MADNESS

Summary Version
1.0

Purpose of Benchmark

Test single CPU performance and parallel (thread) scaling efficiency.

Characteristics of Benchmark

MADNESS is a framework for numerical simulations that can exploit multiresolution analysis and adaptivity. This benchmark includes the numerical kernel and a thread scaling benchmark. The code is written in C++ and compiles with GCC 4.4+, Clang/LLVM 3.0+, Intel C++ and IBM XLC++ 12 with or without C++11 support.

Instructions for running the benchmarks are in `README.measure`.

The numerical kernel benchmark (`test_mtxmq`) should run at a significant fraction of theoretical peak when properly optimized. Many BLAS implementations do not provide an implementation of `DGEMM` that is suitable for the benchmark, hence a custom implementation of small matrix-matrix multiplication is required – the maximum values of `(m,n,k)` are `(400,20,20)` in the benchmark.

The MADNESS repository contains a set of architecture-specific optimized kernels for SSE, AVX, BGP and BGQ (QPX) that are not included, should vendors wish to consult these for insight into how to develop a custom implementation of the kernel for their architecture.

The threaded benchmarks use the MADNESS runtime with the use of Intel Threading Building Blocks (TBB) optional. The TBB version will be faster but is not available on all systems.

Mechanics of Building Benchmark

Build instructions are given in `README.madness` and `Makefile`.

Mechanics of Running Benchmark

Instructions for running the benchmarks are in `README.measure`.

Benchmark Verification:

The benchmarks are self-verifying.