

COMPUTER NETWORKING (CSL317)

ASSIGNMENT – 3

NAME : ARYAN JOTISH PATIL

ROLL : BT18CSE096

HOW TO RUN ?

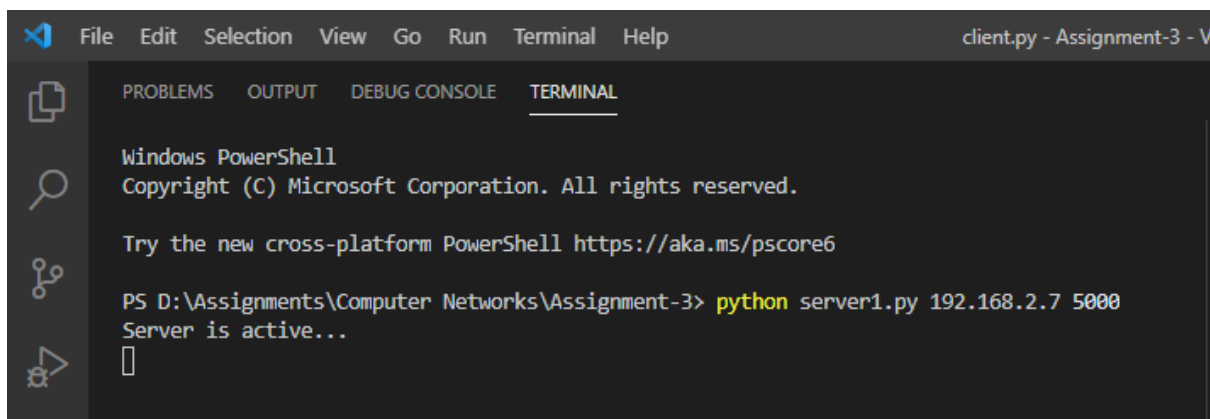
CLIENT : *python client.py <ip address> <port number>*

Eg: `python client.py 192.168.2.8 5000` *(CTRL + C to exit)*

SERVER : *python server<number>.py <ip address> <port number>*

Eg: `python server2.py 192.168.2.8 5000` *(CTRL + C to exit)*

SERVER 1 : SINGLE CONNECTION AT A TIME



The screenshot shows a Windows PowerShell terminal window with the title bar "client.py - Assignment-3 - V". The terminal content includes the Windows PowerShell copyright notice, a link to the cross-platform PowerShell, and the execution of the command `python server1.py 192.168.2.7 5000`. The output of the command is "Server is active..." followed by a cursor.

```
File Edit Selection View Go Run Terminal Help
client.py - Assignment-3 - V

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server1.py 192.168.2.7 5000
Server is active...
█
```

STARTING THE SERVER

The screenshot shows two terminal windows in Visual Studio Code. The left window is running a Python server script (server1.py) which has started and is listening on port 5000. The right window is running a Python client script (client.py) which has successfully connected to the server at 192.168.2.7 on port 5000. The client is prompted to enter a mathematical expression.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server1.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50796)
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING A CLIENT TO THE SERVER

This screenshot shows the client script sending a request to the server. The client enters the mathematical expression '5+935', and the server responds with the answer '940'.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server1.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50796)
Server received : 5+935
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression :5+935
Server returned answer : 940
Enter the mathematical expression : █
```

EXCHANGE OF RESPONSES BETWEEN CLIENT AND SERVER

This screenshot shows three terminal windows. The first two show the server and client from the previous steps. The third window shows a new attempt to run the client script, which results in a 'Connection to the server failed!' error because the server is already listening on that port.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server1.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50796)
Server received : 5+935
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression :5+935
Server returned answer : 940
Enter the mathematical expression : █

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server failed!
PS D:\Assignments\Computer Networks\Assignment-3> █
```

SHOWS ERROR WHEN ANOTHER CLIENT TRIES TO CONNECT

This screenshot shows the client script being terminated. The client enters the expression '5+935' and receives the answer '940', then the connection is terminated by the client. The server terminal shows 'Client Exits...'.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server1.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50796)
Server received : 5+935
Server received :
Client Exits...
█

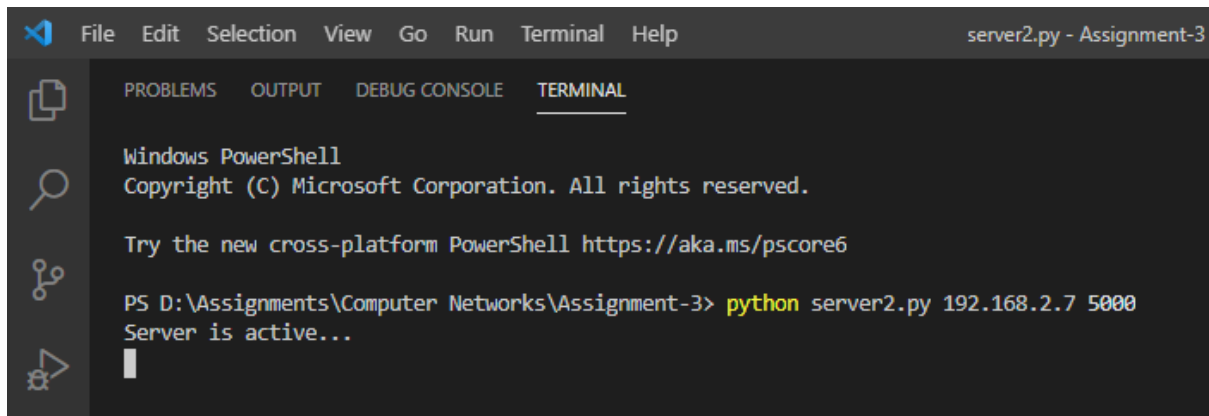
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression :5+935
Server returned answer : 940
Enter the mathematical expression :
Connection terminated by client!
PS D:\Assignments\Computer Networks\Assignment-3> █
```

CLIENT EXITS BY PRESSING CTRL + C

SERVER 2 : MULTI-THREADED SERVER



```
File Edit Selection View Go Run Terminal Help server2.py - Assignment-3

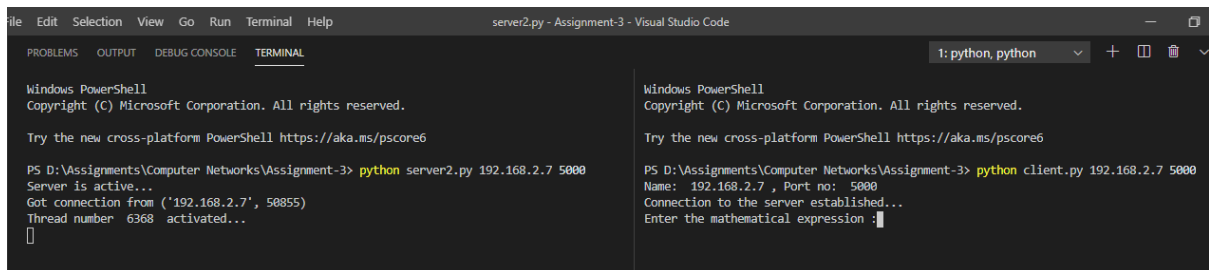
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server2.py 192.168.2.7 5000
Server is active...
█
```

STARTING THE SERVER



```
File Edit Selection View Go Run Terminal Help server2.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

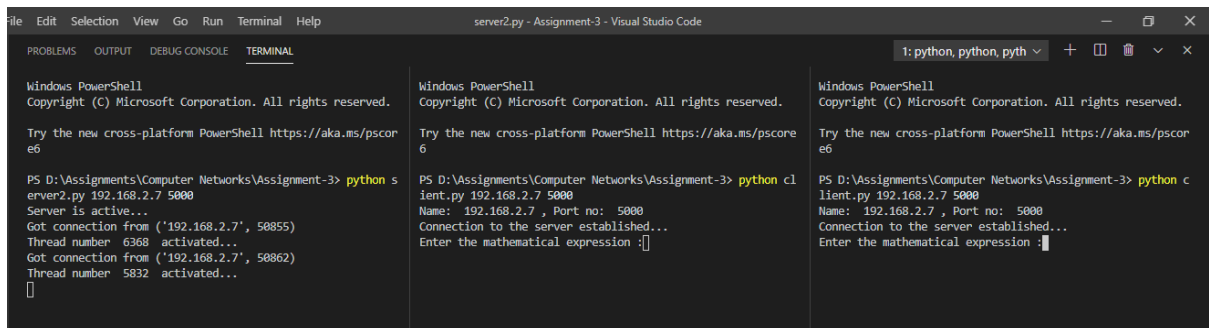
PS D:\Assignments\Computer Networks\Assignment-3> python server2.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50855)
Thread number 6368 activated...
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING 1ST CLIENT TO THE SERVER



```
File Edit Selection View Go Run Terminal Help server2.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server2.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50855)
Thread number 6368 activated...
Got connection from ('192.168.2.7', 50862)
Thread number 5832 activated...
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

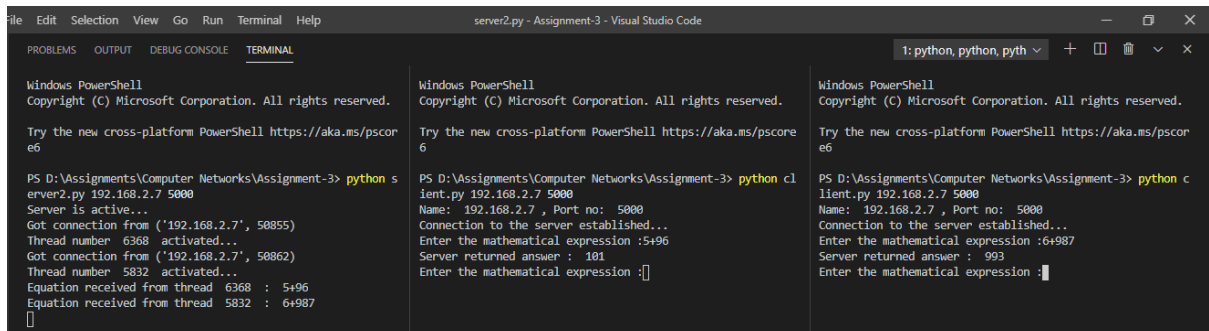
PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING ANOTHER CLIENT SIMULTANEOUSLY



```
File Edit Selection View Go Run Terminal Help server2.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server2.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 50855)
Thread number 6368 activated...
Got connection from ('192.168.2.7', 50862)
Thread number 5832 activated...
Equation received from thread 6368 : 5+96
Equation received from thread 5832 : 6+987
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression :5+96
Server returned answer : 101
Enter the mathematical expression : █

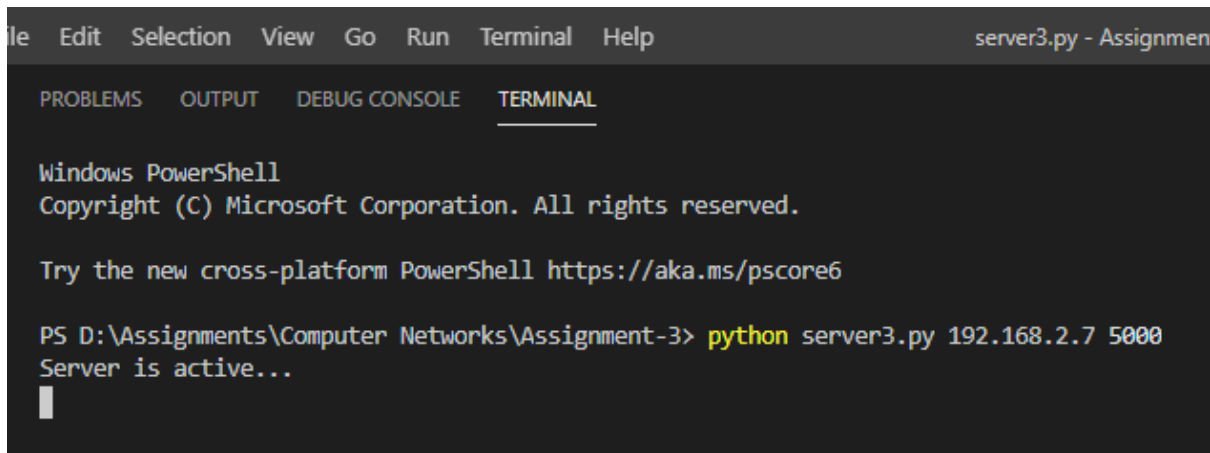
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression :6+987
Server returned answer : 993
Enter the mathematical expression : █
```

SERVING MULTIPLE CLIENTS CONCURRENTLY

SERVER 3 : SELECT METHOD



```
File Edit Selection View Go Run Terminal Help server3.py - Assignment-3

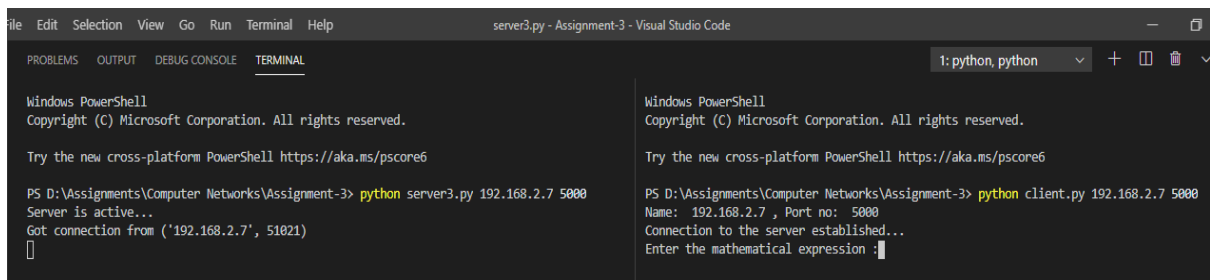
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server3.py 192.168.2.7 5000
Server is active...
█
```

STARTING THE SERVER



```
File Edit Selection View Go Run Terminal Help server3.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

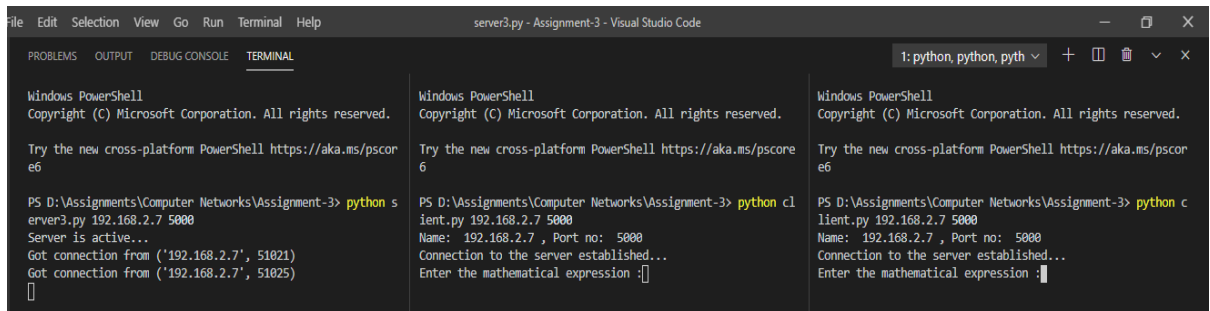
PS D:\Assignments\Computer Networks\Assignment-3> python server3.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51021)
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7, Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING A CLIENT TO THE SERVER



```
File Edit Selection View Go Run Terminal Help server3.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server3.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51021)
Got connection from ('192.168.2.7', 51025)
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

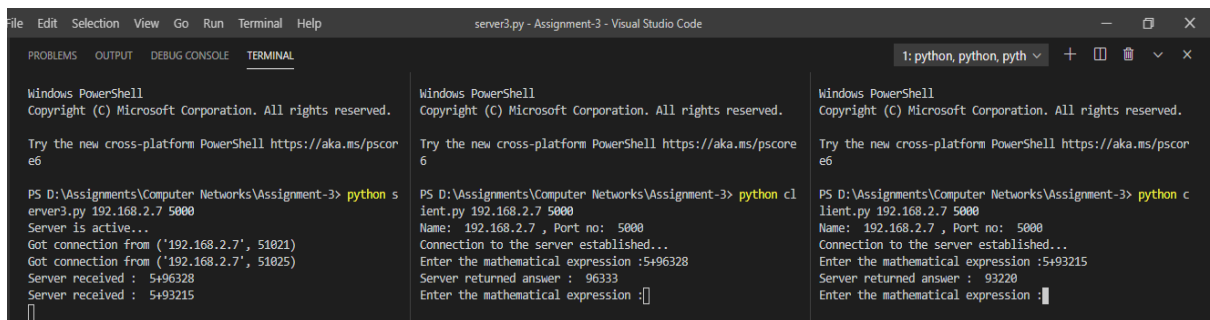
PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7, Port no: 5000
Connection to the server established...
Enter the mathematical expression : █

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7, Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING ANOTHER CLIENT TO THE SERVER (USING SELECT METHOD)



```
File Edit Selection View Go Run Terminal Help server3.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server3.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51021)
Got connection from ('192.168.2.7', 51025)
Server received : 5496328
Server received : 5493215
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7, Port no: 5000
Connection to the server established...
Enter the mathematical expression :5496328
Server returned answer : 96333
Enter the mathematical expression : █

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7, Port no: 5000
Connection to the server established...
Enter the mathematical expression :5493215
Server returned answer : 93220
Enter the mathematical expression : █
```

SERVING MULTIPLE CLIENTS CONCURRENTLY

SERVER 4 : ECHO SERVER

```
File Edit Selection View Go Run Terminal Help server4.py - Assignment-3

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server4.py 192.168.2.7 5000
Server is active...
█
```

STARTING THE SERVER

```
File Edit Selection View Go Run Terminal Help server4.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server4.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51055)
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING A CLIENT TO THE SERVER

```
File Edit Selection View Go Run Terminal Help server4.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server4.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51055)
Got connection from ('192.168.2.7', 51058)
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : █
```

CONNECTING ANOTHER CLIENT TO THE SERVER (USING SELECT METHOD)

```
File Edit Selection View Go Run Terminal Help server4.py - Assignment-3 - Visual Studio Code

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 1: python, python, pyth

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python server4.py 192.168.2.7 5000
Server is active...
Got connection from ('192.168.2.7', 51055)
Got connection from ('192.168.2.7', 51058)
Server received : abracadabra
Server received : hellothere
█

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : abracadabra
Server returned answer : abracadabra
Enter the mathematical expression : █

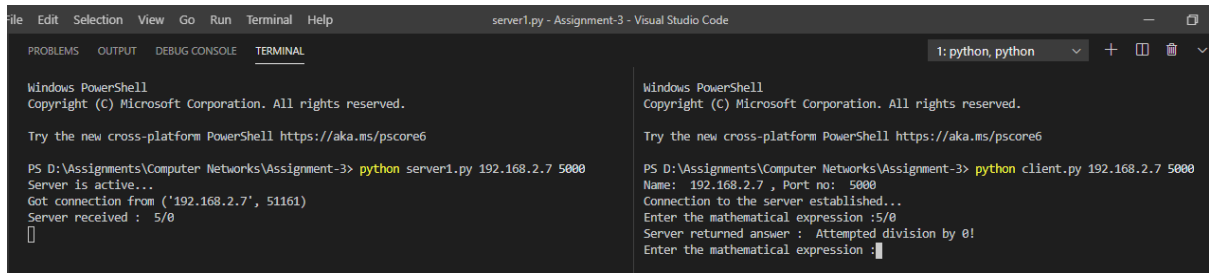
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Assignments\Computer Networks\Assignment-3> python client.py 192.168.2.7 5000
Name: 192.168.2.7 , Port no: 5000
Connection to the server established...
Enter the mathematical expression : hellothere
Server returned answer : hellothere
Enter the mathematical expression : █
```

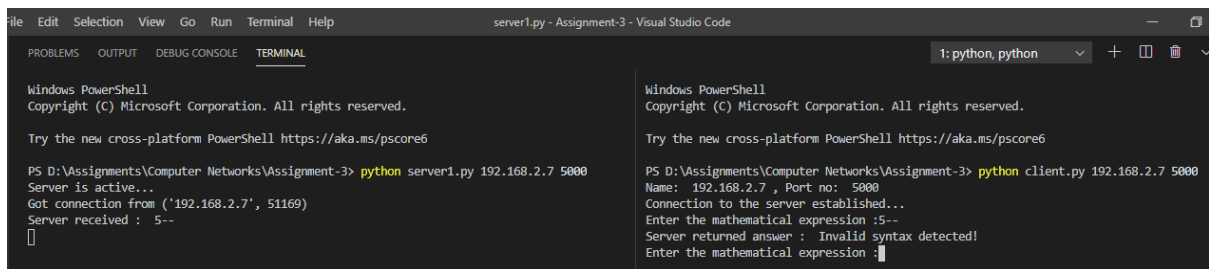
REPLYING WITH THE SAME INPUT STRING TO THE CLIENT

ADDITIONAL FEATURES



The screenshot shows a Visual Studio Code window with a terminal. The terminal is split into two panes. The left pane shows the output of running `python server1.py 192.168.2.7 5000`. The output indicates that the server is active and has received a connection from `(192.168.2.7, 51161)`. The right pane shows the output of running `python client.py 192.168.2.7 5000`. The output indicates that the client has established a connection to the server and has entered the mathematical expression `5/0`. The server has returned the answer `Attempted division by 0!`.

HANDLES DIVIDE BY 0 EXCEPTION WITHOUT LOSING CONNECTION



The screenshot shows a Visual Studio Code window with a terminal. The terminal is split into two panes. The left pane shows the output of running `python server1.py 192.168.2.7 5000`. The output indicates that the server is active and has received a connection from `(192.168.2.7, 51169)`. The right pane shows the output of running `python client.py 192.168.2.7 5000`. The output indicates that the client has established a connection to the server and has entered the mathematical expression `5--`. The server has returned the answer `Invalid syntax detected!`.

HANDLES INVALID SYNTAX WITHOUT LOSING CONNECTION