



3PARdata's Utility Storage Takes a Unique Approach To Attacking Cost and Complexity

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Management Summary

Like death and taxes, the universal bogies of information storage are *cost* and *complexity*. Enterprise IT departments struggle with these issues, and, in response, vendors are challenged to make their storage products simpler and less expensive to purchase and operate. This creative tension provides impetus for innovation and helps drive forward the storage industry.

In this context, the storage vendor 3PAR is blazing a different trail to address the problem of storage cost and complexity. Most industry efforts today are aimed at developing value-enhancing software and hardware that reside in the network and/or on host servers. **The general assumption is that the intrinsic efficiency of storage arrays in terms of resource utilization and operating costs will remain more or less constant (though performance and capacity will continue to climb, like the corresponding processing power gains in servers). Therefore – so the reasoning goes – one needs additional layers of intelligence to compensate and raise overall efficiency of the storage infrastructure.** Many promising technologies have emerged in this category, like storage resource management, heterogeneous device management, volume management, virtualization, and automated provisioning. They appeal especially to enterprises that want to optimize existing capacity, versus buying more.

But 3PARdata has challenged the prevailing assumption about storage efficiency by introducing what it calls *Utility Storage*. Rather than rely on additional infrastructure to compensate, **it simply makes a quantum leap in the efficiency, performance, scalability, and flexibility of the storage arrays themselves.** While Utility Storage does not preclude the other technologies, it can generate significant gains in ease of use and cost-effectiveness by itself.

3PAR's *InServ Storage Servers* are modular and extensible, like many midrange storage arrays, but deliver very high-end performance, availability, and scalability characteristics. With pricing that falls in the midrange, it is like the best of both worlds. The *InForm* operating system within the array delivers a variety of resource management, replication, high-availability, and security features. Of these, the most interesting are the internal virtualization and provisioning capabilities that deliver exceptional resource utilization.

For enterprises looking for a simple, all-in-one remedy to their storage pains, 3PARdata brings a unique offering to the table – and one that is starting to gain traction in the market. Read on for details.

IN THIS ISSUE	
> 3PAR Utility Storage – Hardware	2
> The Real Deal – Software.....	2
> Customers on Board.....	3
> Conclusion	3

3PAR Utility Storage – Hardware

3PAR Utility Storage is a 1-2-3 combination of software, hardware, and mission-critical solutions. It is comprised of the 3PAR *InServ Storage Servers* and 3PAR *InForm* operating system – all built upon the 3PAR *InSpire* architecture. The InServ product line spans both the midrange and high-end segments, providing consolidated storage for multiple servers and applications in both direct-attached and networked environments. The products use a common, highly-scalable architecture that offers up to 3 times the capacity with 2 to 5 times the performance of existing systems.

The InSpire architecture is designed as a tightly-coupled, cache-coherent cluster of up to eight controllers. Each controller runs its own copy of the operating system, so if one of the controllers fails, the entire array is not brought down. Controllers and cache are redundant with failover capabilities. A full-mesh, passive backplane interconnects the controllers and disk drives with high-bandwidth, low-latency links that deliver up to 28 GB/s of aggregate system bandwidth in an eight-way system. The backplane handles both data movement and control communications.

Using dual Pentium processors, the controller nodes separately process control and data traffic, which enables it to handle many small I/O commands at the same time as large blocks for data transfer. In contrast to other, especially midrange storage arrays, 3PAR's approach allows the system to maintain superior performance to multiple applications with different workload profiles. **3PAR Utility Storage's features translate into greater storage**

consolidation onto a single platform, fewer arrays and different models in the data center, easier management, and ultimately lower operating costs.

The InServ Storage Server comes in three models, the *S200*, *S400*, and *S800*. (See the table below for details.) At the high-end is the S800 with up to eight controllers, 2,560 Fibre Channel (FC) drives, up to 376 TB of raw capacity (using 147 GB drives), and 192 FC ports (at 2 Gbps). The ports are shared between host server and drives, and the ratio is configurable depending on performance and connectivity requirements. The mid-range S400 supports up to 188 TB, and the S200 entry-level model up to 94 TB. Adding controllers and disk drives as well as upgrading firmware are non-disruptive to the host applications. The drive shelves and controllers are also interchangeable between models, protecting the investment. Host operating system support includes *Solaris*, *Windows*, *HP-UX*, *AIX*, *Tru64*, and *Linux*.

Entry pricing for InServ Storage Servers is under \$100,000. Per-megabyte pricing is consistent with the midrange segment, making it quite competitive with other high-end arrays. Software is licensed on a per-controller basis, except for *Thin Provisioning*, which is licensed by capacity dedicated to the facility.

The Real Deal – Software

The InForm operating system is the intelligence within the InServ Storage Servers. InForm performs system resource management, virtualization and volume management, tracking service-level metrics, full and snapshot copy with fast resynch,

3PARdata's InServ Storage Servers

	<u>S200</u>	<u>S400</u>	<u>S800</u>
Controller Nodes	2	2 to 4	2 to 8
FC Ports	4 to 24 (48*)	4 to 48 (96*)	4 to 96 (192*)
# Disk Drives	16 to 640	16 to 1,280	16 to 2,560
Max Raw Capacity	94 TB	188 TB	376 TB
Max Cache (Control +	20 GB	40 GB	80 GB
Throughput	625 MB/s	1,250 MB/s	2,500 MB/s
IOPS (from disk)	25,000	50,000	100,000
SPC-1 Benchmark**	12,905	N/A	47,001

* Available with 4-port card for release Q3 2003.

** As reported by 3PARdata. See <http://www.storageperformance.org> for details on spec.

remote mirroring, load balancing, and volume access control. It also offers a graphical user interface (GUI) and command line interface (CLI) for centrally managing multiple InServ systems. **While some of these useful capabilities are “par for the course” in a high-end storage array, the virtualization and volume management features are truly exceptional.**

The InForm operating system presents a single-system virtual image to hosts and administrators. It breaks the disks into 256-MB “chunklets”, which are then assembled into logical disk units with particular performance and availability characteristics, and then finally into virtual volumes presented to hosts. **This three-level scheme of fine-grained virtualization provides very efficient utilization of raw disk capacity. It allows the system to meet a range of service-level requirements simultaneously, and it can deliver exceptional performance by striping data across many disk drives and leveraging their aggregate bandwidth. It also mitigates the need for volume management on host servers by delivering it in the array, which can save software costs and administrative efforts.**

But InServ’s virtualization capabilities and benefits do not stop there. It also addresses the vast amounts of allocated but unused storage that enterprises are faced with, costing millions of dollars. **Storage vendors traditionally install and configure physical capacity upfront for use over a given period of time, and administrators allocate it in large chunks to applications. This avoids out-of-space conditions, application downtime, and the tedious process of continually adding more capacity. However, a large part of allocated capacity typically remains unused.** Like a vacant building, it sits there idle, as a tribute to wastefulness. The bottom line is the customer often pays a high price for excessive amounts of capacity in anticipation of growth expectations.

Thin Provisioning

In June of 2003, the company announced a new software option called *Thin Provisioning* that addresses this problem. It uses *Dedicate-on-Write (DoW)* technology that enables administrators to allocate as much logical capacity as needed over an application’s lifetime. Physical capacity is then automatically drawn from a common pool when needed, but this takes place only when an application writes data and fills

capacity in the storage array. **So the application thinks it has all the capacity it needs indefinitely, but it actually receives it in small dispensations as needed.** This feature also applies to data replicated in RAID groups, point-in-time copies, and mirrors, creating an efficiency multiplier. **Thin Provisioning allows 3PAR Utility Storage to go the extra mile in improving resource utilization, easing administration, and reducing operational and environmental expenses such as floor space, power, and cooling consumption.** In other words, the added cost to buy, house, power, cool, and manage a lot of unused disk drives is greatly reduced. 3PAR believes this feature will change the way storage is managed and distributed to applications, dramatically reduce total cost of ownership, and accelerate storage ROI.

It is also worth noting that InServ GUI is quite easy to use and a mere day of training can prepare an administrator to operate the system. This can ease training costs, speed up system deployment, and make it easier to “slip into” the product.

Customers on Board

The InServ Storage Server became available in fall 2002, and 3PAR has landed more than 13 customers in the U.S. and Japan. They include sizable companies like Hitachi ULSI, Infinity Pharmaceuticals, Merrill Lynch, Veritas, AIG, and Matsushita Electronic Works IS. This is not bad for a newcomer in a difficult and competitive market, and it suggests 3PAR has staying power.

Conclusion

If you think of a true utility, customers “turn it on”, use as much as they need, and pay for it as they use it. 3PAR Utility Storage is a step or two closer to this vision than other arrays on the market. Its unique architecture and software capabilities form an all-in-one solution for better efficiency and consolidation – and for attacking the persistent problem of storage of cost and complexity. **If the name of the game is to spend wisely, use efficiently, and help the bottom line, then the 3PAR message of provision more, purchase less, and accelerate ROI is right on target.**



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