Towards optimal performance of SeisSol, an unstructured ADER-DG code.

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SeisSol is one of the leading codes for earthquake scenarios, in particular for simulating dynamic rupture processes and for problems that require discretizing very complex geometries. Spatial adaptivity in 3D is realized by flexible unstructured tetrahedral meshes, using a high-order discontinuous Galerkin discretization and explicit time stepping following the Arbitrary high order derivatives approach. In the first part of the talk we show how hardware-aware programming of the computational kernels, dominated by small-rank matrix multiplication, in SeisSol leads to greatly improved performance on state-of-the-art supercomputing architectures. The second part discusses recent advances in preparing the clustered ADER time integration for large-scale simulations by taking requirements of hardware already in the numerical setup into account.

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