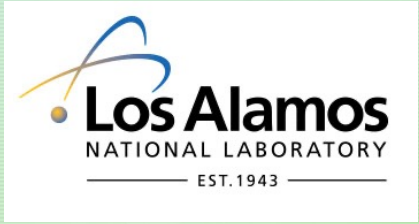
Integration of the PENNANT mini-app into the Pavilion Test Harness



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Overview

- Scientific Codes
- Performance Analysis (HPC)
- HPC PA: Contemporary Mini-Apps
- Why Use a Mini-App?
- PENNANT: Mini-App for FLAG
- My Work This Summer: Pavilion + PENNANT
- Results (Hydro Runtime)
- Conclusion
- Future Work
- Acknowledgements
- Questions and Citations

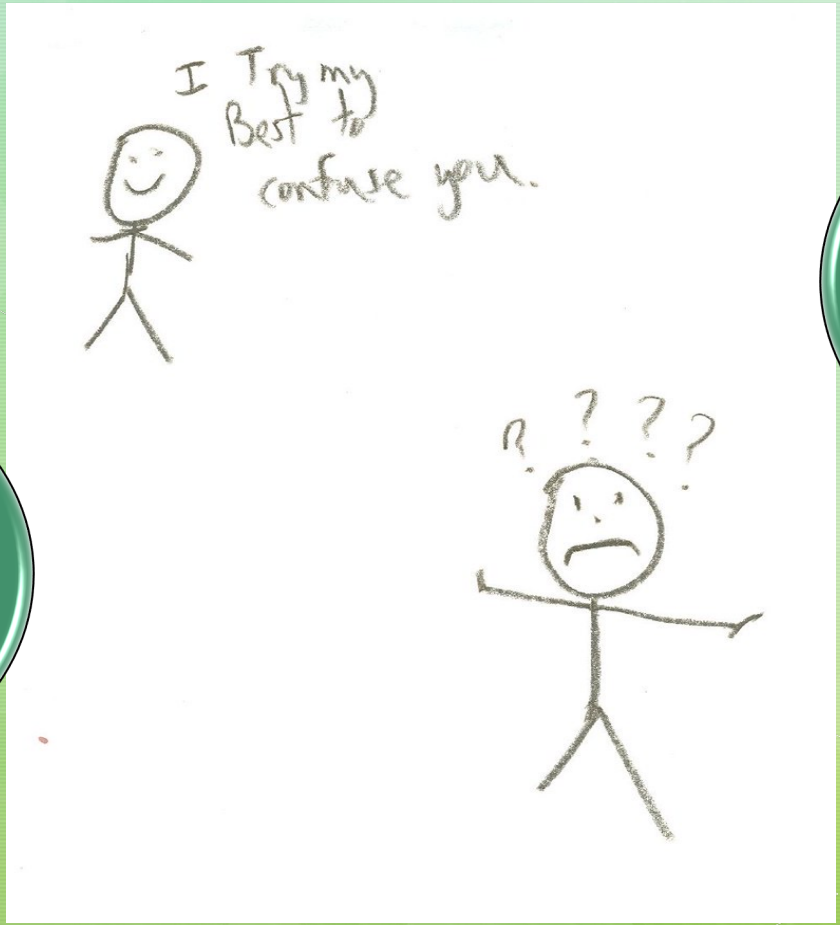
Scientific Codes

- Large code bases
  - KULL (~350K LoC)
  - FLAG (~620K LoC)
  - ALE3D
- Complex
  - Expertise required
- Commercially sensitive
  - Proprietary Source Code

Performance Analysis (HPC)

- Micro Benchmarks
  - Top 500 High Performance Linpack (HPL)
  - HPC Challenge (HPCC)
  - High-Performance Conjugate Gradient (HPCG)
- Application Benchmarks
  - NAS Parallel Benchmark Suite (NASA)
  - Shamrock (AWE)
  - Hydra (AWE)

What To Do?

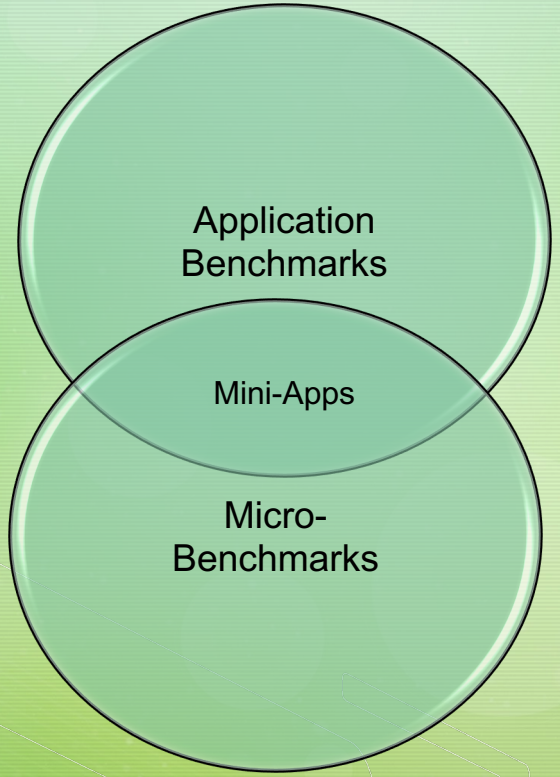


Application Benchmarks

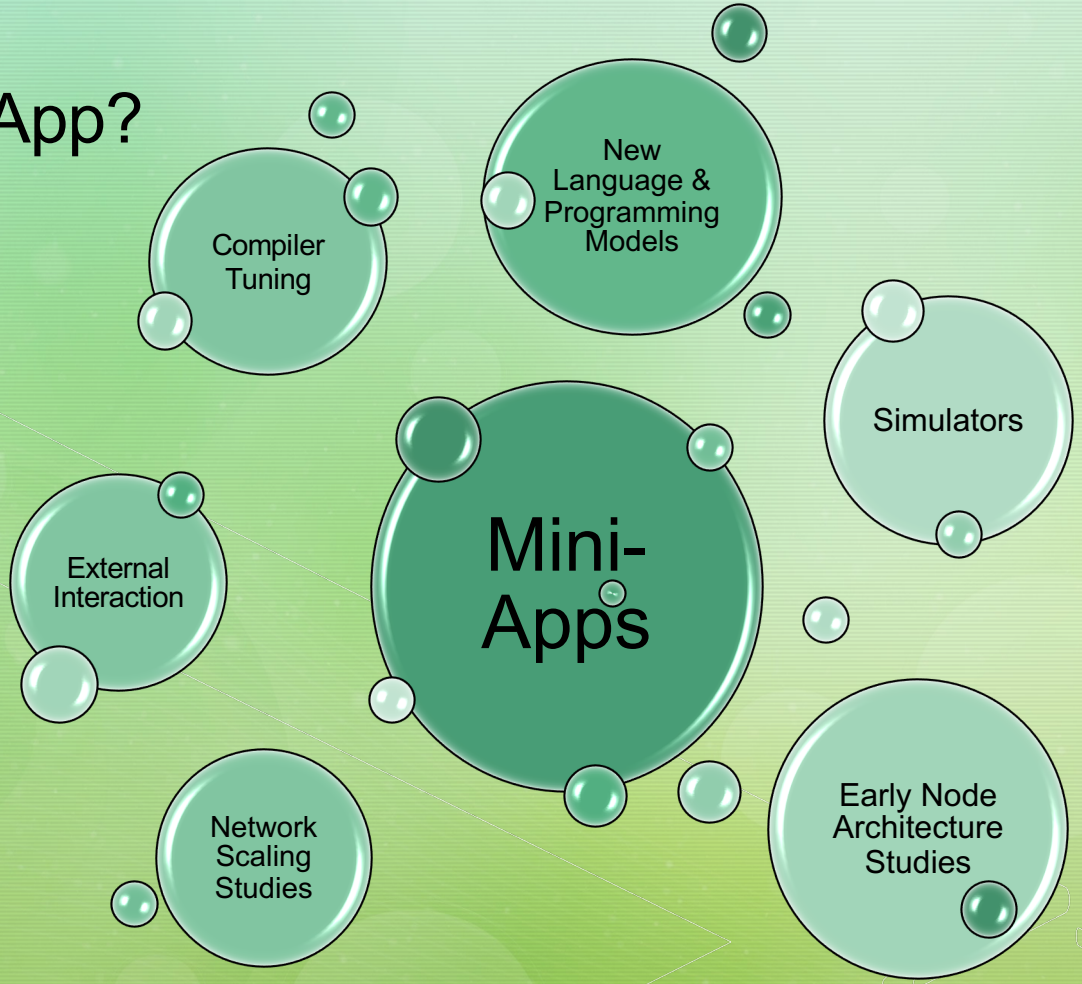
Micro-Benchmarks

HPC PA: Contemporary Mini-Apps

- Small Code Bases
  - PENNANT (~3300 LoC)
- Representative
- Consolidation
- Large-Scale Developer Involvement

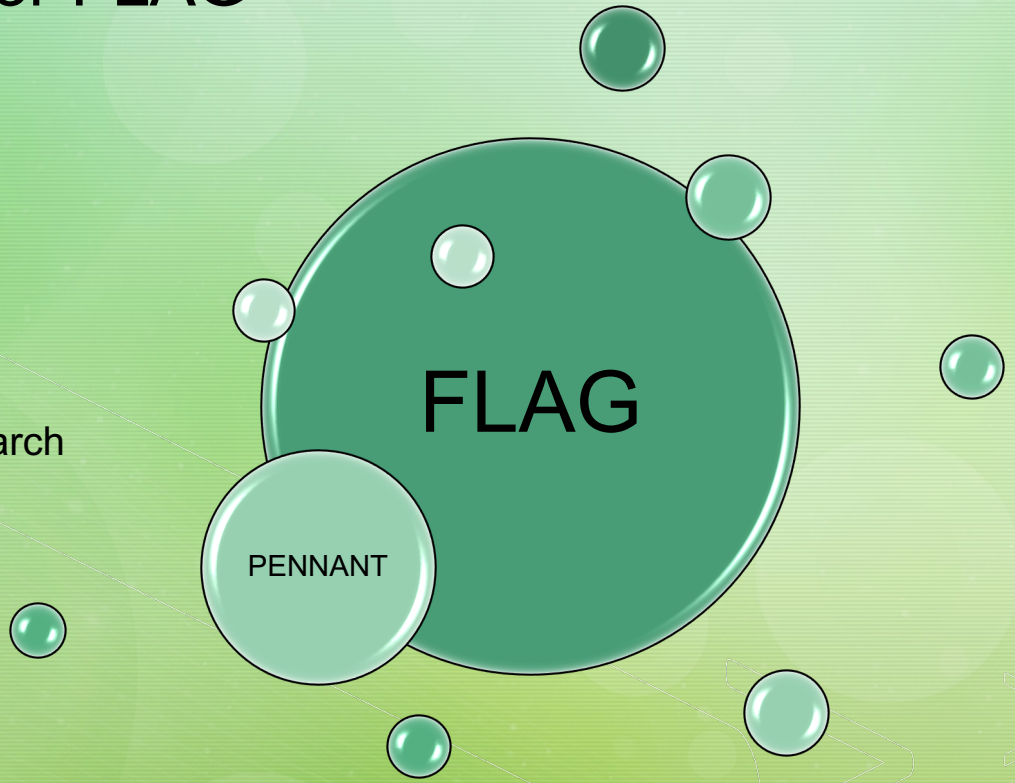


Why Use a Mini-App?



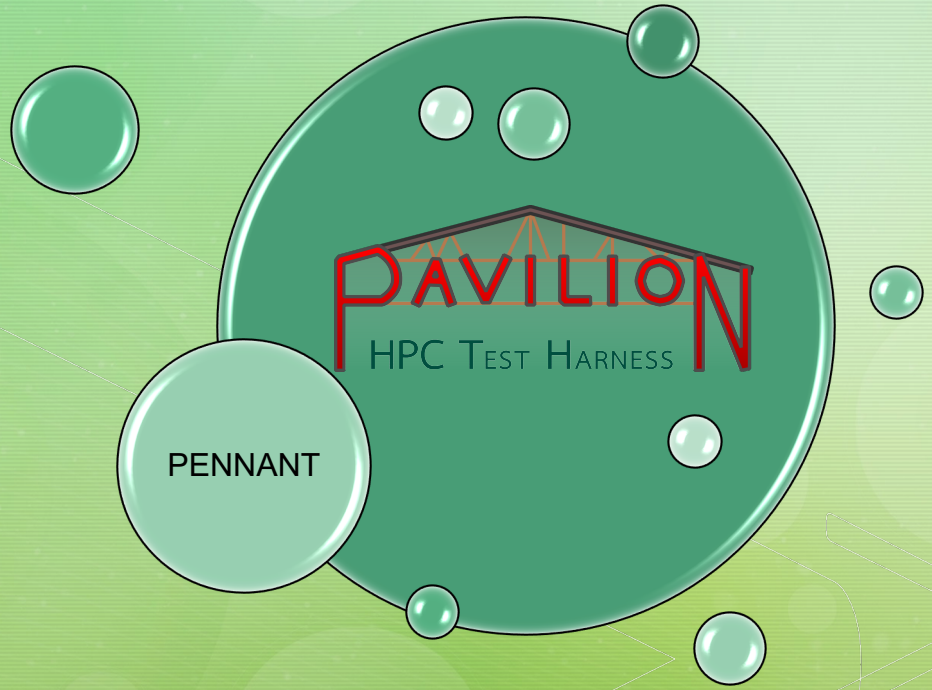
PENNANT: Mini-App for FLAG

- Manual Testing... Can we do better?
- Standard Tests
- Verify & Validate
- Support Advanced Architecture Research



My Work This Summer: Pavilion + PENNANT

- Advantages
- Results
- Bare Metal
- Inheritance
- Challenges



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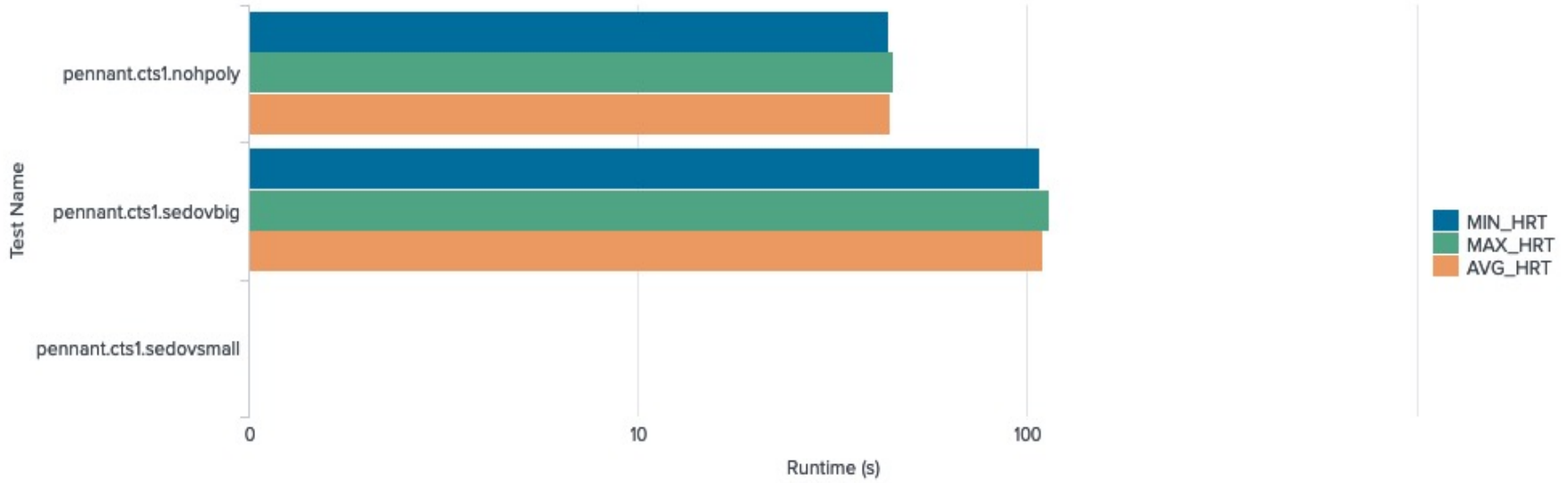
Grizzly Hydro Runtime



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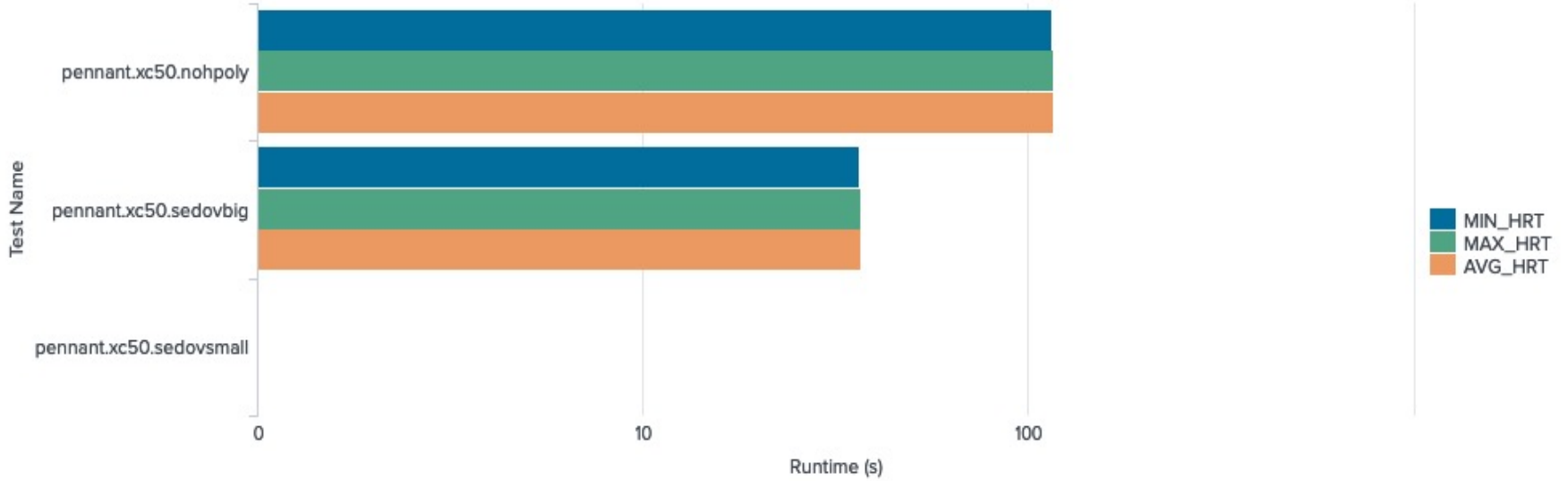
Capulin Hydro Runtime



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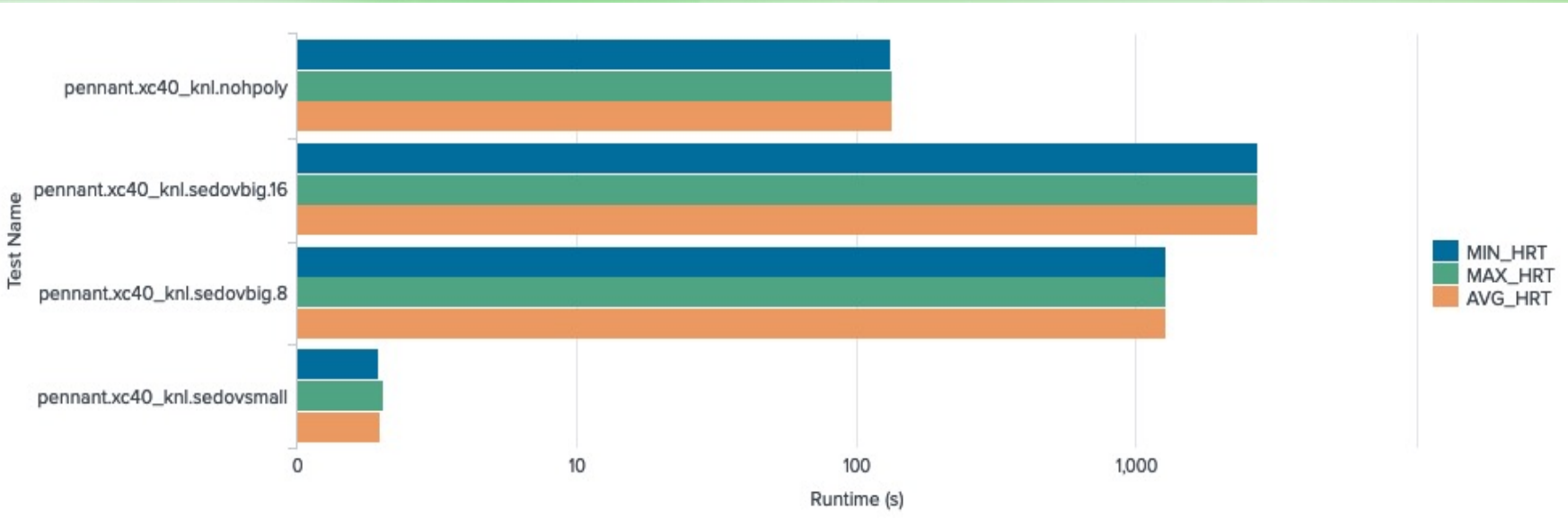
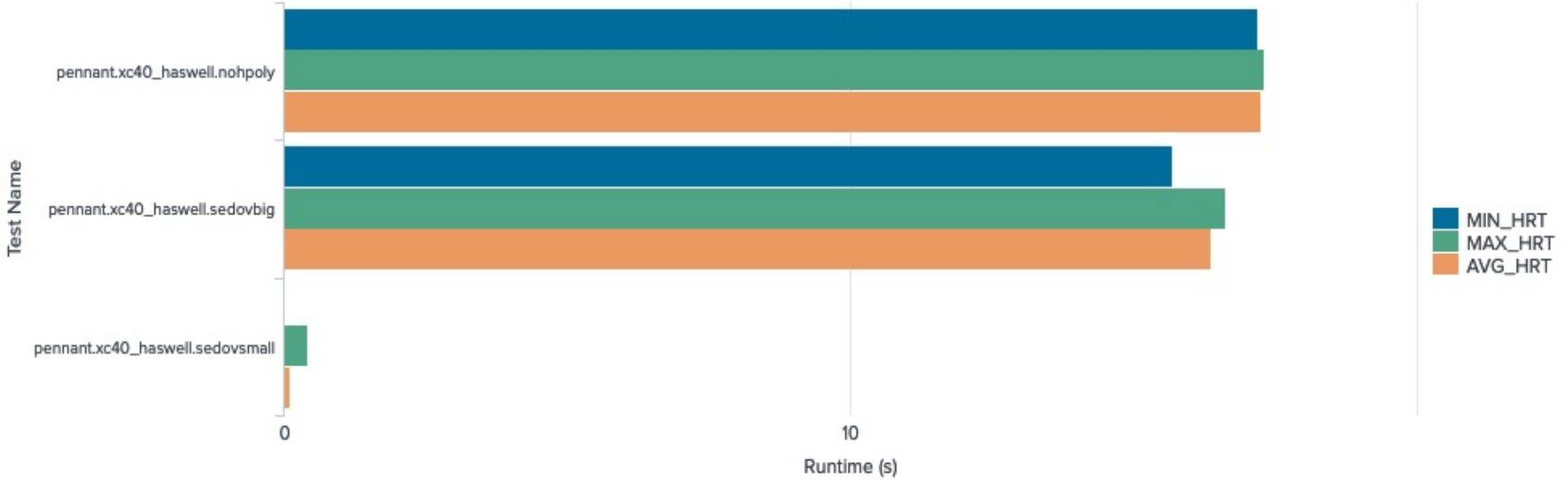
Trinitite (KNL) Hydro Runtime



Trinitite (Haswell) Hydro Runtime



Conclusion

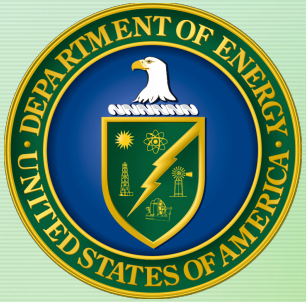
- Support for TOSS3, XC40, XC50
- Simple to Modify
- Straightforward Testing

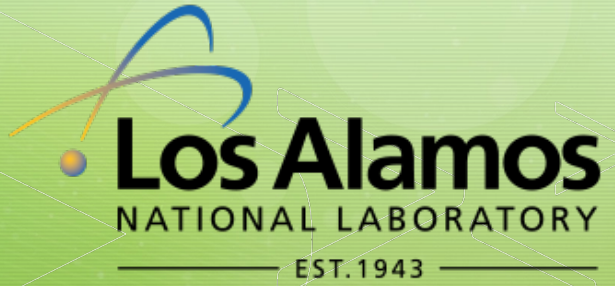
Future Work

- Code Review
- Incorporating the PENNANT test suite into Pavilions production use(?)
- Containerizing PENNANT with Charliecloud
- Documentation

Acknowledgements

- Mentor: Jennifer Green
- PRETeam Members





Questions & Citations

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