New York University
Tandon School of Engineering
Department of Electrical & Computer Engineering

Introduction to Operating Systems (CS-GY6233)
Fall 2020

Assignment 6
(15 points)

a) (10 points) Write two programs, a producer and a consumer, that communicate via a TCP/IP socket.

The producer program's main routine obtains two parameters `n` and `d` from the user, i.e. passed to your program when it was invoked from the shell (n is smaller than 100). It then creates an arithmetic sequence of length `n`, and whose first element is 0 and each subsequent element has the value of `kd`, where k is the element number (k=0 to n-1). The producer sends elements of the sequence to the consumer program via a TCP/IP socket one element at a time, waiting a random time between transmissions (0 to 1 second). At the end, the producer sends a sentinel value (= -1) to signal the end of transmission to the consumer and then exits. At such point, a total of (n+1) transmissions have taken place.

The consumer program (server) listens on the socket and receives and prints all the elements transmitted. Since it does not know the size of the sequence n, it relies on the sentinel to detect the end of transmission.

You need to invoke the consumer (server) first from the command shell, and then the producer (client). Use port 8000 for the server port.

Use the following socket functions in their default mode. You may use the `man` command in your Linux virtual machine for information about the parameters:

CLIENT	**SERVER**
socket() – opens a socket (similar to pipe())	socket()
connect() – connects to a server	bind() – assigns a particular port number to the server listen() – listens to connection requests from clients accept() – accepts a connection from client
write() – writes a buffer to server, just as in file or pipe writing	read() – reads a buffer from client, just as in file or pipe reading
close() – closes the socket	Close()

(2 points): Answer the following:

1. Which of the calls above are blocking and which are not? Explain what that means? Is this a form of direct communications or indirect communications?
2. How would you change your program to communicate between processes in a different machine?

b) (1 points) In assignment 4 part 2, print the start address of the shared buffer for both processes.
   1. (1 point) Is it the same when printed from both processes? and why?
   2. (1 point) Is the address you printed a virtual address or a physical address?

What to hand in (using NYU Classes):

- Your ".c" and ".h" files (with appropriate comments).
- A screen shot of your terminal window showing the current directory, the command used to compile your program, the command used to run your program and the output of your program.

RULES:

- You may consult with other students about GENERAL concepts or methods but copying code (or code fragments) or algorithms to solve your coding assignment is NOT ALLOWED and is considered cheating (whether copied form other students, the internet or any other source).
- If you are having trouble, please ask your teaching assistant for help.
- You must submit your assignment prior to the deadline.