PRESS RELEASE

DDN Infinite Memory Engine Burst Buffer Exceeds 1 TB per Second File System Performance for Japan's Fastest Supercomputer

Allows Researchers using Oakforest-PACS at the Joint Center for Advanced High Performance Computing to Improve Modeling of Fundamental Physical Systems and Advance Understanding of Requirements for Exascale-Level Systems Architectures

TOKYO and SANTA CLARA, Calif. – November 30, 2016 – DataDirect Networks (DDN®) today announced that Japan's highest performance supercomputer has achieved effective I/O performance exceeding 1 TB per second using DDN's Infinite Memory Engine (IME®) to deliver an ultra-high speed file cache system.

"Storage performance has been one of the biggest challenges in developing supercomputers. To meet the demands for storage performance, IME was introduced to the Oakforest-PACS on a massive scale, the first such introduction in the world," said Osamu Tatebe, lead, public relations, JCAHPC / professor, Center for Computational Sciences, University of Tsukuba. "We are very pleased that we could achieve effective I/O performance exceeding 1 TB per second in writing tens of thousands of processes to the same file. With this new storage technology, we believe that we will be able to contribute to society with the further development of computational science, big data analysis and machine learning."

Tweet this: Over 1 TB/s performance achieved by Japan's highest performance supercomputer w/ @ddn_limitless IME Burst Buffer - http://bit.ly/2fDVKXB2

The Oakforest-PACS massively parallel supercomputer is operated by the Joint Center for Advanced High Performance Computing (JCAHPC), which is run collaboratively by the Information Technology Center at the University of Tokyo and the Center for Computational Sciences at the University of Tsukuba. With resources for joint use, Oakforest-PACS will dramatically advance research and development in a variety of next-generation science and technology fields. It will be used for cutting-edge computational science research, as well as to develop talent in the computational science and high performance computing fields, contributing to the future development of each field.

To measure effective I/O performance, DDN used IOR, the I/O throughput benchmark published by Livermore Computing Center of Lawrence Livermore National Laboratory, and achieved more than 1 TB per second in both I/O access patterns: FPP (File Per Process where parallel processes perform independent file I/O respectively) and SSF (Single Shared File where all parallel processes perform I/O to a single shared file). Importantly, SSF is an access method that cannot realize sufficient performance

with a conventional parallel file system, but is considered an effective access method for the next generation of Exascale supercomputers. With its marks for effective performance across FPP and SSF I/O access patterns, DDN IME has proven its eminence as an I/O system not only for conventional I/O processing, but also for future Exascale supercomputing. Results of the IOR benchmark are shown below:

I/O Pattern	Performance
FPP Write	1.14 TB per second
FPP Read	1.20 TB per second
SSF Write	1.18 TB per second
SSF Read	1.25 TB per second

The file system cache of the Oakforest-PACS comprises 25 DDN IME14KX® systems. One DDN IME14KX has 48 x 800GB NVMe SSDs and eight Intel® Omni-Path ports. The 25 DDN IME14KX systems provide a cache of 960 TB and a logical bandwidth of 1.5 TB per second within a space as small as 100 rack units, which is about 2 ½ data center racks. This is one-tenth to one one-hundredth the amount of equipment required to support other current TB/s file systems.

"We are very excited to work with JCAHPC and Fujitsu Limited on innovative, next-generation flash-based storage technologies for scientific computing and big data, and we regard the Oakforest-PACS project as a true partnership between users and suppliers that will advance the way we think about data and storage in high-performance computing," said Robert Triendl, senior vice president of global sales, marketing and field services, DDN.

Supporting Resources

- More on The Joint Center for Advanced High Performance Computing (JCAHPC)
- More on The Information Technology Center, University of Tokyo
- More on The Center for Computational Sciences, University of Tsukuba
- More on DDN IME14K
- More on DDN End-to-End Storage and Big Data Platforms
- More on DDN Customers
- Follow DDN: Blog, Twitter, LinkedIn and Facebook

About DDN
DataDirect Networks (DDN) is the world's leading big data storage supplier to data-intensive, global organizations. For more than 18 years, DDN has designed, developed, deployed and optimized systems, software and storage solutions that enable enterprises, service providers, universities and government agencies to generate more value and to accelerate time to insight from their data and information, on premise and in the cloud. Organizations leverage the power of DDN storage technology and the deep technical expertise of its team to capture, store, process, analyze, collaborate and distribute data,

information and content at the largest scale in the most efficient, reliable and cost-effective manner. DDN customers include many of the world's leading financial services firms and banks, healthcare and life science organizations, manufacturing and energy companies, government and research facilities, and web and cloud service providers. For more information, go to www.ddn.com or call 1-800-837-2298.

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