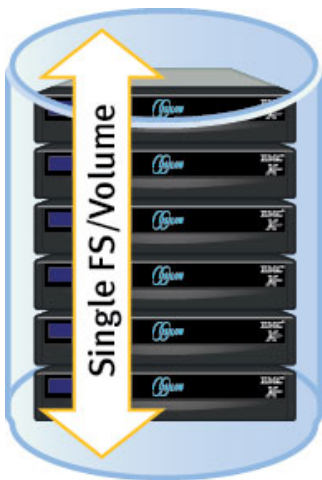


EMC ISILON ONEFS OPERATING SYSTEM

Powering scale-out storage for the Big Data workloads of today and tomorrow

ESSENTIALS

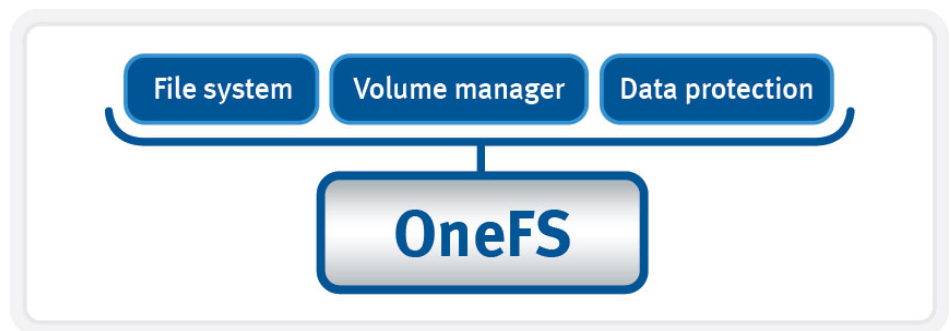
- Easy-to-use, single volume, single file system architecture
- Highly scalable with grow-as-you-go flexibility
- Unmatched efficiency
- Multiprotocol support to maximize operational flexibility
- World's fastest-performing NAS platform
- Enterprise data protection and resiliency for your valuable data
- Robust security and data encryption options



OneFS operating environment

EMC ISILON ONEFS

The EMC® Isilon® OneFS® operating system provides the intelligence behind all Isilon scale-out storage systems. It combines the three layers of traditional storage architectures—file system, volume manager, and data protection—into one unified software layer, creating a single intelligent file system that spans all nodes within a cluster.



The OneFS operating system powers Isilon scale-out storage solutions and provides a massively scalable, high-performance, modular storage architecture that can grow easily with your business. With built-in interoperability, OneFS can help you accelerate a wide range of processes and workflows, while providing the highest levels of data protection available.

EASE OF USE FOR STREAMLINED MANAGEMENT

OneFS has been designed to simplify administration activities and maintain this simplicity as you scale your Isilon storage system. OneFS is a single file system, single volume architecture, which makes it extremely easy to manage, regardless of the number of nodes in your Isilon storage cluster. Isilon storage systems powered by OneFS are simple to install, manage, and scale to virtually any size.

MASSIVE SCALABILITY FOR GROWING BIG DATA ENVIRONMENTS

In contrast to stand-alone storage systems that must “scale up” when additional performance or capacity is needed, OneFS enables an Isilon storage system to “scale out,” seamlessly increasing the existing file system or volume into petabytes of capacity. With OneFS, Isilon storage systems can scale from as little as 18 TB to over 20 PB in a single file system. OneFS allows a storage system to grow symmetrically or independently as more space or processing power is required—providing a grow-as-you-go approach and the ability to scale out as your business needs dictate.

DATA SHEET

Increasing the storage capacity and performance capabilities of an Isilon cluster can be done quickly and easily. Nodes can be added to the file system and be ready to use in minutes—versus a traditional file system, which can take hours to install, configure, and provision. With OneFS, you can quickly and easily add nodes without downtime or manual data migration, thereby saving precious IT resources. OneFS 7.1.1 also enables non-disruptive disk firmware upgrades.

UNMATCHED EFFICIENCY AND COST-SAVINGS

OneFS utilizes an Isilon AutoBalance™ function to automatically reallocate and rebalance data and make storage space more usable and efficient. AutoBalance eliminates on-disk hot spots automatically and enables Isilon storage systems to provide over 80 percent utilization with a single pool of shared storage. To further increase storage efficiency, Isilon SmartDedupe™ offers a data deduplication option, reducing storage requirements by up to 35 percent in environments with redundant data across multiple sources. This industry-leading storage efficiency, combined with the simple and easy-to-manage OneFS operating system, helps you to reduce capital expenditures as well as ongoing operating costs.

With OneFS and EMC Isilon SmartPools® software, you can further optimize your Isilon network-attached storage (NAS) for performance and economy using automated storage tiering and a policy-based approach to automatically move inactive data to more cost-effective storage. This streamlines workflows for your most current data, while remaining completely transparent to users and applications.

SIMPLE AND FLEXIBLE INTEROPERABILITY FOR BUSINESS AGILITY

OneFS provides integrated support for a wide range of industry-standard protocols, including network file system (NFS), Server Message Block (SMB), Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), REST-based Object access for your cloud initiatives and Hadoop Distributed File System (HDFS) for fast and efficient in-place analytics. This allows you to greatly simplify and consolidate workflows, increase flexibility, and get more value from your enterprise applications. With OneFS, you can streamline your storage infrastructure by consolidating large-scale file and unstructured data assets, as well as eliminate silos of storage. With this scale-out data lake approach, you can efficiently store and manage data that supports a wide range of applications for both traditional workloads as well as emerging workloads like mobile computing, cloud applications and Hadoop analytics.

OneFS, the first and only scale-out NAS platform to provide native HDFS support, helps you address your Big Data storage and business analytics needs. This means that with Isilon storage, you can readily use your Hadoop data with other enterprise applications and workloads, while eliminating the need to manually move data around or manage a dedicated infrastructure that is not integrated with or connected to any other applications, as you would need to do with a direct-attached storage approach. This integration simplifies your business analytics initiatives and helps you leverage results faster.

To provide a highly efficient, scale-out storage platform that supports your virtualized server infrastructure environment, OneFS integrates easily with VMware® vSphere®. OneFS incorporates vStorage® APIs for Array Integration (VAAI), which allows you to offload specific storage operations to supported disk arrays and thereby achieve unparalleled performance and efficiencies. OneFS also incorporates VMware vStorage APIs for Storage Awareness (VASA), a new set of APIs that enables vCenter® to view the capabilities of your storage systems and data stores without having to rely upon a separate storage management console. This integration with VMware is designed to help you simplify the management of storage in your large-scale virtualized

infrastructure environment.

To provide a robust control interface for your Isilon storage systems, OneFS incorporates a platform API that directly interfaces with the Isilon file system and allows you to gain an even more robust control interface to the Isilon cluster. The Isilon platform API is a REST-based HTTP interface for automation, orchestration, and provisioning of an Isilon cluster. With the platform API, third-party applications can be used to control the administrative capabilities within OneFS, thereby further simplifying management, data protection, and provisioning.

These levels of interoperability are designed to help you leverage your large data assets more flexibly with a broad range of applications and workloads, as well as across a diverse IT infrastructure environment.

OneFS 7.1.1 allows you to gain additional operational flexibility with support for Microsoft Management Console (MMC). MMC integration allows for Windows administrators to use familiar tools to flexibly manage the creation of shares on Isilon. The typical operations that can be performed include creating and deleting shared folders, and configuring access permissions to a shared folder. You can also view a list of active SMB connections and close any open SMB session.

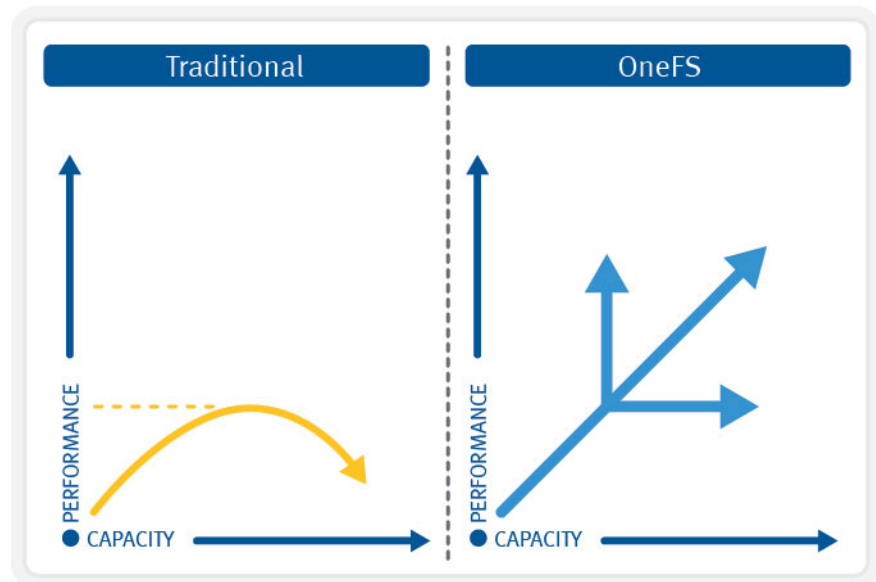
REACH NEW LEVELS OF PERFORMANCE

To support your most demanding applications and workloads, Isilon solutions powered by OneFS, delivers up to 2.6 million file IOPS and 200 GB/s concurrent throughput per cluster. This allows data to be ingested and delivered very quickly to high-performance applications and servers.

A large-scale storage system must provide the performance required for a variety of workflows, whether they be sequential, concurrent, or random. Different workflows will exist between applications and within individual applications. OneFS provides for all of these needs simultaneously with intelligent software. Another important advantage of Isilon scale-out storage is that throughput and I/O per second scale linearly with the number of nodes present in a single system. This means that as your Isilon storage environment grows, performance increases linearly, unlike traditional systems.

To drive increased performance for workloads that have a lot of random read I/O, OneFS 7.1.1 enables a scale-out flash tier that can be expanded to over 700 TB of SSD-based storage in a single cluster. Because the scale-out flash tier is self-configuring and self-optimizing, it is extremely easy to set up and requires little or no administrative overhead.

With OneFS 7.1.1, Isilon is the first scale-out NAS platform to support SMB 3.0 Multi-Channel which allows a suitably configured Windows 8 or Windows Server 2012 or later client to connect to an Isilon cluster and take advantage of the enhanced performance and reliability capabilities.



Scale capacity and performance linearly with OneFS

DATA PROTECTION FOR RESILIENCY AND HIGH AVAILABILITY

OneFS includes a core technology, EMC Isilon FlexProtect[®], which utilizes Reed-Solomon encoding to provide redundancy and data availability. FlexProtect provides protection for up to four simultaneous failures of either full nodes or individual drives. This goes far beyond the maximum level of RAID commonly in use today, which is the double-failure protection of RAID 6.

Because the FlexProtect feature in OneFS is file aware, it also provides file-specific protection capabilities. An individual file or directory can be given a specific protection level, and different portions of the file system can be protected at levels aligned to the importance of the data or workflow. Critical data can be protected at a higher level, whereas less critical data can be protected at a lower level. This provides storage administrators with a very granular protection/capacity trade-off that can be adjusted dynamically as a cluster scales and a workflow ages.

OneFS incorporates several strategies for data protection, including snapshots for backup and recovery, and data replication for disaster recovery protection.

OneFS snapshots are highly scalable and typically take less than one second to create. They create little performance overhead, regardless of the level of activity of the file system, the size of the file system, or the size of the directory being copied. Also, only a file's changed blocks are stored when updating the snapshots, which helps ensure highly efficient snapshot storage utilization.

OneFS, combined with EMC Isilon SnapshotIQ[™] software, can be used to create up to 1,024 snapshots per directory, thereby offering significantly improved recovery-point objective (RPO) timeframes. OneFS also provides near-immediate restoration of snapshot data backups to recover data quickly. With OneFS, snapshot restores are fast, efficient, and simple.

For your disaster recovery protection, OneFS and EMC Isilon SyncIQ[®] software combine to deliver high-performance asynchronous replication of data that addresses a broad range of RPOs and recovery time objectives (RTOs). This solution is easily optimized for either LAN or WAN connectivity to replicate over short or long distances, thereby providing protection from both site-specific and regional disasters.

To reduce replication times between clusters and increase efficiency, OneFS 7.1.1 combines with SyncIQ to enable file splitting that allows large files to be partitioned across multiple threads and replicated in parallel. File sub-ranges can be divided and

split across multiple threads resulting in shorter replication cycles.

OneFS further simplifies and accelerates disaster recovery and business continuity at scale with integrated and push-button simple failover and failback. With faster, easier failover and failback capabilities, most workflows will produce dramatic improvements in sync times. The same workflow will also be able to perform multiple syncs in the same time for “fresher” target data.

Each of these enhanced data protection capabilities will help you reduce both the RPO and RTO of mission-critical applications.

ROBUST SECURITY OPTIONS

To help you meet your corporate governance and compliance requirements, OneFS includes robust security options that offer unprecedented levels of scale-out NAS security.

OneFS and EMC Isilon SmartLock[®] software combine to provide write once, read many (WORM) data protection, which prevents the accidental, premature, or malicious alteration or deletion of your critical data. With OneFS, we also help you meet regulatory and governance needs—including stringent SEC Rule 17a-4 requirements—by providing tamper-proof data retention and protection of your business-critical data.

Isilon also includes a file system audit capability to improve security and control of your storage infrastructure and address important regulatory and compliance requirements. With this audit capability, you will be able to determine which users are accessing specific files, and control and manage file access permissions more effectively. File System audit events can also be forwarded to syslog for filtering and analysis.

To further enhance security, OneFS incorporates roles-based administration control (RBAC) capabilities, which you can use to establish a secure role separation between storage administration and file system access, thereby preventing malicious or accidental changes to your data. With these capabilities, a web UI allows you to controls the creation, delegation, setting, and changing the roles and providing simplicity of operations. Administrators may also use this to determine permissions on a specific file or directory and provide enhanced troubleshooting capability.

OneFS also enables you to create authentication zones that provide secure, isolated storage pools for specific departments within your organization. This also allows you to consolidate storage resources for increased operational efficiency without compromising organizational security. With OneFS 7.1.1, access zones provide support for an HDFS namespace for each access zone. This means you can run multiple separate HDFS namespaces in the same cluster.

OneFS enables the use of Data-at-Rest Encryption (DARE) with industry-standard self-encrypting drives (SEDs) in Isilon nodes. DARE protects against drive theft or loss by keeping data encrypted on drives. OneFS enables data to be securely erased before drives are repurposed or retired by shredding encryption keys.

Cryptographic erasure to wipe data can be done in a matter of seconds. DARE also helps you address important data security regulatory requirements, including the Federal Information Security Management Act (FISMA).

HIGHLY VERSATILE STORAGE PLATFORM

OneFS is ideally suited for file-based and unstructured Big Data applications in enterprise environments—including large-scale home directories, file shares, archives, and business analytics—as well as a wide range of data-intensive, high-performance computing environments such as energy exploration, financial services, Internet and hosting services, engineering, manufacturing, media and entertainment, bioinformatics, and scientific research.

Isilon scale-out NAS, powered by OneFS, is the ideal storage platform to help you address the challenges and opportunities of Big Data in your enterprise.

CONTACT US

To learn more about how EMC Isilon products, services, and solutions can help solve your business and IT challenges, [contact](#) your local representative or authorized reseller—or visit us at www.EMC.com/Isilon.

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