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WHITE PAPER

FREESTOR: OPTIMIZATION

Table of Contents	Page
The Four Pillars of FreeStor Overview	3
Pillar 4: Optimization	4
Optimization Is a Critical Success Factor	4
FalconStor FreeStor as an Optimization Enabler	4
Optimization Vectors	5
The Results	5
About ActualTech Media	6
About FalconStor	6
About The Author	7

THE FOUR PILLARS OF FREESTOR OVERVIEW

With the release of FreeStor[®], FalconStor gives customers the power to seamlessly migrate, recover, protect, and deduplicate data—on or off the cloud—without tying their business to specific hardware, Networks, or protocols. FreeStor provides companies with the ability to enhance just about any storage infrastructure with enterprise-grade features that enhance the overall value of the storage environment. By adding enterprise features, such as comprehensive deduplication, powerful workload migration, and application recovery capabilities, FreeStor brings a 100% software-defined, homogenous, storage management experience to even the most heterogeneous environment. FreeStor's value to an organization revolves around providing its customers with four key data services pillars to address customer use cases.

MIGRATION AND DATA MOBILITY

FreeStor offers one platform for legacy and virtual platforms. Features include:

- Migration from array to array, clusters, or site to site
- Converged services let you control data movement
- WAN-optimized and space-efficient replication lowers costs
- Heterogeneous storage, protocols, system, and application support

CONTINUITY

With FreeStor, data is always on when needed and is performance-optimized:

- Absolutely minimal downtime lowers costs and enhances productivity
- Data is active to, from, and across storage sites and is 99.999% proactive
- Local, active-active, and multi-site storage versatility
- Variable topology deployment allows performance and scale to meet business needs

RECOVERY

FreeStor allows data recovery anywhere via mobile or tablet interface. Features include:

- Policy-based, auditable, validated recovery
- Full integration allows recovery to and from physical, virtual, or mixed environments
- Provides peace of mind that data is protected and fully recoverable
- Bootable and mobile snapshots for instant recovery, test/dev environments, etc.

OPTIMIZATION

FreeStor's optimization with dedupe reduces storage costs and increases backup efficiencies.

- Assume greater control over data and heterogeneous IT infrastructure
- Gain consistent, global deduplication across your storage infrastructure
- Turn on deduplication as needed
- Virtualize all shared storage into a common resource

PILLAR 4: OPTIMIZATION

Keeping the lights on” is no longer a sufficient reason for the IT department’s continued existence. In fact, most businesses are insisting that their IT organizations go far beyond this simple baseline and require IT to constantly innovate and move the business forward. At the same time, budgetary funds that were previously directed to foundational operations are now being eyed for redirection to activities that help propel the business rather than just helping it to stand still.

This can be a contradiction of directives, often summed up as “doing more with less.” On one hand, IT must continue to ensure the sustainability of the data center environment while also ensuring that the company is agile enough to meet new business needs. In order to be successful at balancing these directives, IT must find ways to:

- Simplify the data center, which has become a complex morass requiring deeply skilled —and expensive—staff to operate.
- Ensure maximum return on investment (ROI) in technology purchases.

Simply put, IT needs to optimize its operations and technology to improve sustainability, reduce complexity, and reduce the total cost of ownership for all services. Nowhere are these needs more apparent than in storage. For many, storage environments and operations are among the most expensive resources supported by IT. Traditionally, storage has been complex, requiring highly skilled staff members, and expensive, with IT staff struggling to make the best buying decisions around this resource.

OPTIMIZATION IS A CRITICAL SUCCESS FACTOR

Many businesses have deployed storage environments that are quite disorganized, highly heterogeneous, and very difficult to manage and support. In reality, the individual decisions that have led to this situation are very sound. For example, for a new application that requires storage with high I/O capabilities, buying a separate hybrid or all-flash storage system made sense. However, when these decisions are aggregated, and when the individual outcomes from these discrete decisions are aggregated, the whole is not the sum of its parts.

In fact, in many ways, the whole is far less than the sum of its parts. Each discrete storage solution requires separate management, separate maintenance, and, in some cases, a vastly different skill set. Thanks to the disparate nature of the individual pieces of the storage environment, companies are left with a number of resource islands, each with different capabilities. For example, some may provide data deduplication services, and others may not.

Moving data between these islands is often a manual task, with storage experts on hand to migrate I/O-hungry workloads from capacity-strong storage silos to silos that enable better performance. Since each of these silos, is operated independently, there may be copies of data strewn about the environment, further impacting the overall cost of the storage environment.

FREESTOR AS AN OPTIMIZATION ENABLER

With optimization as a critical success factor in the data center, companies need a comprehensive optimization solution. Hardware SAN/NAS devices sometimes offer siloed optimization, but these become inefficient islands. Little is gained by doing some optimization here or there.

The most comprehensive approach requires companies to implement global data optimization across all storage systems—even disparate storage arrays from different vendors. In the past, automated global data optimization across all types of storage was virtually impossible.

However, today this unique capability is provided by FreeStor provides automated global deduplication across your entire storage infrastructure—even heterogeneous systems—thus tremendously reducing storage costs and increasing backup efficiency. True, comprehensive optimization using deduplication is difficult to achieve with traditional storage because the deduplication engine requires real-time access to all data. Because of FreeStor’s unique Intelligent Abstraction[®] layer, FreeStor has access to all data across all storage devices and can optimize it using global deduplication. FreeStor’s File Deduplication System (FDS) performs deduplication in two different ways:

- **Post-process / concurrent deduplication.** As shown on the left in Figure 1, post-process deduplication optimizes storage after data has already been written to the disk. The benefit here is that there is no write penalty as post-process deduplication is done when storage I/O demands are low. Post-process deduplication reduces the data size, reduces the size of data being protected, and reduces the length of the backup window.

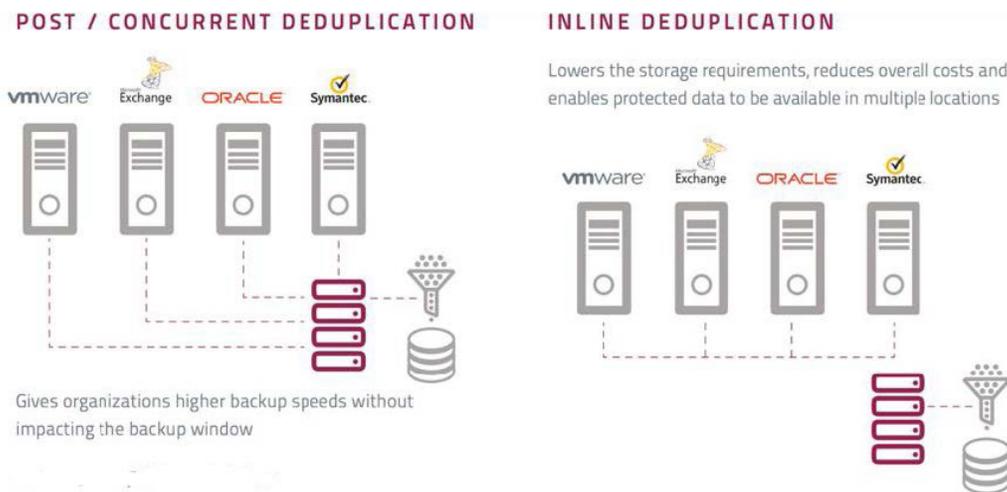


Figure 1: FreeStor's data optimization/deduplication options

- **Inline deduplication.** As shown on the right in Figure 1, inline deduplication optimizes storage before data is written to disk, immediately saving disk space, but usually requiring caching to ensure that that I/O latency is not increased. Inline deduplication means that the disk capacity being saved is immediately saved.

In both types of deduplication, deduplication is done across all types of storage, whether or not the multiple types of storage may be in use.

OPTIMIZATION VECTORS

Optimization is all too often seen as simply a SAN feature that you enable, but there is much more to optimization. The three optimization vectors that you need to know are:

1. **Efficiency.** To be truly optimized, data must be deduplicated, not just in a single LUN or on a single SAN, but across your entire data center, redundant data centers, and even your cloud infrastructure. This level of optimization is truly efficient. With FreeStor, you can save up to 95% on data stored for data protection purposes.
2. **Visibility.** Deduplication and optimization aren't just "checkbox features" that you enable. You must have visibility into what has been deduplicated and where, what rate was achieved, and how much space was saved. Without total visibility into the optimization results, you can't be confident in your optimization solution. FreeStor's optimization reporting is shown in Figure 2.
3. **Scalable.** Data optimization must be scalable because your data will most likely increase over time. Many companies start using FreeStor to optimize one SAN/NAS and add other types of storage to it over time.

THE RESULTS

Utilizing the FreeStor storage software layer across your storage infrastructure offers you and your company numerous benefits, especially related to optimization, including:

- **Reduction of data.** By reducing your data footprint tremendously (including backup data by up to 95%), a "snowball effect" will be created across numerous other common data center operations. Reduction in data sizes mean reduction in the number of disks needed, arrays needed, amount of rack space required, power and cooling required, and time to administer the storage infrastructure.
- **Reduced cost and complexity.** Reduction of the data footprint also results in a reduction in cost to purchase and maintain all that infrastructure and the complexity required to maintain the storage infrastructure and troubleshoot it, should a problem occur.

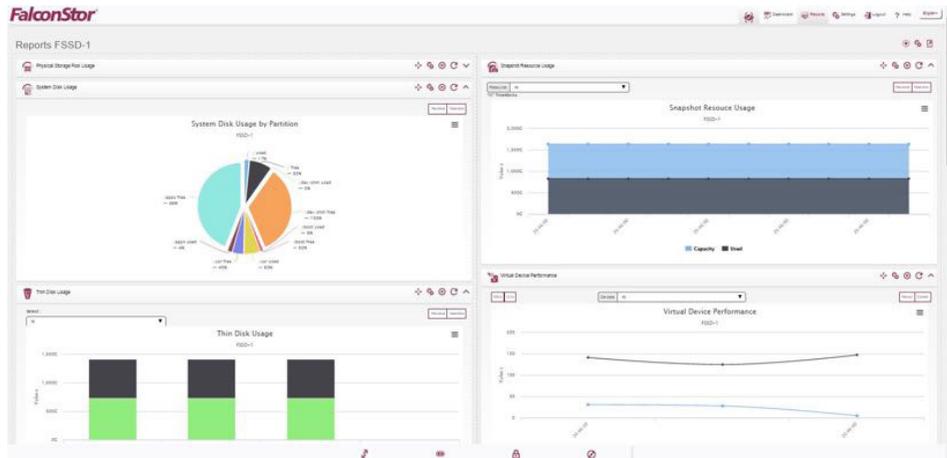


Figure 2: FreeStor’s comprehensive data visibility reporting

- **Improved flexibility.** FreeStor provides the ultimate in flexibility when it comes to optimization with the ability to optimize any type of data storage across multiple sites, including the cloud. FreeStor even gives you the flexibility to perform high performance disk-to-tape (D2T) and disk-to-disk (D2D) backup operations.
- **Massive scalability.** You’ll be able to scale the FreeStor Intelligent Abstraction layer across your entire storage infrastructure, no matter how much it grows and no matter what different types of storage devices you add.

With FalconStor’s FreeStor in place, your entire storage infrastructure (no matter what it’s made of) will be efficient, optimized, flexible, highly available, and protected.

ABOUT ACTUALTECH MEDIA

ActualTech Media delivers authoritative content services and assets for top IT companies across the globe. Leading IT industry influencers Scott D. Lowe, David M. Davis, and partners develop trusted, third-party content designed to educate, convince, and convert IT buyers. ActualTech Media helps its clients reach the right technical and business audiences with content that resonates and leads to results.

ABOUT FALCONSTOR

FalconStor Software[®] Inc. (NASDAQ: FALC) is a leading software-defined storage company offering a converged data services software platform that is hardware agnostic. Our open, integrated flagship solution, FreeStor[®], reduces vendor lock-in and gives enterprises the freedom to choose the applications and hardware components that make the best sense for their business. We empower organizations to modernize their data center with the right performance, in the right location, all while protecting existing investments. FalconStor’s mission is to maximize data availability and system uptime to ensure nonstop business productivity while simplifying data management to reduce operational costs. Our award-winning solutions are available and supported worldwide by OEMs as well as leading service providers, system integrators, resellers and FalconStor. The company is headquartered in Melville, N.Y. with offices throughout Europe and the Asia Pacific region. For more information, visit www.falconstor.com or call 1-866-NOW-FALC (866-669-3252).

ABOUT THE AUTHOR

Scott Lowe is a partner in, and co-founder of, ActualTech Media. Scott has been in the IT field for close to twenty years and spent ten of those years in filling the CIO role for various organizations. Scott has written thousands of articles and blog postings and regularly contributes to such sites as TechRepublic, Wikibon, and virtualizationadmin.com.



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