Course Name:	**Electronics Application Using Python Programming**	**Semester:**	**V**
Date of Performance:	**03 / 09 / 2024**	**Batch No:**	**APPA-2**
Faculty Name:	**Prof. Deepa Jain**	**Roll No:**	**16014022096**
Faculty Sign & Date:		**Grade/Marks:**	**/25**

Experiment No: 6
Title: Study of Socket Programming

Aim and Objective of the Experiment:

To understand the socket concept in networking

COs to be achieved:

CO1: Understand socket based and web service approaches to inter process communications.

Theory

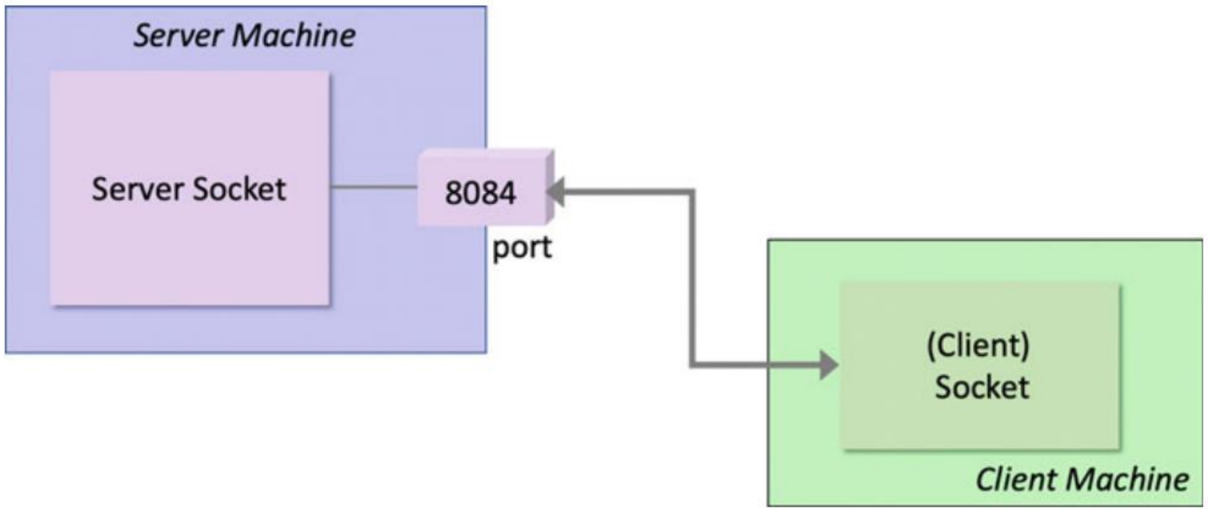
Introduction:

A Socket is an end point in a communication link between separate processes. In Python sockets are objects which provide a way of exchanging information between two processes in a straight forward and platform independent manner. In this chapter we will introduce the basic idea of socket communications and then presents a simple socket server and client application

Socket to Socket Communication:

When two operating system level processes wish to communicate, they can do so via sockets. Each process has a socket which is connected to the others socket. One process can then write information out to the socket, while the second process can read information in from the socket. Associated with each socket are two streams, one for input and one for output. Thus, to pass information from one process to another, you write that information out to the output stream of one socket object and read it from the input stream of another socket object (assuming the two sockets are connected).

To set up the connection, one process must be running a program that is waiting for a connection while the other must try to connect up to the first program. The first is referred to as a server socket while the second just as a socket. For the second process to connect to the first (the server socket) it must know what machine the first is running on and which port it is connected to.



For example, in the above diagram the server socket connects to port 8084. In turn the client socket connects to the machine on which the server is executing and to port number 8084 on that machine.

Tools required:

Any python editor tool

Code:

- Write a Python Client Server application using socket library

CODES:

SERVER 1

```
import socket
ob = socket.socket()
ob.bind(('localhost', 2301))
ob.listen(4)
print("server is ready to listen")
clientobject, add=ob.accept()
print("server is ready to accept the connection")
print("connected with this address: ", add)
ob.close()
```

CLIENT 1

```
import socket
ob = socket.socket()
ob.connect(('localhost', 2301))
print("client is ready to accept the connection")
ob.close()
```

SERVER 2

```python
import socket
ob = socket.socket()
ob.bind(('localhost', 2301))
ob.listen(4)
print("server is ready to listen")
clientobject, add=ob.accept()
print("server is ready to accept the connection")
print("connected with this address: ", add)
gotmsg = clientobject.recv(1024)
gotmsg.decode('utf-8')
print(gotmsg)
ob.close()
```

CLIENT 2

```python
import socket
ob = socket.socket()
ob.connect(('localhost', 2301))
print("client is ready to accept the connection")
msg = 'hello dazai san here'
ob.send(msg.encode('utf-8'))
ob.close()
```

SERVER 3

```
import socket
ob = socket.socket()
ob.bind(('localhost', 2301))
ob.listen(4)
print("server is ready to listen")
clientobject, add=ob.accept()
print("server is ready to accept the connection")
print("connected with this address: ", add)

conn = True
while conn:
    gotmsg = clientobject.recv(1024)
    gotmsg.decode('utf-8')
    print(gotmsg)
    if len(gotmsg) == 0:
        conn = False

ob.close()
```

CLIENT 3

```
import socket
ob = socket.socket()
ob.connect(('10.0.104.42', 2301))
print("client is ready to send data")

conn = True
while conn:
    msg = input("enter your message: ")
    if msg == 'no':
        conn = False
    else:
        ob.send(msg.encode('utf-8'))


ob.close()
```

SERVER 4

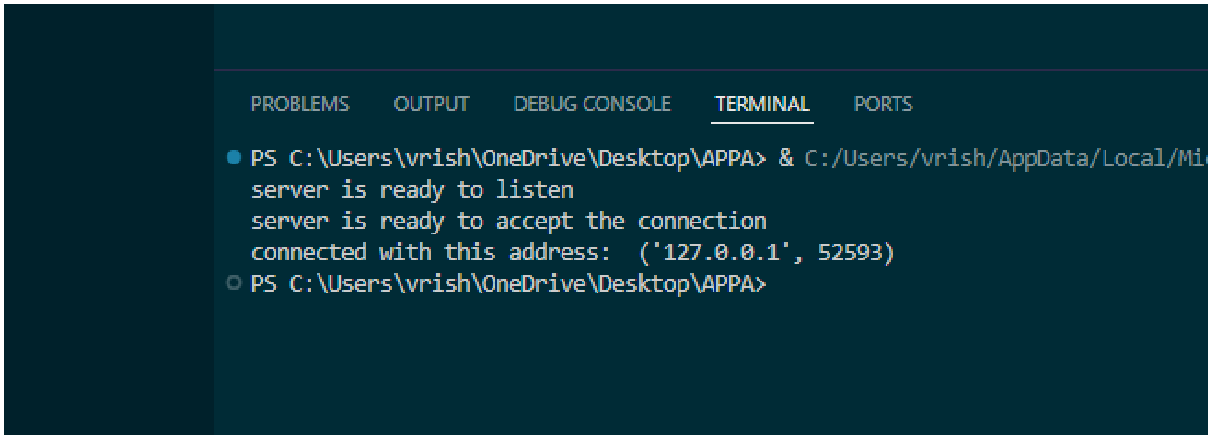
```
import socket


host = 'localhost'
port = 1234

server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server_socket.bind((host,port))
server_socket.listen(4)
print(f"server listening on {host} : {port} ")
client_socket, add = server_socket.accept()
print(f"connected by {add}")

while True:
    data = client_socket.recv(1024)
    if not data:
        break
    print(f"client :  {data.decode()}")

    msg = input("Server: ")
    client_socket.sendall(msg.encode())

server_socket.close()
client_socket.close()
```

CLIENT 4

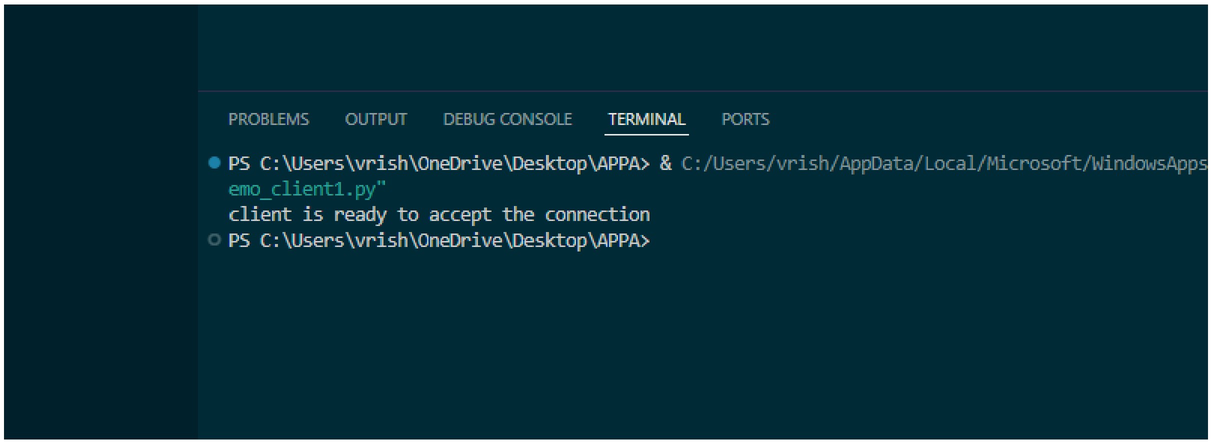
```
import socket


host = 'localhost'
port = 1234

client_socket = socket.socket(socket.AF_INET,socket.SOCK_STREAM)
client_socket.connect((host, port))

while True:

    message = input("Client: ")
    client_socket.sendall(message.encode())
    data = client_socket.recv(1024)
    print(f"Server: {data.decode()}")

    if message.lower() == 'exit' or data.decode().lower() == 'exit':
        break

client_socket.close()
```

Output:

OUTPUT 1

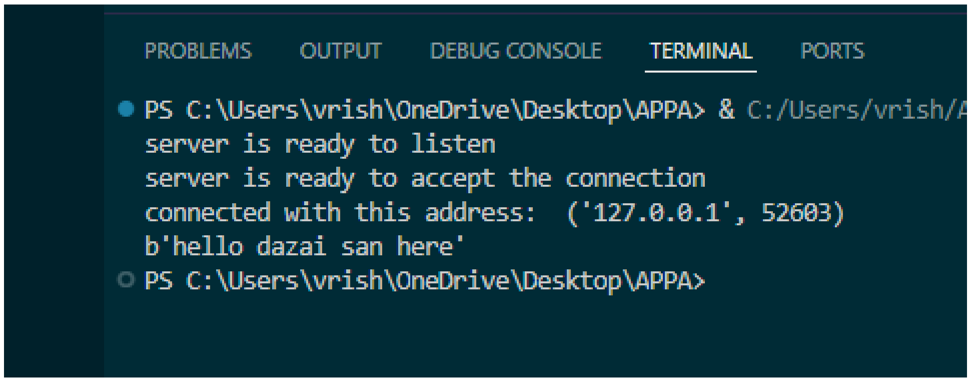


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Mi
server is ready to listen
server is ready to accept the connection
connected with this address:  ('127.0.0.1', 52593)
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

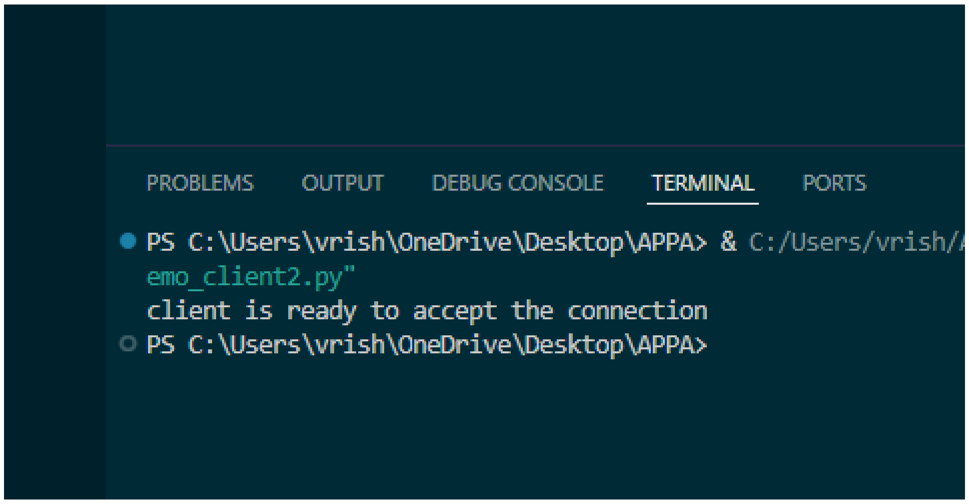


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Microsoft/WindowsApps
emo_client1.py"
client is ready to accept the connection
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

OUTPUT 2

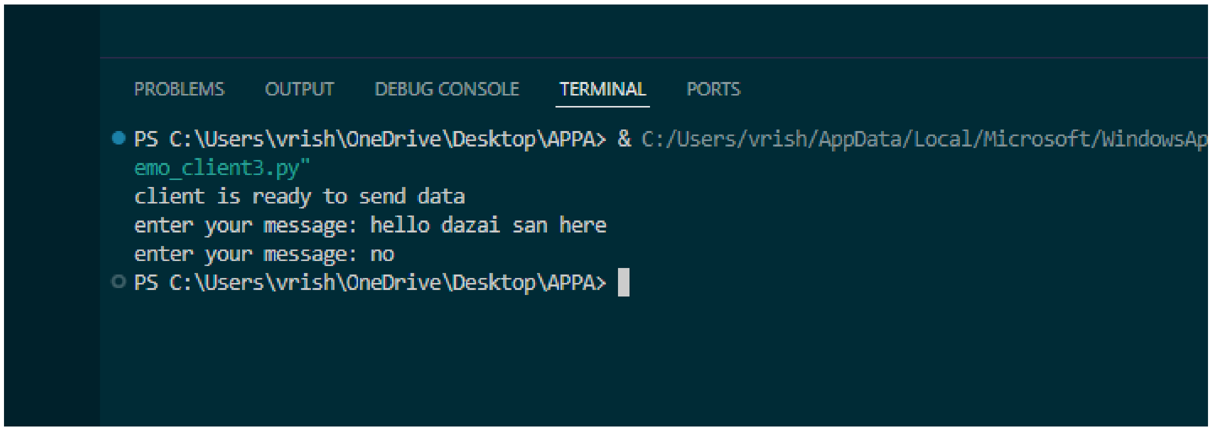


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/A
server is ready to listen
server is ready to accept the connection
connected with this address:  ('127.0.0.1', 52603)
b'hello dazai san here'
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

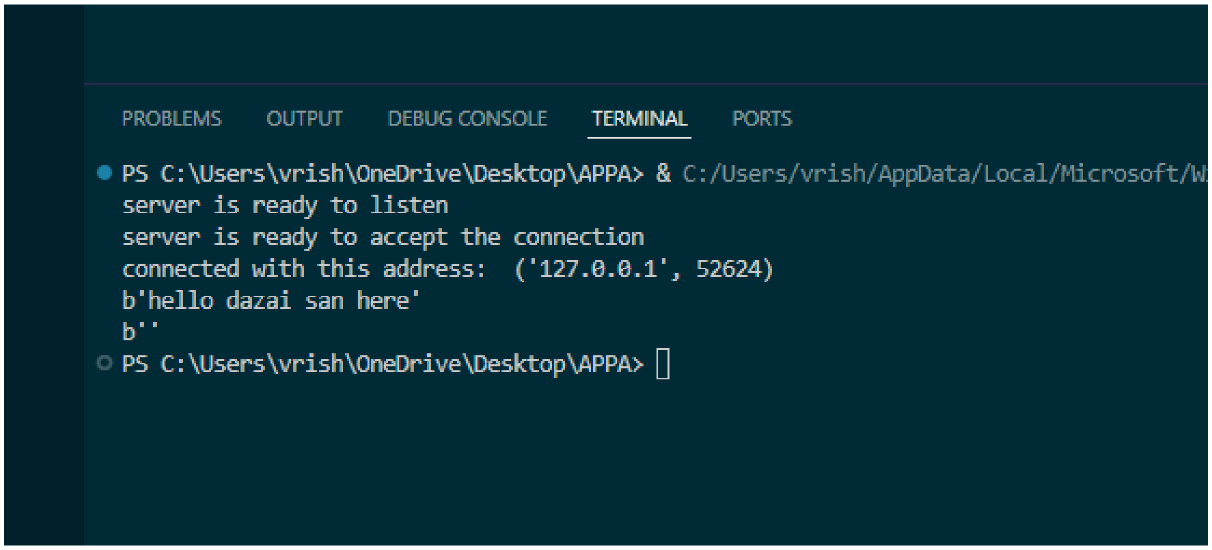


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/A
emo_client2.py"
client is ready to accept the connection
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

OUTPUT 3

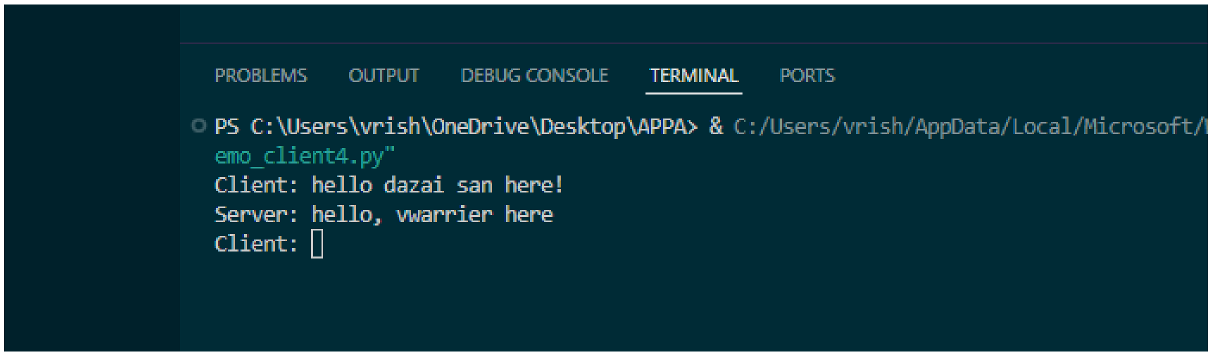


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Microsoft/WindowsAp
emo_client3.py"
client is ready to send data
enter your message: hello dazai san here
enter your message: no
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

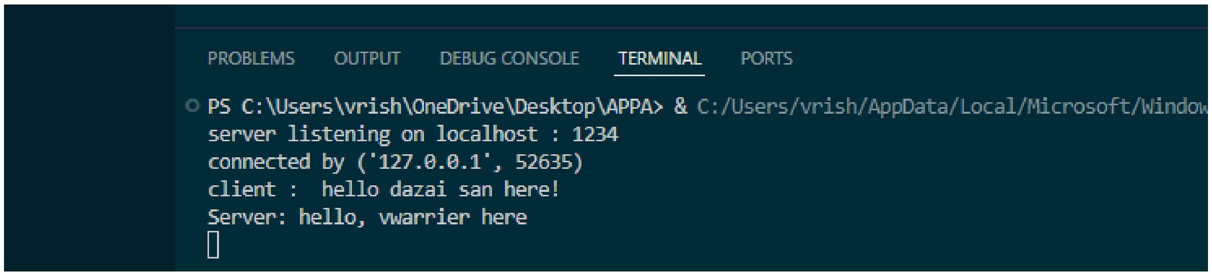


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Microsoft/W
server is ready to listen
server is ready to accept the connection
connected with this address:  ('127.0.0.1', 52624)
b'hello dazai san here'
b''
PS C:\Users\vrish\OneDrive\Desktop\APPA>
```

OUTPUT 4

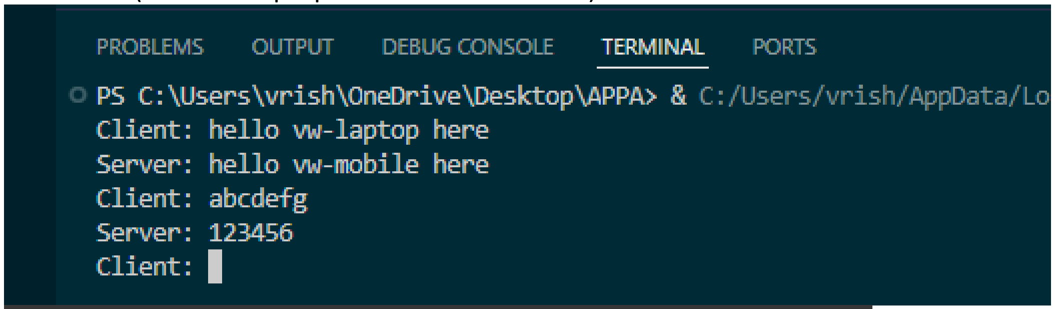


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Microsoft/
emo_client4.py"
Client: hello dazai san here!
Server: hello, vwarrier here
Client: 
```

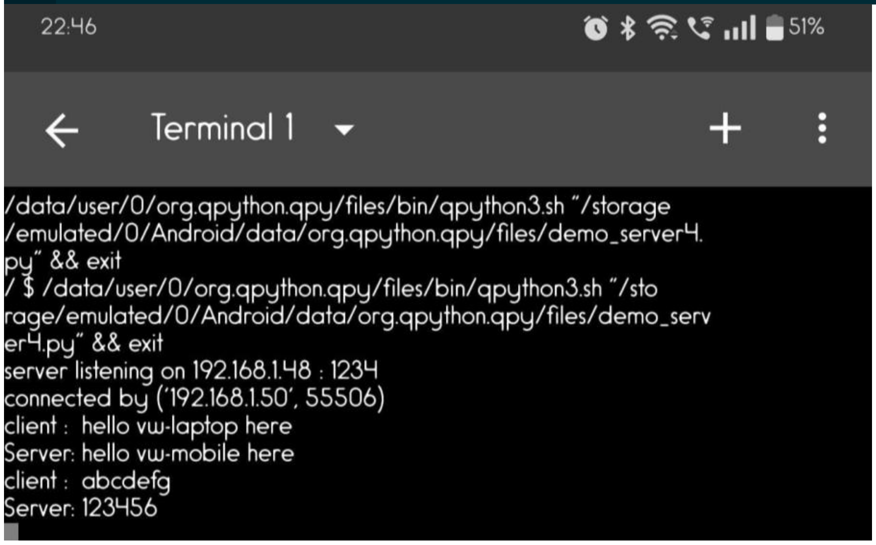


```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Local/Microsoft/Window
server listening on localhost : 1234
connected by ('127.0.0.1', 52635)
client :  hello dazai san here!
Server: hello, vwarrier here
```

OUTPUT 4 (client on laptop and server on mobile):



```
PS C:\Users\vrish\OneDrive\Desktop\APPA> & C:/Users/vrish/AppData/Lo
Client: hello vw-laptop here
Server: hello vw-mobile here
Client: abcdefg
Server: 123456
Client: 
```



```
/data/user/0/org.qpython.qpy/files/bin/qpython3.sh "/storage
/emulated/0/Android/data/org.qpython.qpy/files/demo_server4.
py" && exit
/ $ /data/user/0/org.qpython.qpy/files/bin/qpython3.sh "/sto
rage/emulated/0/Android/data/org.qpython.qpy/files/demo_serv
er4.py" && exit
server listening on 192.168.1.48 : 1234
connected by ('192.168.1.50', 55506)
client :  hello vw-laptop here
Server: hello vw-mobile here
client :  abcdefg
Server: 123456
```

Post Lab Subjective/Objective type Questions:

1. Explain different types of Sockets and its domain

ANS:

Stream Sockets (SOCK_STREAM): These provide reliable, two-way, connection-based communication (like a phone call). They use TCP (Transmission Control Protocol) to send data.

Datagram Sockets (SOCK_DGRAM): These provide connectionless communication (like sending a letter). They use UDP (User Datagram Protocol) and are faster but less reliable.

Socket Domains:

AF_INET: Used for IPv4 Internet protocols (e.g., sending data over the internet using an IP address).

AF_INET6: Used for IPv6 Internet protocols.

AF_UNIX: Used for communication between processes on the same machine (local inter-process communication).

2. Explain Socketserver module and how it is different from socket module

ANS:

Socket module: Provides basic functions for creating and managing network connections. You handle most details (like managing connections and threads) manually.

SocketServer module: Simplifies the creation of server applications. It provides classes like TCPServer and UDPServer that automatically manage connections and handle incoming requests. It's higher-level and more user-friendly than socket, making it easier to create multi-client servers.

Conclusion:

We have successfully explored the fundamentals of socket programming, learning how to establish connections between client and server applications. We successfully implemented and tested socket-based communication to facilitate inter-process communication. This enhanced our understanding of networking concepts in Python.

Signature of faculty in-charge with Date: