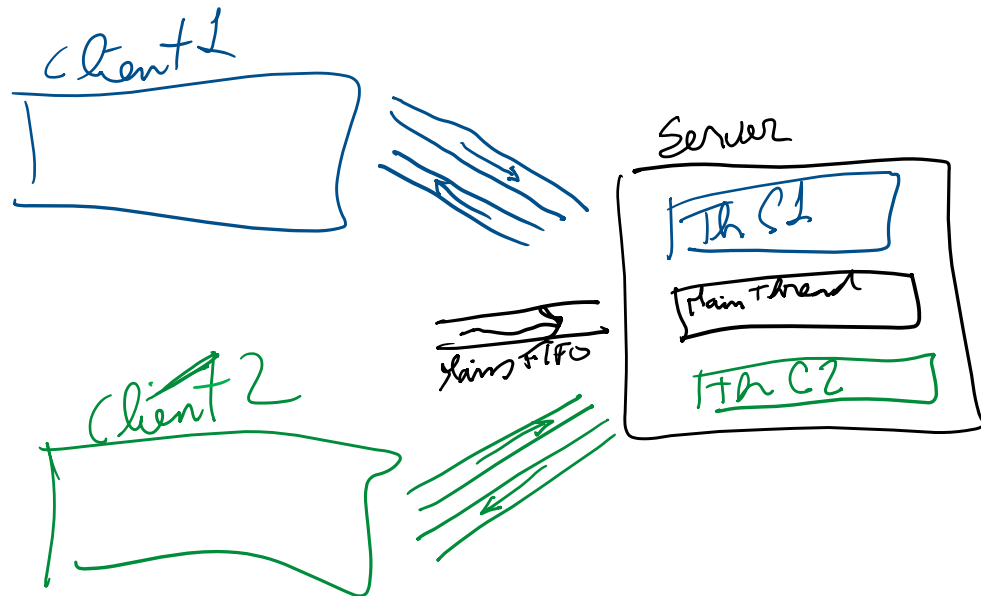


System Programming

6th Laboratory (24 ... 27 March 2020)

I

In this laboratory students will implement a system verifies if numbers generated by various clients are prime. The system is composed of a multithreaded server and multiple clients as identified in the figure:



The clients will communicate with the server using various FIFOs:

- the **main FIFO** will be used for the establishing of communication between the clients and the server
- a pair of **private FIFOs** will allow “private communication” between a client and a

The client will generate random numbers, send each value to the server and wait to an answer (whether those numbers are prime or not). The execution flow of a client will be:

- create two **private FIFOs**
- open main FIFO
- send its PID to the server (through the **main FIFO**)
- loop
 - create random number
 - send number to one the private FIFOs
 - receive the response from the other private FIFO

The server will create one thread for each client, that whenever receives a number will verify if it is prime and sends a response to the client.

<p>The flow of the main thread is:</p> <ul style="list-style-type: none"> • Creation of the main FIFO • Loop <ul style="list-style-type: none"> ○ Read client PID ○ Create new client thread 	<p>Each of the client threads will:</p> <ul style="list-style-type: none"> • Open the two private FIFOs • Loop <ul style="list-style-type: none"> ○ Read a number from one of the private FIFOs ○ Determine whether such number is prime ○ Send the response to the other private FIFO
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After each client disconnect the server should terminate the corresponding thread and close the files.

Things to define before starting to program

- Name/location of the **main FIFO**

This location should be absolute (starting at the root of the file system).
A good place can be the **/tmp/** directory. In Windows Subsystem for Linux (WSL) it is fundamental to use the **/tmp/** directory!

- Format of the names of the **private FIFOs**

This location should be absolute (starting at the root of the file system).
A good place can be the **/tmp/** directory. In Windows Subsystem for Linux (WSL) it is fundamental to use the **/tmp/** directory!

- Name/Location of the **private FIFO** that is used to send numbers from client to server
- Name/Location of the private FIFO that is used to return the response from the server to the client
- Format of the data transferred in the main FIFO
- Format of the data transferred in each of the private FIFO

SYSTEM CALLS

- mkfifo
- unlink
- open / read / write

REFERENCES

- <http://tldp.org/LDP/lpg/node7.html> (section 6.3)
- <http://beej.us/guide/bgipc/html/multi/fifos.html>