15th JLESC Workshop



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Keynote: Vector operations, tiled operations, distributed execution, task graphs, what next?

Tuesday 21 March 2023 14:00 (1 hour)

In the past decades, we have made dramatic changes in the way we express HPC computations. Vector architectures made us employ vector operations, architectures with caches made use leverage tiled kernels, and distributed systems made us express communications. More recently, notably GPU architectures made us try to embrace task-based parallelism so as to efficiently distribute work among a heterogeneous set of resources, and automatically optimize the entailed flurry of data transfers. It is thus intriguing to try to imagine what could be the next programming paradigm shift.

In this talk, I will explore one the current candidates: recursive task graphs. We can indeed notice that they are currently being proposed in various task-based runtime systems. While the details differ, a lot of commonalities arise, and similar performance benefits are observed. On the application side, expressing computation recursively is also a pattern that arises commonly for expressing e.g algorithms on compressed data such as H-matrices. We will thus consider the current proposals and results, and discuss the kinds of benefits that we can expect in the long run. This can include making it easier to express complex algorithms with complex data structures, and improve the efficiency of the execution. It also opens for new perspectives in optimizing execution, which will be part of the just-starting NumPEx PEPR French project.

Session chairperson: Emmanuel Jeannot

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