Dell EMC Update

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Solutions and Alliances
HPC is evolving...
Dell EMC HPC Systems

Transforming the Future at the convergence of HPC, Big Data and the Cloud

Dell Workstations  Dell EMC Servers  Dell EMC Storage  Dell EMC Networking  Management  Services  VMware
Dell Technologies portfolio for HPC

**Dell Workstations**
- Precision Workstations

**Dell EMC Servers**
- PowerEdge Servers
  - C6320
  - C6320p
  - C4130

**Dell EMC Storage**
- Isilon
- Scale I/O
- ECS
- Lustre
- NFS

**Dell EMC Networking**
- S-Series
  - 25/40/50/100GbE
- H-Series
  - (Omni-Path)
- Mellanox EDR
- InfiniBand

**Management**
- Bright Cluster Manager
- Cycle Computing
- OpenHPC

**Services**
- Deployment
- Support
- Financial Services
- Remote Management
  - with X-ISS
- HPCaaS with R-systems

**VMware**
- vRealize Automation (vRA)
- Integrated OpenStack
- Integrated Containers
- vSphere
- Virtual SAN
HPC Innovation Lab

- Design, develop and integrate HPC systems
- Act as the focal point for joint R&D activities
- Conduct application performance studies and develop best practices
- Prototype and evaluate advanced technologies

Zenith
Top500 #372 system based on Intel SSF
Rattler
Collaboration with Mellanox and NVIDIA
Expanding partnerships for innovation and impact
HPC Centers for Innovation

Expanding Existing Programs
• Texas Advanced Computing Center
• San Diego Supercomputer Center,
  NEW: Life Sciences Initiative
• University of Illinois (NCSA)

New EMEA CoEs
• University of Cambridge
• University of Pisa
• NEW: Center for High Performance Computing, South Africa

New APJ programs
• NEW: Institute of Automation, Chinese Academy of Sciences (CASIA)
• NEW: Monash University
Mission

- To develop advanced technology for the Nation and support the broader MIT mission of advancing knowledge and educating students in science, technology, engineering and mathematics

New TX-Green System

- 648 node HPC system using Dell EMC early access systems with Intel Xeon Phi processors (KNL), with Dell EMC H-series switches based on Intel Omni-Path technology

Impact

- 1.7 Petaflops (peak) to enable research in fields such as space observations, robotic vehicles, communications, cyber security, machine learning, sensor processing, electronic devices, bioinformatics, and air traffic control

“The Dell HPC team was very knowledgeable and responsive and able to deliver, install, and benchmark our Petaflop-scale system in less than a month.

This was a great example of a well-coordinated and dedicated organization that was able to allocate the appropriate resources to exceed customer expectations.”

— Jeremy Kepner, MIT Lincoln Laboratory Fellow and head of the Lincoln Laboratory Supercomputing Center
Need: State-of-the-art in Cryo-Electron Microscopy is rapidly replacing the traditional X-ray crystallography method for elucidating the 3D structures of single biomolecules

- Researchers must use sophisticated averaging and machine learning techniques to classify the image and analyze the 3D structure within massive amount of molecular images

Solution: Two HPC clusters to further Cryo-EM cooperative research with Harvard University

- Each with 144 Dell EMC PowerEdge Servers and approximately 2 petabytes of storage with Intel EE Lustre

Goal: Map the three-dimensional structure of biological macromolecules to design inhibitors and develop new drugs to treat or cure patients of cancer and other diseases

“We are trying to modernize the code. There are cases where the new code, leveraging multiple cores and hardware acceleration technology of the Intel chips, speeds up averaging by a factor of 1,000.”

— Dr. Youdong (Jack) Mao, Director of IPCCSB, Principal Investigator, Dana-Farber Cancer Institute, Harvard Medical School
New TOP500 sites (November 2016 list)

#144 Stampede-KNL

#106 TX-Green

#161 Lengau
Dell EMC: Transforming the Future

Driving the convergence of HPC, Big Data and Cloud

- Advancing HPC
- Democratizing HPC
- Optimizing HPC