

NIAC Day Breakout Session Outcomes

Session: HPC @ Exacscale

Facilitators: David, Mark, Randy

Major Organizing Questions/Challenges

- State major research questions/challenges and how they could be NIAC projects

Major Question/Challenge	Associated Projects
<p>Opportunity for Co-Design Exascale Need for a problem at UW / Opportunity for Co-Design / Tightly connected community Access to large scale systems (Hyack @ UW 5600 cores/48 GPUs) (PIC + User Facilities/EMSL-Cascade @ PNNL) Plan to stage the develop of hardware & applications Including algorithm development</p>	<p>Lattice QCD for HEP&NP Grappa: Runtime+hardware acceleration at fine-grain irregular parallelism. AMD Exascale development (Darpa) Chapel@ Cray Approximate computing</p>
<p>Architecture/Application Relationships Google Exacycle -- exascale model (LSST telescope modeling). Understanding of the relationship of problems with gross architectural models. What is a reasonable programming model to search scientific workloads on scavenging/cloud environments? Mixed capability/capacity workloads. Scheduling & Resource planning</p>	<p>Thom D. EMSL Need for training in use of HPC resources</p>

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Major Question/Challenge	Associated Projects
<p>Interactive access to performance of HPC to support “thin king tools” Star-P-like high-level environments. Is there a search-like pre-computation opportunity? Is there a “grand challenge” associated with getting access to HPC to more users?</p>	<p>Howe: Myria/Myrial Callahan: scalable high-level modeling languages eScience</p>
<p>Where do “big data” and “scientific computing” intersect? Are there language synergies as well as architectural synergies?</p>	<p>Howe: Myria/Myrial Callahan: scalable high-level modeling languages eScience</p>
<p>Difficulty of having software portable especially across time? Multicore, GPU, ??? Reengineering tools. How do we serve the long tail of scientific applications/users? Even at the teraflop-level</p>	

Implementation Strategy

- Outline your implementation strategy (what is needed, from whom, and how you will get it)

What	Who	How
Training more computationally savvy scientists		Defragment HPC communities, build curriculum, boot camp, summer school Start with a seminar series for sharing
Identify co-design opportunities		A focused workshop
Understand opportunity for interactivity/high-level interaction		Repeat eScience survey? Seminar series to share problems and requirements?