

EXP:12

End -End Communication at Transport Layer

Aim

To implement an echo client-server using TCP/UDP sockets and to implement a chat program using socket programming.

Algorithm / Procedure

1. **Implement** a basic **TCP Echo Server** that listens for connections, receives a message, and sends the same message back to the client.
2. **Implement** a basic **TCP Echo Client** that connects to the server, sends a message, and prints the echoed response.
3. **Implement** a simple **Chat Program** using TCP sockets, allowing two separate programs (client and server) to send and receive messages interactively.
4. (*Optional*) Implement the same Echo Client-Server using **UDP** sockets to compare connection-oriented vs. connectionless communication.

Code:

tcp_client.py

```
import socket
```

```
s = socket.socket() s.connect(('localhost',  
12345))
```

```
while True:
```

```
    msg = input("Client: ")  
    if msg.lower() == 'exit':  
        break  
    s.send(msg.encode())  
    data = s.recv(1024).decode()  
    print("From Server:", data)  
s.close()
```

tcp_server.py

```
import socket
```

```
s = socket.socket()  
s.bind(('localhost', 12345))  
s.listen(1)  
print("Server ready, waiting for connection...")  
conn, addr = s.accept()  
print("Connected with", addr)
```

```
while True:  
    data = conn.recv(1024).decode() if  
        not data:  
            break  
    print("From Client:", data)  
    conn.send(data.encode())  
conn.close()
```

Client_server.py

```
import socket  
  
s = socket.socket()  
s.bind(('localhost', 12345))  
s.listen(1)  
print("Chat Server waiting for connection...") conn,  
addr = s.accept()  
print("Connected with", addr)
```

```
while True:  
    msg = conn.recv(1024).decode() if  
        msg.lower() == 'bye':  
            print("Client ended chat.") break  
    print("Client:", msg)  
    reply = input("Server: ")  
    conn.send(reply.encode())  
conn.close()
```

client.py

```
import socket  
  
s = socket.socket() s.connect(('localhost',  
12345))  
print("Connected to server. Type 'bye' to end.")
```

```
while True:  
    msg = input("Client: ")  
    s.send(msg.encode()) if  
        msg.lower() == 'bye':  
            break  
    reply = s.recv(1024).decode()  
    print("Server:", reply)  
s.close()
```

Output:

```
C:\Users\Afrah M\Desktop\cn>python tcp_server.py
Microsoft Windows [Version 10.0.26200.6584]
(c) Microsoft Corporation. All rights reserved.

Server ready, waiting for connection...
Connected with ('127.0.0.1', 40896)
From Client: hey! hello
From Client: how you doin'
```

```
C:\Users\Afrah M\Desktop\cn>python tcp_client.py
Microsoft Windows [Version 10.0.26200.6584]
(c) Microsoft Corporation. All rights reserved.

Client: hey! hello
From Server: hey!
Client: how you doin'
From Server: how you doin'
Client: 
```

```
C:\Users\Afrah M\Desktop\cn>python chat_server.py
Microsoft Windows [Version 10.0.26200.6584]
(c) Microsoft Corporation. All rights reserved.

Chat Server waiting for connection...
Connected with ('127.0.0.1', 49941)
Client: hi! hello server!
Server: hey client! how may I help you?
Client: I need to connect to the ip 192.168.0.1
Server: okay, here we go!
Client: connected! thanks!
Server: 
```

```
C:\Users\Afrah M\Desktop\cn>python chat_client.py
Microsoft Windows [Version 10.0.26200.6584]
(c) Microsoft Corporation. All rights reserved.

Connected to server. Type 'bye' to end.
Client: hi! hello server!
Server: hey client! how may I help you?
Client: I need to connect to the ip 192.168.0.1
Server: okay, here we go!
Client: connected! thanks!
Client: 
```

Result

An echo client-server and a chat program were successfully implemented using socket programming. The experiment demonstrated end-to-end communication at the Transport Layer using TCP sockets.