

LCALS Benchmark in Chapel

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Abstract – The LCALS (Livermore Compiler Analysis Loop Suite [1]) benchmark is a collection of loop kernels developed at Lawrence Livermore National Lab, based partially on the “Livermore Loops” benchmarks. The benchmark consists of three groups of kernels; loops extracted from application codes, simple loops, and the original Livermore Loops. Several of the kernels are implemented in both serial and parallel variants. The currently available implementation is written in C/C++ with OpenMP used for parallel versions of several kernels.

The Chapel team recently ported the LCALS benchmark to Chapel [2] in an effort to evaluate and improve the serial and parallel performance and vectorization capability of the Chapel compiler and runtime. In this talk, we will present the Chapel port of the LCALS benchmark. We will discuss the overall structure of the benchmark, and describe the current performance of the Chapel port of the serial and parallel kernels compared against the reference implementation in C/C++ with OpenMP.

Currently, the serial kernels in Chapel are close in performance with C/C++, but the parallel Chapel kernels are generally between 2-5X slower than C/C++ with OpenMP. We will report on some of the causes of these performance gaps and our plans to help close them.

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Bibliography

[1] <https://codesign.llnl.gov/LCALS.php>

[2] <https://github.com/chapel-lang/chapel/tree/master/test/studies/lcals>