Linear Algebra and Math Libraries

Linear Algebra and mathematical libraries are at the bottom of many widely used scientific and engineering applications. For that reason, finding new ways to improve the performance of these kernels and libraries is essential in order to ensure the performance of the applications built on the top of them.

Summary

A wide variety of High Performance Computing (HPC) applications rely on Linear Algebra and mathematical libraries in order to perform their computations. Therefore, providing optimized versions of these building blocks is important to guarantee good performance for scientific applications. In addition, the increasing amount of different computer architectures and their specific peculiarities (number of cores, memory hierarchy, processor frequency...) requires a proper adaptation and optimization of the existing libraries; and also drives to the creation of new ones that apply different approaches in order to make the best use of the provided resources.

Following these ideas, our research line pursues the creation and optimization of mathematical libraries by using different programming models, especially those that are based on tasks.

Objectives

The main objectives of this research line are:
- Analyze existing solutions in order to find ways to improve them
- Implement kernels and libraries applying different programming models
- Studying the impact of using task-based programming models in mathematical codes
Barcelona Supercomputing Center - Centro Nacional de Supercomputación