كلية علوم الحاسب والمعلومات
College of Computer and Information Sciences

CS330–Computer Networks Project

TCP-based client server application

Students Names:

Sarah Khalid Alaridi - 440023365
Sadeem Faisal Alqahtani - 440021429
Sarah Abdullah Alsarami - 440020811
Asia Omar Alrajeh - 440020948

Section: 374

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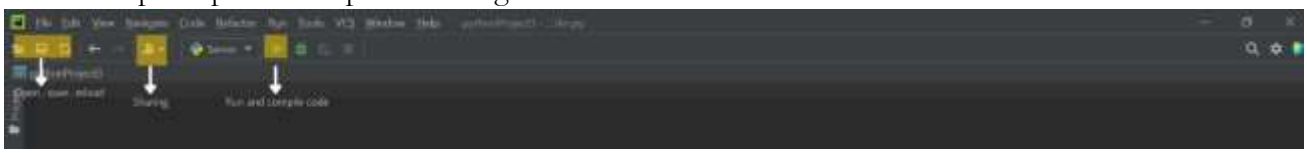
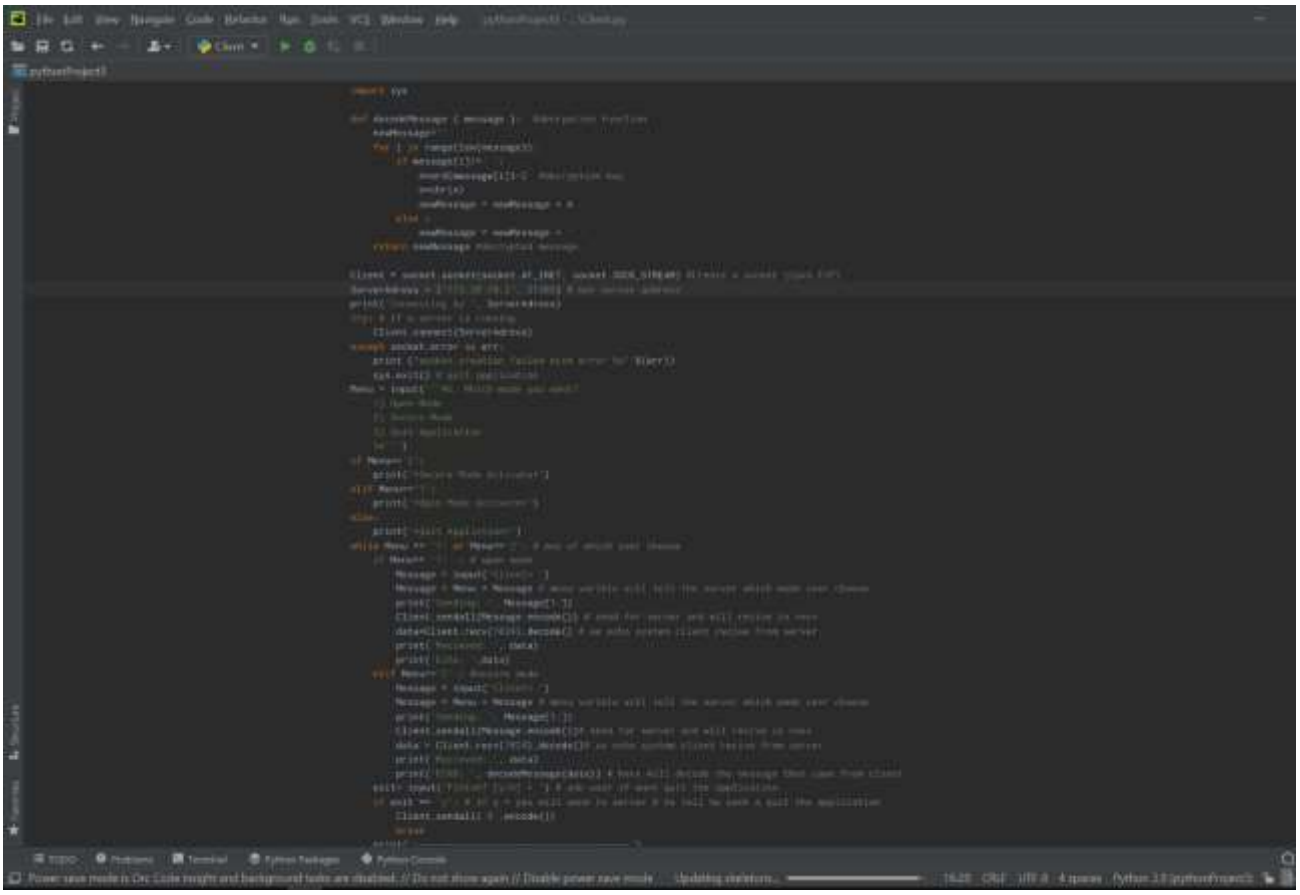
1. Setting up the Programming Environment

In this project we use python as a programming language. it is easy, and we familiar with it. In python, a lot of libraries that help us.
We use pycharm IDE to write and run python program. These are steps how to download pycharm:
Visit this website and download the suitable version you want:
https://www.jetbrains.com/pycharm/download/#section=windows

This is simple explain of important things in IDE:

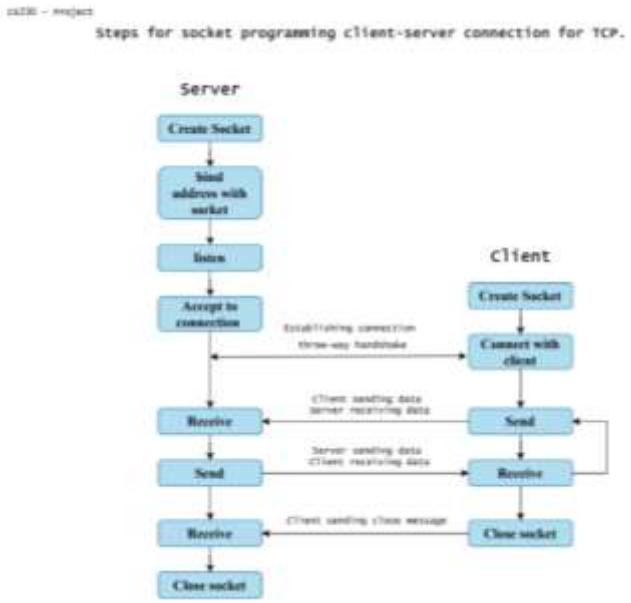




2. Steps for TCP socket programming for client-server connection

We use **Python** socket programming to implement the client- server communication over TCP protocol. we use some sites to help us to write our code:
https://www.youtube.com/watch?v=6DtinPYTZBY

https://www.youtube.com/watch?v=jgaQAIP4toU



Server side:

Create socket:

```
Server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```

Create socket type. AF_INET is the Internet address family for IPv4. SOCK_STREAM is the socket type for TCP.

Bind address with socket:

```
ServerAdress = ('localhost', 21265) #localhost is Ip of host device
Server.bind(ServerAdress)
```

Bind parameter is dependent on Internet address family, we use IPv4 so must fill (Ip, port).

Listen:

```
Server.listen(1) # 1 = maximum length for the queue of pending connections
```

creates a connection request queue of length backlog to queue incoming connection requests.

Accept to connection:

```
connection, ClientAdress = Server.accept()
```

returns a new socket object representing the connection and a tuple holding the address of the client.

Receive:

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

Server reads whatever data that the client sends.

Send:

```
connection.sendall(data)
```

Server works as a echo, so if client send something the server will send it back by using sendall().

Receive:

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

we send a close connection message to tell server this connection is finish.

Close:

```
connection.close()
Server.close()
```

After receive connection message the connection will close and the server socket.

Client side:

Create socket:

```
Client = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
```

As we said in server side, Create socket type. AF_INET is the Internet address family for IPv4. SOCK_STREAM is the socket type for TCP.

Connect with server:

```
Client.connect(ServerAddress) # Server Address = (Ip,port)
```

Connect with server address to establish a connection.

Send:

```
Client.sendall(Message)
```

Send to server a message.

Receive:

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

Receive from server what it sends.

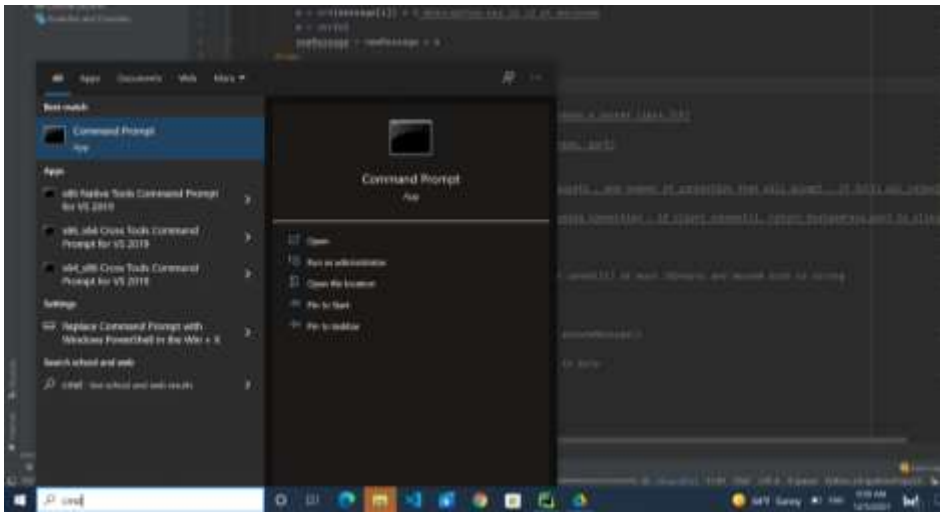
Close Socket:

```
Client.sendall('o') # close message
Client.close()
```

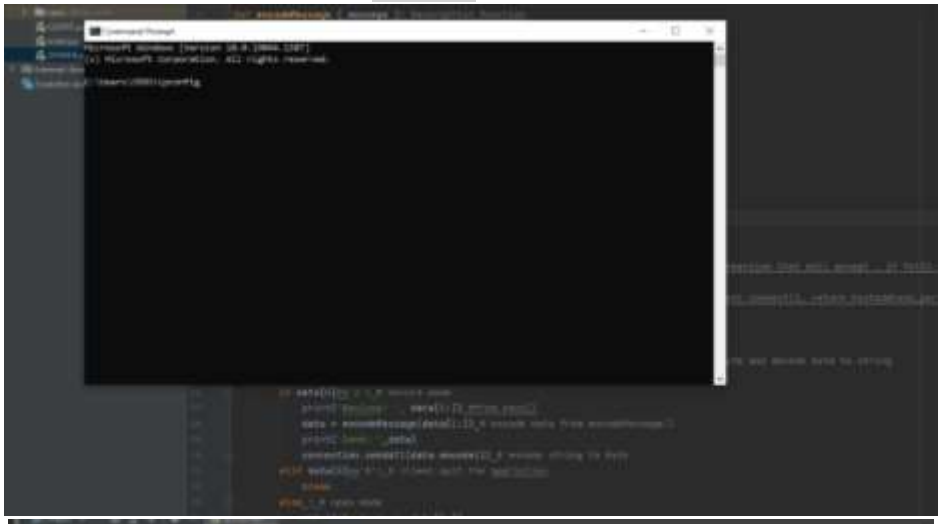
connection will close and the client socket.

3. Steps for setting up the network

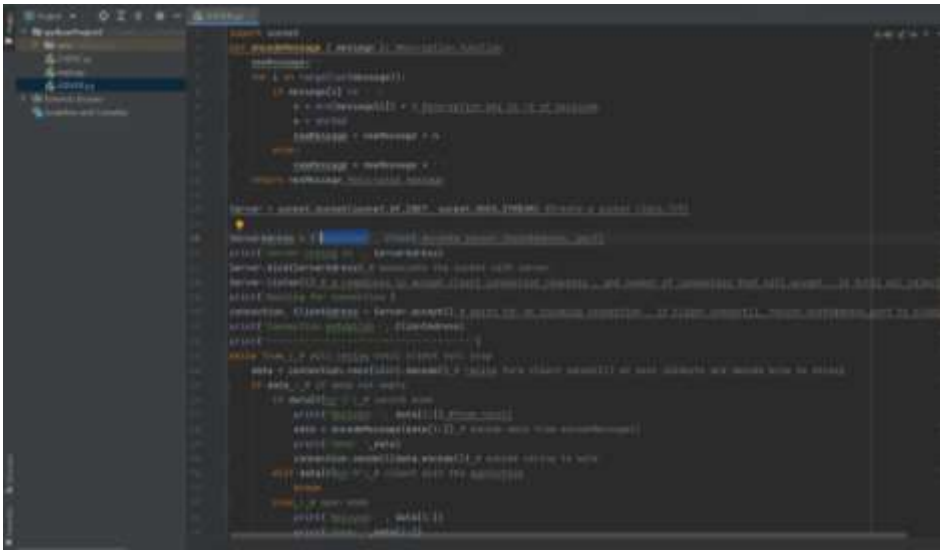
First, we connect in the same network and go to command prompt in server device:

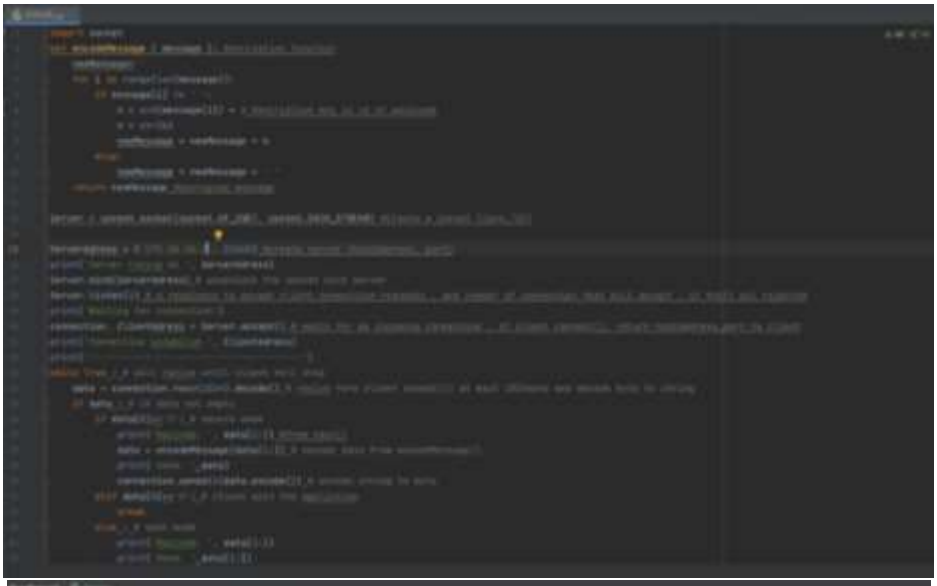


And type ipconfig to take Ip server:



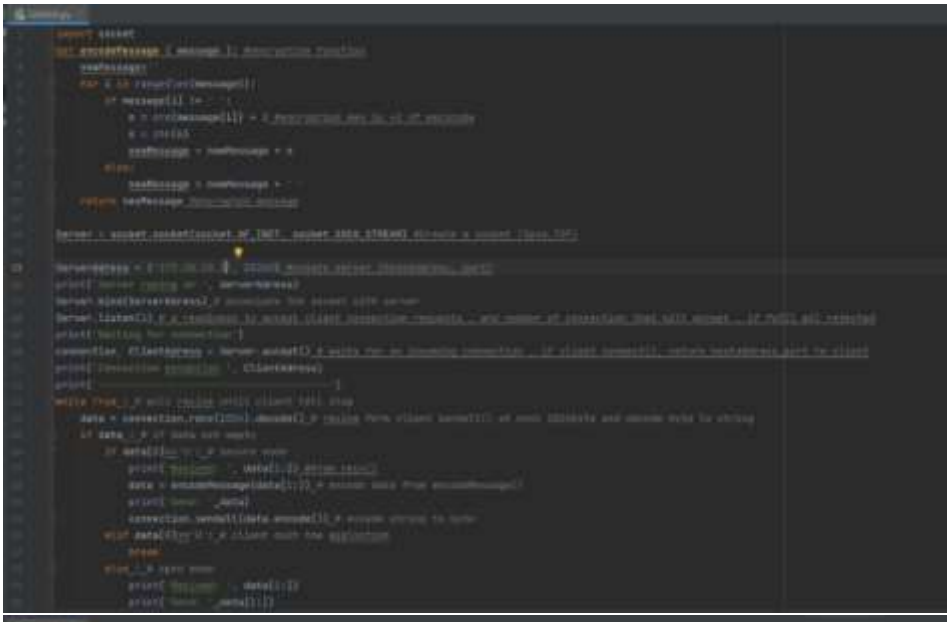
Then change the server address in server code and client

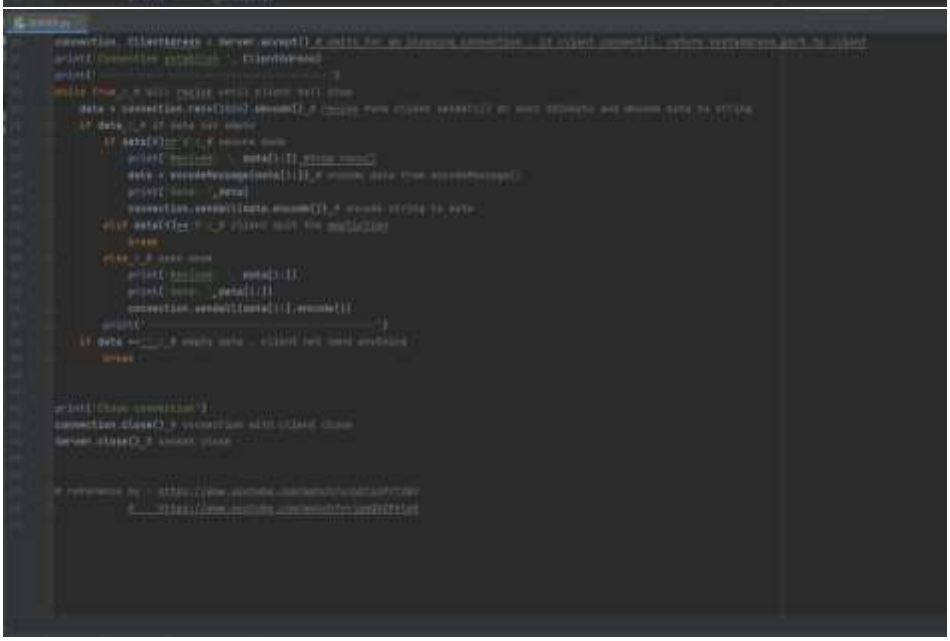




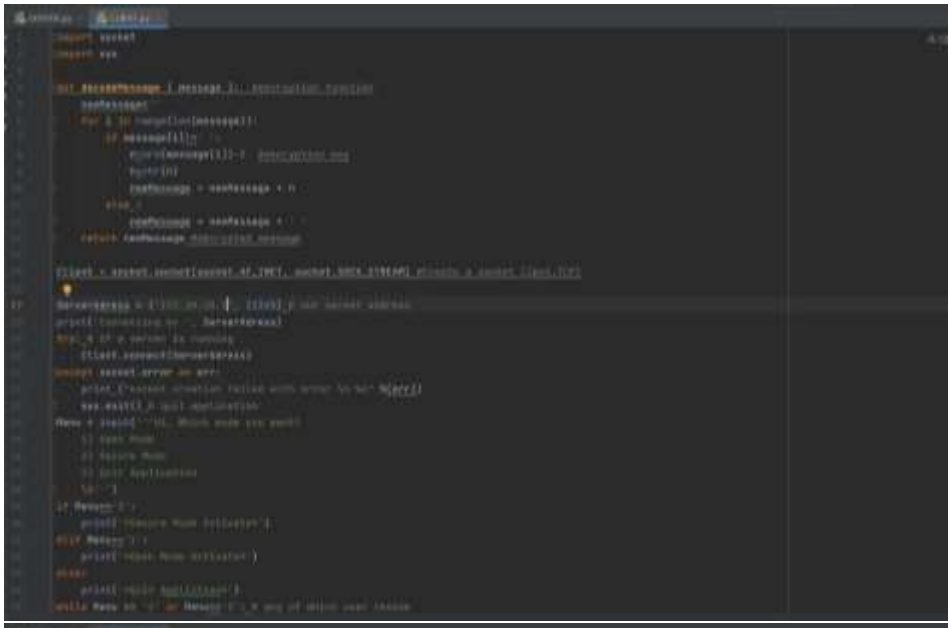
4. Codes and comments:

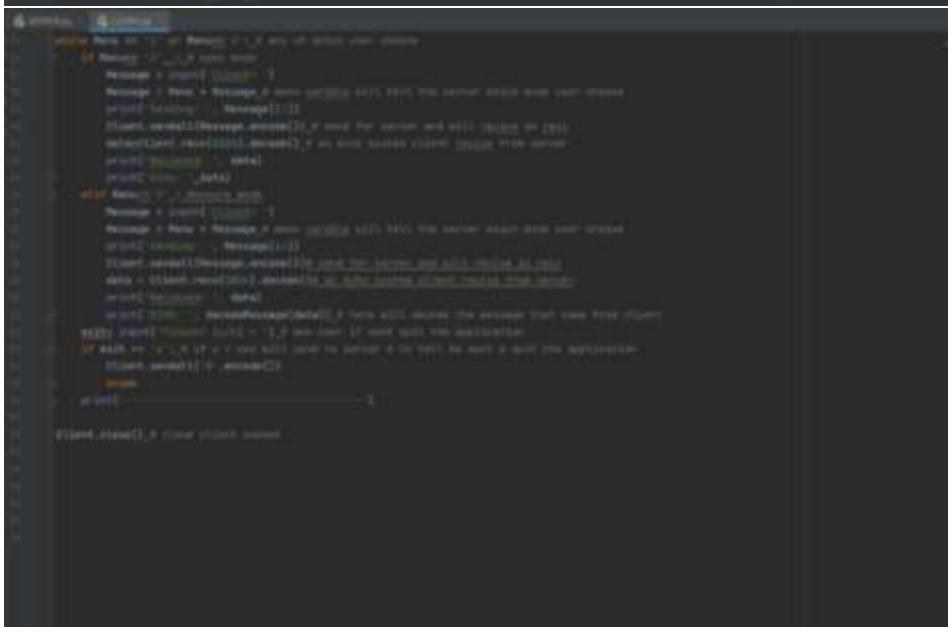
Code of server side:





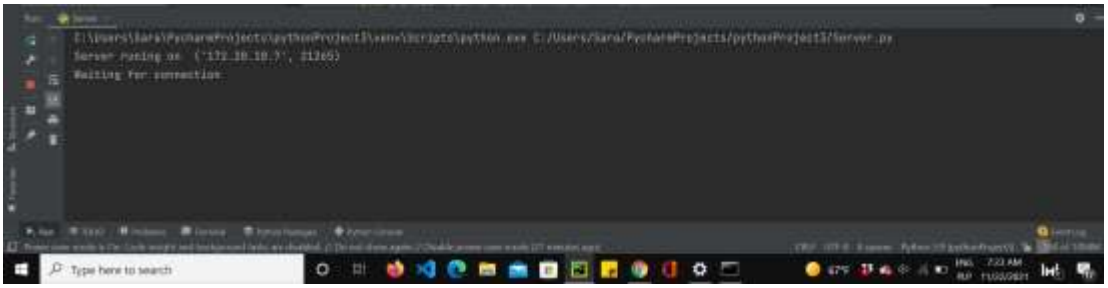
Code for client side:



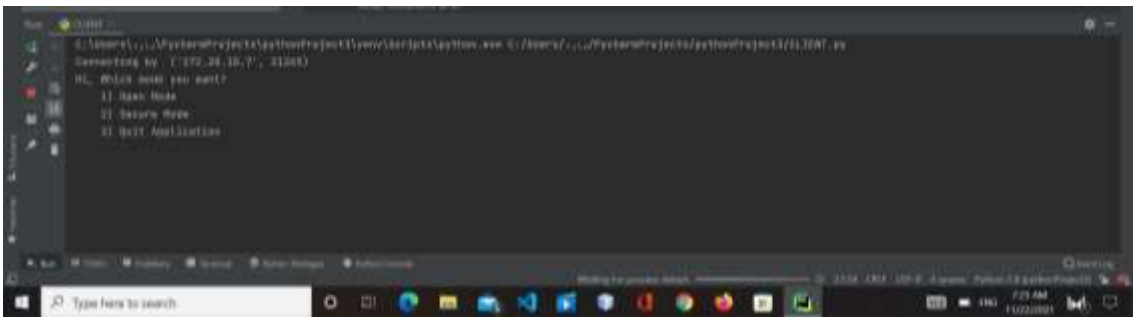


5. Snapshots of the application outputs.

First, the server is in standby mode, waiting for the connection from the client

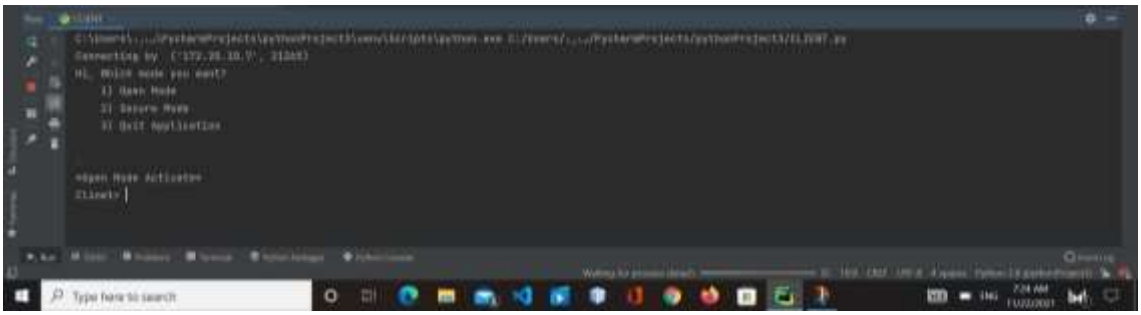


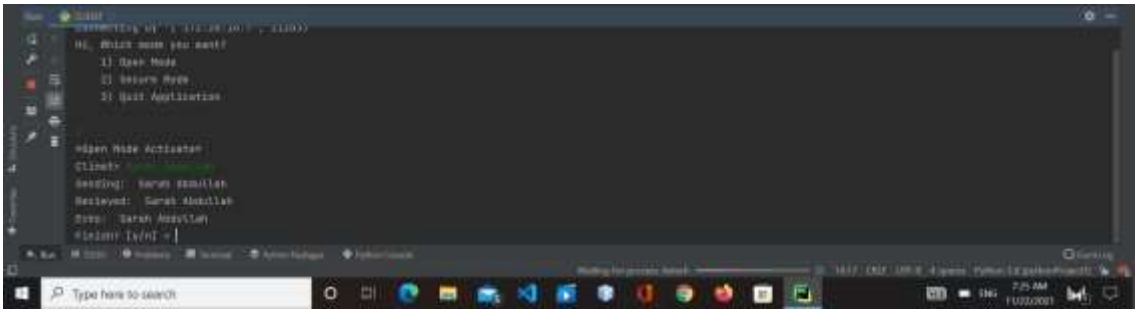
When the client connects, the connection is established then allowed to receive and send messages**.** Now, the client connects to the server from another host, and it Start then choosing mood from menu



1) Open mode

which mean is open mood, he will write words until the client stops 1When the client chooses the number writing





The user will be asked every time if he has finished or not, while he has not finished, he will be allowed to send like here

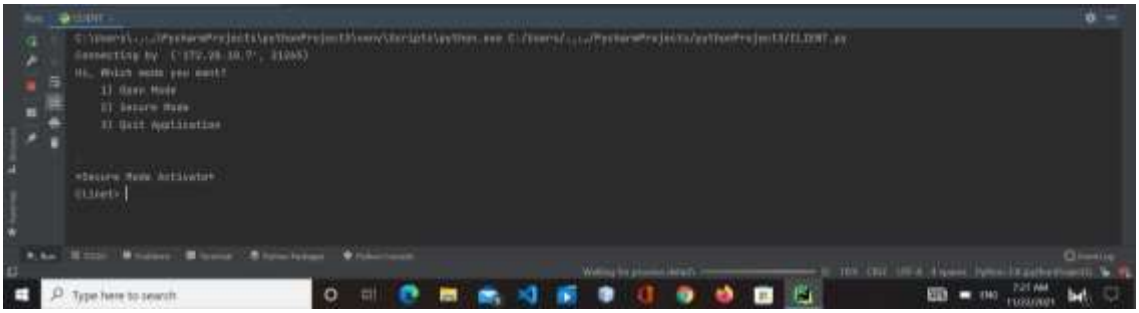
In client when it is write 'n' which mean does not finish, to resend again

When it's over, write 'y' to close the connection

On the server side, it receives messages and send them like this then close connection in server

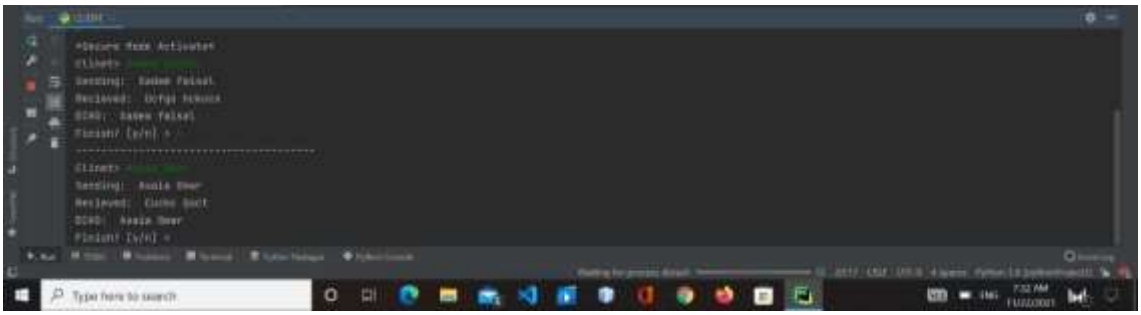
2) Secure mode

If the client wants to send messages in encrypted mode, he will choose from the list number '2', which means sending encrypted messages

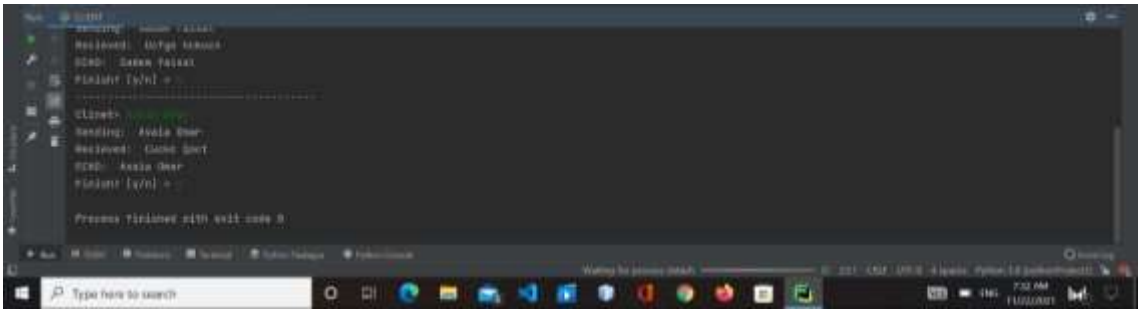


The client will start writing messages and the server will encrypt them and send them back

Also, he asked it finished or no



If he writes "y", the connection will be closed and will not be sent again

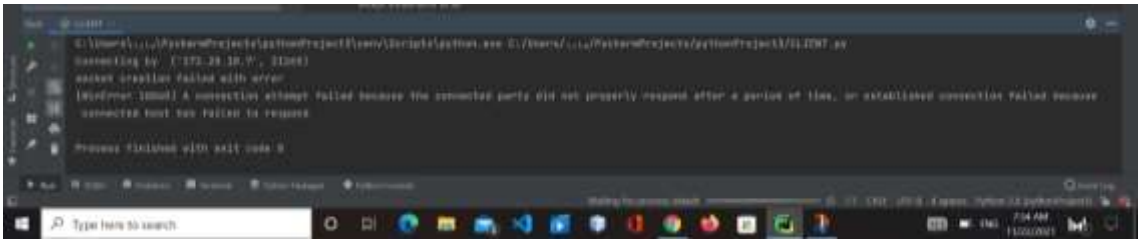


3) Quit application

When he chooses option number ’3’ from the list, the connection will be closed application

4) ERORR

When the server is down, and the client will try to connect



6. Problems and solutions:

Problem 1: We try to understand the server and client flow process, and how to make a socket to server and client.
Solution: By watching Socket Programming Tutorial on YouTube and sites dedicated to explaining this concept.

Problem 2: Find a specific encryption algorithm and how to integrate it into the code, does the client send one word or several? How is the server in down mode? When the client and server code are not on the same host, how do they communicate?
Solution: Through the question of the teacher of the course and research on these concepts in many sites and a question from specialists.

Problem 3: Lack of time and a lot of projects and exams in this semester
Solution: by developing a regular time management plan and ending all assignments on time

Problem 4: How to setup connection between two hosts, what must change to establish a connection between them.
Solution: we search in many sites, and we found where the Ip of any device and we just change the Ip of server in code.

References:

[1] https://www.jetbrains.com/pycharm/download/#section=windows

[2] https://www.youtube.com/watch?v=6DtinPYTZBY

[3] https://www.youtube.com/watch?v=jgaQAIP4toU

[4] https://www.lifewire.com/introduction-to-client-server-networks-817420

[5] 8th edition Jim Kurose, Keith Ross Person,2020

[6] https://realpython.com/python-sockets/