A Market Proven Parallel File System For Data Intensive Storage
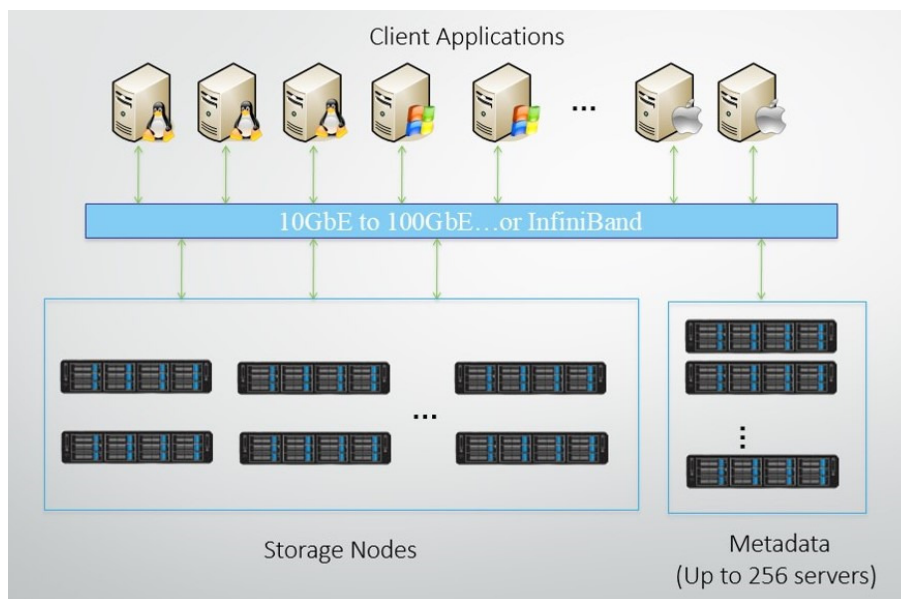
ABOUT SCALA FILE SYSTEM

What is SCALA*fs*?

With more than **1 Exabyte** in **customer deployment,** our underlying technology is a **market proven** parallel file system developed to **efficiently handle** multiple variations of **I/O intensive** workloads.

With great **success worldwide**, this proprietary system is **the solution** for over **700 customers**.

The current **largest cluster** installed has more than **300 storage nodes** of **95PB** and over **200GB/s I/O** throughput.
Worry-free solution with **24/7 customer support** and cluster management.

Why is SCALA*fs* special?

Data files are **transparently distributed** over **multiple nodes**. By simply increasing the number of servers and disks in the cluster, you can **seamlessly scale** file system **throughput and capacity** to the needed level.

SCALA*fs* is **the right choice** for a storage system **with** the best **combined values** of **high performance**, **scalability**, reliable **data protection** and **affordable cost**.

All-in-One Storage for **object**, **block**, and **file-based data**.

SUPPORT

With **direct contact** to the **system developers**, SCALA*fs* offers **easy management** with designated consultants. Our **highly-trained** and experienced **engineering team** is **available 24/7**.
 No matter how large or small the system our staff always makes **customer care** a **top priority**.

Uncompromised Reliability

After hardware setup, software **installation and updates** can be **done in one hour**. Adding servers for **increased performance** and **capacity** requires **no downtime**. With web based **graphical monitoring and administration**, most cluster **issues can be fixed** remotely **without operation interruption**.

Support Options include **Next Business Day**, **Remote** or **On-Site**, Advanced Hardware Replacement.

Solution Guarantee

Whether your goal is to increase productivity or have a better ROI, **we guarantee usage satisfaction on all SCALA systems.**

System Architecture

Client Applications

10GbE to 100GbE…or InfiniBand

Storage Nodes

Metadata (Up to 256 servers)

BEST COMBINED VALUES

Without controllers or gateways, our file system allows **concurrent access** between **all application clients** and **storage servers** in the cluster.

Best I/O Throughput
Always **saturate** what **the hardware** can offer. Using **quality drives** and **server configurations** with **dual 10GbE ports**, the **average throughput** of a single SATA or SAS drive **is 45 to 100MB/s**. This allows you to **fulfill** your throughput requirements **without using higher cost hardware** such as SSD drives..

Reliable Data Protection
With N+M File-level Erasure Coding, SCALA*fs* **distributes data** content at the **file level** across **multiple storage servers**. When N+2 erasure coding is applied the cluster can **sustain operation** with up to **two simultaneous failures**, whether it is an **individual drive** or a **whole node**.

While **traditional** hardware or software **RAID** needs to **rebuild** an **entire** drive, SCALA **rebuilds only** the **files** that are **affected** while using the **entire cluster to rebuild**. Thus it delivers much **faster data recovery** in **a fraction of the time** that **traditional** RAID architectures require. **No downtime or reboot. Recovery of 1 terabyte in less than 20 minutes.**

By directory base, the system offers optimum data protection levels for different files and **better capacity utilization, up to 90% with 16+1.**

Fully POSIX-Compliant
SCALA*fs* is **compatible with all** software applications, x86 based servers and IP networks. No need to make application changes. POSIX enables the **addition of clients** and servers **without downtime**.

SCALA*fs* supports Linux kernels up to **the latest version** and Linux distributions including Debian/Ubuntu, SLES/OpenSuse, or RHEL/Fedora.

Computational Storage
Besides **metadata management**, SCALA*fs* storage servers can also run **client applications** or **computing tasks** on the **same physical nodes**.

Such a converged structure is **cost-effective** as it provides **computational storage** so the cluster of servers become **shared storage** plus **data processing units**.
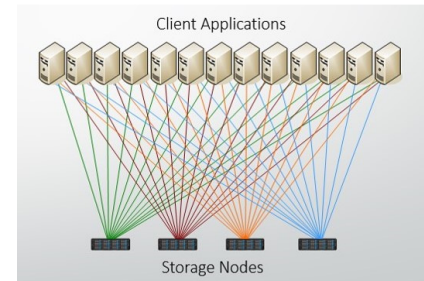
Linux / Windows / macOS
Native clients, all kernel modules that do not require any patches.
- ❖ **Linux:** all versions from kernel 2.6 and up
- ❖ **Windows**: XP, Windows Server 2003 and up
- ❖ **macOS:** 10.5 and up

High Level Data Availability
The **automated self-monitoring mechanism** can **single out and report** failed hardware at both the **disk** or **server level**. Once **inactive hardware** is **detected**, it will be **isolated** for **read-only** operation or **taken out**. The system will then start a **self-healing** process **without any operation interruption**.

Cluster or single server product, SCALA Storage is ideal for HPC, AI, and Big Data Analytics.

ENTERPRISE FEATURES

Offering SAN and Object storage options our system supports Hadoop, Oracle/SQL, VMware, KVM, and Xen. SCALA*fs* works with iSCSI, CIFS, NFS, HTTP, S3, Swift, HDFS, and Cinder.

Single Cluster Threshold

	Theoretical	**Actual Deployment**
Storage nodes	4,096	**333**
Metadata servers	256	**32**
System capacity	EB	**95PB**
Number of files	Unlimited	**50 Billion**

Professional Support

❖ **Cluster Monitoring:** Free support access via emails, phone and live chat. Our consultants can remotely access the system and run diagnostics to ensure cluster condition. On-site support is also available to keep customer business running smoothly.

❖ **Software Maintenance and Update:** Once installed, enjoy free software upgrades and access to a vast suite of enterprise features, such as clone snapshot and replication.

❖ **High Quality Hardware:** All hardware including replacements must go through pre-configuration testing so installation and repair will be done in a time sensitive manner.

Customer Industries

❖ **Oil and Gas**
❖ **Scientific Computing**
  ➢ Genomics
  ➢ Cryo-electron Microscopy
  ➢ Satellite Imaginary and Observatory
  ➢ Geographical Data and Mapping
  ➢ Meteorology/Climate
❖ **Higher Education**
❖ **Media and Entertainment**
❖ **Telecom and Internet**
❖ **AI and Big Data**
❖ **Video Surveillance**

Selected Features

➢ Load balance switch, hardware evenly shared system workload
➢ Runs on platforms such as x86, OpenPOWER, ARM, and Xeon Phi
➢ Re-export through Samba, NFS, FTP, HTTP, iSCSI
➢ Support for group/user ACLs and quota
➢ Fully active network with automatic failure detection
➢ Supports InfiniBand, GigE, multiple subnet and bonding
➢ Cold data sanity check, automatic repair, no downtime
➢ WORM directory avoids modification of saved data

STATISTICS

Metadata Cluster

Standalone or embedded with storage servers. **Designed to fulfill any performance requirements, extremely high IOPS or file open rate.**

Scalable up to 128 pairs (or 256 nodes). In a testbed with 8 storage servers (each with 24x 2TB 7200r SATA), 160 client processes and dual 10GbE network, a metadata pair can provide a sustained file creation rate of more than 20,000 creates per second

Linear Throughput Increase

Unlike the competition who must use high-end hardware to boost performance SCALA*fs* provides predictable and sustainable throughput without deterioration overtime**- with only commodity servers and inexpensive hard drives!**

With highest level of scalability, system throughput will always increase when adding servers and drives.

Customer on-site 7.5PB, near 150GB/s throughput (102 4U 24-bay storage nodes, dual 10GbE network, 4TB SATA)
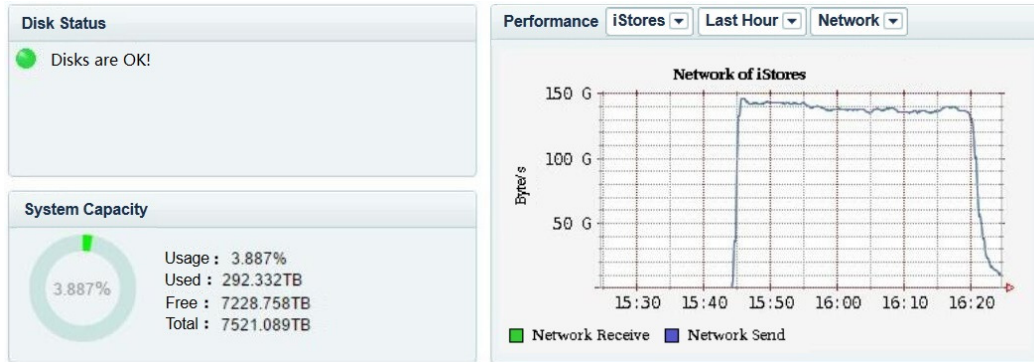
Block device SSD IOPS vs. Ceph (3 2U 12-bay storage nodes, dual 10GbE network, 240GB SSD, 3 client)
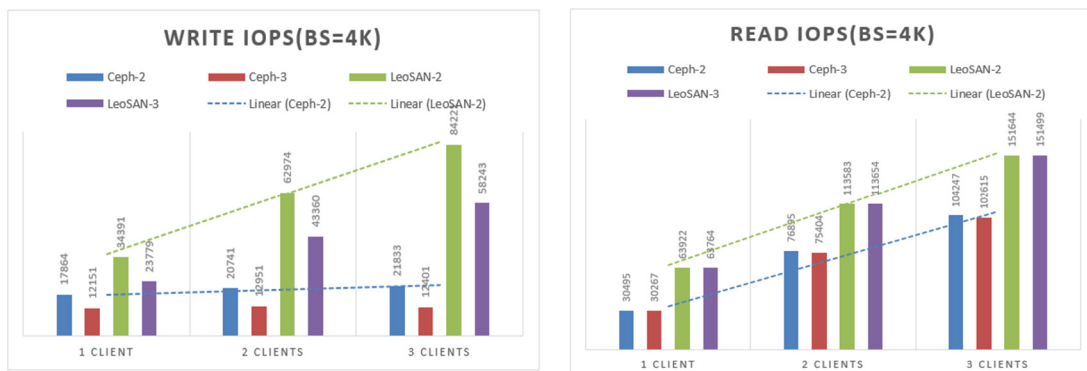
REFERENCES

Comparison Chart

Features	Isilon Nitro	IBM Spectrum Scale	Lustre	SCALA*fs*
Snapshots	Yes	Yes-Complex	No	Yes
Independent capacity/performance scaling	No	No	No	Yes
Scale to thousands of nodes	No	Yes	Yes	Yes
QoS	Yes	No	No	Yes
N+M Data Protection	No	No	No	Yes
Encryption	Yes	Yes	No	Coming
S/W only, H/W independent	No	Yes	Yes	Yes
IB & GbE Support	No	Yes	Yes	Yes

Happy Customers

We take pride in the fact that most of our customers who are now at the Petabyte level started with only a few hundred terabytes.

➢ First Oil & Gas customer in 2009, I/O throughput 2x greater than StorNEXT FS
➢ Higher Education: University of Florida, Georgia Southern University
➢ Scientific Computing: Direct Electron (San Diego) on electron detection for biological molecules
➢ Video Surveillance: Dante Security