NetApp AFF C-Series

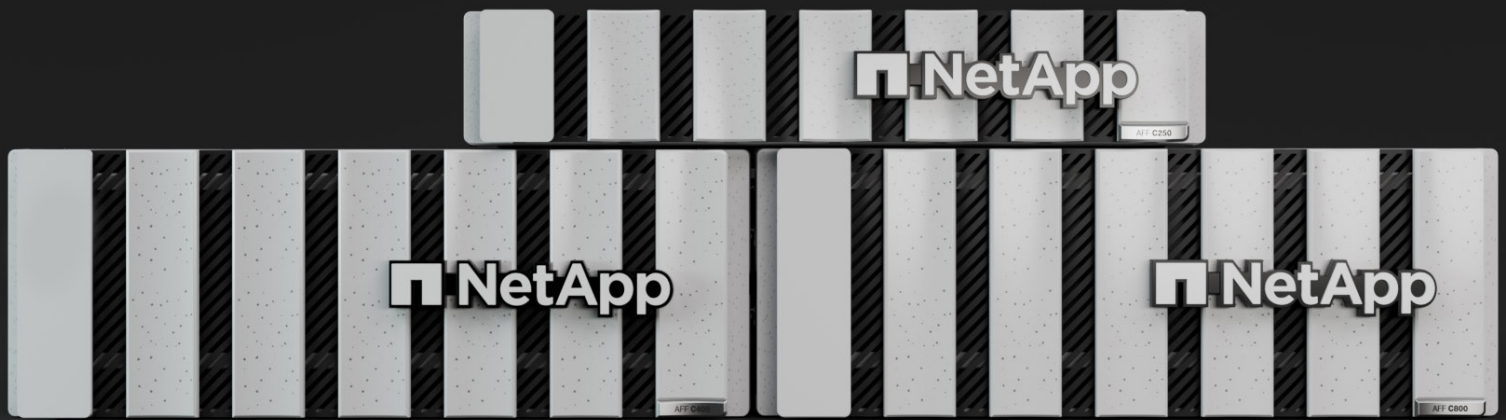**NetApp**

Leading the way to a cloud-connected all-flash data center

As quad-level cell (QLC) flash technology matures and becomes more widely available, organizations are finding that the performance is good enough for many tier 1 and tier 2 workloads—and the price, typically more affordable than triple-level cell (TLC) media, is advantageous. Customers who are eager to modernize their IT infrastructure from HDD to flash don't want to pay a premium for submillisecond performance for non-mission-critical workloads. In addition, organizations are increasingly looking for easy ways to connect to the cloud, creating a dynamic hybrid cloud infrastructure that can address their changing IT needs.

A cloud-connected capacity flash system powered by ONTAP

All-flash storage systems based on QLC media address this challenge. NetApp® AFF C-Series systems help you move more of your data to flash with the latest QLC flash technology. These systems are suited for large-capacity deployment as an affordable way to modernize your data center to all flash and also connect to the cloud. Powered by NetApp ONTAP® data management software, AFF C-Series systems deliver industry-leading efficiency, superior flexibility, and best-in-class data services and cloud integration to help you scale your IT infrastructure, simplify your data management, and reduce storage cost and power consumption.

They enable you to:
- Save big on storage, rack space, and power consumption
- Scale capacity and performance seamlessly without disruption
- Keep business-critical data available, protected, and secure

Increase efficiency and sustainability

Organizations are striving to make their ITOps more cost-efficient and energy-efficient while also meeting their performance and capacity requirements. AFF C-Series systems help our customers achieve these goals by reducing data center costs with a more sustainable and more efficient solution than hybrid flash and HDD systems.

Save big on storage footprint and energy costs
AFF C-Series systems are built on high-density NVMe capacity flash technology. They're a great choice for large-capacity deployments with a small storage footprint—including data lakes, backup consolidation, media and rendering, AI/ML, and analytics. With AFF C-Series systems, you can reduce up to 95% of rack space and save up to 85% of energy cost over hybrid flash storage, as shown in Figure 1. This allows you to cut down your energy consumption and improve sustainability significantly.

Key benefits

Reduce TCO and energy costs while simplifying operations.

- Save up to 95% of rack space and up to 85% of power and cooling cost over hybrid flash storage.
- Reduce cost with guaranteed storage efficiency.
- Realize even greater savings by tiering cold data to the cloud easily.

Scale capacity and performance painlessly as your data grows.

- Expand capacity with nondisruptive scaling in a cluster without silos or data migration.
- Manage data with the ultimate flexibility of unified support across different storage media and protocols, on premises or in the cloud.
- Scale performance with technology innovations of NVMe/FC and NVMe/TCP connectivity.

Keep important data secure, available, and protected.

- Safeguard your data with best-in-class data security and ransomware protection.
- Simplify backup and recovery with built-in application-consistent data protection.
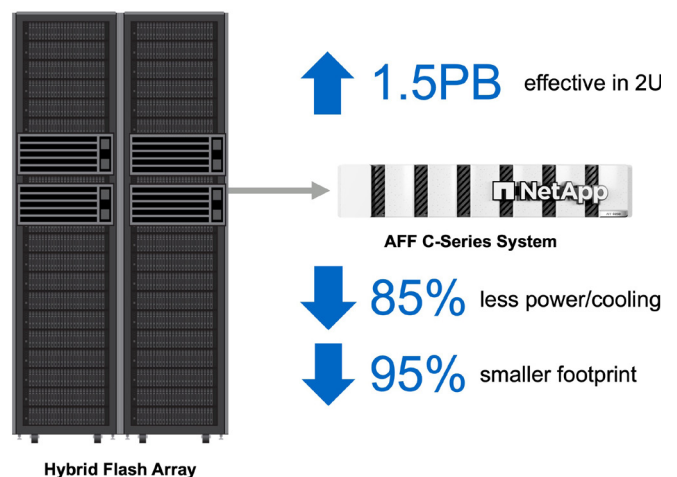- Achieve business continuity and fast disaster recovery with zero data loss and zero downtime.

Figure 1. Reduce TCO with capacity flash

Achieve industry-leading storage savings

NetApp employs various capabilities to promote optimal capacity savings and to reduce your TCO. By supporting SSDs with multistream write technology, and using advanced SSD partitioning, AFF systems provides maximum usable capacity. Thin provisioning; NetApp Snapshot™ copies; inline data reduction features, such as deduplication, compression, compaction, and NetApp's temperature-sensitive storage efficiency technology save even more space, enabling you to purchase the least amount of storage capacity possible.

Tier cold data to the cloud for greater storage and energy savings

A hybrid cloud IT infrastructure powered by NetApp technology lets you simplify and integrate data management across cloud and on-premises environments to meet business demands and gain a competitive edge. With AFF C-Series, you can maximize performance and reduce overall storage costs by automatically tiering cold data to the cloud with FabricPool, as shown in Figure 2. This allows you to reserve flash storage for more frequently used data while also consuming less energy. With NetApp's leading cloud integration, you can also connect to more clouds for more data services, such as backup, caching, and disaster recovery. Best of all, you can simply manage all your data, either on premises or in the cloud, with the NetApp BlueXP™ unified management plane.
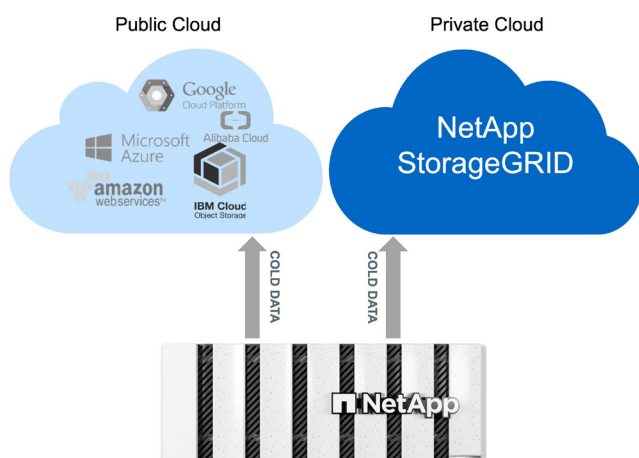

Figure 2. Automatic tiering to the cloud

Scale capacity and performance painlessly as your data grows

As digital transformation continues to fuel explosive data growth, organizations need an easy way to increase capacity and performance—and even move to the cloud as the cloud strategy evolves. With ONTAP unified data management software running on the AFF C-Series systems, you can easily scale your infrastructure without downtime or data migration, and move to the cloud in a few clicks.

Consolidate workloads and expand capacity without disruption

Built on the nondisruptive clustering scale-out architecture in ONTAP, AFF C-Series systems allow you to expand capacity with ease, eliminating storage silos and painful data migrations.

You can also:

- Consolidate workloads on AFF C-Series systems, and safeguard SLAs in multiworkload and multitenant environments with built-in adaptive quality of service (QoS).
- Manage massively scalable NAS containers of up to 20PB and 400 billion files with a single namespace.

Unify data management across storage media, protocols, and the hybrid cloud

Powered by the leading unified data management software, ONTAP, AFF C-Series systems give you the ultimate flexibility of unified support ONTAP lets you move workloads granularly among performance flash, capacity flash, and disk; across SAN, NAS, and object storage; on premises or in the cloud, with a single unified data management software tool set.

Scale performance with technology innovations of NVMe

NetApp was the first enterprise-grade storage vendor to support both NVMe/TCP and NVMe/FC with AFF A-Series systems. These innovative technologies are also available in the AFF C-Series, which enable you to scale performance with modern network connectivity. For most customers, integrating NVMe/FC and NVMe/TCP into an existing SAN is a simple, nondisruptive software upgrade. With NVMe/TCP, which uses the commonly available Ethernet infrastructure, you don't have to invest in new hardware to take advantage of the faster host connectivity. With NVMe/FC, you can get much better performance compared with traditional FC.

Keep important data secure, available, and protected

In a data-driven world, data loss can be increasingly costly—even catastrophic. IT must protect data from both internal and external threats, ensure data availability, eliminate maintenance disruptions, and quickly recover from failures. NetApp ONTAP provides leading built-in data protection, AI-ML-powered ransomware detection, and fast recovery.

Integrated data protection
AFF C-Series systems come with a full suite of acclaimed NetApp integrated and application-consistent data protection software. Key capabilities include the following:

- Native space efficiency with cloning and Snapshot copies reduces storage costs and minimizes performance impact. Up to 1,023 copies are supported.
- NetApp SnapCenter® software provides application-consistent data protection and clone management.
- NetApp SnapMirror® technology replicates to any NetApp FAS, AFF, or object storage systems on premises or in the cloud.

Industry-leading anti-ransomware security
Encryption and key management help guard your sensitive data on the premises, in the cloud, and in transit. The market-leading anti-ransomware protection for both preemption and post-attack recovery safeguards your critical data from ransomware attacks and can prevent catastrophic financial consequences. You can also protect data against threats with multifactor authentication, role-based access control, secure multitenancy, and storage-level file security.

Business continuity and fast disaster recovery
With AFF, you can maintain constant data availability with zero data loss and zero downtime. NetApp MetroCluster software provides synchronous replication to protect your entire system, and SnapMirror Business Continuity provides more flexible, cost-effective business continuity with even more granular replication of selected critical data.

Experience the capacity flash solution that redefines sustainability, scalability, and security. Enjoy flash performance for a price close to disk and in a fraction of the footprint.

Future-proof your investment

When you invest in NetApp AFF storage systems, you can future-proof your investment and eliminate the headache of tech refresh with NetApp Advance, a program that allows you to get a new controller every 3 years with support-managed update included, or move to the cloud, whichever best meets your future business needs. Make the smart choice today and stay current with technology innovations while protecting your investment.

Get more business value with services

Whether you're planning your next-generation data center, need specialized know-how for a major storage deployment, or want to optimize the operational efficiency of your existing infrastructure, NetApp Professional Services and NetApp certified partners can help.

About NetApp
In a world full of generalists, NetApp is a specialist. We're focused on one thing, helping your business get the most out of your data. NetApp brings the enterprise-grade data services you rely on into the cloud, and the simple flexibility of cloud into the data center. Our industry-leading solutions work across diverse customer environments and the world's biggest public clouds.

As a cloud-led, data-centric software company, only NetApp can help build your unique data fabric, simplify and connect your cloud, and securely deliver the right data, services and applications to the right people—anytime, anywhere. www.netapp.com

Table 1) AFF C-Series technical specifications

	AFF C800	AFF C400	AFF C250
Maximum scale-out	2–24 nodes (12 HA pairs)	2–24 nodes (12 HA pairs)	2–24 nodes (12 HA pairs)
Maximum SSDs	2,880	1,152	576
Maximum effective capacity[1]	176PB	71PB	35PB

Per-system specifications (high-availability dual controller)

	AFF C800	AFF C400	AFF C250
Controller form factor	4U with 48 SSD slots	4U	2U with 24 SSD slots
PCIe expansion slots	8	10	4
FC target ports (32Gb autoranging)	32	24	16
FC target ports (16Gb autoranging)	32	32	n/a
100GbE ports (40GbE autoranging)	20	16	4
40GbE ports (can be 4x 10GbE)	n/a	n/a	n/a
25GbE ports (10GbE autoranging)	16	16	16
10GbE ports	32	32	n/a
10Gbase-T (1GbE autoranging)	n/a	16	4
Storage networking supported	NVMe/TCP, NVMe/FC, FC, iSCSI, NFS, pNFS, CIFS/SMB, S3	NVMe/TCP, NVMe/FC, FC, iSCSI, NFS, pNFS, CIFS/SMB, S3	NVMe/TCP, NVMe/FC, FC, iSCSI, NFS, pNFS, CIFS/SMB, S3
OS version	ONTAP 9.12.1 P1 or later	ONTAP 9.12.1 P1 or later	ONTAP 9.12.1 P1 or later
Shelves and media	NS224 (2U, 24 drives, NVMe QLC SSDs)	NS224 (2U, 24 drives, NVMe QLC SSDs)	NS224 (2U, 24 drives, NVMe QLC SSDs)
Power consumption (median)	1463W	1240W (with NS224)	491W
Host/client OS supported	Windows Server 2012, Windows Server 2016, Linux, Oracle Solaris, AIX, HP-UX, macOS, VMware, ESX		

1. Effective capacity based on 5:1 storage efficiency ratios with the maximum number of SSDs installed; space savings will vary dependent on workload and use cases.

Table 2) AFF C Series software

Data access protocols	• FC, iSCSI, NVMe/FC, NVMe/TCP, FCoE, NFS, SMB, S3
High availability	• Active-active and symmetric active-active (SAN-only) host connectivity • Nondisruptive maintenance, upgrade, and scale-out clustering • Multisite resilience for continuous data access
Storage efficiency	• Inline data compression, deduplication, and compaction • Space-efficient LUN, file, and volume cloning • Automatic data tiering
Data management	• Intuitive onboard GUI, REST APIs, and automation integration • AI-informed predictive analytics and corrective action • Quality-of-service (QoS) workload control • Easy provisioning and data management from market-leading host operating systems, hypervisors, and application software
Scalable NAS	• Large-scale single namespace management with local and remote caching
Data protection	• Application-consistent Snapshot copies and restore • Integrated remote backup/disaster recovery • Synchronous zero-data-loss replication • Tamper-proof Snapshot copies
Security and compliance	• Autonomous ransomware protection • Multifactor admin access • Secure multitenant shared storage • In-flight and data-at-rest encryption • Regulatory-compliant data retention • Multi-admin verification before executing sensitive commands
Cloud integration	• Seamlessly tier, back up, replicate, and cache data to private and public clouds • Move data between major public cloud services

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