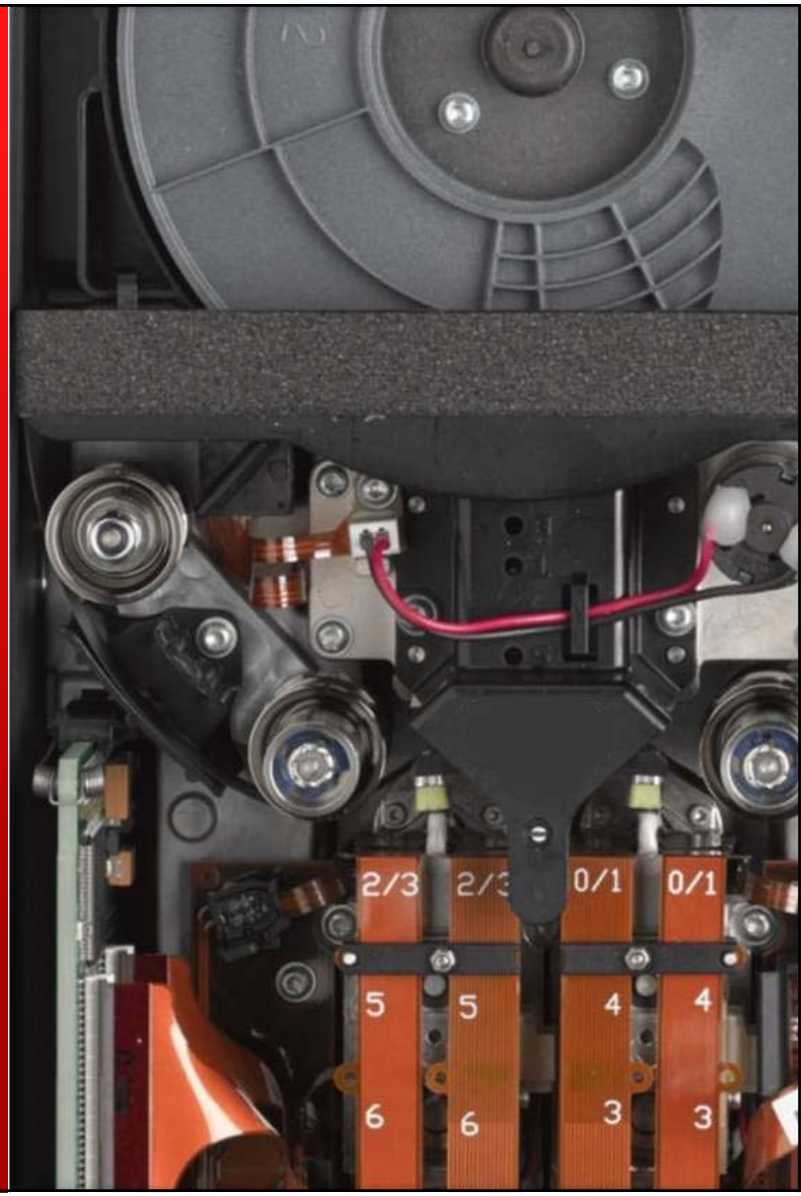
ORACLE

Tape at Oracle

John Herron
Director, Tape Drive Engineering

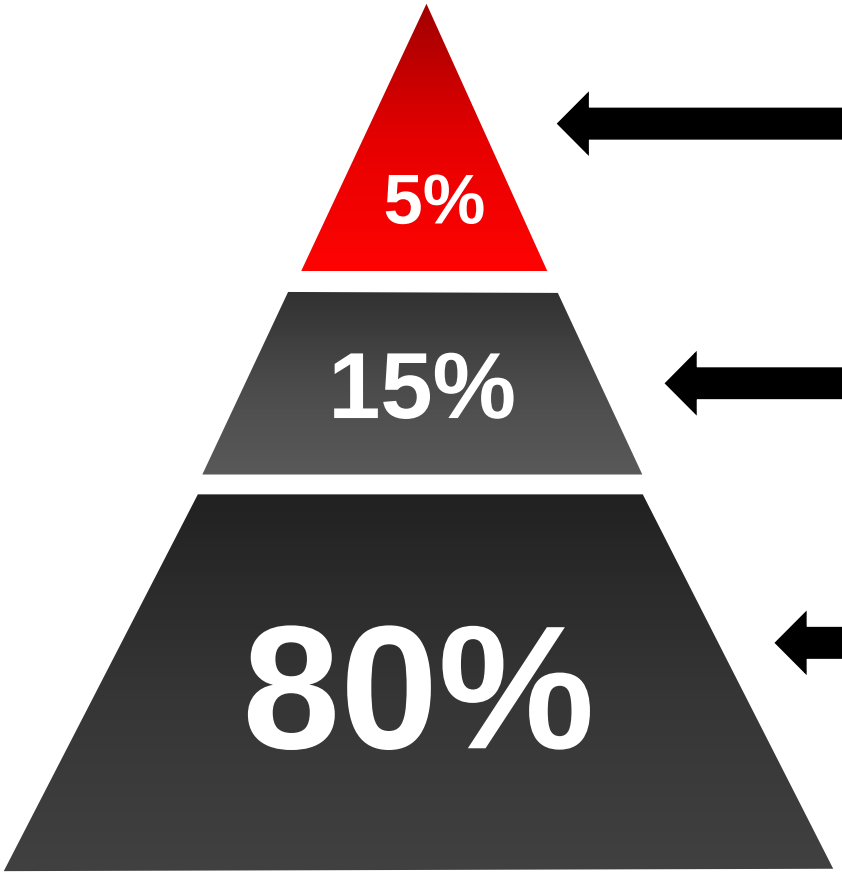
Fujifilm Global IT Executive Summit
October 24, 2013



Oracle is a Tape Company (among other things)

Data is growing so how should it be managed?

Solution: Tiered Storage



Current (<7 days) Flash/Performance Disk

- frequent changes
- immediate access

Recent (7-90 days) Capacity Disk

- infrequent changes
- slight access delay acceptable

Archival (>90 days) Tape

- very infrequent/no changes
- offsite/offline/nearline protected

Tape is Ideal for Disaster Recovery and Archive

Security, Reliability, and Predictability When You Need it Most

- Tape is **decoupled from sources of corruption**
- Tape offers **data integrity validation**
  - detects corrupted data before it is written to tape and simplifies digital auditing
- Tape is the **ultimate "Last Line of Defense"**
  - far more reliable than disk and better suited for environmental disasters
- Tape offers **extreme scalability at the lowest cost**
  - simple and low cost to add cartridges instead of disk appliances
- Tape eases **technology migration**
  - offers longer technology lifecycles and the ability to reuse existing media

ORACLE

Tape Advantage to Increase

Areal Density Trends Drive Lower Cost Per GB

Tape Density: 40% CAGR

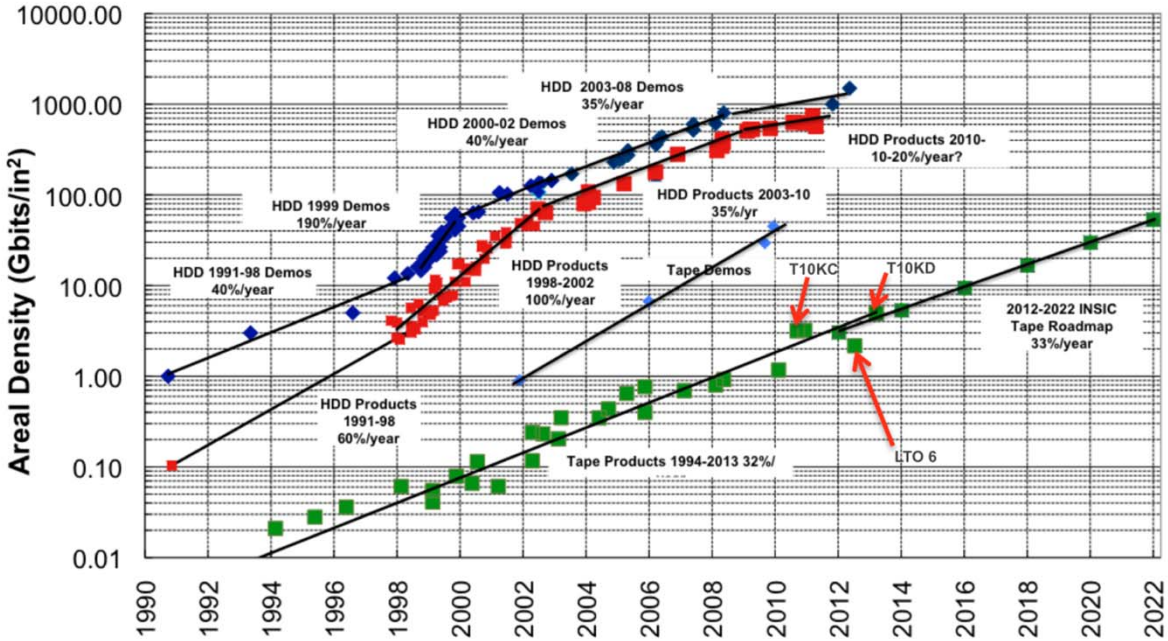
Disk Density: 20% CAGR

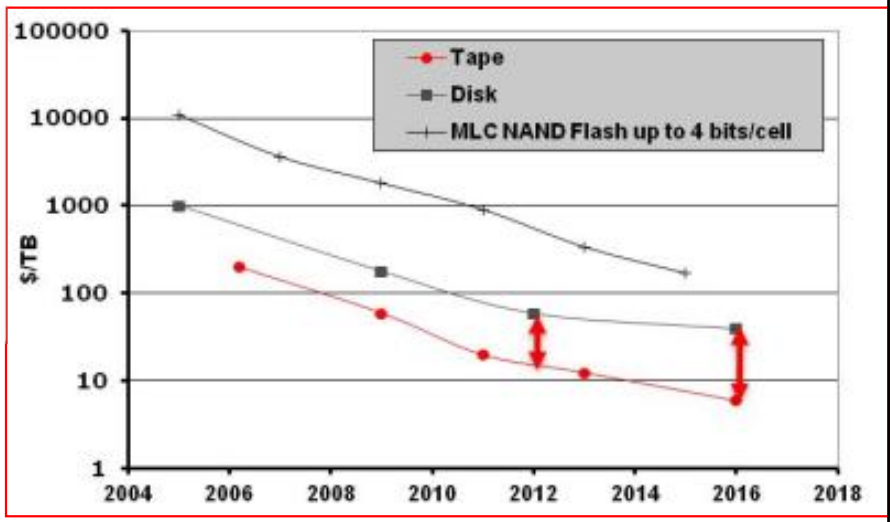
Source: INSIC roadmap areal density projections translated into $/TB

ORACLE

Storage Technologies: Future Projections

Areal Density Trends Drive Lower Cost/TB…





Source: INSIC roadmap

*Tape gets its capacity by having 1000X the recording surface area comparing a 1/2 inch cartridge to a 3 1/2 inch disk.

Archive Foundation

Where Do You Start?

- Start with how the data is stored
  - Media
  - Device
- Add features
  - Compression, Encryption, Performance, etc.
- Add automation, storage management, etc.

Oracle's StorageTek T10000D Tape Drive

- Up to 8.5 TB Native Capacity
- 252 MB/sec Data Rate (uncompressed)
- Up to 800 MB/sec Data Rate (compressed)
- 16 Gb/sec Fibre Channel or 10 Gb/sec FCoE
- Reads T10000A, T10000B, & T10000C Data
- Reuse Existing T10000C-Written Cartridges
- Compatible with SL8500, SL3000, & Rackmount

How to Design a Tape Drive

User View

- High Capacity
- High Performance
- High Reliability
- Host Connectivity

How to Design a Tape Drive

Engineering View

- Select the media
- Match recording head to the media
- Match R/W channel to the head/media
- Track-following servo
- Reliable media handling
- Compression, encryption, etc.
- Add performance features

The Ultimate Archive Media

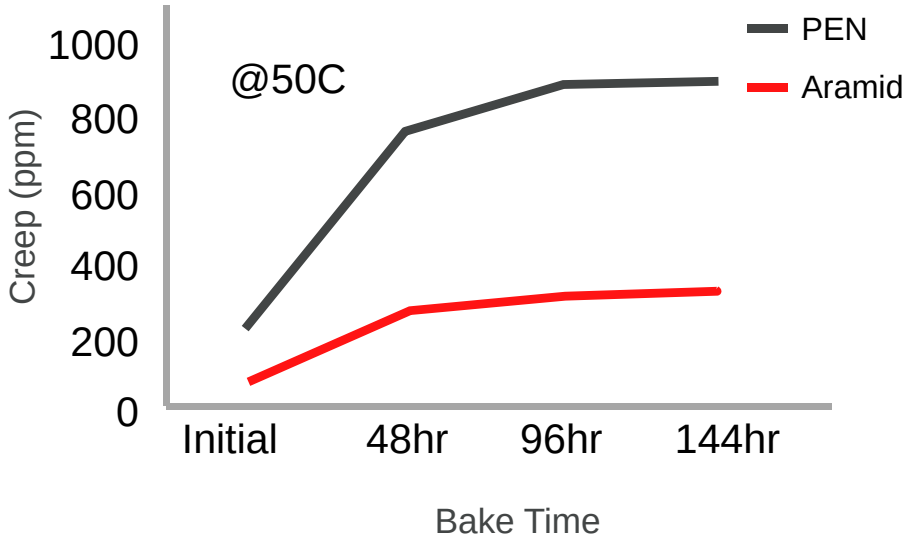
StorageTek T10000 T2 Media Leads the Industry

- Advanced Materials
  - Aramid substrate
  - BaFe magnetic coating
- Ruggedized cartridge for transport
- Designed to preserve customer data for more than 30 years

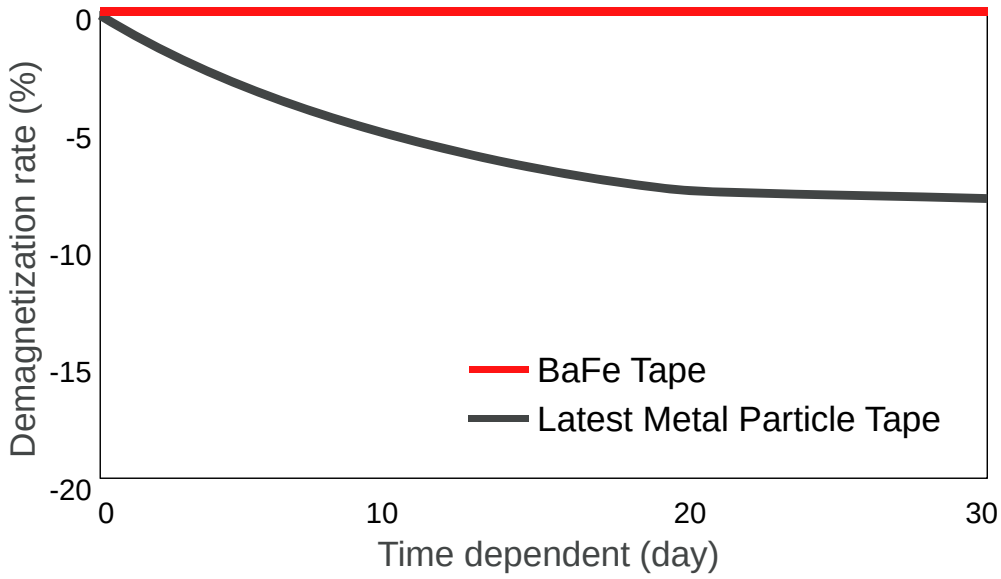
Archive Reliability Depends on Media Stability

Aramid + BaFe = STABLE

Dimensional Stability



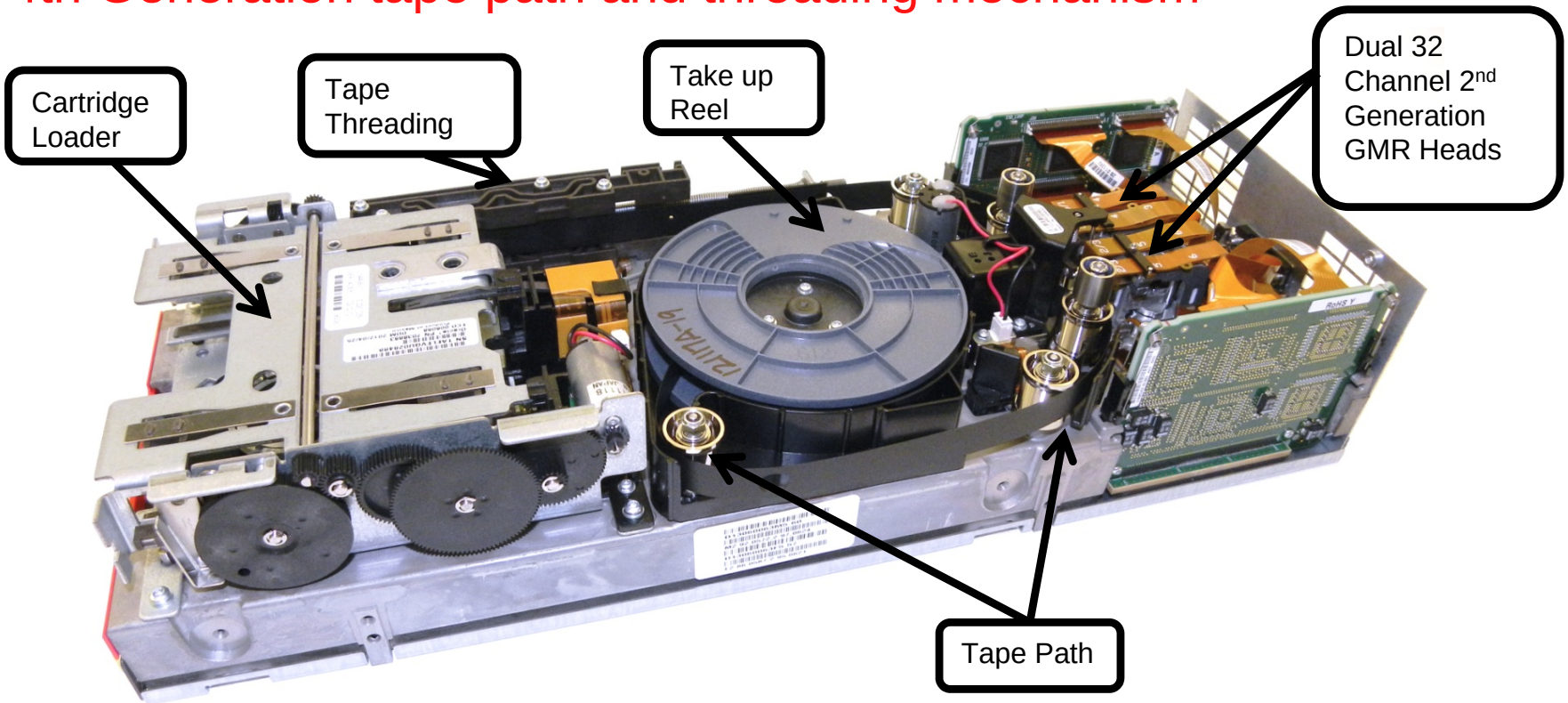
Magnetic and Chemical Stability



"After 30 days, which corresponds to 30 years when stored naturally, there was no change in the amount of demagnetization with BaFe tape."- Engineering Staff, FUJIFILM Recording Media Division

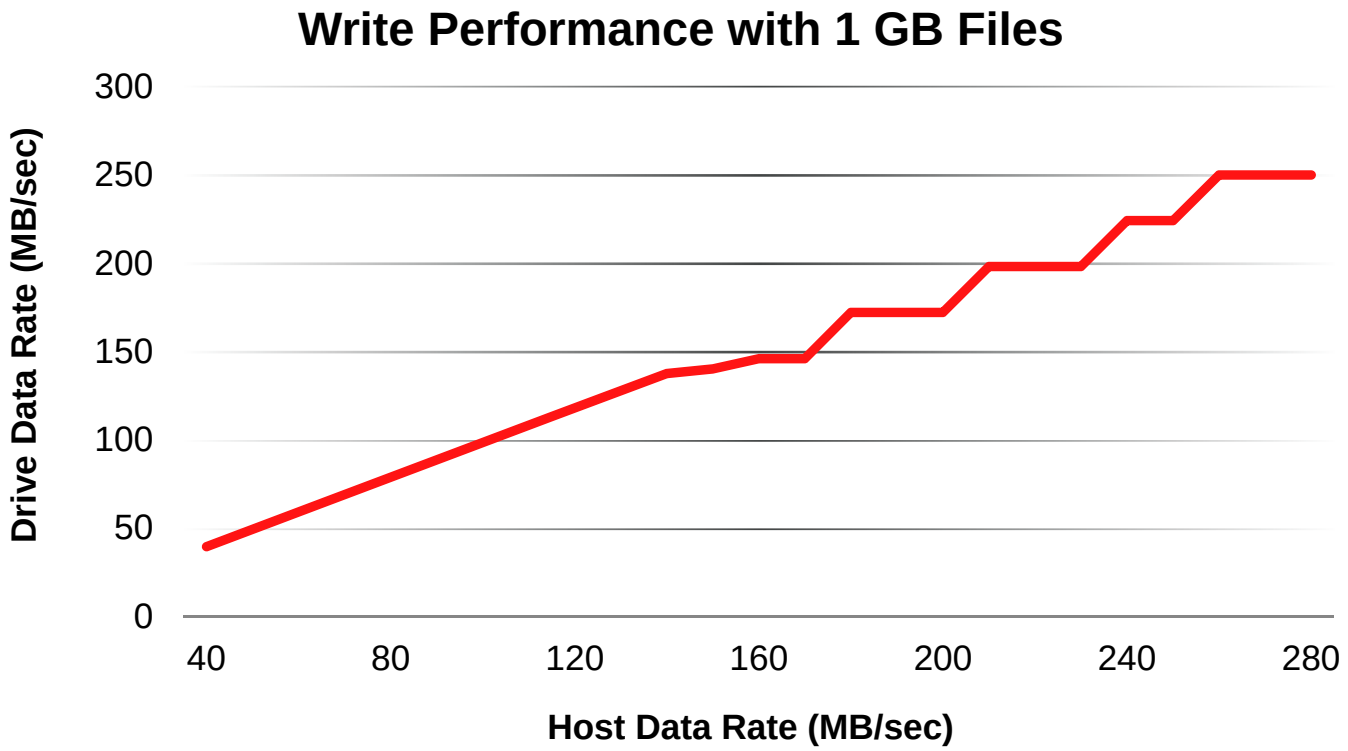
StorageTek T10000D Tape Drive

4th Generation tape path and threading mechanism



Fast Performance with Slow Hosts & Small Files

StorageTek T10000D



ORACLE

STORAGETEK

Oracle's Broomfield, Colorado Campus

Hardware and Software

ORACLE

Engineered to Work Together