

## Task 09 – Parallelization with CPU

- 1) Implement daxpy code (sum of two vectors  $d = x + y$ ) using openmp directives, compare time wrt serial.
- 2) Implement daxpy code (sum of two vectors  $d = x + y$ ) using MPI directives [since you are not using a cluster do not spawn more than 4 tasks (`mpirun -np 4 ./your_daxpy.x`) and limit the number of elements to no more than  $N = \text{few } 10^6$ ], compare time wrt serial.
- 3) (Optional) Implement the reduction of the vector  $d$  (`total_sum = sum(d)`) using openmp and MPI, check that result is “equal” to the serial version.

NOTE: the openMPI library should be present in all linux distribution, so it is not necessary to compile it by yourself.