



## Datasheet

# NetApp AFF

Leading the future of flash

### Key Benefits

- Unleash the power of your data with the industry's first end-to-end NVMe-based enterprise all-flash array that delivers up to 11.4 million IOPS and over 700PB effective capacity.
- Accelerate artificial intelligence and machine-learning applications with sub-200 $\mu$ s latency and massive 300GB/s throughput.
- Upgrade to a modern NVMe-based SAN infrastructure with a simple software upgrade<sup>1</sup> to support 60% more workloads or to cut application response time in half, without disruption.
- Minimize your data center footprint by storing 2PB of data in a 4U compact system with 5 to 10 times the SSD storage savings, delivered by inline data reduction technologies.
- Reduce power use by 15 times, rack space by 37 times, and cut support costs by 67%.
- Unify data management across SAN and NAS environments, both on the premises and in the cloud.
- Set up and configure a complete system and serve data within 10 minutes.
- Safeguard your data with best-in-class integrated data protection.

### The Challenge

As businesses go through the digital transformation, they must modernize their IT infrastructure to improve speed and responsiveness to support critical business operations. All-flash storage systems have been widely adopted to speed up typical enterprise applications. However, newer applications of data analytics, such as those in artificial intelligence (AI) and in deep learning, demand higher and higher performance that the first-generation flash systems cannot deliver.

In addition, it is also critical to offer enterprise-grade data management capabilities for a shared environment across on-premises data centers and the cloud. Unfortunately, many all-flash array solutions on the market today lack robust data management, integrated data protection, seamless scalability, and deep application and cloud integration.

### The Solution

NetApp® AFF systems help you meet your enterprise storage requirements with industry's highest performance, superior flexibility, and best-in-class data management and cloud integration. Combined with the industry's first end-to-end NVMe technologies and NetApp ONTAP® data management software, AFF systems accelerate, manage, and protect your business-critical data. With an AFF system, you can make an easy and risk-free transition to flash for your digital transformation.

Designed specifically for flash, the AFF A-Series all-flash systems deliver industry-leading performance, capacity density, scalability, security, and network connectivity in dense form factors. With the addition of the new NVMe-based AFF A800, the AFF A-Series family extends enterprise-grade flash to AI and to machine learning. By combining low-latency NVMe solid-state drives (SSDs) and the first NVMe over Fibre Channel (NVMe/FC) connectivity, AFF A800 delivers below 200 $\mu$ s latency and a massive throughput of up to 300GB/s in a 24-node cluster.

As the industry's first all-flash arrays to provide both 100 Gigabit Ethernet (100GbE) and 32Gb FC connectivity together, AFF A-Series systems also support the NVMe/FC host connection, allowing customers to run 60% more workloads or cut the application response time by half.

Having been a leader in supporting high-capacity 15TB SSDs and multistream write (MSW) SSDs, AFF is leading again as the first all-flash system to support 30TB SSDs. You can further reduce your storage footprint with the high density of 2PB SSD storage in a 2U drive shelf and move toward an optimally efficient data center.



1. For select NetApp AFF A-Series models only.

## AFF Benefits

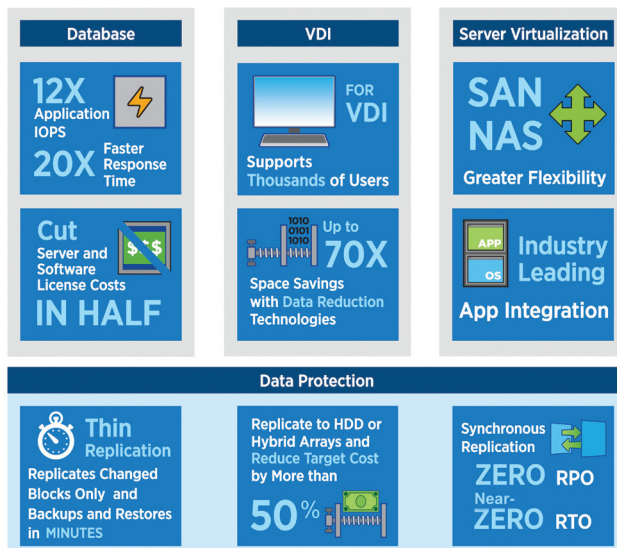


Figure 1) With rich data management capabilities, NetApp AFF systems help you cut business costs.

The newly refreshed AFF A220 platform for small and medium enterprise environments delivers 30% more performance than its predecessor to continue NetApp's leadership in this segment.

With AFF systems, you can:

- **Deploy flash everywhere with best-in-class cloud integration:**
  - You can move data and applications where they run best, either on the premises or in the cloud.
  - AFF offers the broadest application ecosystem integration for enterprise application, virtual desktop infrastructure (VDI), database, and server virtualization.
  - You can integrate flash into your infrastructure nondisruptively, eliminate silos, and scale out as your requirements grow.
- **Accelerate the speed of business while increasing operational efficiency:**
  - Speed up the most demanding workloads such as AI and deep learning with an AFF A800 system, which combines NVMe SSDs and NVMe/FC connectivity to provide an ultrafast end-to-end data path to your applications.
  - Consolidate all your workloads on AFF systems, which deliver up to 11.4 million IOPS at 1ms latency in a cluster with a truly unified scale-out architecture, allowing nondisruptive integration of new technologies such as NVMe.
  - Manage a massively scalable NAS container of up to 20PB and 400 billion files with a single namespace by using NetApp FlexGroup volumes, while maintaining consistent high performance with adaptive quality of service (QoS) and resiliency.

## • Simplify IT operations while transforming data center economics:

- Reduce power consumption by up to 15 times and rack space by up to 37 times and slash support and performance-tuning costs to a third compared with hybrid systems.
- Get flash at the cost of HDDs, thanks to NetApp data reduction technologies, enhanced with new inline data compaction.
- Support all your backup and disaster recovery needs with a complete suite of integrated data protection and replication features.
- Secure your data and simplify key management on any type of drive with NetApp Volume Encryption (NVE), software-based at-rest data encryption that supports onboard and external key manager as well as multifactor authentication (MFA), and crypto-shredding.

## Maximum Flexibility Future-Proofs Investments

With AFF, your investment is protected if your performance and capacity needs change or if your cloud strategy evolves in the future:

- AFF is Data Fabric ready, with proven cloud connectivity. The FabricPool allows you to move data automatically between AFF and the cloud storage enabling a 20x the capacity on the premises to the cloud tiers to maximize performance and to reduce overall storage costs.
- AFF systems eliminate performance silos in your data center. They seamlessly cluster with hybrid FAS systems, enabling workloads to transparently move between high-performance tiers and low-cost capacity tiers.
- You can seamlessly adapt as your needs change with the only all-flash array that allows you to intermix different controllers, SSD sizes, and new technologies so that your investment is protected.
- You can optimize data management for your enterprise workload environment with industry-leading application integration into Oracle, Microsoft, VMware, SAP, OpenStack, and much more.

## Complete Suite of integrated Data Protection

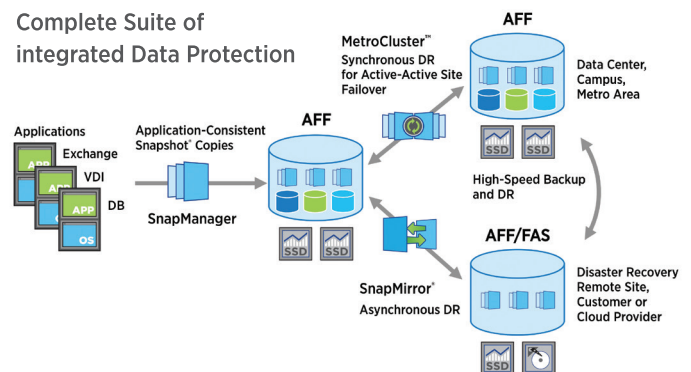


Figure 2) NetApp provides a full suite of integrated data protection and disaster recovery (DR) software.

## All-Flash Performance Powered by End-to-End NVMe Technology

AFF systems are excellent for performance-demanding applications and mixed-workload environments that consist of, for example, Oracle, Microsoft SQL Server, MongoDB databases, VDI, and server virtualization. And with the new end-to-end NVMe-based AFF A800, AFF is also a great choice for AI and deep-learning environments:

- Combined with ONTAP's superior cloud integration and software-defined storage capabilities, AFF enables the full range of the data pipeline that spans the edge, the core, and the cloud for AI and deep learning, leveraging the same ONTAP data management.
- The end-to-end NVMe-based AFF A800 delivers 1.3 million IOPS at below 500µs latency.
- Built-in adaptive QoS safeguards SLAs in multiworkload and multitenant environments. It optimizes performance control dynamically with superior scalability of up to 40,000 workloads per cluster at LUN, file, and VVol levels.
- With the latest ONTAP release, AFF delivers up to 90% performance increase for Microsoft SQL Server with multichannel SMB.

## Transform Your Data Center Economics While Simplifying Operations

With industry-leading performance and density, AFF systems can change your data center economics dramatically by reducing power consumption and rack space to a fraction of what a traditional HDD-based data center needs. AFF systems also significantly simplify storage management and cut support costs by eliminating performance tuning.

AFF comes with a full suite of acclaimed NetApp integrated data protection software. Key capabilities and benefits include:

- Native space efficiency with cloning and NetApp Snapshot™ copies (up to 1,023 copies are supported) to reduce storage costs and to minimize performance impact
- NetApp SnapCenter® software, which provides a unified, scalable and plug-in suite for application-consistent data protection and clone management that simplify application management
- Synchronous replication with NetApp MetroCluster™ software, a leading capability in the all-flash array market that delivers a zero recovery point objective (RPO) and a near-zero recovery time objective (RTO) for mission-critical workloads
- Ability to achieve regulatory compliance with NetApp SnapLock® software, which is enabled with integrated data protection and storage efficiency
- NetApp SnapMirror® replication software, which replicates to any type of FAS or AFF system—all flash, hybrid, or HDD, and on the premises or in the cloud—reducing overall system costs

AFF systems are built with innovative inline data reduction technologies, including inline compression, inline deduplication,

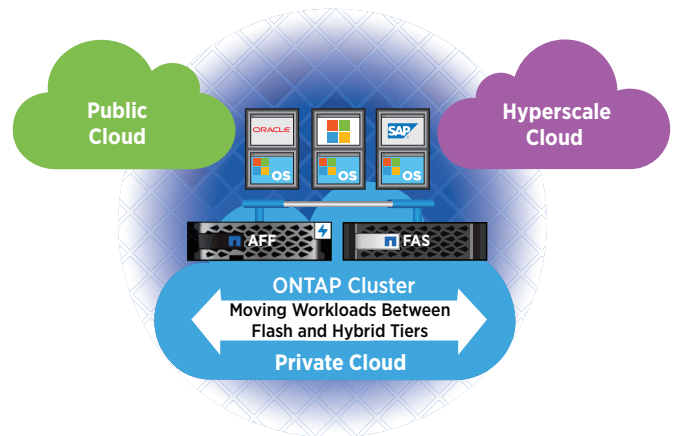


Figure 3) AFF is Data Fabric ready. You can easily move data between tiers and clouds.

and inline data compaction, that provide space savings of 5 to 10 times, on average, for a typical use case. Actual space savings of much higher than 10 times have been reported by our customers. Additional benefits of these technologies are as follows:

- The inline data compaction technology uses an innovative approach to place multiple logical data blocks from the same volume into a single 4KB block. It provides substantial space savings in addition to inline compression for database workloads that have relatively small I/O sizes. Combined space savings as high as 67:1 by using inline data compaction and inline compression together with an Oracle database have been observed.
- Inline compression has a near-zero performance impact. Incompressible data detection eliminates wasted cycles.
- Inline deduplication increases space savings by eliminating redundant blocks. It is particularly effective for VDI workloads, for which it can achieve 70:1 reduction rates. The continued enhancements in the latest ONTAP software, including the expanded aggregate-wide inline and background deduplication and the auto-scheduled post-process deduplication, further increase space savings by up to 30% and help achieve those savings faster.
- As the first all-flash array to support SSDs with multistream write technology, and combined with advanced SSD partitioning in ONTAP, AFF further increases usable capacity by up to 42% for the same cost.

NetApp ONTAP and OnCommand® management software provides automated tools to further simplify management of storage operations:

- Set up your AFF system and start serving application data in less than 10 minutes with the SAN- and NAS-optimized pre-configurations and the fast provisioning workflow.
- Provision and rebalance workloads with confidence by monitoring clusters and nodes to assure performance headroom availability with OnCommand Performance Manager.
- Automate common storage tasks such as provisioning and data protection with fast, one-click automation and self-service by using OnCommand Workflow Automation.
- Import LUNs from storage arrays that are not based on ONTAP software directly into an AFF system to seamlessly migrate data from older storage arrays.

### **Get More Business Value with Services**

NetApp Services and NetApp certified services partners collaborate with you to enhance your IT capabilities through a full portfolio of services that cover your IT lifecycle. To help you get the most value from your flash technology investment, NetApp offers:

- Assessment services to help evaluate the performance and efficiency of workloads across your heterogeneous environments
- Advisory services to help you determine the best workload candidates to move to flash
- Deployment and optimization services to prepare your environment and to deliver continuous operation of your AFF systems

In addition, the NetApp Active IQ® cloud-based predictive analytics and proactive support tool provides real-time insights and recommendations to prevent problems and to optimize your data infrastructure. Learn more at [netapp.com/services](https://netapp.com/services).

### **Easily Unlock the Power of Your Data and the Power of Your Staff**

Built on years of flash innovation and experience, NetApp AFF achieves high I/O at consistently low latency. And it does so without compromising on core enterprise requirements, such as robust data management, efficient data protection, and flexibility to respond to changing needs.

NetApp offers easy and flexible ways for you to deploy AFF systems. Standardized AFF configurations are offered through our channel partners as AFF Express Packs to simplify and to accelerate the purchasing process.

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### **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](https://www.netapp.com). #DataDriven

## AFF Technical Specifications

	AFF A800	AFF A700s	AFF A700	AFF A300	AFF A220
<b>NAS scale-out</b>	2-24 nodes (12 HA pairs)	2-24 nodes (12 HA pairs)	2-24 nodes (12 HA pairs)	2-24 nodes (12 HA pairs)	2-24 nodes (12 HA pairs)
Maximum SSD	2880	2592	5760	4608	1,728
Maximum raw capacity: all flash	79.0PB/70.2PiB	79.0PB/70.2PiB	175.7PB/156.0PiB	140.5PB/124.8PiB	48.3PB/42.9PiB
Effective capacity <sup>a</sup>	316.3PB/280.8PiB	316.3PB/280.8PiB	702.7PB/623.8PiB	562.2PB/499PiB	193.3PB/171.6PiB
Maximum memory	15,360GB	12,288GB	12,288GB	3,072GB	768GB
<b>SAN scale-out</b>	2-12 nodes (6 HA pairs)	2-12 nodes(6 HA pairs)	2-12 nodes (6 HA pairs)	2-12 nodes (6 HA pairs)	2-12 nodes (6 HA pairs)
Maximum SSD	1440	1296	2880	2304	864
Maximum raw capacity	39.6PB/35.1PiB	39.6PB/35.1PiB	87.8PB/78.0PiB	70.3PB/62.4PiB	24.2PB/21.4PiB
Effective capacity	158.2PB/140.4PiB	158.2PB/140.4PiB	351.4PB/311.9PiB	281.1PB/249.5PiB	96.7PB/85.5PiB
Maximum memory	7680GB	6144GB	6144GB	1536GB	384GB
Cluster interconnect	4 x 100GbE	4 x 40GbE	4 x 40GbE	4 x 10GbE	4 x 10GbE

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

	AFF A800	AFF A700s	AFF A700	AFF A300	AFF A220
Maximum SSD	240	216	480	384	144
Maximum raw capacity: all flash	6.6PB/5.8PiB	6.6PB/5.8PiB	14.6PB/13.0PiB	11.7PB/10.4PiB	4.0PB/3.6PiB
Effective capacity	26.4PB/23.4PiB	26.4PB/23.4PiB	58.6PB/52PiB	46.9PB/41.6PiB	16.6PB/14.3PiB
Controller form factor	4U chassis with two HA controllers and 48 SSD slots	4U chassis with two HA controllers and 24 SSD slots	8U chassis with two HA controllers	3U chassis with two HA controllers	2U chassis with two HA controllers and 24 SSD slots
Memory	1280GB	1024GB	1024GB	256GB	64GB
NVRAM	64GB	32GB	64GB	16GB	8GB
PCIe expansion slots	8	8	20	6	n/a
FC target ports (32Gb autoranging)	32	8	32	8	n/a
FC target ports (16Gb autoranging)	32	8	64	24	0-8
FCoE target ports, UTA2	n/a	12	64	24	0-8
100GbE/40GbE ports	16	8	n/a	n/a	n/a
40GbE ports	16	24	32	8	n/a
10GbE ports	32	n/a	64	28	0-8
10GbE Base-T ports (1GbE autoranging)	n/a	8	64	12	n/a
12Gb/6Gb SAS ports	n/a	8	64	24	4
Storage networking supported	NVMe/FC; FC; iSCSI; NFS; pNFS; CIFS/SMB	NVMe/FC, FC, iSCSI, NFS, pNFS, CIFS/SMB	NVMe/FC, FC, FCoE, iSCSI, NFS, pNFS, SMB	NVMe/FC, FC, FCoE, iSCSI, NFS, pNFS, SMB	FC, FCoE, iSCSI, NFS, pNFS, SMB
OS version	ONTAP 9.4 RC1 or later	ONTAP 9.1 GA or later	ONTAP 9.1 GA or later	ONTAP 9.1 GA or later	ONTAP 9.4 RC1 or later
Shelves and media	NVMe Drive Packs	DS224C (2U; 24 drives, 2.5" SFF); DS2246 (2U; 24 drives, 2.5" SFF) See NetApp All Flash FAS Tech Specs page <sup>b</sup> for more details about supported drive types.			
Host/client OS supported	Windows® 2000, Windows Server® 2003, Windows Server 2008, Windows Server 2012, Windows Server 2016, Linux®, Oracle® Solaris, AIX, HP-UX, Mac® OS, VMware®, ESX®				

a. Effective capacity is based on 5:1 storage efficiency ratios with the maximum number of SSDs installed. The actual ratio can be higher depending on workloads and use cases.

b. See <http://www.netapp.com/us/products/storage-systems/all-flash-fas/model-a-tech-specs.aspx>

## AFF A Series Software

Features and software included with ONTAP software

**Efficiency:** NetApp FlexVol®, inline deduplication, inline compression, inline compaction, and thin provisioning  
**Availability:** multipath I/O and active-active HA pair  
**Data protection:** NetApp RAID DP®, RAID-TEC™, and Snapshot  
**Synchronous replication for disaster recovery:** MetroCluster  
**Performance control:** adaptive QoS and balanced placement  
**Management:** OnCommand Workflow Automation, System Manager, Performance Manager, and Unified Manager  
**Scalable NAS container:** FlexGroup

Flash bundle

- Storage protocols supported (FC, FCoE, iSCSI, NFS, pNFS, and SMB)
  - NetApp **SnapRestore**® software: restore entire Snapshot copies in seconds
  - NetApp **SnapMirror** software: simple, flexible backup and replication for disaster recovery
  - NetApp **FlexClone**® technology: instant virtual copies of files, LUNs, and volumes
  - NetApp **SnapCenter**®: unified, scalable platform and plug-in suite for application-consistent data protection and clone management
  - NetApp **SnapManager**® software: application-consistent backup and recovery for enterprise applications
- Go to [NetApp.com](http://NetApp.com) for information about additional software available from NetApp.

Extended-value software (optional)

**NVMe over FC (NVMe/FC) protocol:** faster and more efficient host connection than with original FC  
**NetApp OnCommand Insight:** flexible, efficient resource management for heterogeneous environments  
**NetApp SnapLock:** compliance software for write once, read many (WORM) protected data  
**NetApp Volume Encryption (free license):** granular, volume-level, data-at-rest encryption  
**NetApp FabricPool feature:** Automatic data tiering to the cloud

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