

Parallel Programming Assignment 1

Deadline: April 9, 2024, 23:59 CEST

General Notes:

- For the programming assignments, you may use either of the programming languages C, C++, or Fortran. On the FANG HPC system, the corresponding compilers can be invoked by the commands `gcc`, `g++` and `gfortran`, respectively.
- In order to submit your solutions, follow the instructions given in the course webpage in our Elearning system, <https://elearning.thws.de/course/view.php?id=26935>. In particular, you must upload the following files to the directory indicated in the Elearning courseroom:
 - your source code file(s),
 - all your include files,
 - a shell script that invokes the compiler and the linker and thus builds the executable and,
 - (unless specified otherwise) a Slurm batch file that can start the program on our HPC system.

Further information is given in the courseroom. If anything is unclear or does not work as expected, you should ask me for clarification and/or support.

-
1. Write a program that displays the message

`Hello, World`

to the screen.

(10 Points)

2. Write a program that is to be invoked with one command line argument. This argument should be a character string to be interpreted as a file name. The program should perform the following operations:

- (a) Test whether a file with the given name exists in the current directory. If the file does not exist, write a corresponding error message to `stderr` and exit with error code 1.
- (b) Otherwise, open the file and read the contents line by line.
- (c) Assume that each line consists of a comma separated list of floating point numbers, with the same number of entries in each line. The contents of the file should therefore be interpreted as a matrix. Store the coefficients $a_{j,k}$ ($j = 1, 2, \dots, J$; $k = 1, 2, \dots, K$) of the matrix in a suitable data structure.
- (d) Print the following values to the screen:
 - the coefficient $a_{1,1}$,
 - the number $\sum_{k=1}^K |a_{J,k}|$,
 - the number $\max_{j=1,2,\dots,J} \sum_{k=1}^K a_{j,k}$.
- (e) Close the file and exit with error code 0.

(120 Points)