EE HPC WORKSHOP AGENDA

Tenth Annual Workshop for the Energy Efficient HPC Working Group

Monday, Nov 18, 2019 **https://eehpcwg.llnl.gov/conf_sc19.html**

https://sc19.supercomputing.org/session/?sess=sess123

9:00am - 9:15am	Workshop Introduction and Greetings Organizers: Natalie Bates Anna Maria Bailey Torsten Wilde Siddhartha Jana
9:15am - 10:00am	Keynote: 30 Year Perspective on HPC and Energy Efficiency Presenter: Jeff Broughton
10:00am - 10:30am	*EE HPC WG Morning Break*
10:30am - 11:15am	State of the Working Group
11:15am - 11:50am	The Power Grid
11:50am - 12:30pm	Novel Cooling Technologies and Experiences
12:30pm - 2:00pm	*EE HPC WG Lunch Break and Lunchtime Discussions*
2:00pm - 3:00pm	Machine Installations - Pre-Exascale and Beyond
3:00pm - 3:30pm	*EE HPC WG Afternoon Break*
3:30pm - 3:50pm	Silicon Manufacturing Variability
3:50pm - 4:50pm	Operational Data Analytics - Global Survey Results
4:50pm - 5:25pm	Panel: Challenges with Manufacturing Variation and Other Challenges to Platform Level Monitoring and Management
5:25pm - 5:30pm	Closing Remarks

Lunchtime Discussion Groups

Lunch is scheduled from 12:30PM to 2:00PM. After getting a lunch, gather back here from 1:00PM to 1:45PM to join an informal discussion group on one of these topics.

Exascale Facility Challenges, Mike Strevell (strevell@lanl.gov) and Fumiyoshi Shoji (shoji@riken.jp)

1. What is your limiting facility resource for future supercomputers (i.e., external power to the facility, internal power distribution, cooling, floor loading, etc.)?
2. What technology changes can affect the cost or efficiency of a supercomputer facility? (i.e., adiabatic dry coolers , Thermosyphon, warm water cooling, etc)
3. How do you fund supercomputer facility investments? Are you able to use an incremental funding strategy?
4. What are your facility operational challenges for future supercomputers? How do you train your operations team to minimize cost and maximize performance of complex systems?

Renewable Energy and Datacenter Control, Alan Sill (Alan.Sill@ttu.edu) and Andrew Grimshaw (grimshaw@virginia.edu)

1. What are the limiting factors you perceive as preventing greater use of renewable energy to power capacity computing and supercomputing?
    a. Cost
    b. Unavailability in my data center location
    c. Unavailability in our general area
    d. Lack of relationship with energy supplier or vendor

2. Under what conditions would you consider making use of renewable energy?
    a. Costs would be significantly lower (say, 25% of present energy costs per kWh or lower) but deliverability would only be available when these conditions are met
    b. Costs would be significantly lower (say, 25% of present energy costs per kWh or lower) but fill-in power would be available at my current power costs when these conditions are not met
3. What physical proximity considerations hold for your current use of data centers?
    a. We host our facilities on-site at our own campus or premises only
    b. We use a mix of commercial cloud or external co-location and on-premises resources
    c. We use commercial cloud only
    d. We use remote co-location only
4. Do you currently use a workflow that would allow you to outsource some or all of your institution's computing and data processing needs to be carried out remotely? If so, what are the advantages, and if not, what conditions would allow you to do so if costs could be lower than your on-premises resources, especially if they were significantly lower than present conventional commercial cloud pricing?

After these preliminary questions, we intend to discuss the tradeoffs between on-premises and off-site resources as well as conditions that are perceived to be necessary to get to a situation in which renewable energy sources can play a larger role in the delivery of power for advanced large-scale capacity computing and supercomputing, either to save costs or reduce the carbon emission footprint, or both.

Advancing Warm Liquid Cooling, Dale Sartor (DASartor@LBL.gov) and David Sickinger (David.Sickinger@nrel.gov)

1. Brief description and lessons learned on recent warm liquid deployments? How warm? Heat re-use?
    - How decide on supply temperature, min return temperature if heat re-use, and how much control over facility do you have?
    - Are you in a multi-purpose data center or one that is dedicated to HPC systems? Criteria you use for deciding what equipment is liquid cooled (some % going forward, rack power density threshold, …)
    - Goals (compressor less, dry cooler, …)
2. What specifications do you use for the closed loop heat transfer fluid? Is the treatment proprietary or do you have multiple vendors?
    - What are your thoughts around utilizing row (or per rack) CDUs, or are you wanting to control the IT fluid at the room level?
    - If using row CDUs, do you leave secondary fluid specifications to vendor? Approval process?
    - If using room level approach, criteria and how assign responsibility (fluid quality control, material compatibility, …)?
3. What (wetted) materials do you allow in your closed loop liquid systems? Do you have a specification?
    - Facility vs Secondary loop considerations
4. Do you have other specifications that could be used in an "open" specification?
5. We are coordinating activities with OCP and ASHRAE. Are there other organizations that would be good to publish an open specification for a liquid cooled rack?
6. What do you classify as warm water cooling?
    - Consider using full range of solutions from Cold Plates, Immersion, RDHX within data center?
    - How do you account for electrical energy use from CDUs and additional fans (RDHX)?
7. Trained staff onsite, or expect vendor to maintain liquid cooling system(s)?