**2. Aim: Connectionless Iterative Server : C Implementation of Client-Server Programs Using Iterative UDP Server.**

**UDP Server code :**

// server program for udp connection

#include <stdio.h>

#include <strings.h>

#include <sys/types.h>

#include <arpa/inet.h>

#include <sys/socket.h>

#include<netinet/in.h>

#define PORT 5000

#define MAXLINE 1000

// Driver code

int main()

{

char buffer[100];

char \*message = "Hello Client";

int listenfd, len;

struct sockaddr\_in servaddr, cliaddr;

bzero(&servaddr, sizeof(servaddr));

// Create a UDP Socket

listenfd = socket(AF\_INET, SOCK\_DGRAM, 0);

servaddr.sin\_addr.s\_addr = htonl(INADDR\_ANY);

servaddr.sin\_port = htons(PORT);

servaddr.sin\_family = AF\_INET;

// bind server address to socket descriptor

bind(listenfd, (struct sockaddr\*)&servaddr, sizeof(servaddr));

//receive the datagram

len = sizeof(cliaddr);

int n = recvfrom(listenfd, buffer, sizeof(buffer),

0, (struct sockaddr\*)&cliaddr,&len); //receive message from server

buffer[n] = '\0';

puts(buffer);

// send the response

sendto(listenfd, message, MAXLINE, 0,

(struct sockaddr\*)&cliaddr, sizeof(cliaddr));

}

**UDP Client code :**

// udp client driver program

#include <stdio.h>

#include <strings.h>

#include <sys/types.h>

#include <arpa/inet.h>

#include <sys/socket.h>

#include<netinet/in.h>

#include<unistd.h>

#include<stdlib.h>

#define PORT 5000

#define MAXLINE 1000

// Driver code

int main()

{

char buffer[100];

char \*message = "Hello Server";

int sockfd, n;

struct sockaddr\_in servaddr;

// clear servaddr

bzero(&servaddr, sizeof(servaddr));

servaddr.sin\_addr.s\_addr = inet\_addr("127.0.0.1");

servaddr.sin\_port = htons(PORT);

servaddr.sin\_family = AF\_INET;

// create datagram socket

sockfd = socket(AF\_INET, SOCK\_DGRAM, 0);

// connect to server

if(connect(sockfd, (struct sockaddr \*)&servaddr, sizeof(servaddr)) < 0)

{

printf("\n Error : Connect Failed \n");

exit(0);

}

// request to send datagram

// no need to specify server address in sendto

// connect stores the peers IP and port

sendto(sockfd, message, MAXLINE, 0, (struct sockaddr\*)NULL, sizeof(servaddr));

// waiting for response

recvfrom(sockfd, buffer, sizeof(buffer), 0, (struct sockaddr\*)NULL, NULL);

puts(buffer);

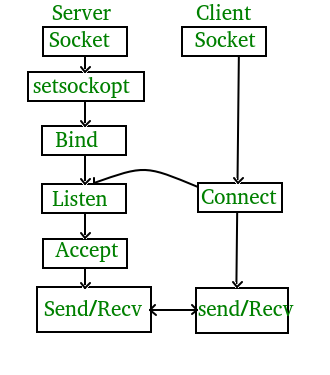
// close the descriptor

close(sockfd);

}

**3. Connection-oriented Iterative Server : C Implementation of Client-Server Programs Using Iterative TCP Server.**

If we are creating a connection between client and server using TCP then it has a few functionalities like, TCP is suited for applications that require high reliability, and transmission time is relatively less critical. It is used by other protocols like HTTP, HTTPs, FTP, SMTP, Telnet. TCP rearranges data packets in the order specified. There is absolute guarantee that the data transferred remains intact and arrives in the same order in which it was sent.



The entire process can be broken down into following steps:

**TCP Server –**

1. using create(), Create TCP socket.
2. using bind(), Bind the socket to server address.
3. using listen(), put the server socket in a passive mode, where it waits for the client to approach the server to make a connection
4. using accept(), At this point, connection is established between client and server, and they are ready to transfer data.
5. Go back to Step 3.

**TCP Client –**

1. Create TCP socket.
2. connect newly created client socket to server.

**TCP Server**

#include <stdio.h>

#include <netdb.h>

#include <netinet/in.h>

#include <stdlib.h>

#include <string.h>

#include <sys/socket.h>

#include <sys/types.h>

#include <unistd.h> // read(), write(), close()

#define MAX 80

#define PORT 8080

#define SA struct sockaddr

// Function designed for chat between client and server.

void func(int connfd)

{

char buff[MAX];

int n;

// infinite loop for chat

for (;;) {

bzero(buff, MAX);

// read the message from client and copy it in buffer

read(connfd, buff, sizeof(buff));

// print buffer which contains the client contents

printf("From client: %s\t To client : ", buff);

bzero(buff, MAX);

n = 0;

// copy server message in the buffer

while ((buff[n++] = getchar()) != '\n')

;

// and send that buffer to client

write(connfd, buff, sizeof(buff));

// if msg contains "Exit" then server exit and chat ended.

if (strncmp("exit", buff, 4) == 0) {

printf("Server Exit...\n");

break;

}

}

}

// Driver function

int main()

{

int sockfd, connfd, len;

struct sockaddr\_in servaddr, cli;

// socket create and verification

sockfd = socket(AF\_INET, SOCK\_STREAM, 0);

if (sockfd == -1) {

printf("socket creation failed...\n");

exit(0);

}

else

printf("Socket successfully created..\n");

bzero(&servaddr, sizeof(servaddr));

// assign IP, PORT

servaddr.sin\_family = AF\_INET;

servaddr.sin\_addr.s\_addr = htonl(INADDR\_ANY);

servaddr.sin\_port = htons(PORT);

// Binding newly created socket to given IP and verification

if ((bind(sockfd, (SA\*)&servaddr, sizeof(servaddr))) != 0) {

printf("socket bind failed...\n");

exit(0);

}

else

printf("Socket successfully binded..\n");

// Now server is ready to listen and verification

if ((listen(sockfd, 5)) != 0) {

printf("Listen failed...\n");

exit(0);

}

else

printf("Server listening..\n");

len = sizeof(cli);

// Accept the data packet from client and verification

connfd = accept(sockfd, (SA\*)&cli, &len);

if (connfd < 0) {

printf("server accept failed...\n");

exit(0);

}

else

printf("server accept the client...\n");

// Function for chatting between client and server

func(connfd);

// After chatting close the socket

close(sockfd);

}

**TCP Client** :

#include <arpa/inet.h> // inet\_addr()

#include <netdb.h>

#include <stdio.h>

#include <stdlib.h>

#include <string.h>

#include <strings.h> // bzero()

#include <sys/socket.h>

#include <unistd.h> // read(), write(), close()

#define MAX 80

#define PORT 8080

#define SA struct sockaddr

void func(int sockfd)

{

char buff[MAX];

int n;

for (;;) {

bzero(buff, sizeof(buff));

printf("Enter the string : ");

n = 0;

while ((buff[n++] = getchar()) != '\n')

;

write(sockfd, buff, sizeof(buff));

bzero(buff, sizeof(buff));

read(sockfd, buff, sizeof(buff));

printf("From Server : %s", buff);

if ((strncmp(buff, "exit", 4)) == 0) {

printf("Client Exit...\n");

break;

}

}

}

int main()

{

int sockfd, connfd;

struct sockaddr\_in servaddr, cli;

// socket create and verification

sockfd = socket(AF\_INET, SOCK\_STREAM, 0);

if (sockfd == -1) {

printf("socket creation failed...\n");

exit(0);

}

else

printf("Socket successfully created..\n");

bzero(&servaddr, sizeof(servaddr));

// assign IP, PORT

servaddr.sin\_family = AF\_INET;

servaddr.sin\_addr.s\_addr = inet\_addr("127.0.0.1");

servaddr.sin\_port = htons(PORT);

// connect the client socket to server socket

if (connect(sockfd, (SA\*)&servaddr, sizeof(servaddr))

!= 0) {

printf("connection with the server failed...\n");

exit(0);

}

else

printf("connected to the server..\n");

// function for chat

func(sockfd);

// close the socket

close(sockfd);

}

**Compilation –**   
Server side:   
gcc server.c -o server   
./server

Client side:   
gcc client.c -o client   
./client

**Output –**

Server side:

Socket successfully created..

Socket successfully binded..

Server listening..

server accept the client...

From client: hi

To client : hello

From client: exit

To client : exit

Server Exit...

Client side:

Socket successfully created..

connected to the server..

Enter the string : hi

From Server : hello

Enter the string : exit

From Server : exit

Client Exit...