



EDUCATION & WORKFORCE DEVELOPMENT

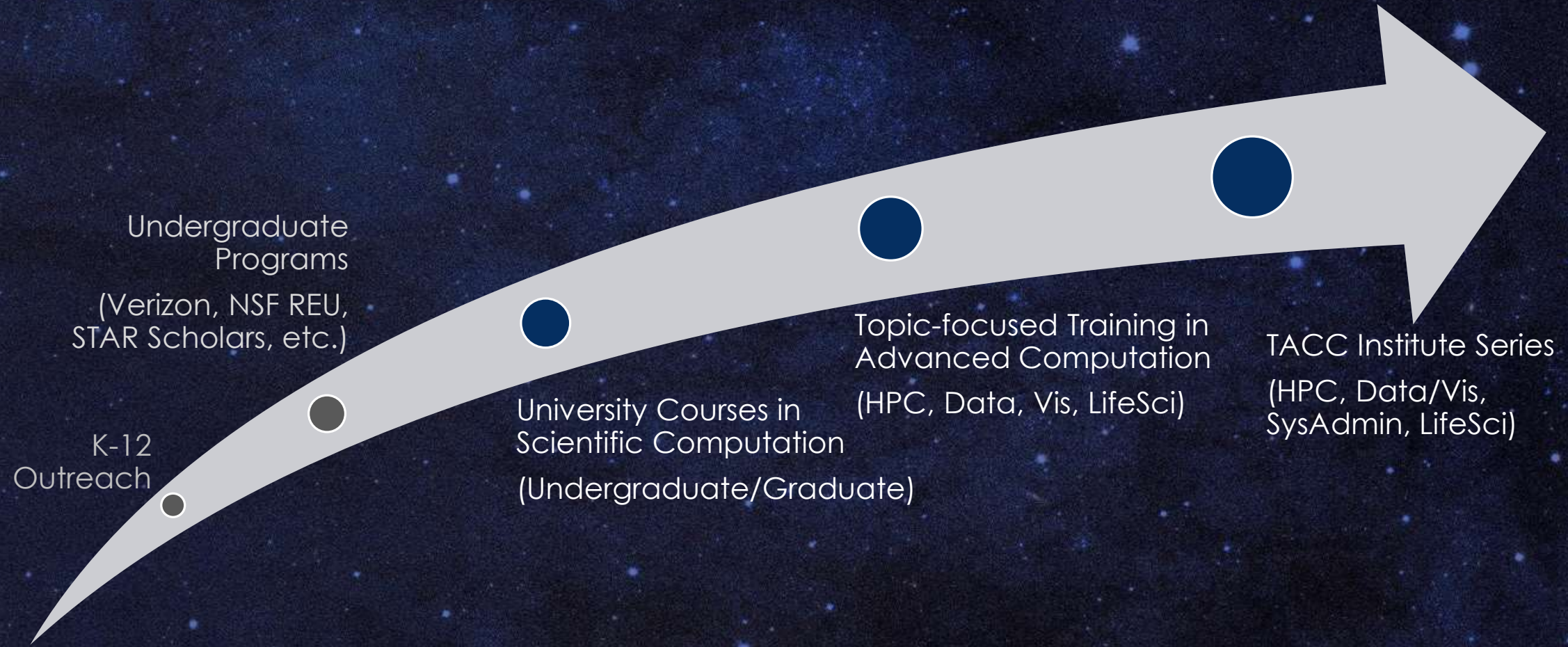
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IDC HPC User Forum

Sept 7, 2016

LIFELONG LEARNING IN ADVANCED COMPUTATION



UNDERGRADUATE PROGRAMS

- ▶ NSF Research Experiences for Undergraduates (REU) grants
 - ▶ 10 undergraduates majoring in science and engineering disciplines
 - ▶ Participants explore grand challenges such as climate modeling, weather forecasting, drug delivery, brain mapping, energy exploration and understanding the human genome, among others.
- ▶ STAR Scholars (Funded by TACC industry partners)

STAR SCHOLARS

- ▶ Graduate or undergraduate interns, depending on project
- ▶ Students work under a TACC mentor, on projects of interest to Partners
- ▶ Students submit papers or posters at conferences
- ▶ Partner funded (\$50K per student for 2 semesters)
- ▶ Funding from BP, Shell, NASA



STAR SCHOLARS - OUTCOMES

- ▶ *Interactive Parallelization Tool* - paper by Ritu Aurora and student Madhav Gupta
<https://www.youtube.com/watch?v=L4a19kF6q48>
 - ▶ IPT can be used by domain-experts and students to semi-automatically generate parallel programs based on multiple parallel programming paradigms (MPI, OpenMP, and CUDA) and learn about these paradigms through observation and comparison.
- ▶ Student paper accepted to SC16: “*A Tool for Semi-Automatic Application-Level Checkpointing*”
- ▶ Work on TACCStats – Todd Evans and student Vivek Pradhan
 - ▶ Student benchmarked a NoSQL database for analysis of all of the job-level data from our systems that is collected by TACCStats.
 - ▶ Working on visualization to facilitate detection of poorly written programs that are not using resources effectively

UNIVERSITY COURSES IN ADVANCED COMPUTATION

- ▶ UT Austin dept. of Statistics and Data Sciences
- ▶ Dual-listed undergraduate/graduate
- ▶ Five (5) courses covering many aspects of advanced computation
 - ▶ Introduction to Scientific Programming – programming concepts using C/C++ and Fortran
 - ▶ Scientific and Technical Computing – basic numerical methods, fundamentals of floating-point arithmetic, common tools for scientific software development (git, make), profiling and optimization, debugging
 - ▶ Parallel Computing – developing parallel applications using OpenMP and MPI
 - ▶ Visualization and Data Analysis – tools for data analysis (Hadoop, R) and visualization of scientific datasets (VisIt, Paraview)
 - ▶ Distributed and Grid Computing – executing data parallel ensembles which do not require MPI using grid-enabled tools (Globus, Condor, etc.)
- ▶ Content and instructor notes made publicly available through a grant from Chevron
 - ▶ <https://www.tacc.utexas.edu/education/academic-courses>

TOPIC-FOCUSED TRAINING IN ADVANCED COMPUTATION

- ▶ Offered in both spring and fall academic semesters
- ▶ 1 and 2-day courses in HPC, Data, and Visualization
 - ▶ Mix of lecture and hands-on exercises
- ▶ Open to TACC users, academic and industry partners
- ▶ In many cases courses are live-streamed and recorded on YouTube
 - ▶ <http://bit.ly/TACCtraining>
- ▶ Upcoming and past training at:
<https://portal.tacc.utexas.edu/training>

Courses have included:

- ✓ MPI/OpenMP
- ✓ Profiling and Optimization
- ✓ Debugging
- ✓ Programming the Intel Xeon Phi (KNC/KNL)
- ✓ Python
- ✓ R
- ✓ Using Hadoop/Spark
- ✓ Data Management Practices and Techniques
- ✓ Introduction to Scientific Visualization
- ...and more

SUMMER SUPERCOMPUTING INSTITUTE (SSI)

- ▶ Held each summer since 2007
- ▶ Originally an aggregation of TACC's topic-focused training courses
 - ▶ MPI, OpenMP, profiling, debugging, visualization
- ▶ Offers one-on-one meetings with computational staff to discuss research-specific problems
- ▶ From 2007-2015, enrollment steady around 40
- ▶ Registration fee for attendees



SUMMER SUPERCOMPUTING INSTITUTE (SSI)

- ▶ In 2016, SSI was expanded
- ▶ Two tracks
 - ▶ Parallel Applications
 - ▶ MPI, OpenMP, debugging, profiling, many-core programming (Xeon Phi)
 - ▶ Data Analysis and Visualization
 - ▶ Python, R, Data Management, Hadoop/Spark, VisIt/Paraview, High Throughput Computing
- ▶ Plenary talks showcasing newest research
- ▶ 90 participants
 - ▶ 5 countries represented
 - ▶ 18% female participation



COMING SOON – TACC INSTITUTE SERIES

- ▶ Series of week long training events modeled on SSI
 - ▶ High Performance Computing
 - ▶ Visualization and Data Analysis
 - ▶ Cluster design and administration
 - ▶ Life Sciences Computing
- ▶ Registration fee TBD
- ▶ To be offered during the summer months
- ▶ More details coming at SC16 in November!

MEASURING IMPACT

- ▶ More than 1,000 registered for training between Aug. 2015 and July 2016
- ▶ We also track number of independent views of our recorded training events
 - ▶ More than 11,000 views between Aug. 2015 and July 2016
 - ▶ Up 25% over previous year
- ▶ In-person participants are asked to answer surveys after training events
 - ▶ Satisfaction with content: > 70% “very satisfied”
 - ▶ Satisfaction with instructors: > 90% “very satisfied”
 - ▶ Would recommend to others: > 70% “definitely”

CONTACT US

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