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Sandia National Laboratories

Welcome and Goals/Objectives for Broader International Engagement in Big Data and Extreme-scale Computing (BDEC)

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ISC15 Workshop on International Activities in BDEC

Frankfurt, Germany

July 16, 2015

CENTER FOR COMPUTING RESEARCH

U.S. DEPARTMENT OF ENERGY
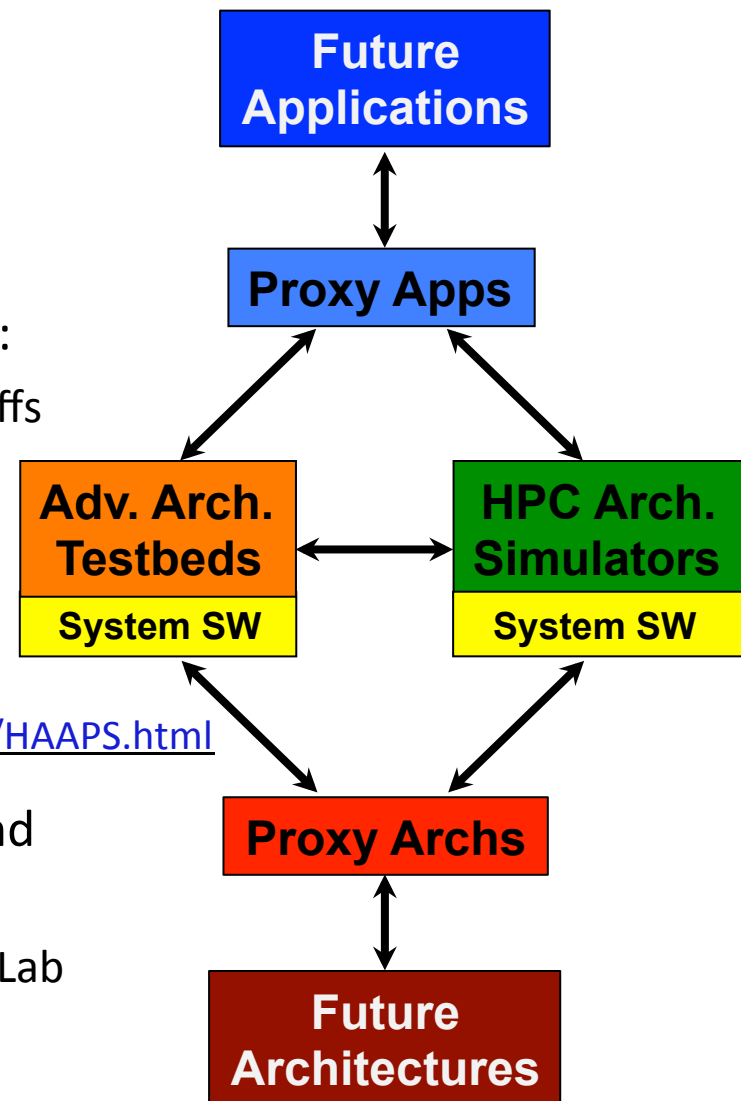NNSA National Nuclear Security Administration

Guiding topical issues/questions

- Overview activities at your Institution that address the technical challenges in hardware and software architecture. Highlight unique perspectives you bring to the workshop as representatives of the broader International community.

- A key goal of the BDEC workshop is to systematically map the opportunities for BD synergy with EC. HPC systems that are created from the integration of commodity computing components, a potential synergy is development of future EC systems with commodity components for BD. *Do you agree with this statement and from your perspective are there other synergies that can be leveraged?*

Guiting topical issues/questions

- **Priorities for international cooperation** in designing and developing hardware and software architectures for both BD and EC? From the perspective of your Institution, do you have examples of successful cooperation or collaboration?

- **In what areas could you benefit from contributions provided by other institutions?** What would you seek in the way of hardware and software components and tools, experimental results and findings, or driver computational challenges from the world-wide EC and BD community to further your goals in these emerging cooperative fields?

Sandia Co-design Capabilities

- Proxy Applications (Mantevo):
  - Application source for architecture-centric optimization and analysis
  - http://mantevo.org

- HPC Architectural Simulation Framework (SST):
  - Flexible to accommodate fidelity/speed tradeoffs
  - http://SST-simulator.org

- ASC Advanced Architecture Test Beds:
  - Evolving examples of COTS "state-of-the-art"
  - http://www.sandia.gov/asc/computational_systems/HAAPS.html

- Abstract Machine Model (AMM) Definitions and associated Proxy Architectures
  - Supported by SC/ASCR Computer Architecture Lab
  - http://crd.lbl.gov/assets/pubs_presos/CALAbstractMachineModelsv1.1.pdf

Future Applications

Proxy Apps

Adv. Arch. Testbeds — **System SW**

HPC Arch. Simulators — **System SW**

Proxy Archs

Future Architectures

Thoughts on Co-Design Paths

- Co-design paths
  - Reactive
  - Proactive
  - Holistic

- The Road Not Taken

  … Two roads diverged in a wood, and I –

  I took the one less travelled by

  And that has made all the difference

  – Robert Frost

- HPC is implicitly a road
  less travelled by

Agenda: Broader Int'l Engagement in BDEC

- 2:00 Welcome & Goals/Objectives for BDEC Cooperation Opportunties to Engage the Broader International Community
- 2:10 Opening remarks and a Personal Perspective from an International BDEC Roadwarrior, Thomas Sterling, UI
- 2:30 BDEC and Alternate Architectures, Kurt Keville, MIT
- 3:00 BDEC Collaboration Opportunities in Russia, Vladimir Voevodin, MSU
- 3:30 SKA Project Update & Collaboration Opportunities, Happy Sithole, CSIR
- 4:00 Break
- 4:30 SKA, DOME & Astron Project, Ronald Luijten, IBM Research Zurich
- 5:00 BDEC Collaboration Opportunties at A*Star/Singapore, Marek Michalewicz, A*STAR
- 5:30 BDEC Collaboration Opportunties at KAUST/Saudi Arabia, David Keyes, KAUST
- 6:00 Wrap-up, Jim Ang and Thomas Sterling