ACM40660/PH504 Practical 9

ICHEC

2022/23 Spring

1 Cartesian topology

Consider a n by m matrix with integer elements. Write a code that does the following:

1. the matrix is split in $p \times q$ blocks with each block distributed on a process, see fig. 1. (p·q=number of processes.)

2. create a Cartesian topology that matches the above block distribution. Use periodicity.

3. initialise he matrix with random values of 0 and 1. You can use ran2.c/ran2.F90 from Assignment 02 to generate random numbers. Be sure that running the code on 1 process or on more, with the same starting seed, results in the same random distribution for your matrix. **Hint:** let process 0 generate the data for each sub-matrix and then send it to the right process. An alternative is to put the random number generator in the proper state in each process.

4. for each process find its Cartesian neighbours.

5. add a function that computes for the sum of all elements in the local block.

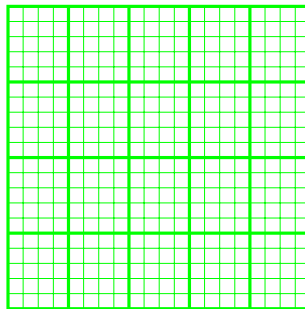6. reduce this in the process 0.

Figure 1. A matrix and its sub-blocks. Each sub-block shall be associated to a process from the Cartesian topology.