

PANASAS ACTIVESCALE 3.0 OPERATING ENVIRONMENT

Object-Based Parallel I/O for HPC Linux® Clusters

The foundation of Panasas® ActiveStor parallel storage solutions is the Panasas ActiveScale operating environment which includes the PanFS™ parallel file system. Now in its third generation, the PanFS parallel file system turns files into smart data objects and then dynamically distributes data activity across Panasas StorageBlade® modules. This object-based storage clustering architecture enables parallel data paths between StorageBlade modules and clients (Linux cluster nodes, application servers or workstations) and eliminates the inherent performance and capacity bottlenecks of traditional file systems. The result is that Panasas ActiveStor storage solutions deliver an order of magnitude improvement in throughput and random I/O performance over leading alternatives. The ActiveScale operating environment also dramatically lowers the cost of managing data storage by supporting Terabytes (TBs) to Petabytes (PBs) of data capacity growth all within a single, easily managed namespace.

Object-based Architecture

Panasas is leading a new wave of intelligent storage. The core principle of the object-based architecture is distributing block management to the storage device in contrast to traditional storage systems that manage blocks on the file server and create a storage bottleneck. These data objects are written to smart object storage devices on a massively parallel scale to remove the performance bottlenecks of traditional designs. Also, data objects can be resized without limitation and independently from other storage system activity, allowing the management of all data within a single seamless namespace and providing independent and parallel growth properties.

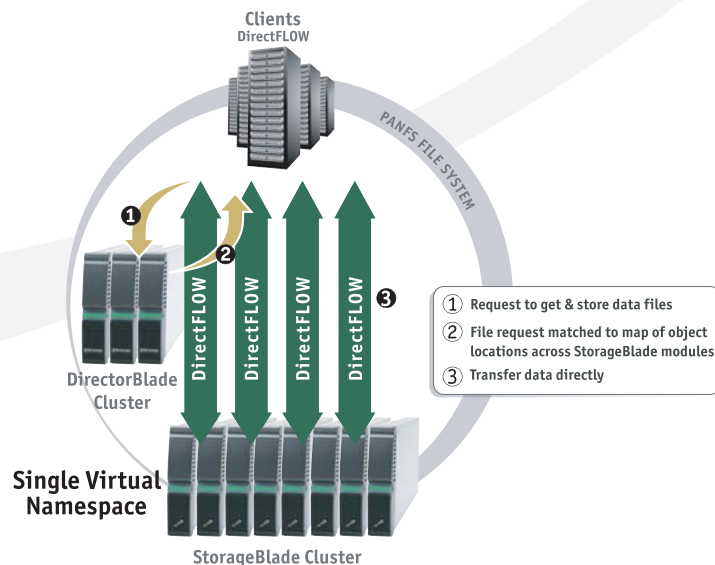
DirectFLOW® Protocol

The performance advantage of the Panasas ActiveStor storage cluster stems from the out-of-band DirectFLOW protocol that enables direct communication between clients and StorageBlade modules. This concurrency

eliminates the bottleneck of traditional, monolithic storage systems and delivers up to 30X performance throughput improvement. The number of data streams is limited only by the number of StorageBlade modules and the number of client nodes. The Panasas ActiveStor storage clusters also support NFS and CIFS protocols enabling UNIX® and Windows® applications to take full advantage of the storage cluster with no client agent required.

PanFS Parallel File System

The Panasas PanFS parallel file system has been designed from the ground up for efficient partitioning of workload and minimal interdependence between clustered elements. Panasas DirectorBlade® modules can be clustered together for a highly scalable, fault-tolerant storage network. By injecting intelligence throughout the object-based architecture, fine-grained, dynamic load balancing is achieved. The DirectorBlade modules work together to



coordinate access to the StorageBlade modules while maintaining cache coherency among the clients. To remove potential I/O bottlenecks, active "hot spots" are identified quickly and object migration routines are invoked to move existing data objects to less utilized StorageBlade modules. In addition, DirectorBlade management activity can be load balanced among all DirectorBlade modules in the cluster.

Predictive Self-management

Panasas Predictive Self-Management encompasses a number of key technologies that work together to deliver elements of health monitoring and self-healing, ensuring the Panasas ActiveStor storage cluster continues to operate and provide maximum performance and continuous access to data. For example, Panasas ActiveScan is a self-healing technology that continuously monitors and maintains the health of your data and the storage devices that hold

it. ActiveScan ensures continuous performance by monitoring the data objects, the parity, the disk media and the individual disk drive attributes. If a potential problem is detected, then the data objects or the parity can be moved to empty space on the disk. If a potential failure of a StorageBlade module is detected, then data can be moved to other StorageBlade modules in the background, usually before the blade actually fails, eliminating the need for reconstruction. If a reconstruction is required, then all DirectorBlade modules in a storage system cooperate in parallel to speed reconstruction up to 10x the rate of conventional RAID controllers, completing rebuild of a 500 GB Blade in less than 90 minutes. Panasas ActiveUpgrade enables all software upgrades to be performed online while applications are running, eliminating user downtime for upgrades. Real-time monitoring of client load generation automatically identifies performance bottlenecks among storage users and notifies administrators.

The Premier Storage System For Scalable Linux Clusters

Panasas offers comprehensive storage solutions for all HPC environments with the highest bandwidth and I/O performance in the industry. The unmatched scalability and capacity of the ActiveStor storage clusters is supported by an easy-to-use management environment. Built on an object-based, parallel file system architecture and optimized to meet the unique needs of Linux cluster customers, the Panasas integrated hardware and software solution is proven in hundreds of Linux cluster installations around the globe.

For more information, contact us today at www.panasas.com or 1-888-PANASAS.



Accelerating Time to Results™

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