



FY20 CCE Programming Environment Synopsis



Tri-lab CCE Programming Environment Team

2 Executive Summary



- Accomplishments and noteworthy items from FY20 along with planned activities for FY21 are discussed for:
 - External contracts
 - PMIx
 - Spack
 - Testing
 - Containers
 - MPI Tuning
- All work herein part of Tri-lab Programming Environment working group.
- Anthony Agelastos (SNL) was CCE PE lead for FY20; Greg Lee (LLNL) will be CCE PE lead for FY21.



Accomplishments in FY20

1. Managed contracts under the Open Source Contract Maintenance for Performance Analysis Software projects, which enabled workshops and training for, and enhancements of, HPCToolkit, Medium-Weight Profiling Tool, Dyninst, Tuning and Analysis Utilities (TAU), and MUST/Vampir.

Noteworthy Topics from FY20

- Collaboration with Rice University has improved HPCToolkit support for LLNL and SNL production codes profiling on both ATS-1 (improvements w/ complex C++ code support) and ATS-2 (GPU profiling enhancements).

Planned Activities in FY21

- Continue managing contracts.
- Continue to focus on Medium-Weight Profiling Tool development with Rice by provide guidance, tests, and requirements.
- Discuss potential Trenz collaboration for their Light-Weight Survey Tool.

This effort is continuing into FY21 & new collaborators continue to want engagement.

Accomplishments in FY20

2. Engaged the PMIx developers and discussed creating a standard and sharing documentation; PMIx versus MPIR adoption and use cases were also assessed.

Noteworthy Topics from FY20

- Planted seeds for creating a standard.

Planned Activities in FY21

- Maintain minimal, heartbeat-level engagement.

PMIx engagement will continue at a low level.

Accomplishments in FY20

3. Completed the FY19 L2 Milestone to define a software environment for the computing center and focused efforts on the build farm (LLNL); worked on disseminable Spack Stacks with an initial focus on TOSS and now moving toward package refinement and other environments (LANL); worked on integrating Spack Stacks into the ASC DevOps effort (SNL).

Noteworthy Topics from FY20

- Significant Tri-lab-collaborative work towards creating disseminable Spack Stacks initially focused on TOSS with an eye towards other environments.

Planned Activities in FY21

- Finalize Spack Stacks for deployment into the TCE 2.0 environment and integrate into sites' software deployment strategy.

Spack usage continues to grow and Tri-lab collaborations are increasing.



Accomplishments in FY20

4. Improved tri-lab testing capabilities with platform regression and acceptance testing capabilities. For example, Pavilion-v2.x released several new versions that added many features. Made progress toward profiling/debugging application testing; the Developer Tools Confidence Test Suite (DTCS) has created draft design documentation to define these needs. Made progress toward creating and benchmarking synthetic workflows: Symphony core development is complete and alignment of benchmarks with production applications is underway.

Noteworthy Topics from FY20

- Many releases & workshops for Pavilion that added features and enabled collaborations.
- DTCS project created design documentation, an initial technology demonstrator, and some HPCToolkit tests to be disseminated with Rice and Tri-lab communities.

Planned Activities in FY21

- Improve Tri-lab testing capabilities, including Imperator, Pavilion-v2.x, and the Developer Tools Confidence Test Suite.
- Identify overlap between tools and gaps in capabilities and work to make the tools complementary.

This effort was strong in FY20 & will continue to grow in FY21 with a focus on collaboration.



Accomplishments in FY20

5. Continued evaluating and developing Linux containers for the deployment of applications and runtime environments on CTS systems by enhancing Charliecloud and working with ECP and other similar container activities to also influence Singularity and Shifter roadmaps.

Noteworthy Topics from FY20

- Many Charliecloud enhancements.
- Influenced Singularity and Shifter roadmaps.

Planned Activities in FY21

- Continue core mission (see above).
- Work with RCE project to make a common GitLab container registry available and accessible from each lab's open restricted network.

This effort will continue to grow in FY21 with a focus on Tri-lab application portability.



Accomplishments in FY20

- Continued the MPI tuning effort (completed the preliminary OpenMPI MCA parameter study) and micro-benchmark development (gathered recommended benchmarks) for assessing communication performance of the CTS-2 system architecture. OpenMPI development supported various version 3 and 4 releases in addition to the Spack package.

Noteworthy Topics from FY20

- OpenMPI dev. supp. Spack, 3.x, 4.x releases.
- Investigations performed for tuning prod. apps. storing params. in the config. file.
- Metripipe (metric extraction, plotting) for analyzing tuning data leveraged heavily for SNL ATDM L1 Milestone analysis & Review.

Planned Activities in FY21

- This effort has been folded into the testing effort (where tests focused on MPI tuning will be maintained).

Expanding interest in bolstering MPI tuning test cases which we aim to generalize and disseminate.

Questions?



Please let us know if you have any questions, comments, or concerns.