HPC Advisory Council

2014 Year-End Summary
The HPC Advisory Council Update

- World-wide HPC non-profit organization (~400 members)
- Bridges the gap between HPC usage and its potential
- Provides best practices and a support/development center
- Explores future technologies and future developments
- Leading edge solutions and technology demonstrations
Centers of Excellence
Special Interest Subgroups

- **HPC|Scale Subgroup**
  - Explore usage of commodity HPC as a replacement for multi-million dollar mainframes and proprietary based supercomputers.

- **HPC|Cloud Subgroup**
  - Explore usage of HPC components as part of the creation of external/public/internal/private cloud computing environments.

- **HPC|Works Subgroup**
  - Provide best practices for building balanced and scalable HPC systems, performance tuning and application guidelines.

- **HPC|Storage Subgroup**
  - Demonstrate how to build high-performance storage solutions and their affect on application performance and productivity.

- **HPC|GPU Subgroup**
  - Explore usage models of GPU components as part of next generation compute environments and potential optimizations for GPU based computing.

- **HPC|Music**
  - To enable HPC in music production and to develop HPC cluster solutions that further enable the future of music production.
HPC music is an advanced research project about High Performance Computing and Music Production dedicated to enable HPC in music creation. Its goal is to develop HPC cluster and cloud solutions that further enable the future of music production and reproduction.
HPC Advisory Council HPC Center

- **Dell™ PowerEdge™ R730**
  - 32-node cluster

- **Dell PowerVault MD3420**
  - Dell PowerVault MD3460
  - InfiniBand Storage (Lustre)

- **HP ProLiant SL230s Gen8**
  - 4-node cluster

- **HP Cluster Platform 3000SL**
  - 16-node cluster

- **Dell™ PowerEdge™ C6145**
  - 6-node cluster

- **Dell™ PowerEdge™ R815**
  - 11-node cluster

- **Dell™ PowerEdge™ R720xd/R720**
  - 32-node cluster

- **Dell™ PowerEdge™ M610**
  - 38-node cluster

- **Dell™ PowerEdge™ C6100**
  - 4-node cluster

- **Dell PowerVault MD3420**

- **Dell PowerVault MD3460**

- **White-box InfiniBand-based Storage (Lustre)**
Exploring All Platforms

X86, Power, GPU, FPGA and ARM based Platforms
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Achieving World Record Performance (Example)

- Results demonstrated by HPCAC outperforms best published record
  - The ANSYS Fluent 15.0 Benchmark publishes ANSYS Fluent performance results
  - HPCAC achieved 25.38% higher performance than previously published results
  - The 32-node/640-core result beats previous record of 96-node/1920-core by ~5%

ANSYS Fluent 15.0.7 Performance (eddy_417k)

Higher is better

- Jupiter
- cray-xc30-intel_e5_2690v2,3000,cle5128,sles11,aries
• HOOMD-blue is a general-purpose Molecular Dynamics simulation
• Demonstrated up to 102% performance improvement with GPUDirect RDMA
HPC Training

- **HPC Training Center**
  - CPUs
  - GPUs
  - Interconnects
  - Clustering
  - Storage
  - Cables
  - Programming
  - Applications

- **Network of Experts**
  - Ask the experts
University Award Program

- **University award program**
  - Universities are encouraged to submit proposals for advanced research
  - Once / twice a year, the HPC Advisory Council will select a few proposals

- **Selected proposal will be provided with:**
  - Exclusive computation time on the HPC Advisory Council’s Compute Center
  - Invitation to present in one of the HPC Advisory Council’s worldwide workshops
  - Publication of the research results on the HPC Advisory Council website

- **2010 award winner is Dr. Xiangqian Hu, Duke University**
  - Topic: “Massively Parallel Quantum Mechanical Simulations for Liquid Water”

- **2011 award winner is Dr. Marco Aldinucci, University of Torino**

- **2012 award winner is Jacob Nelson, University of Washington**
  - “Runtime Support for Sparse Graph Applications”

- **2013 award winner is Antonis Karalis**
  - Topic: “Music Production using HPC”

- **2014 award winner is Antonis Karalis**
  - Topic: “Music Production using HPC”

- **To submit a proposal – please check the HPC Advisory Council web site**
ISC’14 – Student Cluster Challenge Teams
Getting Ready to 2015 Student Cluster Competition
2014 Swiss HPC Conference (March)
2014 Brazil HPC Conference (May)
2014 European HPC Conference (June)
2014 Spain HPC Conference (September)
2014 Singapore HPC Conference (Oct)
2014 China HPC Conference (Nov)
Second RDMA Competition – China (July – October)

• 28 universities participated
• Programming Applications to utilize RDMA technology
• Opportunity to influence the future of data centers
• Create research opportunities for the universities
2014 HPC Advisory Council Conferences

- **HPC Advisory Council (HPCAC)**
  - Application best practices, case studies
  - Benchmarking center with remote access for users
  - World-wide workshops

- **2014 Workshops**
  - USA (Stanford University) – February 2014
  - Switzerland – March 2014
  - Brazil – May 2014
  - Germany (ISC’13) – June 2014
  - Spain – Sep 2014
  - Singapore – Oct 2014
  - China (HPC China) – Oct 2014
  - South Africa – Dec 2014

- **For more information**
  - [www.hpcadvisorycouncil.com](http://www.hpcadvisorycouncil.com)
  - [info@hpcadvisorycouncil.com](mailto:info@hpcadvisorycouncil.com)
2015 HPC Advisory Council Conferences

- USA (Stanford University) – February 2015
- Switzerland – March 2015
- Brazil – May 2015
- Germany (ISC’13) – July 2015
- Spain – Sep 2015
- Singapore – Oct 2015
- China (HPC China) – Oct 2015
- South Africa – Dec 2015

If you are interested to bring HPCAC conference to your area, please contact us.
Thank You!

The HPC Advisory Council activities are all done by the HPC Advisory Council members for the behalf of the entire HPC community.

We would like to thank all of you that helped make 2014 a prosperous year and looking forward for an even greater 2015.

Special thanks to the HPC Advisory Council board members for their help and contribution throughout the year.
Contact Us

Web: www.hpcadvisorycouncil.com
Email: info@hpcadvisorycouncil.com
Facebook: http://www.facebook.com/HPCAdvisoryCouncil
Twitter: www.twitter.com/hpccouncil
YouTube: www.youtube.com/user/hpcadvisorycouncil