

# CS359 2023 Assignment 3 - Client Server Calculator

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## Instructions

Find IP address from command prompt or terminal

Windows: ipconfig

Linux: ip addr

```
C:\Users\user>ipconfig

Windows IP Configuration

Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::f4f2:67ed:4d71:a09%17
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Local Area Connection* 8:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Local Area Connection* 11:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . : iitp.ac.in
    Link-local IPv6 Address . . . . . : fe80::50d2:83e:19e9:906%22
    IPv4 Address. . . . . : 172.16.172.112
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : 172.16.172.1
```

Run servers - only one server is allowed at a time for same ip address and port number

IP address and port number for the server to bind are taken as command-line arguments

py server.py [ip address] [port number]

```
py server1.py 172.16.172.112 12000
```

```
py server2.py 172.16.172.112 12345
```

```
py server3.py 172.16.172.112 1010
```

```
py server4.py 172.16.172.112 1234
```

Run client

IP address and port number of the server socket to connect are taken as command line arguments

py client.py [ip address] [port number]

## Connecting to server1

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py client.py 172.16.172.112 12000
Connected to server
Please enter the message to the server: 1+2+3
Server replied: 6
Do you wish to continue (Y/N)? y
Please enter the message to the server: sfs
Server replied: NameError - name 'sfs' is not defined
Do you wish to continue (Y/N)? y
Please enter the message to the server: 2**4
Server replied: 16
Do you wish to continue (Y/N)? █
```

## Different client waiting to get reply while another client is running

```
user@user-VirtualBox:~$ python3 client.py 172.16.172.112 12000
Connected to server
Please enter the message to the server: 1+2
█
```

## Getting reply after the other client disconnect

```
user@user-VirtualBox:~$ python3 client.py 172.16.172.112 12000
Connected to server
Please enter the message to the server: 1+2
Server replied: 3
Do you wish to continue (Y/N)? y
Please enter the message to the server: 5*2
Server replied: 10
Do you wish to continue (Y/N)?
```

## Output at server

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py server1.py 172.16.172.112 12000
The server is ready to receive
Connected with client ('172.16.172.112', 50392)
Client ('172.16.172.112', 50392) sent message: 1+2+3
Sending reply: 6
Client ('172.16.172.112', 50392) sent message: sfs
Sending reply: NameError - name 'sfs' is not defined
Client ('172.16.172.112', 50392) sent message: 2**4
Sending reply: 16
Connected with client ('172.16.172.112', 50441)
Client ('172.16.172.112', 50441) sent message: 1+2
Sending reply: 3
Client ('172.16.172.112', 50441) sent message: 5*2
Sending reply: 10
█
```

## Connecting to server2

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py client.py 172.16.172.112 12345
Connected to server
Please enter the message to the server: 1+2
Server replied: 3
Do you wish to continue (Y/N)? y
Please enter the message to the server: █
```

Server2 can handle multiple clients concurrently since it is a multithreaded server.

```
user@user-VirtualBox:~$ python3 client.py 172.16.172.112 12345
Connected to server
Please enter the message to the server: 1/0
Server replied: ZeroDivisionError - division by zero
Do you wish to continue (Y/N)? y
Please enter the message to the server: 8/9
Server replied: 0.8888888888888888
Do you wish to continue (Y/N)? █
```

## Output at server

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py server2.py 172.16.172.112 12345
The server is ready to receive
Connected with client ('172.16.172.112', 50748)
Client ('172.16.172.112', 50748) sent message: 1+2
Sending reply: 3
Connected with client ('172.16.172.112', 50811)
Client ('172.16.172.112', 50811) sent message: 1/0
Sending reply: ZeroDivisionError - division by zero
Client ('172.16.172.112', 50811) sent message: 8/9
Sending reply: 0.8888888888888888
Client ('172.16.172.112', 50748) sent message: 8*9
Sending reply: 72
█
```

Connecting to server3

Multiple clients are handled concurrently using select() method.

client 1

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py client.py 172.16.172.112 1010
Connected to server
Please enter the message to the server: 12+5
Server replied: 17
Do you wish to continue (Y/N)? y
Please enter the message to the server: 5*0.5
Server replied: 2.5
Do you wish to continue (Y/N)? y
Please enter the message to the server: 9+6
Server replied: 15
Do you wish to continue (Y/N)? █
```

client 2

```
user@user-VirtualBox:~$ python3 client.py 172.16.172.112 1010
Connected to server
Please enter the message to the server: 2*3
Server replied: 6
Do you wish to continue (Y/N)? y
Please enter the message to the server: 1+3/5
Server replied: 1.6
Do you wish to continue (Y/N)? y
Please enter the message to the server: 4 + 5.3/6
Server replied: 4.883333333333333
Do you wish to continue (Y/N)?
```

Output at server

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py server3.py 172.16.172.112 1010
The server is ready to receive
Connected with client ('172.16.172.112', 64831)
Client ('172.16.172.112', 64831) sent message: 12+5
Sending reply: 17
Client ('172.16.172.112', 64831) sent message: 5*0.5
Sending reply: 2.5
Connected with client ('172.16.172.112', 64837)
Client ('172.16.172.112', 64837) sent message: 2*3
Sending reply: 6
Client ('172.16.172.112', 64837) sent message: 1+3/5
Sending reply: 1.6
Client ('172.16.172.112', 64831) sent message: 9+6
Sending reply: 15
Client ('172.16.172.112', 64837) sent message: 4 + 5.3/6
Sending reply: 4.883333333333333
█
```

## Connecting to server4

This is an echo server that replies the same message to the client that was received from the same client. Here also, multiple clients are handled concurrently using select() method.

### client 1

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py client.py 172.16.172.112 1234
Connected to server
Please enter the message to the server: hi, this is client from windows
Server replied: hi, this is client from windows
Do you wish to continue (Y/N)? y
Please enter the message to the server: good morning
Server replied: good morning
Do you wish to continue (Y/N)? ☐
```

### client 2

```
user@user-VirtualBox:~$ python3 client.py 172.16.172.112 1234
Connected to server
Please enter the message to the server: hi
Server replied: hi
Do you wish to continue (Y/N)? y
Please enter the message to the server: this is client from virtualbox
Server replied: this is client from virtualbox
Do you wish to continue (Y/N)? y
Please enter the message to the server: nice to meet you
Server replied: nice to meet you
Do you wish to continue (Y/N)? ☐
```

## Output at server

```
PS C:\Users\user\Desktop\sem6\CS358-ComputerNetworkLab\2001CS06_CS359\tut03> py server4.py 172.16.172.112 1234
The server is ready to receive
Connected with client ('172.16.172.112', 64887)
Client ('172.16.172.112', 64887) sent message: hi
Sending reply: hi
Client ('172.16.172.112', 64887) sent message: this is client from virtualbox
Sending reply: this is client from virtualbox
Connected with client ('172.16.172.112', 64893)
Client ('172.16.172.112', 64893) sent message: hi, this is client from windows
Sending reply: hi, this is client from windows
Client ('172.16.172.112', 64887) sent message: nice to meet you
Sending reply: nice to meet you
Client ('172.16.172.112', 64893) sent message: good morning
Sending reply: good morning
☐
```

## Additional features

- Additional operations and non-integer operands
  - More than two operands

```
Please enter the message to the server: 1 + 2 * 3
Server replied: 7
```

- Additional operations: Any expressions which can be evaluated in python

Examples:

```
Please enter the message to the server: 9 ** 3
Server replied: 729
```

```
Please enter the message to the server: 6%4
Server replied: 2
```

- Non-integer operands or output

```
Please enter the message to the server: 1 / 2 + 3.8
Server replied: 4.3
```

```
Please enter the message to the server: 6 ** 0.5
Server replied: 2.449489742783178
```

```
Please enter the message to the server: 9 ** 0.5
Server replied: 3.0
```

- Error handling: When a client sends invalid expressions, the server replies the error message to the client instead of terminating the program

Examples

```
Please enter the message to the server: 1 + 2 *(5 + 0.2]
Server replied: SyntaxError - closing parenthesis ']' does not match opening parenthesis '(' (<string>, line 1)
```

```
Please enter the message to the server: 5/0.0
Server replied: ZeroDivisionError - float division by zero
```

```
Please enter the message to the server: x + y
Server replied: NameError - name 'x' is not defined
```

Demo

<https://youtu.be/JLkMhc3t1a0>