

Examples (Lab Exercises follow them)

EX1. Echo server

Client:

```
import socket
```

```
HOST = '127.0.0.1'
```

```
PORT = 2053
```

```
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(f"Received {data.decode()}")
```

Server:

```
import socket
```

```
HOST = '127.0.0.1'
```

```
PORT = 2053
```

```
with socket.socket(socket.AF_INET, socket.SOCK_STREAM) as s:
```

```
    s.bind((HOST, PORT))
```

```
    s.listen()
```

```
    conn, addr = s.accept()
```

```
    with conn:
```

```
        print(f"Connected by {addr}")
```

```
        while True:
```

```
            data = conn.recv(1024)
```

```
            if data:
```

```
                print(f"Client sent {data.decode()}")
```

```
            resp = input("Enter a response to the client: ")
```

```
            if not data:
```

```
                break
```

```
            conn.sendall(resp.encode())
```

```
    conn.close()
```

```
dennis@project-lab:~/ds-lab/examples/echo$ python3 server.py
Connected by ('127.0.0.1', 36392)
Client sent Hello World
Enter a response to the client: hi
```

```
dennis@project-lab:~/ds-lab/examples/echo$ python3 client.py
Received hi
```

EX2. TCP TIME

client

```
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()
```

Server:

```
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()
```

```
dennis@project-lab:~/ds-lab/examples/tcpTime$ python3 client.py
Current time from Sever : Tue Mar 16 13:48:59 2021

dennis@project-lab:~/ds-lab/examples/tcpTime$ python3 client.py
Current time from Sever : Tue Mar 16 13:49:09 2021

dennis@project-lab:~/ds-lab/examples/tcpTime$ python3 client.py
Current time from Sever : Tue Mar 16 13:49:16 2021

dennis@project-lab:~/ds-lab/examples/tcpTime$ █
```

```
dennis@project-lab:~/ds-lab/examples/tcpTime$ python3 server.py
Got a connection from ('172.16.58.150', 45120)
Got a connection from ('172.16.58.150', 45122)
Got a connection from ('172.16.58.150', 45124)
█
```

EX3.TCP CHAT

client:

```
import socket

HOST = '127.0.0.1'
PORT = 31621
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:

```
import socket

HOST = '127.0.0.1'
PORT = 31621

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")

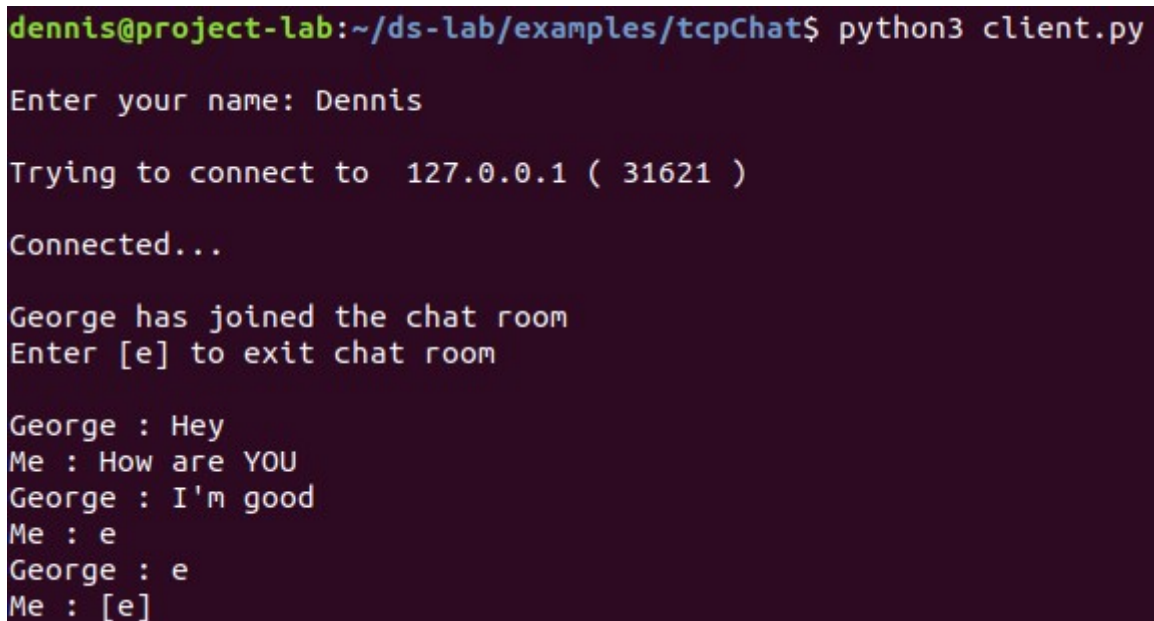
name = input(str("Enter your name: "))
conn.send(name.encode())

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)

```



```

dennis@project-lab:~/ds-lab/examples/tcpChat$ python3 client.py

Enter your name: Dennis

Trying to connect to 127.0.0.1 ( 31621 )

Connected...

George has joined the chat room
Enter [e] to exit chat room

George : Hey
Me : How are YOU
George : I'm good
Me : e
George : e
Me : [e]

```

```
dennis@project-lab:~/ds-lab/examples/tcpChat$ python3 server.py

Waiting for incoming connections...

Received connection from 127.0.0.1 ( 34558 )

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

Enter your name: George
Me : Hey
Dennis : How are YOU
Me : I'm good
Dennis : e
Me : e
Dennis : Left chat room!
Me : [e]
```

EX4. 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)
```

```
print('From Server : ' + Response.decode())
```

```
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
```

```

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)
print('From Server : ' + Response.decode())

while True:
    Input = input('Client Say Something: ')
    ClientSocket.send(str.encode(Input))
    Response = ClientSocket.recv(1024)
    print('From Server : ' + Response.decode())

ClientSocket.close()

```

```

dennis@project-lab:~/ds-lab/examples/concurrentServer$
dennis@project-lab:~/ds-lab/examples/concurrentServer$ python3 client.py
Waiting for connection
From Server : Welcome to the Server
Client Say Something: Dennis
From Server : Johnson
Client Say Something: Bye
From Server : Bye
Client Say Something: █

```

```

dennis@project-lab:~/ds-lab/examples/concurrentServer$ python3 server.py
Waiting for a Connection..
Connected to: 127.0.0.1:59262
Thread Number: 1
Received from client :1Dennis
Server Says: Johnson
Received from client :1Bye
Server Says: Bye
█

```

LAB EXERCISES:

1.UDP Time

client:

```
import socket

# create a socket object
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)

# get local machine name
host = socket.gethostname()
port = 9991

# Receive no more than 1024 bytes
msg = "Send me the time"
s.sendto(msg.encode(), (host, port))
tm, addr = s.recvfrom(1024)
print('Current time from Sever :', tm.decode())
s.close()
```

server:

```
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:
    data, addr = serversocket.recvfrom(1024)

    if not data:
        continue

    print(data.decode(), addr)
    currentTime = time.ctime(time.time()) + "\r\n"
    serversocket.sendto(currentTime.encode('ascii'), addr)
serversocket.close()
```



```
dennis@project-lab:~/ds-lab/lab4/udpTime$ python3 client.py
Current time from Sever : Tue Mar 16 14:46:21 2021

dennis@project-lab:~/ds-lab/lab4/udpTime$ python3 client.py
Current time from Sever : Tue Mar 16 14:46:46 2021
```

```
dennis@project-lab:~/ds-lab/lab4/udpTime$ python3 server.py
Send me the time ('172.16.58.150', 43606)
Send me the time ('172.16.58.150', 35870)
```

2.UDP Chat

client:

```
import socket
```

```
HOST = '127.0.0.1'
```

```
PORT = 1621
```

```
s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
```

```
name = input(str("\nEnter your name: "))
```

```
print("\nSending to ", HOST, "(", PORT, ")\n")
```

```
s.sendto(name.encode(), (HOST, PORT))
```

```
s_name, addr = s.recvfrom(1024)
```

```
print(s_name, "has joined the chat room\nEnter [e] to exit chat room\n")
```

```
while True:
```

```
    message, addr = s.recvfrom(1024)
```

```
    print(s_name, ":", message)
```

```
    message = input(str("Me : "))
```

```
    if message == "[e]":
```

```
        message = "Left chat room!"
```

```
        s.sendto(message.encode(), addr)
```

```
        print("\n")
```

```
        break
```

```
s.sendto(message.encode(), addr)
```

server:

```
import socket

HOST = '127.0.0.1'
PORT = 1621

s = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)
s.bind((HOST, PORT))

s_name, addr = s.recvfrom(1024)

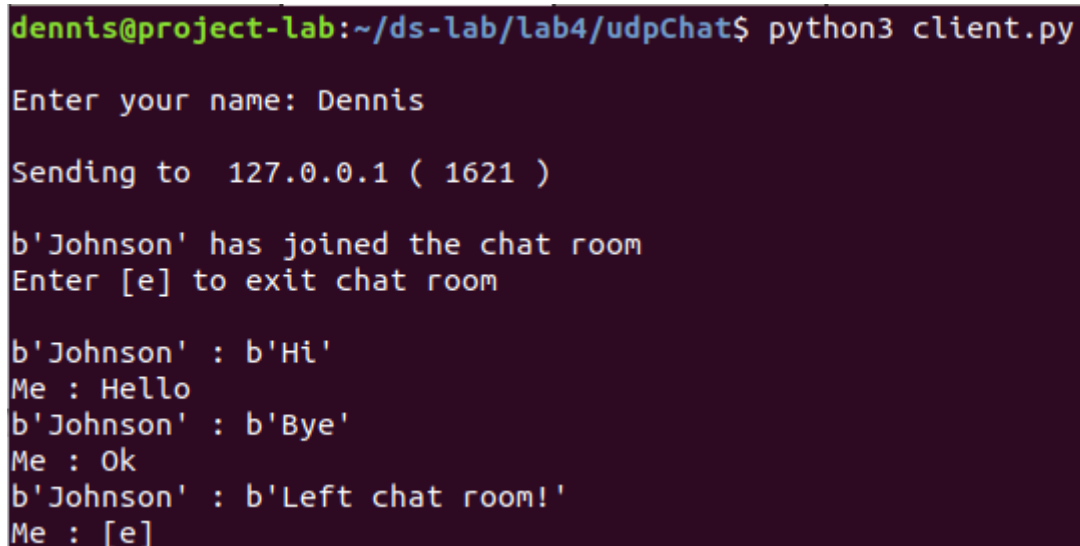
s_name = s_name.decode()
print(s_name, "has connected to the chat room\nEnter [e] to exit chat room\n")

name = input(str("Enter your name: "))
s.sendto(name.encode(), 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)
```



A terminal window with a dark purple background. The prompt is 'dennis@project-lab:~/ds-lab/lab4/udpChat\$'. The user runs 'python3 client.py'. The program prompts 'Enter your name: Dennis'. It then shows 'Sending to 127.0.0.1 (1621)'. A message 'b'Johnson' has joined the chat room' is received. The user enters '[e]' to exit. The program then shows a series of messages: 'b'Johnson' : b'Hi'', 'Me : Hello', 'b'Johnson' : b'Bye'', 'Me : Ok', 'b'Johnson' : b'Left chat room!', and finally 'Me : [e]'.

```
dennis@project-lab:~/ds-lab/lab4/udpChat$ python3 client.py

Enter your name: Dennis

Sending to 127.0.0.1 ( 1621 )

b'Johnson' has joined the chat room
Enter [e] to exit chat room

b'Johnson' : b'Hi'
Me : Hello
b'Johnson' : b'Bye'
Me : Ok
b'Johnson' : b'Left chat room!'
Me : [e]
```

```
dennis@project-lab:~/ds-lab/lab4/udpChat$ python3 server.py
Dennis has connected to the chat room
Enter [e] to exit chat room

Enter your name: Johnson
Me : Hi
Dennis : Hello
Me : Bye
Dennis : Ok
Me : [e]
```

3.P2P TCP Chat

client

```
import socket
```

```
HOST = '172.16.58.131'
```

```
PORT = 2053
```

```
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: (used server code implementation of the server computer instead)
import socket

```
HOST = '127.0.0.1'
```

```
PORT = 31621
```

```
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)
```

```
dennis@project-lab:~/ds-lab/examples/p2p$ python3 client.py

Enter your name: Dennis

Trying to connect to 172.16.58.131 ( 2053 )

Connected...

hi man has joined the chat room
Enter [e] to exit chat room
```

```
180905002@project-lab:~/Desktop/180905002_DSLab/Lab4$ python3 qst3_server.py
#####Server is listening#####
1 .Server received: Dennis
Type some text to send=>hi man
2 .Server sent: hi man
#####Server is listening#####
```