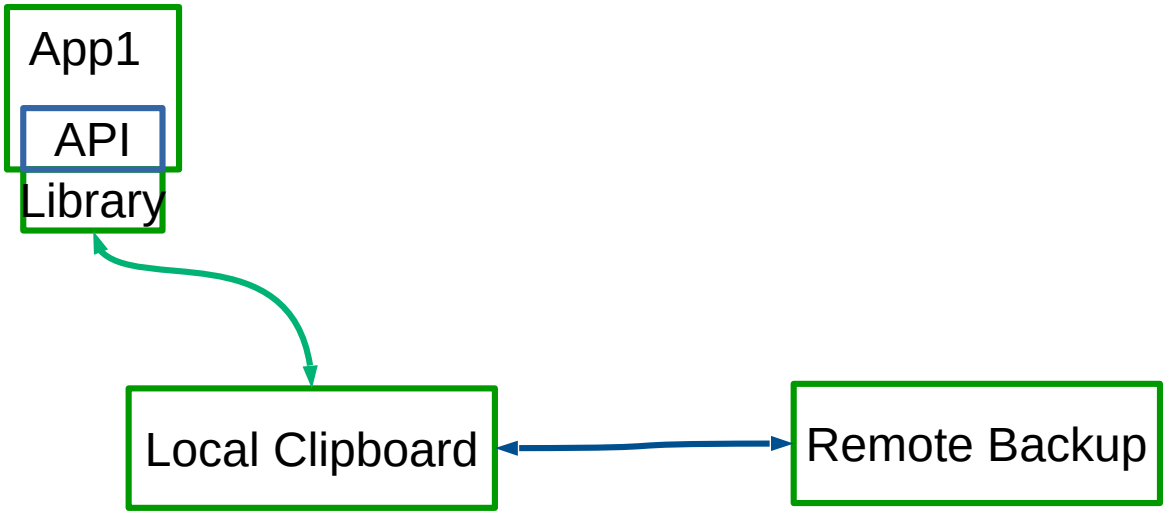
System Programming
7th Laboratory (17, 18 and 20 of April 2018)

The objective of this laboratory is to exercise communication using INTERNET domain STREAM sockets and continue the implementation of the project

Objectives

in this laboratory students will modify the code developed in the previous laboratory by implementing the communication between different processes that run in different machines.
Since thread were not taught each process can only handle one communication channel, and in this laboratory Remote Clipboards will be replaced by a Remote Backup.
In this laboratory applications continue to interact with the server one at a time, and there is only one Clipboard and one Backup process.



The Remote Backup process will hold a copy of the 10 regions containing the same values as the regions on the Local Clipboard.

When the Clipboard starts it will contact the Remote Backup to fetch the values of the 10 regions.

Clipboard

When running the Clipboard the user can use the **-c** argument (as explained in the project assignment).
If a valid address and port is given, the Clipboard will contact with use it to contact the Remote Backup. If it is possible to establish connection the Remote Backup will send to the Clipboard all data.
If that argument is not used the Clipboard will work as described in the last laboratory.

After fetching all data, the Clipboard will start accepting connections from the local applications and server their requests.
If an application issues a copy command the value sent by the application will be replicated to the Remote Backup.

Addresses and ports

To test the Remote Backup, students can run it in the same machine as the Local Clipboard. In this case the client (Local Clipboard) can use the address 127.0.0.1 to connect to the server.
If the students want to experiment the Clipboard and Backup in different machines they should be in the same network or the computer running the Backup should have a valid public address.

On the Backup, the port number can be randomly generated and should be printed on the screen.
The port number should be in the range [1024, 64738].

API

No changes on the API should be made.

Test application

To test the work in this laboratory students should stop and restart the Local Clipboard on order to evaluate if values are replicated to the Backup and fetch on startup.

Supplied code

Students should continue and change the code developed in the previous laboratory.

Error validation

When doing network communication a lot of additional errors can affect the client and the server.
Students should guarantee that all function that return an error code, get validated.
In case of error a suitable action should be taken (ignore, terminate processing, exit, …).
Students should study each function (in the man command) to know what are the return codes:

- socket
- bind
- listen
- connect
- accept
- send or write
- recv or read

Optimizations

Students can start evaluate and decide the best code organization to reduce the time to

process and answer to the applications requests.