

Exam instructions:

- The students' resolution of this exam **should be scanned** and uploaded as a result of the **Written Exam C** task in Aula Global (M95).
- **You can use free scanning applications** like FotoScan (Android, iOS), HP Smart (Android, iOS) or OfficeLens (Android, iOS).
- **You must add the DNI, NIE or passport and the ethical commitment text** that was provided on the previous page. You can write it by hand or print and scan it. This should be **the first scanned page of the exercise that you upload as a task in Aula Global**.
- The duration of this part is **90 minutes**, including the scan and upload time of your exam.
- The total mark of the exam is over 2.5 points.

Problem 1 (5 puntos)

Implement a program that, given (via command line) a filename, a string and, optionally, the string MAY (as last argument):

1. Checks the number of arguments received.
2. Checks if the file exists and can be read and written. If not, displays an error message and terminates.
3. If the user has not entered an additional argument, it will print on the screen all the lines of the file where the first string appears.
4. If the user has entered MAY, it should print the lines where the string is found on the terminal, but all occurrences of the entered string should appear in upper case.

You can use the function

char *strstr(**const char** *haystack, **const char** *needle)

which looks for the first occurrence of the substring needle in the larger string haystack. If found, it returns a pointer pointing to the beginning of the substring found. If not found, it returns a NULL.

Example. If the content of the file fich is:

```
hola Adios
hola holita hola
good bye
```

Example of execution:

```
$ ./find_to_upper fich
Not enough arguments
$ ./find_to_upper fich hola
hola Adios
hola holita hola
$ ./find_to_upper fich hola MAY
HOLA Adios
HOLA holita HOLA
$ ./find_to_upper fich la MAY
HoLA Adios
HoLA holita hoLA
```

Problem 2 (5 puntos)

Implement a program called `one` which:

1. Waits in a loop for SIGTSTP or SIGINT to be received, with the reception of the latter signal causing the program to terminate.
2. The program should count the number of SIGTSTPs it receives and if this number is a multiple of 5, it will send the contents of that counter to process `two` via a **named pipe**. While sending the contents to process `two`, it shall ignore any possible arriving signals until the sending finishes.
3. When it receives SIGINT, it will terminate, but before it terminates, it must indicate to process `two`, through whatever mechanism you decide, that it must also terminate.

Also implement the program `two` that:

1. Waits in a loop for the value of the counter sent to it by the process `one`.
2. When it has received the data, it will create a new process that executes the `echo` command.
 - The command to execute is
`echo "The number is: " the ReceivedNumber`
 - The executable of the `echo` command is located in `/bin/echo`
 - The `echo` command will receive `two` parameters: the string "The number is:" and another string which should be the transformation to string of the number received by the named pipe.
3. When the process `one` tells it to terminate (using the mechanism of your choice), it will print out how many numbers it has received through the named pipe.

There is no kindship between processes one and two, you can use chose the name of the named pipeline.

Example of execution of both processes.**Execution of uno:**

Ejecución de \"uno\":

```
$ ./uno
^Z Continue
^Z Continue
^Z Continue
^Z Continue
^Z Received 5 SIGTSTP: 5 0
Continue
^Z Continue
^Z Continue
^Z Continue
^Z Continue
^Z Received 5 SIGTSTP: 10 5
Continue
^Z Continue
^Z Continue
^Z Continue
^Z Continue
^Z Received 5 SIGTSTP: 15 10
Continue
^Z Continue
^C Finishing
$
```

Execution of dos:

```
$ ./dos
The number is: 5
My child 11483 that executed echo has terminated with state 0
The number is: 10
My child 11484 that executed echo has terminated with state 0
The number is: 15
My child 11485 that executed echo has terminated with state 0
I have received 3 numbers
$
```