New York University
Tandon School of Engineering
Department of Computer Science and Engineering

Introduction to Operating Systems
Spring 2025

Assignment 6
(10 points)

1) (8 points) Repeat assignment 5B, except that you shall now use a TCP/IP socket for communicating between the processes instead of a pipe.

   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
read() – reads a buffer from the socket, just as in file or pipe reading	write() – writes a buffer to the socket, just as in file or pipe writing
close() – closes the socket	close()

   You shall use sockets of (domain, type, protocol) = (AF_INET , SOCK_STREAM, 0) and assign the **parent (consumer) as the server** and the **child (producer) as the client**.

   Insert an initial random wait (1 to 5 seconds) at the server process (but not the client) prior to it starting to listen and accept connections.

   The client may thus fail to connect if it tries to do so before the server has started to listen (which is after the random wait). As such, you should insert a loop in the client that repeatedly attempts to connect, waiting 100 ms between attempts, till it succeeds, eventually.

2) 2 points): Answer the following **for part 2**:
   a. Which of the calls above are blocking and which are not?
   b. Is this a form of direct communications or indirect communications?
   c. What is the failure flag returned from connect() that indicates the server is not ready?
   d. How would you change your program to communicate between processes in different machines?

What to submit to gradescope:

Please submit the following files individually:

1) Source file(s) with appropriate comments.

The naming should be similar to "**lab#_$.c**" (**#** is replaced with the assignment number and **$** with the question number within the assignment, e.g. lab4_b.c, for lab 4, question b OR lab5_1a for lab 5, question 1a).

2) A single pdf file (for images + report/answers to questions), named **"lab#.pdf"** (**#** is replaced by the assignment number), containing:
    - Screen shot(**s**) 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.
3) Your Makefile, if any. This is applicable only to kernel modules.

RULES:

- You shall **use kernel version 4.x.x or above**. You shall not use kernel version 3.x.x.
- You may consult with other students about GENERAL concepts or methods but copying code (or code fragments) or algorithms 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.