



**NetApp™**  
Go further, faster



Software

# Data ONTAP 8.0 Cluster-Mode

Reduce time to market with increased storage performance and scalability

## KEY BENEFITS

### Get to market faster

Accelerate product development and discovery with the ability to scale linearly to gigabytes per second of performance.

Achieve balanced throughput by striping data across controllers.

Simplify management.

Manage petabytes of storage without special client software.

Automatically optimize workloads and eliminate hot spots.

Meet high-availability requirements.

Expand storage and move data with zero downtime.

Protect against double disk failures.

### Reduce time to deployment

Let our service and support experts provide you with the support and services you need for speedy deployment and continuous system operation.

## THE CHALLENGE

### Scaling performance while controlling costs

High-performance, technical computing and digital media content applications place extreme demands on your storage systems. Compute clusters running these applications can require multiple gigabytes per second of performance and many terabytes—or even petabytes—of capacity. To maintain peak application performance, you need to be able to add storage and move data between systems and tiers of storage without disrupting ongoing operations. At the same time, to control costs, you need to be able to effectively manage your storage environment.

## THE SOLUTION

### Deploy Data ONTAP 8.0 Cluster-Mode for high performance and high capacity

NetApp® Data ONTAP® 8.0 Cluster-Mode helps you achieve results and get to market faster by providing the massive throughput and scalability you need to meet the demanding requirements of your high-performance computing and digital media content applications. Achieve high levels of

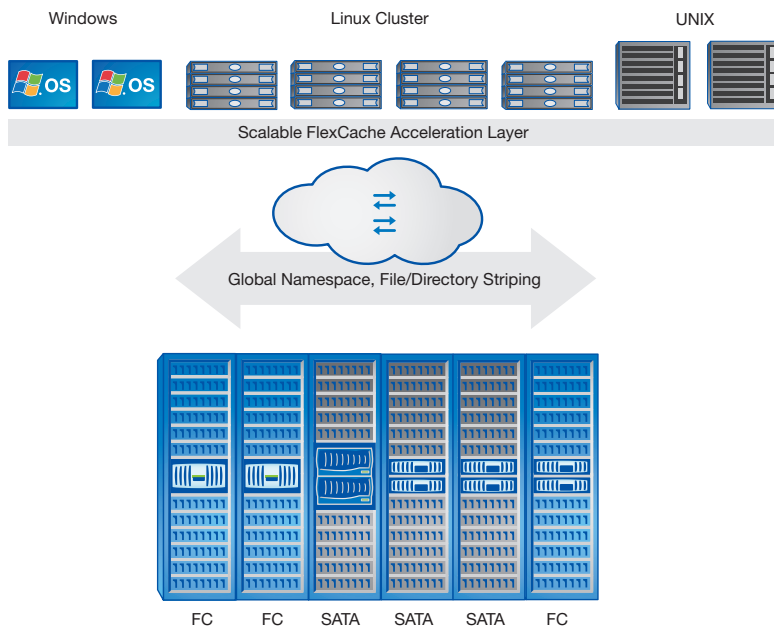
performance, manageability, and reliability for your large Linux®, UNIX®, or Microsoft® Windows® clusters with Data ONTAP 8.0 Cluster-Mode.

The Data ONTAP 8.0 Cluster-Mode operating system includes:

- Multinode scaling using a global namespace
- NetApp FlexVol® storage virtualization
- Clustered file system
- Snapshot™ replication and mirroring

## RAID-DP® TECHNOLOGY

Data ONTAP 8.0 Cluster-Mode is configured in pairs for high availability. You can add up to dozens of FAS controllers and storage as needed to scale to multiple gigabytes per second of throughput and petabytes of capacity. To help you achieve the right balance of performance and cost of ownership, our Data ONTAP 8.0 Cluster-Mode supports any combination of fast Fibre Channel and economical serial ATA (SATA) disk drives.



**Figure 1)** Data ONTAP 8.0 Cluster-Mode systems provide scale-out storage that supports petabytes of capacity and gigabytes per second of throughput.

### ACCELERATE PERFORMANCE

To support the throughput needs of compute clusters with hundreds or thousands of CPUs and extreme NFS and CIFS performance demands, you can increase throughput to multiple gigabytes per second by adding storage controllers to your cluster. Your aggregate bandwidth available from the single global namespace scales linearly with the number of nodes in the system.

Data ONTAP 8.0 Cluster-Mode systems use clustered file-system technology to provide maximum I/O throughput and remove the bottlenecks that impact production. You can stripe volumes across any or all of the storage controllers and disks in the system, enabling balanced levels of throughput for even a single file or volume and allowing your technical teams to run multiple compute jobs concurrently. When many compute nodes simultaneously require data, you can use load-balancing mirrors within the Data ONTAP 8.0 Cluster-Mode system or add our FlexCache® storage accelerators in front of the system to deliver much higher read throughput.

### SIMPLIFY STORAGE AND DATA MANAGEMENT

Our fully integrated storage solutions are easy to install, manage, and maintain. With our global namespace capability, you can simplify client-side management by mapping all data volumes in the cluster into a file-system tree structure that automatically maps or remaps servers to their data, even if that data is moved. By offering a single system image across multiple storage nodes, the global namespace eliminates the need for complex automounter maps and symbolic link scripts.

### IMPROVE DATA ACCESS

We virtualize storage at the file-system level to enable all compute nodes to mount a single file system, access all stored data, and automatically accommodate physical storage changes that are fully transparent to the compute cluster. Each client or server can access a huge pool of data residing anywhere in the Data ONTAP 8.0 Cluster-Mode system through a single mountpoint.

### KEEP RESOURCES IN BALANCE WITHOUT DISRUPTING OPERATIONS

As you add storage nodes to the system, you can easily keep all physical resources—CPUs, cache memory, network I/O bandwidth, and disk I/O bandwidth—in balance. Data ONTAP 8.0 Cluster-Mode systems enable you to add storage and move data between storage controllers and tiers of storage without disrupting users and applications. This lets you increase capacity, balance workloads, and can eliminate storage I/O hot spots, all without the need to remount shares, modify client settings, or stop compute jobs, as is typically required to rebalance workloads on other high-performance computing (HPC) storage systems.

### SIMPLIFY INSTALLATION AND MAINTENANCE

You can use standard NFS and CIFS protocols to access Data ONTAP 8.0 Cluster-Mode systems and do not need to install any special clients or code on each server in the compute cluster. The Data

ONTAP 8.0 Cluster-Mode architecture also reduces or eliminates routine capacity allocation and storage management tasks, letting you spend less time managing storage and more time achieving results.

#### **MEET HIGH-AVAILABILITY REQUIREMENTS**

Along with stringent performance requirements, high reliability is important for technical applications and cluster computing. Data ONTAP 8.0 Cluster-Mode systems leverage core NetApp software such as WAFL®, RAID-DP, and Snapshot, which have been proven in over 94,000 system installations. RAID-DP (a high-performance version of RAID 6) protects against double disk failure, and transparent controller clustering and failover automatically bypass any failed components, with no interruption in data availability. In addition to having no single point of failure, Data ONTAP 8.0 Cluster-Mode lets you expand or reconfigure storage while online. This allows your applications to run without interruption even while you add more storage capacity or throughput.

#### **ENABLE CONTINUOUS OPERATIONS**

Data ONTAP 8.0 Cluster-Mode systems are configured for continuous operation with the use of high-performance, modular NetApp storage components. Each system consists of one or more FAS building blocks, and each FAS building block is a high-availability pair of controllers (storage nodes). Multiple controller pairs form a single, integrated Data ONTAP 8.0 Cluster-Mode system. Data ONTAP 8.0 Cluster-Mode uses Ethernet technology—Gigabit and 10-Gigabit—for server connections and for interconnecting FAS controllers. You can also connect servers via InfiniBand through a gateway. NetApp provides fully integrated Cluster Network Switches based on the system configurations to provide ease of installation and deployment.

Each controller can support any mix of Fibre Channel and SATA disk drives, and you can move data nondisruptively between nodes or between different tiers of disks as performance requirements change. This capability enables you to maximize performance where needed while simultaneously improving capacity utilization.

#### **CAN REDUCE TIME TO DEPLOYMENT**

NetApp Global Services provides the support and services you require for speedy deployment and continuous system operation. NetApp services include installation, implementation, training, and full support of your Data ONTAP 8.0 Cluster-Mode systems. Our Rapid Deployment Service option can help you speed time to deployment for your storage. Our Global Services can provide you with best practices, complete knowledge transfer and expert support.

Implementation services for Data ONTAP 8.0 Cluster-Mode systems include:

- Storage layout design
- Global namespace configuration
- HA configuration and best practices
- Volume striping configuration
- “How-to” help customized for your environment and workflow

## PARTNER FOR SUCCESS

### Experience you can trust

NetApp is a Fortune 1,000 company with over 94,000 successful customer installations worldwide. With a proven, world-class global service and support organization, we provide the foundation you need for future success as you enhance and grow your IT and storage environment. Today, many of our customers use our Data ONTAP GX storage solutions to support intense HPC workloads driven by hundreds or thousands of CPUs for tasks that include:

- Processing seismic information for faster oil discoveries
- Designing semiconductors that enable faster and better video, audio, gaming, and location-based services for wireless devices
- Rendering state-of-the-art animations and special effects for film and television
- Simulating complex systems to accelerate research in areas such as climate modeling, high-energy physics, and biotechnology
- Analyzing financial market data to increase investment returns and decrease market risk

## CUSTOM SUPPORT SERVICES

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 problem resolution. SupportEdge Premium also includes quarterly storage availability audits and a Software Subscription Plan.



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