**Lab Practical #10:**

Implement Client-Server Socket programming using C language

**Practical Assignment #10:**

1. **Write a C code for TCP Server-Client Socket Programming.**
2. **Write a C code for UDP Server-Client Socket Programming.**
3. **For TCP Server-Client:**

**TCP Server C Program:**

#include <stdio.h>

#include <netdb.h>

#include <netinet/in.h>

#include <stdlib.h>

#include <string.h>

#include <sys/socket.h>

#include <sys/types.h>

#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 C Program:**

#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);

}

**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...

1. **For UDP Server-Client:**

**UDP Server C Program:**

// Server side implementation of UDP client-server model

#include <stdio.h>

#include <stdlib.h>

#include <unistd.h>

#include <string.h>

#include <sys/types.h>

#include <sys/socket.h>

#include <arpa/inet.h>

#include <netinet/in.h>

#define PORT 8080

#define MAXLINE 1024

// Driver code

int main() {

int sockfd;

char buffer[MAXLINE];

char \*hello = "Hello from server";

struct sockaddr\_in servaddr, cliaddr;

// Creating socket file descriptor

if ( (sockfd = socket(AF\_INET, SOCK\_DGRAM, 0)) < 0 ) {

perror("socket creation failed");

exit(EXIT\_FAILURE);

}

memset(&servaddr, 0, sizeof(servaddr));

memset(&cliaddr, 0, sizeof(cliaddr));

// Filling server information

servaddr.sin\_family = AF\_INET; // IPv4

servaddr.sin\_addr.s\_addr = INADDR\_ANY;

servaddr.sin\_port = htons(PORT);

// Bind the socket with the server address

if ( bind(sockfd, (const struct sockaddr \*)&servaddr,

sizeof(servaddr)) < 0 )

{

perror("bind failed");

exit(EXIT\_FAILURE);

}

int len, n;

len = sizeof(cliaddr); //len is value/result

n = recvfrom(sockfd, (char \*)buffer, MAXLINE,

MSG\_WAITALL, ( struct sockaddr \*) &cliaddr,

&len);

buffer[n] = '\0';

printf("Client : %s\n", buffer);

sendto(sockfd, (const char \*)hello, strlen(hello),

MSG\_CONFIRM, (const struct sockaddr \*) &cliaddr,

len);

printf("Hello message sent.\n");

return 0;

}

**UDP Client C Program:**

// Client side implementation of UDP client-server model

#include <stdio.h>

#include <stdlib.h>

#include <unistd.h>

#include <string.h>

#include <sys/types.h>

#include <sys/socket.h>

#include <arpa/inet.h>

#include <netinet/in.h>

#define PORT 8080

#define MAXLINE 1024

// Driver code

int main() {

int sockfd;

char buffer[MAXLINE];

char \*hello = "Hello from client";

struct sockaddr\_in servaddr;

// Creating socket file descriptor

if ( (sockfd = socket(AF\_INET, SOCK\_DGRAM, 0)) < 0 ) {

perror("socket creation failed");

exit(EXIT\_FAILURE);

}

memset(&servaddr, 0, sizeof(servaddr));

// Filling server information

servaddr.sin\_family = AF\_INET;

servaddr.sin\_port = htons(PORT);

servaddr.sin\_addr.s\_addr = INADDR\_ANY;

int n, len;

sendto(sockfd, (const char \*)hello, strlen(hello),

MSG\_CONFIRM, (const struct sockaddr \*) &servaddr,

sizeof(servaddr));

printf("Hello message sent.\n");

n = recvfrom(sockfd, (char \*)buffer, MAXLINE,

MSG\_WAITALL, (struct sockaddr \*) &servaddr,

&len);

buffer[n] = '\0';

printf("Server : %s\n", buffer);

close(sockfd);

return 0;

}

**OUTPUT :**

**Server Side :**

$ ./server

Client : Hello from client

Hello message sent.

**Client Side :**

$ ./client

Hello message sent.

Server : Hello from server