



Solution Brief

Dell HPC NFS Storage Solution

Solve HPC challenges at any scale with storage performance you can rely on

Dell's comprehensive HPC storage solutions can help research and product development organizations of all sizes stay ahead of storage and access demands.

- Cost-effectively scale your storage as your data demands grow
- Validated configurations help prevent and eliminate potential software and hardware issues.
- Compute, storage, networking and software are integrated and optimized to provide the best possible performance and scalability for the money.
- Dell Services delivers end-to-end support to reduce deployment delays, saving you time and money.

Data continues to drive the demand for high performance storage. The flood of information generated by sensors, satellites, high-performance computer simulations, high-throughput devices and medical imaging will push data repositories to sizes that were once inconceivable. Multiple petabytes to exabytes are starting to become commonplace in the enterprise.

In a recent Intersect360 study, HPC-oriented and non-HPC respondents rated I/O performance metrics (bandwidth, latency, and IOPS throughput) as the top technical challenges for HPC and big data workflows.¹

Maximize your primary storage capacity

High-performance computing (HPC) applications demand storage solutions that can address the wide-ranging requirements of customer applications and processes in cross-functional environments. In particular, storage solutions for high bandwidth and HPC applications must be able to handle the amount and frequency of data generated by these workloads.

Compute nodes in an HPC environment almost always require a common shared file system for applications and tools. A Network File System (NFS) provides a simple, robust solution for such a common shared file system. Storage solutions based on the NFS protocol are widely used for HPC clusters because NFS is simple, time-tested, easy-to-use and install, has known failure modes and is a standard package in virtually every Linux distribution. NFS is a widely known shared file system that can be easily supported by a Linux sys admin reducing costs for additional staff expertise or support licenses.



Affordable HPC storage with high data throughput

To meet the network file storage needs of HPC clusters, we developed the Dell HPC NFS Storage Solution (NSS). It's cost-efficient, rock-steady storage with the right combination of features, performance and scalability to handle a high volume of data requests, supporting up to 480TB of raw storage space. Using proven Dell technology architected and optimized by Dell HPC experts, it achieves up to 30 percent better throughput compared to non-optimized NFS solutions. It delivers faster sequential read performance than the previous generation (NSS 5.5), 75% on average, while maintaining similar write performance.

- **Take the guesswork out of sizing and optimization:** The solution comes in four predefined configurations that are available either with Fourteen Data Rate (FDR) InfiniBand or 10Gbps Ethernet connectivity. Both InfiniBand and Ethernet configurations are available up to 480TB raw capacity.
- **Highly scalable primary storage solution:** Based on standards based Dell PowerEdge and PowerVault products and Red Hat's Scalable File System (XFS).
- **High data throughput:** To the meet performance demands of applications, the solution provides up to 2.23 GB/s of sequential write throughput and up to 6.07 GB/s of sequential read throughput for a single file system.ⁱⁱ
- **Standard components and software:** Install the NSS-HA storage appliance practically anywhere. You get a modular, scalable design that is pre-configured, tuned, and ready to go.

NSS-HA building blocks

The building blocks of Dell HPC NFS Storage Solution are:

- **Dell PowerEdge R630 NFS servers :** Running Red Hat Enterprise Linux operating system, Red Hat's Highly Scalable File System (XFS) and Red Hat Cluster Suite to provide file access to user data. Depending on the customer environment, the R630 server can be configured either with a FDR InfiniBand card or a 10Gb Ethernet card. It also includes RAID-1 for the OS for improved system resiliency as well as dedicated high performance swap space (two drives in RAID-0) to improve file system checks or repairs.

ⁱ Intersect360 Research Special Study, "The Big Data Opportunity for HPC Technology Vendors," 2013.

ⁱⁱ Benchmark performance results obtained from systems equipped with FDR InfiniBand.

To check on availability in your country, [have a Dell HPC specialist contact you.](#)

Simplify your HPC Storage at Dell.com/hpc

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- **Dell PowerVault MD3460 storage:** Provides the shared RAID storage for two NFS gateway servers in the highly available configurations. The PowerVault MD3460 is an RBOD with two RAID controller modules in the storage array. The MD storage comes fully populated with 60 1-4TB Near-line SAS (7200 RPM) drives configured in RAID 6 to enhance data availability, and features 12 Gbps SAS connections for faster transfer rates.
- **Dell PowerVault MD3060e:** 4U, 60 drive dense enclosure expansion box that is used as an EBOD to extend the capacity of the PowerVault MD3460. This expansion storage unit provides user data storage space by using 60 1-4TB, Near-line SAS, 7200 RPM drives for the best \$/GB.
- **Spares kits:** Cold spare 1-4TB NL-SAS drives are included in the configurations so that the customer can quickly swap out drives in the event of a drive failure.

Limited IT and research resources?

Get worry-free HPC deployment and management that frees up your engineers to do their best work. Researchers, scientists and engineers can focus on core business and strategic research initiatives instead of managing the cluster. Dell's award-winning ProSupport is included on all solutions configurations. This support covers the storage solution in its entirety, both hardware and software.

Deployment Services option

Ensure your storage solution success through Dell's installation and implementation services for your Dell HPC NFS Storage Solution. Dell Field Deployment Engineers can deploy this solution into your HPC or non-HPC environment. We will completely rack, cable and configure the solution components to help you get up and running in no time.

