Quantum®

STORNEXT FILE SYSTEM

FEATURES & BENEFITS

Connectivity Options
Client can connect via FC, iSCSI, iSER/RDMA, and IB.

Scalable Performance
Parallel access across macOS, Windows, and Linux.

High Storage Services Performance
Up to 23 GB per second on a single stream, sub-millisecond latency across 2,500 parallel streams, supports 6,500 concurrent streams.

Flexible Software-Defined Architecture
Deployment options align with application workflow requirements. Adjust performance tier per working data set.

Automate Data Lifecycle Management
Fluid movement of data from high-performance tiers to nearline tier ensuring data security, integrity, and accessibility throughout its lifecycle.

**Ecosystem Integration and Support with Open APIs**
StorNext is a POSIX-compliant file system with a standard set of APIs and a broad ecosystem of integrated and certified applications.

Increase productivity and reduce time to critical business insights with StorNext® File System. StorNext architecture delivers the necessary performance to get your business moving forward.

First, there was a monolithic storage system that addressed the majority of applications' needs for storage performance and capacity. Then came virtualization with demands for storage diversification. Today, organizations are seeking solutions that address their specific IT challenges and enable them to drive a competitive advantage. StorNext File System is a software platform architected to manage unstructured data through its lifecycle, delivering the required balance of high performance, scalability, data protection and preservation, and cost.

Other systems may deliver throughput performance, but not across thousands of parallel streams at sub-millisecond latency. Other systems can deliver capacity, but not the ability to dynamically move data to the media with the most appropriate mix of performance and cost. Other systems offer long-term retention in lower-cost storage, but not the ability to automate data movement and ensure integrity, resiliency, and accessibility on premise or in the cloud.

BROADEST RANGE OF CONNECTIVITY OPTIONS
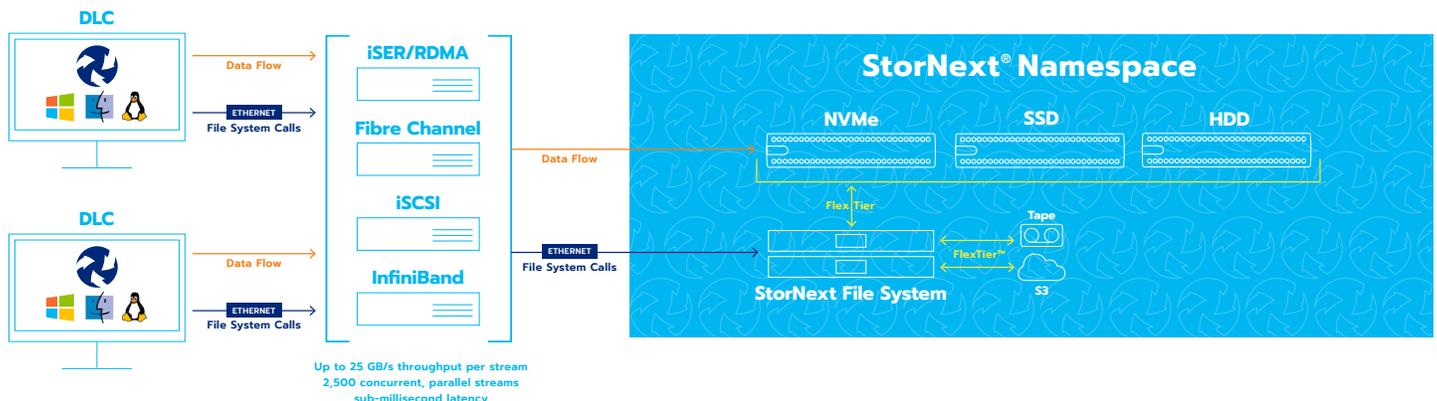
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STORNEXT SOLUTION

StorNext delivers full data lifecycle management from data creation to the end. As data moves across storage media, from NVMe or SSD to HDD, tape, or cloud, StorNext provides continuous access. For performance-sensitive applications, StorNext leverages iSER/RDMA or IB direct to storage connections for up to 23 GB/s single stream throughput. The storage media can be NVMe or SSD Flash for sub-millisecond latency. Thousands of parallel streams are supported to maximize data ingest and streaming. Once data no longer has performance demands, it is automatically, per policy, placed on lower-cost storage.

If data requires preservation over time, it can be copied or moved to Quantum LTO supported tape libraries, ActiveScale™ object store on premise, or S3 in the public cloud. Data placed in object storage or S3 in the cloud is self-describing with vast benefits: leverage applications in analytics directly against data in the cloud, facilitate collaboration across departments or organizations, and protect data assets from infrastructure obsolescence or vendor lock-in.

TOP FILE SYSTEM USE CASES

High-Performance Computing
- High data volume ingests
- Latency-sensitive workflows

Data Streaming
- Parallel streaming to multiple clients

Artificial Intelligence
- Large data sets to train AI

Data Analytics
- Stream data through AI algorithms to derive results or action

INDUSTRY-LEADING FEATURES

Clients and Connectivity	
StorNext Client	Allows users and applications to connect over Ethernet, Fibre Channel, or InfiniBand (IB) networks where the lowest latencies and highest performance access is required. Supports macOS, Windows, and Linux.
Client Connections	Leverages FC, iSCSI, iSER/RDMA, and IB to deliver the right level of performance and value.
Data Services	
FlexTier™	Move and copy files and folders between primary and secondary storage, all within a single namespace.
FlexSync™	A simple high-performance tool for creating local or remote replicas.
File System Pools	Create primary volumes with multiple classes of media for optimized performance at no additional cost.
Client Access Control	Secure access to data by locking which machines may access a file, directory, or file system.
QoS	Control bandwidth allocation to clients based on needs and priorities.
Quotas	Report on and control file system capacity allocation by user, group, and project.
Software Management	
Web GUI	Simple management of your StorNext File System environment and devices.
Cloud Analytics	Monitor system health anytime, anywhere from a secure cloud-based portal.
Web API and CLI	Modern, secure programming interface for connecting applications to StorNext; automate commonly performed tasks with a rich set of CLI commands.
Administration Roles	Granular control and delegation of administrative functionality.
Access Controls	Active Directory, LDAP, and Apple Open Directory supported.
Self-Describing Objects	Store data in S3, on premise or cloud, with separate metadata and data paths, enabling data access independent of StorNext.
File System	
Storage Allocation	Patented, intelligent storage allocation techniques to determine where to place files on storage.
Metadata Management	StorNext's unique approach to metadata management helps to maximize performance and provides for advanced data management capabilities.
Scalable Namespace	StorNext supports up to 6 billion files.

CONCLUSION

If you are experiencing storage service delays, if your applications are lagging due to lack of performance, if you are struggling to keep up with processing and storing unstructured data, the StorNext File System platform can make a difference. StorNext's unique combination of high performance, scalability, and comprehensive lifecycle management capabilities meets the requirements of the most demanding workloads.

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INGESTING, PROTECTING, AND PRESERVING DATA

StorNext File System Delivers End-to-End Lifecycle Management for Unstructured Data

Consider the lifecycle of data: On your vacation, you take a picture and share it with others to show them how great your vacation was. You may choose to create a postcard from the picture for the holidays or make it into a thank you card. After a while, you are not looking at the picture as much, but it is still valuable and irreplaceable. You might print it or put it into a cloud archive and retain it for a long time. The same happens with data created across industries.

1. **Ingest** - At the time of data creation it must be ingested into an environment that can accommodate key operations, such as analysis, manipulation, rendering, synthesis, and streaming. This step requires predictable performance and ease of access.

2. **Protect** - Once data has been ingested, it must be protected against unintended events, such as deletion, infrastructure failure, disasters, ransomware, and corruption. To ensure protection, an offline copy of the data must be created.

3. **Preserve** - Unique instances of data retained for long periods of time require integrity assurances. It is important to be certain that data created today is accessible five, ten, twenty, fifty years later. Preserving data over time requires periodic health checks, resiliency of underlying infrastructure, and standards-based access to data.

StorNext®

FEATURED BENEFITS

- **High Performance When Needed**
  Delivers highly parallel access to data at low latency for the most demanding application workloads.

- **Automate Data Placement**
  Move data to the most appropriate storage tier for optimized efficiency of performance and capacity.

- **Protect Data**
  Ensure data availability whether it is active or static. Protect against data corruption or unintended deletion by creating a secondary, independent copy.

- **Preserve Data over Its Lifecycle**
  Deliver data integrity assurance, redundancy against ransomware and site failures while leveraging most cost-effective infrastructure.

HIGH-SPEED, LOW-LATENCY DATA INGEST

StorNext File System delivers high throughput at low latency. Whether it is data streaming from sensors collecting information about atmosphere or the flow of traffic at a given intersection; data created by microscopes, telescopes, or cameras; or data generated by financial application, AI, or multi-dimensional models, the key is that data is delivered at low latency, high throughput, and in parallel streams. Performance can scale independent of capacity, where capacity of the overall system consists of fast tier cache and lower-cost tiering of storage without affecting file accessibility or visibility.
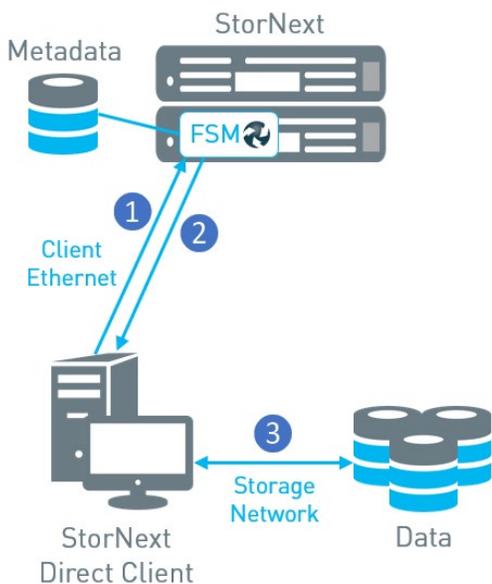
No.	Steps During Read	Steps During Write
1	Where's the data for file ABC?	Where can I write?
2	FSM: Block XX to YY	FSM: Block AA to BB
3	Read data direct from storage	Write data direct to storage

StorNext Clients communicate directly with storage for maximum performance.
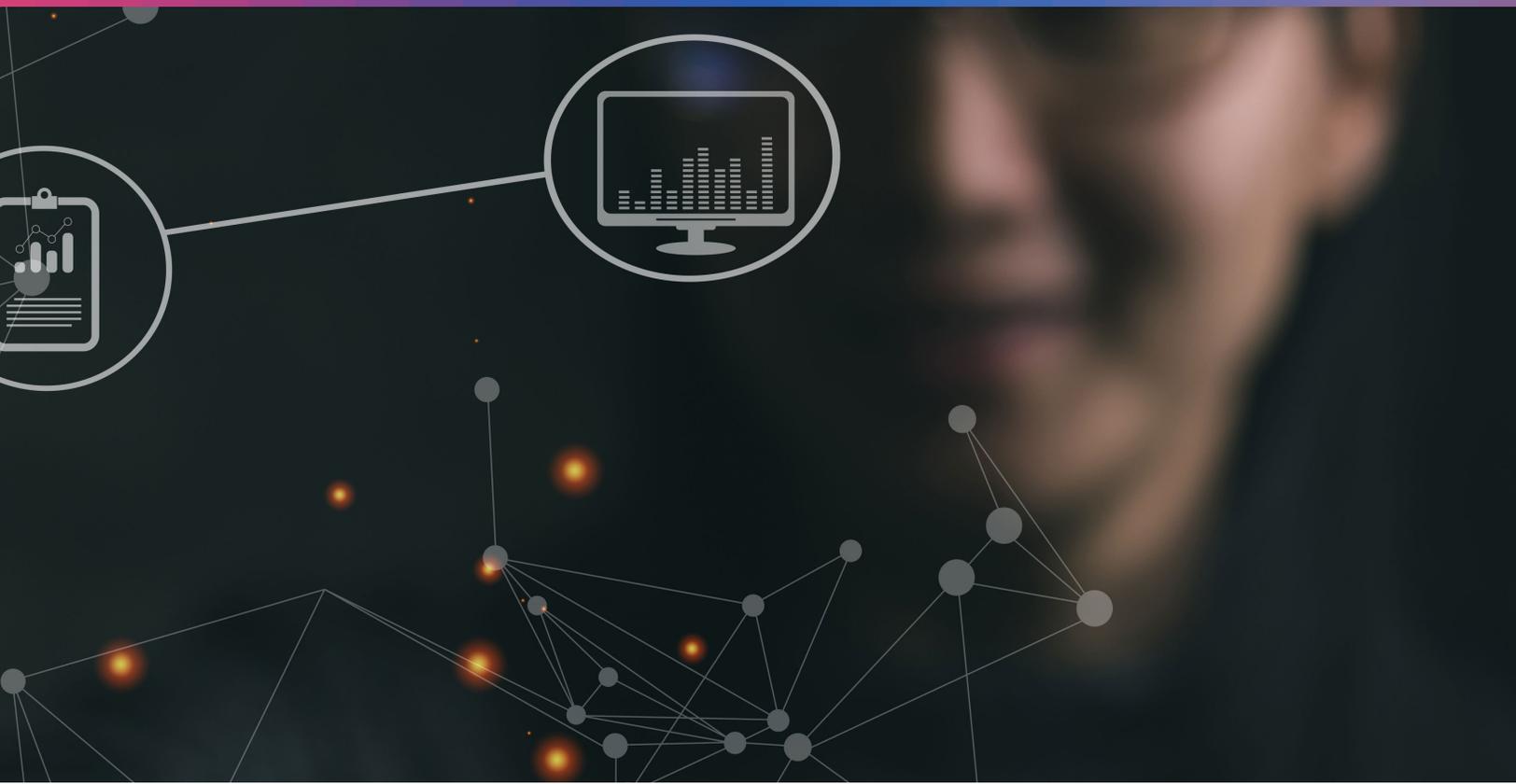
PROTECT VALUABLE FILE ASSETS WITHOUT AFFECTING PERFORMANCE

StorNext FlexSync™ software tracks the files that have been modified and copies the changes to a separate file system for protection. If something happens to the primary copy of data, applications and users can access data from a secondary location. The system can be configured with how many FlexSync versions are kept over a defined period of time based on business RPO and RTO requirements. If a file is deleted or corrupted, an administrator or end user may go into the backup copy and roll it back to a point in time before the deletion or corruption occurred.
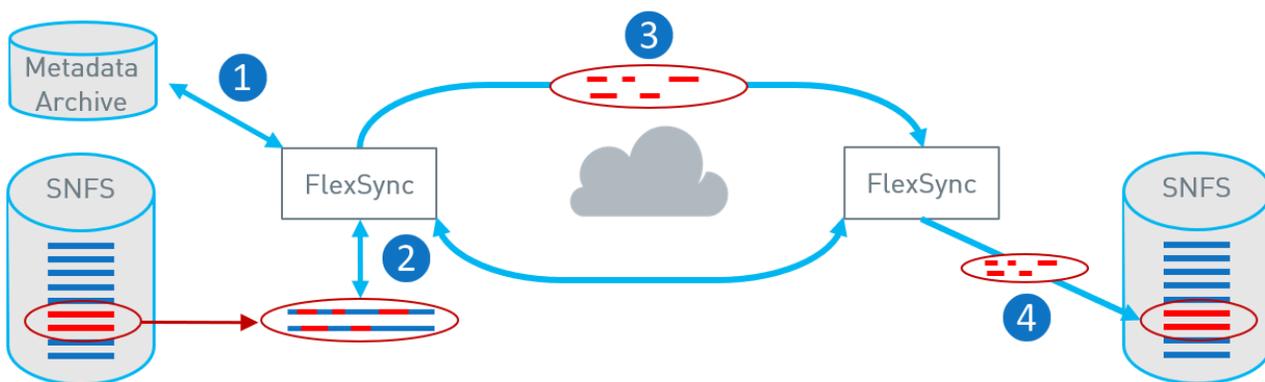
No.	Action
1	Query Metadata Archive for new or changed files on source
2	Compare block checksums, identify new or changed blocks
3	Send new and changed blocks only to target
4	Changes merged into target StorNext File System (SNFS)

FlexSync Delta Block Compression only replicates changed blocks for maximum efficiency.

PRESERVING DATA OVER ITS LIFECYCLE

Data is one of the greatest assets any organization has. At scale, it is challenging for organizations to ensure that these valuable assets are preserved and can be retrieved in a timely manner when necessary. StorNext platform leverages preservation features in its active archive solutions to ensure that data remains valid over time. These features are:

• **Immutability** – In many industries it is critical to know that the data put into an archive is the same data that will be read out years later. Immutability prevents any changes to be applied to the file. The duration of immutability may be set ahead of time and will terminate only when the policy sates it is ok to do so.

• **Data Integrity Checks** – Data stored on any media (disk or tape) may experience silent bit corruption or demagnetization over time. It is important to check on the health of the data over time and be able to correct any errors found.

• **"Set it and forget it"** – Archives must be accessible over long periods of time; they must have the agility to respond to the changes in the market, whether it is the introduction of new media, protocols, or system architectures. The environment must be easy to scale and adaptable. Once it is deployed, no forklift migrations or no complex format conversions.

• **Secure data** – Ransomware has been causing much anxiety in the market; attackers are taking over key data assets and holding them ransom. Ability to protect data through isolation, airgap, and immutability ensures that protection.

• **Disaster Protection** – Things happen, and it is critical the risk of data loss is as close to zero as possible. This requires protection against drive failure, chassis (components) failure, or site failure. Erasure encoding across media (tape and disk) with geographic dispersion allows for the business to set an acceptable risk threshold and deploy the system to reflect it.

StorNext leverages advanced features and architectures of its ecosystem, consisting of Scalar® tape libraries and ActiveScale™ storage to deliver long-term preservation of organizations' most valuable data assets.

SUMMARY

All data has a lifecycle; organizations have struggled with managing their data's lifecycle due to lack of standards, need to move large data sets, cost associated with managing storage systems, ensuring data protection and viability, and maintaining access to data over time. Quantum has integrated its unique products into a comprehensive platform for data lifecycle management. It starts with StorNext File System that offers high throughput at low latency for large data sets. It enables multi-stream ingest and high performance access for data for analytics. Data is always protected using FlexSync software providing administrators and application owners peace of mind. Once data becomes less active, it can be preserved in its active archive tier that offers data integrity, immutability, Ransomware protection, disaster risk mitigation, ease of use and long-term accessibility to data. The end-to-end solution is uniquely positioned to provide value to any organization struggling under the weight of data.

FOR MORE INFORMATION

For more information, visit: **www.quantum.com/stornext**

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