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1. How to Run the Client-Server Socket Programs

1. Overview

This document provides step-by-step instructions on how to set up and run the Python client-server socket programs (*server1.py*, *server2.py*, *server3.py*, *server4.py*, and *client.py*). The instructions are tailored for both **Windows** and **Linux** operating systems.

The assignment consists of:

- One Client Program:
 - *client.py*
- Four Server Programs:
 - *server1.py*: Handles one client at a time.
 - *server2.py*: Handles multiple clients concurrently using threadings
 - *server3.py*: Handles multiple clients concurrently using select.
 - *server4.py*: An echo server that handles multiple clients using select.

2. Prerequisites

Before you begin, ensure you have the following installed on your system:

1. **Python 3**: The code is written in Python 3. To check your version, open a terminal and run **python --version** or **python3 --version**. If you don't have it, download it from python.org.
2. Git (for Option 2 only): If you choose to get the code using git clone, you must have Git installed. You can download it from git-scm.com. Generally Git comes inbuilt in Linux. You Can check it with
3. **Command-Line Interface (CLI)**:
Windows: Command Prompt or PowerShell.
Linux: Any terminal emulator (e.g., Terminal, GNOME Terminal, Konsole).

3. Setup: Getting the Code

First, you need to get the project files onto your computer. Choose **one** of the two options below.

- ❖ Option 1: Download and **Extract** a ZIP File

This is the simplest method if you are not familiar with Git.
Get the ZIP File (provided with this documentation): Obtain the project's .zip file and save it to your computer.

Extract the Files:

- On **Windows**: Right-click the .zip file, select "Extract All...", and choose a destination. This will create a new folder containing all the project files.
- On **Linux**: Right-click the .zip file and select "Extract Here",
Or use the terminal command **`unzip <filename>.zip`** .
(eg. :- `unzip socket.zip` (where socket is the name of zipped folder))

❖ Option 2: Clone the Repository using Git

This method is recommended if you are comfortable with the command line and Git.

Open a Terminal and navigate to where you want to store the project.

Clone the Repository: Use the git clone command with the repository's URL.

In bash(terminal)

`git clone https://github.com/d4a1k11s19h8/C_N_LAB.git`

This will create a new directory named **C_N_LAB** with all the necessary files.

4. Step-by-Step Running Instructions

1. **Step 1:** Open Terminals

- a. You need at least two separate terminal windows: one for the server and one for the client. To test the multi-client servers, open three or more terminals.

2. **Step 2:** Navigate and Verify the Project Directory

- In each terminal, you must **navigate** to the folder containing the .py files.

❖ Method A: Manual Navigation (All Operating Systems)

Use the cd (change directory) command to enter the project folder.

Bash

On Windows, if you extracted to Documents

`cd C:\Users\YourUser\Documents\C_N_LAB\Socket1`

On Linux, if you cloned into Documents

`cd ~/Documents/C_N_LAB/Socket1`

❖ Method B: Shortcut (Windows Only)

You can open a terminal directly inside the project folder:

Open File Explorer and navigate to the folder where you extracted or cloned the files.

Right-click on an empty space within the folder.
Select "Open in Terminal", "Open PowerShell window here", or "Open command window here" (the option depends on your Windows version).
This saves you from having to use the `cd` command.

- **Verify Your Location (Crucial Step)**

Before proceeding, confirm that you are in the correct directory. List the files to make sure the scripts are present.

- ❖ On Windows, run the `dir` command:

Bash(Terminal)
`dir`

- ❖ Linux, run the `ls` command:

Bash(Terminal)
`ls`

Expected Output:

- You should see a list of files that includes `client.py`, `server1.py`, `server2.py`, `server3.py`, and `server4.py`.
- If you don't see them, you are in the wrong directory. (Correctly check the implementation of steps before this)

3. Step 3: Run a Server

In your first terminal, choose and run one of the server programs. \

The command format is:

`python <server_file.py> <ip_address> <port>`
<ip_address>: Use 127.0.0.1 for local testing (this means "this computer").
<port>: A port number between 1024 and 65535 (e.g., 5000).

Example:

On Windows

`python server1.py 127.0.0.1 5000`

On Linux (may require python3)

`python3 server1.py 127.0.0.1 5000`

The server will now be listening for connections.

4. Step 4: Run the Client

In your second terminal (which is also in the project directory), run the client program. You must use the **same** IP address and port as the server.
`python client.py <server_ip> <server_port>`

Example:

Bash

On Windows

python client.py 127.0.0.1 5000

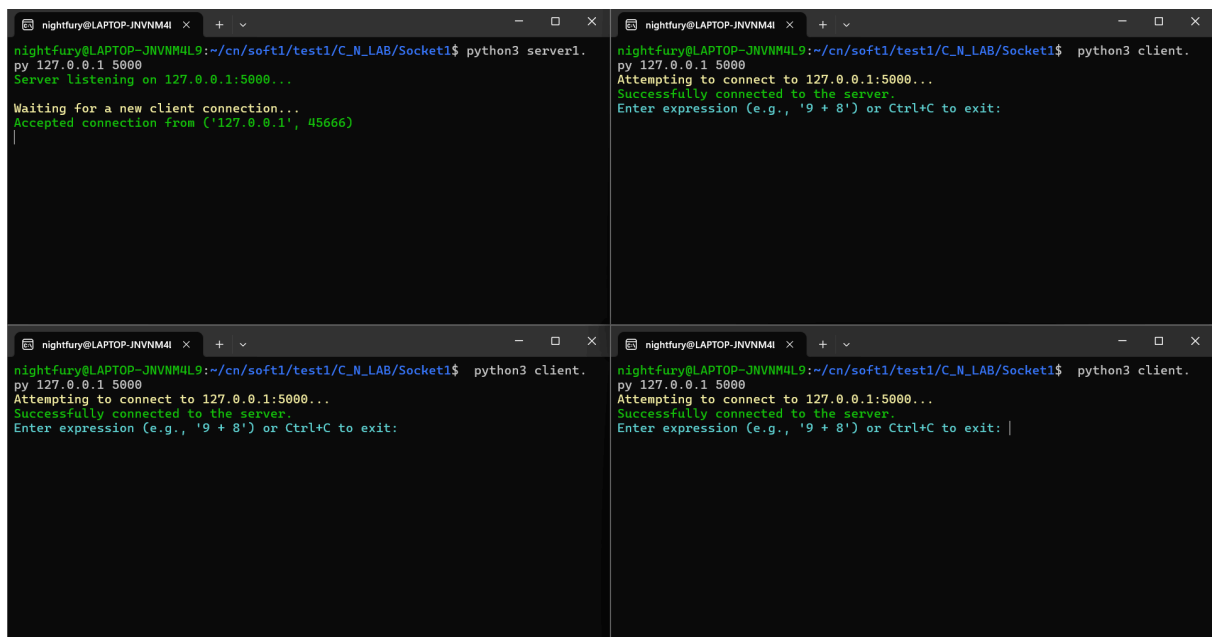
On Linux (may require python3)

python3 client.py 127.0.0.1 5000

The client will connect, and you can start sending messages.

2. Some Screenshots of output

1) Server1.py



The image displays four terminal windows arranged in a 2x2 grid, showing the execution of a server and client program. The top-left window shows the server running 'python3 server1.py' and listening on 127.0.0.1:5000. The top-right window shows the client running 'python3 client.py' and successfully connecting to the server. The bottom-left window shows the client attempting to connect and successfully connecting. The bottom-right window shows the client attempting to connect and successfully connecting.

```
nightfury@LAPTOP-JNVNM4I:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server1.py
py 127.0.0.1 5000
Server listening on 127.0.0.1:5000...
Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 45666)

nightfury@LAPTOP-JNVNM4I:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
py 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4I:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
py 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4I:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
py 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |
```

All client trying to connect but only 1 able to connect at a time
As clear from next output

```
nightfury@LAPTOP-JNVNM4I x + v - □ X
nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server1.py
Server listening on 127.0.0.1:5000...

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35146)
Received from ('127.0.0.1', 35146): '8 / 9'
Sending reply to ('127.0.0.1', 35146): '0.8888888888888888'

nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 5 / 6
Sending: '5 / 6'

nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 / 9
Sending: '8 / 9'
Server replied: 0.8888888888888888

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |
```

As soon as one of the clients ends the connection. Then the server accepts the input from the next client which approached first earlier.

```
nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server1.py
Server listening on 127.0.0.1:5000...

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35146)
Received from ('127.0.0.1', 35146): '8 / 9'
Sending reply to ('127.0.0.1', 35146): '0.8888888888888888'
Client ('127.0.0.1', 35146) disconnected.

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35158)
Received from ('127.0.0.1', 35158): '5 / 6'
Sending reply to ('127.0.0.1', 35158): '0.8333333333333334'

nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 5 / 6
Sending: '5 / 6'
Server replied: 0.8333333333333334

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |

nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 / 9
Sending: '8 / 9'
Server replied: 0.8888888888888888

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNM4I9:~/cn/soft1/test1/C_N_LAB/Socket1$ |
```

Same for the next client as well

```
nightfury@LAPTOP-JNVNMM4I x + -
Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35146)
Received from ('127.0.0.1', 35146): '8 / 9'
Sending reply to ('127.0.0.1', 35146): '0.8888888888888888'
Client ('127.0.0.1', 35146) disconnected.

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35158)
Received from ('127.0.0.1', 35158): '5 / 6'
Sending reply to ('127.0.0.1', 35158): '0.8333333333333334'
Received from ('127.0.0.1', 35158): '9 / 0'
Sending reply to ('127.0.0.1', 35158): 'Error: Division by zero'
Client ('127.0.0.1', 35158) disconnected.

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 47986)
Received from ('127.0.0.1', 47986): '3 / 8'
Sending reply to ('127.0.0.1', 47986): '0.375'

nightfury@LAPTOP-JNVNMM4I x + -
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 5 / 6
Sending: '5 / 6'
Server replied: 0.8333333333333334

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 / 0
Sending: '9 / 0'
Server replied: Error: Division by zero

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ |

nightfury@LAPTOP-JNVNMM4I x + -
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 / 9
Sending: '8 / 9'
Server replied: 0.8888888888888888

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$
```

When no clients are there then server prints waiting for clients

```
nightfury@LAPTOP-JNVNMM4I x + -
Sending reply to ('127.0.0.1', 35146): '0.8888888888888888'
Client ('127.0.0.1', 35146) disconnected.

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 35158)
Received from ('127.0.0.1', 35158): '5 / 6'
Sending reply to ('127.0.0.1', 35158): '0.8333333333333334'
Received from ('127.0.0.1', 35158): '9 / 0'
Sending reply to ('127.0.0.1', 35158): 'Error: Division by zero'
Client ('127.0.0.1', 35158) disconnected.

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 47986)
Received from ('127.0.0.1', 47986): '3 / 8'
Sending reply to ('127.0.0.1', 47986): '0.375'
Client ('127.0.0.1', 47986) disconnected.

Waiting for a new client connection...

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 5 / 6
Sending: '5 / 6'
Server replied: 0.8333333333333334

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 / 0
Sending: '9 / 0'
Server replied: Error: Division by zero

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNMM4I x + -
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 / 9
Sending: '8 / 9'
Server replied: 0.8888888888888888

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNMM4I x + -
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 3 / 8
Sending: '3 / 8'
Server replied: 0.375

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ |
```

When server is shutted down then all the clients will also be shutted down

```
Sending reply to ('127.0.0.1', 47986): '0.375'
Client ('127.0.0.1', 47986) disconnected.

Waiting for a new client connection...
^C
Server is shutting down.
Closing server socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ mousepad server1
.py
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server1.
py 127.0.0.1 5000
Server listening on 127.0.0.1:5000...

Waiting for a new client connection...
Accepted connection from ('127.0.0.1', 52386)
^C
Server is shutting down.
Closing server socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 / 9
Sending: '8 / 9'
Server replied: 0.8888888888888888

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 0 + 9
Sending: '0 + 9'
Server closed the connection.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 / 0
Sending: '9 / 0'
Server replied: Error: Division by zero

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 * 8
Sending: '9 * 8'
An error occurred: [Errno 104] Connection reset by peer
Closing client socket.
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$
```

2) For Server2

Multithreaded various clients

```
nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server2.
py 127.0.0.1 5000
Multi-threaded server listening on 127.0.0.1:5000...
[THREAD 134301598996160] Accepted connection from ('127.0.0.1', 52948)
[THREAD 134301598996160] Accepted connection from ('127.0.0.1', 52964)
[THREAD 134301582210752] Accepted connection from ('127.0.0.1', 52976)
[THREAD 134301598996160] Received from ('127.0.0.1', 52948): '5 * 9'
[THREAD 134301598996160] Sending reply to ('127.0.0.1', 52948): '45.0'
[THREAD 134301598996160] Received from ('127.0.0.1', 52964): '3 / 9'
[THREAD 134301598996160] Sending reply to ('127.0.0.1', 52964): '0.3333333333333333'
[THREAD 134301582210752] Received from ('127.0.0.1', 52976): '8 - 4'
[THREAD 134301582210752] Sending reply to ('127.0.0.1', 52976): '4.0'

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 3 / 9
Sending: '3 / 9'
Server replied: 0.3333333333333333

Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 5 * 9
Sending: '5 * 9'
Server replied: 45.0

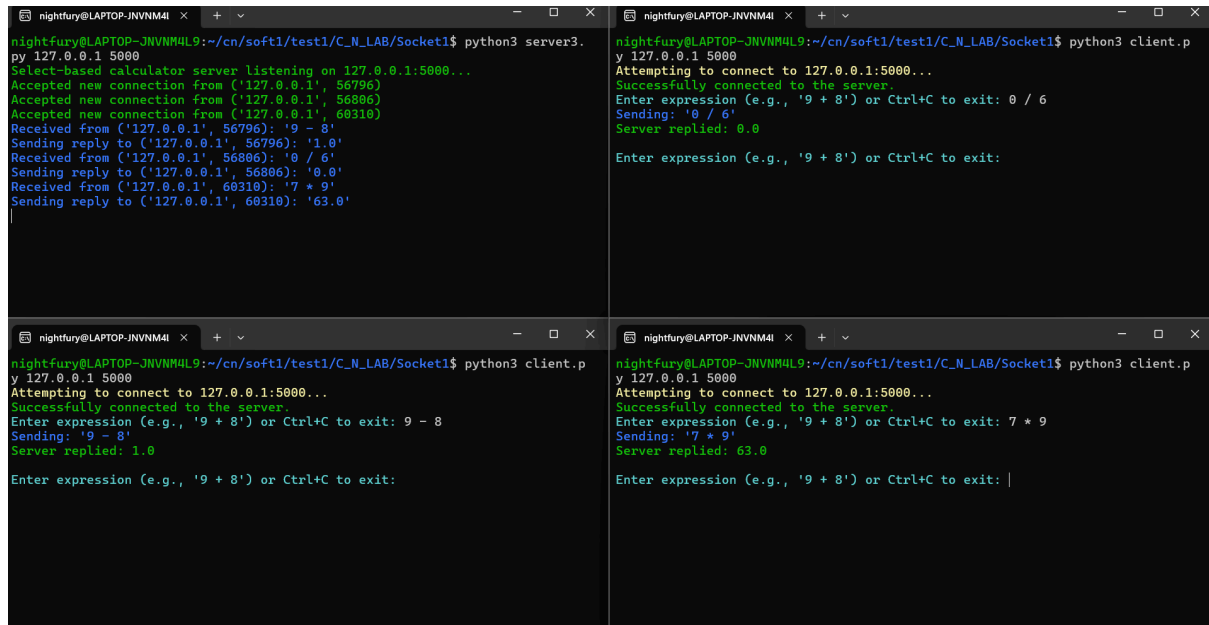
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNMM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.p
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 - 4
Sending: '8 - 4'
Server replied: 4.0

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |
```


3) For Server3

Server3 handling multiple clients concurrently



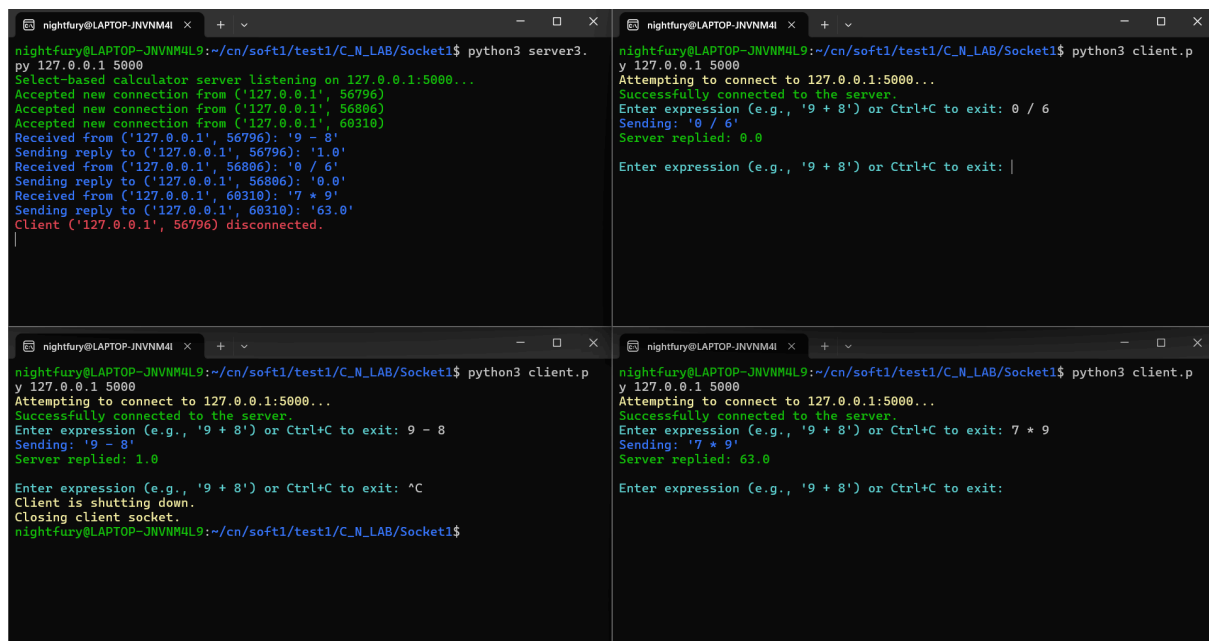
```
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server3.py
127.0.0.1 5000
Select-based calculator server listening on 127.0.0.1:5000...
Accepted new connection from ('127.0.0.1', 56796)
Accepted new connection from ('127.0.0.1', 56806)
Accepted new connection from ('127.0.0.1', 60310)
Received from ('127.0.0.1', 56796): '9 - 8'
Sending reply to ('127.0.0.1', 56796): '1.0'
Received from ('127.0.0.1', 56806): '0 / 6'
Sending reply to ('127.0.0.1', 56806): '0.0'
Received from ('127.0.0.1', 60310): '7 * 9'
Sending reply to ('127.0.0.1', 60310): '63.0'

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 0 / 6
Sending: '0 / 6'
Server replied: 0.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 - 8
Sending: '9 - 8'
Server replied: 1.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 7 * 9
Sending: '7 * 9'
Server replied: 63.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |
```

If clients breaks the connection it shows that in the server



```
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server3.py
127.0.0.1 5000
Select-based calculator server listening on 127.0.0.1:5000...
Accepted new connection from ('127.0.0.1', 56796)
Accepted new connection from ('127.0.0.1', 56806)
Accepted new connection from ('127.0.0.1', 60310)
Received from ('127.0.0.1', 56796): '9 - 8'
Sending reply to ('127.0.0.1', 56796): '1.0'
Received from ('127.0.0.1', 56806): '0 / 6'
Sending reply to ('127.0.0.1', 56806): '0.0'
Received from ('127.0.0.1', 60310): '7 * 9'
Sending reply to ('127.0.0.1', 60310): '63.0'
Client ('127.0.0.1', 56796) disconnected.

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 - 8
Sending: '9 - 8'
Server replied: 1.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 0 / 6
Sending: '0 / 6'
Server replied: 0.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 7 * 9
Sending: '7 * 9'
Server replied: 63.0
Enter expression (e.g., '9 + 8') or Ctrl+C to exit:
```

4) For Server4

Echo based server which replies the same message to the client. It can handle multiple clients concurrently

```
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server4.py
py 127.0.0.1 5000
Select-based ECHO server listening on 127.0.0.1:5000...
Accepted new connection from ('127.0.0.1', 38478)
Accepted new connection from ('127.0.0.1', 38486)
Accepted new connection from ('127.0.0.1', 38502)
Received from ('127.0.0.1', 38478): '0 + 6'
Echoing back to ('127.0.0.1', 38478)...
Received from ('127.0.0.1', 38486): '9 * 7'
Echoing back to ('127.0.0.1', 38486)...
Received from ('127.0.0.1', 38502): '8 - 3'
Echoing back to ('127.0.0.1', 38502)...
|

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 * 7
Sending: '9 * 7'
Server replied: 9 * 7

Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 0 + 6
Sending: '0 + 6'
Server replied: 0 + 6

Enter expression (e.g., '9 + 8') or Ctrl+C to exit:

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 - 3
Sending: '8 - 3'
Server replied: 8 - 3

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: |
```

```
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 server4.py
py 127.0.0.1 5000
Select-based ECHO server listening on 127.0.0.1:5000...
Accepted new connection from ('127.0.0.1', 38478)
Accepted new connection from ('127.0.0.1', 38486)
Accepted new connection from ('127.0.0.1', 38502)
Received from ('127.0.0.1', 38478): '0 + 6'
Echoing back to ('127.0.0.1', 38478)...
Received from ('127.0.0.1', 38486): '9 * 7'
Echoing back to ('127.0.0.1', 38486)...
Received from ('127.0.0.1', 38502): '8 - 3'
Echoing back to ('127.0.0.1', 38502)...
Client ('127.0.0.1', 38478) disconnected.
Client ('127.0.0.1', 38486) disconnected.
^C
Server is shutting down.
Closing server socket.
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 9 * 7
Sending: '9 * 7'
Server replied: 9 * 7

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 0 + 6
Sending: '0 + 6'
Server replied: 0 + 6

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: ^C
Client is shutting down.
Closing client socket.
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$

nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ python3 client.py
y 127.0.0.1 5000
Attempting to connect to 127.0.0.1:5000...
Successfully connected to the server.
Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 - 3
Sending: '8 - 3'
Server replied: 8 - 3

Enter expression (e.g., '9 + 8') or Ctrl+C to exit: 8 + 5
Sending: '8 + 5'
Server closed the connection.
Closing client socket.
nightfury@LAPTOP-JNVNM4L9:~/cn/soft1/test1/C_N_LAB/Socket1$ S
```

3. Additional features implemented

- Shown the Client address connected to the server4 and server3 (peername)
- Shown the Server2's unique identifier for each thread used for clients
- Coloured the output for better Readability