Performance Results

Chapel Team, Cray Inc.
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Executive Summary

● Generally speaking, performance has improved with 1.14

● Previous slide decks have shown performance changes:
  ...due to array optimizations
  ...due to compiler and library optimizations
  ...due to runtime improvements

● These slides contain additional v1.14 performance results
  ● not tied to any specific effort, just comparisons across releases
Outline

- Shootout Benchmarks Trends
- Single-Locale Performance Trends
- Multi-Locale Performance Trends
Shootout Benchmarks Trends
Shootout Benchmarks Trends

- Lots of improvements for shootout benchmarks
Shootout Benchmarks Trends

- Lots of improvements for shootout benchmarks
  - in many cases, the improvements were significant

![Graphs showing benchmark comparisons: binarytrees, threading, nbody, fannkuchredux]
Shootout Benchmarks Trends

- Known regression for chameosredux
  - caused by an atomic load bug fix
Shootout Benchmarks Trends

- **Known regression for meteor-elegant**
  - also caused by an atomic load bug fix
    - surprisingly --no-local performance improved
    - meteor is an incredibly short benchmark, likely just cache effects
      (~40% of execution time is spent in runtime initialization)
  - happily, meteor-fast performance improved
Single-Locale Performance Trends
Single-Locale Performance

- Significant single-locale performance improvements
  - new convergences w/ reference timings; between local and --no-local
  - no known regressions
Multi-Locale Performance Trends
Multi-locale Performance

- Multi-locale improvements for many benchmarks
- No known regressions

![Graphs showing performance improvements](image-url)
Performance Priorities and Next Steps
Performance Priorities and Next Steps

● **Continue to improve ugni+qthreads performance**
  ● understand differences compared to ugni+muxed
  ● strive to close performance gaps and retire muxed tasking

● **NUMA-aware performance**
  ● strive to support NUMA by default without performance loss

● **Continue benchmark-driven improvements**
  ● single locale:
    ● eliminate remaining performance gap for LCALS
    ● improve performance for shootouts and proxy apps
  ● multi-locale:
    ● reduce unnecessary communication code
    ● optimize scalability of core algorithms (task spawning, reductions, barriers)
    ● focus on ISx, MiniMD/CoMD, LULESH
    ● consider submitting an entry for 2017 HPC Challenge
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