QSAN Storage Manager

XEVO

Enterprise Data Management for Block Storage

Key Benefits

Care

- Try to imagine that you will never forget to replace your SSDs before they fail again
- QSLife, QSAN's native disk drive technology, uses a unique algorithm designated to analyze SSD activity to help you keep an eye on disk drive health and information
- Thus, it will alert you at any awareness point after setting up the threshold

Trust

- You can monitor your storage with notebooks, tablets or mobile devices by using XEVO operating system
- Under the support of QSAN XEVO's analysis system, a one-year performance and capacity analysis can be generated for you
- You can choose to receive the report immediately or subscribe to reports on a recurring basis
- This allows IT generalists who use our solution to analyze storage usage more swiftly and with more ease

Fluency

- XEVO frees you from the complicated process of deploying your storage
- Power it on and enjoy the convenience and ability to focus on your business without having to pay attention to storage setup with just a few clicks

Overview

XEVO is a flash-based storage management system designed by QSAN. XEVO's core technology provides the excellence, flexibility, and intelligence needed to simplify all content for a hybrid storage system. Using XEVO, the system can be deployed in five minutes and provide an intuitive user interface for real-time resource monitoring and management.

Evolution without Limits

XEVO's features set the foundation for the next generation of hybrid storage for all workloads of enterprise data services to prove XEVO's availability and optimization. The spirit of XEVO's design is to simplify the operation process so that the user may have more time to focus on business matters and leave the complexity to us.

- Monitor and analyze disk drives
- Analysis the status of business usage
- Integrated reporting at a glance
- More workload balancing

Agile and Always Simple

Imagine that you have to establish numerous storage environments all at a time. In the past, storage systems had to process operations several times back and forth to meet our goals. With XEVO, you can save your time building storage environments by utilizing automatic functions which enable the deployment of multiple volumes in just one step.

- Easy deployment in 5 minutes
- Auto load balance
- Improve drive utilization
- Grouping batch operation

Responsibility to Protect Data

Multiple backup solutions help businesses protect their data more intensively. Not to mention supporting synchronous replication can ensure data consistency between the replication source and target. It ensures every write I/O requested from the applications on the host will be completed after the host obtains the confirmation between the source and the target. Make sure your digital assets are safe when disaster happens.

- Prevents drives failure at the same time
- Find out the killer that affects system performance at a glance
- Authorizations of users responsibility
- Protect enterprise digital assets
- Restore accidentally deleted data

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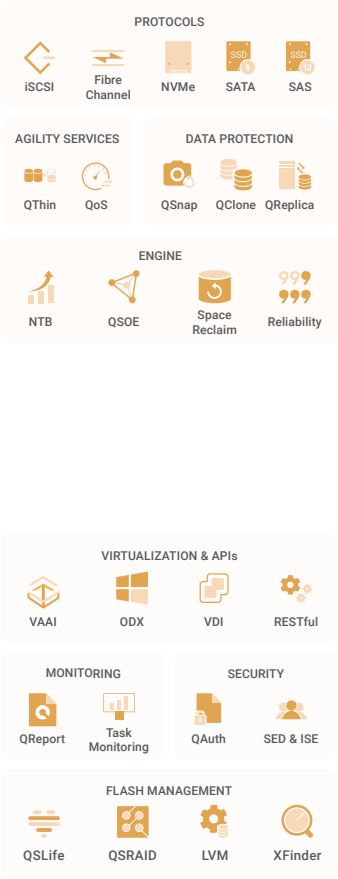


Software Feature

Powering Storage Functionality

XEVO implements rich host applications and delivers enterprise data services founded upon QSAN core engines. These are the technologies that care about your data and drive the high performance QSAN is so proud of.

- **QoS** (Quality of Service)
- **QSLife** (Intelligent Disk Drive Analyzer)
- **QReport** (Analyze Business Usage)
- **QAuth** (Authorizations of User Responsibility)
- **QSnap** (Snapshot and Snapshot Recycle Bin)
- **QClone** (Local Clone)
- **QReplica** (Remote Replication)
- **QCache** (SSD Cache)*
- **QTiering** (Auto Tiering)*

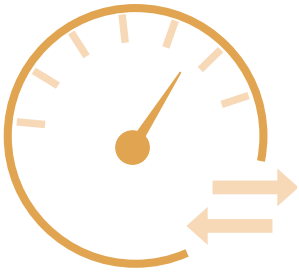
High-Speed Data Experience

XEVO is designed for high-speed data transmission. The unique algorithm makes XEVO compatible with SATA / SAS and NVMe protocols and achieves µs-level high-speed performance, bringing the most immediate data response to every critical mission.

- **Storage Optimization Engine** - XEVO optimizes communication-centric processes to reduce multi-protocol overhead, increase session scalability, increase total I/O throughput, IOPS, and achieve low latency performance.
- **High-speed Connectivity** - XEVO implements industry-leading Ethernet and FC high-speed network connections. The data environment can be easily and freely configured according to requirements.

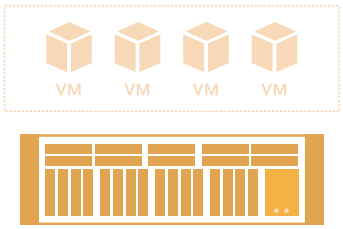
Brand New Data Experience

With the exponential growth of data, easy management has become the foundation of modern IT. XEVO simplifies the complex IT process from construction to maintenance. Make enterprises focus on value creation instead of IT management.



- **QSLife** (Intelligent Disk Drive Analyzer) - QSAN's native SSD technology offers users a specified technology to analyze the SSD activity and uses a unique algorithm to help the user to keep an eye on the health of drives.
- **QReport** (Analyze Business Usage) - Generates performance, capacity analytics, SSD cache, and auto tiering statistics within one year, simplifying the work of IT managers. Advanced QReport collects all disk drive health and analysis information, compiles them into emails and sends regular emails to administrator to determine how to deal with system exceptions, thereby avoiding the risk of data corruption.
- **Grouping Batch Operation** - Group the required contents (e.g. volumes or hosts) to save a lot of time managing storage and prevent accidental damages caused by human negligence.
- **QoS** (Quality of Service) - To provide effective services to every mission, XEVO's QoS ensures that the service requirements of the job are met and balances the workload of the system.

* Only available for hybrid storage models



Virtualization Ready

XEVO is verified with VMware® Ready™ and Microsoft® Hyper-V™ certified. No matter which virtualization environment you've adopted, XEVO is a convenient and fast storage system that allows you to deploy a low-latency and high-performance virtualization environment to expand your business. To protect VM and data, XEVO also supports 3rd party virtual machine backup software to ensure that your VMs and data are never at risk of loss.

High Availability with No Single Point-of-Failure

XEVO's automatic failover / failback mechanism and cache mirroring through NTB (Non-Transparent Bridge) bus to achieve active-active HA functionality allows the system to withstand multiple component failures and achieve 99.9999% availability.

- Dual-Active (Active / Active) - The dual-active design provides the highest-level availability and supports non-disruptive firmware upgrades. It also allows double the host bandwidth and cache-hit ratio by utilizing both controllers, meaning there are no idle resources within the system.
- Automatic Failover / Failback - When one controller fails, the other controller can seamlessly take over all the tasks of the failed controller.
- Online firmware update - Always keep the latest version of firmware with zero system downtime.
- Cache-to-Flash Memory Protection - In the event of power loss, it will lose the cache data stored in volatile memory. The cache-to-flash memory protection function will safely transfer the memory cache data to a non-volatile flash device for permanent preservation.

Comprehensive Data Security

XEVO provides the most comprehensive features to guarantee your data security and protect your businesses from data theft, unauthorized disclosure, malicious network attacks, and accidental corruption.

- QSRAID - Supports 15 different RAID levels to provide storage redundancy for additional protection. The global hot spare function enhances RAID protection by automatically replacing the failed disks and starting the rebuild process without the user intervention.
- QReplica (Remote Replication) - QReplica has unlimited bandwidth, traffic shaping, and multiple connections per replication task powerful capabilities. It's the most efficient way to perform remote data backup.
- QSnap (Writable Snapshot) - QSnap allows direct access to the snapshot content with reading / writing permissions. It will not affect the content of the target volume and is suitable for laboratory testing and teaching practice environments.
- SED (Self-Encrypting Drive) Support - With the technology, even if the physical drive is stolen or misplaced, the data on it remains protected against data breach by generating the AK (Authentication Key) to prevent unauthorized access.
- QAuth (Authorizations of Users Responsibility) - Grants different users the appropriate permission through access right control with QAuth feature.

Software Specification

Operating System	64-bit embedded Linux
Storage Management	RAID level 0 ,1 ,0+1 ,3 ,5 ,6 ,10 ,30 ,50, 60, and N-way mirror / RAID EE level 5EE, 6EE, 50EE, and 60EE Flexible storage pool ownership / Global hot spares / Online disk roaming Write-through and write-back cache policy / Background I/O priority setting / Instant RAID volume availability Fast RAID rebuild / Online storage pool expansion / Online volume extension / Online volume migration[1] Auto volume rebuilding / Instant volume restoration / Online RAID level migration Video editing mode for enhanced performance / Disk drive health check and S.M.A.R.T. attributes Storage pool parity check and media scan for disk scrubbing / SSD wear lifetime indicator Disk drive firmware batch update / QSLIfe to monitor and analyze the activity of disk drives Multiple volume creation / Volume QoS (Quality of Service)
iSCSI Host Connectivity	CHAP & mutual CHAP authentication / iSCSI-3 PR (Persistent Reservation for I/O fencing) iSNS / VLAN (Virtual LAN) / Jumbo frame (9,000 bytes) support
Fibre Channel Host Connectivity	FCP-2 & FCP-3 support / Auto detect link speed and topology Topology supports point-to-point[2] and loop
High Availability	Dual-Active (Active/Active) controllers / Cache mirroring through NTB bus / ALUA support Management port seamless failover Multipath I/O and load balancing support (MPIO, MC/S, Trunking, and LACP) Firmware update with zero system downtime / Cache-to-Flash memory protection
Security	Secured Web (HTTPS), SSH (Secure Shell) / iSCSI Force Field to protect from mutant network attack iSCSI CHAP & mutual CHAP authentication / ISE & SED drive support
Storage Efficiency	Thin Provisioning with space reclamation SSD Cache[3] / Auto Tiering[3]
Networking	DHCP / Static IP / NTP / Trunking / LACP / VLAN / Jumbo frame (up to 9,000 bytes)
Advanced Data Protection	Snapshot, block-level, differential backup Writeable snapshot support Manual or schedule tasks Snapshot recycle bin Remote Replication Auto remote replication without doing configurations 1 Step Local-to-Remote Asynchronous, block-level, differential backup based on snapshot technology Synchronous[3], block-level, always synchronize based on the recorded fracture log Traffic shaping for dynamic bandwidth controller Manual or schedule tasks Volume clone for local replication Auto local clone without doing configurations Instant volume restoration Support USB UPS and network UPS with SNMP management
Virtualization Certification	Server Virtualization & Clustering Latest VMware vSphere certification / VMware VAAI for iSCSI & FC Microsoft Windows Server Hyper-V certification / Microsoft ODX
Easy Management	USB LCM[4] / Serial console support / Online firmware update Intuitive Web management UI, secured web (HTTPS), SSH (Secured Shell), LED indicators S.E.S. support / S.M.A.R.T. support Grouping batch operation for host and protection groups QReport generates performance, capacity analytics, SSD cache and auto tiering statistics Advanced QReport collects all disk drive health and analysis information and sends periodic emails XFinder utility support to easy find storage system / RESTful API support QAuth for authorizations of user's responsibility
Log	Event log with filter / Download the entire event log or between a certain time period
Notification	Email / SNMP / syslog / RESTful API
Green & Energy Efficiency	Wake-on-LAN and Wake-on-SAS to turn on or wake up the system only when necessary / Auto disk spin-down
Multi-Browser Support	Google Chrome / Microsoft Edge / Apple Safari / Mozilla Firefox
Host Operating System Support	Windows Server SLES / RHEL / CentOS Solaris / FreeBSD Mac OS X
Utility	XFinder / XInsight
Notes	1. The feature is based on RAID level migration of disk groups on the fly in thick provisioning pools. 2. 16 / 32 Gb Fibre Channel only supports Point-to-Point topology. 3. The feature is only available for hybrid storage models, optional and not included in the default package. 4. The feature is optional and is not included in the default package.

Specification Sheet

Pool	
Maximum number of disk groups in a pool	32
Maximum number of disk drives in a disk group	64
Maximum number of RAID EE spares in a disk group	8
Maximum number of disk drives in a pool	256
Maximum number of pools per system	64
Maximum disk capacity support	Largest disk capacity on the market
Thick Provisioning Pool	
Maximum capacity of a disk group	1,408 TB (calculated by 22 TB HDD)
Maximum capacity of a thick provisioning pool	5,632 TB (calculated by 22 TB HDD)
Maximum capacity of total thick provisioning pools	Unlimited
Thin Provisioning and Auto Tiering Pool	
Maximum capacity of a disk group	256 TB
Maximum capacity of a thin provisioning or an auto tiering pool	4,096 TB
Maximum capacity of total thin provisioning or auto tiering pools	4,096 TB
Provisioning granularity	1 GB
SSD Cache Pool	
Maximum number of SSD cache pools per system	4
Maximum number of SSDs in an SSD cache pool	8
Maximum capacity of an SSD cache pool	32 TB
Maximum number of shared volumes in an SSD cache pool	32
Maximum number of dedicated spare SSDs in an SSD cache pool	4
Volume	
Maximum number of volumes in a pool	96
Maximum number of volumes per system	4,096
Maximum number of hosts per volume	1,024
Maximum volume capacity of a thick provisioning pool	5,632 TB (calculated by 22 TB HDD)
Maximum volume capacity of a thin provisioning pool	1,024 TB
iSCSI	
Maximum number of iSCSI targets per system	256
Maximum number of initiator addresses per system	256
Maximum number of iSCSI hosts (dual controller / single controller)	2,048 / 1,024
Maximum number of iSCSI sessions (dual controller / single controller)	2,048 / 1,024
Maximum number of iSCSI connections (dual controller / single controller)	8,192 / 4,096
Maximum number of CHAP accounts per system	64
Fibre Channel	
Maximum number of fibre channel hosts (dual controller / single controller)	512 / 256
LUN	
Maximum number of LUNs per system	8,192
Snapshot	
Maximum number of snapshots per volume	256
Maximum number of volumes in a snapshot	64
Maximum number of snapshots per system	8,192

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Specification Sheet

Local Clone	
Maximum number of local clone pairs per source volume	1
Maximum number of local clones per system	64
Remote Replication	
Maximum number of remote replication pairs per source volume	1
Maximum number of remote replications per system	64
Maximum number of traffic shapings per system	8
Maximum number of iSCSI multi-paths in a remote replication task	2
Maximum number of iSCSI multiple connections per remote replication task path	4
Host Group	
Maximum number of host groups per system (iSCSI / fibre channel)	128 / 8
Maximum number of volumes per host group (iSCSI / fibre channel)	64 / 32
Maximum number of hosts per host group (iSCSI / fibre channel)	16 / 16
Maximum number of iSCSI multi-paths in a remote replication task	2
Protection Group	
Maximum number of protection groups per system	32
Maximum number of volumes per protection group	64
Maximum number of local clone tasks per protection group	64
Maximum number of remote replication tasks per protection group	64