Western Digital

Western Digital, Quobyte® and NEC Work Together to Deliver Powerful, Flexible Research Platform

Quobyte

Benefits

- Capacity may be expanded to more than 2.0PB raw capacity per rack using 20TB SMR HelioSeal hard drives

- Eliminated silos by replacing multiple, siloed systems with a unified storage solution, enabling better collaboration, easier management and efficient use of hardware

- Provided deep insight through real-time analytics and integrated monitoring and management with a choice of interfaces (web console, command line and API)

- Lowered OPEX costs with dramatic savings in power, cooling and management, even at petabyte scale

Challenges

- Existing HPC environment had to be enhanced to support the recent field of research "data analytics"

- Needed a storage system to preserve a large amount of research data for subsequent re-use that could sustained bandwidth of 50+ GBps

- Available data center space limited to no more than three 19-inch racks, but capacity requirements exceeded 10PB

- Solution needs to be easily upgradable by a factor of two to three in a later phase of the project

- Power, heat dissipation (and therefore cooling efficiency), were all important design criteria

Company Profile

Zentrum für Informationsdienste und Hochleistungsrechnen (ZIH) is a central research institution at the Technical University of Dresden, Germany. In addition to standard IT services for more than 6,600 employees and 35,000 students, ZIH also runs a high-performance computing environment for the State of Saxony.

Recently, ZIH wanted to upgrade their compute environment in order to support high-speed data analytics capabilities. Quobyte, Western Digital and NEC worked together to design, deliver and install a complete solution to meet their needs today, and into the future.

Architecting the Solution

To meet the customer requirements, a solution was based on the NEC QxFS Storage Appliance with 20 building blocks of NEC 1U HPC servers plus Western Digital Ultrastar® Data102 storage platform.

The NEC QxFS Storage Appliance utilizes Quobyte's software-defined storage to create a high-performance, highly available shared storage service without the need for conventional storage arrays or filers. HPC Data-Analytics (HPC-DA) introduces a new type of workflow in scientific computing. As the DA part in HPC-DA typically uses local low-latency storage, the solution uses an NVMe™ over fabric (NVMe-oF™) storage solution as low-latency temporary storage for a machine learning (ML) cluster. This on-demand local storage needs to fetch large datasets over the network and save outcomes in a versatile storage environment.

Powerful Storage for Demanding HPC Workloads

Western Digital's Ultrastar Data102 was selected because it was designed to solve the vibration and cooling issues prevalent in high-density data center rack configurations. A set of innovative technologies were developed that reduce performance degradation and overcome cooling issues by driving airflow through the middle of the platform.

The Ultrastar Data102 provided:

High Density – Western Digital's 20TB HelioSeal® SMR HDDs provide up to 2.0PB of raw storage in just a 4U enclosure.

Innovation – Patented IsoVibe™ and ArcticFlow™ technologies improve performance and cooling.

Upgradability – Provide an easy path to a higher capacity in the future through simple upgrade of HDD capacity.

Today's HPC environments, for both commercial and scientific research, have to support a diversity of user workloads across domains. Each workload can have vastly

"In an easy-to-manage-and-scale file system, the combination of supporting a wide range of access interfaces and workloads, including HPC workloads for file, block and object, made Quobyte the solution of choice for NEC's project at the University of Dresden."

Kim Gardner
VP Sales & Business Development in EMEA at Quobyte

different performance profile, a variety of storage protocols and interface requirements and massive scalability needs. Western Digital makes HPC environments thrive by accelerating performance, simplifying workflows and reducing costs. Add to this fault tolerance, manageability and affordability at scale, and you have an optimal solution for these demanding environments.

Quobyte Data Center File System

Quobyte's ability to simultaneously support multiple access methods with uniform Access Control Lists (ACLs) between them—along with true multi-tenancy support—makes it the perfect choice for high-performance, long-term storage. Besides this scenario, the Quobyte solution can also be used to share data between the simulation and the data-analytics part of the HPC environment.

Quobyte's next-generation Data Center File System (DCFS) unifies file, block and object storage for enterprise and scientific applications. Backed by a decade of research, this parallel file system core serves low-latency and high-throughput workloads within a single system.

Starting with four servers, Quobyte can be extended drive by drive and server by server to meet new requirements and adapt to new challenges. As a shared-nothing architecture, its IOPS and throughput scales linearly with every added resource.

High availability and data protection is baked into the Quobyte software to help protect against hardware failures. Together with extensive management functionality, Quobyte handles failures automatically and enables non-disruptive upgrades.

Conclusion

With the ability to increase performance, lower costs and increase flexibility at scale, the combination of Western Digital Ultrastar Data102 storage platform, NEC QxFS Storage Appliance and Quobyte Data Center File System simplified the storage and management of research data and provided a solid solution for HPC driven data analytics.

Ultrastar Data102 and Ultrastar Data60 Storage Platforms

Western Digital.