Terabyte SAN / NAS Backup & Restore: Meeting the Challenge Using *IPStor* and *NetVault*
**Today’s Storage Demand**

As information storage requirements continue to double and triple, companies of all sizes are all facing a dilemma in managing corporate information storage. As multi-terabytes of stored information become the norm, the issue of backing up or restoring very large amounts of data in the shortest possible time has become increasingly urgent. Although backup times are critical, restore times are even more critical when the time comes to recover corporate data. Information recovery times are critical to the overall financial bottom-line of the corporation in today’s competitive marketplace.

Even with today’s corporate down-sizing and conservative spending trends, information storage requirements continue to escalate at a phenomenal rate. Forrester Research predicts that companies will increase their average online storage capacities by a factor of 10 over the next five years. This means that storage and the associated administrative and maintenance costs will grow from the current 5% of IT budgets to 17% or more in 2003. Dataquest, another leading industry analyst, reports the average desktop consumption of storage space has grown from 1.4 GB in 1997 to 3.5 GB in 1999 and is projected to reach 14 GB in 2003. For corporate data centers, worldwide RAID capacity deployment will grow to 1.3 million TB by 2003 at a compounded annual growth rate of 79%. Even though cost-per-megabyte for storage is declining at the rate of 35% to 40% per year, the increase in complexity of storage systems, such as mirroring, 24x7 backup, high-availability configurations, leads to increases in storage management costs.

As the need for more efficient information management grows, Internet, e-commerce, and digitization of data increase the requirement for more effective communications bandwidth. Data corruption, viruses, hard disk failure, power failure, accidental or malicious data deletion, theft and natural disasters are all situations that necessitate attention for a meaningful, centralized data management strategy.

As the stored data becomes more critical and irreplaceable, the need for uninterrupted availability of data and for fast, complete recovery is absolutely required. A company without the ability to store and retrieve its data on-demand will lose “the battle” to its competitors with that ability. It is estimated that the ratio of management cost vs. acquisition cost for storage has increased over time to 8:1 in 1999 (source: SNW, 1999). This means that for every $1 spent on purchasing storage systems, another $8 will be spent to perform on-going maintenance and management.
The combination of increasing amounts and overall reliance on corporate information brings a new level of importance to what was once a relatively straightforward aspect of data management – backups. Some organizations face such a tremendous rate of change in their data that they require continual round-the-clock backups. All of these trends are placing enormous pressure on Information Technology organizations to increase the speed of backups while reducing the degree to which they intrude on day-to-day operations. High performance is one of the keys in solving this problem.

Improvements have been made over the years in tape storage technologies, interface technologies, backup and recovery management strategies, and software applications. To keep up with these technology improvements, backup and restore software applications also need to be able to adapt and sustain the increased data throughput thresholds.

**Innovative Storage Management**

With this ever-increasing information storage need, comes an equally new level of complexity in the deployment and management of storage devices. This complexity can be significantly reduced by employing SAN and NAS technologies into an existing LAN/WAN environment. Although there are still debates about advantages and disadvantages between NAS and SAN, the reality is that these two storage topologies do not compete. Rather, they are both needed in corporate data centers. NAS represents a quick and easy way to add shareable storage space to users and workgroups for general purpose file sharing, or to some application servers that are not storage-intensive. SAN represents a way to separate the server and storage into two independently managed layers, yet maintain SCSI block level access by the servers, simplifying the complexity of the overall IT infrastructure.
Fibre Channel has come a long way and emerging as a potential de facto means to implement a SAN. However, various shortcomings, including cost, have required the need to apply multiple niche solutions to fill connectivity, storage virtualization, storage management, and security requirements. Given that the demand for enterprise storage keeps increasing, the market is ripe for a sensible alternative to SAN and NAS; an approach that makes not only good use of fibre channel, but also taps into the vast connectivity of IP/iSCSI via affordable Gigabit Ethernet.

SAN and NAS storage should be provided from a single virtualized storage pool and managed under a unified management umbrella, including daily backups, all from one centralized storage management console. NetVault, from BakBone Software, Inc., is a high-performance enterprise backup and restore software suite, that provides simple, yet powerful, point-and-click SAN and NAS backup capabilities, all from a centralized management console. In combination with the new IPStor virtual storage management engine from FalconStor, NetVault provides the most cost-effective, high-performance information management solution available in today's converging world of LAN, NAS and SAN technologies.

**Demonstrable Alliance for Absolute Virtual Storage Solutions**

It is difficult to filter through the plethora of press releases about all the new hardware and software products that position new standards as the saviors for providing safe, secure, fast, reliable, scalable and “lights out” failsafe network operation. With all too many unanswered questions about the integration, data integrity, compatibility, interoperability, total cost of ownership, infrastructure
Early technology adopters, once heralded as trailblazers and gurus, are an endangered species in today’s economy, and once again the conservative pragmatist rule the distributed processing domain. These post-millenium IT managers carry the heavy burden of resolving the data storage pandemonium brought on by the de-centralized computing model that requires absolute, no-compromise storage solutions that really work. These solutions must be elegant, robust, seamless, simplistic and, most importantly, make sound economic sense. The basic challenges facing the networking world is how to move huge amounts of data quickly and reliably; organize it and store it; then save and retrieve it; and finally, how to keep it safe from disaster.

**Finally, a Natural Alliance that Makes Sense**

BakBone’s NetVault, a high performance enterprise backup and restore suite, combined with the robust IPStor storage virtualization engine from FalconStor, have forged an alliance that blends the very best attributes of data protection software with a non-complicated storage resource management software that frees the network administrator from having to worry about the myriad of nuances associated with SAN, NAS, iSCSI, DAFS or InfiniBand interface standards and protocols. The unique bond between NetVault and IPStor can be characterized as “natural synergy” where two totally unrelated software suites can be deployed as “co-operative applications” that fully compliment each other’s functionality without co-mingling their native code bases.

IPStor runs on a standard Linux-based server and supports both block-level and file-level I/O transfers allowing concurrent “inband” control over standard IP networks. This symmetrical configuration allows the IPStor software to reside within the data path between the application servers and the storage assets enabling end users to combine SAN and NAS devices under a central storage topology. Additionally, the product provides such dynamic services as high availability, snapshot copies, mirroring and “zero-impact” backup and recovery utilizing BakBone’s NetVault. According to Steve Duplessie, senior analyst with Enterprise Storage Group in Milford, MA, “IPStor comprises not only end-to-end IP-based storage networking but also a full-blown virtualization engine.” The value proposition of zero-impact backup is quite compelling when terabytes of information storage are required to be protected in ever-decreasing backup time spans.
A Sensible Alternative

The IPStor network storage infrastructure software by FalconStor, Inc. is the only solution in the market today that is based on the vision of providing true unified SAN plus NAS services. The design of IPStor incorporates a wide variety of technology implementations, allowing it to operate as enterprise-class storage infrastructure software.

Key IPStor Features:

- Supports FC, SCSI, and future iSCSI and InfiniBand-based storage devices.
- Interfaces with application servers through standard/Gigabit Ethernet IP infrastructure using a storage-over-IP (SAN/IP™) protocol to provide virtualized storage resources.
- Provides NAS services using CIFS and NFS protocols on virtualized storage resources shared with SAN.
- Storage virtualization with dynamic volume re-sizing
- Mirroring
- Snapshot
- Remote replication
- High availability through active-active failover
- SNMP management integration
- Access security (Authenticated Diffie-Hellman)
- Zero-impact backup and restore using NetVault backup & restore software
- LAN-free and server-less backup using NetVault backup & restore software
- Java-based management console
- End-to-end diagnostics and reporting
- NAS service through CIFS/SMB and NFS
- SAN service through IPStor SAN Client driver, a virtual SCSI Adapter driver running at each application server.

Coupled with the NetVault backup software suite, the FalconStor IPStor delivers maximum data throughput to any attached tape storage device at speeds comparable to the actual device performance specifications. NetVault is BakBone Software’s answer to the demand for an easy to use, fully functional, high performance, scalable storage management software solution. From workgroup to enterprise, from LAN, SAN and NAS, NetVault’s unique modular architecture and flexibility provides the most advanced solution to protect your most valuable asset…information. NetVault is truly a modular solution that delivers ease of use without compromising robust performance.
Included with the standard NetVault package is the TurboVault performance enhancement utility, providing the user with the ability to tune and allocate the amount of memory shared between the IPStor and NetVault according to available memory and native speed of the backup tape device. TurboVault tuning parameters also provide the ability to adjust data transfer block sizes to be used in conjunction with the memory allocation. This allows the user to tune and control data transfer to meet their requirement.

In initial NetVault v6.0.3 performance testing at FalconStor with standard LTO drives connected to the IPStor, average backup data transfer rates were clocked at 30MB/sec and restores of 32MB/sec. Equating to 108GB/per hour backup and 115GB/hour restore times with a single LTO drive over a standard IP Ethernet backbone, these are amazing numbers when calculating the overall ROI for a standard IPStor / NetVault configuration solution.

Thru the use of the Zero-Impact Backup capabilities of IPStor, not only is data transfer rates maximized, but overall network traffic and trouble-shooting is minimized as raw data is backed up directly from the local IPStor journaled magnetic disk to the IPStor locally attached NetVault backup device. Employing zero-impact backup provides a viable alternative to the hardware-dependent and minimal data transfer rate capability of competitive third-party and e-copy initiatives.

**Key NetVault Features:**

- Simple Point-and-Click Administration
- Modular Core Architecture
- SmartClients™ – Allows Sharing Of Client-Attached Media Devices
- Dynamically Shared Drives™ (DSD) – Allows SAN/NAS Sharing Of Media Devices
- TurboVault Performance Tuning Features
- Application Plugin Modules – DB2, MS Exchange, Informix, Lotus Notes, ODS, Oracle Online, Oracle RMAN, SAP R/3, MS SQL, Sybase ASE
- Consolidated File System Backup
- SAN Lan-free Backup
- NDMP NAS Support
- DVD-RAM Support
- Disk Staging
- Virtual Library Support
- Cleaning Cartridge Support
**Summary**

The IPStor product from FalconStor, Inc. is the only information storage solution available today that provides unified SAN and NAS storage infrastructure for enterprise-class environments, at a fraction of the cost of comparable component-level products. IPStor is an enabling technology that provides the ability to upgrade the performance capabilities of any existing IP infrastructure investment already deployed, without requiring additional expenditures to bring fibre channel performance to your existing Ethernet backbone. Coupled with the NetVault backup and restore software suite, the IPStor provides a true SAN and NAS enterprise-wide information storage management solution that outpaces any other comparable configuration in both cost and performance.

**Key Points To Remember:**

- Eliminates Backup Software At Application Servers ~ Zero-Impact Backup
- Runs NetVault Backup & Restores On IPStor Server
- Ultra-Fast Image Backup and Restore With SnapShot
- Ensure Transactional Integrity For DB2, MS Exchange, Informix, Lotus Notes, ODS, Oracle Online, Oracle RMAN, SAP R/3, MS SQL, SybaseASE
- Minimizes Administrative Overhead Through A Centralized Information Management Console