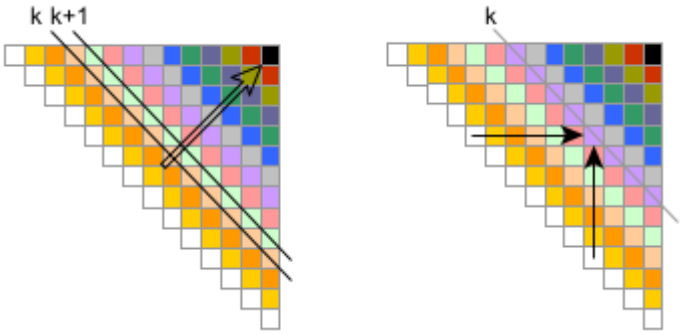
Project 1
SPM course a.a. 23/24

May 17, 2024

Distributed Wavefront computation

Consider the same problem of Assignment 1 (wavefront computation). Instead of the work function "wasting time" used in the Assignment 1 version, for each diagonal element of the matrix M (NxN) of double precision elements, the new distributed version computes the *n-k* diagonal element $e^k_{m,m+k}$ ($m \in [0, n-k[$) as the result of a dotproduct operation between two vectors v^k_m and v^k_{m+k} of size k composed by the elements on the same row *m* and on the same column *m+k*.

$$e^k_{i,j} = dotprod\left(v^k_m, v^k_{m+k}\right)$$



The values of the element on the major diagonal $e^0_{m,m}$ are initialized with the values (*m+1)/n*.

Implement two parallel versions:

1. For a single multi-core machine using the FastFlow library
2. For a cluster of multi-core machines using MPI.

The developed code should be delivered in a tarball (tgz or zip) with a PDF document, a Makefile/Cmake for compiling the source code on the spmcluster machine, and all scripts for running the tests using SLURM.

The PDF document must describe the parallelization strategy adopted, the performance analysis, the plots of the speedup/scalability/efficiency obtained by the tests, comments, problems faced, etc. It should be at most 12 pages long.