

# SAM-FS - Advanced Storage Management Solutions for High Performance Computing Environments

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# SAM-FS - Advanced Storage Management Solutions for High Performance Computing Environments

Advanced Storage Management Solutions

from

LSC, Inc.

“Software should NOT be the Limiting Factor in  
Storage Management!”



# SAM-FS - Advanced Storage Management Solutions for High Performance Computing Environments

## LSC, Inc. - Our Mission:

To provide Enterprise-wide Storage Management  
Software Solutions with:

- Highest Performance
- Highest Capacity
- Most Data Security
- Virtually Unlimited Scalability

for Effective Management and Safeguarding of Data.



# Data Storage in HPC Environments: Challenge or Opportunity?

- ✓ Extremely High Data Bandwidth Requirements
- ✓ Explosive Data Growth
  - PetaBytes of data will quickly approach ExaBytes
- ✓ HPC Users are Leading Edge Customers
  - Keep pushing the boundaries
  - Willing to work on application to get better performance
- ✓ Data Servers Must Have Low CPU Usage
  - To conserve CPU cycles for the HPC applications
- ✓ Prefer a Commercial “Off the Shelf” Product

# The File System: Critical, Central Component for Storage Management

## ✓ File System Features Desired by HPC Users:

- Meta-data and File-data can Reside on Separate Devices
  - No head seek conflict on reads and writes of short and long data
- Support for Disk Striping AND Round-Robin Configurations
  - Additional Support for “Striped Groups”
  - Do not want to use a separate Volume Manager
- Excellent Scalability by Adding Devices or Logical Units (LUNs)
  - Greater than 99% scalability factor

# The File System: Critical, Central Component for Storage Management

## ✓ File System Features Desired by HPC Users (cont.):

- Capability of using “direct I/O” and “no write lock” feature
- Disk Allocation Unit (DAU) Size Must be Freely Settable
  - Adjustment of DAUs must be settable and can be based on disk data alignment
- Pre-allocation of Disk Blocks to Assure Sequential Writes and Reads
- Option to Lock I/O Buffers (mlock)

# The File System: Critical, Central Component for Storage Management

- ✓ File System Features Desired by HPC Users (cont.):
  - Write to Disks at Device Speeds Through the File System
  - Support single machine write, multiple machine read
    - Access to the same file system on multi-ported RAID subsystems
  - Provide Fastest Performance on Open Systems
    - “Off the Shelf” systems like SUN Ultra to E10000
    - Hardware configuration is the only limiting factor

# Scalability and Performance: The Limit Should Always be The Hardware!

- Threaded, Parallel Functionality for all Data Access and Features
  - Migrating, Retrieving, Releasing, Recycling, etc.
- Sustain Data Transfer to Tape Drives at Physical Device Speeds
  - To multiple devices at the same time
- Support for Full 64bit (18.4EB) Addressing
- Performance Must Scale with Hardware
- Support Virtually Unlimited Capacities
  - On Media
  - Number of File Systems
  - Number of Files
- Equal Data Access Rates for Small and Large Files



# Flexible Migration and Archive Policies: “Must Have” Features for Advanced Data Management

- ✓ Migration Must be Based on Flexible Policies and Options
  - Instantly make multiple copies
    - Time-based archiving to best protect your data
    - Make copies at any time to any media
  - Archive by group, user, directory, file, minsize, maxsize, wildcard, etc.
  - Optionally or Automatically Specify Pools of Media for Archiving
  - Automatically Assign new Migration Rules During Operation

# Flexible Migration and Archive Policies: “Must Have” Features for Advanced Data Management

- Associative Archiving and Staging
  - Automatically control where your data goes and how it comes back
- Directly Access Data from Media with Random Tape Access
  - Fast positioning without having to bring data back to the disk cache
- Partial Release Options to Leave File Stubs on the Disk
  - Optionally specify when the data should stage back automatically
- Directly write and read data in custom formats to media
  - At device speeds through the file system inode
- Automatically Control Disk Cache Usage



# Data Protection and Disaster Recovery: Should be As Easy As Possible!

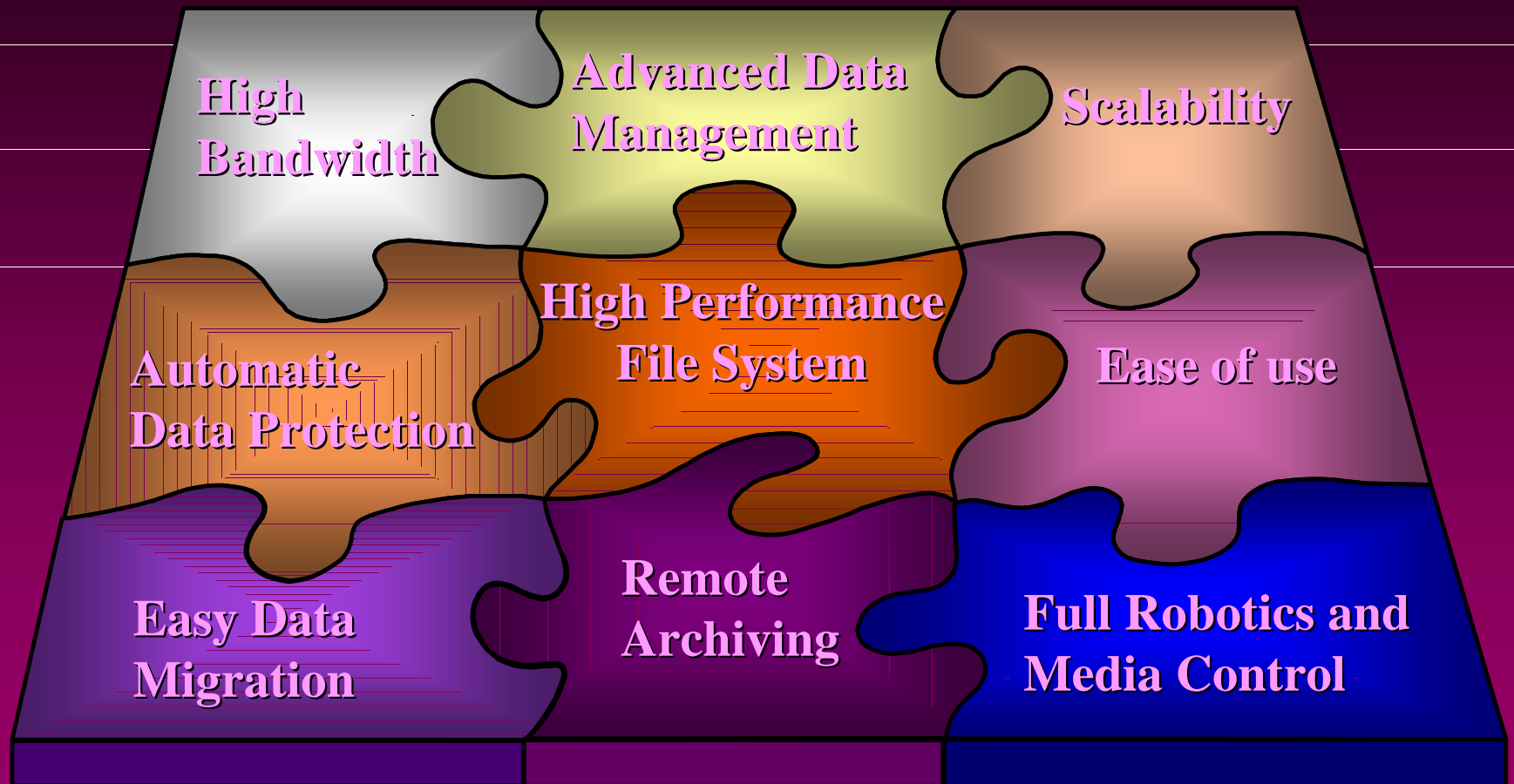
## ✓ Automatically Protect the Data

- Instantly Make Multiple Copies
  - Time based archiving to best protect your data
- Copies Must Live in Different Locations
- Support for Remote Vaulting and Shelved Media
- Fast Recovery after Disaster
- Data on Media in “Industry Standard” Format
  - Capability of retrieving Data without application

# Ease of use: As Transparent As Possible!

- ✓ Transparent Interface to Users and Applications
  - Minimal user training
  - No application modification required
- ✓ Transparent to Storage Technology In Use
- ✓ No Downtime Required for Maintenance
- ✓ Availability of GUIs and Tools
  - for easy Administrator access and control

# Advanced Storage Management Software from LSC, Inc. Provides the Pieces for your Total Storage Solution Needs!



# Advanced Storage Management Solutions from LSC, Inc.



## LSC's Products Are Available For You Today:

- SAM-FS - THE Standard in High Performance Data Management
  - Fully Developed
  - Feature Rich
  - Well Received by Our Customer Base
- SAM-HPFS - The NEW High Performance File System
  - Best Performance and Most Scalable File System in the Industry
- SAM-Remote - Remote Data and Robot Control
  - Control Distributed Data Throughout your Enterprise
- SAM-Migration Toolkit - Read “foreign” data
  - Access “Foreign” Data Directly Through the SAM-FS File System

