



## Datasheet

# NetApp FAS9000 Modular Hybrid Flash System

Quickly respond to demanding storage needs across flash, disk, and cloud with industry-leading data management.

### Key Benefits

#### Accelerate Enterprise Applications

Reduce latency and speed operations with up to 50% higher performance.

#### Maximize Uptime

Eliminate planned downtime. Add, upgrade, or retire storage with no disruptions.

#### Enhance Reliability, Availability, and Serviceability

Streamline maintenance and upgrades with an advanced modular design.

#### Consolidate Infrastructure

Scale up to 172PB, cluster with NetApp® All Flash FAS systems, and integrate existing third-party storage arrays.

#### Adapt Faster to Changing Needs

Easily reconfigure to meet changing performance, capacity, and connectivity requirements.

#### Optimize for the Hybrid Cloud

Easily implement a service-oriented IT architecture that spans on-premises and cloud resources.

### The Challenge

#### Deliver high performance and maximum availability while reducing TCO and eliminating silos

For today's critical business operations, performance and availability are essential. However, the infrastructure to achieve these goals can introduce a level of complexity that drives up management costs; increases the chance for costly errors; and requires specialized training, skills, and knowledge.

Many enterprises struggle, held back by structural limitations in legacy storage and data architectures. Traditional storage arrays deliver on basic needs, but are complex to manage and maintain and must be replaced every three to five years, adding to total costs. And they can create silos of data across your organization.

### The Solution

#### Maximize storage performance and upgradability

The demands of a data-driven business require a new approach to storage with an integrated combination of scalable, high-performance hardware and adaptive storage software to support existing workloads as well as new applications. Storage system design should streamline maintenance and extend the useful life of the storage system.

NetApp FAS9000 hybrid storage systems are engineered specifically to address these needs. Powered by NetApp ONTAP® data management software, the FAS9000 unifies your SAN and NAS storage infrastructure. Designed to take full advantage of 40GbE and 32Gb FC, the FAS9000 is the most powerful FAS system that NetApp has ever created, and its intelligent modular design enhances reliability, availability, and serviceability (RAS). Service operations are greatly simplified, minimizing the risk of errors and reducing the time needed to accomplish the operations. The fully upgradable modular design increases flexibility, streamlines maintenance, and extends the life of the platform, reducing the disruption and expense that come with tech refreshes.

FAS9000 systems can be clustered with NetApp All Flash FAS (AFF) arrays and can be integrated with the cloud. So, you have the control to move your data where it's needed to deliver the optimal combination of performance, storage capacity, and cost efficiency. With proven agility and data management capabilities, the FAS9000 has the flexibility to keep up with changing business needs while delivering on core IT requirements.

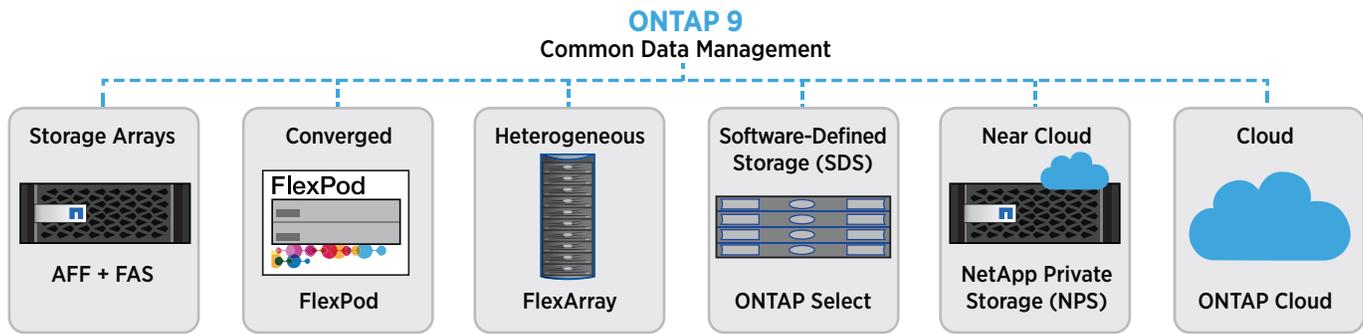


Figure 1) Standardize data management across architectures with a rich set of enterprise data services.

### Unlock the power of flash

FAS9000 hybrid storage systems deliver up to 50% more performance than our previous generation, boosting throughput, lowering latency, and meeting stringent service levels. The base configuration includes 2TB of onboard NetApp Flash Cache™ caching that is based on NVMe technology. This can be expanded with up to 16TB of onboard NVMe flash and up to 144TB of hybrid flash by using NetApp Flash Pool™ intelligent data caching. Hot data is automatically promoted to flash in real time, so you get the full benefit of flash performance.

### Scale and adapt to meet changing needs

The intelligent, modular design of the FAS9000 offers superior upgradability and flexibility. Each HA pair includes dual controllers and four independent slots for NVMe flash. FAS9000 systems also enable high-speed 40GbE NAS and 32Gb SAN data centers. With 20 I/O expansion slots to support 12Gb SAS, 40GbE, and 32Gb FC, as well as 10GbE and flexible 4-port UTA2 adapters for both Ethernet and FC connectivity, it provides superior connectivity. I/O cards are easily serviced, and controllers can be replaced or upgraded without disturbing I/O cabling, eliminating the potential for errors.

FAS9000 hybrid storage lets you optimize and accelerate your storage environment as performance and capacity requirements change. Scale up by adding capacity, flash acceleration, or I/O connectivity. Upgrade to more powerful controllers to accommodate growing workload demands. Scale out by growing from 2 nodes to 24 nodes with a maximum of 172PB of capacity. Or combine different FAS and AFF models in the same cluster to satisfy the exact storage needs of every workload.

With the NetApp FlexGroup feature of ONTAP 9, FAS9000 supports massive, easy-to-manage NAS containers. A single namespace can grow to 20PB and 400 billion files while maintaining consistent high performance and resiliency.

To protect the security of your data, the NetApp Volume Encryption feature that is built into ONTAP easily and efficiently encrypts any volume on any FAS (or AFF) system. No special self-encrypting disks are required. Plus, optional external key management can further increase security.

### Achieve superior availability and nondisruptive operations

With the nondisruptive addition and replacement of system components and cluster nodes, the superior serviceability of the FAS9000 makes it possible to perform updates during regular work hours. Scaling occurs without maintenance windows or the challenge of coordinating downtime across teams.

FAS9000 enterprise storage is engineered to meet the most demanding availability requirements. All models are designed to deliver 99.9999% or greater availability through a comprehensive approach that combines highly reliable hardware, innovative software, and sophisticated service analytics.

Software and firmware updates, hardware repair and replacement, load balancing, and tech refresh happen without planned downtime. Plus, NetApp Integrated Data Protection technologies protect your data, accelerate recovery, and integrate with leading backup applications for easier management.

Optimize your data infrastructure with the cloud-based predictive analytics and proactive support of NetApp Active IQ®. Prevent problems, save time and gain insight by leveraging machine learning to get real-time predictions and recommendations based on community wisdom from NetApp's massive user base.

NetApp MetroCluster™ technology expands data protection to eliminate the risk of data loss by synchronously mirroring data between locations for continuous availability of information. A MetroCluster storage array can exist in a single data center or in two different data centers that are located across a campus, across a metropolitan area, or in different cities. No matter what happens, your data can be protected from loss and is continuously available to meet the most business-critical needs.

### Get more from existing storage array investments

Simplify your IT operations and deliver more value from existing third-party arrays by using them as additional storage capacity behind FAS9000 systems. NetApp FlexArray® virtualization software running on FAS9000 extends ONTAP to include storage capacity from EMC, Hitachi, HPE, IBM, and NetApp E-Series arrays. Consolidate management of your existing storage to increase efficiency, add support for SAN and NAS workloads, and provide superior data management functionality.

## Optimize hybrid cloud deployment

Organizations today are focusing on service-oriented IT architectures in which cloud IT models are leveraged to enhance return on investment and assets. FAS9000 running ONTAP is optimized for private and hybrid cloud with secure multitenancy, adaptive quality of service (QoS), nondisruptive operations, and easily defined tiers of service.

A FAS9000 that is tightly integrated with the industry-standard OpenStack cloud infrastructure enables an organization to build a private cloud that delivers a simple service-oriented IT architecture and meets the demanding needs of enterprise applications.

For organizations that need an enterprise-class hybrid cloud with predictable performance and availability, the FAS9000 can be used in a NetApp Private Storage (NPS) for Cloud solution. With NPS for Cloud, you can directly connect to multiple clouds by using a private, high-bandwidth, low-latency connection. Connect to industry-leading clouds such as Amazon Web Services (AWS), Microsoft Azure, or IBM Cloud and switch between them at any time, all while maintaining complete control of your data on your dedicated, private FAS9000. You get the elasticity of the public cloud and protect your data with NetApp technologies that you understand and trust.

For maximum flexibility, ONTAP Cloud is a version of ONTAP software that runs in AWS and Azure. Providing the storage efficiency, availability, and scalability of ONTAP, it allows quick and easy movement of data between your on-premises FAS9000 and AWS or Azure environment with NetApp SnapMirror® data replication software.

## Build the right long-term platform

When it comes to long-term storage infrastructure investments, it is critical to focus on flexibility for adapting to future requirements,

simplification of your storage environment, and total cost of ownership (TCO). With its intelligent, modular design and superior serviceability and upgradability, the FAS9000 provides a significant price/performance benefit. Plus it delivers industry-leading storage efficiency technologies such as inline deduplication, inline compression, inline compaction, thin provisioning, and space-efficient NetApp Snapshot® copies to reduce your cost per effective gigabyte of storage.

In a data-driven business, you also need the ability to leverage data for competitive advantage and to assign resources dynamically for more effective operations. The NetApp OnCommand® storage management software portfolio is composed of a range of products for use with the FAS9000, including automation, integration, device-level management, and enterprise storage resource management.

## Get It Right from the Start by Using NetApp Expertise and Tools

Get the most out of your investment by engaging professional services experts from NetApp or our Services Certified Partners. When moving data into your new environment, smooth the transition and mitigate risks by using proven NetApp methodologies, tools, and best practices. [Learn more at netapp.com/services](https://netapp.com/services).

**Table 1) FAS9000 technical specifications**

Scale-Out	FAS9000
<b>NAS scale-out: 1-24 nodes (12 HA pairs)</b>	
Maximum drives (HDD/SSD)	17,280/5,760
Maximum raw capacity	172PB
Maximum onboard Flash Cache based on NVMe technology	192TB
Maximum Flash Pool	1728TB
Maximum memory	12,288GB
<b>SAN scale-out: 1-12 nodes (6 HA pairs)</b>	
Maximum drives (HDD/SSD)	8,640/2,880
Maximum raw capacity	86PB
Maximum onboard Flash Cache based on NVMe technology	96TB
Maximum Flash Pool	864TB
Maximum memory	6144GB
Cluster interconnect	2 x 40GbE

## About NetApp

NetApp is the data authority for hybrid cloud. We provide a full range of hybrid cloud data services that simplify management of applications and data across cloud and on-premises environments to accelerate digital transformation. Together with our partners, we empower global organizations to unleash the full potential of their data to expand customer touchpoints, foster greater innovation and optimize their operations. For more information, visit [www.netapp.com](http://www.netapp.com). #DataDriven

## Per HA Pair Specifications (Active-Active Dual Controller)

	FAS9000
Maximum drives (HDD/SSD)	1,440/480
Maximum raw capacity	14.4PB
Maximum onboard Flash Cache based on NVMe technology	16TB
Maximum Flash Pool	144TB
Controller form factor	8U
ECC memory	1024GB
NVRAM	64GB
PCIe expansion slots	20

## OS version: ONTAP 9.1 RCI and later

Shelves and media	See the Shelves and Media page <sup>1</sup> on NetApp.com for the most current information.
Storage protocols supported	FC, FCoE, iSCSI, NFS, pNFS, CIFS/SMB
Host/client operating systems supported	Windows 2000, Windows Server 2003, Windows Server 2008, Windows Server 2012, Windows Server 2016, Windows XP, Linux, Sun Solaris, AIX, HP-UX, Mac OS, VMware, ESX

<sup>1</sup> [netapp.com/us/products/storage-systems/disk-shelves-and-storage-media/index.aspx](https://netapp.com/us/products/storage-systems/disk-shelves-and-storage-media/index.aspx).

**Table 2) NetApp FAS9000 series software**

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	<p>The ONTAP 9 Base Bundle includes a set of software products that deliver leading data management, storage efficiency, data protection, and high performance. The optional Premium Bundle and extended value software products provide advanced capabilities, including instant cloning, data replication, application-aware backup and recovery, volume encryption, and data retention.</p>
<p>Software included in ONTAP 9 Base Bundle</p>	<p>The Base Bundle includes the following NetApp technologies:</p> <ul style="list-style-type: none"><li>• Storage protocols: all supported data protocol licenses (FC, FCoE, iSCSI, NFS, pNFS, CIFS/SMB)</li><li>• Efficiency: NetApp FlexVol® software, deduplication, compression, compaction, and thin provisioning</li><li>• Availability: multipath I/O</li><li>• Data protection: NetApp RAID-TEC™, RAID DP®, and Snapshot technology</li><li>• Performance: adaptive QoS</li><li>• Scalable NAS container: FlexGroup</li><li>• Management: OnCommand System Manager and OnCommand Unified Manager</li></ul>
<p>Software included in ONTAP 9 Premium Bundle (optional)</p>	<p>To add capabilities to the Base Bundle, the optional Premium Bundle includes the following NetApp technologies:</p> <ul style="list-style-type: none"><li>• <b>FlexClone®</b>: data replication technology for instant virtual copies of databases or virtual machines</li><li>• <b>SnapMirror®</b>: simple, efficient, flexible disaster recovery</li><li>• <b>SnapVault®</b>: disk-based backup software for complete backups and online archiving to primary or secondary storage in minutes instead of hours or days</li><li>• <b>SnapRestore®</b>: data recovery software to restore entire Snapshot copies in seconds</li><li>• <b>SnapCenter®</b>: unified, scalable platform and plug-in suite for application-consistent data protection and clone management</li><li>• <b>SnapManager®</b> suite for application- and virtual machine-aware backup, recovery, and cloning</li></ul> <p>See <a href="http://NetApp.com">NetApp.com</a> for information about additional software available from NetApp.</p>
<p>Extended value software (optional)</p>	<p>Separate optional software, beyond the Base Bundle and Premium Bundle, is also available:</p> <ul style="list-style-type: none"><li>• <b>OnCommand</b> suite of management software that provides the visibility and control to help maximize system utilization, meet storage SLAs, minimize risks, and boost performance</li><li>• <b>NetApp SnapLock®</b> compliance software for write once, read many (WORM)-protected data</li><li>• <b>Volume Encryption</b>: granular, volume-level data-at-rest encryption</li><li>• <b>FlexArray</b> virtualization of existing third-party storage arrays into an ONTAP environment to leverage the array storage capacity behind a NetApp FAS</li><li>• <b>SnapCenter Advanced</b>: advanced automation, data protection policies, and file-level search and restore</li></ul>

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