

Second Workshop on HPC Education and Training for Emerging Technologies (HETET20)

Abstract

High performance computing has become central for empowering progress in diverse scientific and non-scientific domains. With the advent of myriad different technologies in the post peta-scale computing era, the future of HPC involves a significantly greater degree of parallelism than we are observing currently. The rapid advancement and introduction of new processing technologies for HPC has facilitated the convergence of Artificial Intelligence (AI) and Machine Learning (ML), Data Analytics and Big Data and the High Performance Computing (HPC) domain platforms to solve complex large-scale real-time analytics and scientific applications pertaining to diverse scientific and non-scientific fields. As we move towards exascale future and beyond, the new convergent computing platforms along with a paradigm shift in programming applications leveraging these platforms provide both challenges and opportunities for cyberinfrastructure facilitators, trainers and educators to develop, deliver, support, and prepare a diverse community of students and professionals for careers that utilize high performance computing along with emerging technologies to execute increasingly hard jobs and predict evolving trends, equipping them to solve real-world complex scientific, engineering, and technological problems.

The HETET20 workshop is an ACM SIGHPC Education Chapter coordinated effort aimed at fostering collaborations among the practitioners from traditional and emerging fields to explore strategies to enhance computational, data-enabled, AI and HPC educational needs. Attendees will discuss approaches for developing and deploying HPC education and training, as well as identifying new challenges and opportunities for keeping pace with the rapid pace of technological advances - from collaborative and online learning tools to new HPC platforms; advanced technology solutions supporting HPC, Accelerated Analytics, and AI applications. The workshop will provide opportunities for: learning about methods for conducting effective HPC education and training for emerging technologies; promoting collaborations among HPC educators, trainers and users; and for disseminating resources, materials, lessons learned and good/best practices.

Workshop Scope

Computing facilities face a common challenge of supporting a diverse user base with varied skills and needs. There is a growing base of users familiar with GUI platforms, complex set of machine learning, deep learning, reinforcement, and analytics algorithms and little or no LINUX experience, and who are new to the utilization of HPC resources, compute, storage, memory, and communications needs. There are also needs for continuing education with those familiar with HPC systems as application development and system hardware are constantly evolving. Most training groups report that they have limited staff and resources, which results in increased community interest to utilize conference gatherings as a platform to share resources and materials, to identify opportunities for collaboration on content development and to discuss effective strategies for enhancing the breadth and depth of high quality training and education that can be offered.

After a successful HETET19 where we had more than 55 attendees, we are proposing a second half day Workshop on HPC Education and Training for Emerging Technologies at the ISC20 conference to

highlight the collaborative efforts that are underway to develop and deploy HPC training and education, to identify new challenges and opportunities with emerging technologies, and to foster new, enhanced and expanded collaborations to respond to the demands for a larger and more diverse HPC workforce in all sectors of society (e.g. academia, government agencies, business and industry).

Relevance of the Workshop for ISC20

The HETET20 workshop will share the results of collaborations among the SIGHPC Education Chapter members to-date and will identify new opportunities for collaborations which we plan to highlight at SC20 and PEARC20. To accomplish this, the community will be invited to submit papers highlighting collaborations among centers, and presentations on new strategies and resources that can be adopted by others to enhance HPC training and education for emerging technologies. In addition to the presentations, there will be time for small group discussions centered on topics of interest to the community. These discussions will focus on articulating challenges and potential solution strategies that the community can build on over the coming year. In addition, the organizers will use interactive polling to share views and perspectives, and to help drive the conversations. The objective is to identify collaborative activities SIGHPC members may pursue during 2021.

Our goal is to enhance and extend the diversity and expertise of the HPC workforce supporting converging Artificial Intelligence (AI) and Machine Learning (ML), Data Analytics and Big Data and the High Performance Computing (HPC) platforms through interactions at this ISC20 workshop. The workshop will produce a report highlighting the accomplishments of the year 2020, challenges and opportunities for 2021, and action plans for 2021. Additionally, the workshop will be the focus of a Special Edition of the Journal of Computational Science Education.

Workshop Scheduling Information

Based on the attendance at the previous workshop series at PEARC19, SC19, ISC19 and growing interest in HPC education and training activities, we anticipate more than fifty people from multiple organizations will attend the HETET20 workshop. A workshop report will be published on the ACM SIGHPC Education Chapter website within three months after the completion of the Conference.

Format

The HETET workshop will include: 1) Panel 2) Presentations, and 3) Lightning talks. To encourage community engagement, we will begin with a welcome from the ACM SIGHPC Education Chapter to share the vision, goals, and new developmental efforts of the chapter with the workshop attendees. We have invited panelists from Australian Data Science Education Institute, Shodor Inc., Pawsey Supercomputing Centre, University of Sheffield and Barcelona Supercomputing Centre, Barcelona Tech to talk about “***Building Future: HPC Education, Outreach and Training***”. Following the Panel, we will invite four 15-minute presentations or demos from education and training community members covering the topics pertaining to accomplishments, challenges, and opportunities. Followed by the Presentations, we will have four to six education and training members to provide 5-minute lightning talks. The lightning talks will

provide a high-level overview of the topics that are aligned with the theme of the workshop. While the time allocated for the lightning talks may not be enough for presenting the fine details of the chosen topic, it could be enough for including key information that piques the interest of the audience for an engaging discussion after the talk. The presenters will be asked specifically to focus on topics, such as, lessons learned, resources to be shared, opportunities to collaborate and others in their presentations.

Following the talks, there will be open discussions on the issues raised by the presenters. The organizers will use interactive polling to share views and perspectives, and thereby give everyone a “voice” in the meeting. This interactive session will encourage, educate and map the views and perspectives identified to a list of core challenges for developing action plans and potential collaborations. The participants will be asked to share information about their near-term development plans and their unfulfilled needs that have potential to be addressed through collaboration with other organizations.

We will be inviting the full papers and the extended lightning talk abstracts to be published in a special issue of *Journal of Computational Science Education* for disseminating the HPC education and training efforts with the community-at-large.

Proposed Schedule

- **09:00-9:15 Welcome SIGHPC Education Chapter**
 - ✓ **SIGHPC committee needs - call for community help**
 - ✓ **How to get involved**
- **9:15-10:00 Panel**
 - ✓ **Best Practices for Scaling-Up and Sustaining HPC Education, Outreach and Training**

Panelists: Linda McIver (The Australian Data Science Education Institute), Scott Lathrop (Program Manager, Shodor Education INC.), Mozghan K Chimeh (University of sheffield), and Maria-Ribera Sancho (Barcelona Supercomputing Centre, Barcelona Tech)

Paper Session 10:00-11:00

- **Paper Session:**
 - ✓ **10:00-10:15 Presentation/demo 1**
 - ✓ **10:15-10:30 Presentation/demo 2**
 - ✓ **10:30-10:45 Presentation/demo 3**
 - ✓ **10:45-11:00 Presentation/demo 4**
- **11:00-11:30 Coffee Break**

Lightning Talks and Discussion Session: 11:30-1:00

- **11:30-12:00 Lightning Talks**
- **12:00-12:45 Open Discussion and Polling of Audience**
 - ✓ **Capture interests, concerns, suggestions, comments from participants**
- **12:45-1:00 Review Next Steps and Action Plans**
 - ✓ **Next steps, challenges & priorities for committee**

- **1:00** **Adjourn**

Attracting Participants

Our participants include users, professionals, researchers, scholars, educators, and other interested community members with an active interest in training, educating, using and supporting the HPC community of developers, researchers, educators, and practitioners. We will recruit participants from a range of international institutions including universities, labs and industry. The workshop will be announced via mailing lists of over 6,000 trainers and educators who have attended previous computational science education and SC education and training events. The workshop will be advertised through the ACM SIGHPC, HPCWire, InsideHPC, the Internal Science Grid This Week (iSGTW) newsletter, the XSEDE newsletter, XSEDE Campus Champions mailing list, PEARC community, ACI-REF community, the XSEDE Service Provider Forum, the CASC membership, the Great Lakes Consortium for Petascale Computation members, and SURA members., We will post notices on the SIGHPC Facebook, twitter and linkedin, and announce on the www.hpcuniversity.org portal, as well as other social media venues.

The SIGHPC education chapter website will be utilized as a platform to collect and share the presentation materials and the links to training resources, to post polling results, and to provide information about HPC training and education sessions of general interest to the international community.

Timeline

Dec 2019: Workshop website goes live upon being accepted to ISC20 Conference

Dec 2019: Call for presentations issued internationally.

April 2020: Finalize Invited Talks; update website with presentation abstracts.

June 2020: Conduct workshop during ISC20 Conference.

August 2020: Workshop report released.

Topics to Cover

There will be an open call for topics from among the international community. The SIGHPC education chapter workshop committee members will be asked to help rank the presentations to determine the topics of greatest relevance to the community.

Topics of interest may include, but are not limited to, the following:

- Pedagogical methods/tools for High performance data analytics and cognitive computing
- Best Practices and models for teaching and learning HPC topics and course materials
- Sustainable educational strategies for HPC education and training
- Emerging and scalable online environments and tools for HPC education and training
- Evaluation and Assessment of training and instructional materials
- Legal issues involved in training (e.g. ADA compliance, software licenses, intellectual property rights, etc.)
- Novel andragogical approaches for training and education
- Pedagogical methods/tools for non-traditional HPC and non-HPC disciplines
- Pedagogical methods/tools enabling HPC, Accelerated Analytics, and AI applications.

Paper Format

The submitted paper must follow the Journal of Computational Science Education templates to generate your PDF: [MS Word](#) and [Latex](#). Papers that do not comply with ACM format and maximum 8 page length limit will be returned.

Selection Criteria

The submitted papers will be assessed based on their novelty, technical quality, potential impact, insightfulness, depth, clarity, and reproducibility. The authors must describe the algorithms and resources and processes used in the paper as completely as possible to allow reproducibility. This includes experimental methodology, empirical evaluations, and results.

The reproducibility factor will play an important role in the assessment of each submission. Authors are strongly encouraged to make their code and data publicly available whenever possible.

Review Process

Submissions will be peer-reviewed by at least 3 individuals. After the preliminary notification date, authors may rebut reviewer inquiries and their comments. Based on the rebuttal feedback, the Program Committee will notify authors of the final decision. Paper submission is available online.

Organizing Committee

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