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Summer Semester 2024

Parallel Programming
Assignment 5

Deadline: Tuesday, June 4, 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.
- To submit your solutions, follow the instructions given in the course webpage in our Elearning system.

Background: In the OpenMP chapter of the lectures, we had discussed the Gauss-Jacobi method for (approximately) solving large systems of linear equations. In particular, we had derived the sequential form of the algorithm and a parallel version using OpenMP.

Question:

1. Write a program that implements a parallel version of the Gauss-Jacobi algorithm as described earlier, but using MPI.

   Your program should read the coefficient matrix of the system and the right-hand side from a file and print the output to another file. Both file names should be passed to the program via its argument list.

   Create a number of large equation systems whose solutions you know and test the program with these systems. Please also upload the input and output of the program to your directories.

   Provide detailed comments explaining the MPI commands that you use.

   Test your program on the compute node `fang-s010` with 6, 12 and 16 processes.

   (400 Points)