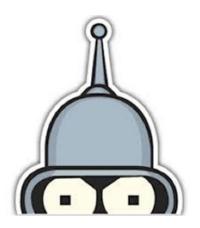


## **B2 - Stumpers**

B-CPE-210

## SandPile

Duo Stumper



1.01





## SandPile

binary name: sandpile

repository name: CPE\_duostumper\_\$STUMPERNUMBER\_\$ACADEMICYEAR

repository rights: ramassage-tek

language: C

compilation: via Makefile, including re, clean and fclean rules



- Your repository must contain the totality of your source files, but no useless files (binary, temp files, obj files,...).
- Error messages have to be written on the error output, and the program should then exit with the 84 error code (O if there is no error).



The \$STUMPERNUMBER is always on one digit: 1, 2, ...



For this project, the only authorized functions are those of the standard libc.

The goal of this project is to develop an hour-glass when looked from above.

Let's imagine a rectangular grid, with each square containing grains of sand.

When there are at least four grains of sand in the same square, it becomes unstable.

It will then distribute a grain of sand into each of the 4 neighboring squares, and its own number will decrease by 4.

One collapse can lead to another, which will create a chain reaction:

++	++	++	++	++
010	010	021	021	131
222  >	232	>  320  >	330  >	>  111
233	233	311	311	031
++	++	++	++	++

Your project will take three parameters: a path to the file containing the initial grid, a string containing the characters used to represent the number of grains of sand in a cell and a number of iterations to apply on the supplied grid.



The initial grid should be valid and in a stable configuration. If it's not the case, your program must consider it as an error!





Your program will display the initial grid after n iterations of following sand (n>=0).

The grains of stand will always stay in the center of the grid (or as close as possible to the center, starting from the top-left corner).

```
Terminal - + x

~/B-CPE-210> cat -e map.txt

021$
320$
311$
~/B-CPE-210> ./sandpile map.txt "0123" 2

131
111
031
~/B-CPE-210> cat -e map2.txy
acb$
dca$
dbb$
~/B-CPE-210> ./sandpile map2.txt "0123" 2 &>/dev/null; echo $?

84
```