

INTERNATIONAL EXASCALE SOFTWARE PROJECT (IESP)

Purpose

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- 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?

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- 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

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- 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

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- 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

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- 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

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- 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

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- 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?