EDUCATION & WORKFORCE DEVELOPMENT
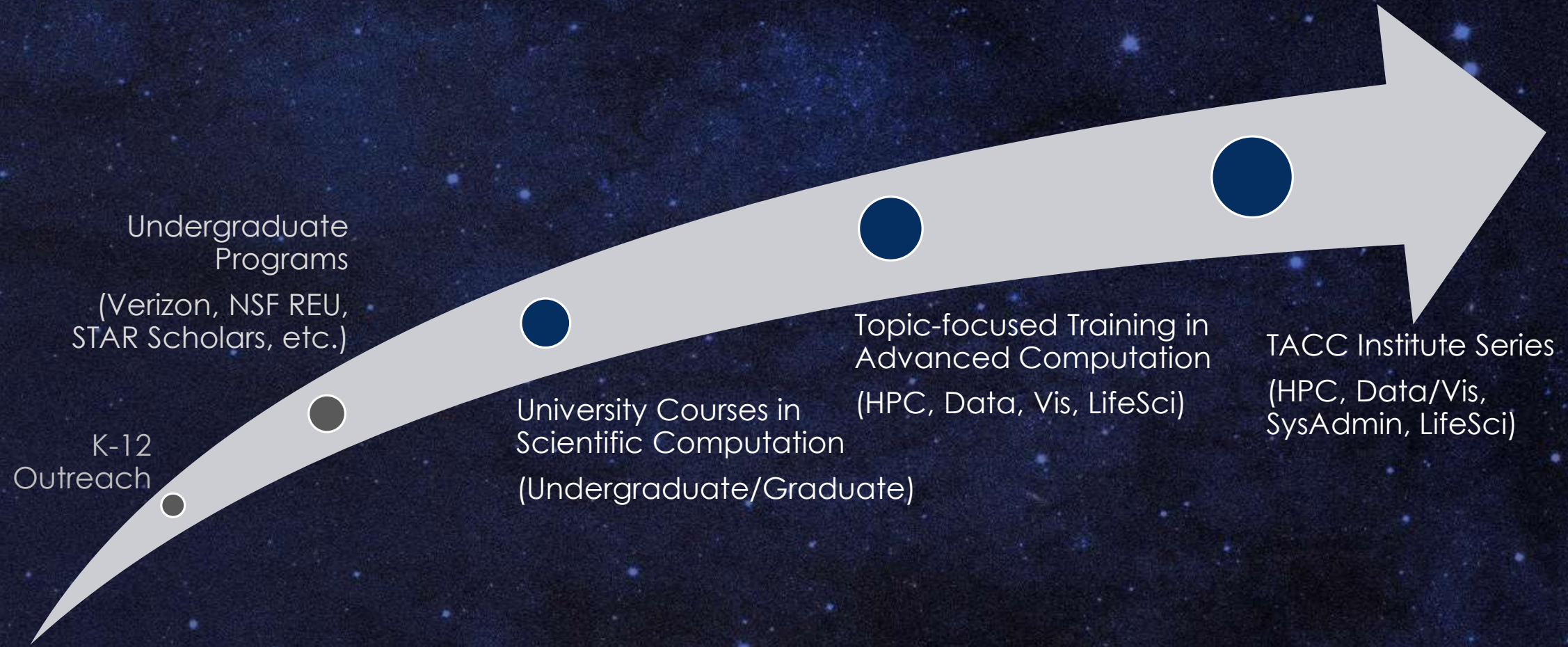
Melyssa Fratkin

Industrial Programs Director

IDC HPC User Forum

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LIFELONG LEARNING IN ADVANCED COMPUTATION

Undergraduate Programs

(Verizon, NSF REU, STAR Scholars, etc.)

K-12 Outreach

University Courses in Scientific Computation

(Undergraduate/Graduate)

Topic-focused Training in Advanced Computation

(HPC, Data, Vis, LifeSci)

TACC Institute Series

(HPC, Data/Vis, SysAdmin, LifeSci)

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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▶ https://portal.tacc.utexas.edu/training