



StoreVault Advanced Protection Architecture

NetApp technologies working together

Advanced data protection

Advanced system protection



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introduction

StoreVault **Advanced Protection Architecture** combines protection for your data with technologies that maintain your system to ensure maximum availability. The NetApp technologies work together, providing StoreVault products with peace-of-mind data protection and system availability rarely found outside the data center.

There are two key parts to the Advanced Protection Architecture. First, StoreVault **Advanced Data Protection** is composed of core NetApp data protection components that have been hardened in some of the most rigorous testing data center environments in the world. Second, the StoreVault **Advanced System Protection** is a collection of NetApp technologies that work together to provide a high level of system uptime, ensuring maximum data availability.

StoreVault Advanced Protection Architecture is just one of the ways that the StoreVault S500 delivers peace-of-mind data storage, allowing you to spend more time on your business and less time worrying about your storage.

For more information, please visit www.storevault.com

advanced data protection

Overview

With StoreVault products, your data is protected in many ways. NetApp Snapshot™ technology provides the ability to maintain 250 snapshot images per volume. Snapshot images are taken without disruption to normal operations and with no performance impact. SnapRestore™ StoreVault Edition provides a way to almost instantaneously restore individual files, a directory, or even a multi-terabyte file system. Data ONTAP® StoreVault Edition is based on the highly optimized, scalable, and flexible operating system that powers NetApp enterprise storage solutions. The WAFL® (Write Anywhere File Layout) file system provides availability, flexibility, and high performance. Integrated NVRAM protects data in cache even in the event of a sudden power loss.

NetApp Snapshot Technology

A snapshot is a point-in-time image of the file system, which is taken instantly with no impact on system performance and with very little impact on storage capacity. Snapshots can be browsed in a directory structure that looks just like the original; in fact, the only difference is that the snapshot directory is a read-only image of the file system frozen in time. A snapshot can be recovered instantaneously to “revert back” to that point in time for an individual file, a folder, a directory, or even for the entire file system. Research has shown that the majority of restore requests are for individual files, but reverting the file system might be the useful in the event of a virus infection or to reestablish a baseline environment for testing. The power of NetApp Snapshot is its simplicity – end users can even be authorized to recover their own files and directories from a snapshot without systems administrator intervention.

NetApp Snapshot technology is unique in the way that it captures images of data, resulting in reduced storage costs and system administration time.

NetApp Snapshot is integral to the way the file system works. NetApp developed the WAFL file system to enable high-performance, high-integrity storage systems. By using a set of pointers to the individual blocks of data, the file system knows where everything is. By making a copy of those pointers, and not the data, an instantaneous image of the entire file system can be captured. As data blocks are changed, pointers in the live file system are redirected to new blocks; however the snapshot pointers still point

to the original blocks to preserve that point-in-time image. When another snapshot is taken, the new pointers are recorded against the current live file system.

Also, the backup window becomes a thing of the past, because backups to tape can be performed on a Snapshot – at any time, not just nights and weekends!

Data ONTAP StoreVault Edition

At the heart of StoreVault products is a robust operating system that is based on Data ONTAP, the highly optimized, scalable, and flexible operating system that powers NetApp enterprise storage solutions. While it is tailored to meet the needs of small- and middle-sized businesses, the performance, reliability, and peace-of-mind data protection remain the same.

Data ONTAP StoreVault Edition provides support for key underlying NetApp technologies that provide peace-of-mind data protection, including Snapshot technology that enables instant backup and restore; RAID-DP™, which provides protection from concurrent disk drive failures; the WAFL, (Write Anywhere File Layout) file system, which provides availability, flexibility, and high performance; integrated NVRAM for data protection; and seamless integration into existing Windows® and/or UNIX® installations. The combination of Data ONTAP StoreVault Edition with StoreVault Manager provides a simple to use yet robust, scalable, and flexible environment.

SnapRestore StoreVault Edition

Today there are many threats to critical business data: files can be overwritten or deleted, or become corrupted. With traditional data recovery methods, recovery can take hours or even days. Using NetApp Snapshot technology, SnapRestore StoreVault Edition provides a way to almost instantaneously restore individual files, a directory, or even a multiterabyte file system; and because no data is copied, recovery time is the same. In contrast, alternative storage solutions copy all of the data and require much more time and disk storage for the backup-and-restore operation.

SnapRestore StoreVault Edition is tailored to the needs of small- to medium-sized businesses and provides a simple interface to enable IT generalists to quickly recover data.

advanced system protection

Overview

StoreVault products use a combination of NetApp technologies that work together behind the scenes to ensure the highest levels of data availability.

Continuous disk drive monitoring and periodic automated maintenance can alert the system to a potential disk drive failure before it happens. If a drive is diagnosed as likely to fail, a global hot spare can be instantly brought online. Rapid RAID Rebuild enables the contents of the potentially bad drive to be copied in the background to the spare before it fails. If the drive fails before the full contents are copied, then only the remainder needs to be rebuilt from parity calculation, dramatically reducing the time to full recovery.

Single-drive power cycling allows a hung drive to be temporarily shut down and restarted without disrupting the entire array. Even the firmware for an individual drive can be updated without disruption to the system.

With RAID-DP, your data remains protected even in the event of dual concurrent drive failures. StoreVault products with RAID-DP can even withstand a second drive failure during recovery rebuild operation.

RAID-DP

Conventional, single-parity, RAID schemes provide protection in the event of a disk drive failure. If a drive fails, the data can still be constructed from the surviving drives, and when the failed drive is replaced, the entire array can be rebuilt to its protected status. However, if a second drive fails before the array is rebuilt, then all of the data can be lost. With today's high-capacity disk drives, this rebuild time is typically many hours, increasing the probability of a second drive failure before recovery is complete.

NetApp RAID-DP (double parity) technology prevents data loss in the event of a second drive failure without excessive redundancy costs. In an elegantly simple solution, a second parity drive is added to the array, and parity for this drive is calculated differently from the first parity drive.

With RAID-DP, your data remain protected even during a recovery rebuild and can even withstand a second drive failure during rebuild. RAID-DP is just one of the ways that the StoreVault S500 delivers peace-of-mind data protection.

Global Hot Spare

Having a hot spare reduces the time to full data protection by automatically starting the rebuild process as soon as a failed drive, or a drive that is about to fail, is detected. Typically, in the event of a disk drive failure, the failed disk is replaced with a new drive and the RAID group is rebuilt. As the name suggests, a hot spare is a spare drive that is in the StoreVault product, and ready to be used, but not currently used for data. Data ONTAP StoreVault Edition detects the presence of a drive that has failed or is showing signs of imminent failure. The hot spare is immediately brought online and built in the background to replace the failed drive. The administrator is notified of the event and can physically replace the failed drive at a convenient time.

This immediate failover significantly reduces the likelihood of a second drive failure occurring while the array is being rebuilt. The NetApp RAID-DP implementation protects against dual drive failure.

Rapid RAID Rebuild

The capacity of disk drives is growing significantly faster than the data rates to the drives; the result is that the time to rebuild is extended to hours. Rapid RAID Rebuild is a NetApp technology that combines drive monitoring and the global hot spare. When potential failure of a drive is detected, Rapid RAID Rebuild enables the contents of the potentially bad drive to be copied in the background to the hot spare before failure occurs. If the flagged drive fails before the full contents are copied, then only the remainder needs to be rebuilt from parity calculation, dramatically reducing the time to full recovery.

StoreVault Advanced Protection Architecture

advanced system protection (continued)

Nondisruptive Firmware Updates

Occasionally the firmware on the drives needs to be updated to provide system improvements. Unlike competitive systems, the StoreVault products can keep working without disruption to normal operations. The disk drives can have their firmware updated without bringing down applications or preventing users from getting to their data.

Single-Drive Power Cycling

Hard disk drives are very complex devices with their own software or firmware and sophisticated error correction and data protection algorithms. Occasionally a drive may get hung while trying to retrieve data. Most systems would call the drive out as a bad drive, which would require replacement of the drive and system rebuild.

StoreVault products have the capability to individually power cycle the hung drive (similar to rebooting a PC). Often this clears the problem and the drive behaves normally. This power cycling is logged, and if the drive continues to exhibit problems it is flagged for replacement. If there is a global hot spare, then the system goes into the Rapid RAID Rebuild.

Drive Monitoring and Maintenance

The disk drives are continuously monitored for health and performance. If any of the parameters exceed predefined limits, the drive can be flagged for replacement as described earlier. The individual drives also periodically execute self-maintenance routines to ensure longevity and data integrity.

summary

The StoreVault Advanced Protection Architecture is designed to protect your data and maintain data availability. It is made up of two parts: StoreVault Advanced Data Protection and StoreVault Advanced System Protection. These two elements of NetApp technology combine to provide protection for your data and maintenance of your system to ensure maximum availability.

StoreVault Advanced Data Protection is composed of core NetApp data protection components that have been hardened in some of the most rigorous testing data center environments in the world.

StoreVault Advanced System Protection is a collection of NetApp technologies that includes predictive failure analysis and self-healing elements, which work together to maintain the availability of your networked storage.

The new StoreVault S500 is an all-in-one scalable networked storage solution that allows first-time NAS and SAN users to simplify not only the installation process, but also the day-to-day protection and management of their data. StoreVault products provide access to the powerful data storage management tools and capabilities that have previously been available only to large IT shops, but without the complexity normally associated with enterprise-class storage.

To find out more about how the StoreVault Advanced Protection Architecture can provide additional security for your business data, please visit www.storevault.com.



Network Appliance, Inc.
495 East Java Drive
Sunnyvale, CA 94089

About Network Appliance

Network Appliance is a world leader in network storage solutions for today's data-intensive world. Since its inception in 1992, Network Appliance has delivered technology, product, and partner firsts that simplify data management. Information about Network Appliance solutions and services is available at www.netapp.com.

For more information on StoreVault, a NetApp division, go to www.storevault.com.

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