COMPETITIVE COMPARISON:

All-Flash Storage Systems

NetApp AFF vs. Pure Storage FlashArray//M

OVERVIEW

Data has become the lifeblood of companies of all sizes and across all industries. Organizations are reinventing themselves to unlock new value from existing applications as well as next-generation social, mobile, cloud, and analytics technologies. To address these demands, businesses must modernize IT infrastructure to accelerate application performance, improve data center economics, and adapt to evolving business demands with confidence.

This document compares two all-flash solutions that might be considered by companies that are modernizing their storage infrastructure to accelerate application performance: the NetApp AFF and the Pure Storage FlashArray//M.

The FlashArray//M family consists of four different models: The M10, M20, M50, and M70, each of which is an independent, non-clustered array containing a pair of storage controllers and SSD devices.

The NetApp AFF family is also made up of four models: the AFF A200, A300, A700, and A700S. Like the FlashArray, AFF storage controllers are deployed in pairs. However, unlike the FlashArray, as many as 12 AFF node pairs can be combined to deliver all-flash performance across 24 storage controllers as part of a single cluster.

Although the FlashArray and NetApp AFF share some similarities in design, many critical points of differentiation exist. This analysis examines five essential criteria to consider when evaluating flash storage products and compares how the NetApp AFF and the Pure FlashArray stand up to each.

Note that this analysis does not consider performance capabilities or storage efficiency features, such as compression and deduplication. You should conduct testing on vendor-provided systems using your own applications and datasets to validate performance and efficiency claims and guarantees. In cases where testing is not possible, we recommend that you consult published performance benchmarks from reputable, third-party organizations, such as the Storage Performance Council.

COMPARISON SUMMARY

	NetApp AFF	Pure FlashArray//M
1. Flexible Scalability	✓	◒
2. Quality of Service	✓	◒
3. Application Integration	✓	◒
4. Future-proof Architecture	✓	◒
5. Cloud Integration	✓	◒

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Five Key Differences Between NetApp and Pure Storage

FAST FACT

AFF node pairs are available at multiple price/performance points and can be mixed and matched within a single cluster configuration in many ways—old and new, big and small, all-flash, hybrid flash, and all-HDD node pairs—within the same cluster.

1. FLEXIBLE SCALABILITY

Pure FlashArray//M: FlashArray enables you to scale up and expand capacity by adding storage shelves and SSDs to a pair of storage controllers. However, the maximum capacity is limited by the constraints of each controller's addressable capacity—a maximum of 10TB to 512TB of flash capacity, depending on the model. Scaling beyond those limits requires a controller swap-out or an investment in additional controller pairs, each of which represents a capacity silo that must be managed separately.

In addition, FlashArray storage controllers are deployed in an active/passive configuration in which the active controller processes all I/O requests and the passive controller acts as a pass-through device. If the active controller experiences a failure, all I/O activity fails over to the passive controller. By design, FlashArray systems are limited to 50% utilization of the maximum processing power available in any controller pair.

NetApp AFF: AFF node pairs support active/active operation so that users can achieve over 50% controller utilization, if needed. Each AFF node pair can scale up to support a maximum of 144 to 480 SSDs, depending on the model, with a maximum physical capacity of 7.3PB for A700 systems. An AFF cluster can also scale out to support up to 88PB of all-flash capacity. AFF node pairs are available at multiple price/performance points and can be mixed and matched within a single cluster configuration in many ways—old and new, big and small, all-flash, hybrid flash, and all-HDD node pairs—within the same cluster. In addition, the AFF supports the latest in high-capacity SSDs, which at the time of writing includes 15.3TB SSDs.

Comparison: FlashArray offers basic, scale-up capacity expansion by adding storage shelves. When the performance, capacity, and host connectivity limits of a controller pair are reached, additional FlashArrays must be deployed individually and managed independently. The active/passive controller architecture of the FlashArray can also lead to inefficiencies: With each controller pair operating at half of its maximum performance potential, expensive all-flash storage resources end up underutilized.

By contrast, new AFF node pairs can be deployed as part of a cluster architecture and managed as part of a single environment. This provides tremendous flexibility to adapt to changes in workloads over time. For example, when additional processing power is needed, you can nondisruptively add an AFF node pair that is optimized for performance to a cluster. Alternatively, if you need more capacity, you can add high-capacity, all-flash, hybrid, or HDD nodes to the cluster.

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FAST FACT

The ability to combine policy-based QoS with multiple tiers of storage media (all-flash, hybrid, and HDD) within a single ONTAP® cluster enables IaaS service providers and private cloud administrators to automate storage management and increase operational efficiency.

AFF node pairs can also be used to virtualize storage arrays from a variety of vendors, enabling you to incorporate existing storage resources into a cluster rather than being forced to rip and replace valuable IT infrastructure.

2. QUALITY OF SERVICE (QOS)

Pure FlashArray//M: Pure introduced a basic QoS capability (Always On) for FlashArray in 2016. Always On is designed to automatically throttle the heaviest workloads when a controller pair "reaches performance saturation." More recently, Pure announced policy-based QoS, which consists of two separate features:

- Performance Classes enable administrators to control the order in which volumes are throttled.
- Performance Limits can be used to set a throughput limit (MB/s) on a per-volume basis.

Classes and Limits can be used together to prioritize the order in which workloads are throttled when performance demands exceed FlashArray capabilities. However, combining Classes and Limits adds complexity and is recommended for "more sophisticated users."

NetApp AFF: QoS controls have been available in AFF systems since 2013. They enable the delivery of predictable storage performance for business-critical applications in a shared infrastructure environment. By assigning not-to-exceed performance limits on a per-workload basis, resources can be proactively managed. It is also possible to set minimum performance thresholds for the most business-critical workloads. More recently, an Adaptive QoS feature has been introduced to enable user-defined QoS policies for AFF systems, such as gold, silver, and bronze. Adaptive QoS is designed to automatically maintain policy-based performance levels as workloads increase and decrease over time.

Comparison: Both AFF and FlashArray enable you to set QoS policies to provide predictable performance levels for different types of workloads, based on business needs. Perhaps the biggest difference between the two is the scope at which these policies can operate. Like other management operations, QoS for a Pure FlashArray must be set up and managed on a per-controller-pair basis. AFF QoS operates on a cluster-wide basis and can be used to manage performance across a much larger pool of resources—up to 24 all-flash storage controllers per cluster. The ability to combine policy-based QoS with multiple tiers of storage media (all-flash, hybrid, and HDD) within a single ONTAP® cluster enables IaaS service providers and private cloud administrators to automate storage management and increase operational efficiency.

3. APPLICATION INTEGRATION

Pure FlashArray//M: FlashArray offers basic integration for VMware (VASA/VAAI), Microsoft (VSS), and OpenStack environments. For more sophisticated functionality and integration with applications such as Oracle and SAP, customers must purchase third-party software from Pure Storage partners. Customers that prefer not to invest in third-party tools have the option to create and support their own custom scripts.

NetApp AFF: NetApp SnapManager® and SnapCenter® software offer a rich set of application integration features.

SnapCenter software provides simple, centralized, scalable, end-to-end data protection and an in-place copy data management solution for enterprise data, both on-premises or in a hybrid cloud. Application integration is available for Oracle, Microsoft SQL Server, SAP, MySQL, and IBM DB2 as well as OpenStack, VMware, Windows, and custom application environments.

Comparison: The FlashArray offers basic application integration for some environments and relies on third-party vendors to provide more sophisticated functionality. AFF goes well beyond this with advanced data management tools that provide visibility into your data wherever it resides—on-premises, in remote locations, or in the cloud. For example, SnapCenter software supports the creation of data protection copies on cloud-integrated appliances, cloud-connected storage, and cloud-native software targets, such as ONTAP Cloud for AWS and Azure. In addition, SnapCenter software takes full advantage of ONTAP data services to provide space-efficient and application-consistent, disk-based backups; rapid, granular restore; application-consistent recovery; and quick, space-efficient cloning.

4. FUTURE-PROOF ARCHITECTURE

Pure FlashArray//M: The FlashArray uses a traditional dual-controller, block-based architecture. Access to new capabilities, such as higher capacity flash modules, NVMe flash media, and NVMeoF connectivity, requires customers to replace FlashArray controllers and/or expansion shelves. Unlike most all-flash systems, the FlashArray is designed to use custom flash modules instead of industry-standard hardware.

NetApp AFF: NetApp AFF systems take advantage on ONTAP, the world's leading storage operating system, to provide a wide range of features enabled by software rather than hardware. For example, AFF systems can be tightly integrated with multiple cloud storage services or deployed as a software-defined storage gateway in front of third-party systems. They support unified SAN/NAS configurations (FC, iSCSI, FCoE, SMB and NFS) and offer a wide variety of integrated data protection features.

AFF systems can also be combined with hybrid and HDD-based FAS systems as part of a single, flexible storage cluster. In this manner, high performance storage nodes can be combined with high capacity nodes to support a diverse range of enterprise applications, including applications with high capacity needs (i.e., data warehousing) and those with extreme performance requirements (i.e., enterprise databases). Flexible deployment models enable a future-proof infrastructure design that can take full advantage of the NetApp Data Fabric architecture.

FAST FACT

SnapCenter software supports the creation of data protection copies on cloud-integrated appliances, cloud-connected storage, and cloud-native software targets, such as ONTAP® Cloud for AWS and Azure.

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Comparison: Limited capacity expansion and a focus on block protocols place the FlashArray in a niche with other hardware-centric, SAN-based flash solutions. While such solutions can be suitable for dedicated applications, they lack the multi-protocol support and scale-out capabilities needed for large mixed-workload deployments. The use of custom hardware for the FlashArray family will likely require significant, ongoing R&D hardware investments to keep pace with industry trends.

By comparison, the AFF software-defined approach, with multi-protocol support and flexible clustering, can support a wide array of enterprise applications, both on-premises and within hybrid cloud environments. The AFF cluster architecture enables new features to be introduced by adding new nodes while preserving your investments in previous generations of controller hardware and storage media.

5. CLOUD INTEGRATION

Pure FlashArray//M: Pure offers limited cloud integration for the FlashArray. The company recently introduced CloudSnap, which will enable full and incremental snapshot replication of Flash Array volumes to AWS cloud storage services. For integration with Microsoft Azure environments, Pure offers an open source PowerShell module. In addition, Azure ExpressRoute connections can be used to connect on-premises Pure systems with the Azure cloud.

NetApp AFF: AFF systems offer a wide range of cloud integration and data portability across multiple cloud services. For example:

- You can automatically tier data between an AFF and cloud storage services to maximize performance and reduce overall storage cost.
- You use cloud-native storage as a target for AFF backups or for disaster recovery.
- You can use the cloud for software development and then replicate your data to an on-premises AFF for production deployments.
- You can seamlessly synchronize NFS data between on-premises AFF systems and the cloud.
- You can create secure, high-speed connections between AFF systems and multiple cloud services, including AWS, Azure, Google Cloud Platform and IBM Bluemix.

Comparison: The FlashArray recently introduced basic, do-it-yourself cloud integration for a few cloud services. On the other hand, NetApp has developed close partnerships with cloud industry leaders over many years, including Amazon, Google, IBM, and Microsoft. With one of the industry's largest ecosystems of cloud partnerships, NetApp's leadership in design and implementation of Data Fabric and hybrid cloud data portability provides customers with maximum freedom and flexibility when choosing cloud partners.

FAST FACT

The AFF cluster architecture enables new features to be introduced by adding new nodes while preserving your investments in previous generations of controller hardware and storage media.

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SUMMARY

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

AFF is excellent for performance-demanding applications such as Oracle, Microsoft SQL Server, and MongoDB, and it is also a great choice for shared environments that need to support a variety of enterprise workloads running on virtual desktops, virtual servers, and containers.

Built on years of flash innovation and experience, NetApp AFF achieves high I/O at consistent 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.

Discover how NetApp Flash can meet your needs.

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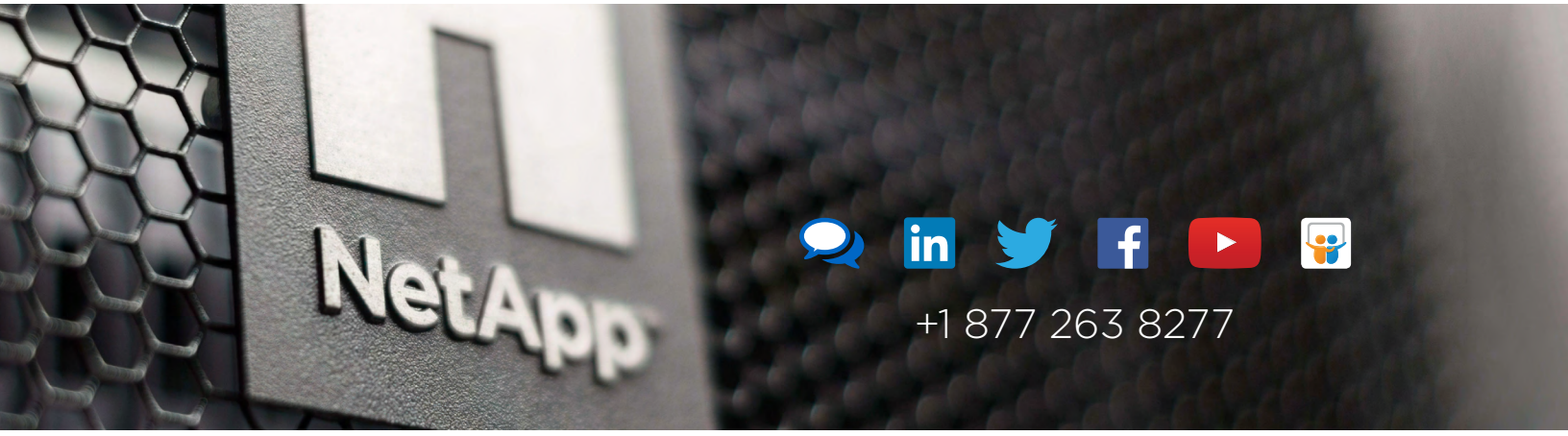

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