EDUCATION & WORKFORCE DEVELOPMENT

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CASC Fall Meeting

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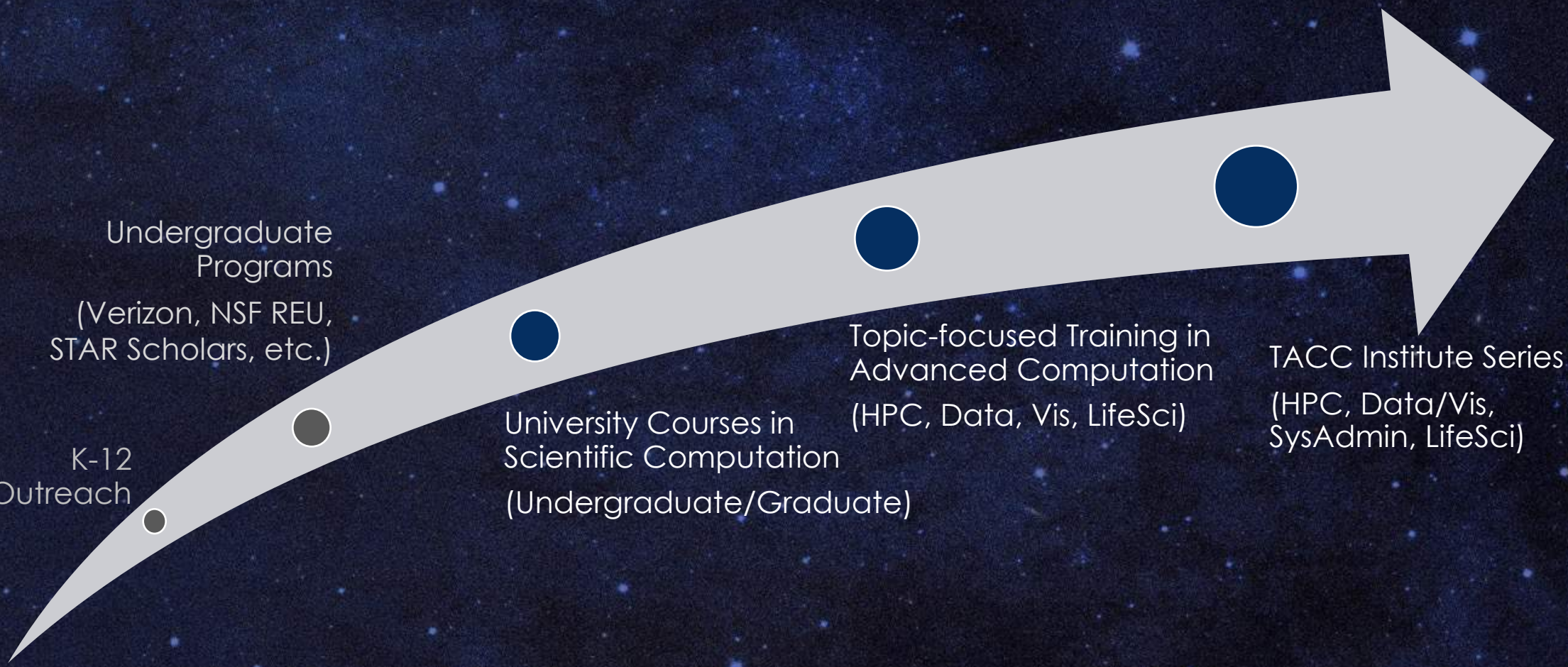
LIFELONG LEARNING IN ADVANCED COMPUTATION



K-12 PROGRAMS

- Verizon Innovative Learning Summer Entrepreneurship Experience
  - 25 students from around the country for 3 ½ weeks
  - Immersive, hands-on camp designed to expose underserved and underrepresented rising sophomores and juniors in high school to skills and careers in technical fields and innovation.

- CODE@TACC Summer Camp – 11th and 12th graders learned to:
  - Use project based-learning approach to foster creativity and problem solving skills
  - Participate in team-building exercises that will prepare students for the workplace of the future
  - Handle the basics of networking, physical interfacing and electronics
  - Design, create, and program a robot
  - Create wearable devices
  - Interact with TACC's cutting-edge technology systems
  - Collaborate with peers, college students, scientists, researchers and engineers

UNDERGRADUATE INTERNSHIP 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.)

UNIVERSITY COURSES IN ADVANCED COMPUTATION

- 18 Credit Hours = Undergraduate Certificate
- 15 Credit Hour = Graduate Portfolio

- Content and instructor notes made publicly available through a grant from Chevron
  - https://www.tacc.utexas.edu/education/academic-courses

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, academics and industry partners

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

FOCUSED TRAINING IN ADVANCED COMPUTATION

- 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
- Course Materials also available for download.

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
- Fee for 2016: $200

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
  - *HPC For Managers*
  - *SysAdmin Training*
- 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