Lab 5: Getting started with parallel performance models

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Task 5.1

Analize with your partner both codes 5.1 and 5.2 that implement a matrix- vector multiplication. Write in the report of this laboratory the main differences of both codes.

The main difference is that the sequential program does all the operations sequentially, while the parallel code distributes the work among different processes, and then computes the work in parallel.

The parallelization of the matrix vector product is done by scattering across the processors the rows of the matrix A in groups, scattering the vector and then all-gathering it in the processors, multiplying the local parts of A by the vector in order to get a part of the resulting vector and then gathering all the parts in order to get the full result.

Also, the initialization of the matrices is always performed in sequential.

Task 5.2

Analize Table 5.3 and explain what happened with the relation of terms σ(n) and ϕ(n)/p + κ(n, p). Clarify if in this case the parallelization is a good solution. Justify the answer.

We see that the sequential portion time σ is huge, with respect to the parallelizable part ϕ. Also, with the overhead of communication, we observe the dominant term in the parallel time to be κ(n, p). We estimate it for p=2 and n=32768 as:

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κ(n, p) = 4396 - 818/2 = 3987
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So, in this specific example, parallelization doesn't improve the performance. In fact, it worsens the execution time.