



Spectrum Archive and TS1160

Carl Reasoner

Tape and Spectrum Archive Specialist

Washington System Center

Email: creason@us.ibm.com

An aerial photograph of New York City, showing a dense urban landscape with numerous skyscrapers and buildings. The image is tinted with a deep blue color. In the foreground, a large body of water (likely the Hudson River) is visible, with a bridge or highway crossing it. The city extends into the distance, with the horizon line visible under a clear sky.

Quick Overview of IBM Spectrum Archive

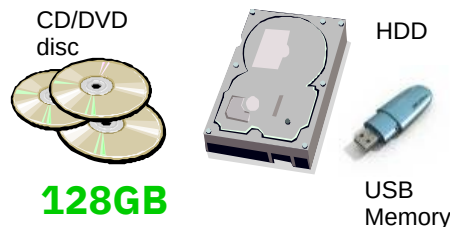
Tape Evolution – New Use Case with Linear Tape File System

File System Designed for Tape

- Not traditional use of Tape by TAR command nor Tape Backup Software

Allows the user to access to the data on tape using the file manager (Windows Explorer), just like USB memory stick and CD/DVD

- Application program can **access to the files directly** without tape backup/restore program or database



Directory Structure

File List View

名前	サイズ	種類	更新日時	属性	アクセス
Adobe					
Acrobat 6.0					
Acrobat 7.0					
Resource					
CIDFont					
CM					
Se					
Adobe					
Frame					
Photo					
Read					
LTFS-Demo01	128 KB	Windows Med...	2009/11/25 11:08	000:28	720 x 480
LTFS-Demo01	9428 KB	Windows Med...	2009/11/23 17:29	001:28	720 x 480
LTFS-Demo02	95682 K...	Movie Clip	2009/11/25 11:15		
LTFS-Demo02	155 KB	Windows L...	2009/12/08 10:25		
LTFS-Demo Vid...	22,895 K...	Windows Med...	2009/12/08 10:25	000:31	720 x 480
LTFS-Library D...	5,963 KB	Windows Med...	2009/11/17 21:06	001:27	720 x 480
P1010113.avi	7,964 KB	Video Clip	2009/11/17 20:47	000:24	640 x 480
P1010114.avi	3,160 KB	Video Clip	2009/11/17 20:47	000:10	640 x 480
P1010115.avi	2,708 KB	Video Clip	2009/11/17 20:48	000:00	640 x 480
P1010119.avi	12,116 K...	Video Clip	2009/11/17 20:50	000:44	640 x 480
P1010120.avi	10,003 K...	Video Clip	2009/11/17 20:48	000:35	640 x 480
P1010132.avi	49,759 K...	Video Clip	2009/11/25 10:48	000:20	640 x 480
P1010132_1.avi	49,759 K...	Video Clip	2009/11/25 10:54	000:20	640 x 480

LTFS Advantages



File System designed for Long-Term Retention and Media Portability

Award-winning technology, invented and maintained by IBM

- File System implementation available as **open source** since 2010

Open Standard

- ISO/IEC 20919:2016
- Data structure on tape
 - » Two Partitions – Index Partition and Data Partition
- Industry Collaboration - SNIA Technical Working Group
 - Version 2.4 approved in 2017
- Logo Program (Compatibility Testing) by LTO Consortium

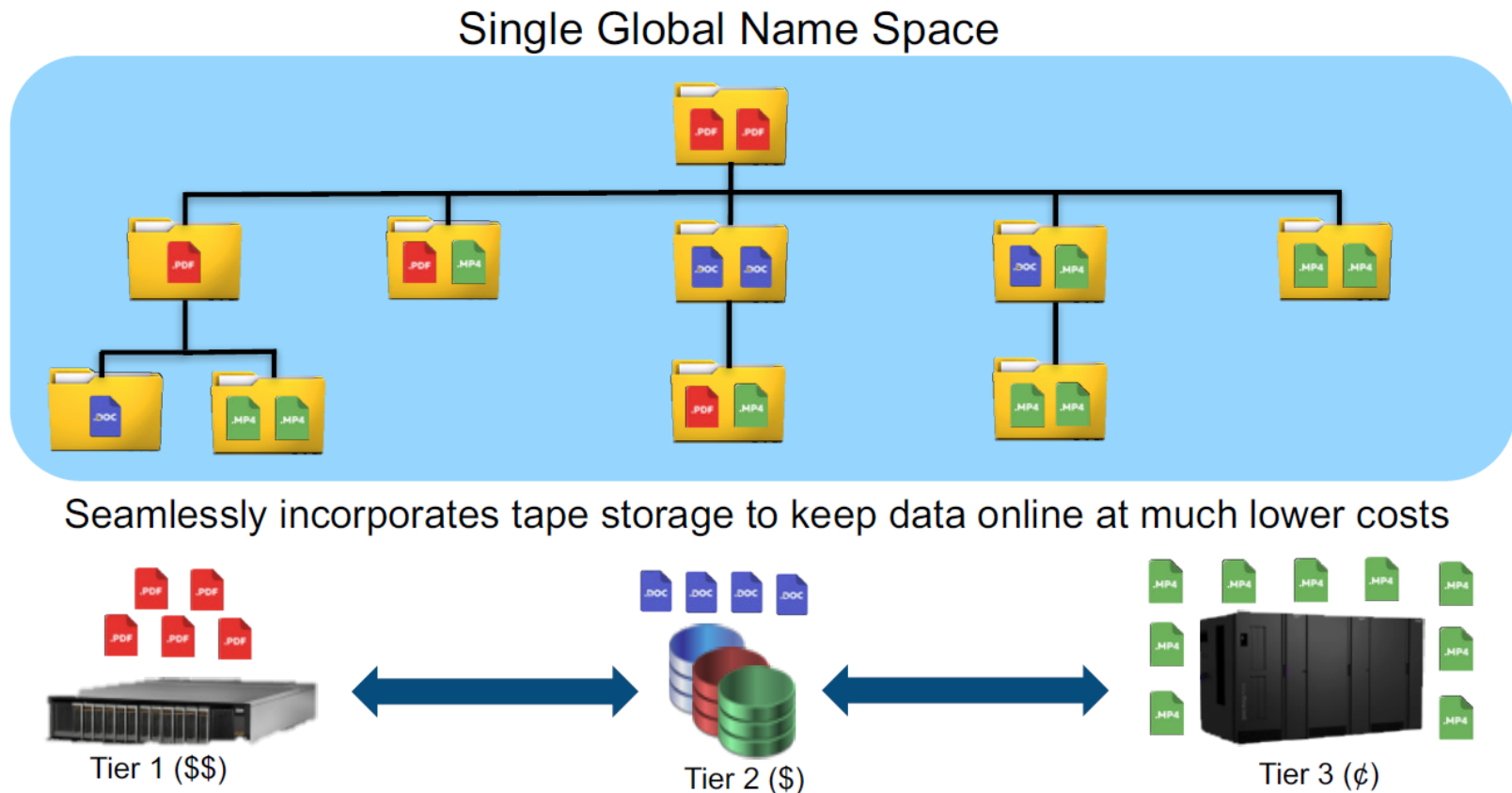
Self-Describing

- Information Exchange by Tape – **No Vendor Lock-in**
- No separate DB server for managing tape contents

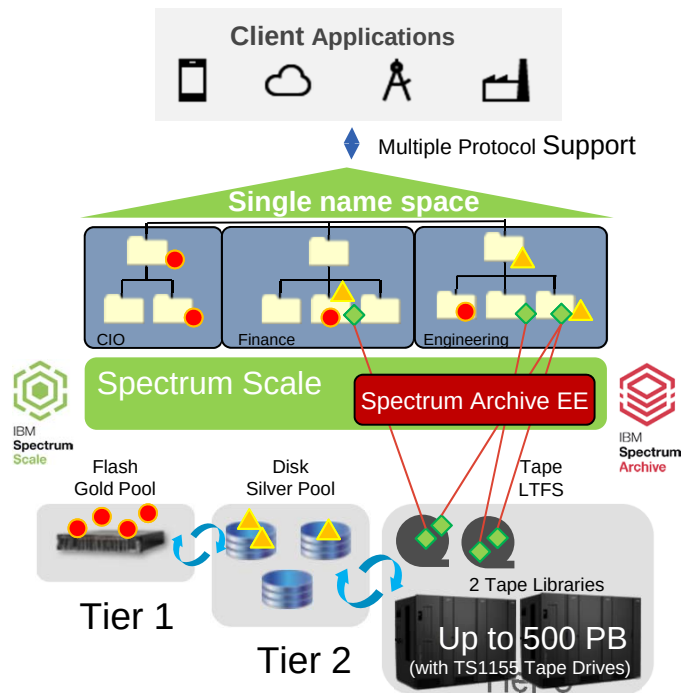
Available as **IBM Spectrum Archive**

- 3 Editions; Single Drive Edition (SDE), Library Edition (LE), and Enterprise Edition (EE)

Integrates tapes as low cost tier of your operational storage



IBM Spectrum Archive Enterprise Edition (EE)



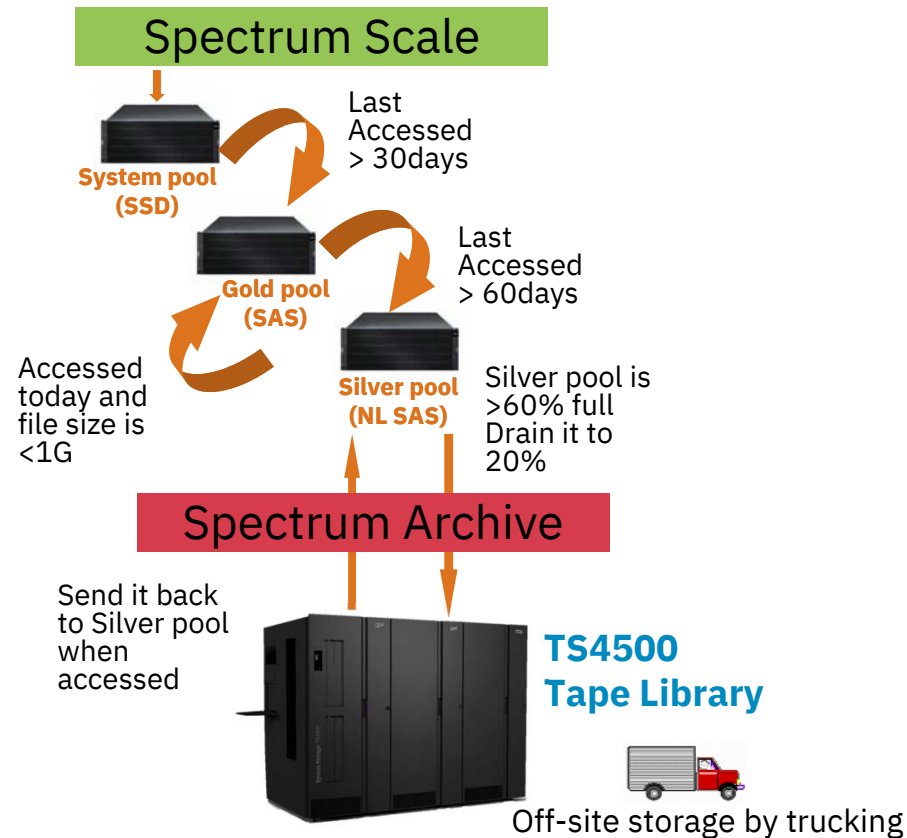
Linux:

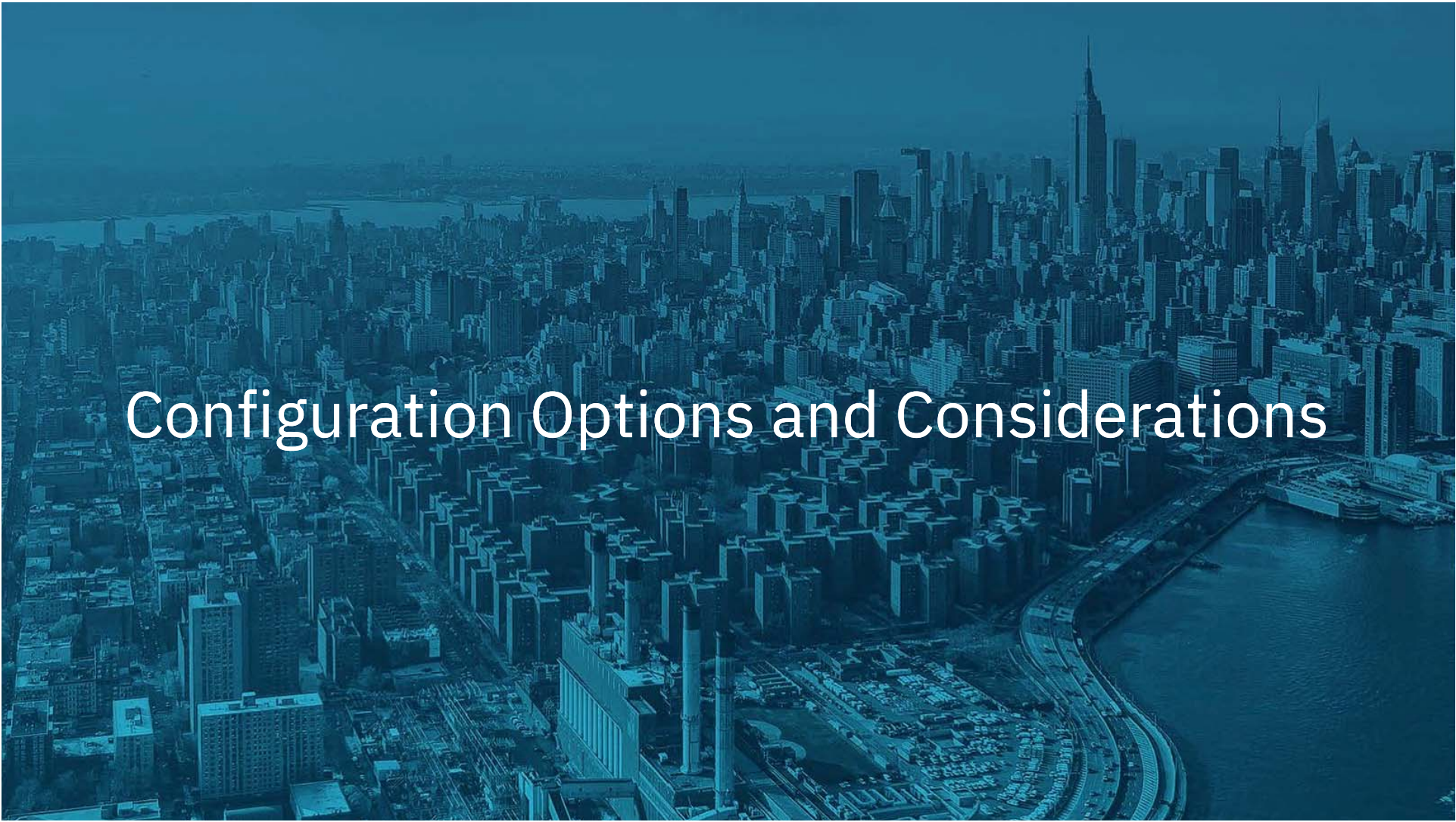
Orderable from AAS or PPA

Trial Version available from IBM Web site

- Automated Data Management
- Seamlessly incorporates tape storage under the single namespace
 - **Keep data in active archive** at much lower costs
 - **Policy-based data placement**
 - **Persistent view** of the data - data still listed in directories
 - Once data is accessed it is moved to disk – recall on demand
- Tape as the external pool of Spectrum Scale
 - Tapes **in LTFS format**
 - Exporting tapes to other site and accessible with other LTFS software
- CLI, REST API, Grafana-based dashboard screen

Solution: Cost Optimization by Policy-based Multi-Tier Storage



An aerial photograph of a dense urban landscape, likely New York City, featuring a mix of high-rise skyscrapers and lower residential buildings. The image is heavily tinted with a dark blue color. In the foreground, a large body of water is visible on the right, with a curved road or bridge structure. The text "Configuration Options and Considerations" is overlaid in white, centered horizontally across the middle of the image.

Configuration Options and Considerations

Building Block Options for Scale Out

1. Servers

- CPU - x86 or POWER Little Endian
- Software – Spectrum Scale and Spectrum Archive

2. Disk Storage

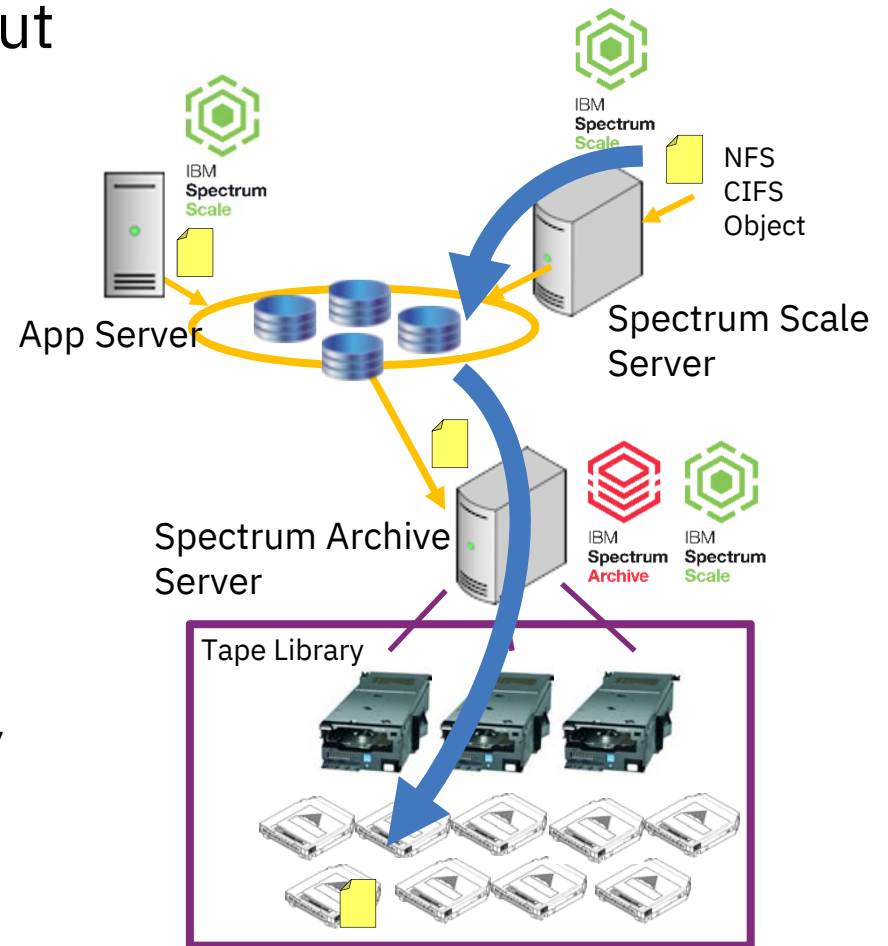
- Internal or External

3. Tape Drive and Tape Media

- Drive Type (LTO or Enterprise Tape, Generation)
- WORM or Non-WORM
- Interconnect (HBA, Switches, Zoning)

4. Tape Library

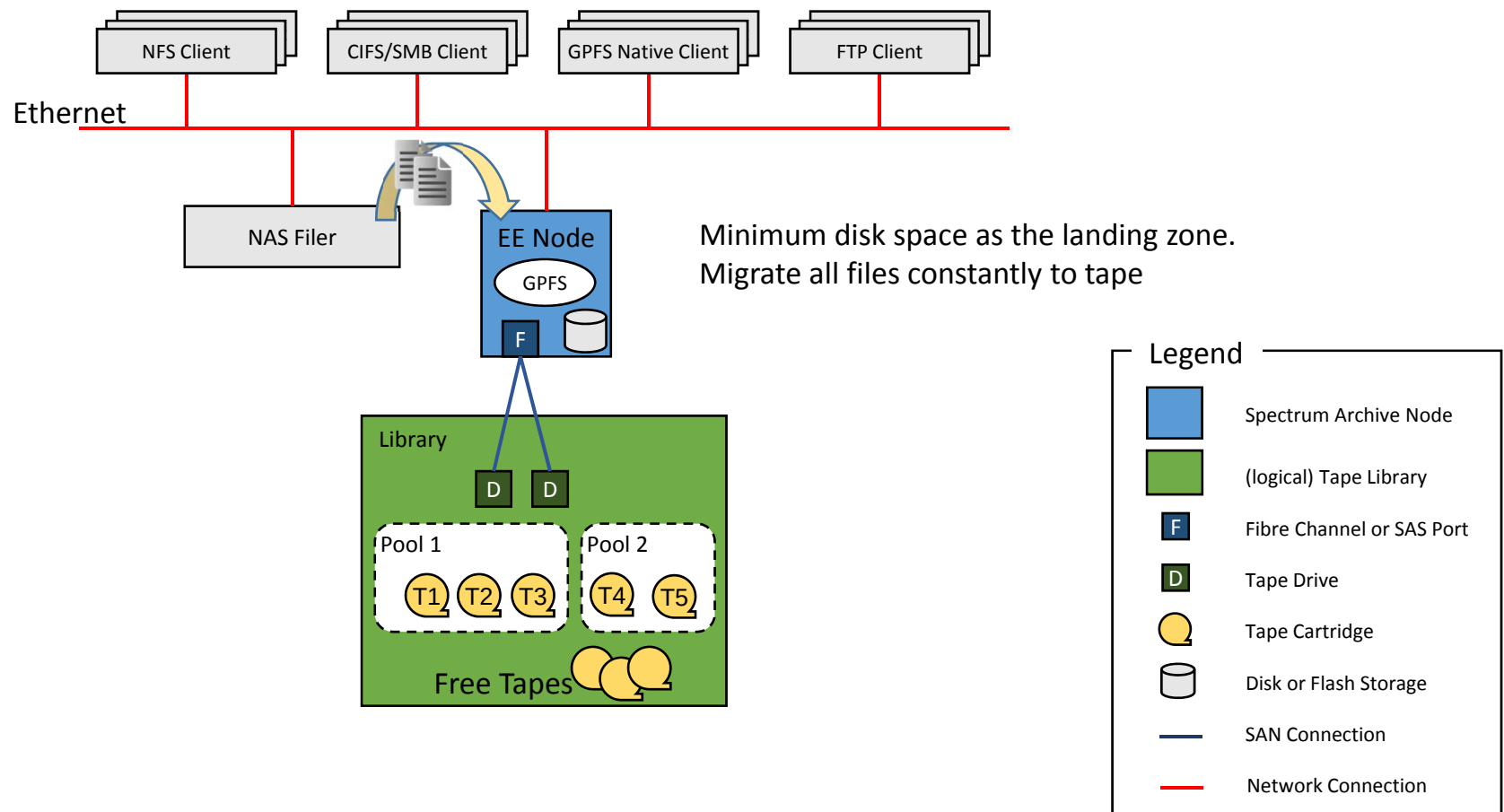
- Up to 2 tape libraries for redundancy
- TS4500 and TS3500 (houses up to 20000 tapes)
- 19 inch rack mount TS3310 and TS4300



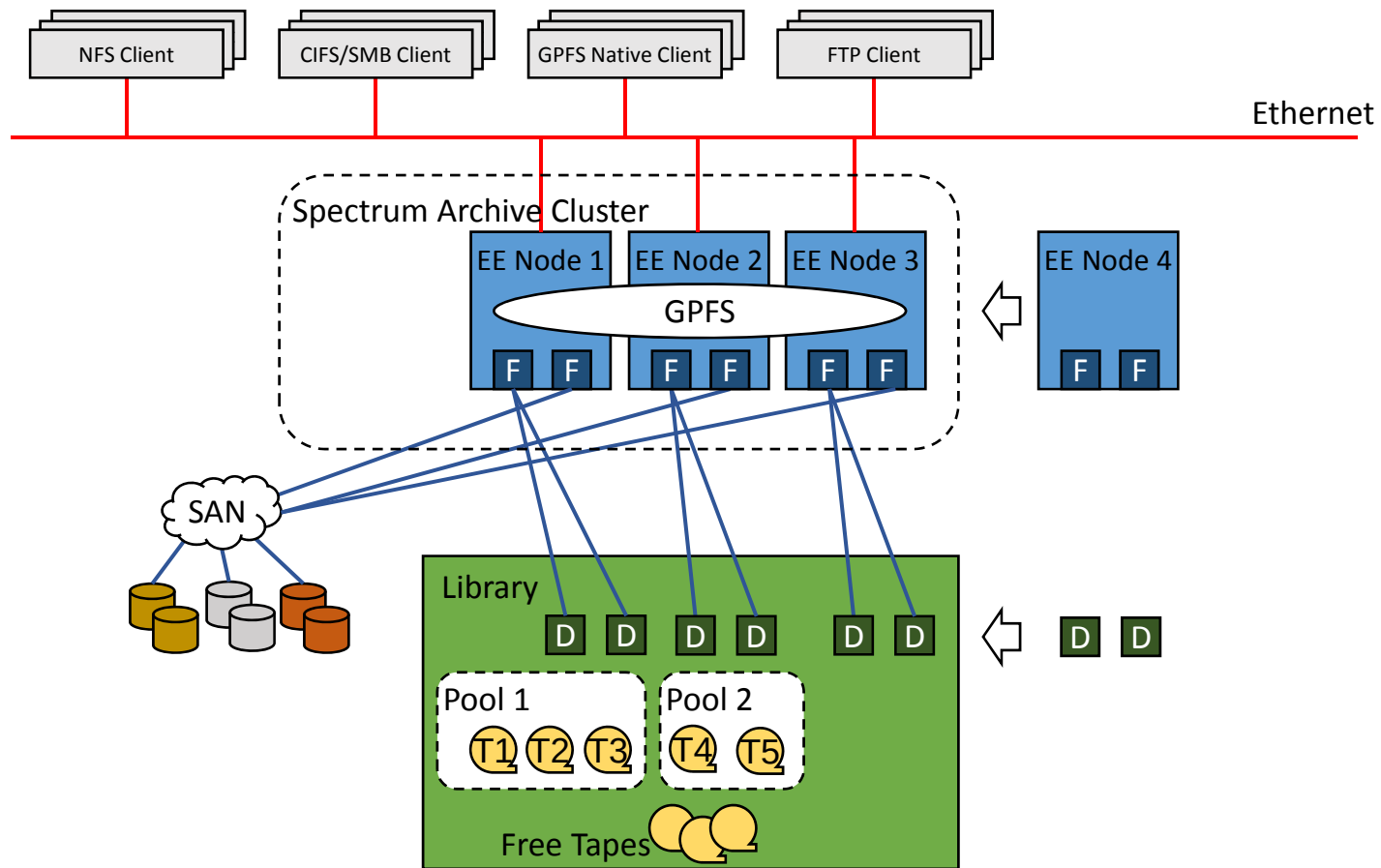
Planning Considerations

1. Connecting to the existing Spectrum Scale cluster, or brand-new installation
2. Redundancy Level
3. File Size
4. Recall Ratio
5. Data Lifecycle
6. Performance Requirements (Operation Hours, Throughput)

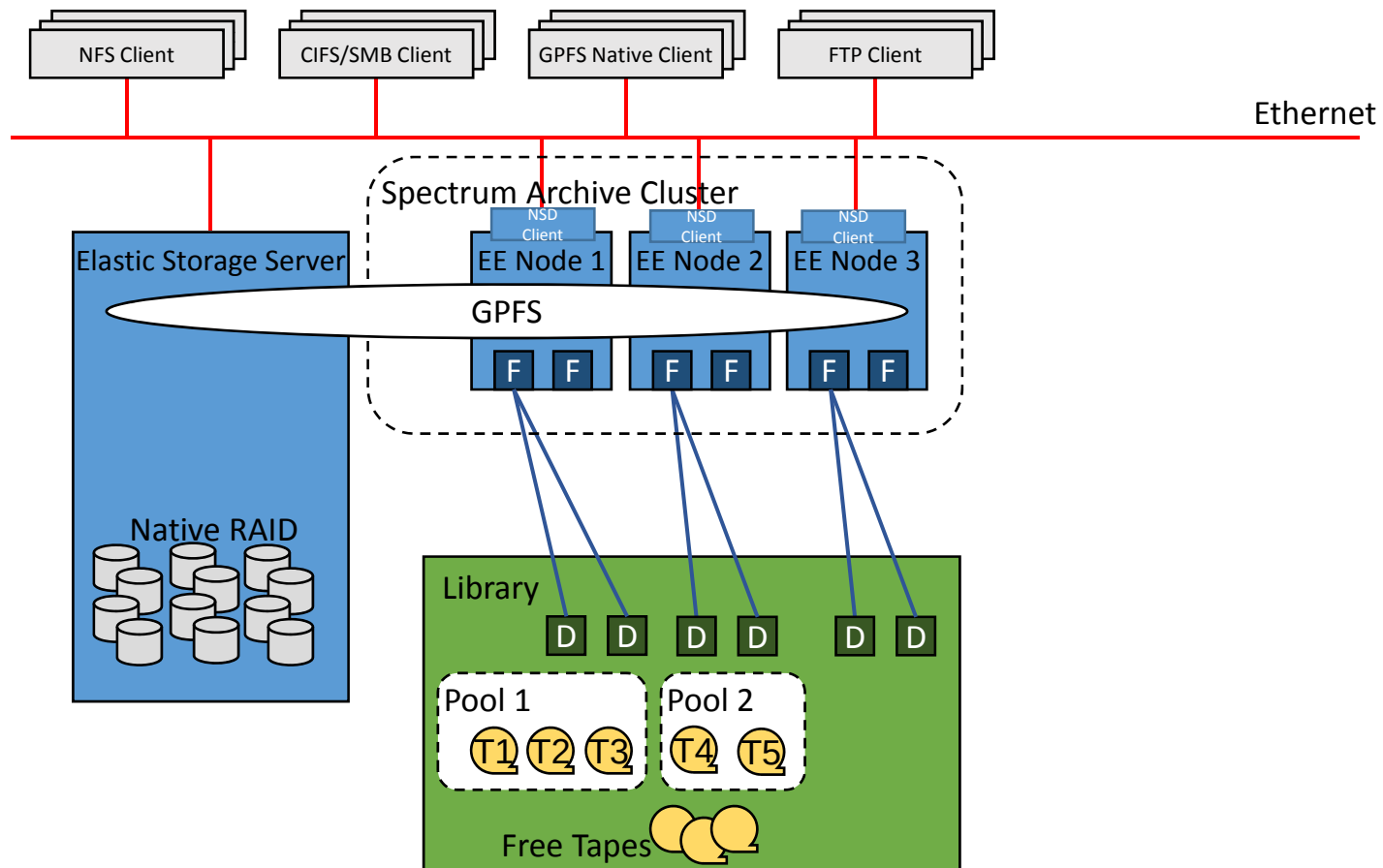
Minimum Configuration (Ingest from External Filer)



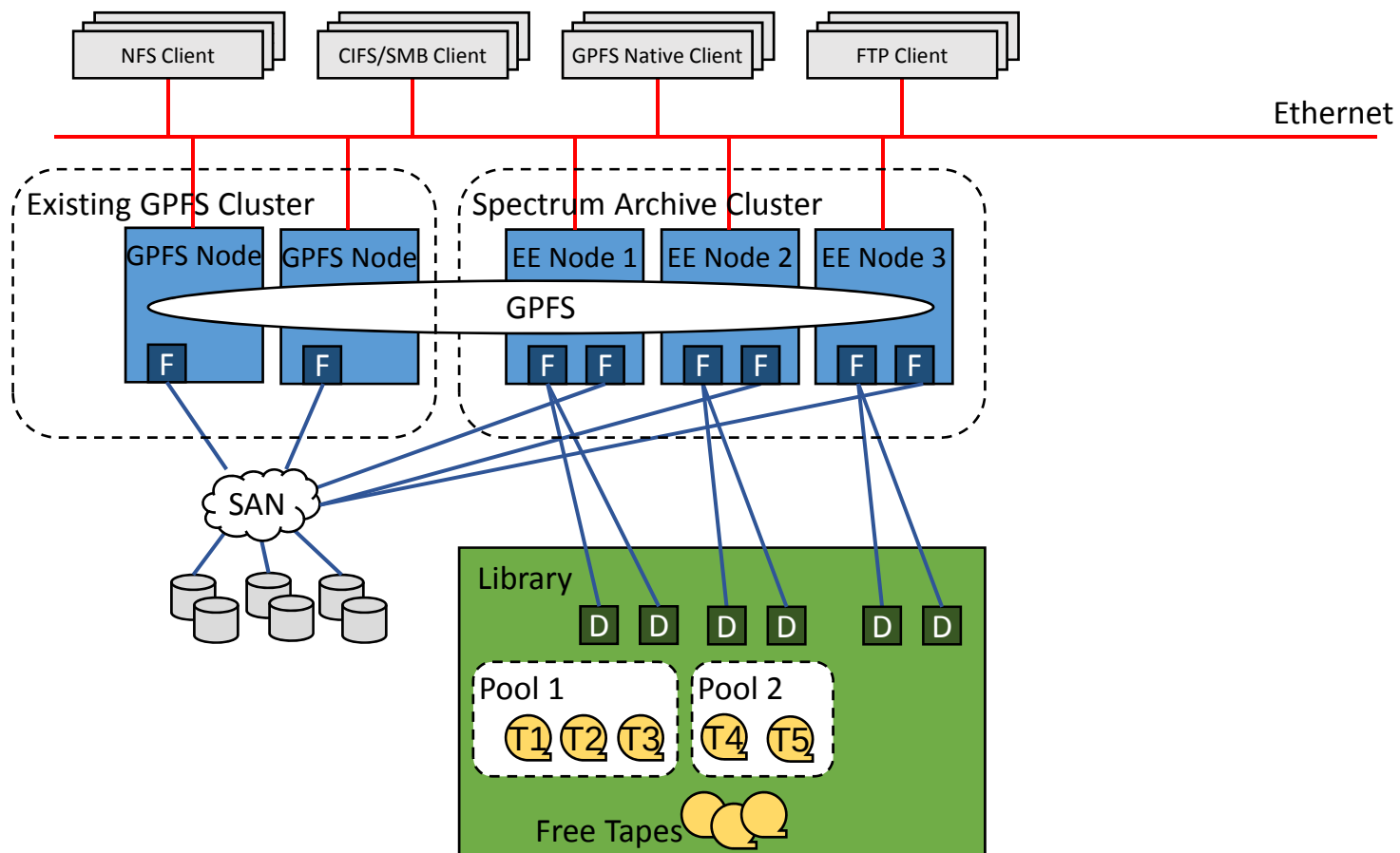
Scale-out Configuration



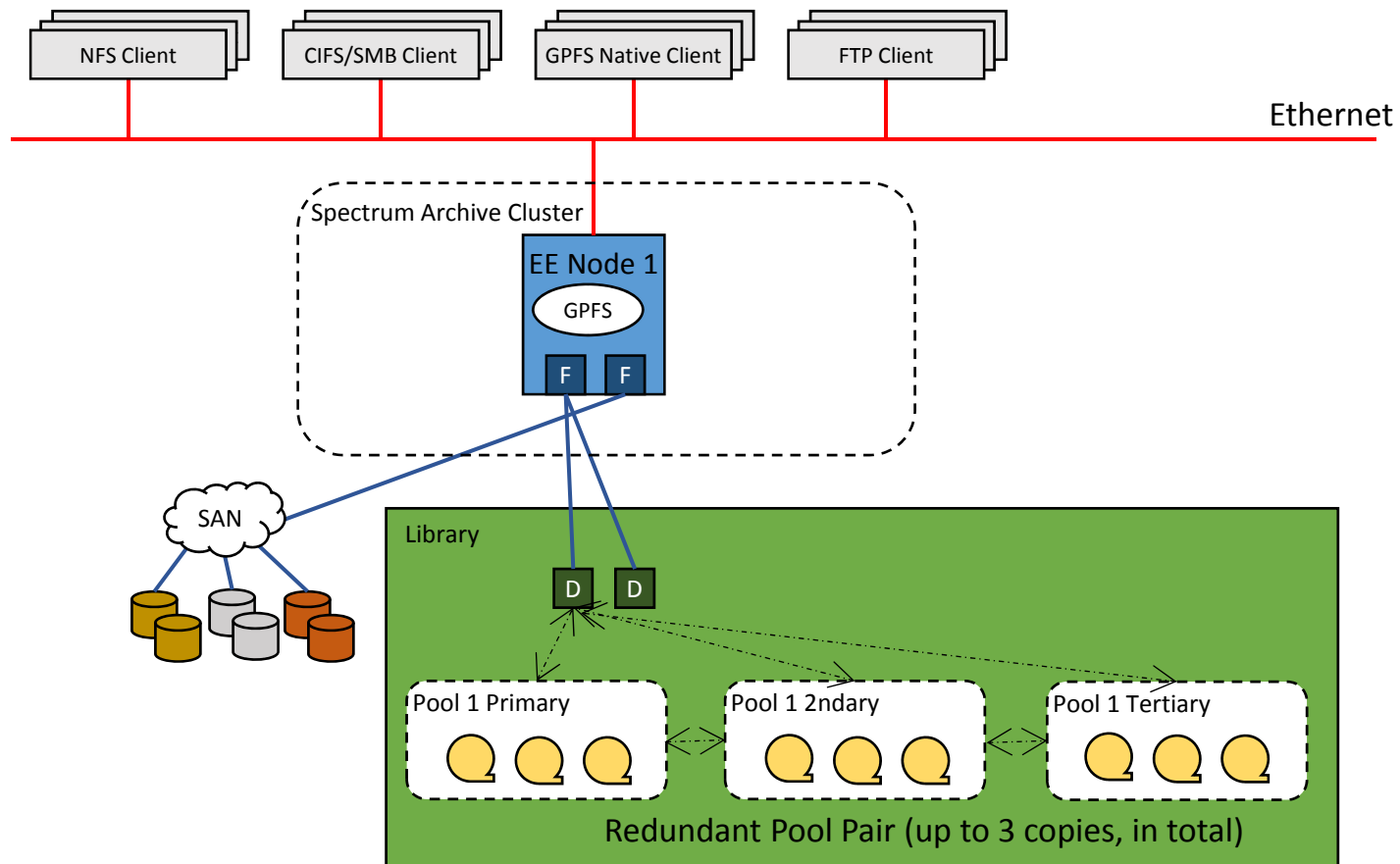
Configuration with ESS



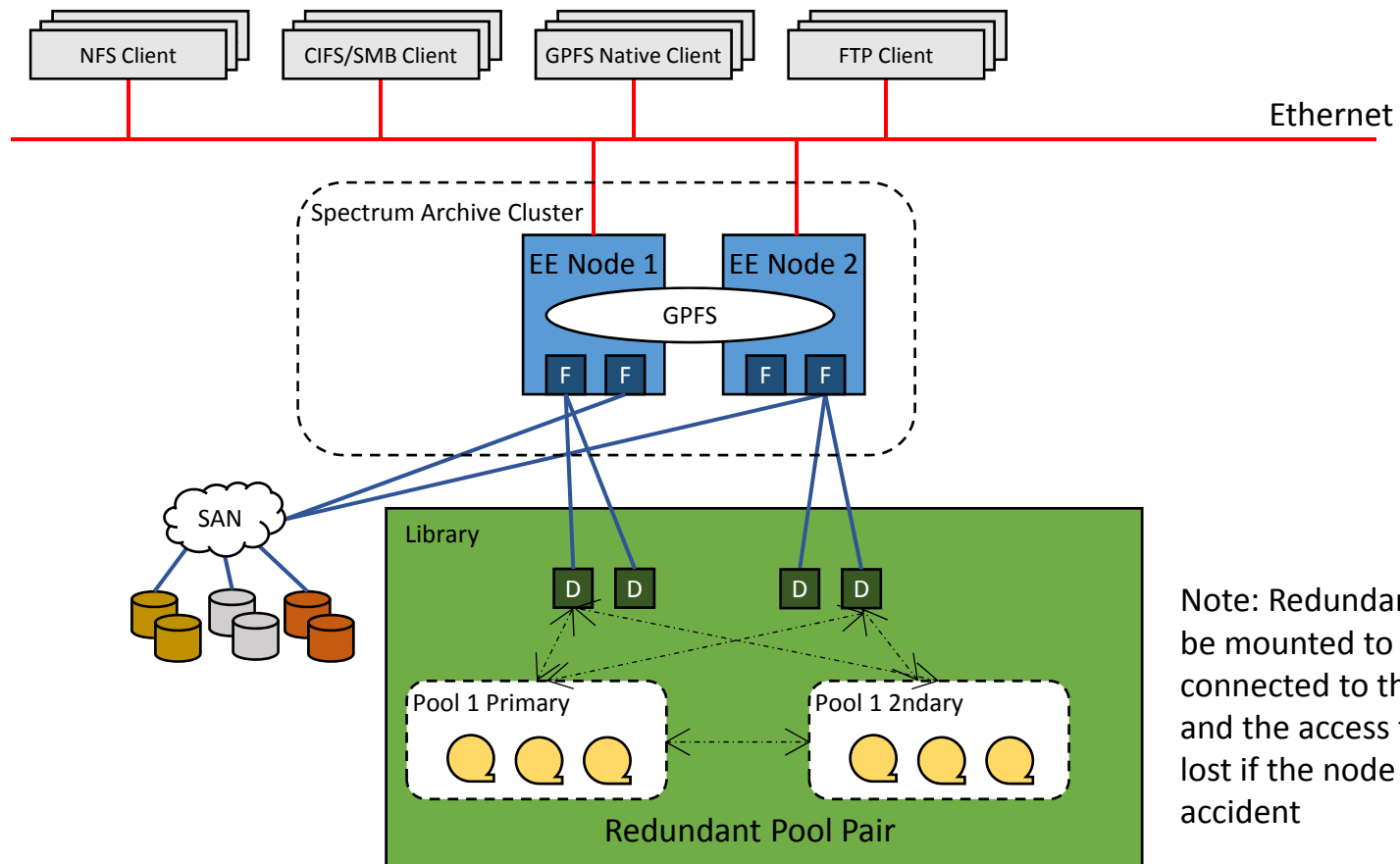
Adding Spectrum Archive to Existing Spectrum Scale Cluster



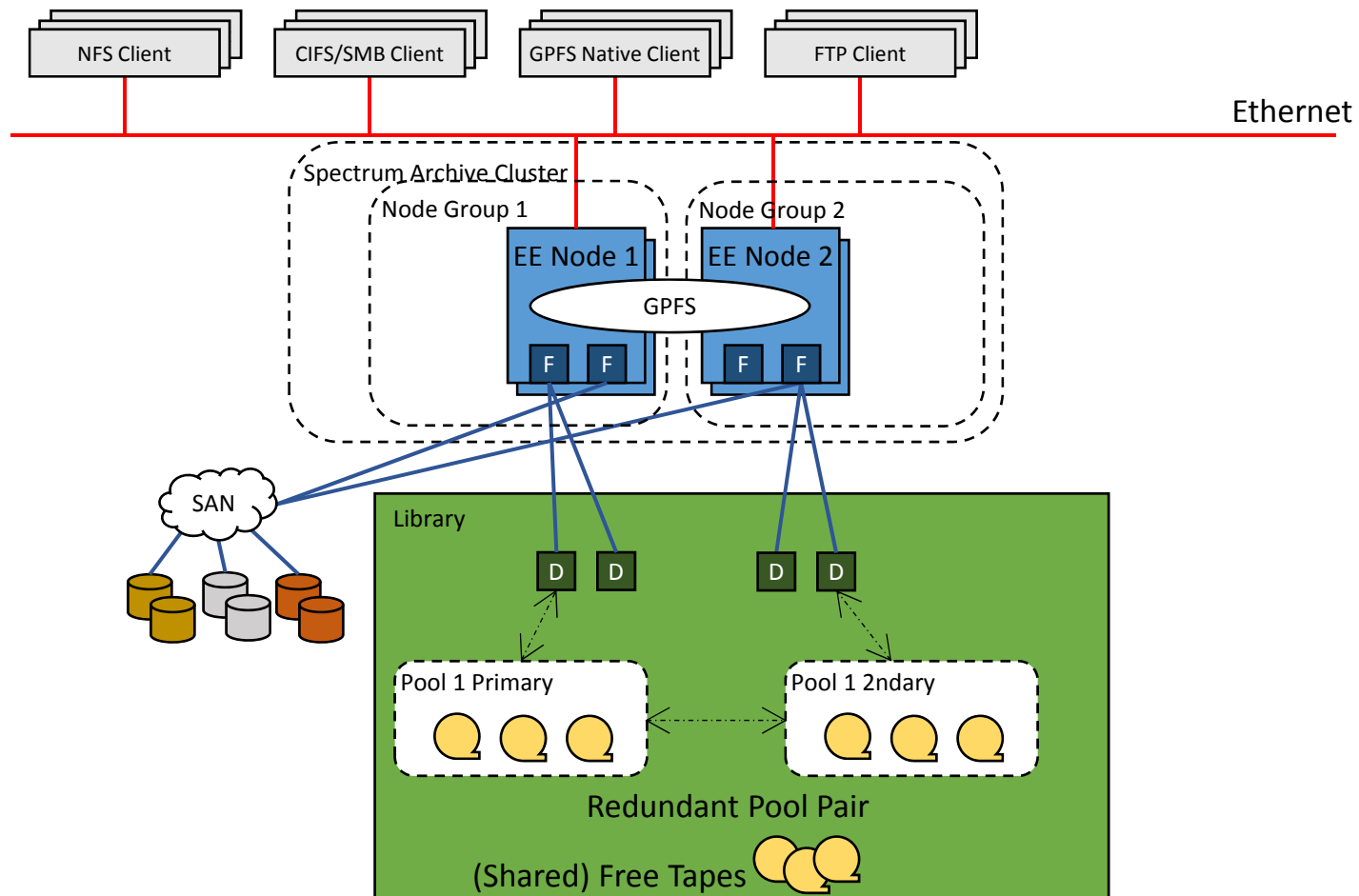
Redundant Copy



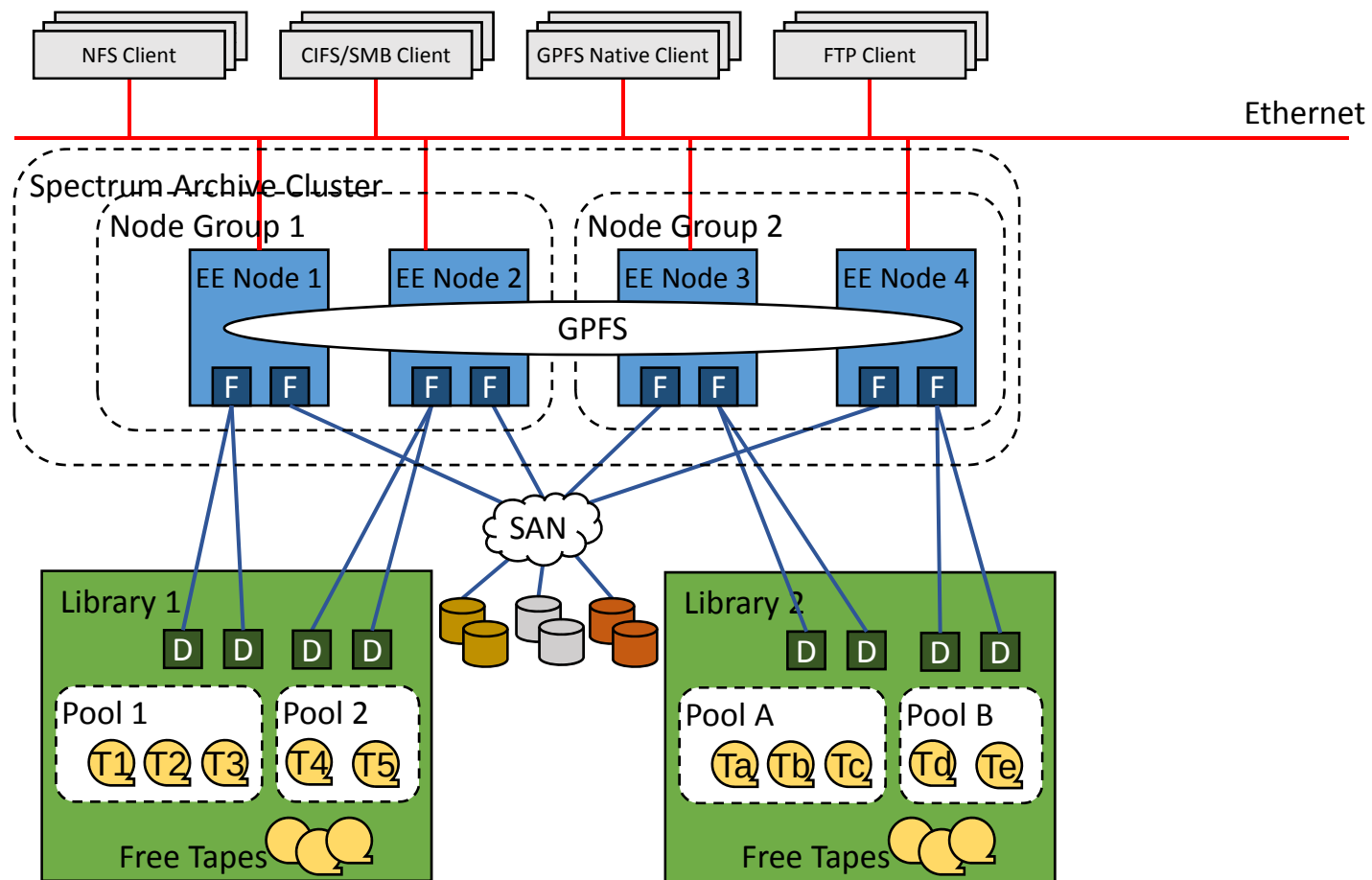
Redundant Copy with Multiple Node



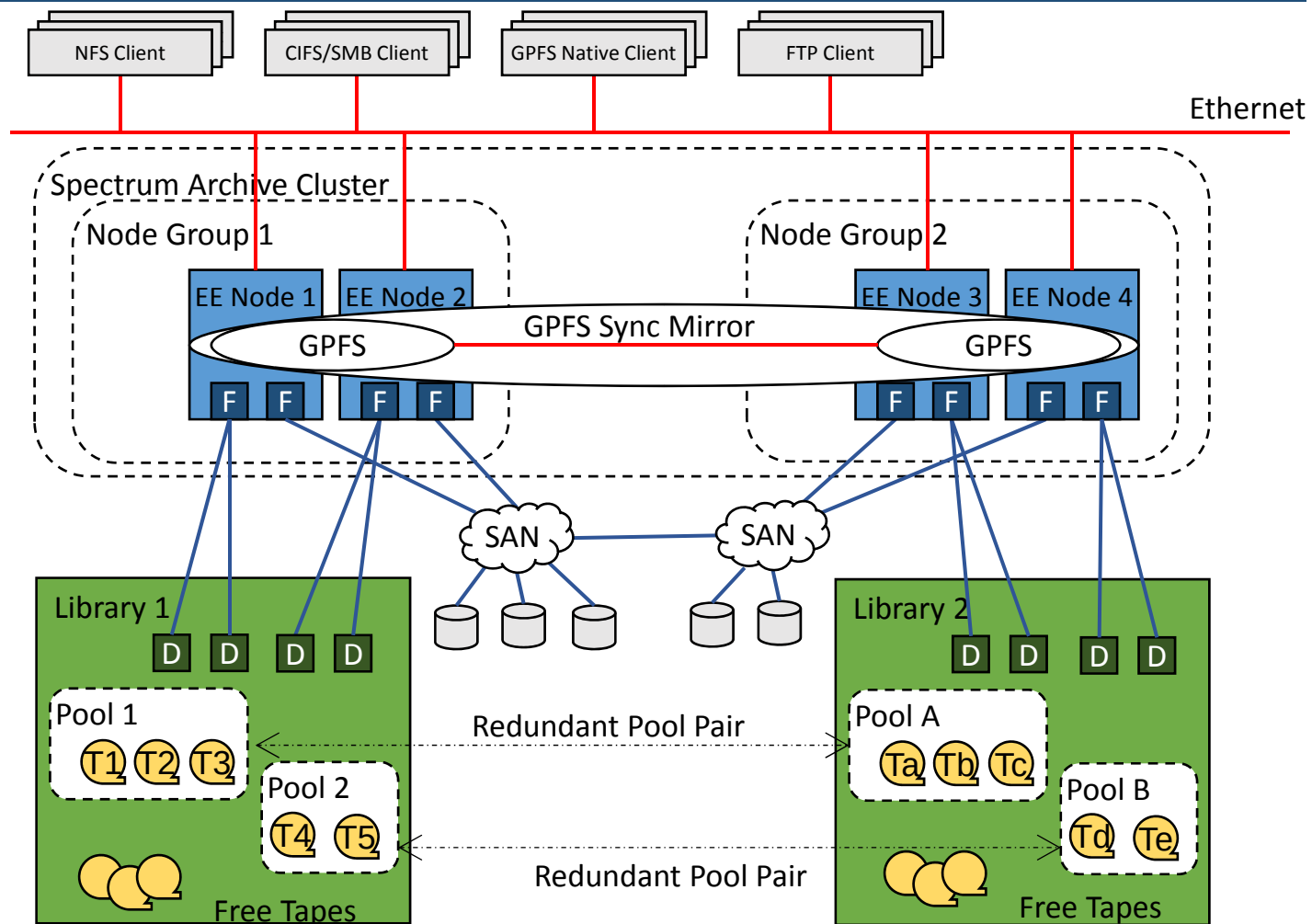
Failure Isolation by Node Groups



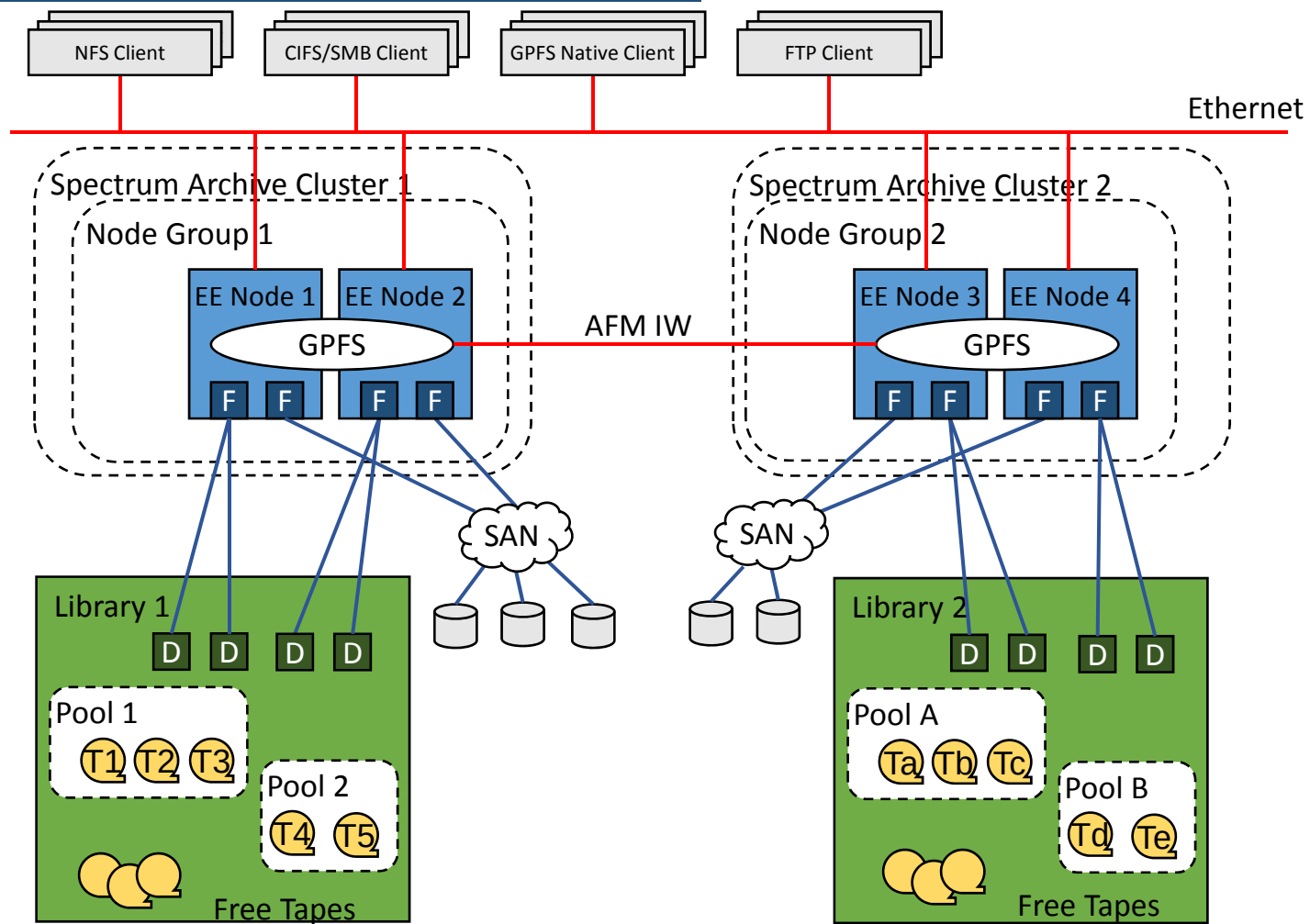
Multi-Library Configuration (Library Redundancy and Capacity Scale-out)



Multi-Library Configuration with GPFS Stretch Cluster (Sync Mirroring)



Long Distance Replication by AFM IW mode



IBM Tape: Cost-efficient, reliable and secure storage solutions

IBM Storage and SDI

Improving storage TCO and scale out capacity

- Improve storage space efficiency with the new TS1160 Tape Drive storing 2x more native capacity* per tape
 - New JE Barium Ferrite media delivers improved TCO with greater capacity
 - Supports Write Once Read Many (WORM) cartridges
 - Provides faster native data rate of up to 400 MB/s to help avoid bottlenecks when performing data intensive applications
 - Adds dual-port 16 Gb FC support
- Enhances existing IBM TS4500 and TS3500 tape libraries

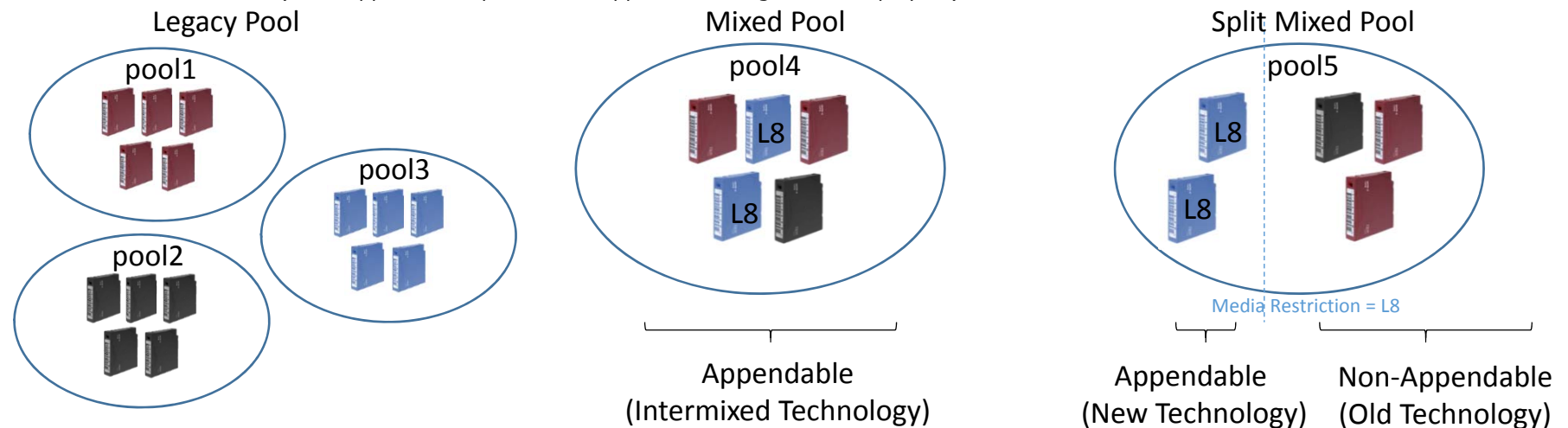


Reduce cost of long term storage when facing massive data growth with IBM Spectrum Archive

- IBM Spectrum Archive expands storage capacity with TS1160 Tape Drive support and delivers quality improvements to improve customer experience.

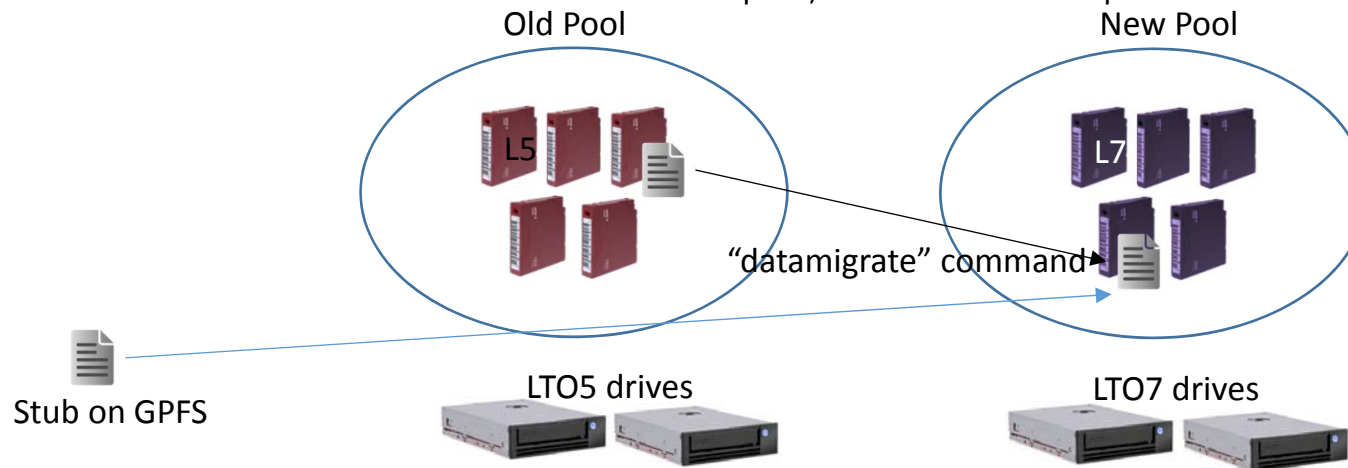
EE 1.2.6: In-Pool Technology Upgrade using Intermixed Tape Pool

- Allow writing to specific media type
 - “Appendable” tapes will be used for migration or as the target of reclaim
- Others will be treated as “Non-appendable” tape (still eligible for recall and source of reclaim)
- Media restriction can be set by “ltfsee pool set” command per pool
 - No restriction by default
 - Specify one media type For example, “JD” or “L7”
 - 3592 media will be also enforced to use a particular format density (“E07”, “E08”, or “55F”)
- “Free space” in CLI and REST API indicates the appendable space
 - New information (“Non-appendable space” and “Appendable” flag will be displayed)



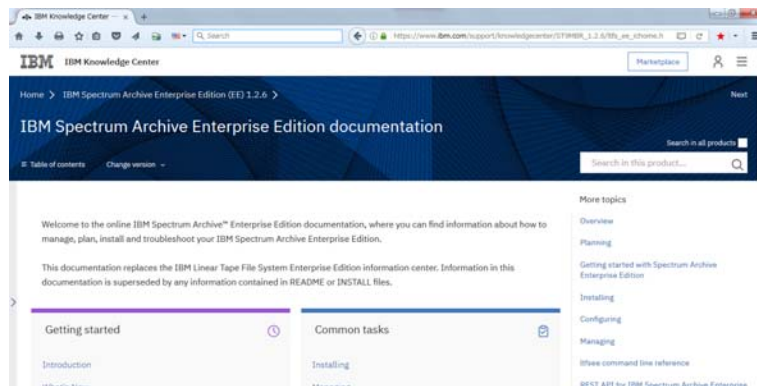
EE 1.2.6: Pool-to-Pool Data Migration

- New “ltfsee datamigrate” - Allows to move the content of tape to different pool
 - Source and Target Pools needs to be in the same library and same node group
 - This cannot be used to increase the replicas
- Usage example
 1. Redirect the new migration to new pool
 1. Change the name of existing pool to something else (pool1 → pool2)
 2. Create a new pool with old name
 2. Move the contents of old pool by using “ltfsee datamigrate” command
Stub file will be updated by datamigrate command
 3. After all contents are transferred to new pool, withdraw the old pool



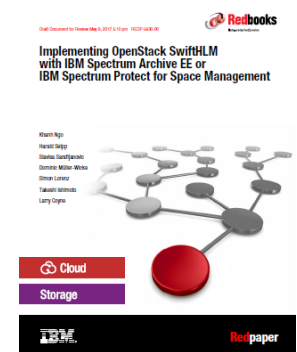
Resources

Product Manual (Knowledge Center)



<https://www.ibm.com/support/knowledgecenter/ST9MBR>

Redbooks



<http://www.redbooks.ibm.com/abstracts/sg248333.html>

<http://www.redbooks.ibm.com/abstracts/redp5384.html>

<http://www.redbooks.ibm.com/abstracts/redp5430.html>

