Clustered NAS: Scalable, Manageable Storage

Doubling Storage Capacity

It is difficult to imagine any area of the business world that has not been dramatically altered by the move to digital communications. Departmental web servers are as common as fax machines, and plain text documents have been replaced by online rich media as the preferred medium for exchanging business information. The trend is having an enormous impact on storage systems.

Instant access to digital content requires a tremendous amount of storage capacity. Industry analysts predict that most organizations will double their storage needs each year, with management costs far outpacing hardware and software costs, as capacity increases. These direct costs, alone, tell only half the story. System outages due to disk-full, disk-failure or disk-upgrades are having a dramatic impact on business productivity and competitiveness, with the cost of downtime now reaching $100,000's per hour in industries like retail and financial services. Storage availability is now a high visibility business problem.

Recognizing the looming crisis, storage vendors have responded with significantly easier to install and manage general file serving technology. Network Attached Storage (NAS) is rapidly replacing Server-Captured Storage (SCS) and Direct-Attached Storage (DAS), as the scalability and productivity limitations of the older technologies become evident. The emphasis on simple to deploy storage appliances has resulted in NAS: a technology that allows storage devices to be quickly plugged into an existing network, becoming operational in a matter of minutes.

Not all NAS solutions are alike, however, and assessing the business need for availability and scalability of the storage system can quickly help to distinguish different NAS offerings.

Low-End NAS and High-End NAS

Small, low-end NAS devices provide instant-on storage capacity with minimal administrative overhead, but can create a long-term management problem. Adding more storage results in more devices, increasing the system administrator's day-to-day management burden, and requiring downtime while each new box is installed. High-end NAS appliances provide large volume capacity, giving the system administrator breathing room between upgrades, but come with a high price tag, and often more features than many applications need.

What most organizations need from general file serving storage falls somewhere between these two alternatives. The Lunar Flare NAS Appliance from Tricord Systems provides such a solution, offering the scalability and availability of high-end NAS with the cost-effectiveness of low-end NAS.

Tricord Lunar Flare NAS Appliance – the aggregated answer

The Lunar Flare NAS Appliance provides a highly scalable, highly available, pay-as-you-grow general file serving storage solution. Based on patented clustering technology, the Tricord Illumina™ software aggregates multiple Lunar Flare NAS Appliances into a pool of

storage, presenting one general file serving interface to end-users, client applications and system administrators.

Illumina™ is a true distributed file system, efficiently utilizing the resources of all clustered Lunar Flare NAS Appliances. Spreading the load of end-user file data, and metadata, across each pooled appliance, Illumina™ gives the cluster unprecedented scalability and availability. The distributed file system provides end users, client applications and administrators with a single, consistent view of files, from any cluster network access point.

The Lunar Flare NAS Appliance allows administrators to incrementally adjust end-user storage growth with pay-as–you-grow scalability. Adding space to a Lunar Flare NAS cluster is as simple as connecting another appliance to the network: the new storage is auto-detected and integrated into the cluster, without the need for downtime. The Illumina™ software dynamically redistributes file system data across all available appliances in the cluster, without impacting end-user access.

Illumina™ eliminates the complexity of managing multiple storage appliances. Using browser-based administration software, Illumina™ provides one point of management for the entire pool of Lunar Flare NAS Appliances, dramatically improving administrator productivity.

Implementing a unique RAID architecture across all appliances in the cluster, the Lunar Flare NAS cluster provides bulletproof fault tolerance. The Illumina™ software stripes file data across all available Lunar Flare NAS Appliances. If one appliance fails, parity data from surviving appliances allows end-user file serving to continue uninterrupted. Support for hot-spare NAS appliances enables data from a failed appliance to be dynamically reconstructed, bringing the system back to full fault tolerance.

Just-In-Time Storage Capacity

The efficient scaling of storage capacity is an issue system administrators have confronted for many years. Traditional SCS and DAS storage architectures offer limited growth; SCS scalability restricted to the number of disk drives physically enclosed in the server box, and DAS restricted by the limits of the SCSI architecture. Adding disks to SCS and DAS configurations compounds performance bottlenecks as CPU and memory become increasingly constrained. NAS technology promises an instant-on, plug-and-play solution to storage growth, but not all NAS appliances offer the same scalability.

The simplicity and affordability of low-end NAS provides a tempting solution to the problem of constantly increasing storage capacity. But low-end NAS offers limited growth, requiring the addition of more NAS devices to the network as the capacity of each appliance is reached. Each new NAS box requires downtime, in order to map existing users to the new storage, and adds more platforms to be managed by the system administrator.

High-end NAS appliances, on the other hand, provide customizable storage capacity with room for significant growth as demand increases. The downside is that these high-capacity enterprise systems come with a very high entry price, forcing customers to pay for more storage space than they immediately need.

Tricord Systems, Lunar Flare NAS Appliance solves the scalability problem by providing cost-effective, pay-as-you-grow incremental growth. The Illumina™ software aggregates multiple Lunar Flare NAS Appliances into a single pool of storage, so organizations only pay for the configuration that satisfies today's storage needs. As capacity demands grow,

adding more storage space is simple. Each new Lunar Flare NAS Appliances is automatically detected and dynamically integrated into the storage pool without impacting end-user access, eliminating the need for system downtime, and providing instant access to more storage.

Managing More With Less

The escalating growth in storage capacity is happening at a time when organizations are also facing a shortage of qualified IT staff, with the burden of managing more with less falling on the system administrator. While NAS appliances provide immediate productivity gains - by eliminating the task of configuring general-purpose computers for file system storage – the choice of NAS must be carefully considered. Short-term fixes for capacity shortages can result in longer-term management problems.

Low-end NAS appliances provide instant relief for over-burdened system administrators, but as the capacity of the appliance is reached, administrators have little alternative but to add another appliance. Each new device requires end-user access to be reconfigured in order to take advantage of the new capacity. This invariably means late nights and weekends for the administrator, who must schedule system downtime when business users are not active on the system. The administrator now has two NAS objects to manage, rather than one, adding to the day-to-day management workload.

High-end NAS appliances extend the interval between the capacity upgrades but, as demand continues, additional storage will eventually be needed, leading to the same multiple appliance management issues noted for low-end NAS.

The aggregated Lunar Flare NAS Appliance uses sophisticated clustering technology to dramatically boost system administrator productivity. No matter how many Lunar Flare NAS Appliances are pooled together, they present a single point of management for the administrator. All appliances in the cluster are monitored and managed simultaneously, from anywhere on the network, using browser-based management tools.

The Lunar Flare NAS cluster offers a manageable growth path, with configurations ranging from 258 Gigabytes to over 2 Terabytes of raw capacity. Expanding the storage space requires minimal system administrator intervention and can be performed without taking the cluster offline. The Illumina™ software dynamically adjusts RAID configurations, file allocations and end-user access mapping to accommodate new storage space, without impacting end-user access to files.

Beyond RAID

NAS, like every other component of the digital infrastructure, is subject to increasingly stringent availability expectations. Departmental NAS appliances support business critical customer facing services and applications, and around the clock end-user access. Any interruption in NAS service can have a tremendous impact on the entire business.

Low-end NAS appliances frequently offer support for internal RAID, providing a base level of fault tolerance. If a single disk fails, the appliance will continue to support file access. However, no redundancy is offered for CPU, memory, network, power supply or the cooling fan, leaving the system vulnerable to a single point of failure from any one of these components.

High-end NAS appliances offer abundant redundancy, maintaining duplicates of every component in the system. This over-engineered approach provides high levels of fault tolerance but at a high price.

The Lunar Flare NAS Appliance offers an innovative, elegant and cost-effective alternative to the under-provision of low-end NAS and the overkill of high-end NAS.

The Lunar Flare NAS Appliance responds to the need for fault tolerance with state-of-the-art clustering technology. Implementing a virtual RAID architecture, the Illumina™ software disperses end-user files across appliances in the cluster: If one appliance fails, another will always be available to continue serving file data to users. In configurations of more than three Lunar Flare NAS Appliances, files larger than 1MB are striped across all appliances in the cluster, in a virtual RAID5 implementation. For files smaller than 1MB, and for configurations of fewer than three NAS appliances, data is mirrored between two appliances, in a virtual RAID1 implementation.

The Illumina™ software supports the use of hot-spare appliances: Lunar Flare NAS Appliances configured into the cluster but not actively hosting files. In the event of an appliance failure, the hot-spare unit is drafted into service, and files from the failed appliance are copied to the unit. End-user file serving continues uninterrupted while data is automatically rebuilt on the hot-spare, bringing the entire system back to full fault tolerance without the need for operator intervention.

High-Performance File Serving

The rapid increase in storage capacity is having an inevitable impact on file serving performance. As NAS appliances host more and more files, limited access to CPU, memory and network connectivity become the bottleneck. Conventional NAS appliances, both low-end and high-end, offer little to alleviate this bottleneck.

The Lunar Flare NAS cluster implements a distributed file system that balances file access across all available NAS appliances. End-users see the same file system configuration no matter which appliance access point they enter the system from. The distributed nature of the Lunar Flare NAS cluster means that as appliances are added to increase storage capacity, CPU, memory and network connectivity also increase, giving the cluster near linear performance scalability.

Lunar Flare NAS – Solving the Scalability and Availability Problem

The rapid growth of storage capacity experienced by all businesses is a natural consequence of the continuing move to a digital economy. The production, aggregation and dissemination of content is now one of the chief competitive differentiators for any business. The ability to securely house the growing amounts of digital information and guarantee its availability, without incurring a significant maintenance burden, is becoming a significant business issue.

The Lunar Flare NAS Appliance from Tricord Systems offers a unique aggregated approach to deploying and managing general file serving storage. Using clustering technology, powered by the revolutionary Illumina™ software, the Lunar Flare NAS Appliance offers pay-as-you-grow scalability. The auto-detecting, self-configuring Illumina™ software seamlessly integrates new capacity into the NAS cluster to provide instant access to additional storage space, without requiring system downtime.

The Lunar Flare NAS Appliance provides sophisticated high-availability features that safeguard file system access, even if an appliance in the cluster fails. Automatic integration and deployment of hot-spare appliances provides continuous end-user file system availability, without operator intervention.

Offering the entry-point advantages of low-end NAS with the scalability and high-availability features of high-priced NAS, the Lunar Flare NAS Appliance provides a long-term, strategic NAS solution.