Lesson-17: Client-Server Programming In Python

- What do you mean by 'protocol' in networking (Ex: HTTP, TCP, IP, DHCP etc.)?
- What is an OSI Layer?
- What is the difference between TCP/IP and UDP?
- What is a 'Host' and 'Software Port' In Networking?
- What is address family IPV4 and IPV6?
- What is loopback address?

A TCP/IP SERVER:

Program tcp-server.py: **Output:**

```
import socket

#server name and port number

host = '127.0.0.1'
port = 2000

#creating a socket as a communication medium
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

#let the clients know who and where the server is bound to (connect to)
s.bind((host,port))

#how many clients is this server ready to respond
s.listen(1)

c, addr = s.accept()

print(type(c))
print(type(addr))
print("My Client Is From : " , str(addr))

#send message to client
c.send(b"Hello Buddy! Thanks For Connecting ! Bye !")

c.close()
```

Output:
```
<class 'socket.socket'>
<class 'tuple'>
My Client Is From :  ('127.0.0.1',
49305)
```

A TCP/IP CLIENT:

Program tcp-client.py   **Output:**

```
import socket

#need server name and port number to connect
host = '127.0.0.1'
port = 2000

#creating a socket as a communication medium
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

#connect it to the server who is waiting to accept
s.connect((host,port))

message = s.recv(1024)

while message:
    print("Message From Server :", message.decode( ))
    message = s.recv(1024)

s.close( )
```

Message From Server : Hello
Buddy! Thanks For Connecting !
Bye !

A UDP SERVER:

Program udp-server.py   **Output:**

```
import socket

localIP     = "127.0.0.1"
localPort   = 20001
bufferSize  = 1024

msgToClient = b"Hello UDP Client"


# Create a datagram socket
UDPServerSocket = socket.socket(family=socket.AF_INET, type=socket.SOCK_DGRAM)
# Bind to address and ip
UDPServerSocket.bind((localIP, localPort))
print("UDP server up and listening")
# Listen for incoming datagrams

while(True):

    message,address = UDPServerSocket.recvfrom(bufferSize)

    print(message.decode())
    print(address)
    # Sending a reply to client
    UDPServerSocket.sendto(msgToClient, address)
```
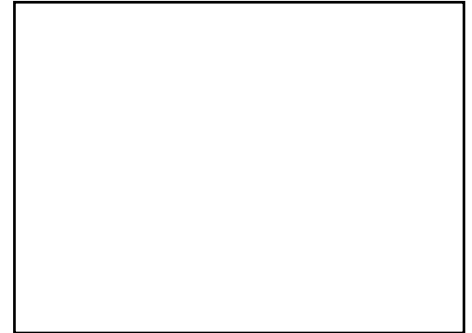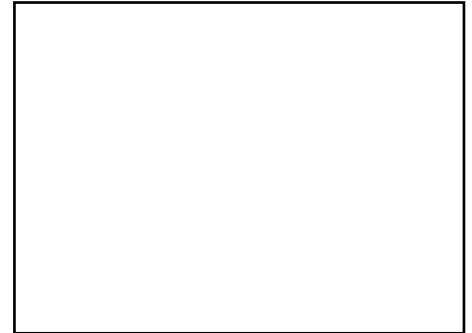
A UDP CLIENT:

Program udp-client.py   **Output:**

```
import socket

msgToServer         = b"Hello UDP Server"
serverAddressPort   = ("127.0.0.1", 20001)
bufferSize          = 1024
```

```
# Create a UDP socket at client side
UDPClientSocket = socket.socket(family=socket.AF_INET, type=socket.SOCK_DGRAM)

# Send to server using created UDP socket
UDPClientSocket.sendto(msgToServer, serverAddressPort)

serverMessage,serverAddress = UDPClientSocket.recvfrom(bufferSize)

print(serverMessage.decode())
print(serverAddress)
```

A FILE SERVER:

Program file-server.py   **Output:**

```
import socket

host = '127.0.0.1'
port = 2000

s = socket.socket()

t = (host,port)
s.bind(t)
s.listen(1)

c,addr = s.accept()

file_name = c.recv(1024)

fname = str(file_name.decode())
print("File Name received from client :", file_name)
try:
    f = open(file_name, "rb")
    data = f.read()
    c.send(data)
    print("File Data Sent To Client")
    f.close( )
except FileNotFoundError:
    c.send(b'File Does Not Exist')

c.close( )
```

> File Name received from client :
> b'network_file.txt'
> File Data Sent To Client

A FILE CLIENT:

Program file-client.py   **Output:**

```
import socket

host = '127.0.0.1'
port = 2000

s = socket.socket()

t = (host,port)
```

> Enter the file name:
> network_file.txt
>
> My name is Subhash. I am a
> programmer.

```
s.connect(t)

file_name = input("Enter the file name: ")
s.send(file_name.encode())

file_data = s.recv(1024)
print(file_data.decode())
s.close()
```

Two-Way Communication (Server Code):

Program server-code.py   **Output:**

```
import socket

host = '127.0.0.1'
port = 2000

s = socket.socket()
s.bind((host,port))
s.listen(1)
c,addr = s.accept()

while True:
    message_from_client = c.recv(1024)

    if not message_from_client:
        break

    print("Client Says :", str(message_from_client.decode()))

    message_to_client = input("What do you wish to say to client? ")

    c.send(message_to_client.encode())

c.close( )
```

```
Client Says : hi
What do you wish to say to
client? hello
Client Says : what are you doing?
What do you wish to say to
client? Waiting for your message
Client Says : ok bye
What do you wish to say to
client? bye
```

Two-Way Communication (Client Code):

Program client-code.py   **Output:**

```
import socket
host = '127.0.0.1'
port = 2000

s = socket.socket()
t = (host,port)
s.connect(t)
```

```
Enter your message to server: hi
Message From Server :  hello
Enter your message to server:
what are you doing?
Message From Server :  Waiting
for your message
Enter your message to server: ok
bye
Message From Server :  bye
```

```python
message_to_server = input("Enter your message to server: ")

while message_to_server != 'stop':
    s.send(message_to_server.encode())

    message_from_server = s.recv(1024)
    message_from_server = message_from_server.decode()
    print("Message From Server : ", message_from_server )

    message_to_server = input("Enter your message to server: ")

s.close()
```

Program findipaddress.py:

```python
#Knowing IP Address Of A Website

import socket

host = "www.google.com"

try:
    addr = socket.gethostbyname(host)
    print("IP Address = " + addr)
except socket.gaierror:
    print("The website does not exist")
```