Exascale Computing Project's Broadening Participation Initiative

Suzanne Parete-Koon
Oak Ridge National Laboratory
Oak Ridge, Tennessee
paretekoonst@ornl.gov

Mary Ann Leung
Sustainable Horizons Institute
Rancho Mirage, California
mleung@shinstitute.org

Sreeranjani Ramprakash
Argonne National Laboratory
Argonne, Illinois
jini@alcf.anl.gov

Lois Curfman McInnes
Argonne National Laboratory
Argonne, Illinois
curfman@mcs.anl.gov

ABSTRACT

The mission of the U.S. Department of Energy's (DOE) Exascale Computing Project (ECP; https://www.exascaleproject.org) is to ensure all the necessary pieces are in place for the nation's first exascale systems. The project is delivering an ecosystem that includes mission critical applications and an integrated software stack, while working closely with U.S. high-performance computing (HPC) hardware companies to identify and drive the development of advanced computer system engineering and hardware components. All of these elements are necessary to enable fully functional, capable exascale computing environments, which are critical to national security, scientific discovery, and a strong U.S. economy. ECP is composed of hundreds of researchers and engineers from various DOE national laboratories as well as academic and industry partners. [1]

This article gives an overview of ECP's Broadening Participation Initiative (https://www.exascaleproject.org/hpc-workforce/), which has the mission of establishing a sustainable plan to recruit and retain a diverse workforce in the DOE high-performance computing community by fostering a supportive and inclusive culture within the computing sciences at DOE national laboratories. We will describe key activities within three complementary thrusts: establishing an HPC Workforce Development and Retention Action Group, creating accessible 'Intro to HPC' training materials, and launching the Sustainable Research Pathways for High-Performance Computing (SRP-HPC) workforce development program. We are leveraging ECP's unique multilab partnership to work toward sustainable collaboration across the DOE community, with the long-term goal of changing the culture and demographic profile of DOE computing sciences.

KEYWORDS

High Performance Computing, Education, Diversity, Equity, Inclusion, Workforce Development

1 HPC WORKFORCE DEVELOPMENT AND RETENTION ACTION GROUP

The mission of the HPC Workforce Development and Retention (HPC-WDR) Action Group is to enable DOE national laboratories and their related computing communities to share their collective insight for inclusive and equitable workforce development and retention for high-performance computing. Representatives from various national laboratories and associated universities meet regularly to share ideas, catalog best practices, and develop recommendations and strategies for improvement.

The first two HPC-WDR projects are a webinar series and a website focused on best practices for developing a diverse, equitable, and inclusive HPC workforce culture. Webinars (https://www.exascaleproject.org/workforce-development-seminar-series/) have been held on best practices in mentoring and how to normalize inclusion by embracing our differences. The most recent webinar covered how to be a good workplace ally. The speakers are drawn from the HPC community. The website, once developed, will host an archive of webinar recordings, along with information on workforce and cultural development opportunities and best practices drawn from the participating computing communities.

2 INTRO TO HPC

The mission of the Intro to HPC team is to provide accessible introductory material to HPC, thereby addressing gaps in, and expanding the pipeline of, people with foundational HPC skills. The first target is the development of an intensive HPC/AI course aimed at advanced undergraduate students and early graduate students in underrepresented groups. The team is working collaboratively across DOE national laboratories and communities to develop a curriculum, including hands-on HPC exercises. The team has issued a broad call for interest and identified potential contributors from across the ECP and national laboratory staff. To determine a plan for the program, they are leveraging experience and a framework

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from Argonne National Lab's Education Department. Listening sessions with a subset of the computational postdoctoral population at Argonne and Oak Ridge National Labs were held to uncover HPC topics that were (1) useful and (2) missing from their undergraduate and early graduate education. Once the curriculum is complete, the plan is to have course materials freely available online for community use.

The Intro to HPC team is also working with universities by conducting listening sessions to understand the challenges of teaching advanced computing topics and how to address them. The team is focusing on minority-serving institutions in the U.S. that offer 4-year degrees with computer science or related departments. The first listening session was completed on April 21, 2022. Invitations were sent to 40 institutions, resulting in participation of 14 professors from 12 institutions. A listening session report including lessons learned is now available. Ultimately, the team plans to work with administrators and faculty at interested universities to develop and implement Intro to HPC programs at their institutions.

3 SUSTAINABLE RESEARCH PATHWAYS FOR HPC

Sustainable Research Pathways for HPC (SRP-HPC; https://shinstitute.org/srp-hpc/) is an inclusive workforce development program that began this year with a cohort of 61 students from underrepresented groups in HPC and related faculty. They are working with ECP teams at 9 DOE labs on a variety of projects across application development, software technologies and advanced computing facilities. The program includes onboarding at the ECP Annual meeting and a 10-week summer experience that incorporates extended opportunities for mentoring and community building. In addition to boosting participants' careers by giving them the opportunity to explore cutting-edge research opportunities at DOE labs, the program also focuses on helping people learn how to work together and unlearn biases so that inclusion becomes a normal practice.

The SRP-HPC program is based on a program started in 2015 at Lawrence Berkeley National Laboratory (Berkeley Lab) that was developed by the Sustainable Horizons Institute, a 501(c)3 nonprofit dedicated to building inclusive scientific communities. The ECP Broadening Participation Initiative has scaled up the SRP concept across the ECP community.

4 CONCLUSION

Through these three complementary thrusts, the Exascale Computing Project's Broadening Participation Initiative is helping to build a more diverse workforce and foster an inclusive professional environment for high-performance computing through the national labs and their related academic partners. Submission and reviewing guidelines, and methodology: http://submissions.supercomputing.org/reproducibility

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