received from the server:
Enter the input data:

```