Task 3 – IPC – Can be done in pairs (NOT triples)

This time, we are dealing with communications.
Your goal is to implement a chat tool, that well help to set some performance tests.

Part A: basic functionality (25 pts)
Implement a chat cmd tool that can send messages over the network, to the same tool ,listening on the other side, and get the response, so there will be **2 sides** communication, simultaniosly
Name the tool **stnc** (**st** for students, **nc** for network communication). The usage s like this:
The client side: stnc -c IP PORT
The server side:stnc -s PORT
the communication will be done using IPv4 TCP protocol

By “chat” we mean a tool that can read input from keyboard, and **in the same time** listen to the socket of the other side.

Part B: performance test (75 pts)
Extend your tool, to make it a network performance test utility.
You can use your chat channel, for system communication, like transferring states, times , etc.
By performance test we mean the next task.
1) Generate a chunk of data, with 100MB size
2) Generate a checksum (hash) for the data above
3) Transmit the data with selected communication style, while measuring the time it takes
4) Report the result to stdOut

communications styles are:
tcp/udp ipv4/ipv6 (4 variants)
mmap a file. Named pipe (2 variants)
Unix Domain Socket (UDS) :stream and datagram (2 variants)

usage:
The client side: stnc -c IP PORT -p <type> <param>
-p will indicate to perform the test
<type> will be the communication types: so it can be ipv4,ipv6,mmap,pipe,uds
<param> will be a parameter for the type. It can be udp/tcp or dgram/stream or file name:

You have only 8 combinations:
ipv4 tcp
ipv4 udp
ipv6 tcp
ipv6 udp
uds dgram
uds stream
mmap filename
pipe filename

The server side: stnc -s port -p (p for performance test) -q (q for quiet)
-p flag will let you know that we are going to test the performance.
-q flag will enable quiet mode, in which only testing results will be printed.
(This is extremely important for the automatic test.)
the results will be in milliseconds (ms) and printed like this
name_type,time

Examples:

```
ipv4_udp,112233
uds_stream,112233
mmap,223355
pipe,554411
```

Notes:

- It's clear that the performance test tool is NOT a chat tool, so there is no expectation to have a conversation before or after the test. Both the client and the server will finish once the test of the requested type is done
- You can use the ./ command then needed. As it's a port of a command to a shell to exec a code, its not listed on the usage sections
- If there is a error in parameters, like missing params, or giving some malformed text, print the help/usage text (in any form) and exit
- It's highly suggested to use the Beej IPC Guide, available at https://beej.us/guide/bgipc/html/
- the task is meant to be done with poll/select api, and without threads

Administrative details:
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What you need to submit:
1) all the **code C** files that have been used
2) a **Make** file for your solution, including **default** and **clean** options,that will generate execution files, **named as specified in the task**
3) a plaint text file (aka read.me) that will explain the usage of each tool and
your system environment (flavot of Linux).
Also a screenshot may be added (but not obligatory)

The task intends to be checked automatically. Therefore:
1) Please, don't add any unnecessary folders, or files, as the submission may be ignored
2) You should provide a **ZIP** archive (nor rar/7z/tar etc.). Files in a wrong archive will not be checked
3) A **working make** file is a MUST for the task. Broken make (for any reason), will cause the whole work to get a zero mark, even if the code is perfect.
Beware of using mac OS, windows subsystem, and so on, as they may append changes
4) The executable should be named according to the task. Wrong name may lead to a zero (0) mark.

5) Don’t wait for the last day to submit your work. No excuses like “pc fall from 5-th flor, water ruined the memory, windows update brooked the file system” and so on will be accepted.
Verify on the moodle website, that the work is submitted. You may (but not have to) provide a screenshot of the submission.
6) If you are late with the submitting and have a good reason (Reserves, seeks, wedding, etc.), you have to provide evidence for that, and you can not submit with another person who is your pair, but don’t have any reason being late. The penalty for being late without a reason will be 5 points for a day, and you MUST update your trainer about that, and follow the instruction if they exist.
7) A screenshot from camera/phone is not accepted