

# Want Better Research Faster? How Can CSU Make High-Performance Computing Work for You?



**ISTeC**  
**Research Computing Open Forum**

**Friday, September 26**

**1pm - 3pm**

**Morgan Library Event Hall**

**(dessert and beverages will be available)**

# ISTeC Research Computing Open Forum

**H. J. Siegel**

Abell Endowed Chair Distinguished Professor  
of Electrical and Computer Engineering  
and Professor of Computer Science



- “Want Better Research Faster?”
- “How Can CSU Make High-Performance Computing (HPC) Work for You?”
- **Objective of Open Forum**
  - ▲ gather feedback so CSU can provide HPC for your research
    - equipment, software packages, education, consulting
  - ▲ determine an approach for providing these needs

# Definition of HPC (High-Performance Computing)

- HPC definition is a loose guideline for our committee's work
- “Any computer program or software application that
  - ▲ requires or would benefit from the use of numerous processors and/or computers to process some volume of data
  - ▲ within a reasonable timeframe
  - ▲ that would be beyond the capabilities of a single laptop/desktop/workstation computer.”
- also a need on campus for storage that is higher performance and/or larger in scale than is found with a typical desktop
  - ▲ there is a separate ISTE C Data Management Committee
  - ▲ we will interact with that committee
    - to avoid reinventing what they are doing
    - while being sure that data issues are not ignored

# What We Have Today

- ISTeC “won” NSF MRI grant in 2009 for a campus HPC system
- ISTeC Cray operational in January 2011
  - ▲ for small to medium-sized applications
- a diverse and steadily growing user base, exceeding capability
- excellent HPC courses and tutorials in the past
- a reliable, but aging, hardware environment
- a rich suite of customized software application packages
- industrial participation (Woodward)
- successful

# What are We Lacking Today

- capacity to accommodate
  - ▲ growth in users to ~ 1,000 within 2 to 3 years
  - ▲ bigger, more complex, large-data applications
- ability to allow users to have large subsystems for a week
- latest hardware technology (including accelerators)
  - ▲ > 10X increase in performance
- latest internal processor interconnect technology
  - ▲ especially for large, complex, multi-physics problems
- big data, fast storage
- support for continuing to teach courses on how to use HPC
- support for an HPC consulting service
- CSU is now behind other institutions in the state in HPC that have significant internal financial support - UCB, Mines

# ISTeC Research Computing Committee

- constituted by the Offices of the Vice Presidents for Research and Information Technology (VPR and VPIT)
- received charge from VPIT on April 28, 2014
  - ▲ determine a strategy for research computing for CSU
  - ▲ consider alternatives for research computing systems, both on-campus and off-campus
  - ▲ analyze the range and scope of the research computing being done at CSU that needs HPC
  - ▲ if the ISTE C Cray is being used efficiently and effectively
  - ▲ try to finish report by end of October 2014

# ISTeC Research Computing Committee Members

- H.J. Siegel, Electrical & Computer Eng'g Dept., COE - Chair
- Wim Bohm, Computer Science Dept., CNS
- Randy Boone, Ecosystem Science & Sustain. Dept., WCNR
- Ray Browning, Health and Exercise Science Dept., CAHS
- Richard Casey, Infectious Disease Research Center (IDRC)
- Dan Cooley, Statistics Dept., CNS
- Mark Enns, Animal Sciences Dept., CAS
- Xinfeng Gao, Mechanical Engineering Dept., COE
- Dan Hamp, ACNS
- Bhavesh Khemka, student/Post-Doc rep. and ISTeC Cray user
- Scott Novogoratz, CVMBS
- Tony Rappe, Chemistry Dept., CNS
- Dan Turk, Computer Information Systems Dept., COB



# Open Forum Agenda

1. ISTeC Research Computing Committee - H.J. Siegel, ECE (5/5)
2. Welcome - Pat Burns, VPIT, and Aaln Rudolph, VPR (5/5)
3. Brief Overview of ISTeC Cray - Rick Casey, ACNS/IDRC (5/5)
4. Purdue CIO HPC Approach - Scott Novogoratz, CVMBS (5/5)
5. Survey of HPC at Other Universities - Pat Burns, VPIT (5/5)
6. Survey of HPC Needs at CSU - Tony Rappe, Chemistry (10/10)
7. Using Cloud Computing - Rick Casey, ACNS/IDRC (5/5)
8. Using NSF or Nat'l Lab Machines - Bhavesh Khemka, ECE (5/5)
9. Model HPC Consulting - Ray Browning, Biomed. Eng. (5/5)
10. Additional feedback and discussion (20 minutes)



# Questions?