

A Taxonomy of Application Properties for Mixed-Precision Autotuning

Authors:

Gulcin Gedik, Robert Schöne

Co-author:

Christian von Elm

Mixed-precision arithmetic can reduce time-to-solution and energy-to-solution on modern heterogeneous HPC systems. Yet tool-based mixed-precision autotuning succeeds unevenly across real applications. A key missing piece is application-based guidance: which characteristics make a code a good candidate for mixed-precision autotuners, and which characteristics make the process costly, fragile, or inconclusive. This poster presents a forward-looking vision for application-centric mixed-precision tuning by proposing a taxonomy of properties that shape feasibility and payoff. We relate these property categories to a generic mixed-precision autotuner workflow, producing an impact matrix that clarifies why the same tuning stage can constitute fundamentally different problems across applications, and why tool comparisons without an explicit application-property frame can be misleading. We conclude by outlining how these properties can be operationalized as checklist for assessing application tuning readiness.