

Energy Efficient High Performance Computing Working Group
10/8/13 Meeting Report

INTRODUCTION

The EE HPC WG held a meeting on 10/8/13. This Working Group is composed of members representing major Federal departments and independent agencies, private sector representatives, and members of the academic community. More information can be found at the working group's website, <http://eehpcwg.lbl.gov>.

Documents from the group can be found at

<https://docs.google.com/leaf?id=0BzyTVVVRdMKpNWVjNTI5YTEtMTIiZi00YTA5LTlkMTYtZmY3ZDIyZjJjZmMy&hl=en>.

NEXT MEETING: December 10th, 9:00-10:00AM Pacific Time

Upcoming WEBINAR: Thursday, November 14th, 9:00-10:00AM Pacific Time

This is the fifth in a series of working webinars organized by the Energy Efficient HPC Working Group that are focused on requirements for energy/power measurement capabilities that extend the full stack; from system, to platform, cabinet, node, board and discrete components.

See <http://eehpcwg.lbl.gov/documents/procurement-considerations-presentations> for a copy of the previous presentations.

At this webinar, Srilatha Manne will present AMD's response to the requirements.

The forum will be a series of working webinars, with a capstone presentation at the SC13 EE HPC WG workshop (<http://eehpcwg.lbl.gov/conferences>).

Introductions and Announcements: *Natalie Bates & Dale Sartor, LBNL*

- Membership continues to grow and at last count we were over 380 members.
- The Procurement Team has organized a series of working webinars and are planning a capstone presentation at the SC13 EE HPC WG Workshop. We hope you will all participate.

Conferences Sub-group Update: *Anna Maria Bailey & Marriann Silveira, LLNL*

- **News on EE HPC WG participation in upcoming Conferences**

❖ SC13 Supercomputing Conference will be held in Denver Colorado from November 17-22.

The agenda for the SC13 workshop is posted on the EE HPC WG website on the conferences sub-pages.

The title is 'Building' Energy Efficient High Performance Computing Fourth Annual EE HPC WG Workshop at SC13

This annual workshop is organized by the Energy Efficient HPC Working Group. It provides a strong blended focus that includes both the facilities and system perspectives; from architecture through design and implementation. The sessions will cover all of the currently active activities of the EE HPC WG. It will also feature special talks on both Sunday and Monday. Dan Reed, currently from the University of Iowa and Chris Malone, Google, will talk about HPC and data warehouse-sized computers. On Monday, Jack Dongarra, University of Tennessee and Steve Poole, ORNL will describe proposed new benchmarks and their implications for power, energy and efficiency. Also on Monday, John Shalf, LBNL, will present a survey of system architecture trends and energy efficiency.

Current activities include: Liquid Cooling Commissioning, HPC and Interaction with Electric Utility Providers, Procurement Considerations, Energy Re-use, Total Usage Effectiveness and Workload-based Power Measurement Methodology.

We also were approved for all three SC13 Birds of Feather Sessions! Great job!

- A TUE Bof will provide a forum for reviewing the beta test results and also provide for further community feedback on the new metrics.
- A Liquid Cooling Commissioning BoF will present lessons learned from Steve Hammond, NREL, Anna Maria Bailey, LLNL and Detlef Lebrecht, LRZ. The audience will also be asked to provide your lessons learned and review the draft commissioning paper.
- A joint BoF with the Green500 will do several things, including provide a forum for highlighting the new power measurement methodology.

The EE HPC WG website Links and Events page lists many upcoming Conferences and Workshops that have an HPC Energy Efficiency Focus

Future Conferences: (more details at <http://eehpcwg.lbl.gov/events-and-links>)

Infrastructure Sub-Group Update: *William Tschudi, LBNL & Dave Martinez, SNL*

- **LIQUID COOLED COMMISSIONING TEAM UPDATE:** The Liquid Cooling Commissioning Team has collected and reviewed best practices and lessons learned for commissioning of liquid cooling infrastructure. The ultimate goal is to improve the commissioning process for delivering a liquid cooling infrastructure that works when the HPC system is installed. The Team has finished a draft document that was distributed to the general

membership for review. We are now soliciting ‘lessons learned’ from sites that have deployed- or are in the process of deploying- liquid cooling infrastructure. If anyone would like to contribute to the lessons learned, let Natalie know. We'll also be presenting at the SC13 Workshop on Sunday morning as well as an SC13 BoF on Tuesday at noon. The presenters include Dave Martinez, Tom Durbin from NCSA, Detlef Lebrecht from LRZ in Munich, Marriann Silveira from LLNL, Mike Ellsworth from IBM. Mike is also active with ASHRAE T9.9. The team has been working with ASHRAE and they are interested in using the document we produce as the basis for an ASHRAE publication on liquid cooling commissioning.

- **TUE TEAM:** The TUE Team has developed a metric that improves PUE by accounting for infrastructure elements that are a part of the HPC system (like cooling and power distribution). The team has already tested the metric at ORNL and published a paper with the results. (The paper was awarded with “Best Paper” at ISC13.) There will be a TUE presentation at the SC13 Workshop by Mike Patterson and an SC13 BoF on TUE on Wednesday at noon. We really need people to test the TUE metric and report on their results at this BoF. Please let Natalie know if you are interested.
- We are hoping you can provide insight into your site’s ITUE and TUE in November... We recognize that no one has an “ITUE Meter” installed and getting the data could be difficult. Frankly, a discussion of what would need to be done at your site to do so would even be a nice contribution to the BoF. Hopefully you can go further though and explore what capabilities you do have in your cluster to measure or approximate ITUE and get some results. It could be as simple as total IT power in minus CPU and Memory (if you can measure that) for a 1st order look at it. IPMI and other platform monitoring schemes do have some component level monitoring. Listing that for your site, coupled with what is missing from that list to get to ITUE would also be a good discussion for our BoF in Denver.
- **ENERGY REUSE EFFECTIVENESS:** The Energy Re-use Effectiveness Team in collaboration with The Green Grid has developed a standard metric for measuring the contribution of re-using heat generated by HPC systems for other useful purposes. NREL has been identified as an alpha site for evaluating this metric, but results are pending acceptance and use of their new system. There are other SC sites that have been using their waste heat – mostly for heating adjoining office space. This team has been tracking those SC sites and doing outreach to engage them as testers of the Energy Re-use Effectiveness Metric. One of the sessions at the SC13 workshop will be on Energy Re-use. Steve Hammond will moderate the session and panelists (who have some experience with heat reuse) will include Gert Svensson, from KTH in Sweden, Paul Brenner from the University of Notre Dame and Bill Tschudi from LBNL. Please contact Natalie if you are interested.

Compute System Sub-group Update: *Natalie Bates, LBNL*

- **SYSTEM WORKLOAD POWER MEASUREMENT METHODOLOGY:** The Power Measurement Methodology along with the Green500, Top500 and Green Grid have developed a standard methodology for measuring energy and power while running a workload. The team developed the standard, refined it through both alpha and beta testing and collaborated with the Green500 List to ensure adoption as the Green500 run rules. They are now developing outreach and other tools for broader adoption of the measurement methodology. The ultimate goal is to have broad use of the highest quality energy and power measurement methodology for all of their

system workload energy efficiency benchmarking activities. We are writing a paper for submission to the ACM/SPEC Conference to be held in Dublin in March.

- **HPC AND GRID INTEGRATION:** The Demand Response Team is investigating how HPC centers have, can and should engage more actively with the Grid electricity providers. We have collected information from 11 US-based SC sites that are on the Top100 list. This includes LLNL, LANL, ORNL, LBNL, ANL, Purdue, SDSC, NCSA, NOAA, Intel and WPAFB. This is an investigative activity with the ultimate goal of educating the HPC DOE Facility and Operations Managers about HPC and grid integration opportunities and challenges.
- **PROCUREMENT CONSIDERATIONS:** The RFP Team has a whitepaper that recommends procurement document requirements that target more energy efficient HPC systems. The intention is to raise the bar and extend the requirements with a yearly update of the whitepaper. The 2013 focus is on measurement capabilities. This draft whitepaper has been reviewed by the EE HPC WG. We are planning a series of webinars for September with the system integrators and component providers invited to respond to the requirements and talk about their roadmaps. The ultimate goal is to have vendors respond to the requirements with cost-effective product features.

PARTICIPANTS INCLUDED

Name	Organization