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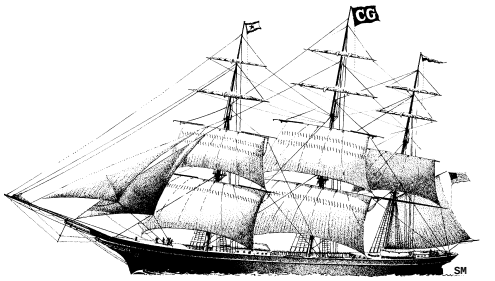

Navigating Information Technology Horizons℠

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3PAR and FalconStor Team Up to Provide a Consolidated Utility Virtual Tape Library

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Management Summary

It has been said by many people more learned and famous than me that "**The whole is greater than the sum of its parts**". This has been proven true in many disparate areas from entertainment to sports to industry. When truly talented people put their own unique abilities together, the ensuing union can produce a result beyond the scope of human expectations. In the world of entertainment, for example, we were blessed with decades of comic relief from the marriage of George Burns and Gracie Allen. Here was an example of two individuals performing in concert who could play off of each other in a manner that simply could not be achieved by two solo performers. In music, the partnership of Richard Rogers and Oscar Hammerstein gave us words *and* music that have entertained millions for decades, long after either had passed from the music scene. In sports, we have countless examples of individuals whose athletic achievements increased dramatically when paired with a partner who could occupy the minds of their common opponent and build a greater success story than either could individually. Take for example the famous *Mr. Inside* and *Mr. Outside* of West Point football fame from the 1940's. Doc Blanchard, Mr. Inside, could run the ball up the middle, taking on the heart of the opponent's defense. However, if the other team knows that you are coming, they can stop superman. Paired with Mr. Outside, Glenn Davis, however, the opponents had no idea if the run would be up the middle or around end. Together they were unstoppable.

In the Information Technology arena, we see many examples of partnerships designed to take advantage of the strengths of both parties to make a greater whole. One classic example of recent vintage is the 20-year partnership between Sun Microsystems and Oracle. The central focus of this marriage was the joining of the Oracle database with the power of Sun servers, with *SPARC* technology and the *Solaris* operating system. This partnership has seen its latest manifestation in the availability of a one-year Oracle database license at no charge to the end user with the purchase of maintenance on *UltraSPARC IV* and *IV+* Sun Fire servers. Another partnership of hardware platform and software application has recently been announced, this time between 3PAR and FalconStor. Designed to take advantage of 3PAR's technology leadership in multi-tier, utility storage with their *InServ Storage Server* and FalconStor's leadership in backup/recovery with its *Virtual-Tape Library* (VTL) software, the resulting union has produced a solution that enables users to scale and consolidate their storage requirements on a single platform. To learn more about this unique partnership and how it can lower your total cost of IT ownership (TCO), please read on.

IN THIS ISSUE

The Data Center Storage Dilemma

The recent explosion of digital storage requirements within the enterprise has seen the installation of a myriad number of heterogeneous storage solutions infiltrating the data center, each with a unique set of service levels and administrative requirements. In the next two years, we can expect to see more new information being generated than has been created since the inception of computer storage. Where are we going to put it? How will we access it? How will we be able to expedite the backup process so that we can meet an already shrinking backup window?

All information may have been created equally; it most certainly does not stay equal over the course of its lifetime. Information requires lifecycle management[1] in order to ensure that the cost of storing it does not weigh its value to the enterprise. Some information is more valuable than others; it is *primary* data that provides input into mission-critical applications, for example. It requires instantaneous access. The platform on which it is stored must remain available at all times, 7 by 24 by 365. There is another set of information, a *secondary* tier, which must be retained due to corporate policy, but it does not have to have immediate availability, recovery data for example. There is a *third* set of information that must be retained to satisfy government regulations and keep the enterprise executive wing out of jail; financial data and email, for example. The value that the enterprise places on information determines how and where it is stored over the data center's storage resources. What data requires high-speed, redundant availability? What data can exist in a slightly slower and less expensive disk environment? What data can be archived to tape to take advantage of the lowest cost storage, although adding to the complexity of an already convoluted storage area network (SAN)? Can the enterprise take advantage of the higher performance provided by nearline disk to eliminate the need for tape? Is tape always required?

The data center staff is charged with protecting these valuable enterprise assets. The staff must also enable and manage access to all authorized individuals through the enterprise. Furthermore, they must do so within a limited, and decreasing, budget structure. They must implement a cost-effective solution for backup and recovery that combines the best features of both disk- and tape-based backup solutions. In this manner, they can deliver a unified back-up/recovery platform which enhances the performance and reliability of the process while consolidating the management and provisioning of the storage resource. But, how?

First, they must review a heterogeneous collection of installed storage appliances and determine the utilization factor of each, what kind of information is stored on each different tier of storage installed in their network, and what its present value is. Then they must implement a consolidation plan that enables simplification of the data center while at the same time improving asset utilization, allowing for a multi-tier storage environment and lowering the enterprise TCO. This must include service level administration that can become more complicated and expensive, defeating any reductions in cost achieved from physical consolidation. There are many solutions available, each one proclaiming to be the best solution for your enterprise. Just ask the sales rep!

One storage company, 3PAR, has recognized the problem and determined that they cannot develop a better software solution that those already available on the market. Therefore, rather than trying to reinvent the wheel, they have partnered with a company than has a better wheel, FalconStor Software. 3PAR has married its *InServ* storage platform, designed to be a multi-tiered utility storage environment, to FalconStor's *VTL* (virtual tape library) software, enabling the nearline availability of information that previously would have been archived only to

[1] See **The Clipper Group Explorer** dated August 29, 2002, entitled *Tiered Storage Classes Save Money – Getting The Most Out of Your Storage Infrastructure*, at http://www.clipper.com/research/TCG2002030.pdf.

tape. **This produces a solution for the data center that is more valuable that the sum of its parts.**

A Unified Utility Storage Solution

In order to enable the enterprise to consolidate all of their online, nearline, and backup/recovery application data onto a single, multi-purpose platform, the data center must identify a *scalable storage resource* with utility characteristics (See Exhibit 1, below) and *virtual tape library software* that can deliver the desired service levels for each tier while maximizing their cost-effectiveness. Both of these elements must conform to industry standards. 3PAR has combined its own utility storage solution, the *InServ Storage Server*, with FalconStor's *Virtual Tape Library* to do just that. This union has created a utility VTL that combines simple installation with high performance and easy management access to enable an efficient storage environment. Let's take a look at the parts of this utility solution.

The 3PAR Utility Storage Platform

The InServ Storage Server is available in two models, the *S400* and the *S800*. It is a flexible platform with a cost-effective entry footprint designed to be:

- ***Modular*** – Independent and upgradeable components covering capacity, connectivity, and performance help to eliminate any initial requirement for over-provisioning and extend the life of the platform, protecting the enterprise investment;
- ***Scalable*** – A single system with significant headroom in the areas of capacity, performance, and connectivity to satisfy enterprise requirements for years to come;
- ***Available*** – Performance under failure, rapid rebuild times, and non-disruptive hardware and software upgrades provide consistent service levels;
- ***High Performing*** – Asymmetrical virtualization technology in a heterogeneous workload environment ease performance concerns and reduce investments in array hardware;

Exhibit 1 –
Utility Storage Characteristics

- Capability to grow non-disruptively in a cost effective manner;
- Scalability in terms of capacity, performance, and connectivity;
- High Availability;
- On-demand provisioning without complex administrative overhead (automated); and
- A secure environment with measurable service levels in order to be shared in a common storage environment.

The InServ storage server is constructed around a simple, unique design, the 3PAR *InSpire Architecture*. InSpire technology consists of the *InForm* operating system and three types of hardware components: Controller Node, Backplane, and Drive Chassis.

Controller

This performance and connectivity building block is the proprietary data movement engine that 3PAR uses to leverage open systems standards. A single cluster consists of two to eight nodes[2], with an intra-node connection via a high bandwidth, low latency backplane. Each controller node can scale from 4 to 32 2-Gbps FC host ports. Each node runs its own instance of 3PAR's *InForm* operating system, independently, so any single node may fail without adversely affecting data availability. Each controller node is serviceable online and is configured with a battery backup to extend the life of each node in case of power outage, long enough to save its cache to an internal disk within the node.

Each controller node eliminates the performance bottlenecks created by competing workloads by separating control processing from data movement. For example, OLTP and data warehousing can coexist, enabling superior performance for both transactional

[2] An S400 will support up to 4 nodes, an S800 up to 8.

and sequential applications. This provides increased flexibility to consolidation projects, minimizing additional array requirements.

Backplane

This is a high-performance, passive, full-mesh backplane that unites all of the system resources to achieve a highly available platform with automatic load balancing and simple administration. It provides a dedicated 1-GBps link between each controller node. This low-latency backplane enables the controllers to form a single, cache-coherent system, enabling the transfer of work from one node to another in case of failure.

Drive Chassis

A single drive chassis can support up to 40 drives, 147GB and 300GB FC (higher performance) and 500GB Nearline (lower cost), configured in 10 hot-pluggable drive magazines of four dual-ported drives each, in a 4U enclosure. The ability to include both FC and Nearline drives provides the flexibility and investment protection to install a single drive chassis in a fully tiered storage infrastructure. A single InServ storage server can support up to 64 drive chassis, thus scaling from 16 to 2,560 drives[3] non-disruptively, with advanced fault isolation and error handling. Each chassis is configured with hot-pluggable, redundant power supplies and up to four 2Gbps FC ports. This enables all of the chassis components to be serviced online. 3PAR software controls RAID 10 and RAID 50 data distribution, enabling recovery from a magazine or chassis failure.

InForm Operating System

The InForm operating system delivers extensive capabilities for storage virtualization, ease of use, security, and service-level reporting. It also employs a 3-level virtualization scheme, based upon a mapping methodology, to ensure performance and maximize utilization. (See Exhibit 2, in the next column.) In addition, the InForm Suite includes 3PAR *Thin Provisioning* to eliminate problems occur-ring from allocating storage that is never used, and 3PAR *Access Guard* to restrict volume access to a specific host or port, or combination of the two. 3PAR *Full Copy* allows for the creation of a complete point-in-time copy of a virtual volume, enabling rapid application recovery, testing, and other applications.

Exhibit 2 – Mapping Methodology

- **1st Level** – Virtualizes physical drives of any capacity into a pool of 256MB "chunklets" to maximize disk utilization.
- **2nd Level** – Associates chunklets with logical disks based upon RAID level in order to meet precise cost, performance, and availability characteristics. This results in an automatic load balancing, minimizing requirements for array planning and disk management.
- **3rd Level** – Associates Virtual Volumes with logical disks for export to hosts and applications.

FalconStor VirtualTape Library

The FalconStor *VirtualTape Library* solution specifically addresses the most significant enterprise IT issue: maximizing storage investments in the face of shrinking budgets. It does this by focusing on four immediate tasks:

- Consolidating the management of backup resources;
- Enhancing the reliability and speed of backup operations;
- Accelerating the speed of recovery; and
- Securing the data in transit.

This is accomplished by taking advantage of industry standard disk devices to provision virtual tape drives and libraries for SAN-attached backup servers, without changing existing application configurations. This eliminates robot failures and physical tape errors and increases the data transfer rate for both backup and recovery. This also preserves the enterprise investment in backup policy and staff training. FalconStor VTL,

[3] This is twice the density of some competitive options.

combined with the 3PAR InServ platform, maximizes the performance and reliability of third party backup software by using disk to emulate industry standard tape libraries. Availability and performance are real business benefits which are also improved due to storage controller-aware I/O load balancing, taking advantage of the transparent failover capabilities of InServ or the ability to configure two arrays in an active-active mode to maximize service availability.

In addition to standard backup/recovery features, VTL also provides a Continuous Data Protection option (CDP), delivering rapid, reliable data recovery with reduced data loss and minimal downtime to help users attain recovery point and recovery time objectives. CDP puts VTL into a disk-based backup mode, allowing incoming information to be continuously replicated and journaled in order to provide multiple transactionally consistent reference points for data rollback to any good point in time. This enables users to recover business critical data quickly, as needed.

VTL also reduces administrative costs with a new level of centralized management via an IP-based delta replication option. This feature replicates virtual tapes over IP in a peer-to-peer or many-to-one configuration. VTL also lowers administrative overhead by enabling users to initiate full disk or file recovery through rollback or mounted snapshots. VTL allows virtual tapes to be exported automatically or on demand. The replication of data requires securing it during the transmission process. FalconStor VTL ensures this with the encryption of the data stream from one VTL to another, local, or remote, using the Advanced Encryption Standard (AES), with no impact to backup servers or the production environment. The *Encryption for Replication* feature efficiently prevents the information from being intercepted and read by unauthorized personnel. Further, encryption is administered through a simple key management process.

In addition, virtual tapes can be copied to physical tapes using the backup application copy function, offline, or replicated to a remote site where they can be stored as a virtual tape or exported to physical tape for archiving purposes. Once removed from a secure environment, however, a physical tape can be lost or stolen. *FalconStor VTL Secure Tape* feature encrypts data upon export from virtual to physical media, protecting it from any unauthorized access.

Conclusion

What 3PAR has not done is probably more significant than any overt action that they could have taken, to provide real business benefits for their customer base. **They did not try to reinvent the wheel**. Instead, 3PAR entered into the path of matrimonial bliss with FalconStor to deliver a turnkey business solution to reduce the TCO for storage to the data center. If we look at the improvements in utilization from consolidation and add to that the savings attributable to an increase in both availability and reliability, we can see a measurable benefit to the enterprise. We can also include the savings in time from moving tape I/O to disk I/O. How much of a savings? You will have to measure that for yourself the next time the data center needs to recover a mission-critical file from tape for an application that has brought your order/entry application to a grinding halt.

The 3PAR Utility VTL integrates seamlessly and securely with just about any existing backup application, whether it is from Computer Associates, HP, IBM, Legato, or Veritas. It is certified for maximum compatibility to preserve the investment that your enterprise has already made in backup and recovery policies. If your enterprise is looking to reduce costs and lower the total cost of IT ownership through consolidation, take a look at the fruit of this union. It may provide the scalable, secure, multi-tier storage solution that you need.

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