



SYSTEM

DATA ONTAP® GX SYSTEMS

High-performance compute clusters place extreme demands on storage systems. NetApp Data ONTAP GX systems provide massive I/O throughput and scalability for high-performance NFS environments.

KEY HIGHLIGHTS

Highest Performance

Scale to extreme levels of throughput

Linear scaling as nodes are added

Volume striping enables extreme throughput for single file or volume

Unmatched Simplicity

Scaling to multiple petabytes under a single, global namespace

Transparent data movement

Requires no client-side software

Easy, rapid deployment

Excellent Reliability

WAFL® file system proven in over 60,000 installations

RAID-DP™ guards against multiple disk failures

Snapshot™ copies enable rapid recovery

No single point of failure

Proven Services

Reduced time to deployment

Integration of best practices

Complete knowledge transfer

High-quality support

THE CHALLENGE:

Scaling Performance with Reduced Management Complexity

Linux® and UNIX® compute clusters running technical applications have demanding storage requirements. Performance requirements are typically in the multigigabyte-per-second range, and capacity can scale into the petabyte class. To avoid hot spots and optimize economics, it is highly desirable to be able to move data between systems and tiers of storage without disruption. Finally, it is critical that the storage environment can be easily and effectively managed.

THE SOLUTION:

NetApp Scale-Out Storage System

Data ONTAP GX systems are optimized to meet the demanding requirements of high-performance computing (HPC) applications running on large Linux and UNIX clusters, while delivering unmatched management simplicity. By combining multinode scaling, global namespace, and a clustered file system with innovative NetApp FlexVol™, Snapshot, mirroring, and RAID-DP technology, Data ONTAP GX systems provide you with the highest levels of performance, manageability, and reliability.

Data ONTAP GX systems are based on the Data ONTAP GX operating system and two or more FAS3050 or FAS6070 system building blocks. Each FAS building block includes a pair of controllers (nodes) configured for high availability.

Data ONTAP GX systems can consist of 2 to 24 nodes, scaling to multiple gigabytes per second of throughput and up to 6PB of capacity. As nodes are added to a Data ONTAP GX system, performance scales linearly. Clustered file-system technology, delivered via the FlexVol High Performance option (HPO), enables extreme levels of throughput even for a single file or volume. Additionally, Data ONTAP GX systems support any combination of Fibre Channel and serial ATA (SATA) disk drives to ensure the right balance of performance and cost of ownership.

EXTREME PERFORMANCE

Data ONTAP GX software meets the extreme performance requirements of Linux and UNIX compute clusters. As nodes are added to a Data ONTAP GX system, throughput easily scales to multiple gigabytes per second. Data ONTAP GX software provides multidimensional scaling because the aggregate bandwidth available from the single global namespace scales

linearly with the number of nodes in the system. As storage nodes are added to the system, all physical resources (CPUs, cache memory, network I/O bandwidth, and disk I/O bandwidth) can easily be kept in balance. With their advanced load-balancing capabilities and superior ease of use, Data ONTAP GX systems are well matched to compute clusters with thousands of nodes and extreme NFS performance demands.

Data ONTAP GX systems utilize clustered file-system technology to provide maximum I/O throughput. With the FlexVol HPO, volumes are striped across any or all of the nodes in the system, enabling extreme levels of throughput for even a single file or volume. Higher read performance can also be realized by using load-balancing mirrors.

MANAGEMENT SIMPLICITY AND TRANSPARENT ADAPTABILITY

Data ONTAP GX systems are fully integrated solutions that are easy to install, manage, and maintain. Global namespace capability simplifies client-side management by mapping all data volumes into a file-system tree structure. It virtualizes storage at the file-system level, enabling

all compute nodes to mount a single file-system, access all stored data, and accommodate physical storage changes that are fully transparent to the Linux or UNIX compute cluster.

The global namespace offers a single system image across multiple nodes and eliminates the need for complex auto-mounter maps and symbolic link scripts. Each client is provided with a single mountpoint, which allows access to a huge pool of data residing anywhere in the Data ONTAP GX system.

Data ONTAP GX systems provide a powerful capability to move data between nodes and/or tiers of storage, nondisruptively and transparently to applications. This enables effective load balancing and elimination of hot spots, without the substantial management intervention that is typically required to perform such activities on other systems.

Data ONTAP GX systems do not require any client-side code to be installed on the compute cluster. Therefore the installation and maintenance processes are also greatly simplified. And the Data ONTAP GX system reduces or eliminates routine capacity allocation, along with storage management tasks.

HIGHLY RELIABLE

Along with stringent performance requirements, high reliability is important for technical applications on compute clusters. Data ONTAP GX systems leverage core software such as WAFL, RAID-DP, and Snapshot, which have been proven in over 60,000 system installations. These systems have been designed to meet high-reliability requirements with features such as RAID-DP (Double-Parity RAID) and transparent node failover, which ensures that failed components are bypassed automatically, with no interruption in data availability. In addition to having no single point of failure, Data ONTAP GX systems can be scaled and adjusted while online, allowing your applications to run without interruption.

MEETING THE NEEDS OF HPC MARKETS

Data ONTAP GX systems are particularly well matched to the requirements of HPC markets. For applications such as seismic processing, movie creation, electronic design automation, genomics, and other data-intensive programs, there is a requirement to scale storage capacity and performance to extreme levels, while

reducing management complexity. Data ONTAP GX systems have been specifically designed to meet these challenges with a solution that is high performance, easy to scale and manage, and highly reliable.

SYSTEM CONFIGURATIONS

Data ONTAP GX systems are configured for continuous operation with the use of high-performance, modular NetApp storage components. Each system consists of two or more FAS3050 or FAS6070 building blocks, and each FAS building block is a high-availability pair of controllers (nodes). Up to 12 FAS3050 and/or FAS6070 controller pairs (24 nodes) can be combined into a single, integrated Data ONTAP GX system. Gigabit Ethernet technology is used for client connections and for interconnecting FAS controllers.

These systems can use any mix of Fibre Channel and SATA disk drives, and data can be moved nondisruptively between storage tiers as requirements change over time.

Total storage capacity can be scaled up to 6PB.

COMPREHENSIVE SERVICES

NetApp Global Services provides the comprehensive support and services required for continuous system operation. NetApp services include installation, implementation, and full support of your Data ONTAP GX systems. As a result, you can expect reduced time to deployment, integration of best practices, complete knowledge transfer, and high-quality support.

Implementation services for Data ONTAP GX systems include:

- Storage layout design
- Global namespace configuration
- HA configuration and best practices
- Volume striping configuration
- Customized “how to” help based on customer environment and workflow

In addition, NetApp SupportEdge Premium offers a hybrid approach to support, combining expert on-site resources with innovative remote capabilities. SupportEdge Premium includes hardware and software installation, system monitoring, proactive notification, immediate reactive support, remote diagnostics, and a blend of remote and on-site repair. Quarterly storage availability audits and a software subscription plan are also included.

A VENDOR YOU CAN TRUST

NetApp is a leading Fortune 1000 company with over 60,000 successful customer installations worldwide. With a proven world-class global service and support organization, our track record provides the foundation for your future success as you enhance and grow your IT and storage environment.

ABOUT NETWORK APPLIANCE

Network Appliance is a world leader in unified storage solutions for today's data-intensive enterprise. Since its inception in 1992, Network Appliance has delivered technology, product, and partner firsts that simplify data management. Information about Network Appliance™ solutions and services is available at www.netapp.com.

TECHNICAL SPECIFICATIONS

Data ONTAP GX System Properties

Operating System	Network Appliance Data ONTAP GX 10.0 software
Network Protocol Support	NFS V2/V3 over UDP or TCP, Microsoft® CIFS (basic functionality only)
Standard Software Features	Global namespace; transparent FlexVol move; integrated automatic RAID manager, including RAID-DP, Snapshot, e-mail alerts, NIS, DNS, FlexVol, NDMP, SSH, CLI, Web GUI
Optional Software Licenses	FlexVol High Performance option, asynchronous mirroring, basic CIFS, SnapRestore®
Min–Max Nodes	2–24
Max Storage Capacity	6000TB
Max Volumes	12,000
Controller Models	Dual-controller FAS3050 and/or FAS6070 (with active/active failover)
Disk Shelves Supported (Fibre Channel, SATA)	DS14mk2 FC, DS14mk2AT
Disk Drive Capacities Supported	FC: 72GB (15k RPM), 144GB (10k or 15k RPM), 300GB (10k RPM) SATA: 250GB, 500GB (7.2k RPM)

FAS3050 Configuration¹

Max Raw Capacity	168TB
Controller Configuration	Dual-controller configuration required
Processor	4 x Xeon (2.8 GHz)
NVRAM	512MB (NV5)
Memory	8GB
Gigabit Ethernet Ports	12
2Gb FC Ports (Disk)	8
2Gb FC Ports (Tape)	4 (optional)

¹Standard configuration of Data ONTAP GX 10.0 is shown. For detailed system, disk shelf, and environmental specifications, refer to FAS3000 series technical specifications.

FAS6070 Configuration²

Max Raw Capacity	504TB
Controller Configuration	Dual-controller configuration required
Processor	8 x Opteron 852 (2.6 GHz)
NVRAM	4GB (NV6)
Memory	64GB
Gigabit Ethernet Ports	12
2Gb FC Ports (Disk)	16
2Gb FC Ports (Tape)	4 (optional)

²Standard configuration of Data ONTAP GX 10.0 is shown. For detailed system, disk shelf, and environmental specifications, refer to FAS6000 series technical specifications.



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