

Multi-Task Programming - Assignment 1

Parallel Image Processing with UNIX Processes

The purpose of this assignment is to implement a program in C or C++ that is able to perform traditional image processing such as blurring, sharpening and edge detection. See the following *wikipedia* article for more details : [https://en.wikipedia.org/wiki/Kernel_\(image_processing\)](https://en.wikipedia.org/wiki/Kernel_(image_processing)).

This program has to be designed to take advantage of all available processors to reach the best possible performance by using UNIX processes (see, `man 3 get_nprocs` to get the number of processors currently available).

A sequential implementation is available on the course web page (see `image_processing.c` compiled with `gcc image_processing.c -lm`). This program takes two arguments : an input image filename followed by an output image filename. Images have to follow the *Portable GrayMap* format (magic number : P5). See, <http://netpbm.sourceforge.net/doc/pgm.html> for more details. An example of input file is available on the course web page (see `eiffel.pgm`). Images can be converted to the *pgm* format with the `convert` command from the *imagemagick* package. For example, `convert eiffel.jpg eiffel.pgm`.

The evaluation of your assignment will take into account the following points : computation time, memory usage, correctness, source code structure, and the good use of CPUs available. Your implementation will be tested on a 16 cores workstation.

Modalities

This assignment is to be made in groups of at most *two* persons.

All the source files, a `Makefile`, and a `README` (enclosed in a `.tar.gz` or `.tgz`) have to be sent by e-mail to `julien.roland@isen-lille.fr` no later than **Thursday, February 2, 2018 at 08:30**. (Please mention as subject of the email MULTITASK PARALLEL ASSIGNMENT 1 2018) The archive has to be named as follows: `<Lastname1Firstname1>_<Lastname2Firstname2>.tar.gz` (e.g. `ThompsonKen_RitchieDennis.tar.gz`).

The source files have to be well structured (pay attention to variable names and the use of functions), and well commented (when needed). You have to check that your program can be executed on Linux (Please mention the Linux distribution and the version of the compiler in the `README`).

The late penalty for this assignment is i points, where $i \in \mathbb{N}^*$ is the number of hours you are late.