Driving HPC energy efficiency

- ❑ Energy Efficient HPC Working Group
  - ■ Forum for sharing of information
    - ■ Peer-to-peer exchange
    - ■ Best practices and case studies
    - ■ Collective action
  - ■ Open to all interested parties

EE HPC WG Website

http://eehpcwg.lbl.gov

Email

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Energy Efficient HPC Linked-in Group

http://www.linkedin.com/groups?gid=2494186&trk=myg_ugrp_ovr

With a lot of support from Lawrence Berkeley National Laboratory

Power Measurement Methodology: Complexities and Issues

- Fuzzy lines between the computer system and the data center, e.g., fans, cooling systems
- Shared resources, e.g., storage and networking
- Data center not instrumented for computer system level measurement
- Measurement tool limitations, e.g., frequency, power verses energy
- dc system level measurements don't include power supply losses

Proposed Methodology Improvements

- Current power measurement methodology is very flexible, but compromises consistency between submissions
- Proposal is to keep flexibility, but keep track of rules used and quality of power measurement
- 3 Levels of power measurement quality
  - Sampling rate; more measurements means higher quality
  - Completeness of what is being measured; more of the system translates to higher quality
  - Common rules for start/stop times
  - Vision is to continuously 'raise the bar' with higher levels

Power/Energy Measurement Methodology (Current Proposed)

Level	Aspect 1: Time Fraction & Granularity	Aspect 2: Machine Fraction	Aspect 3: Subsystems Measured
1	20% of run Power measurement $\geq$ 1 per second Report $\geq$ 1 avg. power measurement	(larger of) 1/64 of machine or 1kW	[Y] Compute nodes [ ] Interconnect net [ ]Storage [ ]Storage Network [ ]Login/Head nodes
2	100% of run Power measurement $\geq$ 1 per second Report $\geq$ 10 avg. power measurements	(Larger of) 1/8 of machine or 10kW	
3	100% of run Total integrated energy measurement Report $\geq$ 10 running total energy measurements	Whole machine	

Testing proposed improvements: early adopter phase

- 5 early adopters to use methodology for June'12 submissions to Top500 and Green500
    - Herbert Huber, Leibniz Supercomputing Center
    - Buddy Bland, Oak Ridge National Laboratory
    - Kim Cupps, Lawrence Livermore National Laboratory
    - Nic Dube, Université Laval, Calcul Québec, Compute Canada
    - Susan Coghlan, Argonne National Laboratory
- Seeking feedback
    - Early adopter
    - ISC Birds of Feather
- Next revision expected by September 2012

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