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Grid: A next generation C++ library for data parallel QCD

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We discuss progress and performance from the development of the Grid
data parallel interface for cartesian fields of tensor data types. The
library is suitable for the simulation of QCD including multiple grids.

Wherever appropriate the interface is quite similar to that of QDP++,
but the library makes use of C++11 features to reduce the volume of code,
compared to QDP++ while bringing greater generality and greater performance.

While the library simultaneously targets MPI, OpenMP and SIMD parallelism, the SIMD optimisation is notably flexible. Performance is substantially improved through the use of a data layout transformation and benchmark results are presented for simple Lattice QCD operations and the Wilson operator under AVX, AVX2 and AVX512 instruction set targets.

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