NetApp EF-Series all-flash arrays EF600, EF300, EF570, and EF280

Affordable to extreme performance all-flash storage systems for wide range of mixed enterprise workloads

NetApp

The challenge

Enterprises of every size are finding that they must evolve and innovate to gain competitive advantage. Performance and availability of key business applications is tightly linked to time to market, revenue, and customer satisfaction, and enterprises want solutions that improve the speed and responsiveness of these applications.

At the same time, managing data keeps getting more complex and costly—especially with limited resources, space, and power. Cost-effectiveness of operations is just as important as operating without disruptions and delivering consistent performance. Organizations also want the ability to gain value and insights from their data that will differentiate them from competitors and speed time to market.

The solution

The NetApp® EF-Series is a family of entry-level and midrange all-flash storage arrays that can accelerate access to your data and help you derive value from it faster. These systems offer both SAS and NVMe flash storage and provide you with affordable to extreme IOPS, response times under 100 microseconds, and bandwidth up to 44GBps. They're ideal for mixed workloads and demanding applications such as analytics and high-performance computing (HPC).

The EF-Series is packed with enterprise-proven capabilities, including:

- NVMe over Fabrics support, providing lowest latency and investment protection

- Fibre Channel (FC), iSCSI, and InfiniBand (IB) support for enhanced interoperability with your existing SAN infrastructure

- Redundant components with automated failover

- Advanced monitoring and diagnostics with proactive repair

- Intuitive storage management with comprehensive tuning functions

- Full-function NetApp SANtricity® Web Services embedded REST API

Key benefits

Performance

- Modular and flexible configuration options to support demanding performance and cost requirements

- Industry-leading IOPS and ultralow latency to increase application responsiveness

- NVMe delivers 2 times the performance of SAS-based all-flash arrays

- Support for multiple high-speed host interfaces in 2U form factor

Value

- Industry-leading price/performance for both IOPS and bandwidth

- NVMe-oF and SCSI options provide investment protection to meet future demands without forklift upgrades

Simplicity

- Simple, flexible, online administration

- Browser-based on-box GUI with guided configuration and recovery guru

- SQL Server setup in under 6 minutes

- Embedded REST APIs for easy integration

- Worry-free reliability with over 1 million installations

- SANtricity Snapshot™ technology, volume copy, rmirroring for data protection where supported, and Dynamic Disk Pools (DDP)

- SANtricity data assurance (T10-PI standard) for data integrity and protection against silent data corruption

Combined, these capabilities offer outstanding price/performance, configuration flexibility, and simplicity in a compact package to help you make actionable decisions faster and more securely. The EF-Series helps you protect your storage investment with systems that grow with your business.

Powerful and affordable performance

The NetApp EF600 and EF570 all-flash arrays are designed specifically for workloads that demand the highest levels of performance. The NetApp EF300 and EF280 arrays are designed for mixed workload environments such as big data analytics and databases. The NVMe all-flash arrays deliver double the performance of SAS all-flash arrays, and you can accelerate write IOPS and read/write throughput with an end-to-end NVMe system that's purpose-built for high-performance workloads.

- Achieve better performance for analytics applications such as Splunk and Hadoop, reducing time to actionable data.

- Significantly improve the overall efficiency of your IT operations while meeting performance requirements.

- Rapidly unlock the value of your data to create key insights with all-flash NVMe systems.

- Speed up databases, real-time analytics, and HPC applications at scale with any of the many enterprise file systems the EF-Series is integrated with, including BeeGFS.

Enterprise value

The EF-Series all-flash arrays offer industry-leading price/performance in an enterprise-grade system. With support for up to 367TB of flash capacity in a single modular 2U building block, the EF-Series enables you to easily meet ever-changing business requirements. The EF300 now supports expansion with SAS enclosures: Add a tier of spinning media to complement your ultralow latency NVMe SSDs. With various connectivity, infrastructure, and media options, the EF-Series offers investment protection so that you can meet future demands without forklift upgrades.

Proven simplicity

Modular design and simple management tools make it easy to configure, manage, and scale without adding management complexity.

The EF-Series runs on the enterprise-proven SANtricity OS. Optimized for flash, the SANtricity OS allows you to maximize performance through extensive configuration flexibility and custom performance tuning.

The SANtricity System Manager graphical performance tools provide key information about storage I/O from multiple viewpoints, allowing administrators to make informed decisions about configuration adjustments to further refine performance. For more performance analysis, solutions for Splunk Enterprise and Grafana are available.

High availability and enterprise reliability

The EF-Series was engineered from the start to support applications that are at the heart of a corporation's business. Built to provide enterprise reliability in both the architecture and the software design, the EF-Series leverages expertise based on more than 20 years of development experience and more than 1 million implemented systems. Fully redundant I/O paths, advanced data protection features, and extensive diagnostic capabilities allow EF-Series to achieve greater than 99.9999% availability with data integrity and security.

"By having the flash platform available, we're able to facilitate these critical enterprise apps that are high I/O and generate market insight. Then we can give that information back to the business so they can make informed decisions."

– Nick Vine, Hosting and Security Manager, Mirvac

Secure data, secure management

NetApp SANtricity drive encryption combines key management with drive-level encryption for comprehensive security for data at rest with no impact to performance. Because all drives eventually leave the data center through redeployment, retirement, or service, it's reassuring to know that your sensitive data isn't leaving with them. You can choose to manage the drive authentication keys natively for a simple lowest-cost solution or use a KMIP-compliant external key manager for centralized administration. Management access to the EF-Series is protected with role-based access control (RBAC) and LDAP/Active Directory integration.

Advanced data protection

SANtricity DDP technology enables storage administrators to simplify RAID management, improve data protection, and maintain predictable performance under every condition. DDP technology evenly distributes data, protection information, and spare capacity across the drives, simplifying setup and maximizing use. This innovative technology minimizes the performance impact of a drive failure and can return the system to optimal condition up to 8 times faster than traditional RAID. With shorter rebuild times and exclusive technology to prioritize critical reconstruction, DDP significantly reduces exposure to multiple failures, offering a level of data protection that simply can't be achieved with traditional RAID.

With the SANtricity OS, all management tasks can be performed while the storage remains online with complete read/write data access. Storage administrators can make configuration changes, conduct maintenance, and expand storage capacity without disrupting I/O to attached hosts.

SANtricity OS online capabilities include:

- Dynamic capacity and volume expansion allow administrators to increase the capacity of an existing pool, volume group, or volume.

- Dynamic segment size migration allows administrators to change the segment size of a given volume.

- Dynamic RAID-level migration changes the RAID level of a RAID group on the existing drives without requiring the relocation of data. Supported RAID levels are 0, 1, 5, 6, and 10.

- All software/firmware updates (controller, drive) are nondisruptive, with no interruption to data access.

- You can perform online import of remote volumes over iSCSI by using the SANtricity remote storage feature.

DevOps ready

To enable the automation and agility needed by DevOps-minded teams, robust support for Ansible is available. EF-Series Ansible collections simplify and streamline adoption by supporting all storage provisioning tasks, including setting up attached host servers. For advanced use cases, all functions available on an EF-Series array are also exposed as embedded REST APIs through SANtricity Web Services. Eliminate risk and accelerate your business with DevOps-ready storage that can be managed as code.

Validated solution reference designs

With tested solution designs for enterprise databases, HPC with BeeGFS, and real-time analytics using Splunk, you can be confident that your critical business applications built on EF-Series systems will continue to work flawlessly. You can focus on growing your business instead of worrying about your data infrastructure.

ASHRAE compliance

All EF-Series systems meet the certification requirements of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, a global society that advances human well-being through sustainable technology for the built environment. All EF Series models are ASHRAE A4 compliant.

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.

Table 1) EF-Series technical specifications.

	NVMe Flash		SAS Flash	
	EF600	EF300	EF570	EF280
Maximum raw capacity in base controller enclosure	367TB (NVMe)	367TB (NVMe)	1.8PB (SAS)	1.5PB (SAS)
Maximum drives in base controller enclosure[1]	24 SSD	24 SSD	24 SSD	24 SSD
Maximum IOPS[2]	2,000,000 IOPS	670,000 IOPS	1,000,000 IOPS	300,000 IOPS
Maximum read bandwidth[2]	44GBps	20GBps	21GBps	10GBps
Maximum write bandwidth[2]	13GBps	7GBps	9GBps	4GBps
I/O interface options	200Gb NVMe/IB, NVMe/RoCE 200Gb iSER/IB 100Gb NVMe/IB, NVMe/RoCE 100Gb iSER/IB, SRP/IB 32 Gb NVMe/FC 32Gb FC 25Gb iSCSI	100Gb NVMe/IB, NVMe/RoCE 100Gb iSER/IB, SRP/IB 32 Gb NVMe/FC 32Gb FC 25Gb iSCSI	100Gb NVMe/IB, NVMe/RoCE 100Gb iSER/IB, SRP/IB 32Gb/16Gb FC 25Gb/10Gb iSCSI 12Gb SAS	32Gb/16Gb FC 12Gb SAS 25Gb/10Gb iSCSI
Expansion options	n/a	Up to 240 NL-SAS HDDs[3] or Up to 96 SAS SSDs	Up to 96 SAS SSDs	Up to 72 SAS SSDs
Maximum possible raw capacity with expansion	n/a	4.7PB or 1.8PB all-SSD	1.8PB	1.5PB

Table 2) EF-Series software.

Features	Descriptions
High-availability features	Dual active controller with automated I/O path failover Automatic Load Balancing and path connectivity monitoring DDP technology and traditional RAID levels Redundant, hot-swappable storage controllers, disks, power supply units (PSUs), fans Automatic rebuild after a drive failure Mirrored data cache with battery-backed destaging to flash Proactive drive health monitoring Online upgrades and maintenance for software and firmware Online configuration, expansion, contraction, and tuning Data assurance (T10 PI ANSI standard for data integrity) NetApp Active IQ Six-nines availability (with appropriate configuration and service plans)
Security features	RBAC with audit log LDAP/LDAPS for user authentication Digital certificate management Multifactor authentication (MFA) supported through SAML 2.0 Internal key management supported with self-encrypting drive (SED) or FIPS drives External key management (KMIP-compliant) supported with SED or FIPS drives Transport Layer Security (TLS) 1.2 minimum for all management communication
Optional features	SANtricity drive security data at rest encryption[4]

	EF600 and EF300	EF570 and EF280
Included software features	SANtricity volume copy SANtricity Snapshot® copy Remote storage online volume import (iSCSI) Dynamic Disk Pools technology and traditional RAID levels 0, 1, 5, 6, and 10 On-box SANtricity System Manager On-box SANtricity Web Services API SANtricity Unified Manager for enterprise management Smart NVMe SSD performance and endurance management	SANtricity volume copy SANtricity Snapshot® copy Remote storage online volume import (iSCSI) Dynamic Disk Pools technology and traditional RAID levels 0, 1, 5, 6, and 10 On-box SANtricity System Manager On-box SANtricity Web Services API SANtricity Unified Manager for enterprise management Asynchronous mirroring (FC and iSCSI) Synchronous mirroring (FC)

1. The base system can be configured with a minimum of 6 SSDs. See the expansion options later in this table.
2. Peak system performance.
3. Combination of NL-SAS and SSDs not to exceed 240 drives total.
4. Hardware and software for at-rest data encryption are not available in certain countries, including Russia, Belarus, Kazakhstan, and other Eurasian Customs Union countries.

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