Project 4 – Client / Server Chat/Game

Introduction

In this coding project you will first create a simple client-server chat room between a client and a server program. This requires knowledge of socket programming and general TCP considerations.

Later, your task is to design and implement a multiplayer ASCII game (any game) within the chat programs between the client and server. This is to give you the opportunity to experiment with more complicated procedures for sending information to and from the client/server.

We also encourage you to engage with the extra credit portions of the assignment.

Writing a client-server chat program

This client-server chat is fairly simple in design. The implementation will include two files which provide a simulation of a client-server chat, although both programs operate on the same system. Once both programs are started and connected to each other, the two programs can send messages to each other. The chat process works on a turn-based paradigm. The client goes first, then the server, then the client, etc. When a client is prompting a user for input you will see the prompt "Enter Input >". If you do not see this, it is not the current processes turn. All messages sent must be limited to 4096 bytes.

Also, it is okay that quit/shutdown of one process (client or server) prompt the quit/shutdown of its partner (server or client). The idea is to have the program send the "/q" message to its partner right before quitting.

Finally, you will reuse a socket for the life of the program. The one issue with reusing sockets is that there is no easy way to tell when you've received a complete communication:

"… if you plan to reuse your socket for further transfers, you need to realize that there is no EOT (end of transmission) on a socket. I repeat: if a socket send or recv returns after handling 0 bytes, the connection has been broken. If the connection has not been broken, you may wait on a recv forever, because the socket will not tell you that there's nothing more to read (for now). Now if you think about that a bit, you'll come to realize a fundamental truth of sockets: messages *must either be fixed length* (yuck), *or be delimited* (shrug), *or indicate how long they are* (much better), *or end by shutting down the connection*. The choice is entirely yours, (but some ways are righter than others)."
Source: https://docs.python.org/3.4/howto/sockets.html

Note that in the process of testing, you can "hang" a port. This will give an error when you start the server: [Errno 48] Address already in use. Don't worry, the ports will recycle eventually.

There are several ways around this, including simply specifying a different port every time you run. A good alternative, that mostly works, is to set a socket reuse option before the bind command on the server: `s.setsockopt(socket.SOL_SOCKET, socket.SO_REUSEADDR, 1)`

Specification

Server

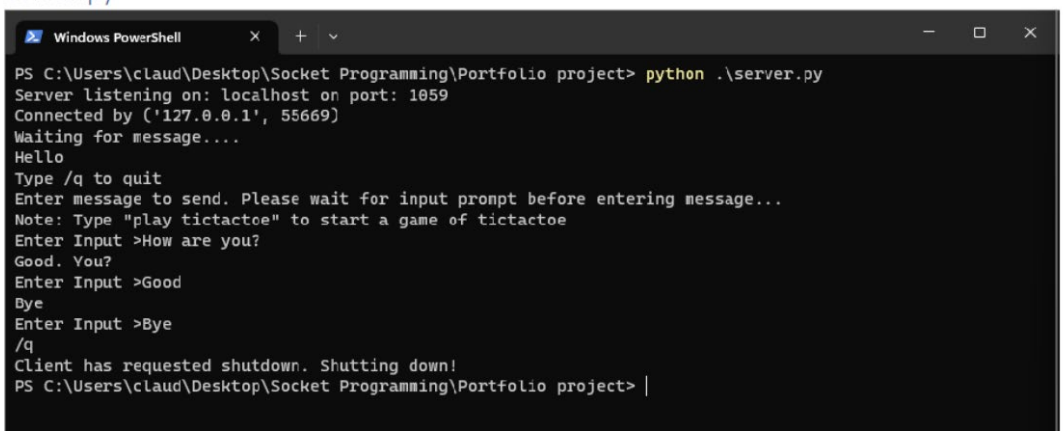
1. The server creates a socket and binds to 'localhost' and port xxxx
2. The server then listens for a connection
3. When connected, the server calls recv to receive data
4. The server prints the data, then prompts for a reply
5. The server sends the reply
6. Back to step 3
7. Sockets are closed (can use *with* in python3)

Client

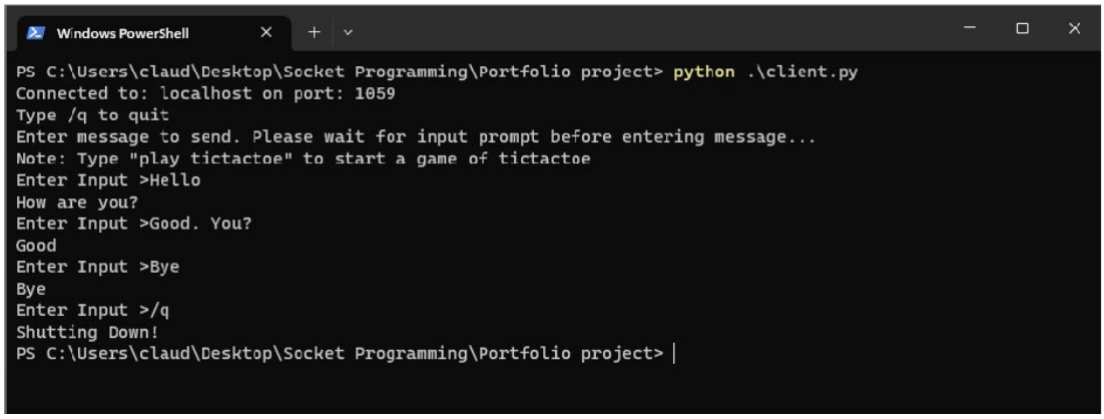
1. The client creates a socket and connects to 'localhost' and port xxxx
2. When connected, the client prompts for a message to send
3. The client sends the message
4. The client calls recv to receive data
5. The client prints the data
6. Back to step 2
7. Sockets are closed (can use *with* in python3)

A better spec might just be to show example screenshots:

Server.py



Client



Writing a Multiplayer Game

Now, turn your client-server into a multiplayer ascii game. Tic-tac-toe? Hangman? Rock-Paper-Scissors? The choice is up to you.

For example (from the screenshots above), you can enter the command “play tictactoe” to switch from the chat to game mode. Once the game has finished, the normal chat function resumes. You can exit the programs by entering “/q” on either the client or the server when it is their turn.

In this part, extra points may be awarded subjectively based on effort (**10 extra points possible**). For example, you can add better validation and error handling to the implementation.

What to turn in

1. In the Word/.pdf doc:
    a. Include instructions on how to run your programs. Are they python3?
    b. Include screenshots of your running code.
    c. Include comments / questions (optional)
2. In your code listings:
    a. Include sources you used (web pages, tutorials, books, etc)
    b. Comment your code

Resources

https://docs.python.org/3.4/howto/sockets.html
https://realpython.com/python-sockets/
