BLUE WATERS

SUSTAINED PETASCALE COMPUTING

HPC Workforce

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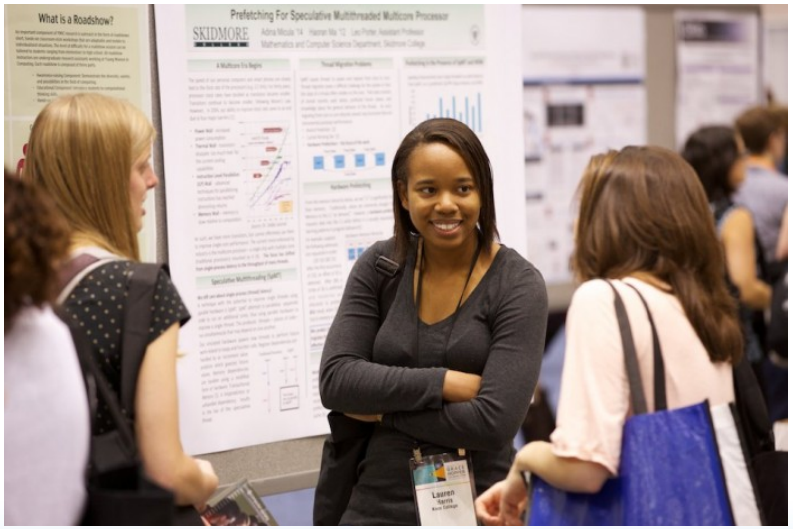
GREAT LAKES CONSORTIUM
FOR PETASCALE COMPUTATION
CRAY

HPC Workforce Strategies

- Education Allocations
- Webinars and Workshops
- Virtual School of Computational Science
- Graduate Fellows
- Internships
- Community Outreach
- Blue Waters Symposium
- Repository of Materials
- External Evaluation



Education Accounts

- 1% of Blue Waters for educational applications
- Open to faculty and staff at US institutions
- To support workshops, institutes, classes, etc.
- Selections by Education Allocations Committee
- Status
  - Expect to support about 20 projects at a time
  - 37 projects approved to date; 17 completed
  - Over 860 participants from 28 institutions
  - Projects span one day workshops, semester courses, multi-day summer schools, and student internships

Education Allocations: Lessons Learned

- Allocation request process improved
  - we are responding to requests within a week
  - final report template provided
  - special queues or node reservations for education projects, capturing student excitement is easier when wait time is reduced
- Impact statements from project leaders
  - *"the resources used are significantly beyond what they have access to on campus"*
  - *"this experience will better prepare the students to use petascale resources in the future"*
  - *"team gained invaluable knowledge of Blue Waters and High Performance Computing"*
  - *"Blue Water's performance was exceptional"*
  - *"class covered OpenMP, OpenAcc, and MPI, all over the same system and using the same software configuration"*

Webinars/Workshops

- Monthly user web conference calls
- NCSA/Blue Waters Network Services
- Application I/O High Availability Best Practices
- Advanced MPI Capabilities
- HPC and Python
- Introduction to HDF5
- Advanced User Workshop
- International HPC Summer School
- OpenACC, OpenMP workshops (3)
- Hackathon
- XSEDE Summer Bootcamps

Webinars/Workshops

- Blue Waters staff have supported XSEDE webinars and provided local staff support for XSEDE workshops
- SC14 education workshop
- 3 multi-day summer workshops
  - Introduction to GPGPU programming
  - Data Intensive Computing
  - Scientific Visualization

SC15 HPC Workshop

- Continuation of the SC14 SC14 HPC Training Workshop
- Provide a few topical presentations
- Have a series of round-table discussions
- Propose ideas for collaborative efforts for the next year
- We are looking for sites that want to help in the planning and participate in the workshop

Virtual School of Computational Science and Engineering

- Full Semester Course Offerings
- Offering on-line graduate credit courses each semester
  - 40 hour courses, with syllabus, exercises, assessment
  - Recorded videos for local playback
  - Connecting multiple institutions
  - Faculty receive stipend, A/V support, TA support
- Seek collaborating campus faculty
  - Faculty offer credit course on their campus
  - Faculty and students watch videos together
  - Faculty provide mentoring and support
- Coordinated by Steve Gordon, Ohio Supercomputer Center

VSCSE: Semester Course Offerings

- Previous course offering
  - Algorithmic Techniques for Scalable Many-core Computing Course by Wen-mei Hwu, UIUC
  - Sites: U of Oklahoma, U of Tennessee Knoxville, North Carolina State U for total of 57 students
- Current offerings
  - Scientific Visualization by Han-Wei Shen, OSU
  - Designing and Building Applications for Extreme Scale Systems by Bill Gropp

Course Improvements

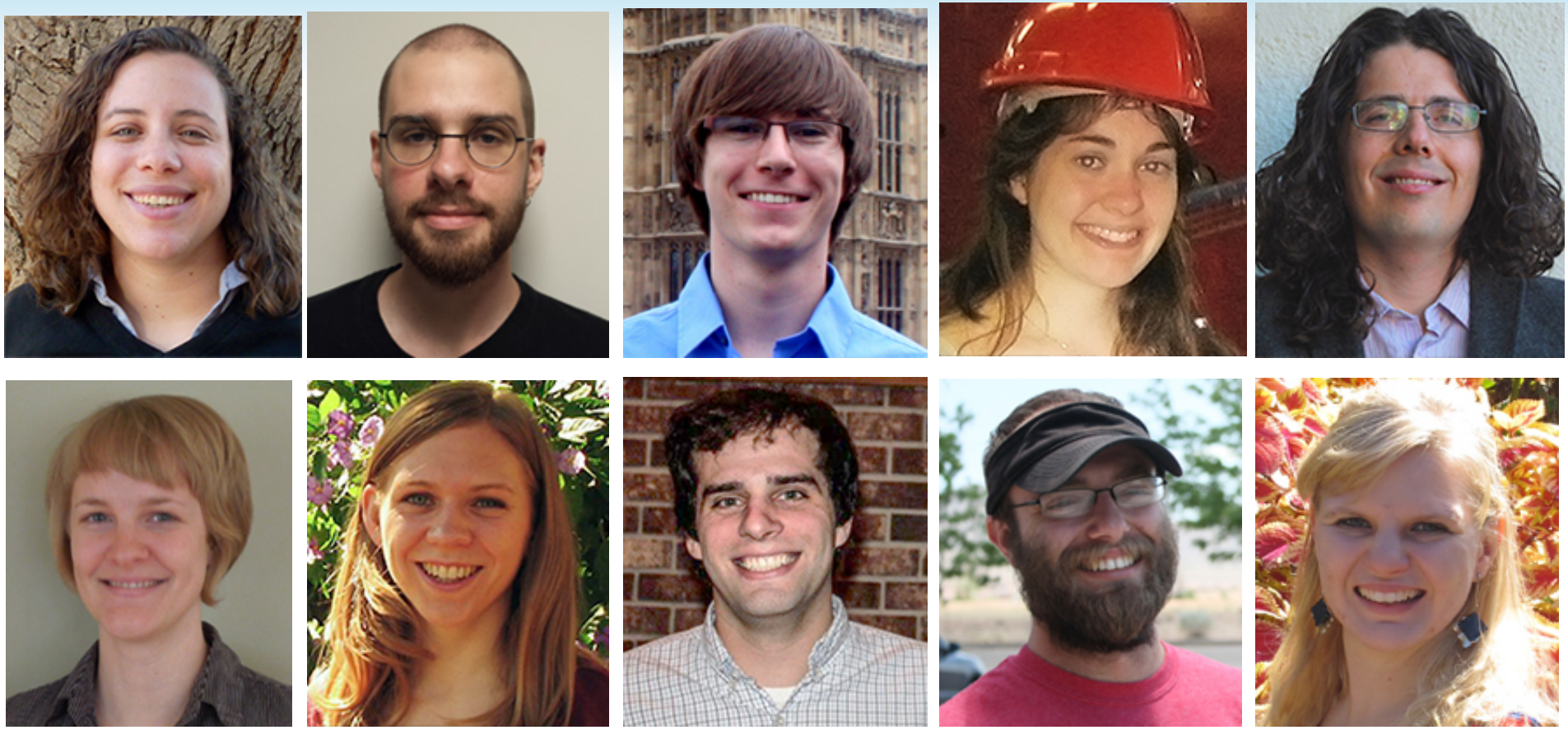
- Evolving course structure and content based on experiences from first offerings
  - More complete quizzes that reflect final exam content
  - More examples of final projects to assist students and faculty with choosing projects
  - Changes to underlying course management infrastructure to provide multiple ways to interact with participating students and faculty
  - Additional coordination with collaborating faculty

Blue Waters Graduate Fellowships

- Program modeled after NSF Graduate Fellows
  - Enrolled in a PhD program at a US institution
  - Support for 1 year, renewable for 1 additional year
  - $38K stipend plus $12K tuition, fees, travel
- Cadre 1: 100 applications from 49 institutions
  - 35 very high caliber applicants
  - 6 Fellows selected
  - RAPID award supporting 4 additional fellows
  - All attending the Blue Waters Symposium in May
- Recruitment for 2nd cadre started at SC14
  - Selections underway now

Support for Fellows

- Each fellow assigned technical point of contact
- Monthly calls to gauge progress and deal with any problems
- Face-to-face meetings at SC14
- Quarterly written reports on progress
- Each presents a research paper and a poster at the Blue Waters Symposium in May



2014 Blue Waters Graduate Fellows

External Evaluation

Findings to date

- Program provides lots of resources and direction for the projects
- Blue Waters mentors are responsive, cooperative, and helpful
- Live- chat tool is very useful for prompt help
- Program is intensive and forces learning without any distractions
- SC14, BW Symposium, and workshops provide great experience to meet HPC people and get hands-on help
- Making connections with students and faculty in new fields
- Fellows highly interested in using computational techniques

Plans

- Technical Mentors Focus Group
- Academic Advisers/Fellows Mid-survey
- Participate in regular calls with Fellows

Student Internships

- Support 20 undergraduates and graduates per year
- Status
  - 21 selected
  - Over half are women and/or minority students
  - 24 students attended May 26-June 6 institute at NCSA
  - all students now working with mentors for one year
- Students attended a 2 week institute
- Students matched with BW or XSEDE research projects for one year
- Recruitment for next cadre started at SC14 – selections underway now

External Evaluation

Findings

- High levels of overall satisfaction including communication between instructors and participants
- Most useful aspect was learning the parallel computing concepts
- All participants have a better understanding of supercomputing and Blue Waters
- Increase hands-on time and handouts
- Success breeds success and confidence
- Extensive recruiting supports diverse program
- Competence can be developed with effort

2014-2015 Student Interns

Community Outreach

- Presentations on Campuses
- Presentations at Meetings
  - Tapia Conference 2014
  - SACNAS
  - Grace Hopper
  - XSEDE / PRACE HPC Summer School
  - Importance of application performance at ACS meeting
- Encourage campus representative participation in Campus Champions
  - Build community among campuses
  - Raise awareness of BW

Repository of Education and Training Materials

- Builds on collection of learning materials provided through NSF's National Science Digital Library (NSDL)
  - Includes 30 undergraduate curricular modules developed through Blue Waters funding during deployment phase with over 50,000 downloads in last four months
- Conduct formal reviews to provide quality materials
- Developing training roadmaps with links to reviewed materials
- Usage: ~5-600 visits per day, >7,000 pages accessed daily; 700,000 pages accessed since 1 August 2014
- www.hpcuniversity.org

Open Discussion

- What strategies do you find most useful?
- In what areas might we share resources?
- How might we collaborate?

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