INTERNATIONAL EXASCALE SOFTWARE PROJECT (IESP)
Purpose

□ This meeting is the kickoff to a series of international workshops on HPC software.

□ The focus of the workshops:
  □ Build a plan for how the international community can join together to improve software available for high-end systems over the next 3 to 10 years.

□ The DOE and NSF have committed their support for the workshops.
Why?

- The open source community provides much of the world’s HPC software.

- The productivity and performance of this software is key to enabling scientific discovery via computational science.

- Goal: Improve the world’s simulation and modeling capability by improving the coordination and development of the HPC software environment.
Current State

- No global evaluation of key missing components
- Important architectural features changing over the next few years will leave holes in environment.
  - Power management
  - Multicore tools
  - Fault management
  - Speculative execution, transactional memory, GPGPUs
  - Programming models
- Environments on high-end systems are not very compatible.
- HPC environments poorly coordinated with vendors
  - Example: optimized math libraries lag far behind new chip features.
International Community Effort

- We believe this needs to be international collaboration for various reasons including:
  - The scale of investment,
  - The need for international input on requirements, and
  - Europeans, Asians, and others are working on their own software that should be part of a larger vision for HPC.

- We envisage a series of workshops to define and help coordinate the agenda.
Output of the Workshops

- Community proposed unified and united roadmap for the software needed for exascale.
- A report by the community on a path forward for Exascale Software.
A Draft Plan Might Look Like

- Build international collaborations in the areas of high-performance computing software and applications.
- Research and development needed for new programming models and tools addressing extreme scale, multicore, heterogeneity and performance,
- Cooperation in large-scale systems deployments for attacking global challenges.
- Using the roadmap to guide the development of open source systems software, I/O, data management, visualization, and libraries of all forms targeting tera/peta/exascale computing platforms.
- Joint programs in education and training for the next generation of computational scientists.
- Vendor engagement to coordinate on how to deal with anticipated scale.
Workshops and Report

- 3 workshops over the next year
  - With a report out at SC09
- Broad engagement by the community
- First one in the States in late Winter – early Spring
- Second one in Europe in the Summer
- Third one in Asia in the early Fall
- We have an email list at iesp@eecs.utk.edu where you can express your willingness to participate.
- We hope that other agencies will join in supporting the effort that DOE and NSF have already committed to supporting.
Immediate Effort (HPC SC)

- Coordinate software activities of major supercomputer centers
  - NSF Track 1 & 2 centers
  - DOE Science centers
  - Others...
- Provide as much commonality as possible to users
- Share resources across centers
- Accelerate adoption of new software
- Starting ASAP and becoming persistent
Activities

- Share information on user requirements and available software
- Collaborate in porting and supporting common APIs and tools
- Collaborate in the evaluation of new APIs and tools
- Share education material
Mechanisms

- Periodic meetings
- Common user surveys
- Information sharing portal(s)
- Technical committees to define common interfaces and services and push standards
- Collaborations in
  - education (courses, materials)
  - software support (problem reporting and handling)
Support for New Software

- Common activities to promote and evaluate new APIs and tools
  - concurrent deployment
  - joint support
  - joint evaluation
  - joint adoption/availability/sunset policy
  - joint development activities (test suites, porting, integration...)

Questions?