

Exercises part.3

29 March 2017

Parallelization

The target of this exercise is to solve the **Laplace Equation** in parallel

1) Distributed vectors

1. Initialize MPI
2. Find a convenient way of distributing vectors to the different N^{ranks} processors and store info on local sizes
3. Generate a random Laplace problem paying attention to distributed random generator issues: the generated problem should not depend on the number of processors

2) Implement gathering of non-local data

Choose one of (or optionally both) the two efficient approaches illustrated in the lecture:

1. Shifting the vector back/forward (you can optionally avoid creation of buffer)
2. Caching non-local data

to apply the discrete Laplace matrix to a vector.

3) Run the full solver

1. Perform global reduction of the scalar products
2. Run the solver and compare the results with those obtained in the scalar code
3. Take a large problem and perform benchmarks: produce plots of the weak/strong scaling of your implementation(s)