Programming Parallel Computers

Aalto 2023

IS4: fast solution ★★

Please note that you can still submit, but as the course is already closed, your submissions will not be graded.

To get started with the development, download the code templates, unzip the file, edit is.cc, and run `./grading test` or `./grading benchmark` to try it out — see the instructions for more details!

Upload your solution as a file here…

Please upload here the file is.cc that contains your solution to task IS4.

Choose File No file chosen

… or copy-paste your code here

Submit

Your submissions

Your submissions to IS4 will appear here; you can simply reload this page to see the latest updates.

What you will need to do in this task

Please read the general instructions for this exercise first. Here are the additional instructions specific to this task:

> Using all resources that you have in the CPU, solve the task as fast as possible. You are encouraged to exploit instruction-level parallelism, multithreading, and vector instructions whenever possible, and also to optimize the memory access pattern. Please do all arithmetic with double-precision floating point numbers.

What I will try to do with your code

I will first run all kinds of tests to see that your code works correctly. You can try it out locally by running `./grading test`, but please note that your code has to compile and work correctly not only on your own computer but also on our machines.

If all is fine, I will run the benchmarks. You can try it out on your own computer by running `./grading benchmark`, but of course the precise running time on your own computer might be different from the performance on our grading hardware.

Benchmarks

Name	Parameters
benchmarks/1 the input is a multicolor image with 100 × 100 pixels	nx = 100, ny = 100
benchmarks/2a the input is a multicolor image with 199 × 199 pixels	nx = 199, ny = 199
benchmarks/2b the input is a multicolor image with 200 × 200 pixels	nx = 200, ny = 200
benchmarks/2c the input is a multicolor image with 201 × 201 pixels	nx = 201, ny = 201
benchmarks/3 the input is a multicolor image with 400 × 400 pixels	nx = 400, ny = 400

Grading

In this task your submission will be graded using benchmarks/3: the input is a multicolor image with 400 × 400 pixels.

The point thresholds are as follows. If you submit your solution no later than on Sunday, 21 May 2023, at 23:59:59 (Helsinki), your score will be:

Running time	Points
≤ 10.000 sec	1
≤ 8.000 sec	2
≤ 4.000 sec	3
≤ 3.000 sec	4
≤ 2.000 sec	5

If you submit your solution after the deadline, but before the course ends on Sunday, 04 June 2023, at 23:59:59 (Helsinki), your score will be:

Running time	Points
≤ 8.000 sec	1
≤ 4.000 sec	2
≤ 2.000 sec	3

Contest

Your submissions to this task will also automatically take part in the contest, and you can receive up to 2 additional points if your code is among the fastest solutions this year!

Running time	Extra points
≤ 1.20 × fastest	1
≤ 1.05 × fastest	2