Design and Programming Assignment 2

Group Members: Anthony Tortola, Mohammed Al-Shaibani, Supreyo Atonu, Talha Fareed, Adam Mazur

Q1) Design a network application protocol for this application and justify your design decision. In your protocol design, you should address the following. [35 points]

1. The communication patterns of the network application.
   - The communication pattern allows for request-response communication in which the job seeker requests information from the job creator to complete its job, in turn, the job creator sends back the necessary information in a response message.

2. Define the protocol design goals.
The protocol design goals are:
   - We wanted the protocol to incur a minimum setup for connection and maintenance for connection overheads.
   - We wanted the protocol to minimize the requirements for resources setting up and maintaining the connection.
   - We wanted to avoid deadlocks, livelocks, or improper terminations.
   - Job Creator imposing limit on data transfer.
   - Keeps the connection open till no more jobs are requested.+

3. Define the message format, structure and semantics
   - The message format is simple, the seeker sends 2 values and the job type it has accepted, to be computed and returned client side by the server, it also sends a request simultaneously to determine whether to close or keep the connection open to receive more jobs.
   - The response message must convert the computation into a string to be return

4. Design the communication rules.
The rules for communication are as follows:
   - Allow only 1 instance of a job to be requested and received at once as to not allow for any computation error.
   - Only 2 specifically defined values in the scope of the program requirements must be sent.
   - Only 1 value should be returned by the server after each request and response and it must also be within the defined scope.
   - The last request sent by the seeker MUST have a value returned before the connection is ended otherwise the job will not have been completed.
   - There are a certain number of job types selected randomly to be given to the seeker.

Q2) Argue the need for a new application layer protocol for this network application instead of using existing standard protocols (e.g. HTTP, SMTP, WebSocket, etc.) [10 points]
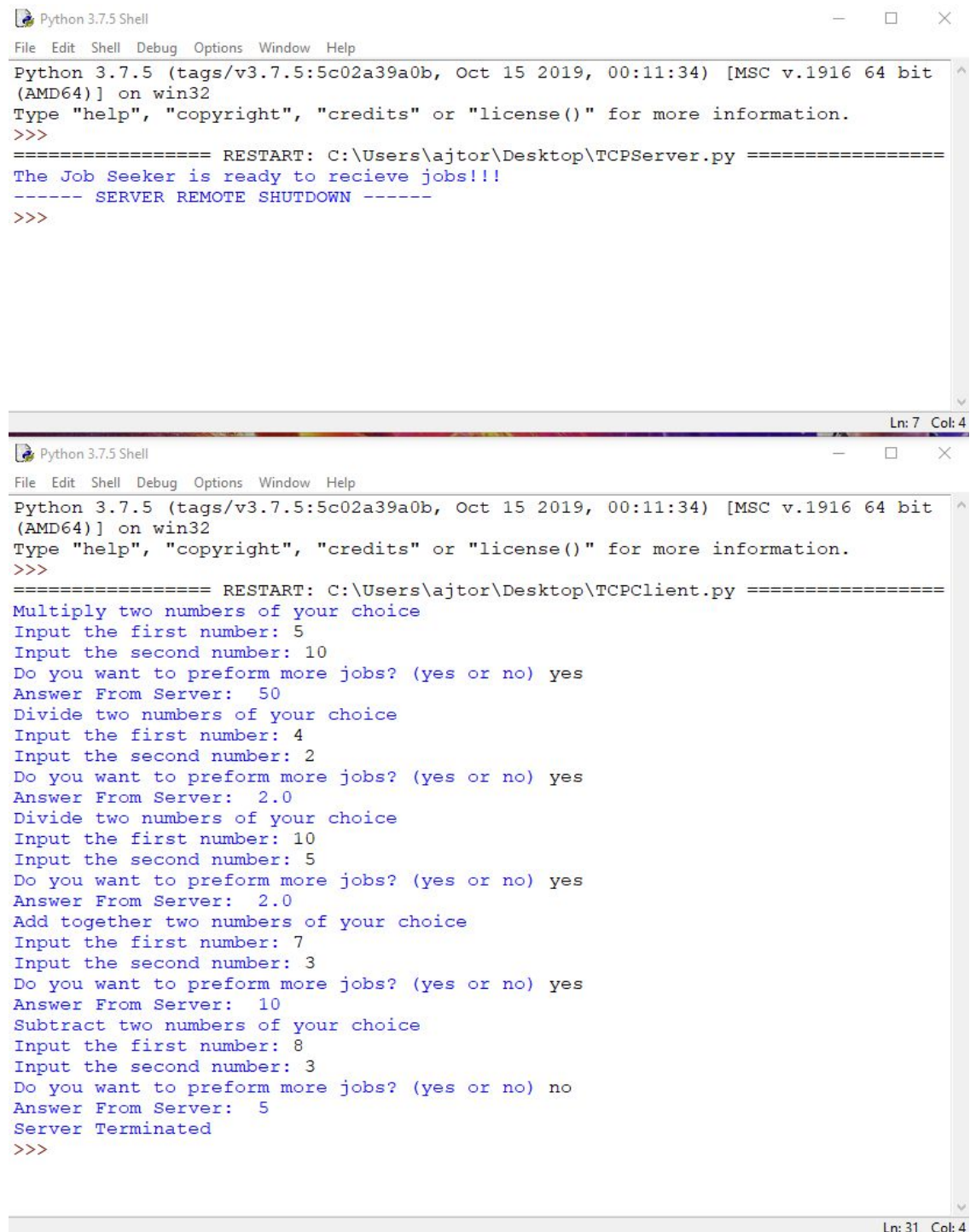The reason we needed a new application layer protocol instead of using existing standard protocols is so we can achieve the desired goal for our protocol.
   - We wouldn't want to use HTTP protocol because we don't want the connection to close right away once the response from the server is received.

- We wouldn't want to use SMTP protocol because we are not dealing with mail transfer.

Our application layer protocol is different from the existing protocols in the sense that it solves the computation of integers and sends the response back as a string all while looping over until it is terminated by the user.

Q3) Provide the implication source code of your network application protocol with sufficient test cases based on the design goals, message philosophy (format, structure, semantics), and Communication rule.

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Python 3.7.5 Shell                                                    —  □  ×

File  Edit  Shell  Debug  Options  Window  Help
Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 00:11:34) [MSC v.1916 64 bit
(AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
================ RESTART: C:\Users\ajtor\Desktop\TCPServer.py ================
The Job Seeker is ready to recieve jobs!!!
------ SERVER REMOTE SHUTDOWN ------
>>>
                                                                    Ln: 7  Col: 4
```

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Python 3.7.5 Shell                                                    —  □  ×

File  Edit  Shell  Debug  Options  Window  Help
Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 00:11:34) [MSC v.1916 64 bit
(AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
================ RESTART: C:\Users\ajtor\Desktop\TCPClient.py ================
Multiply two numbers of your choice
Input the first number: 5
Input the second number: 10
Do you want to preform more jobs? (yes or no) yes
Answer From Server:  50
Divide two numbers of your choice
Input the first number: 4
Input the second number: 2
Do you want to preform more jobs? (yes or no) yes
Answer From Server:  2.0
Divide two numbers of your choice
Input the first number: 10
Input the second number: 5
Do you want to preform more jobs? (yes or no) yes
Answer From Server:  2.0
Add together two numbers of your choice
Input the first number: 7
Input the second number: 3
Do you want to preform more jobs? (yes or no) yes
Answer From Server:  10
Subtract two numbers of your choice
Input the first number: 8
Input the second number: 3
Do you want to preform more jobs? (yes or no) no
Answer From Server:  5
Server Terminated
>>>
                                                                    Ln: 31  Col: 4
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