

*SAN*Cluster

Excellent Performance

- World-leading clustered metadata technology
- Large directory support and fast filename lookup
- Supports data & metadata intensive workload
- Near linear aggregated read/write throughput with the increase of storage nodes

Superior Reliability

- No single point of failure
- Automatic failure detection
- Fast data recovery

Best TCO

- Pay as you grow
- Single management interface
- Predictable scale up capacity and performance.



*SAN*Cluster

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SANCluster InfinityScale Storage

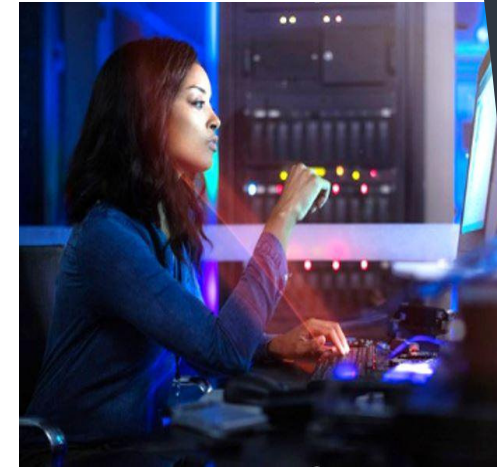


Scale-out Technology at work for you

ADDRESSING YOUR FUTURE DEMANDS BY SANCLUSTER SCALEOUT TECHNOLOGY

SANCLUSTER **InfinityScale** Storage is a scale out storage solutions designed for large-scale, data-intensive applications. With a fully POSIX-compliant parallel file system and other software components, SANCLUSTER **InfinityScale** Storage scale out solutions provides the best price and performance storage solution.

SANCLUSTER **InfinityScale** Storage has proven customer successes in Internet, oil & gas, life sciences & bioinformatics, media & entertainment, video surveillance, education and government for high performance computer (HPC) storage solutions.



Best Total Costs of Ownership

SANCLUSTER **InfinityScale** Storage provides a complete solution for your storage needs.

With predictable performance and capacity to increase by adding additional storage node, customers are only need to pay as you grow. Our price/performance solution is competitive to all of the other commercial scale-out solutions.

Fast Deployment

All storages are preconfigured with either 144TB or 216TB configuration. IT or storage administration only takes less than 15mins for deployment. With automatic load balance and non-disruptive upgrade, storage nodes can be added with just a few clicks to scale out the solution which are all transparent to the application servers or computing node.

Easy Management

SANCLUSTER **InfinityScale** Storage includes a centralized management GUI, **InfinityScale** Manager, to configure, manage, and monitor the systems. Only one administrator can easily manage a cluster with PB level of storage.

Flexible solutions for Your business needs

Reliability

SANCLUSTER **InfinityScale** Storage systems are design with no single point of failure. Both data path and data storage have built-in redundant path in order to prevent possible down time. In addition, Data is replicated across storage node networks to prevent disk, server or network failures.

Built-in automatic failure-detecting mechanisms can detect hardware failures and self-healing process provides recovery automatically. The process is totally transparent to applications and no manual recovery is required.

Compared to traditional RAID controller, recovery time is only 1/5 of the time required to recover from hard drive failure.

Load Balancing

Traditional storage uses RAID as the physical unit and LUN as the logical unit, which limits data allocation and tends to result in an unbalanced load. SANCLUSTER Storage evenly distributes data and replicas in parallel to different storage nodes, ensuring all the disks have the same level of utilization. When customers add new servers for more capacities, system workloads will be balanced automatically to maintain the utilization and increase the overall performance.

SANCluster InfinityScale Ability

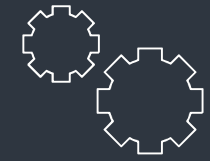
SANCLUSTER **InfinityScale** Storage capacity and performance is based on linear expansion. Based on a non-disruptive systems expansion and predictable capacity and performance increase, SANCLUSTER Storage Scale out Solution provides best ROI for your storage budget and growth.

Performance

SANCLUSTER **InfinityScale** Storage is designed for data & metadata intensive workload. It utilizes ~90% of network performance. SANCLUSTER Storage File System (SANCLUSTERFS) is optimized for both large files (>10GB) and small files (KB-sized). Large files are striped as 64MB sections across storage node. The aggregate throughput grows linearly when adding more storage node.

With world's leading clustered metadata technology, SANCLUSTER **InfinityScale** enables the support of large directories and fast filename lookup, ideal for Big Data/Cloud management. Supporting up to 4,000 computing nodes, with hundreds of GB/s aggregated throughput.

Metadata servers can also scale up linearly. SANCLUSTER **InfinityScale** Storage supports more than 200 billion filename lookups with up to 128 metadata servers, offering hundreds of thousands of files per second.



Fast Deployment
and
Easy Management



Reliability
&
Scalable Performance



Best Total
Costs of
Ownership

✚ **Concurrency Access**

SAN / NAS:

The overall performance of SAN or NAS on high concurrency access is dramatically decreased due to the physical limitations of hard drives. A hard drive's overall performance decreases considerably because hard drives need to seek data back and forth with spinning disk and read head. One alternative is using SSD, but the cost for hundreds of TB is very high. In addition, there are limitations of memory chip failure due to high write patterns.

SANCluster InfinityScale:

Designed to support high concurrent access, divides data and stores it into available hard drives from different storage nodes, allowing different clients to access data from all storage node to aggregated performance. This eliminates the problem of physical limitations of hard drives.

✚ **Controller Limitation / Traditional RAID structure**

SAN / NAS

Typical NAS or SAN deployment will involve a RAID controller: either a software RAID from OS or a hardware RAID using dedicated RAID engines. This is a performance bottleneck, as RAID performance will be limited by the controller or OS. Traditional RAID 5 or 6 also creates issues of rebuild speed, performance degradation during hard drive failures, taking long or difficult for online expansion.

SANCluster InfinityScale:

InfinityScale uses the most direct access to the hard drives without using any RAID controller, removing bottleneck created by the RAID engines. At the same time, SANCLUSTER scale-out architecture allows a linear, predictable performance increase when adding additional storage nodes. SANCLUSTER's data redundancy is based on File-Level RAID, which instead of using hard drives, blocks and sectors as RAID building block, files or data will stripe and create parity on files level. This approach provides increased performance and redundancy by distribution data into all available node and drives. Typically, rebuild time is 15min / TB data.

✚ **Storage Hot Spot**

SAN / NAS

SAN and NAS gateway in the storage infrastructure can create hot spot: multiple clients access via a single gateway or controller, while other gateways or controllers are sitting idle. There is no intelligent in storage infrastructure to direct traffic to less used gateway or controllers.

SANCluster InfinityScale:

- Instead of a dedicated controller or gateway, SANCLUSTER solution separates the workload to all available storage nodes in the systems. Data also strip and storage to available storage nodes and hard drives. Clients will connect to each available storage node directly to create an aggregated throughput, and eliminate hot spot that will only go to certain units.

✚ **System Management**

SAN / NAS

- Most of SAN / NAS are management are separated by controller, which means that a storage administrator is required to manage each individual controller, gateway or RAID by itself. As storage capacity increases, the workload of the management also increases.

SANCluster InfinityScale:

- SANCLUSTER uses a single pane of glass approach. A web based interface can oversee metadata, storage node and client status, as well as a detailed log of the performance and failure alerts.

SANCLUSTER Scale out solution provides a complete solution that not only online expands performance and capacity, but also provides an easy way to manage small TB or large PB deployment. A traditional storage architect's shortcoming can easily be overcome with SANCLUSTER solutions.

• **SANCluster InfinityScale Advantage over SAN/NAS**

- SANCluster **InfinityScale** original design for HPC's files systems, is intended to improve typical disadvantages for traditional RAID deployment on NAS/SAN. Here are a couple of points



✚ **Network Architecture**

SAN / NAS

- FC SAN Structure involves expensive FC switches and requires dedicated knowledge. IP SAN use IP network switch, but requires a network engineer to create redundancy and performance using network management. In addition, some scale-out NAS structure involve additional network to maintain data integrity and metadata management, making a complicated storage architecture that requires a special management and extra cost.

SANCluster InfinityScale:

- SANCLUSTER strips away any required network setup and management. Redundancy and failure are included in the package, without additional management. At the same time, metadata servers are within the same network, so no need for additional management or cost.