Top Session Picks for ISC14

Like many of you, we are bound for Leipzig, Germany for next week's International Supercomputing Conference. Holding with tradition, we've scoured the session list for some of the more noteworthy topics for the annual listing of our top sessions to attend. For those who will not be making the trip, fear not, we'll be on hand at all the sessions listed here and others with live special reporting here, so do stay tuned. We're expecting a great many announcements from across the ecosystem, many of which will hit the wires as early as Sunday evening.

Before we kick off the list of our top picks for the ten most promising sessions and speakers at ISC14, we'll point to one event that is too critical to overlook. The opening session on Monday is the (natural) top pick, in part because of the announcement of the latest bi-annual Top500 list, which will be presented by Jack Dongarra, Erich Strohmaier, and Martin Meuer. But also, at the close of this all-important session presenting highlights from this 43rd incarnation of the Top500, there will be a memorial review of the life and career of ISC founder, Dr. Hans Meuer. We look forward to the list, presentations of PRACE and Gauss awards, and of course, taking time to remember such a kind, respected pioneer in HPC.

We'll assume the keynotes are a must-see for all in attendance and leave them off this list, although we're very much looking forward to keynote presentations from Satoshi Matsuoka, Klaus Schulten, Thomas Sterling, and Karlheinz Meier.

Exploring New HPC Benchmarks

One of the more pervasive themes we expect during this show (as well as SC'14) is around the usefulness of Linpack as the primary, representative benchmark for supercomputing. On Thursday, Jack Dongarra and Mike Heroux will present first experiences and new improvements for the new HPCG benchmark which we've covered rather extensively in its early incarnation here on HPCwire over the last year (overview here). While the team thus far expect HPCG to develop in the coming year and over successive Top 500 lists, at this point it's a complementary benchmark to highlight the strength of Top 500 systems in more real-world application scenarios. We'll be looking forward to these updates and finding out how Dr. Dongarra and Dr. Heroux see the refinement and implementation going forward.

In addition to this discussion, Tilmann Rabl will talk about a project to create an alternative listing for "Big Data Systems" and Mark Adams will present a new benchmark called HPGMG based on algebraic multigrid solvers, which are widely used in HPC and provide more balanced loads for all parts of HPC systems.

Detailed Briefings on HPC in Asia-Pacific

All of the major HPC conferences on the planet tend to be "West-centric" with the lens focused mostly on supercomputing activities in the U.S. and Europe, even if that's not the intention of organizers. Asia is a continuing major influence in the global HPC ecosystem, both in research and vendor contexts, thus we were thrilled to see two sets of detailed reports on supercomputing activities from all over the content. Country briefs from Japan, China, Korea, India, Singapore, Australia and elsewhere will be granted on Thursday across two split sessions from researchers and center leaders who are closest to the activity in their respective countries. It will be fascinating to learn about new technology development, motivating factors, procurement decision-making and processes and funding from this diverse group of Asia-Pac HPC leaders.

In addition to offering reports on various national and regional HPC activities, center leaders will report on various projects that highlight the role HPC plays in the local economy, research infrastructure, and ultimately, quality of life. While it's late in the conference, this leads us into another session that makes Thursday an important day…

HPC in Real-World Context: Key Examples from Research and Industry

Lawrence Berkeley National Lab's John Shalf will be chairing a session on "Real Life HPC" that will bring back into focus the purpose of the entire supercomputing ecosystem—harnessing large-scale computing to tackle complex, critical problems.

In this series of short presentations, Shane Corder of Children's Mercy Hospital of Kansas City, Missouri will talk about using HPC systems to decode the sequence of each infant's genome to look rapidly for genetic markers of disease to save the lives of premature babies in the Neonatal Intensive Care Unit (NICU) of Children's Mercy Hospital. In his work at the Center for Pediatric Genomic Medicine, they are using HPC to push the turn around time for this application from several months to just 24 hours.

Oliver Fuhrer of the Climatology Meteo Swiss in Zurich will discuss the societal impacts and economic benefits of weather information for the next hours, days, weeks, seasons and even years have been rapidly increasing over the past decade. His talk will cover the transformation of the COSMO model to run on hybrid computing systems to increase the speed and accuracy of these models.

Mauricio Araya of Shell Oil will talk about the use of HPC exploring the depths of the earth computationally to find new energy reserves to ensure our energy future. Seismic inversion poses a very different challenge when implemented efficiently on massively parallel computers from seismic processing because its statistical, non deterministic, formulation, and the HPC optimization strategies of both will be described in some detail.

With all the vendor, Top500, and other industry-related activity, it's sometimes easy to forget what this ecosystem is capable of providing. Sounds like an excellent way to round out the show—and offers some "in the trenches" perspective on what HPC means, needs, and might develop into in years ahead.

Real-World Enterprise HPC

Complementing the above series of talks will be another multi-presenter format session on how HPC is critical to a number of industries, including oil and gas, life sciences, animation, design and other areas. As the organizers describe, "ENI and Airbus will illustrate the position of scientific and large scale computing in the value chain, giving an outlook on how new Petaflop capacities are used efficiently in production environments. Janssen will present the challenges of combining massively parallel sequencing, high content imaging, and quantitative systems pharmacology; and how the collaboration established with Intel and the five universities in Flanders, around the ExaScience Life Lab, will focus on creating innovative approaches."

The session will be complemented by two solution providers sharing some of their most recent innovative developments. Fujitsu will demonstrate the potential of dynamic, real time visualization for decision making in the car industry, based on VRED and how to use in offline high quality imagery productions. Finally, IBM will present work being done at the cross road between the integration of genomics and translational platforms to efficiently support knowledge discovery by speeding up the process of analytics for genomics data.

Future Supercomputing Technologies

Three speakers will highlight emerging concepts and technologies in HPC in this Tuesday session, beginning with Alex Ramirez from the Barcelona Supercomputer Center, who will discuss the future of system on chip architectures for supercomputing systems. As he describes, "enabling multiple SoC providers enables competition, and competition is good for the customer: faster product evolution, more innovation, better features at lower prices," noting that "the

convergence of embedded computing and HPC is already here."

In addition, Burkhard Steinmacher-Burow will outline a vision for data-centric systems. A central motivator for DCS is to ensure the attributes of the architecture and implementation lead to commercially viable exascale systems. "This means that investments in programming models, languages and software development will be preserved for the future and that new optimized code will be positioned to take advantage of Exascale features," he notes. The session will detail the hardware, software and programming models of such systems.

Finally, Dr. Robert Wisniewski of Intel will describe the next generation of HPC software trends leading into exascale and beyond. As he notes of his talk, the goal will be to "identify some of the challenges facing the HPC community from a software perspective including the realities of the application ecosystem that has been built up and suggest a plausible path forward that is not solely evolutionary or solely revolutionary, but a combination." Examples will be presented to demonstrate how such a path might be achieved.

Bring Your Toughest Questions: The Vendor Showdown

Split between two separate sessions on Monday, Addison Snell of Intersect360 Research, with co-chair Rupak Biswas from NASA Ames will kick things off with a stellar lineup of vendor folks that many in the HPC community know well, including Molly Rector of DDN, Charles Wuischpard of Intel, Barry Bolding from Cray, Gilad Shainer of Mellanox, Supermicro's Don Clegg and several others. For those who've been attending the Hot Seat panels each year, these showdowns offer something a bit different as they'll be focused on interaction with the audience as the vendors defend against tough observer and moderator questions. Bring your best meat to the grill, in other words.

The second Vendor Showdown panel will be moderated by Frank Behrendt, who with his 451 Research co-chair, will put hard queries to a panel featuring more companies we follow, including T-Platforms, Samsung, Bull, RSC, NEC, D-Wave and others. This is going to be a lot of fun—and you'll definitely find HPCwire with a front row seat to the action.

For the Futurists: Quantum Computing Exploration

Wednesday will offer a rich set of actual end user stories from the quantum computing trenches as Rupak Biswas from NASA Ames presents on his center's use of one of the first commercial quantum computing machines from D-Wave. Adding to these experiences, Hartmut Neven from Google will share benchmark results for the D-Wave Two Quantum Annealer and Frederico Spedalieri from USC will describe USC's progress with the machines in terms of testing for true "quantumness" and what the future of quantum computing applications might look like. This will be an exciting hour and a half, even if it moves away from practical HPC and into the realm of machines that so few will have a chance to experiment with.

ISC Think Tank Panel: Who Controls the Future of Supercomputing

On Wednesday afternoon, moderator Andrew Jones of NAG will present a series of questions around a range of topics relevant to where supercomputing as both practice and an industry are heading in the coming years. From whether or not exascale will drive the future of HPC technology development or if it's a matter of commercial users driving the new breed of requirements to how the community should (or could) react to other subtle forces, including policy, politics, funding and more, the panel will offer a well-rounded, diverse set of views. On the Think Tank stage will be NCSA's Bill Kramer, Isabella Weger from ECMWF, Simon McIntosh-Smith of Bristol University, and SGI's Eng Lim Goh. As many of you know, Andrew Jones likes to push to the heart of matters, so we're looking forward to this intelligent discussion.

With that, we'll say that it never feels fair picking only a small selection. The truth is, the hardest part about ISC and SC alike is navigating a schedule that has too many things of interest happening at once. Feel free to stop by the

HPCwire booth to bop me on the head for not putting your favorite session picks on the list– or better yet, just to say hello. Look forward to seeing you all…

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