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NATIONAL INSTITUTE FOR COMPUTATIONAL SCIENCES

# NICS

## Application Acceleration Center of Excellence (AACE)

**Glenn Brook**

University of Tennessee  
Joint Institute for Computational Sciences  
Director, AACE



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# Application Acceleration Center of Excellence (AACE)

Joint Institute for Computational Sciences  
University of Tennessee & ORNL



- Established early in 2011 in partnership with NICS, HPC vendors, and academic institutions
- *An essential element of a sustainable software infrastructure for simulation in science and engineering*
- Director: Glenn Brook



# **AACE — Mission**

- **To prepare the national supercomputing community to effectively and efficiently utilize future supercomputing architectures**
  - **To optimize applications for current and future accelerator-based compute systems**
  - **To develop expertise in the expression and exploitation of fine-grain and medium-grain parallelism crucial for exascale computing**
  - **To conduct research and education programs focused on developing and transferring knowledge related to emerging computing technologies**
  - **To provide expert feedback to HPC vendors to guide the development of future supercomputing architectures and programming models**



# **AACE — Current Objectives**

- **Accelerate NSF projects toward exascale computing by exploiting state-of-the-art heterogeneous architectures**
- **Engage the broader community in the development of new algorithms and science codes optimized for accelerator-based architectures**
- **Disseminate fundamental knowledge and principles related to the effective and efficient use of accelerators through training courses, educational materials, and research publications**
- **Host visiting students and faculty at NICS to facilitate cross-disciplinary collaboration and effective exchange of expertise**



# **AACE — Projects**

- **Investigating the Intel MIC Architecture**
  - **Porting applications to developmental hardware**
  - **Developing appropriate programming models**
  - **Providing appropriate expert feedback to Intel**
  - **Engaging UT staff and students**
    - **2 professors, 3 research scientists, and 4 graduate students**
    - **Contributions from around 10 additional staff members**
- **Plan to conduct similar work with emerging hardware from NVIDIA and AMD in the near future**
- **Plan to investigate “Green” computing technologies**





**KRAKEN**

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