

# Performance Results

**Chapel Team, Cray Inc.**  
**Chapel version 1.16**  
**October 5, 2017**





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# Executive Summary

- **Generally speaking, performance has improved with 1.16**
- **Previous slide decks have shown performance changes:**
  - ...due to array improvements
  - ...due to compiler and library optimizations
  - ...due to runtime optimizations
- **These slides contain additional v1.16 performance results**
  - not tied to any specific effort, just comparisons across releases



# Outline

- Single-Locale Performance Trends
- Multi-Locale Performance Trends
- Scalability Trends

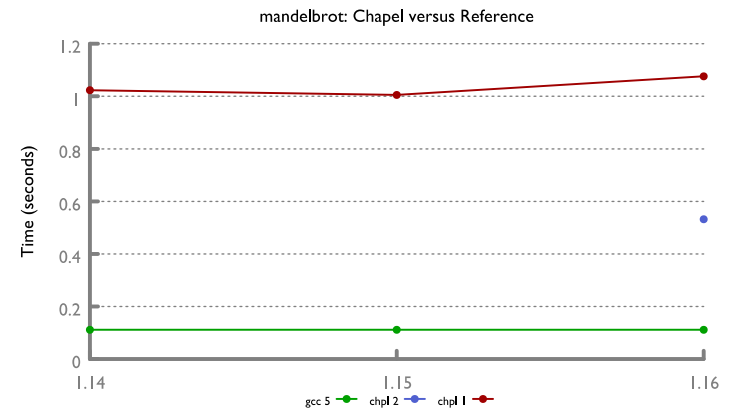
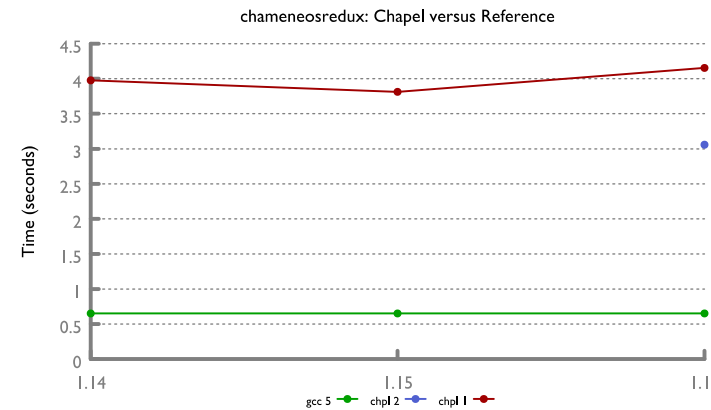
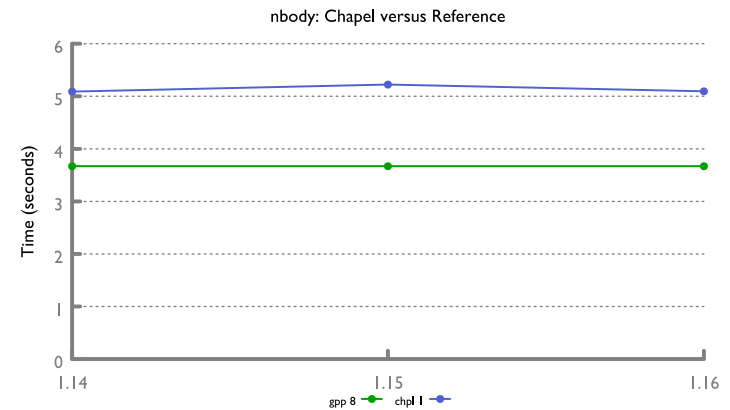
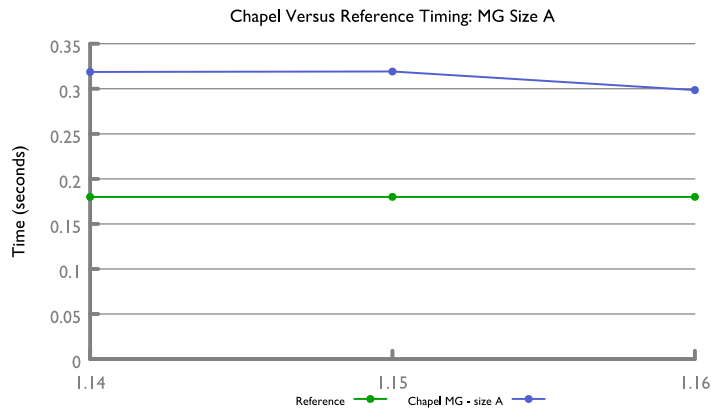


# Single-Locale Performance Trends



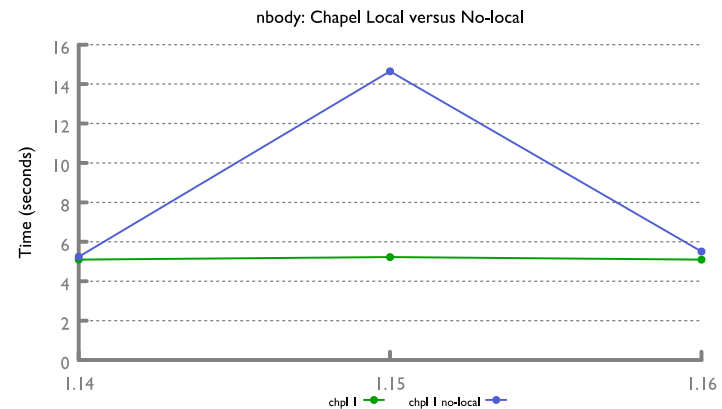
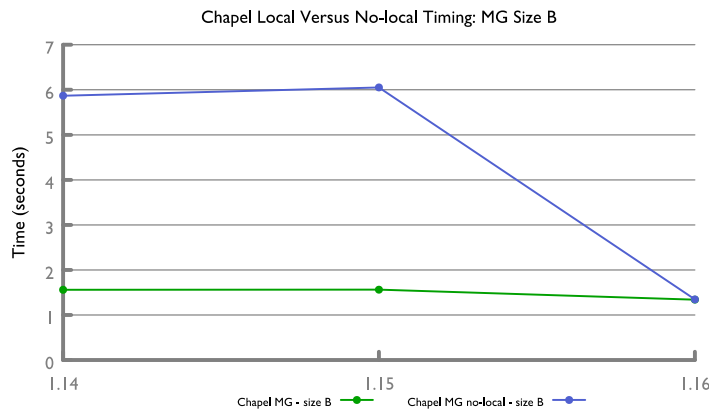
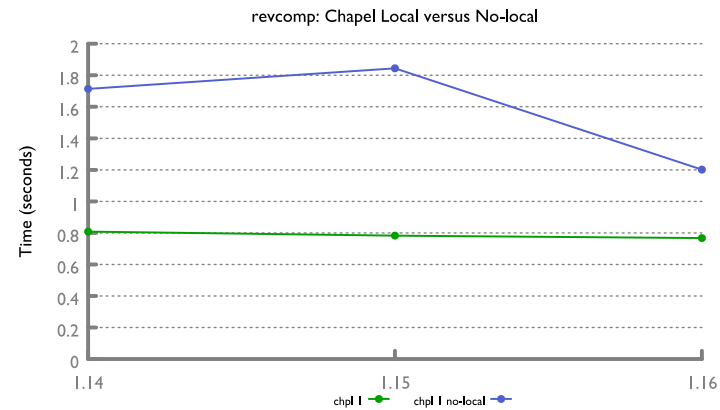
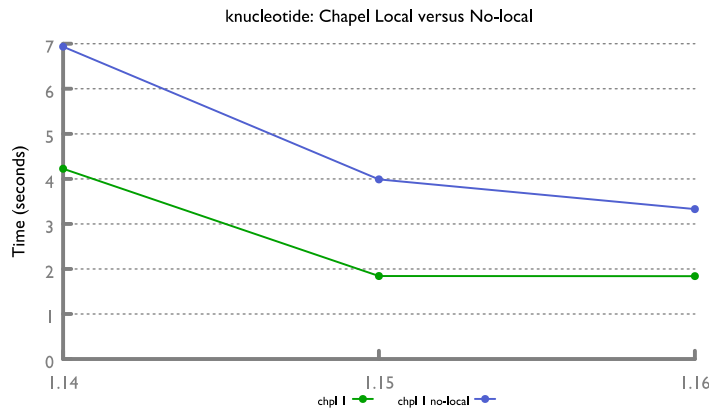
# Single-Locale Performance

- No major --local performance changes
  - Minor improvements and regressions



# Single-Locale Performance

- Some significant --no-local performance improvements
  - No known regressions



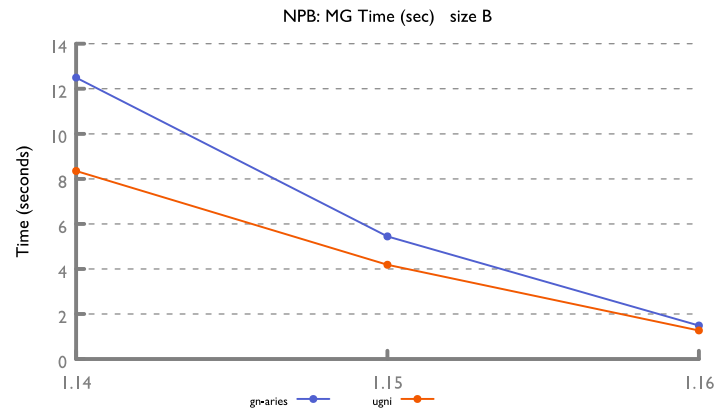
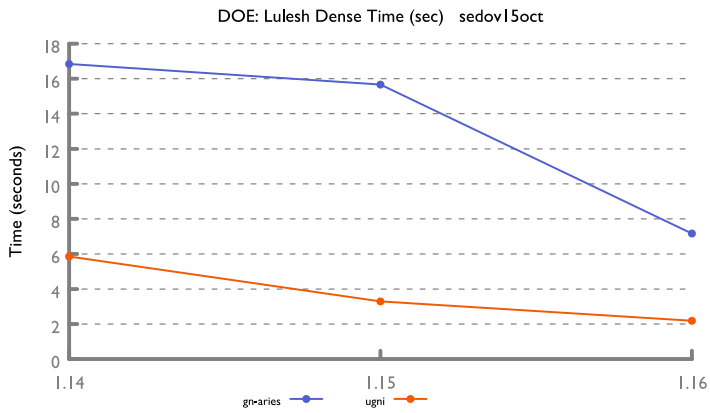
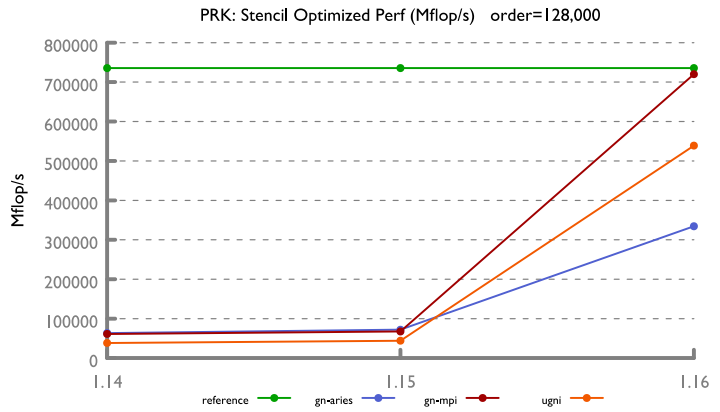
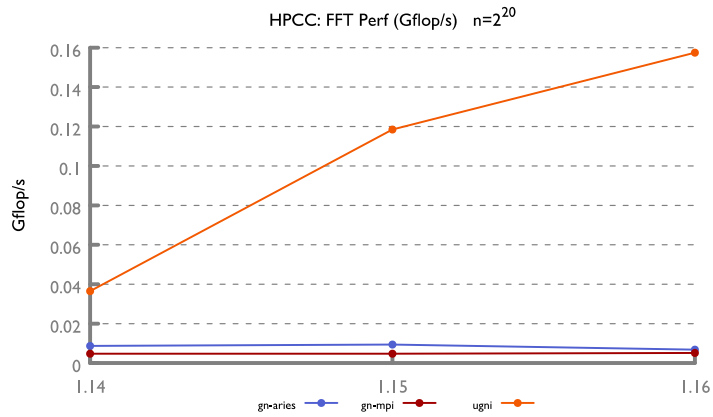
# Multi-Locale Performance Trends





# Multi-Locale Performance

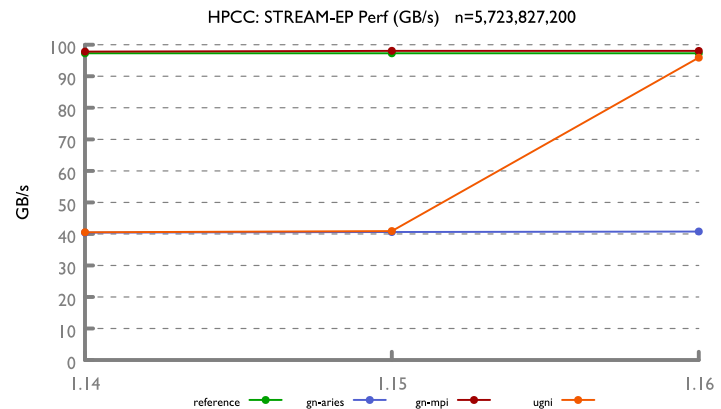
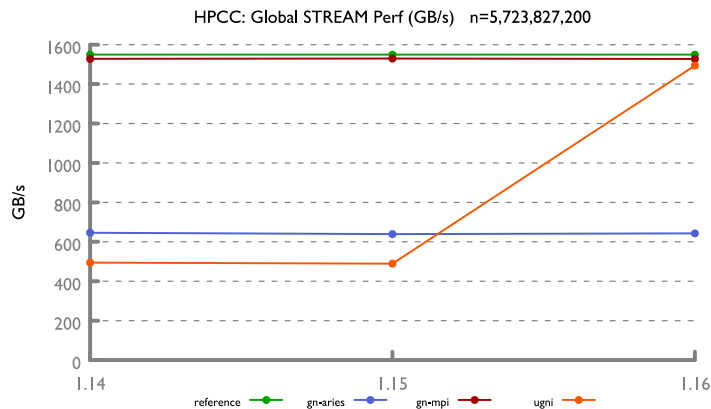
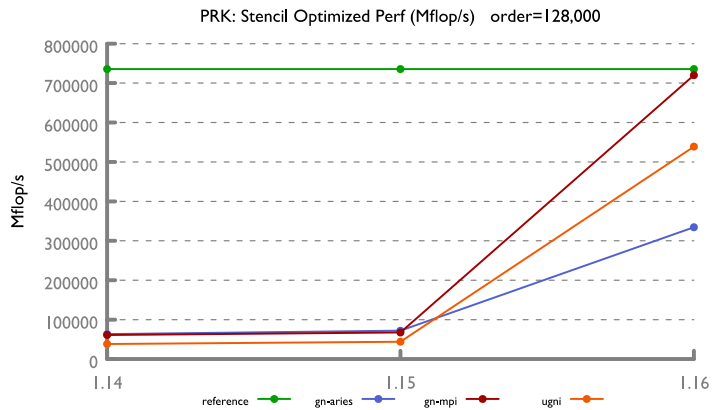
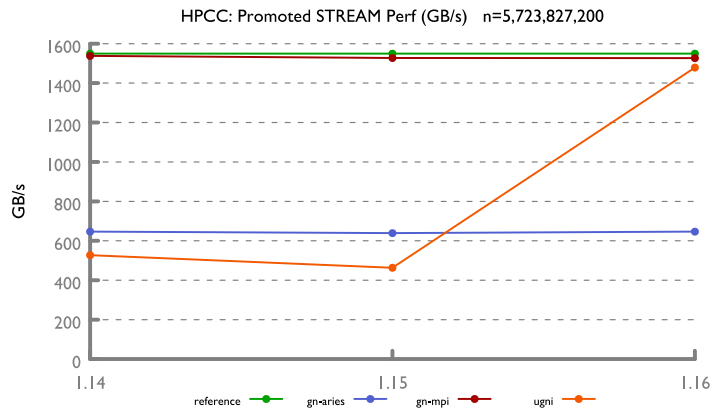
- Significant multi-locale performance improvements
  - No known regressions





# Multi-Locale Performance

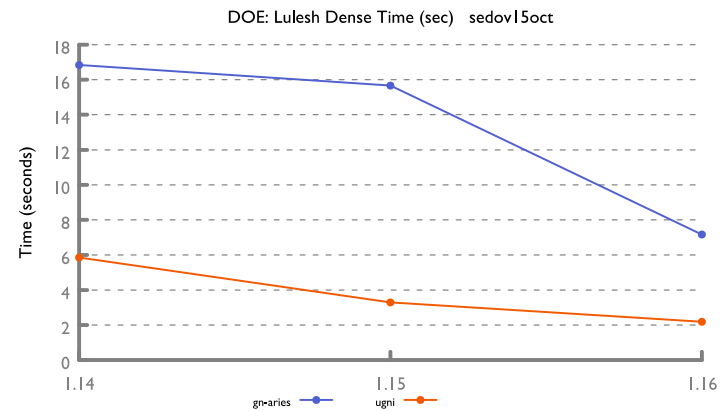
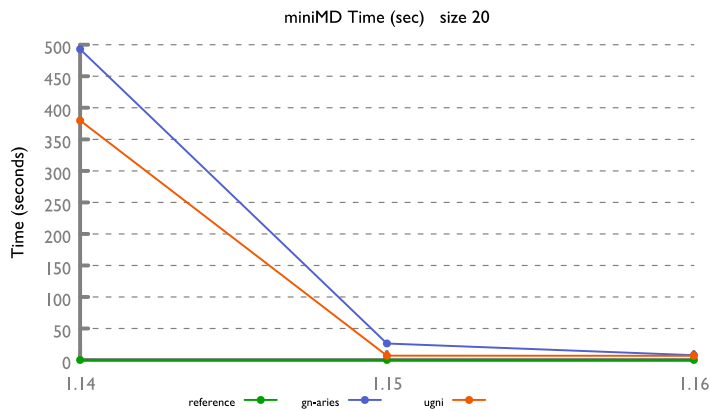
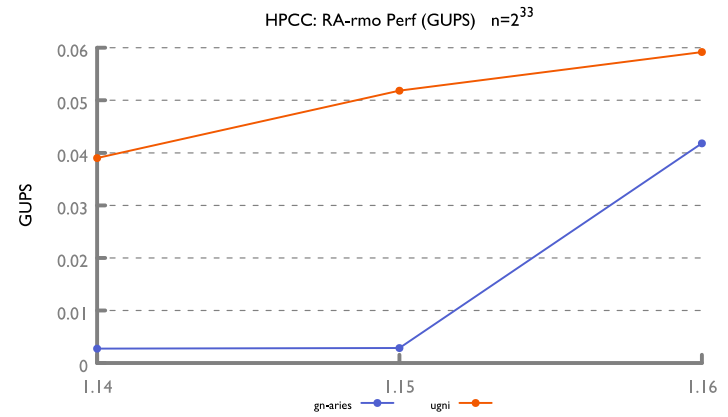
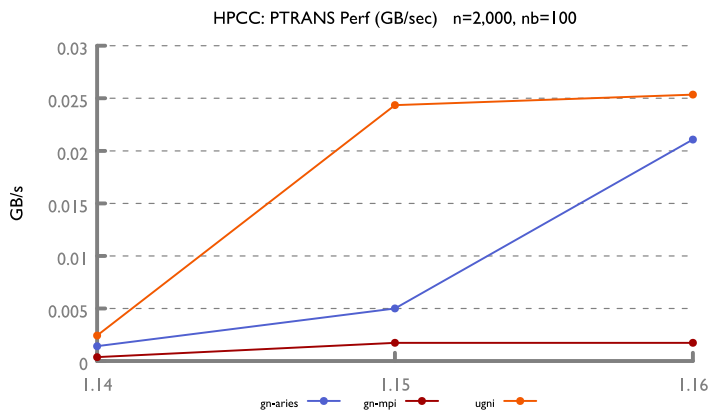
- Significant multi-locale performance improvements
  - Improvements for ugni from dynamic registration





# Multi-Locale Performance

- Significant multi-locale performance improvements
  - Improvements for gasnet-aries from GASNet's multi-domain feature

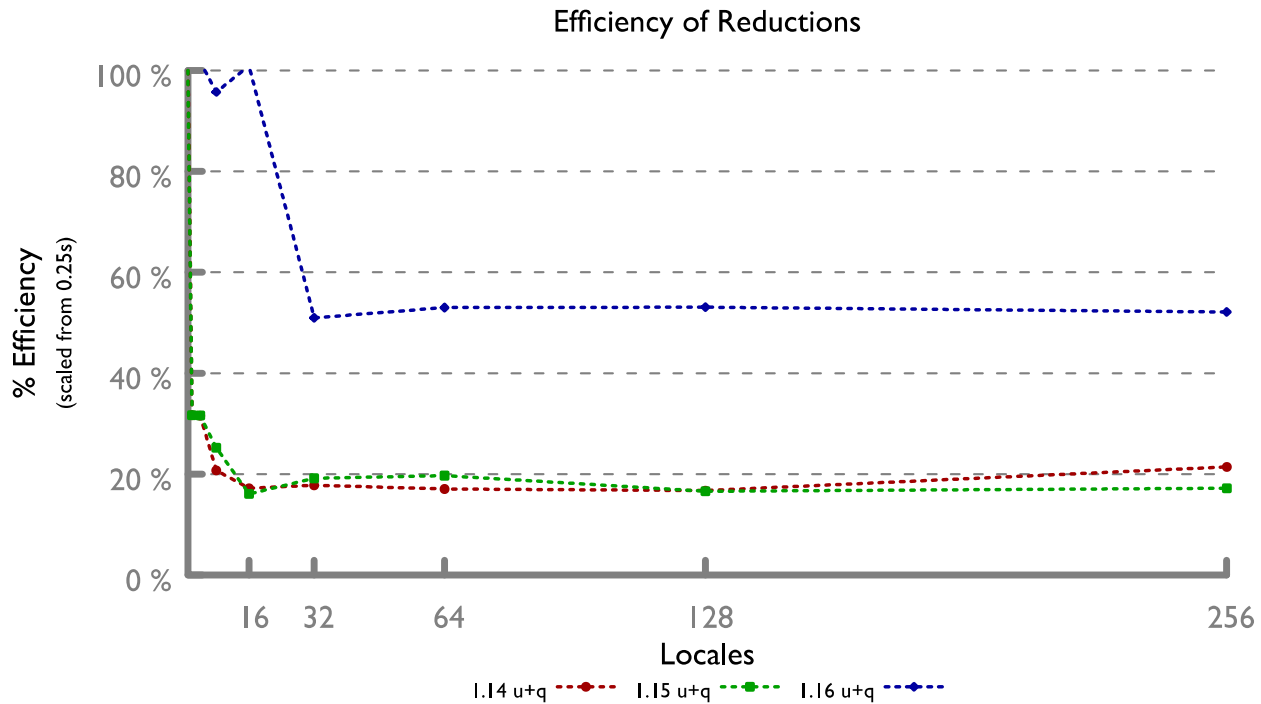


# Scalability Trends



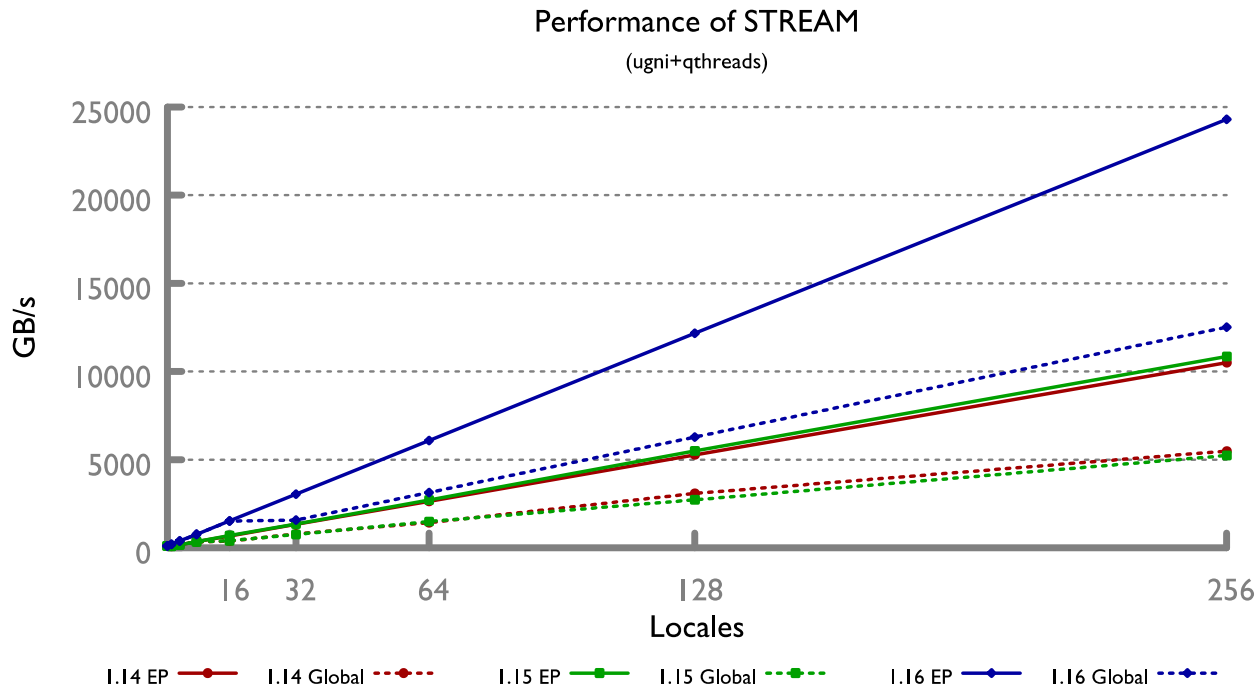


- **Significant improvements for numa-sensitive benchmarks**
  - Result of dynamic registration leading to affinity improvements





- **Significant improvements for numa-sensitive benchmarks**
  - Result of dynamic registration leading to affinity improvements
    - stream global not scaling as well as EP yet (still need to investigate)



# Performance Priorities and Next Steps



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COMPUTE | STORE | ANALYZE



# Performance Priorities and Next Steps

- **Continue benchmark-driven improvements**
  - single-locale:
    - improve performance for shootouts (requires better vectorization)
  - multi-locale:
    - reduce unnecessary communication code
    - improve task-affinity between consecutive foralls
    - optimize scalability of core algorithms (task spawning, reductions, barriers)
    - focus on ISx, PRKs, MiniMD/CoMD, LULESH, and other DOE proxy apps







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