SGI NAS: Modular Open Storage

Resetting the Rules on What to Expect from Network Attached Storage.

Features

128-bit File System

Unlimited Capacity Storage

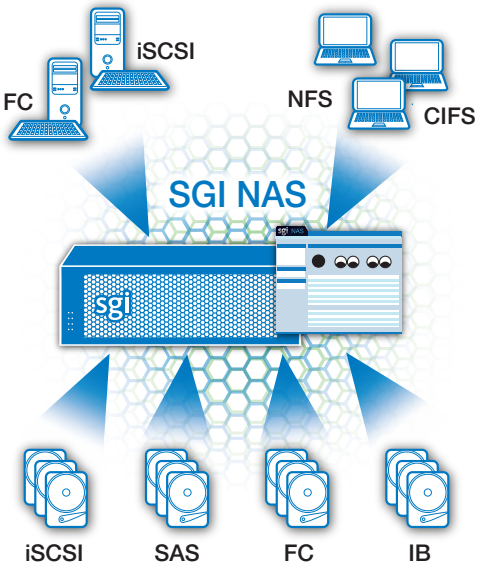
Unlimited File Size

Unified Appliance

What is SGI NAS?

SGI NAS is a unified storage management platform that delivers enterprise-class features and runs on industry standard hardware. SGI NAS helps organizations implement high performance, yet cost-effective data storage solutions by taking advantage of features such as inline deduplication, unlimited snapshots and cloning, hardware-agnostic solutions, and high availability support.

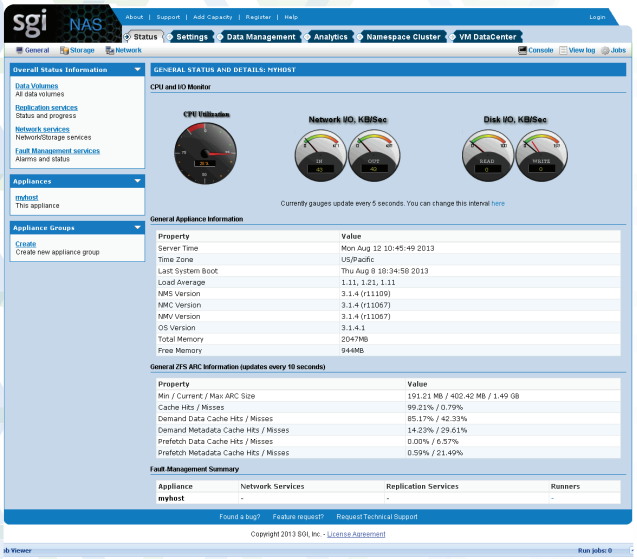
All enterprise features, such as thin provisioning, storage snapshots, cloning, and replication, are built in and implemented without any additional license or costs. In contrast, with a traditional appliance model, it is required to do a controller upgrade if performance, or the number of spindles, reach a certain level.



The functionality of a SGI NAS solution allows you to scale your storage needs as you would scale a virtual environment (by adding more hardware). Also, storage migration techniques are built-in, thereby allowing for system expansion and upgrades as needs and technology evolves.

Additional features include:

- ZFS technology—the most scalable and flexible 128-bit file system.
- Unlimited snapshots and copy-on-write clones.
- Legacy solutions limit the file system size. There are no such limitations with SGI NAS.
- Support for NAS (NFS v3, NFS v4, CIFS*, WebDAV/HTTP, FTP) and support for SAN (iSCSI & FC) means flexibility
- Internal Tiering Management Support
- Inline dedupe and compression reduce primary storage.
- Specialized devices, such as SSDs, accelerate read and write performance.
- Synchronous / asynchronous replication for easy disaster recovery.
- Set up remote back-ups and disaster recovery at off site locations.
- Manage disks and JBODs using command line or SGI NAS Management Viewer (NMV).



Key Scalability and Flexibility advantages of SGI NAS

Hybrid Storage Pools

Hybrid Storage Pools (HSP) are the heart of the system and dictate overall performance. Primarily, initial capacity and the expected capacity growth, as well as IOPS and the read/write ratio between them, are the most dominant factors.

Block allocation algorithms of the Hybrid Storage Pool transform small random writes into a single, more efficient sequential write operation. Virtual machines invoke a large number of random read / writes, and the HSP provides intelligent methods of handling these unpredictable workloads. With SGI NAS, these fundamental features dramatically accelerate performance.

The Hybrid Storage Pool uses RAM, Solid State Devices (SSDs), and rotational drives all at once. As such, instead of just adding spindles, the design of the pool provides more degrees of freedom. Within the HSP, three different device types can be created: one virtual device type for cache (read operations); a log device (write operations); and a regular virtual device (capacity).

Built-in Space Savers

Deduplication: SGI NAS is the only software storage solution that supports inline data deduplication for primary storage, which saves storage capacity and decreases the number of required I/Os when data is highly redundant. With the SGI NAS Web interface, administrators can optionally configure data volumes for deduplication that, in virtualization environments, provide capacity savings and IO reduction where there are many systems with replicate sets of data. Data duplication only stores unique data blocks in the pool and can save up to 90% of storage capacity depending on the use case.

Unlimited Snapshots and Cloning: Snapshots provide an efficient point-in-time copy of the data set. Only changes to the data set are written to the pool. Cloning snapshots also enables read / write actions, only keeping track of the new written blocks to the newly created clones.

SGI NAS is built on an Open Storage architecture, and as such provides significant advantages over legacy storage solutions. Three key points make SGI NAS the superior unified storage solution:

Maximum Efficiency:

- ZFS-based unified storage for NFS, CIFS*, iSCSI, and Fibre Channel
- Advanced features like 128-bit addressing, deduplication, compression, thin provisioning, SCSI un-map, unlimited snapshots, copy-on-write clones, individual file sizes, and native SSD performance
- Runs on industry-standard commodity hardware, reducing cost and increasing flexibility

Ultimate Operational Flexibility:

- Unified management interface makes it simple to reallocate storage capacity as customer demand changes
- Optimized for the high density, high performance and high availability hardware of SGI Modular InfiniteStorage Server platform.
- Also runs on commodity hardware, enabling service providers to expand capacity rapidly by simply adding more disks and SSDs or upgrading processors, without hard limits and the replacement costs of legacy systems
- Openly distributed REST API lets providers integrate SGI NAS power and flexibility into existing cloud storage infrastructure

Optimized for Multi-tenancy:

- Runs as a Virtualized Storage Appliance
- Provides ultra-fast virtual machine cloning
- Optional VM Data Center module integrates SGI NAS tightly with VMware, Citrix Xen, and Microsoft Hyper-V, allowing cloud hosting providers to monitor and manage all three virtual environments in one view
- Defines and deploys storage policies directly from SGI NAS to individual virtual servers

SGI NAS Benefits

- **Lower Capital Expenses:** Open Storage architecture offers dramatic savings in hardware costs and support contracts, allowing them to offer customers more competitive per-TB rates.
- **Lower Operational Expenses:** SGI NAS is certified as VMware- and Citrix-ready, which means a far lower risk of interoperability glitches with the leading virtualization vendors.

- **Simplified Management:** Storage management from one console.
- **Simplified Integration:** Reliance on published REST APIs lets cloud providers integrate SGI NAS into their storage architecture back-end quickly and easily.
- **Greater Flexibility and Scalability:** Scalable software-only approach removes the barriers to rapid scaling, allowing providers to adjust service offerings quickly and easily to respond to competition and market demands.

Plug-ins for extensible functionality

Auto-CDP Plug-in Overview

- The Automatic Continuous Data Protection (Auto-CDP) Plug-in replicates storage volumes between two different SGI NAS appliances in real time, at a block level.
- Conceptually, the service performs a function similar to a local disk mirroring scheme of RAID1, except that in the case of Auto-CDP, this is done over an IP network.
- Auto-CDP operates in synchronous mode. Synchronous mode is the Remote Mirror mode where the I/O operation is not confirmed as complete until the remote volume has been updated.
- This synchronous replication is in contrast to the asynchronous replication performed by the Auto-Tier and Auto-Sync capabilities of SGI NAS. Replication is performed over an IP network.
- Auto-CDP does not place any restrictions on the number of replicated volumes (ZFS pools). You can deploy the appliance with SAS- and SATA-based volumes, based on your business requirements.
- Auto-CDP is an independent plug-in, but using it with the Simple HA (or Simple Failover) plug-in provides advanced features and stability.

Target FC Plug-in Overview

The SGI NAS Target FC Plug-in provides enterprise-grade control and monitoring that allows system administrators to govern the appliance during software and configuration upgrades and updates.

This plug-in is the component that allows ZFS data sets (ZVOLs) to appear as Fibre Channel or iSCSI disks to their respective initiators on the attached SAN.

SGI NAS Namespace Cluster Plug-in

As the number of users and applications simultaneously accessing data constantly increase, any given storage server potentially can become a bottleneck, in terms of available I/O bandwidth, CPU, memory, network, and disk I/O resources.

Many existing network infrastructures have limitations in their ability to scale. In addition, there is a high cost associated with ever-changing workloads, adding network applications, or upping the number of concurrent users.

The solution to these issues involves various techniques of spreading the I/O workload over multiple storage servers, which can be integrated to the existing network infrastructure.

SGI NAS Namespace Cluster Plug-in:

- Simplifies management of multiple NFS servers by isolating clients from actual physical locations of the shared server-based file systems.
- Enables easy creation and maintenance of unlimited, unified namespace.
- Supports live and offline migration of namespace directories and folders transparently to NFS v4 clients.
- Namespace Cluster enables complete management from a single console.
- Removes the ‘single server’ bottleneck resulting from a growing number of NFS clients simultaneously accessing shared data. Also provides increasingly powerful and demanding applications on the client side that access shared file data.

NAS clients always have been able to mount folders exported by multiple NAS servers. Maintaining a uniform naming scheme across multiple clients requires extra work from system administrators. But the tools available to perform that work do not scale well.

Namespace Cluster provides an easy and intuitive way to build a global namespace of any size, where directories and files are transparently distributed over any number of servers. Replication of folders and directories is supported as well.

Summary

As a scalable, flexible open storage solution, SGI NAS is rewriting the rules on what customers should expect from network attached storage.

By adding the modular choices of the SGI MIS hardware, SGI NAS provides IT managers with a cost-effective enterprise solution without the legacy design issues that can be found in appliance-based models.

*SGI NAS uses native (in-kernel based) CIFS driver (smbsrv) which is an integrated SMB protocol. The SMB protocol is the natural file-sharing protocol, by means of CIFS shares, to CIFS/SMB enabled clients, such as Windows and Mac OS systems. Therefore, a Windows client (or other CIFS client) can inter operate with SGI NAS CIFS service as if would with a Windows server.

The CIFS service can operate in either workgroup mode or in domain mode. In workgroup mode, the CIFS service is responsible for authenticating users locally when access is requested to shared resources This authentication process is referred to as local login.

In domain mode, the CIFS service uses pass-through authentication, in which user authentication is delegated to a domain controller.

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