FalconStor®

GLOBAL APPLICATION & SAN ACCELERATION WITH SOLID-STATE STORAGE

A WHITE PAPER

GLOBAL APPLICATION AND SAN ACCELERATION WITH SOLID-STATE STORAGE

ABSTRACT

Solid-state storage or memory is becoming an increasingly common storage mechanism, providing many advantages in the areas of performance and reliability. Seek time is significantly reduced, allowing for quick response times and high rates of input/output operations per second (IOPS). This white paper investigates the pros and cons of solid-state storage and explains how the FalconStor® Network Storage Server (NSS) enhances this technology to deliver additional value through application-specific and global SAN acceleration.

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INTRODUCTION

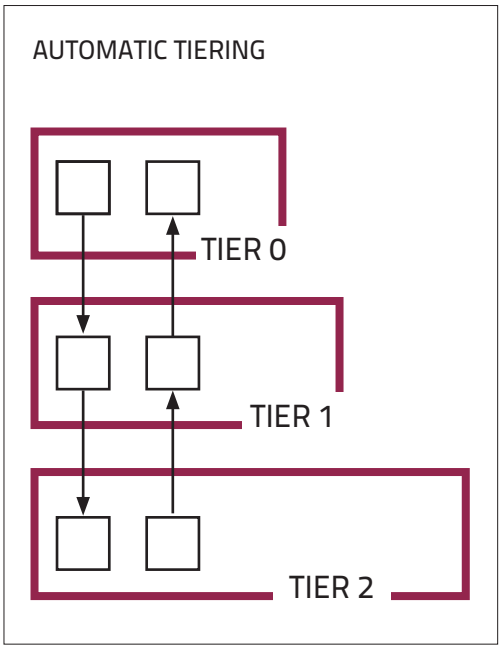
The performance of your IT infrastructure has a direct impact on the success of your organization. The faster you can process your orders, check your inventory, and respond to customer requests, the more competitive your organization can be. As organizations deploy more powerful servers and higher speed networks, they need to improve the performance of their storage infrastructure to keep up with the demands of the new components. Traditionally, organizations have dealt with storage performance bottlenecks in two ways. First, they upgraded their storage infrastructure with higher-performance disk resources such as Fibre Channel (FC) or SAS drives, and ran the applications that require high levels of IOPS and low latency on new disks. They then added more disks to match the most demanding I/O profile of supported applications.

The introduction of solid-state storage is allowing organizations to rethink the way they approach performance bottlenecks. However, hosting whole applications on a high IOPS, low-latency solid-state disk can be very cost-prohibitive. Organizations need an innovative way of deploying solid-state storage and reaping its benefits without the high price tag.

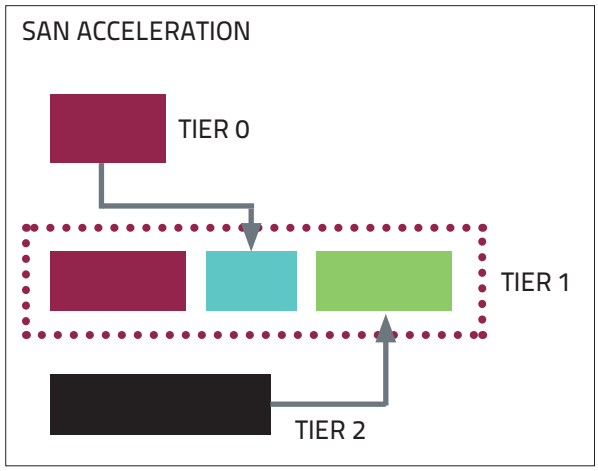
AUTOMATIC STORAGE TIERING OR DATA CACHING?

To answer this question, we need to take a closer look at application behavior, especially those applications with large processing requirements. For instance, ERP applications with periodic heavy workloads (such as accounts receivable/payable, inventory and warehousing reports) do not need a high-performance infrastructure all the time, nor do they process all of the data at once. In such a case, an ideal solution would only have the data that the application will process on high-performance resources such as SSD, and only when necessary.

Automatic data tiering can identify data sets that have been heavily accessed by an application and move them with a variable granularity to the higher tier of storage the next time an I/O storm hits the storage environments. This process in itself can present a heavy load on the storage infrastructure.

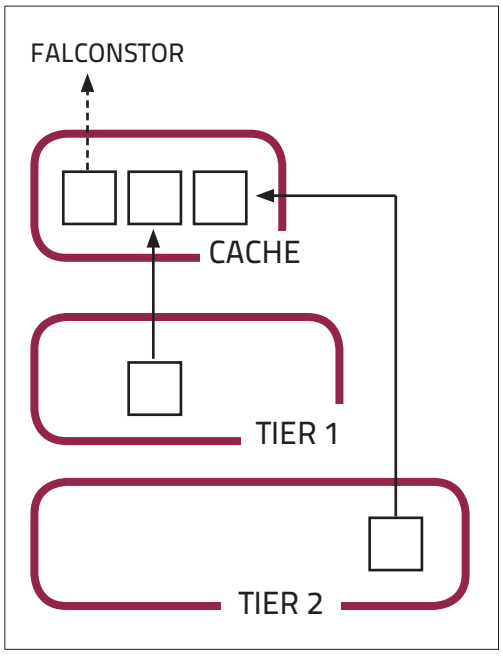


Through automatic tiering, you can review historical access trends and make appropriate data migration decisions. However, this approach fails to address the immediate need of an application processing new data, and it can present a heavy load on the storage infrastructure. If you have more than two tiers of storage, data movement can be severely delayed causing negative side effects for applications or server options. Furthermore, you have to account for additional storage capacity, typically 15 to 20%, dedicated as a data movement buffer. Lastly, once their access trend decreases, highly accessible data sets that reside on the highest tier may need to be moved back.



The other approach to leveraging solid-state storage is to use it as an extension of the disk controller cache to address peaks in storage performance demand. To accelerate reads and writes to disk drives, disk array storage controllers have always relayed on cache. However, a cache with volatile memory cannot be considered as a higher tier of storage and could be very limited in terms of scalability.

As read requests hit a specific dataset, this data set can be copied to the higher tier of storage. Solid-state and all subsequent reads can be accommodated from the solid-state layer delivering high-performance reads with very low latency and superior response time. Once the data is no longer in-demand, it can be deleted from the cache and referenced back to its original location allowing new in-demand data sets to be copied to that highest tier. This concept can provide significant acceleration to a SAN environment at a relatively low cost, but it lacks the intelligence to be flexible and effective enough to address different needs of a complex storage and server infrastructure.



Intelligent, predictable acceleration

FalconStor NSS natively provides a cost-effective alternative to traditional methods of application and storage acceleration. NSS gives organizations the flexibility to leverage SSD technology to improve the performance of business applications without requiring additional investments.

FalconStor NSS utilizes solid-state memory as a cache, but it uses the cache differently from traditional solutions. Managed solid-state resources can be segmented into read/write acceleration zones used as a shared general cache for different applications and storage resources. The solution can also be used as a dedicated segment for specific applications where the entire application data can be migrated to that tier.

HotZone® functionality, a caching mechanism built into NSS, is optimized to work with random access database applications by monitoring the disk access pattern and intelligently copying the highly accessed data to the cache for fast read access. HotZone is enabled with a Quality of Service (QoS) feature that can guarantee priority access to certain applications.

In addition to copying the datasets with the highest I/O profile, FalconStor NSS allows organizations to prioritize workloads and define their retention time in the cache. This flexibility provides predictable performance acceleration per application to match the degree of importance of certain workloads. To effectively maximize the performance, historical trending and intelligent profiling of data enables you to proactively predict application behavior and optimize the distribution of the data.

The solid-state tier receives all-new disk writes requests to the SAN, significantly accelerating application write processes. This approach to accelerating both read and write requests to the SAN provides consistent acceleration, even in legacy storage environments.

Cost-effective global SAN acceleration

Through its heterogeneous storage architecture, FalconStor NSS can seamlessly integrate within a storage environment and exploit solid-state performance to improve SAN performance substantially without a huge expense or a forklift upgrade. In this manner, FalconStor NSS more than doubles the storage environment IOPS at less than one-third the cost of adding new spindles, providing optimum value and return on investment (ROI). FalconStor NSS offers organizations freedom to use solid-state technology in a manner that fits their overall application needs today while providing a platform that can still support them in the future.

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