

THIC Inc.

The Premier Advanced Recording Technology Forum

Storage Solutions for the Enterprise

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**Presented at the THIC Meeting at the National Center for Atmospheric
Research, 1850 Table Mesa Drive, Boulder CO 80305-5602**

June 29-30, 2004

ADIC is a Storage Solutions Provider to the HPC Community

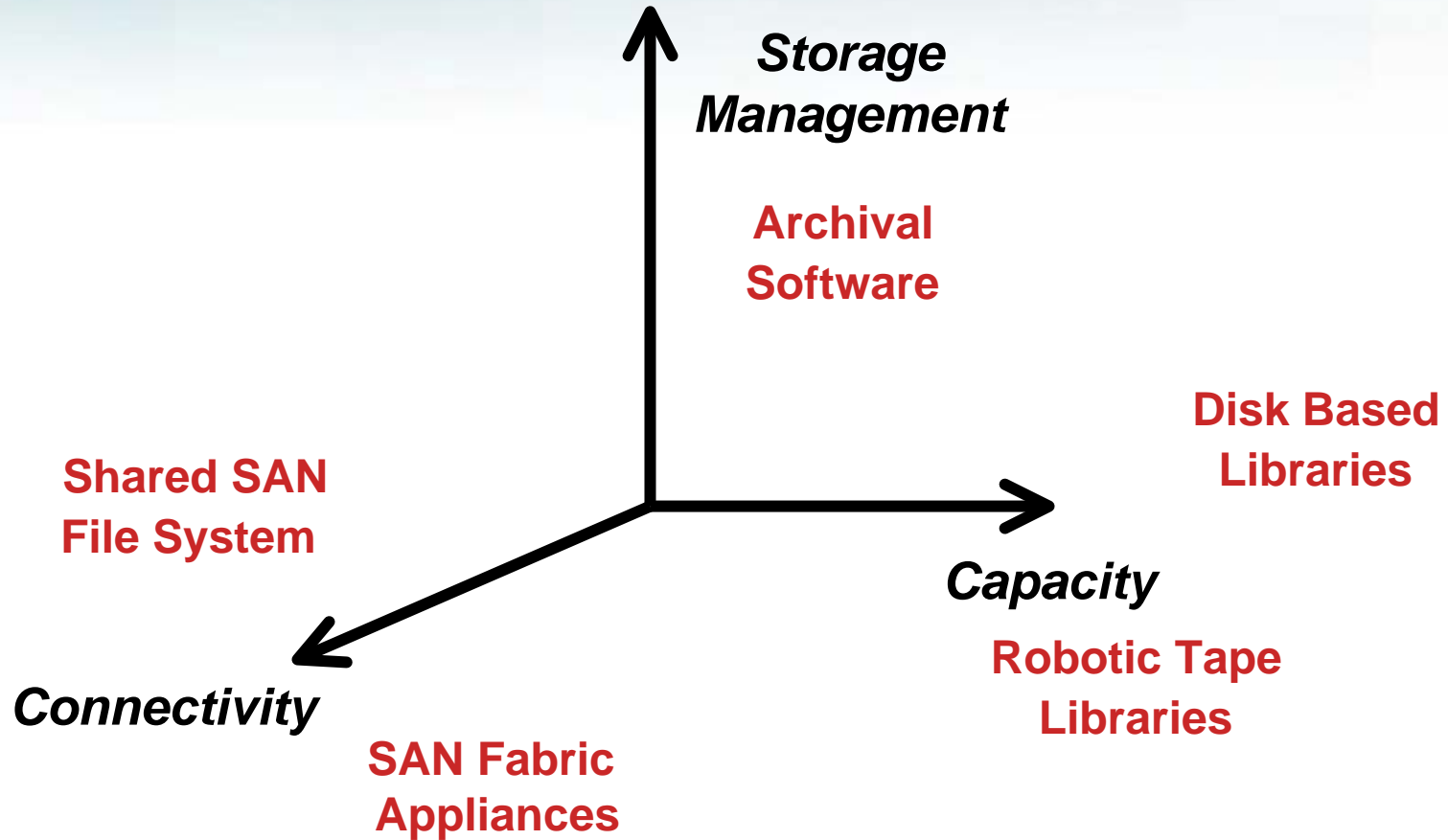
Reliable robotic library solutions to meet growing data requirements.

Connectivity technology for storage consolidation.

Data archival software that supports ADIC and STK libraries.

Cost-effective technology for remote site disaster recovery and continuous operations.

Storage Components



The Scalar Product Family

ADIC Scalar 10K



*Scalar i2000
with Intelligent Architecture*



ADIC Scalar 1000



ADIC Scalar 100



ADIC Scalar 24



Enterprise

Mid-range

Departmental



Intelligent Storage™

ADIC History

1983 – Corporation Founded and Ships Product

ADIC delivers robotic libraries for mini-computers

1996 – Public Offering

Listed on NASDAQ symbol ADIC

1998 – Acquisition of EMASS

Adds Enterprise HW and SW storage technology

1999 – Acquisition of Mountain Gate

Adds file system technology

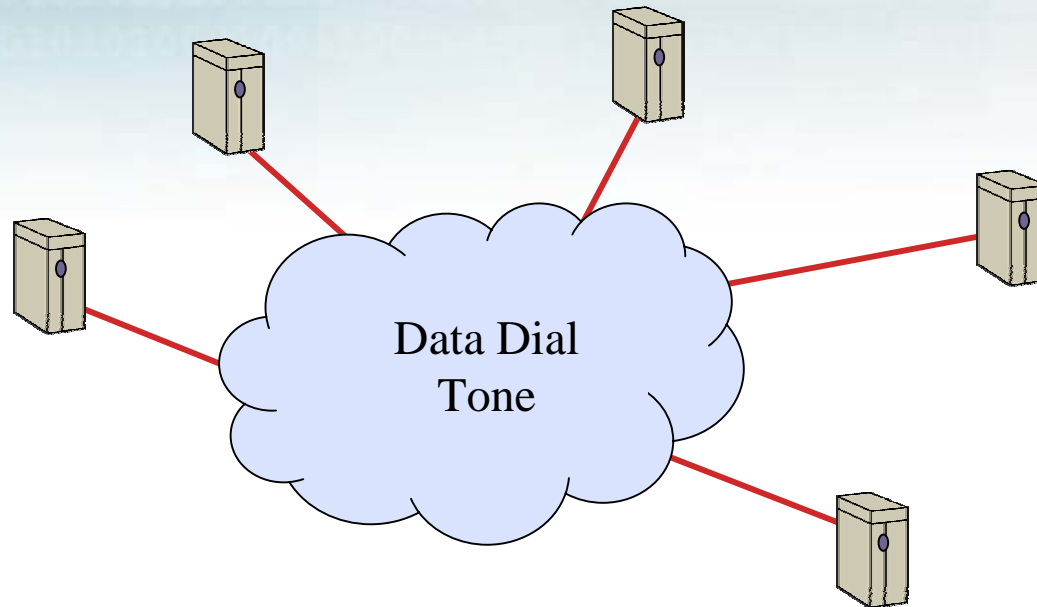
2001 – Acquisition of Pathlight

Adds connectivity technology

2002 – Market Share Leader in Open Systems Automation

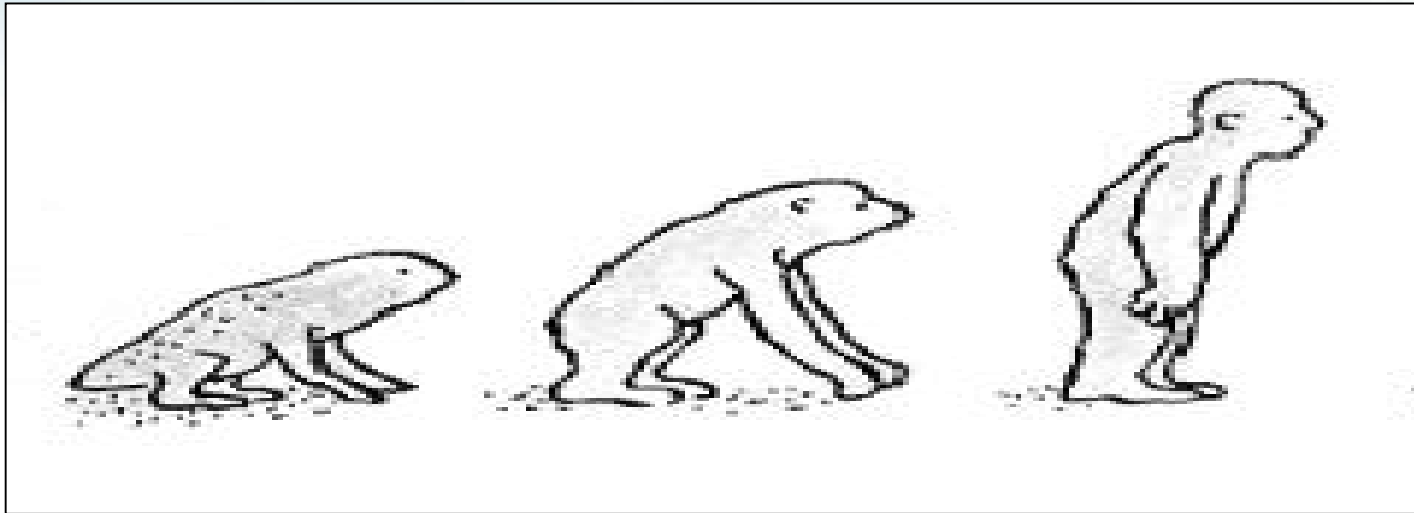
Reported by IDC

Data Connectivity



- Heterogeneous
- High Performance
- Foundation for Storage Consolidation
- Lifecycle Management

Storage Transformation



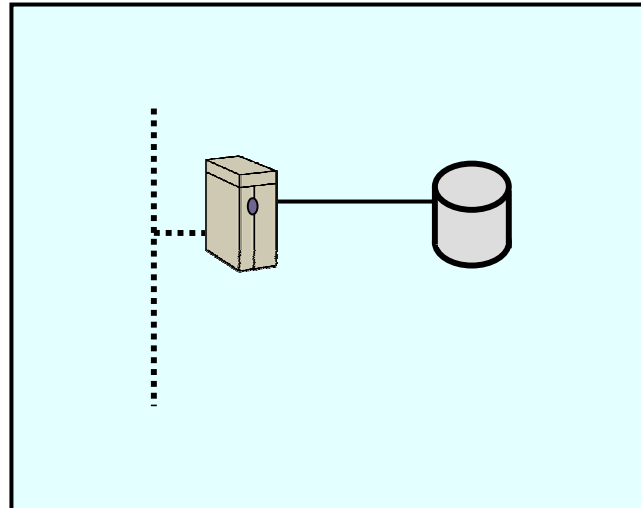
Direct Attach
SCSI

Shared Peripherals
FC Switched Fabric

Shared Data
StorNext File System

SCSI Disk

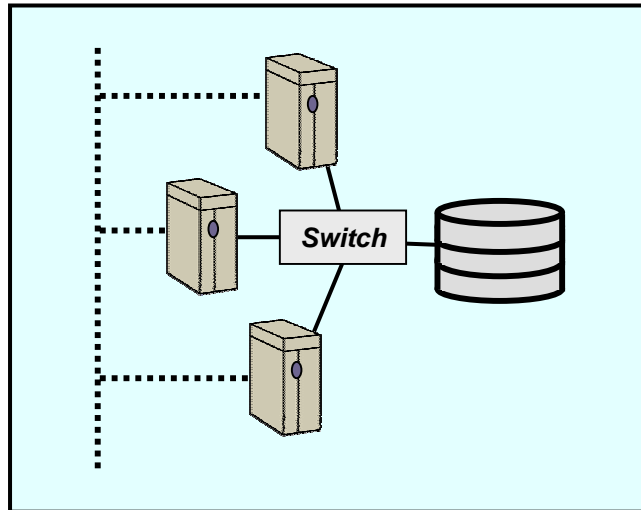
- Exclusive control by the host OS of the file system**
- Data is shared through the host & over the LAN**
- Data sharing places a load on the host**
- Data access depends on host availability**



SAN Connectivity to Disk Array

Fiber channel with a switch enables storage networking

- Exclusive control by the host OS of each file system**
- Data is shared through the host & over the LAN**
- Data sharing places a load on the host**
- Data, when shared, is duplicated**
- Data access depends on host availability**



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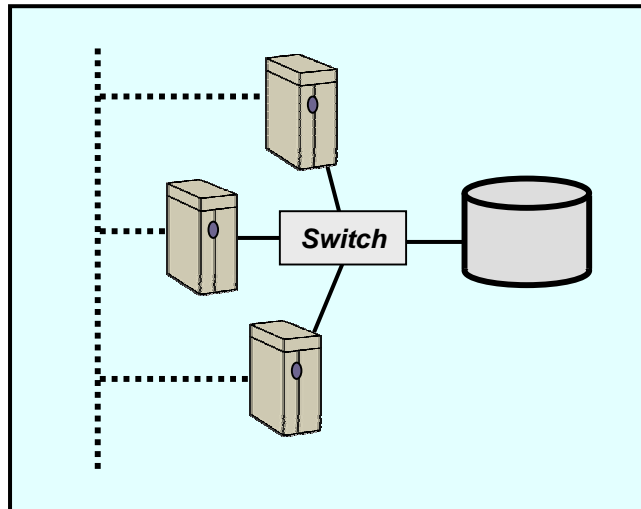
SAN with StorNext File System

Disk has one (or more) shared file systems

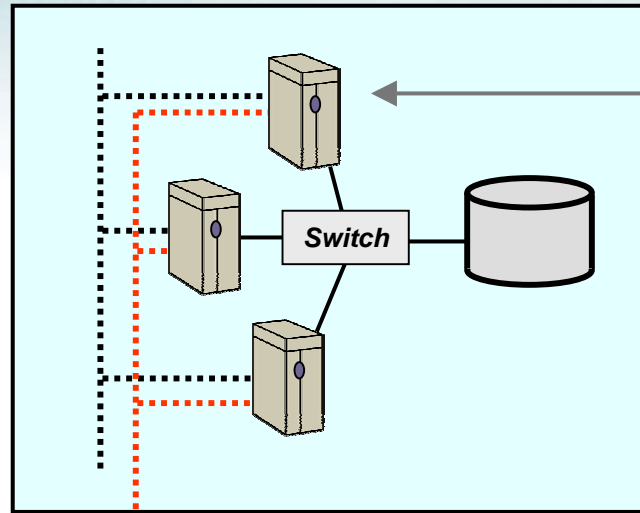
Simultaneous access by all clients (formerly called hosts)

No data duplication, no file copying across the LAN

Data access is not affected by a single host failure

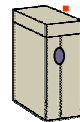


How StorNext File System Works



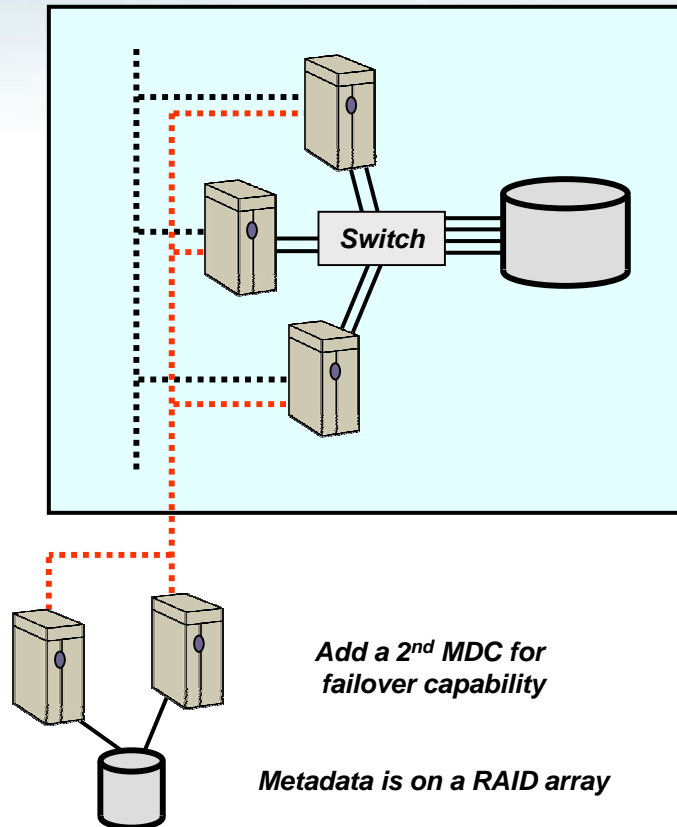
Client asks metadata controller for info and permission to access file

A dedicated metadata LAN provides communication between the file system clients and the MDC for file creation, deletion, and access



A metadata controller stores the file names, extents, ownerships, and permissions

StorNext File System Enhancements



Add paths in the FC fabric for bandwidth and redundancy

Add a 2nd MDC for failover capability

Metadata is on a RAID array



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OS Support and Features

- **Supported Systems**
 - **PowerPC:** AIX 5.2, **Apple OS X**
 - **IA-32:** Win NT, Win 2000, Win 2003, Win XP
 - **IA-32:** Redhat 7.3, 8.0, ELAS; SuSE ES
 - **IA-64:** Redhat ELAS
 - **Sparc:** Solaris 8, 9
 - **Cray:** **Cray X-1**
 - **Mips:** Irix 6.5.24
 - **HP PA-RISC:** **HP-UX** by year end 2004
 - **AMD Opteron:** RHELAS 3, SuSE ES 9 by year end 2004
- **Other Features**
 - **SAN FC fabric and iSCSI**
 - **Quality of service, journaling, multi-path failover**
 - **Optimized for large files**
 - **NFS export**



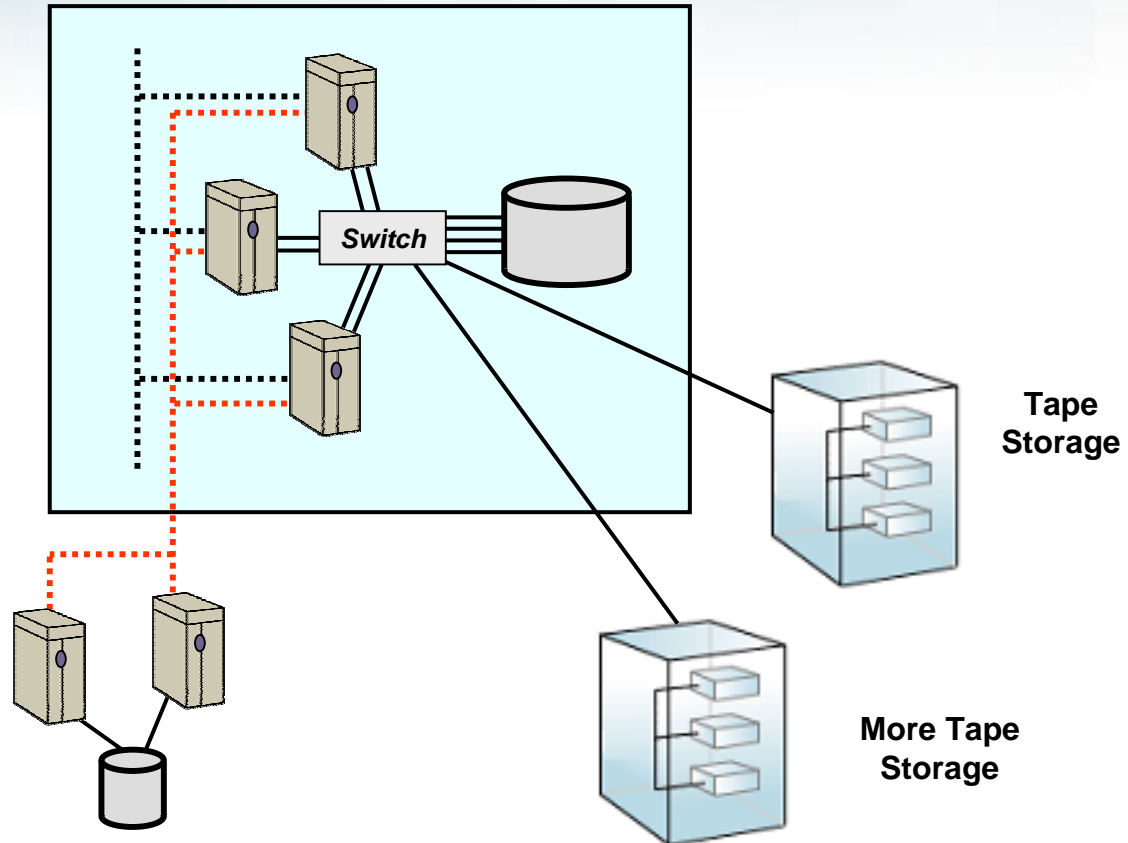
File System Limits

- **Size**
 - 512 LUNs (current SNFS limit)
 - 2 TB per LUN (current OS limit)
 - 1 PB current maximum for a single file system
- **Metadata delivery rate (file creates per second)**
 - 100 per sec with two metadata LUNs, MD and JNL
 - 500 per sec with solid state LUNs for MD and JNL
 - 2500 per sec estimate for planned “bulk create”
- **Client Count**
 - Limited by metadata delivery rate
- **Bandwidth**
 - 180 MB/sec single 2GB fibre channel path
 - 16 GB/sec demonstrated scalability on 112 LUNs



Information Lifecycle Management

Add libraries and use databases to keep track of files



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