FINAL PROJECT
DATA COMMUNICATIONS NETWORKS

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15010473 - section 8

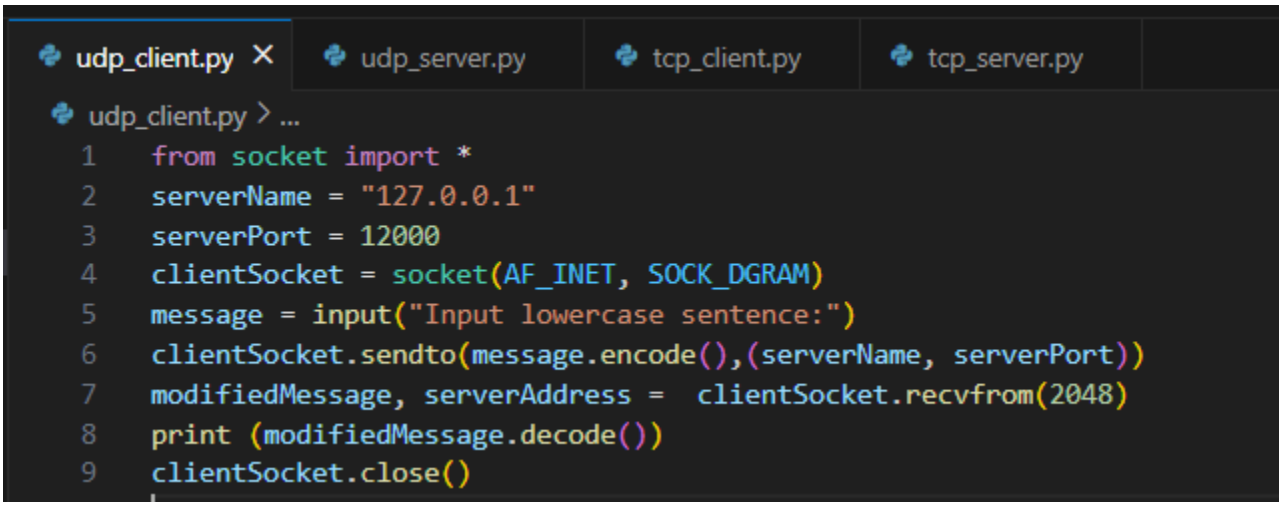
“Socket Programming” Assignment

Part 1:

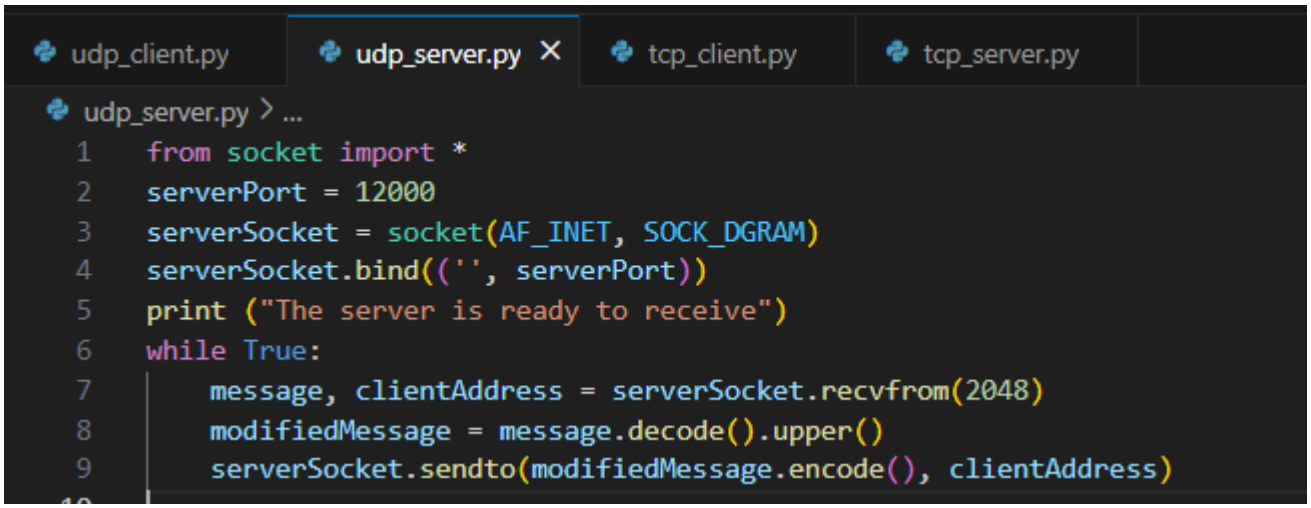
1. Install and compile the Python programs:

Code

1. UDP client:



2. UDP server:



3. TCP client:

udp_client.py | udp_server.py | tcp_client.py | tcp_server.py

tcp_client.py > ...

```python
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input('Input lowercase sentence:')
clientSocket.send(sentence.encode())
modifiedSentence = clientSocket.recv(1024)
print ('From Server:', modifiedSentence.decode())
clientSocket.close()
```

4. TCP server:

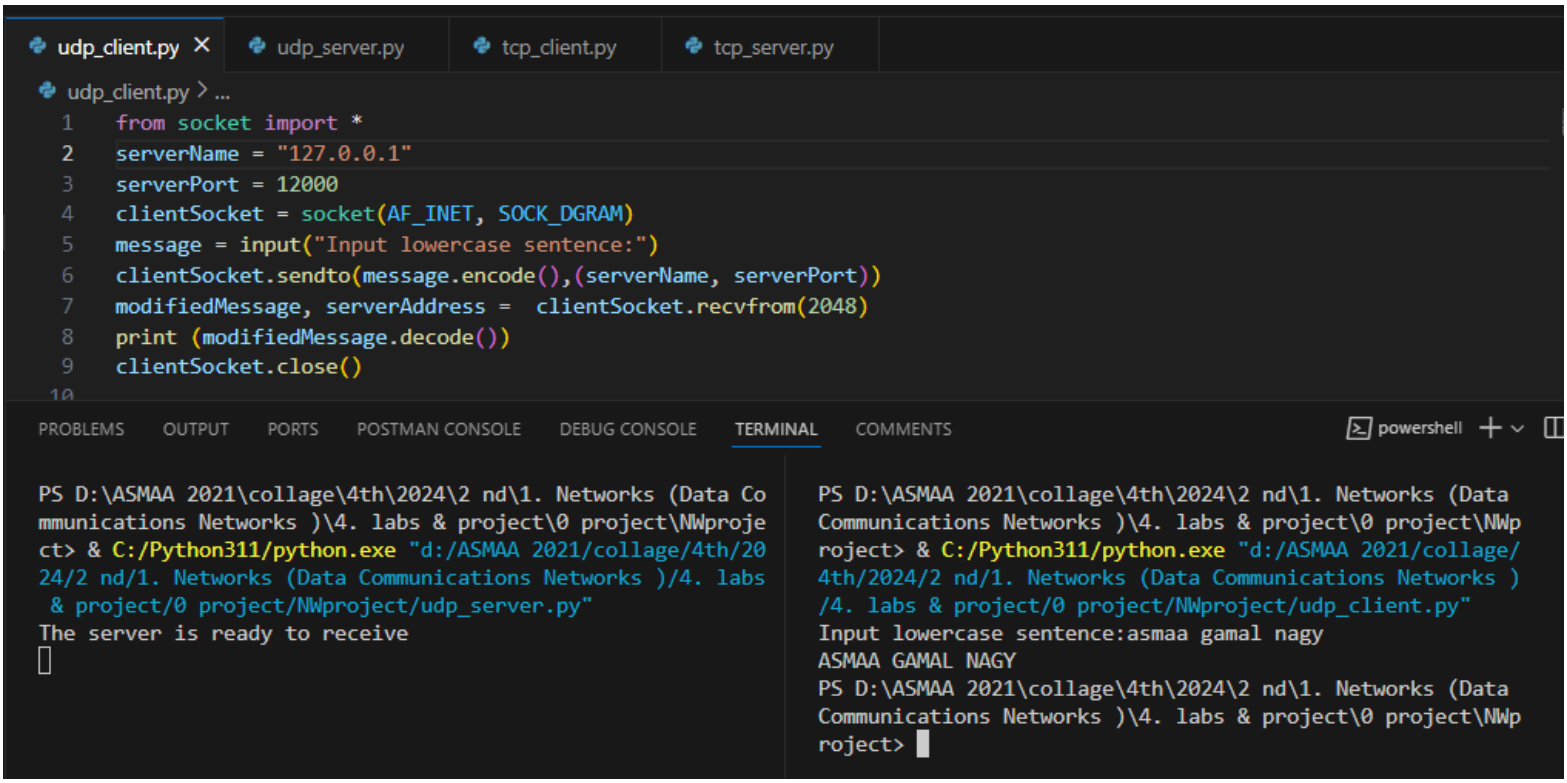
udp_client.py | udp_server.py | tcp_client.py | tcp_server.py

tcp_server.py > ...

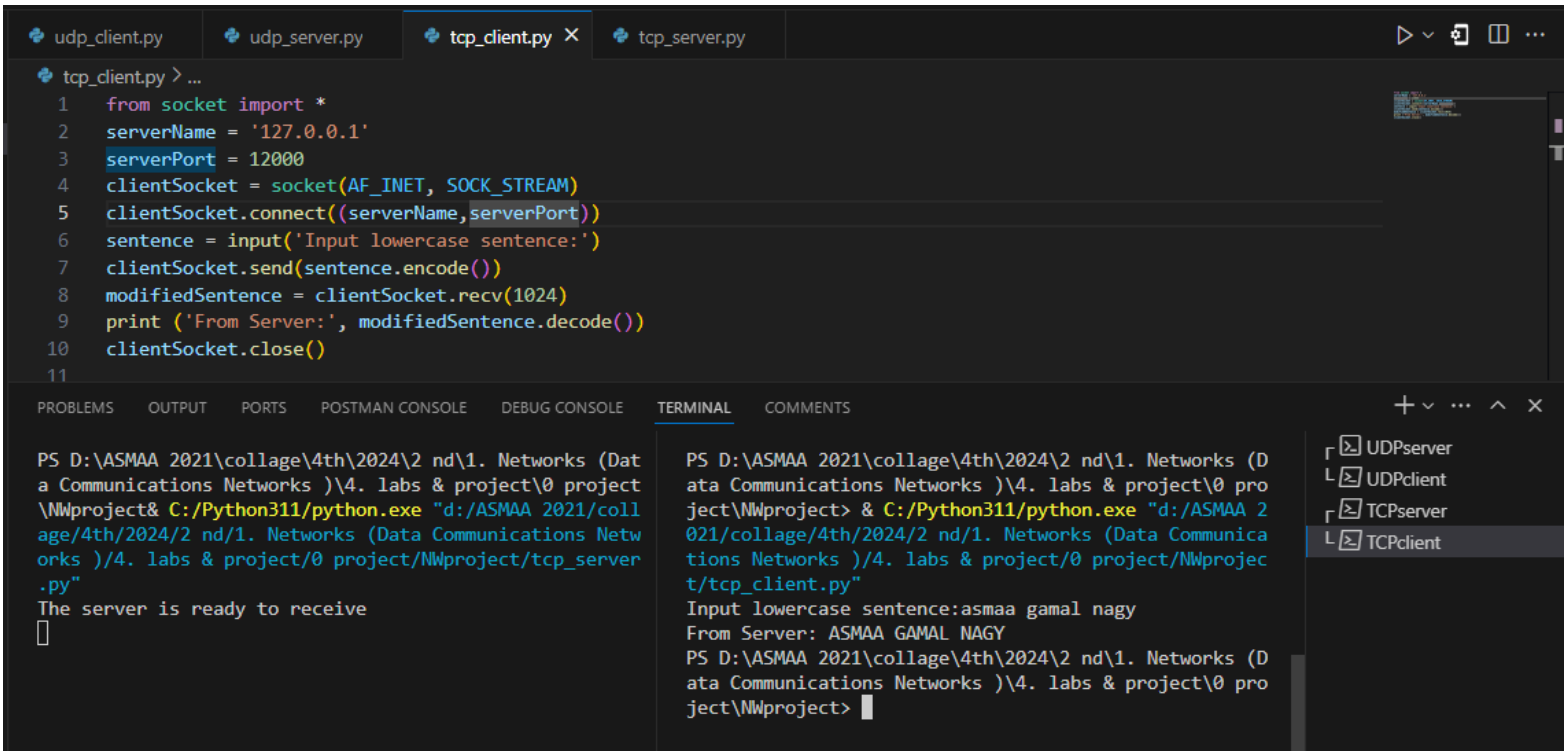
```python
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind(('',serverPort))
serverSocket.listen(1)
print('The server is ready to receive')
while True:
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()
    capitalizedSentence = sentence.upper()
    connectionSocket.send(capitalizedSentence.encode())
    connectionSocket.close()
```

Results after “compile and run”

1. UDP:



2. TCP:



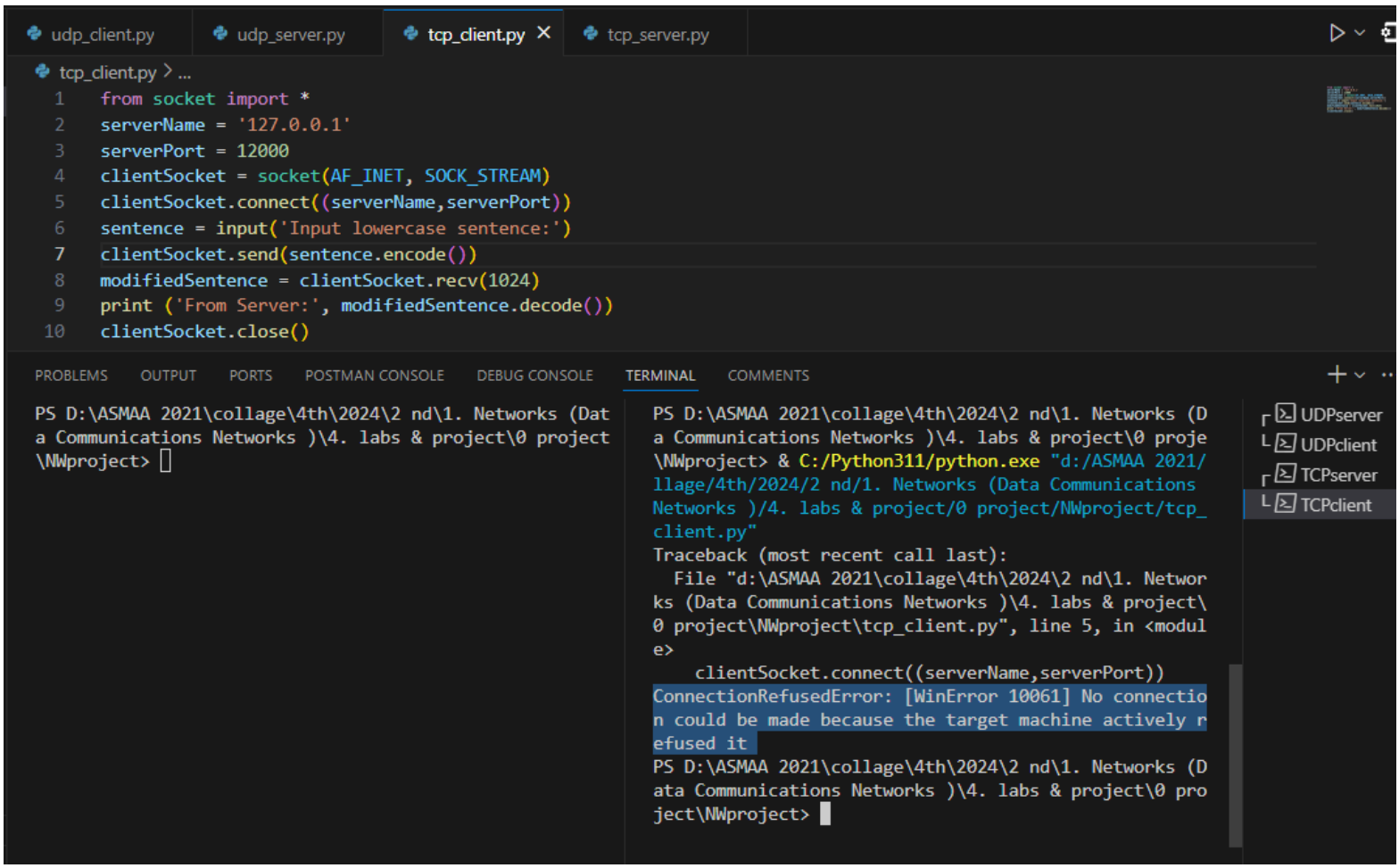
a. Suppose you run TCPClient before you run TCPServer. What happens? Why?0

It gives an error:
ConnectionRefusedError: [WinError 10061] No connectiousn could be made because the target machine actively refused it

Because:

No TCP connection is stublished yet, because the server is not running so that the client can not start the connnection setup.

Screenshot for what happens:



b. Suppose you run UDPClient before you run UDPServer. What happens? Why?

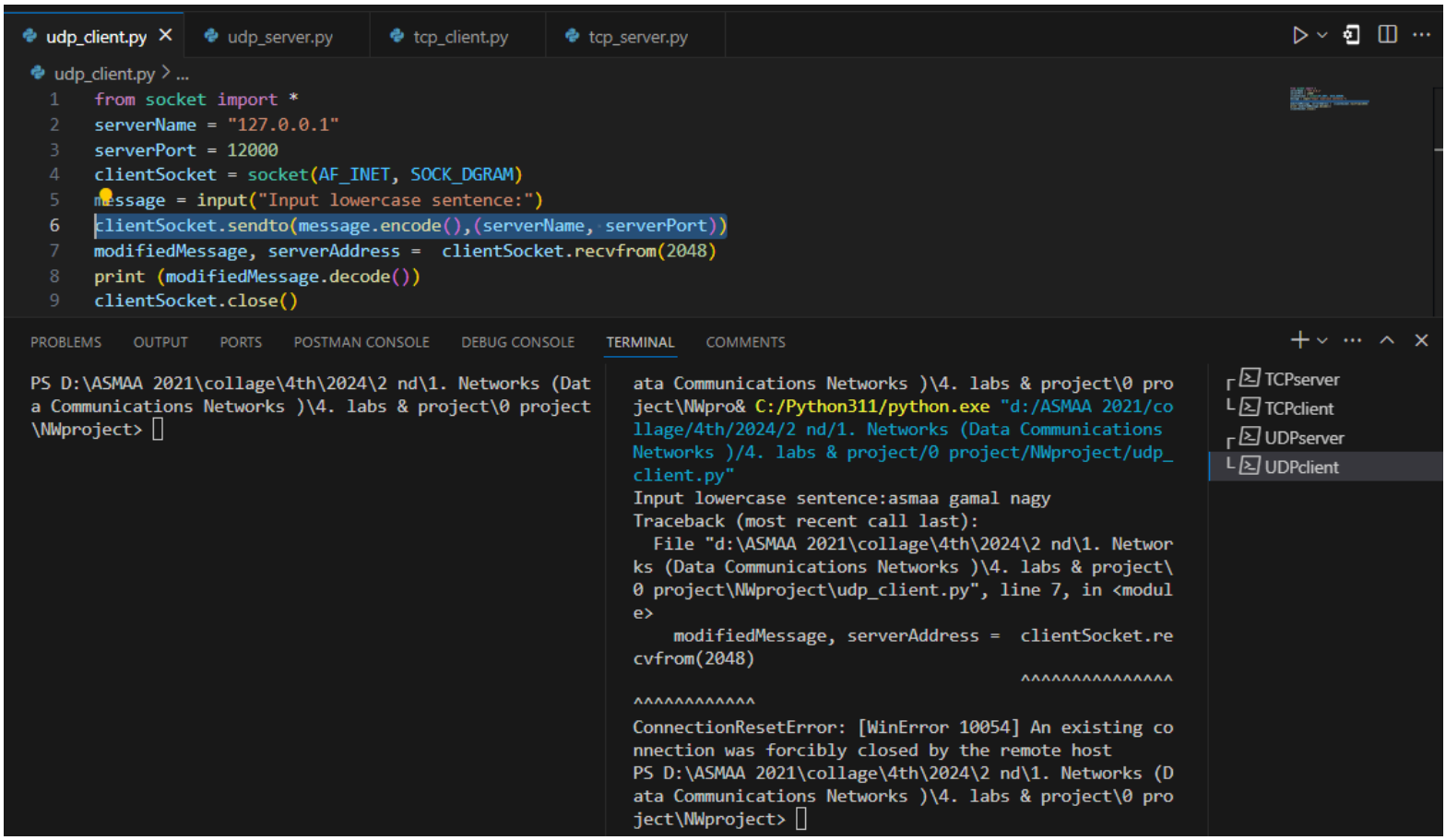
The UDP client runs, and askes you to enter your input lowercase message, but it gives the user a connection error when the client try to send your message to the remote closed unactive server

Because:

UDP doesn't need to stablish a connection unlike the TCP, but when it comes to receive the message reply , it will brust an error, after this code line:

```
modifiedMessage, serverAddress =  clientSocket.recvfrom(2048)
```

Screenshot for what happens:



c. What happens if you use different port numbers for the client and server sides?

UDP:

After changing the UDP server port number to a different port number (4000) and keep the UDP client working at the same old port num(12000), the UDP client asks the user to enter an input message then gives us the same **connection error** us before, so your packets are lost.

Screenshot for what happens:

udp_client.py | udp_server.py | tcp_client.py | tcp_server.py

udp_server.py > ...

```
1  from socket import *
2  serverPort = 4000
3  serverSocket = socket(AF_INET, SOCK_DGRAM)
4  serverSocket.bind(('', serverPort))
5  print ("The server is ready to receive")
6  while True:
7      message, clientAddress = serverSocket.recvfrom(2048)
8      modifiedMessage = message.decode().upper()
9      serverSocket.sendto(modifiedMessage.encode(), clientAddress)
10
```

PROBLEMS | OUTPUT | PORTS | POSTMAN CONSOLE | DEBUG CONSOLE | TERMINAL | COMMENTS

```
PS D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject> & C:/Python311/python.exe "d:/ASMAA 2021/collage/4th/2024/2 nd/1. Networks (Data Communications Networks )/4. labs & project/0 project/NWproject/udp_server.py"
The server is ready to receive
```

```
PS D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject> & C:/Python311/python.exe "d:/ASMAA 2021/collage/4th/2024/2 nd/1. Networks (Data Communications Networks )/4. labs & project/0 project/NWproject/udp_client.py"
Input lowercase sentence:asmaa
Traceback (most recent call last):
  File "d:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject\udp_client.py", line 7, in <module>
    modifiedMessage, serverAddress = clientSocket.recvfrom(2048)
                                     ^^^^^^^^^^^^^^^^^^^^^^^^^^^
ConnectionResetError: [WinError 10054] An existing connection was forcibly closed by the remote host
```

TCPserver | TCPclient | UDPserver | UDPclient

Ln 2, Col 15 | Spaces: 4 | UTF-8 | CRLF | Python 3.11.4

TCP:

After changing the TCP server port number to a different port number (5000) and keep the UDP clientworking at the same old port num(12000), the TCP client will give an error directly because **No Connection** has stablished as the server port num is now different from the port num that the client is now trying to reach out, so they can't talk to each other now.

The error statement:

clientSocket.connect((serverName,serverPort))
ConnectionRefusedError: [WinError 10061] No connection could be ma be made because the target machine actively refused it

Screenshot for what happens:

udp_client.py | udp_server.py | tcp_client.py | tcp_server.py

tcp_server.py > ...

```
1  from socket import *
2  serverPort = 5000
3  serverSocket = socket(AF_INET,SOCK_STREAM)
4  serverSocket.bind(('',serverPort))
5  serverSocket.listen(1)
6  print('The server is ready to receive')
7  while True:
8      connectionSocket, addr = serverSocket.accept()
9      sentence = connectionSocket.recv(1024).decode()
10     capitalizedSentence = sentence.upper()
11     connectionSocket.send(capitalizedSentence.encode())
```

PROBLEMS | OUTPUT | PORTS | POSTMAN CONSOLE | DEBUG CONSOLE | TERMINAL | COMMENTS

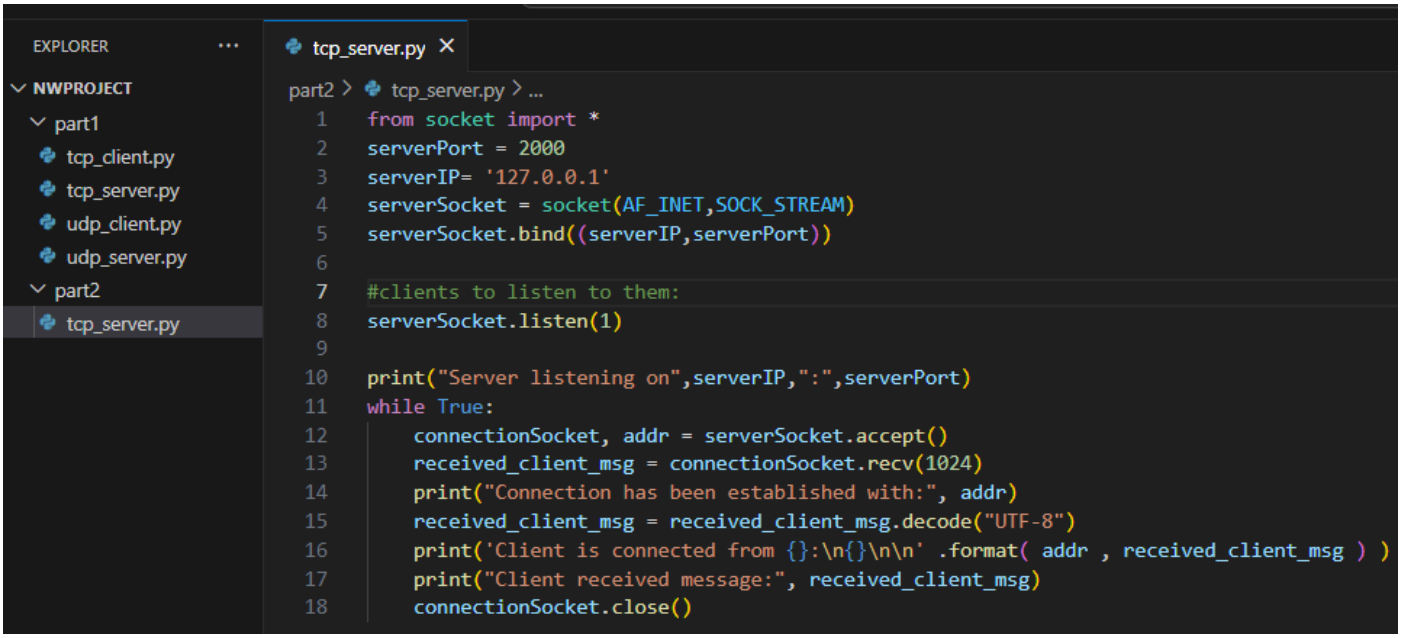
```
PS D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject> & C:/Python311/python.exe "d:/ASMAA 2021/collage/4th/2024/2 nd/1. Networks (Data Communications Networks )/4. labs & project/0 project/NWproject/tcp_server.py"
The server is ready to receive
```

```
PS D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject> & C:/Python311/python.exe "d:/ASMAA 2021/collage/4th/2024/2 nd/1. Networks (Data Communications Networks )/4. labs & project/0 project/NWproject/tcp_client.py"
Traceback (most recent call last):
  File "d:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject\tcp_client.py", line 5, in <module>
    clientSocket.connect((serverName,serverPort))
ConnectionRefusedError: [WinError 10061] No connection could be made because the target machine actively refused it
```

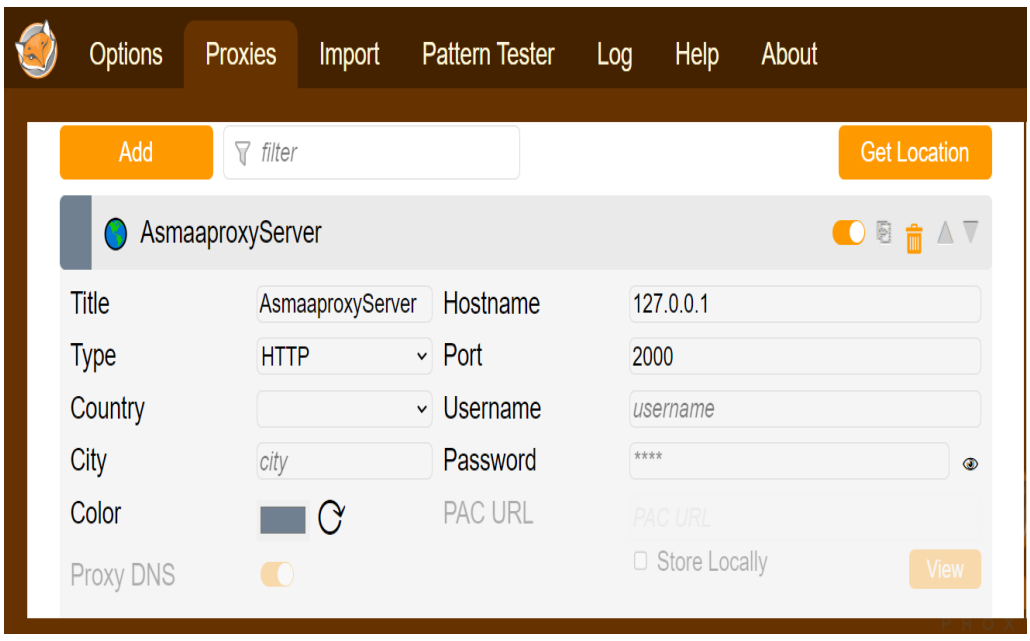
Part 2:

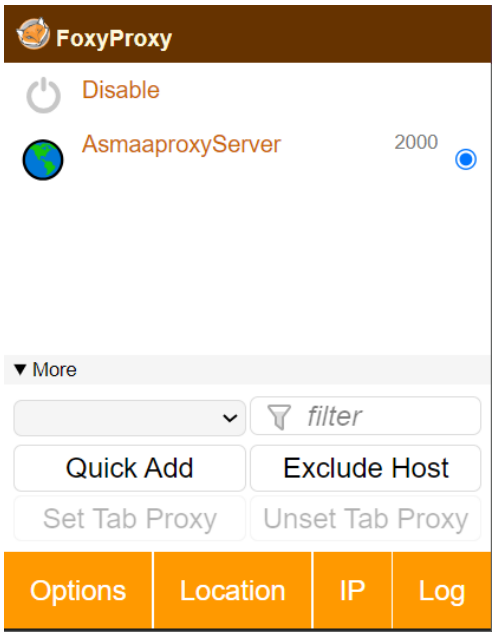
1. **Write a simple TCP program for a server that accepts lines of input from a client and prints the lines onto the server's standard output.**

This is the TCP program code:



2. **Compile and execute your program. On Web browser, set the proxy server in the browser to the host that is running your server program; also configure the port number appropriately.**





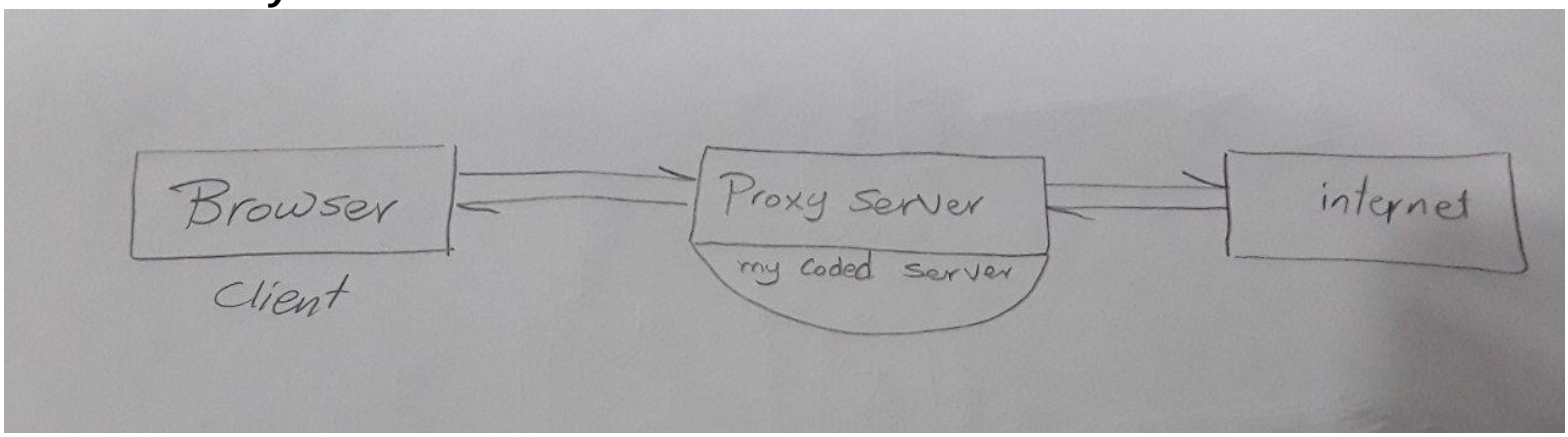
3. **Your browser should now send its GET request messages to your server, and your server should display the messages on its standard output. Use this platform to determine whether your browser generates conditional GET messages for objects that are locally cached.**

Yes, I got some conditional GET messages as shown bellow:

```
PS D:\ASMAA 2021\collage\4th\2024\2 nd\1. Networks (Data Communications Networks )\4. labs & project\0 project\NWproject> & C:/Python311
/python.exe "d:/ASMAA 2021/collage/4th/2024/2 nd/1. Networks (Data Communications Networks )/4. labs & project/0 project/NWproject/part2
/tcp_server.py"
Server listening on 127.0.0.1 : 2000
Connection has been established with: ('127.0.0.1', 3337)
Client is connected from ('127.0.0.1', 3337):
GET http://vulnweb.com/ HTTP/1.1
Host: vulnweb.com
Proxy-Connection: keep-alive
Cache-Control: max-age=0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/124.0.0.0 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b
3;q=0.7
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: SL_G_WPT_TO=ar; SL_GWPT_Show_Hide_tmp=1; SL_wptGlobTipTmp=1
If-None-Match: W/"5f1fedf1-fb2"
If-Modified-Since: Tue, 28 Jul 2020 09:20:49 GMT
```

```
Client received message: GET http://vulnweb.com/ HTTP/1.1
Host: vulnweb.com
Proxy-Connection: keep-alive
Cache-Control: max-age=0
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/124.0.0.0 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b
3;q=0.7
Accept-Encoding: gzip, deflate
Accept-Language: en-US,en;q=0.9
Cookie: SL_G_WPT_TO=ar; SL_GWPT_Show_Hide_tmp=1; SL_wptGlobTipTmp=1
If-None-Match: W/"5f1fedf1-fb2"
If-Modified-Since: Tue, 28 Jul 2020 09:20:49 GMT
```

Idea Summary of Part2:




thank you


BYE