

EU-US HPC Summer School Report September 2012



Photo: Participants and presenters at the 2012 Summer School.

Executive Summary

From more than 230 applications, 60 graduate students and postdocs -- including 30 percent women -- were selected from higher education institutions across Europe and the United States to attend the 3rd Annual Summer School on Computational Challenges in High-Performance Computing, June 24-28, 2012. The event was hosted by the Partnership for Advanced Computing in Europe (PRACE) and the Extreme Science and Engineering Discovery Environment (XSEDE). The students met at the Royal Marine Hotel in Dublin, Ireland, where the Irish Centre for High-End Computing (ICHEC) -- the Irish member of PRACE, took care of local coordination and hospitality. Nationalities of the students spanned several continents including Asia, Europe, the Middle East, and Central and North America.

This was the third in an ongoing series of summer schools jointly organized by PRACE and XSEDE with funding from the European Commission (EC) and the United States National Science Foundation (NSF). The goals of the summer school series were to expand the knowledge of the attendees about high-performance computing (HPC) and its applications in multiple fields of science, technology, engineering and mathematics. The summer school stimulated international collaborations and friendships among the attendees and presenters through the unique global setup of the school.

The 2012 participants were engaged in learning about:

- Long-term trends and strategies for advancing scientific discovery
- Availability of PRACE and XSEDE cyberinfrastructure in Europe and the United States to support computational science research and education
- Challenges and solutions for conducting leading-edge research across multiple fields of study
- Scientific programming and software development strategies
- Performance analysis and profiling
- Algorithmic approaches and numerical libraries
- Data-intensive computing
- Scientific visualization

Attendees were immersed in a mix of presentations and hands-on sessions led by more than 20 leading researchers and HPC professionals from both sides of the Atlantic. The program placed particular emphasis on how HPC is being applied to meet current and future computational challenges in various scientific disciplines, as well as the relevant tools and techniques for tackling different problems. Meals and social activities were coupled with mentoring to form an integral part of the school's program, which was designed and organized to promote interaction among the participants.

The goal was to expand the knowledge of the attendees about high performance computing (HPC) and its applications in multiple fields of science and engineering. The goal was also to foster new collegial friendships and partnerships (nationally and internationally) among the presenters and attendees. Additional information about the event is available at: <https://www.xsede.org/web/summerschool12>

Participant and Presenter Feedback

Through a survey conducted at the end of the Summer School, 90% of the attendees, and 100% of the presenters and support staff, indicated that they found the summer school to be excellent or very good. Through the surveys, the respondents provided a number of suggestions for further improving the summer school in future years, along with a very strong vote for continuing to offer similar summer schools in the future.

The following is a summary of the analysis from 59 responses to the survey, or 98% of the participants. The participants felt that the following aspects of the Summer School were very beneficial:

- Ability to interact informally with the presenters in a comfortable and open environment
- Ability to learn about HPC challenges in a diverse range of fields

- Networking with other international students
- Learned a great deal that will benefit their own research spanning research methods, programming tools and new networks of colleagues

The participants provided a number of good suggestions for improvements in the future. The major recommendations for improvements included:

- Provide both introductory and advanced sessions during the hands-on tutorials to accommodate the diverse background of the participants
- Provide more hands-on tutorials
- Encourage the talks to focus on technology challenges and solutions
- Lengthen the Summer School to 5 days and provide more free time for assimilating the information and talking with others
- Ensure very good Internet connectivity

The following is a summary of the analysis of the responses by 16 of the 24 presenters and staff, or a 67% response rate. Overall, the presenters and staff felt that the best and most important aspect of the Summer School were the interactions with the participants and the other presenters and staff. There were good discussions on HPC topics and opportunities that will benefit the participants and the presenters. The Summer School provided a good foundation for further interactions and collaborations.

The group felt that overall the organization was very good, but that there is room for improvements and fine-tuning in the future. The major recommendations from the presenters and staff for improvements were providing opportunities for introductory and advanced sessions, providing more break-out sessions for topical discussions, more opportunities for mentors and mentees to meet and talk, and ensuring a good balance among technical sessions, free time, and social events.

Quotes from Attendees

David Keyes from the Columbia University and King Abdullah University of Science and Technology, delivered the opening keynote presentation on exascale challenges and said he was honored to participate in such an “elite activity” as the summer school. He was particularly impressed with the selection of students and post-docs who attended. “They have diversity of gender, race, institutional rank, citizenship, and, of course, discipline and applications-enabling spectrum, but all are poised to benefit. By their affiliation and advisors and their short round-the-room introductions, they are clearly going to be the ones in whom to invest.”

"I especially enjoyed how the presenters were mixed with the students, and it was nice to interact with them on a friendly, equal level. In my experience, talking to people like the presenters, who are really good in the field, can be extremely intimidating, and this summer school really helped me make that initial connection with many people that I wanted to meet and get to know better, as well as introducing me to people I had never met before. Overall, I gained more confidence in my own abilities to enter and succeed in the field of high performance computing. I learned a lot of things that I would not otherwise have been introduced to, and met many people that I will continue to communicate and collaborate with in the future. The summer school gave me opportunities that I would not otherwise have, and has been a once-in-a-lifetime opportunity." *Robin Betz, UCSD, participant.*

"To the organizers who put in so much time and created such an excellent conference, I can only say thank you, this has been one of the best conferences I have been to and will serve as a model. If I had to point to the strongest aspect of the conference, it would be the diversity of research represented, and the depth within each area. We are all heads down in our individual work, however, I've always wanted to chat with a lot of the folks in the other disciplines and I got to do that and make permanent connections. I have to say the conference made such a lasting impression I'm still trying to follow up on it all and all the things I have to do from it. It showed me particular areas in HPC that I may have a role to play post-graduation, and may be looking into that." *Dylan Pfeifer, UT Austin, participant.*

"The lectures and hands-on sessions covered a broad range of timely and highly interesting topics, and the quality of speakers was extraordinarily high. Numerous networking opportunities among the participants and lecturers sparked good discussions, some of which may extend well into the future. Overall, it was a most useful and rewarding experience for everyone involved." *Frank Jenko, Max Planck Institute for Plasma Physics and Ulm University, presenter.*

Goal

Building on the success of the previous EU-US Summer Schools on HPC Challenges in Computational Sciences, XSEDE and PRACE conducted the 3rd Summer School July 24-28, 2012 in Dublin, Ireland. The goal was to expand the knowledge of the attendees about high performance computing (HPC) and its applications in multiple fields of science and engineering. The goal was also to foster new collegial friendships and partnerships (nationally and internationally) among the presenters and attendees.

The major changes from 2011 included the following offerings:

- Better guidance to the science presenters based on feedback from 2011
- The addition of more hands-on sessions
- Mentoring among participants and presenters
- More organized social activities to foster community building

- New topics based on feedback from past participants and presenters

The site was selected to provide convenient access to US and European attendees as well as providing a scenic location with ready access to tourist attractions, restaurants and stores, as well as the advantages of a large city including mass transit.

Summer School Committee

The following people served on the program committee for 2012:

First Name	Last Name	Institute	Country of Institute
Galen	Arnold	NCSA	USA
Philip	Blood	PSC	USA
Shawn	Brown	PSC	USA
Pekka	Manninen	CSC	Finland
Jim	Ferguson	NICS	USA
David	Henty	EPCC	UK
Scott	Lathrop	Shodor/NCSA	USA
Hermann	Lederer	RZG	Germany
Simon	Wong	ICHEC	Ireland

Funding Support

Housing and meals for all attendees, presenters and staff was provided from the European Commission (EC) through PRACE. The NSF Office of Cyberinfrastructure ¹provided funding for travel by US participants and presenters.

Recruitment of Participants

The Summer School was announced in the PRACE and XSEDE web sites, and promoted through a Press Release which appeared in various media including International Science Grid This Week (iSGTW), HPCWire, and professional society newsletters.

The PRACE and XSEDE leadership used extensive mailing lists and contacts among other organizations that were instrumental in helping to spread the word to assist with the recruitment of participants. XSEDE distributed information via the more than 110 Campus Champions in the US, through the Southeastern Universities Research Association (SURA) and the EL Alliance, and PRACE also spread the information via the partner sites in the different European countries.

¹ NSF Award: "Evaluating and Enhancing the eXtreme Digital (XD) Cyberinfrastructure for Maximum Usability and Science Impact"; Award #0946505; John Towns, NCSA, Principal Investigator.

The 2012 summer school targeted graduate students and postdocs from the US and Europe with a pro-active emphasis placed on recruiting under-represented participants, including women and minorities. The 2012 Summer School provided a web site with information about the summer school and a registration form at <https://www.xsede.org/web/summerschool12>.

Selection of Participants

Interested graduate student and postdocs applied via the summer school web site. The applicants were asked to provide the following:

- Abstract of research focus and their research plans
- Experience with computational science and high performance computing including familiarity with MPI, OpenMP, multi-core, GPUs, applications packages, etc.
- Description of why the applicant wants to participate in the summer school, what they expect to learn, how they plan to apply what they learn, and how they will share what they learn with others.

Applications were reviewed by experts in their fields, and the selection criteria included:

- Description of current research project and how it will benefit from the applicant learning about HPC
- Support of their faculty or research advisor to participate
- A basic understanding of computational science and high performance computing and experience with at least one of MPI, OpenMP, multi-core, or GPU programming
- Compelling statement of the applicant's reason for attending the Summer School
- A broad cross-section among the science and engineering communities from among the applicants
- A broad cross-section from institutions across the US and Europe
- Diversity among the participants including women, minorities and people with disabilities

Summer School Program

Presenters were selected from the US and Europe to address a broader range of science topics, to cover the hands-on topics, and to engage experts in the field. They were also selected to mentor the attendees during the summer school. Support staff were selected from the US and Europe to provide assistance during the hands-on sessions, to provide mentoring to the attendees, and to coordinate logistics.

The agenda for the 2012 Summer School is included in Appendix A.

Selected Attendees

Over 236 applications from graduate students and postdocs were submitted from US and European institutions. Of these, 35 European students and 25 US students were accepted. There were participants from institutions in 16 countries, and over 30% of the attendees were women. Presenters and support staff were invited from Europe and the US to provide presentations, tutorials, mentoring and support for the participants.

Summer School Surveys

To assess the value and impact of the summer school and to help plan for future events, a survey of the attendees was conducted at the conclusion of the summer school. A separate survey was conducted with the presenters and support staff to capture their perspectives on the quality of the summer school and how it could be improved in future events. We received survey responses from 59 of 60 (98%) participants, and 16 of 24 (67%) presenters and support staff.

Through the surveys, everyone was asked about their goals for attending and the extent to which the summer school met those goals. Overwhelmingly the responses indicated that the summer school met their goals, and quite a few said the event exceeded their expectations. When asked for their overall assessment, 90% of the participants rated the summer school as excellent or very good. Fully, 100% of the presenters and support staff all rated the summer school as excellent or very good.

The detailed analysis of the surveys is provided in appendices C (attendees) and D (presenters and support staff).

Summary

The overwhelming consensus from attendees, presenters and support staff is that while there is room for improvement, the summer school was extremely effective in allowing the attendees and presenters to achieve (or surpass) their reasons for attending, and that they should be continued with minor changes, and continue as an international endeavor.