

## Computer Network (Practical list -4)

1. You have a server that stores the data of the employees of a company. The data is in the below format. EMP. ID FirstName Last Name Department Experience(years) Employee can query the server for the data by giving the employee ID and can receive the details in return. Server will return error message if it does not have the details for any employee ID. Using Socket programming, write a client program and server program that performs the required operations. You can write the code in any language of your choice. (No need to create actual Database on server side, you can use collections like Map in Java or Dictionary in Python. You can also choose any other data structure to store the data.)

a.) Explain the difference between TCP and UDP protocol.

	TCP	UDP
<b>Full form</b>	Transmission Control Protocol	User Datagram Protocol or Universal Datagram Protocol
<b>Connection</b>	Transmission Control Protocol is a connection-oriented protocol.	User Datagram Protocol is a connectionless protocol.
<b>Function</b>	As a message makes its way across the internet from one computer to another. This is connection based.	UDP is also a protocol used in message transport or transfer. This is not connection based which means that one program can send a load of packets to another and that would be the end of the relationship.
<b>Usage</b>	TCP is suited for applications that require high reliability, and transmission time is relatively less critical.	UDP is suitable for applications that need fast, efficient transmission, such as games. UDP's stateless nature is also useful for servers that answer small queries from huge numbers of clients.
<b>Use by other protocols</b>	HTTP, HTTPS, FTP, SMTP, Telnet	DNS, DHCP, TFTP, SNMP, RIP, VOIP.
<b>Ordering of data packets</b>	TCP rearranges data packets in the order specified.	UDP has no inherent order as all packets are independent of each other. If ordering is required, it has to be managed by the application layer.
<b>Speed of transfer</b>	The speed for TCP is slower than UDP.	UDP is faster because error recovery is not attempted. It is a "best effort" protocol.

<b>Reliability</b>	There is absolute guarantee that the data transferred remains intact and arrives in the same order in which it was sent.	There is no guarantee that the messages or packets sent would reach at all.
<b>Weight</b>	TCP is heavy-weight. TCP requires three packets to set up a socket connection, before any user data can be sent. TCP handles reliability and congestion control.	UDP is lightweight. There is no ordering of messages, no tracking connections, etc. It is a small transport layer designed on top of IP.
<b>Data Flow Control</b>	TCP does Flow Control. TCP requires three packets to set up a socket connection.	UDP does not have an option for flow control

**b.) Write the socket program that connects client and server using UDP protocol.**

➤ **UDP for server Program:**

```
from socket import *
```

```
DataEmployy = {
```

```
    "101": "Firstname : Ved, Lastname : Shukla , Dep : Mechanical , Experience(years) : 2 ",
```

```
    "102": "Firstname : Meet, Lastname : Shah , Dep : IT , Experience(years) : 3.5 ",
```

```
    "103": "Firstname : Sujit, Lastname : Maniya , Dep : Computer , Experience(years) : 1.5 ",
```

```
    "104": "Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 4 ",
```

```
    "105": "Firstname : Kaushal, Lastname : Jani , Dep : Mechanical , Experience(years) : 4.5 "
```

```
}
```

```
serverPort = 4000
```

```
serverSocket = socket(AF_INET, SOCK_DGRAM) # udp
```

```
serverSocket.bind(("", serverPort))
```

```
print("server is up and waiting for query...\n")
```

```
while True:
```

```
    query, clientAddress = serverSocket.recvfrom(2048)
```

```
    query = query.decode('utf-8')
```

```
    print("Received the query from client for Employee Id = \t{}".format(query))
```

```
    res = DataEmployy.get(str(query),"The Employee data is not present in database ...\n")
```

```
    res = res.encode('utf-8')
```

```
    print("Sending the result to client..\n")
```

```
    serverSocket.sendto(res,clientAddress)
```

➤ **UDP for client Program:**

```
from socket import *
```

```
serverName = '127.0.0.1'
```

```
serverPort = 4000
```

```
clientSocket = socket(AF_INET,SOCK_DGRAM) #udp
```

```
query = input("Enter your Employee id\t")
```

```
query = query.encode('utf-8')
```

```
print("Sending the data to server ...\n")
```

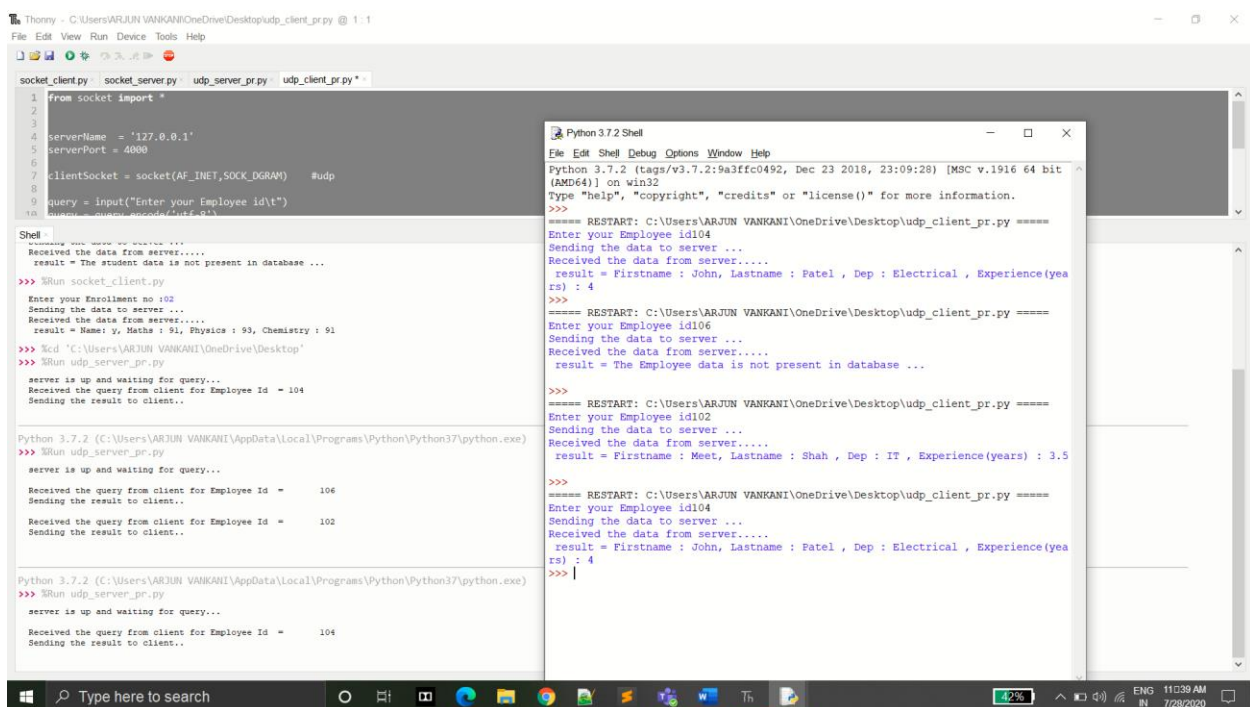
```
clientSocket.sendto(query,(serverName,serverPort))
```

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

```
result = result.decode('utf-8')
```

```
print("Received the data from server.....\n result => \n{}".format(result))
```

```
clientSocket.close()
```



```
1 from socket import *
2
3
4 serverName = '127.0.0.1'
5 serverPort = 4000
6
7 clientSocket = socket(AF_INET, SOCK_DGRAM) #udp
8
9 query = input("Enter your Employee id\t")
10 query = query.encode('utf-8')
```

```
Python 3.7.2 (tags/v3.7.2:9a3ffc0492, Dec 23 2018, 23:09:28) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> RESTART: C:\Users\ARJUN VANKANI\OneDrive\Desktop\udp_client_pr.py =====
Enter your Employee id104
Sending the data to server ...
Received the data from server.....
result = Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 4
>>>
===== RESTART: C:\Users\ARJUN VANKANI\OneDrive\Desktop\udp_client_pr.py =====
Enter your Employee id106
Sending the data to server ...
Received the data from server.....
result = The Employee data is not present in database ...
>>>
===== RESTART: C:\Users\ARJUN VANKANI\OneDrive\Desktop\udp_client_pr.py =====
Enter your Employee id102
Sending the data to server ...
Received the data from server.....
result = Firstname : Meet, Lastname : Shah , Dep : IT , Experience(years) : 3.5
>>>
===== RESTART: C:\Users\ARJUN VANKANI\OneDrive\Desktop\udp_client_pr.py =====
Enter your Employee id104
Sending the data to server ...
Received the data from server.....
result = Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 4
>>> |
```

### c.) Write the socket program that connects client and server using TCP protocol

#### ➤ TCP for server Program:

```
from socket import *
```

```
DataEmploy = {
    "101": "Firstname : Ved, Lastname : Shukla , Dep : Mechanical , Experience(years) : 2 ",
    "102": "Firstname : Meet, Lastname : Shah , Dep : IT , Experience(years) : 3.5 ",
    "103": "Firstname : Sujit, Lastname : Maniya , Dep : Computer , Experience(years) : 1.5 ",
```

```

        "104": "Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 4
",
        "105": "Firstname : Kaushal, Lastname : Jani , Dep : Mechanical , Experience(years)
: 4.5 "
    }

```

```

serverPort = 1234
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind(('', serverPort))
serverSocket.listen(1)

```

```

print("server is up and waiting for query...")

```

```

while True:
    connectionSocket, addr = serverSocket.accept()
    query = connectionSocket.recv(2048)
    query = query.decode('utf-8')

```

```

    print("Received the query from client for enrol no = {}".format(query))

```

```

    res = DataEmployy.get(str(query), "The student data is not present in database ...")
    res = res.encode('utf-8')

```

```

    print("Sending the result to client..")
    connectionSocket.send(res)
    connectionSocket.close()

```

#### ➤ TCP for client Program:

```

from socket import *

```

```

#ip address or url like www.google.com

```

```

serverName = '127.0.0.1'

```

```

serverPort = 1234

```

```
clientSocket = socket(AF_INET,SOCK_STREAM)
```

```
clientSocket.connect((serverName,serverPort))
```

```
query = input("Enter your Enrollment no : \t")
```

```
query = query.encode('utf-8')
```

```
print("Sending query..")
```

```
clientSocket.send(query)
```

```
result = clientSocket.recv(2048)
```

```
result = result.decode('utf-8')
```

```
print("Received the data from server.....\n result = {}".format(result))
```

```
clientSocket.close()
```

```
tcp_server.py - C:\Users\ARJUN VANKANI\OneDrive\Desktop\work\tcp_server.py (3.7.2)
File Edit Format Run Options Window Help
from socket import *

DataEmply = {
    *101*: "Firstname : Ved, Lastname : Shukla , Dep : Mechanical , Experience(years) : 3.5 ",
    *102*: "Firstname : Meet, Lastname : Shah , Dep : IT , Experience(years) : 3.5 ",
    *103*: "Firstname : Sujit, Lastname : Maniya , Dep : Computer , Experience(years) : 3.5 ",
    *104*: "Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 3.5 ",
    *105*: "Firstname : Kaushal, Lastname : Jaisi , Dep : Mechanical , Experience(years) : 3.5 "
}

serverPort = 1234
serverSocket = socket(AF_INET,SOCK_STREAM)
serverSocket.bind(('', serverPort))
serverSocket.listen(1)

print("server is up and waiting for query...")

while True:
    connectionSocket, addr = serverSocket.accept()
    query = connectionSocket.recv(2048)
    query = query.decode('utf-8')

    print("Received the query from client for enrol no = {}".format(query))

    res = DataEmply.get(query)
    res = res.encode('utf-8')

    print("Sending the result to client")
    connectionSocket.send(res)
    connectionSocket.close()

tcp_client.py - C:\Users\ARJUN VANKANI\OneDrive\Desktop\work\tcp_client.py @ 13:1
File Edit View Run Device Tools Help
from socket import *

#ip address or url like www.google.com
serverName = '127.0.0.1'
serverPort = 1234

clientSocket = socket(AF_INET,SOCK_STREAM)
clientSocket.connect((serverName,serverPort))

query = input("Enter your Enrollment no : \t")
query = query.encode('utf-8')

print("Sending query..")
clientSocket.send(query)

result = clientSocket.recv(2048)
result = result.decode('utf-8')

print("Received the data from server.....\n result = {}".format(result))

clientSocket.close()

Shell
>>> Run tcp_client.py
Enter your Enrollment no : 104
Sending query..
Received the data from server.....
result = Firstname : John, Lastname : Patel , Dep : Electrical , Experience(years) : 3.5
>>>
```