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Practice Programs:
1.A) Write a program where client can send a message to the server and the server can receive the message and send, or echo, it back to the client.

Echo Client :

```
import socket
HOST = '127.0.0.1' # The server's hostname or IP address
PORT = 2053
# The port used by the server
with socket.socket(socket.AF_INET, socket.SOCK_STREAM) as s:
        s.connect((HOST, PORT))
        s.sendall(b'Hello, world')
        data = s.recv(1024)
        print('Received Connection')
        print('Server:', data.decode())
```

Echo Server :

```
import socket
HOST = '127.0.0.1' # Standard loopback interface address (localhost)
PORT = 2053
# Port to listen on (non-privileged ports are > 1023)
with socket.socket(socket.AF_INET, socket.SOCK_STREAM) as s:
        s.bind((HOST, PORT))
        s.listen()
        conn, addr = s.accept()

        with conn:
                print('Connected by', addr)
                while True:
                        data = conn.recv(1024)
                        if data:
                                print("Client: ",data.decode())
                                data = input("Enter message to client:");
                                if not data:
                                        break;
                                # sending message as bytes to client.
                                conn.sendall(bytearray(data, 'utf-8'));
        conn.close()
```

```
180905093@project-lab:~/Desktop/DS_LAB/WEEK_4$ python3 pracserver-1.py
Connected by ('127.0.0.1', 59434)
Client:  Hello, world
Enter message to client:hello , how are you?
```

```
180905093@project-lab:~/Desktop/DS_LAB/WEEK_4$ python3 praclient-1.py
Received Connection
Server: hello , how are you?
```

2A) Write a program to create TCP time server in Python

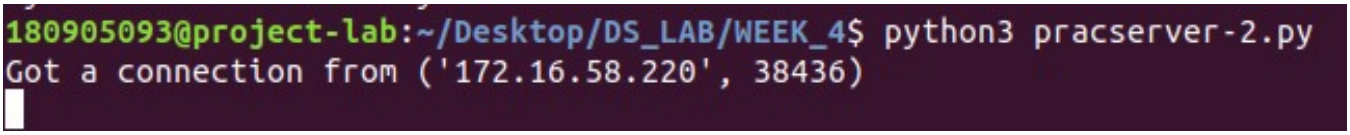
Time Client :

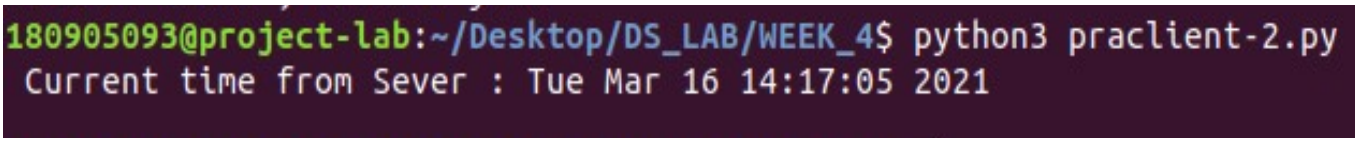
```
#client.py
import socket
# create a socket object
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
# get local machine name
host = socket.gethostname()
port = 9991
# connection to hostname on the port.
s.connect((host, port))
# Receive no more than 1024 bytes
tm = s.recv(1024)
print(' Current time from Sever :', tm.decode())
s.close()
```

Time Server :

```
# server.py
import socket
import time
# create a socket object
serversocket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
# get local machine name
host = socket.gethostname()
port = 9991
# bind to the port
serversocket.bind((host, port))
# queue up to 5 requests
serversocket.listen(5)
while True:
        # establish a connection
        clientsocket,addr = serversocket.accept()
```

```
    print("Got a connection from %s" % str(addr))
    currentTime = time.ctime(time.time()) + "\r\n"
    clientsocket.send(currentTime.encode('ascii'))
    clientsocket.close()
```





3A) Write a TCP chat server in python using socket programming.

Client Chat:

```
import socket
HOST = '172.16.58.193' # Standard loopback interface address (localhost)
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket()
name = input(str("\nEnter your name: "))
print("\nTrying to connect to ", HOST, "(", PORT, ")\n")
s.connect((HOST, PORT))
print("Connected...\n")
s.send(name.encode())
s_name = s.recv(1024)
s_name = s_name.decode()
print(s_name, "has joined the chat room\nEnter [e] to exit chat room\n")
while True:
    message = s.recv(1024)
    message = message.decode()
    print(s_name, ":", message)
    message = input(str("Me : "))
    if message == "[e]":
        message = "Left chat room!"
        s.send(message.encode())
        print("\n")
        break
    s.send(message.encode())
```

Server Chat:

```
# server.py
import socket
HOST = '127.0.0.1' # Standard loopback interface address (localhost)
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket()
s.bind((HOST, PORT))
s.listen()
print("\nWaiting for incoming connections...\n")
conn, addr = s.accept()
print("Received connection from ", addr[0], "(", addr[1], ")\n")
s_name = conn.recv(1024)
s_name = s_name.decode()
print(s_name, "has connected to the chat room\nEnter [e] to exit chat room\n")
name = input(str("Enter your name: "))
conn.send(name.encode())
while True:
        message = input(str("Me : "))
        if message == "[e]":
                message = "Left chat room!"
                conn.send(message.encode())
                print("\n")
                break
        conn.send(message.encode())
        message = conn.recv(1024)
        message = message.decode()
        print(s_name, ":", message)
```

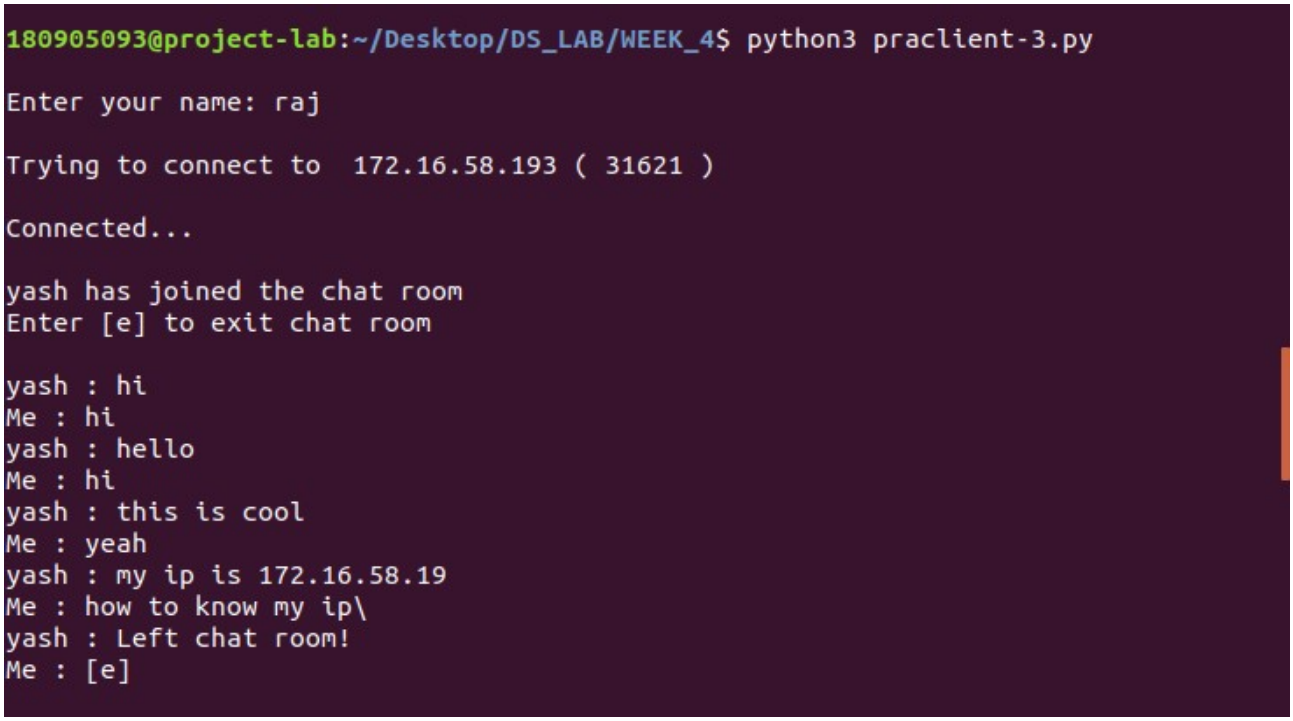
```
180905093@project-lab:~/Desktop/DS_LAB/WEEK_4$ python3 pracserver-3.py

Waiting for incoming connections...

Received connection from  127.0.0.1 ( 45258 )

raj has connected to the chat room
Enter [e] to exit chat room

Enter your name: reddy
Me : hi
raj : hello
Me : how are you
raj : Left chat room!
Me : [e]
```



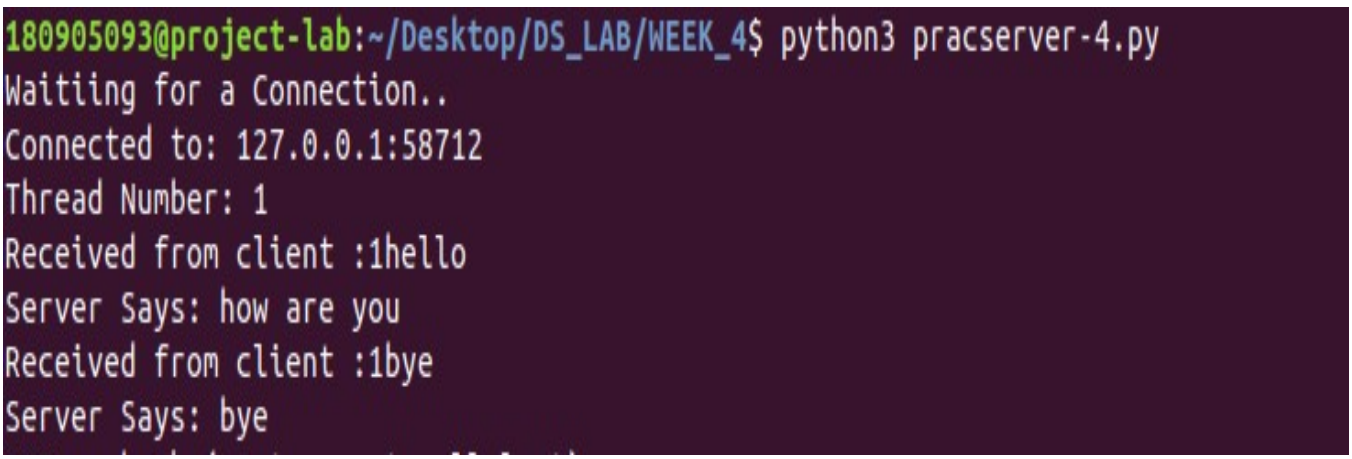
4A. Forking/ Threading (Concurrent Server)

client :

```
import socket
ClientSocket = socket.socket()
host = '127.0.0.1'
port = 11596
print('Waiting for connection')
try:
	ClientSocket.connect((host, port))
except socket.error as e:
	print(str(e))
Response = ClientSocket.recv(1024)
while True:
	Input = input('Client Say Something: ')
	ClientSocket.send(str.encode(Input))
	Response = ClientSocket.recv(1024)
	print('From Server : ' + Response.decode())
ClientSocket.close()
```

server:

```
import socket
import os
from _thread import *
ServerSocket = socket.socket()
host = '127.0.0.1'
port = 11596
ThreadCount = 0
try:
        ServerSocket.bind((host, port))
except socket.error as e:
        print(str(e))
print('Waitiing for a Connection..')
ServerSocket.listen(5)
def threaded_client(connection):
        connection.send(str.encode('Welcome to the Server'))
        while True:
                data = connection.recv(2048)
                print('Received from client :' + str(ThreadCount) +data.decode())
                Inputs = input('Server Says: ')
                if not data:
                        break
                connection.sendall(Inputs.encode())
        connection.close()
while True:
        Client, address = ServerSocket.accept()
        print('Connected to: ' + address[0] + ':' + str(address[1]))
        start_new_thread(threaded_client, (Client, ))
        ThreadCount += 1
        print('Thread Number: ' + str(ThreadCount))
ServerSocket.close()
```



```
180905093@project-lab:~/Desktop/DS_LAB/WEEK_4$ python3 praclient-4.py
Waiting for connection
Client Say Something: hello
From Server : how are you
Client Say Something: bye
From Server : bye
```

Lab Exercise:

1. Write a UDP time server to display the current time and day.

#client.py

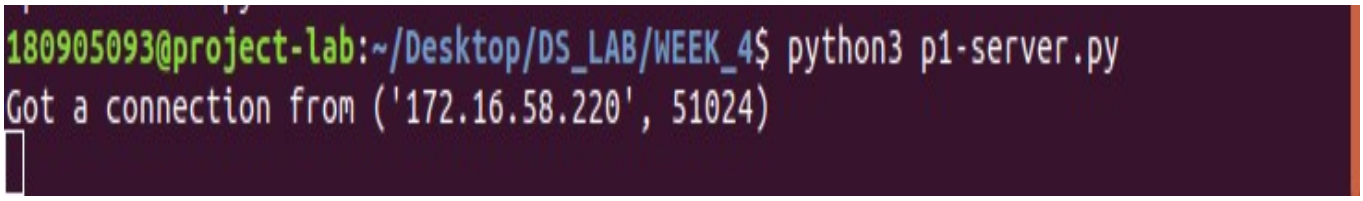
```
import socket
# create a socket object
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
# get local machine name
udp_host = socket.gethostname()
udp_port = 9991
#Send some message so the server gets client address
msg = 'hi'
s.sendto(msg.encode(),(udp_host,udp_port))
# Receive no more than 1024 bytes
tm = s.recv(1024)
print(' Current time from Sever :', tm.decode())
s.close()
```

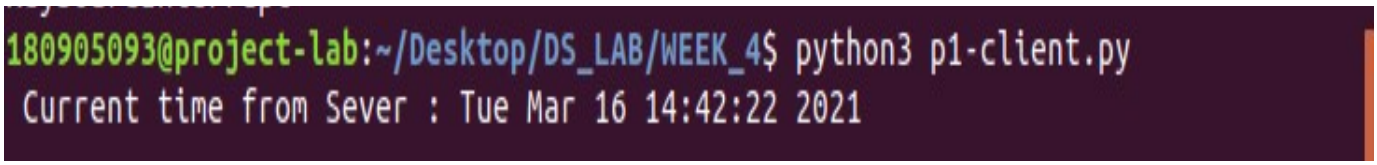
 # server.py

```
import socket
import time
# create a socket object
serversocket = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
# get local machine name
host = socket.gethostname()
port = 9991
# bind to the port
serversocket.bind((host, port))

while True:
        # reveive a udp message
        data,addr = serversocket.recvfrom(1024)
        print("Got a connection from %s" % str(addr))
        currentTime = time.ctime(time.time()) + "\r\n"
```

```
        serversocket.sendto(currentTime.encode('ascii') , addr)
```





2. Write a UDP simple chat program for message send and receive.

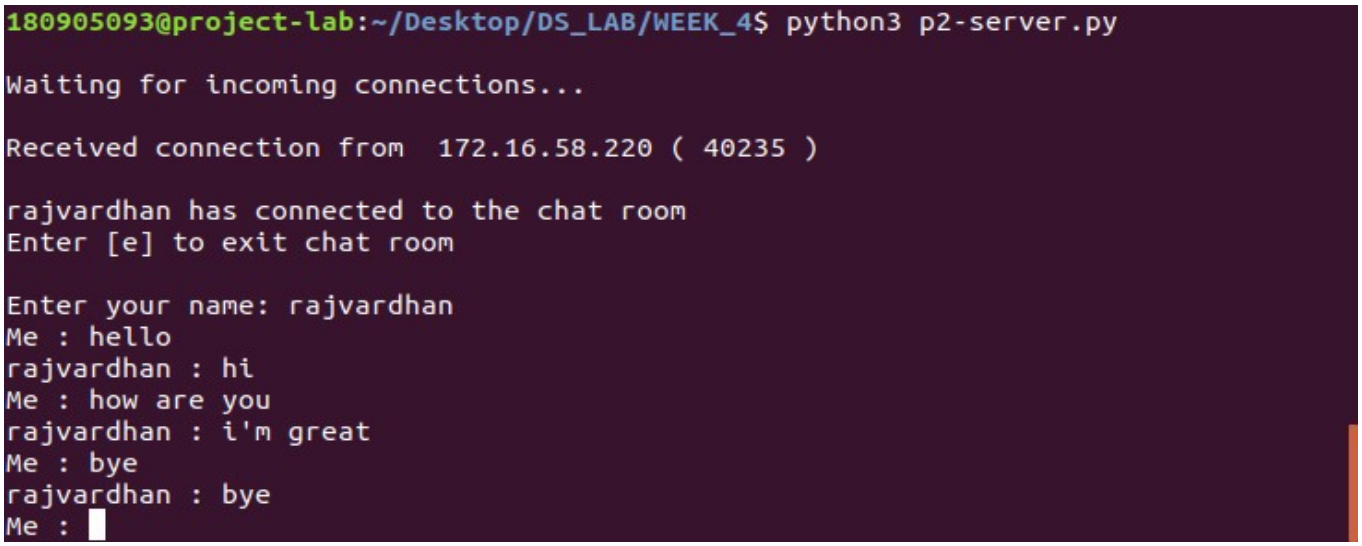
#client code :

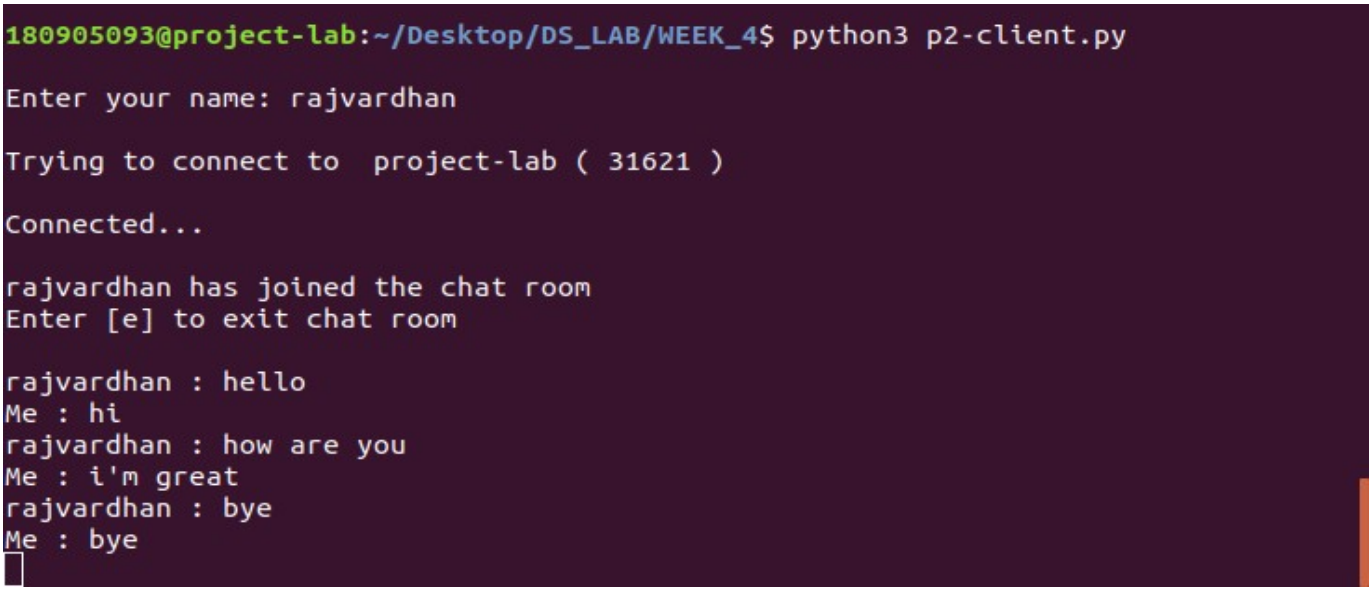
```
import socket
HOST = socket.gethostname()
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
name = input(str("\nEnter your name: "))
print("\nTrying to connect to ", HOST, "(", PORT, ")\n")
s.sendto(b"" , (HOST , PORT))
print("Connected...\n")
s.sendto(name.encode('ascii') ,  (HOST , PORT))
s_name = s.recv(1024)
s_name = s_name.decode()
print(s_name, "has joined the chat room\nEnter [e] to exit chat room\n")
while True:
        message, addr = s.recvfrom(1024)
        message = message.decode()
        print(s_name, ":", message)
        message = input(str("Me : "))
        if message == "[e]":
                message = "Left chat room!"
                s.sendto(message.encode() , (HOST , PORT))
                print("\n")
                break
        s.sendto(message.encode() , (HOST , PORT))
```

#servercode :

```
import socket
HOST = socket.gethostname()
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
s.bind((HOST, PORT))

print("\nWaiting for incoming connections...\n")
data,addr = s.recvfrom(1024)
print("Received connection from ", addr[0], "(", addr[1], ")\n")
s_name, addr = s.recvfrom(1024)
s_name = s_name.decode()
print(s_name, "has connected to the chat room\nEnter [e] to exit chat room\n")
name = input(str("Enter your name: "))
s.sendto(name.encode('ascii') , addr)
while True:
        message = input(str("Me : "))
        if message == "[e]":
                message = "Left chat room!"
                s.sendto(message.encode() , addr)
                print("\n")
                break
        s.sendto(message.encode() , addr)
        message, addr = s.recvfrom(1024)
        message = message.decode()
        print(s_name, ":", message)
```





3. Write a TCP/UDP peer to peer chat system between two different machines.

#client-code:

```
import socket
HOST = '172.16.58.111'
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
name = input(str("\nEnter your name: "))
print("\nTrying to connect to ", HOST, "(", PORT, ")\n")
s.sendto(b"" , (HOST , PORT))
print("Connected...\n")
s.sendto(name.encode('ascii') ,  (HOST , PORT))
s_name = s.recv(1024)
s_name = s_name.decode()
print(s_name, "has joined the chat room\nEnter [e] to exit chat room\n")
while True:
        message, addr = s.recvfrom(1024)
        message = message.decode()
        print(s_name, ":", message)
        message = input(str("Me : "))
        if message == "[e]":
                message = "Left chat room!"
                s.sendto(message.encode() , (HOST , PORT))
                print("\n")
                break
        s.sendto(message.encode() , (HOST , PORT))
```

#server-code:

```
import socket
HOST = socket.gethostname()
PORT = 31621 # Port to listen on (non-privileged ports are > 1023)
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
s.bind((HOST, PORT))

print("\nWaiting for incoming connections...\n")
data,addr = s.recvfrom(1024)
print("Received connection from ", addr[0], "(", addr[1], ")\n")
s_name, addr = s.recvfrom(1024)
s_name = s_name.decode()
print(s_name, "has connected to the chat room\nEnter [e] to exit chat room\n")
name = input(str("Enter your name: "))
s.sendto(name.encode('ascii') , addr)
while True:
        message = input(str("Me : "))
        if message == "[e]":
                message = "Left chat room!"
                s.sendto(message.encode() , addr)
                print("\n")
                break
        s.sendto(message.encode() , addr)
        message, addr = s.recvfrom(1024)
        message = message.decode()
        print(s_name, ":", message)
```