



The Hybrid Multicore Consortium (HMC)



Presented by

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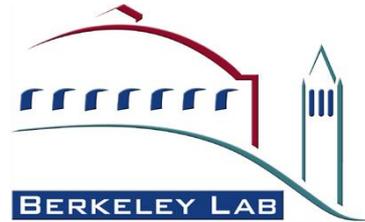
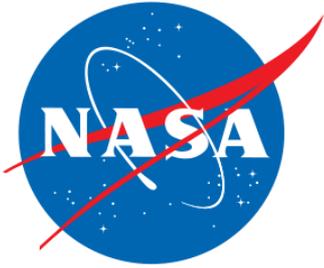


A multi-organizational partnership to support the effective development (productivity) and execution (performance) of high-end scientific codes on large-scale, accelerator-based systems

<http://computing.ornl.gov/HMC>

Membership is open to all parties with an interest in large-scale systems based on hybrid multicore technologies

Organizing partners



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



The organizing partners have made substantial investments in the deployment of large-scale, accelerator-based systems



Industrial affiliates



Goal: Facilitate production readiness of hybrid multicore systems

- **Challenge**

- Existing applications require significant reengineering to effectively manage the resources provided by large-scale, accelerator-based systems

- **Immediate goal**

- Identify obstacles to migrating high-end scientific applications to large-scale, accelerator-based systems
- Maintain long term perspective to ensure that today's efforts are not lost on tomorrow's platforms

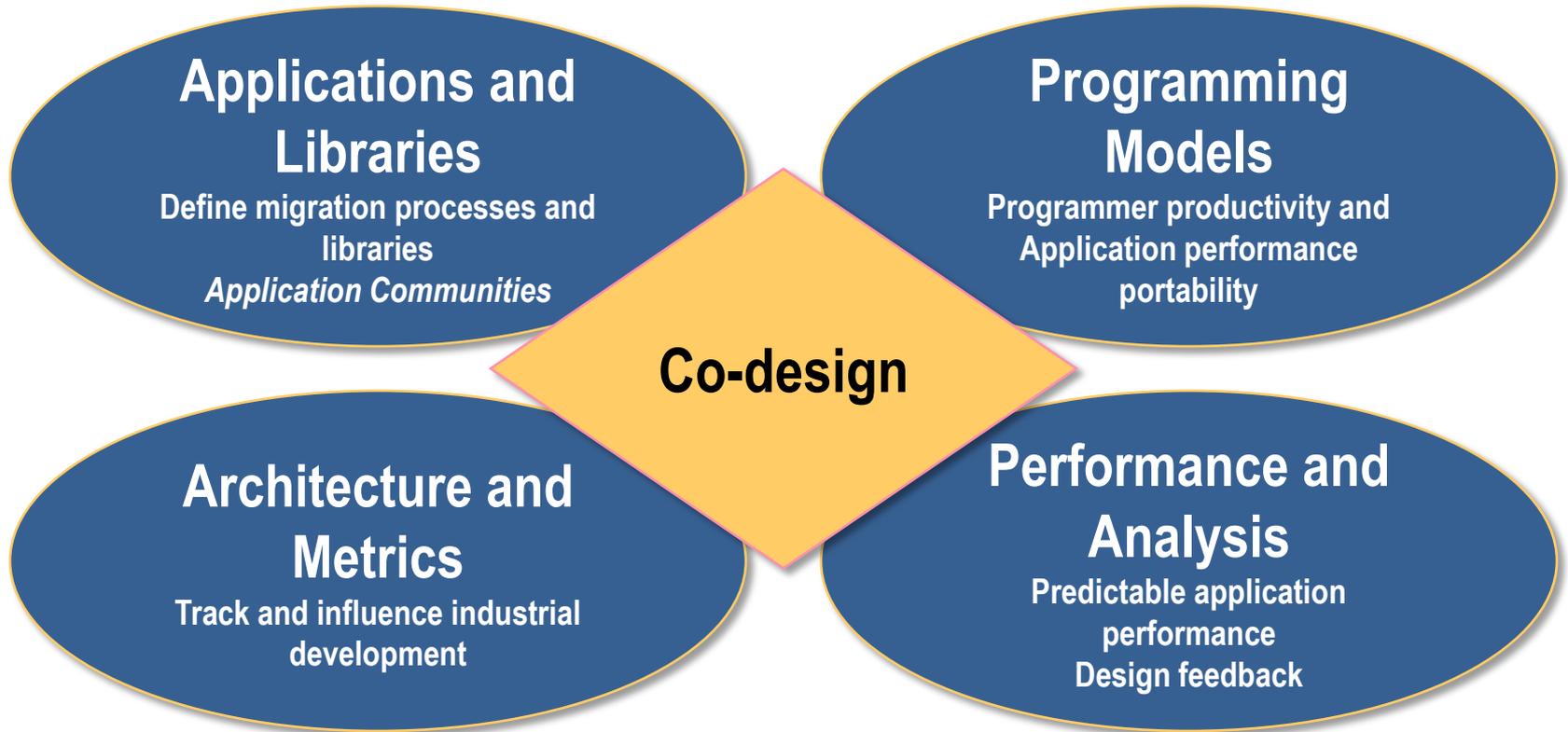
- **Long term goal**

- Identify strategies and processes, based on **co-design** among applications, programming models, and architectures, to support the effective development (**productivity**) and execution (**performance**) of large-scale scientific application

Approach

- Engage the broad community, including:
 - HW and SW developers (vendors)
 - Scientific computing community (users)
 - Education and training
- Maintain a **roadmap** documenting relevant projects and gaps
- Provide a unified voice to influence emerging standards and developers (both hardware and software)
- Serve as a clearinghouse to communicate successes and lessons learned
- Workshops and Web site
 - Define and update the roadmap
 - Support interactions (clearinghouse and engagement)
- Maintain long term vision while providing solutions for near term systems (“Think globally, act locally”)

Technical committees (TC)



Grading criteria

Urgency How soon is it needed?	Duration How long will it be useful?	Responsive Will adding resources help?	Applicability How broadly can it be used?	Timeline How soon can we expect it?
Critical Needed now	Long Useful for the foreseeable future	High Resources enable significant progress	Broad Applicable beyond scientific computing	Immediate Results within 1–2 years
Important Needed within 3 years	Medium Useful for Exascale	Moderate Resources enable progress	Science Applicable to general scientific computing	Soon Results within 2–5 years
Useful Needed after 3 years	Near Only useful for immediate systems	Low Resources have little affect on progress	Narrow Only applicable to HPC systems	Eventually Results after 5 years

Architecture and metrics summary

Topic	Urgency	Duration	Responsive	Applicability	Timeline
Math & I/O Libraries	Critical	Medium	Moderate	Broad	Immediate
Novel Algorithm Research	Critical	Long	High	Broad	Soon
Profiling Tools	Important	Long	High	Science	Eventually
Generic Scientific Toolkits	Useful	Long	High	Broad	Eventually
Fault Tolerance Tools	Important	Long	High	Science	Eventually

Programming models summary

Topic	Urgency	Duration	Responsive	Applicability	Timeline
Technology Evaluation & Selection	Important	Medium	High	Narrow	Immediate
Translation Tools	Critical	Medium	High	Science	Soon
Debugging and Performance Support	Important	Long	High	Broad	Soon
HMC & non-HMC Performance Portability	Important	Long	Moderate	Broad	Eventually
Expressive Programming Environments	Useful	Long	Moderate	Broad	Eventually

Architecture and metrics summary

Topic	Urgency	Duration	Responsive	Applicability	Timeline
Accelerator/ System Interface	Critical	Long	High	Broad	Soon
Accelerator Design	Critical	Long	High	Broad	Soon
System Software	Critical	Long	High	Science	Immediate
Simulation & Modeling	Important	Long	High	Broad	Immediate
Metrics	Important	Long	High	Broad	Soon
System Design	Important	Medium	High	Broad	Immediate

Performance and analysis summary

Topic	Urgency	Duration	Responsive	Applicability	Timeline
Performance Instrumentation	Important	Medium	Moderate	Broad	Soon
Integrated Measurements	Important	Medium	High	Science	Immediate
Tools for Code Optimization	Important	Long	Moderate	Broad	Soon
Predictive Modeling	Critical	Long	High	Science	Immediate

Contact

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