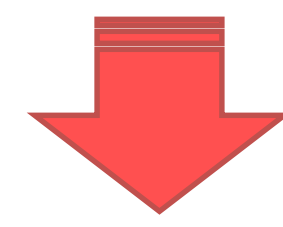


# ECP Training Updates

Ashley Barker (ORNL) and Osni Marques (LLNL)

The Training effort of the Hardware and Integration component of ECP disseminates best practices and provides training on key ECP technologies. Its activities consist of selected application-driven training that aid application teams, e.g., seminars and webinars, deep dive workshops and lectures, hackathons, and tutorials. High-priority topics include:

- ❖ algorithms, methods, and high performing libraries
- ❖ memory and storage hierarchies
- ❖ on-node parallelism and vectorization
- ❖ application portability techniques
- ❖ software engineering design principles and best practices



<https://exascaleproject.org/all-training-events>

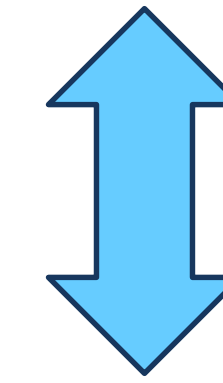
- ❖ 100+ training events to-date (tracked on HI dashboard)
- ❖ 4K+ participants to-date (tracked on HI dashboard)

## Sample of events offered in coordination with TAG

date	title	event
03/26/19-03/29/19	Kokkos Bootcamp	Workshop
04/24/19-04/25/19	Quantum Computing User Forum	Tutorial
5/20/2019	Introduction to Summit Workshop	Workshop
04/29/19 - 05/02/19	OpenMP Brookathon 2019	Hackathon
4/11/2019	Introduction to NVIDIA Profilers on Summit	Tutorial / Webinar
07/29/19-07/30/19	Introduction to CMake	Workshop
07/22/19 - 07/26/19	OpenMP Hackathon at ORNL	Hackathon
08/07/19-08/09/19	Profiling Tools Workshop	Workshop
11/1/2019	ECP/NERSC UPC++ Tutorial	Tutorial
9/6/2019	Introduction to GPU Programming with HIP	Webinar

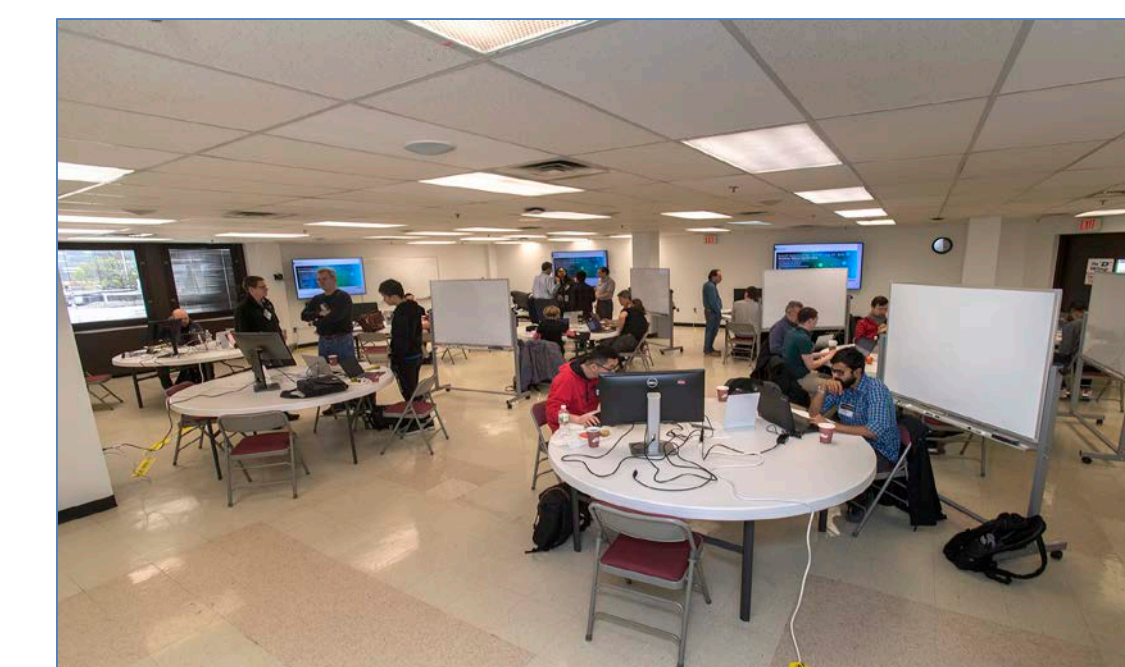
Staging a training agenda:

- ❖ Annual survey
- ❖ ATPESC: <https://extremecomputingtraining.anl.gov>
- ❖ ECP Training Advisory Council Meeting (TAG)
- ❖ Interactions with the ECP community



Top most impactful areas for training according to the 2019 ECP annual training survey. We want to hear from you!

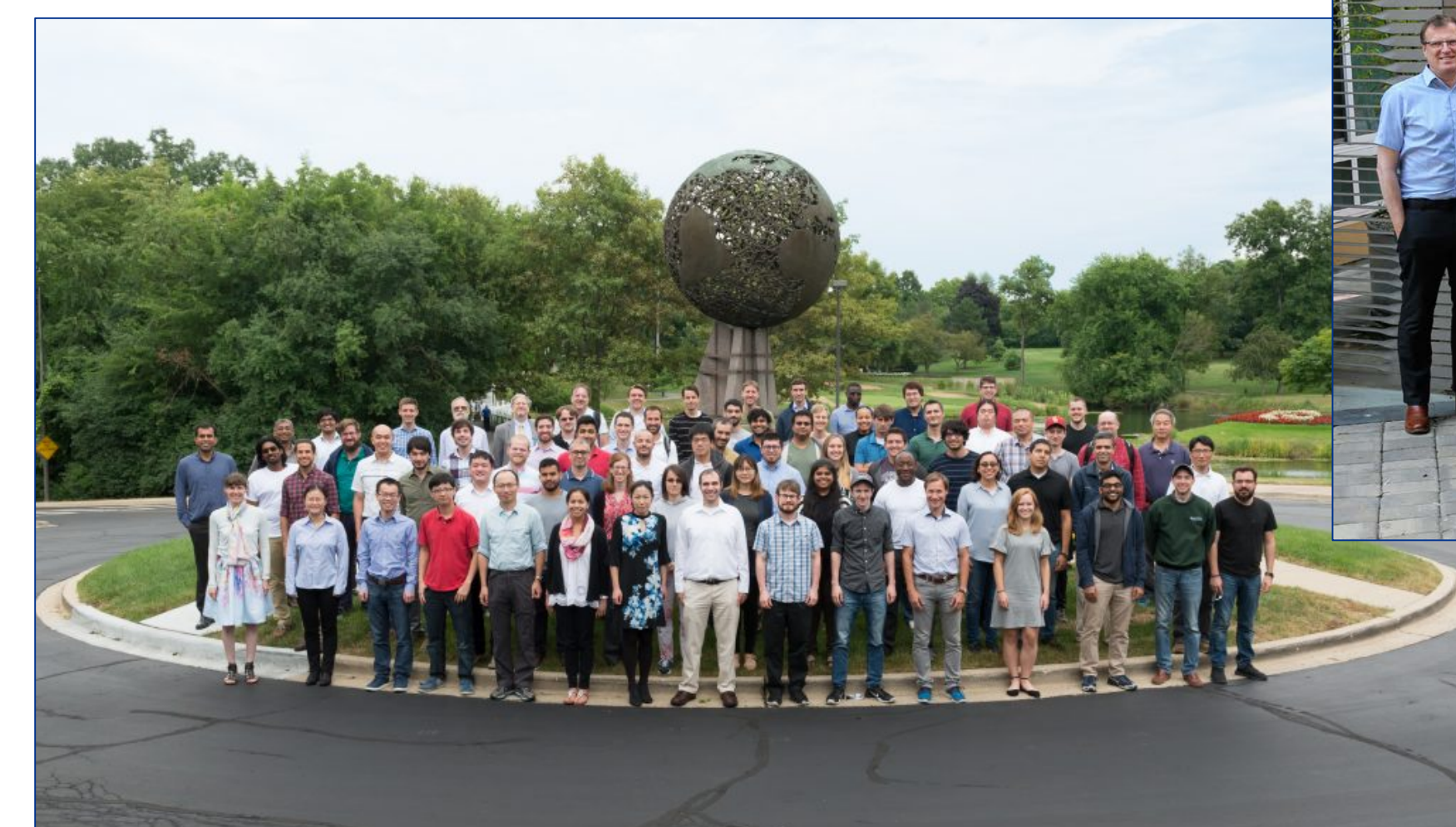
- CMake
- Spack
- Building applications within containers
- Git, GitHub and Gitlab
- Python
- CUDA
- HIP
- SYCL
- Advanced MPI
- C++ and Using C++14/17 effectively
- OpenMP 4.5+
- AMD GPU Hackathons



OpenMP Brookathon 2019



ATPESC 2018 Workshop (left) and 2019 molecular sciences summer school (right)



## Webinars of the HPC-BP Series offered in coordination with the IDEAS ECP Productivity Project (<https://ideas-productivity.org>)

date	title	presenter(s)
06/07/17	Python in HPC	Rollin Thomas (NERSC), William Scullin (ALCF) and Matt Belhorn (OLCF)
07/12/17	Intermediate Git	Roscoe Bartlett (SNL)
08/16/17	Using the Roofline Model and Intel Advisor	Sam Williams and Tuomas Koskela (LLNL)
09/13/17	Barely Sufficient Project Management: A few techniques for improving your scientific software development	Mike Heroux (SNL)
11/01/17	Managing Defects in HPC Software Development	Tom Evans (ORNL)
12/06/17	Better Scientific Software ( <a href="https://bssw.io">https://bssw.io</a> ): So your code will see the future	Mike Heroux (SNL) and Lois McInnes (ANL)
01/17/18	Bringing Best Practices to a Long-Lived Production Code	Charles Ferenbaugh (LANL)
02/28/18	Jupyter and HPC: Current State and Future Roadmap	Matthias Bussonnier (UC Berkeley), Suhas Somnath (ORNL) and Shreyas Cholia (NERSC)
03/28/18	Scientific Software Development with Eclipse	Greg Watson (ORNL)
04/18/18	Software Citation Today and Tomorrow	Daniel Katz (NCSA and UIUC)
05/09/18	On-demand Learning for Better Scientific Software: How to Use Resources and Technology to Optimize your Productivity	Elaine Raybourn (SNL)
06/13/18	Popper: Creating Reproducible Computational and Data Science Experimentation Pipelines	Ivo Jimenez (UCSC)
07/18/18	How Open Source Software Supports the Largest Computers on the Planet	Ian Lee (LLNL)
08/21/18	Software Sustainability: Lessons Learned from Different Disciplines	Neil Chue Hong (Software Sustainability Institute)
09/19/18	Modern CMake	Bill Hoffman (Kitware)
10/17/18	Open Source Best Practices: From Continuous Integration to Static Linters	Daniel Smith and Ben Pritchard (Molecular Sciences Software Institute)
12/05/18	Introduction to Software Licensing	David Bernholdt (ORNL)
01/23/19	Quantitatively Assessing Performance Portability with Roofline	John Pennycook (Intel), Charlene Yang and Jack Deslippe (NERSC)
02/13/19	Containers in HPC	Shane Canon (NERSC)
03/13/19	Parallel I/O with HDF5 - Overview, Tuning and New Features	Quincey Koziol (NERSC)
04/10/19	Testing Fortran Software with pFUnit	Thomas Clune (NASA Goddard)
05/08/19	So You Want to be Agile? Strategies for Introducing Agility into Your Scientific Software Project	Mike Heroux (SNL)
06/12/19	Modern C++ for High-Performance Computing	Andrew Lumsdaine (PNNL & University of Washington)
07/17/19	When 100 Flops/Watt was a Giant Leap: The Apollo Guidance Computer Hardware, Software and Application in Moon Missions	Mark Miller (LLNL)
08/14/19	Software Management Plans in Research Projects	Shoaib Ahmed Sufi (Software Sustainability Institute)
09/11/19	Discovering and Addressing Social Challenges in the Evolution of Scientific Software Projects	Rene Gassmoeller (UC Davis)
10/16/19	Tools and Techniques for Floating-Point Analysis	Ignacio Laguna (LLNL)
12/11/19	Building Community through xSDK Software Policies	Ulrike Meier Yang (LNL) and Piotr Luszczek (UTK)