Reckoning with the Realities of Storage

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Storage Shipment History and Projections

- Tape (LTO)
- SSD
- HDD

Shipped Capacity in Exabytes

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Touch rate versus response time indicating various types of uses

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Digital storage technologies regions overlaid on the Touch Rate/Response Time chart
Comparison of archive storage
Archive

- Traditional archives are focused on digital preservation and content access is not a big focus.
- Some people have “active archives” that act more like a long term content library and content access is important.
- Digital archives may exist on your own storage, DAS/SAN/NAS or private cloud, or in a third party data center (the “public” cloud).
Actual HDD Product Introductions

ASTC projects 10 Tbps by 2025
Magnetic Tape (LTO) Roadmap

LTO Roadmap

LTO-3 | LTO-4 | LTO-5 | LTO-6 | LTO-7 | LTO-8 | LTO-9 | LTO-10
---|---|---|---|---|---|---|---
Shipment Year | 2005 | 2007 | 2010 | 2013 | 2015 | TBD | TBD | TBD
Native Capacity | 400GB | 800GB | 1.5TB | 2.5TB | 6.0TB | Up to 12.8TB | Up to 25TB | Up to 50TB
Compressed Capacity | 800GB | 1.6TB | 3.0TB | 6.25TB | 15TB | Up to 32TB | Up to 62.5TB | Up to 125TB
Native Transfer Rate | 80 MB/s | 120 MB/s | 140 MB/s | 160 MB/s | 300 MB/s | Up to 472 MB/s | Up to 708 MB/s | Up to 1100 MB/s
Compressed Transfer Rate | 160 MB/s | 240 MB/s | 280 MB/s | 400 MB/s | 750 MB/s | Up to 1180 MB/s | Up to 1770 MB/s | Up to 2750 MB/s

LTO-7 tape cartridges now less than one cent per GB!
$/GB Trends

LTO Tape Media

~10 X
Comparison of estimated annual cost to save 1 PB for 20 years

- Tape about 2.5 X less expensive than HDDs over the 20 years
- Depends upon assumptions, IBM had 13 X, Clipper Group had 6 X
Growing use of cloud storage in M&E

Cloud storage revenue to increase to over $2.1 B by 2020


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Migration Speeds

• Loaded LTO 7 Tape Data Rate: 300 MB/s
• HGST 10 TB Helioseal HDD Data Rate: 249/237 MB/s (R/W)
• Tape data rate is faster when loaded but it may take several seconds to load a tape cartridge from a library, so total access time is much slower than HDDs
• Storage in the cloud may be on HDDs or tape
Percentage of digital long-term archives on various media

- Digital tape: 40%
- Ext. HDDs: 28%
- Local storage network: 16%
- DVD discs: 4%
- Private or public cloud: 5%
- Other: 5%
- Blu-ray discs: 2%


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References

• Touch Rate: A metric for analyzing storage system performance, Steven Heltzer and Tom Coughlin, 2015, http://www.tomcoughlin.com/techpapers.htm

Conference Theme: The Art of Storage

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- Storage for Artists: Challenges and Opportunities in Post Production Storage
- Content on the Move: Delivering Storage Content When and Where it is Needed
- Archiving: Don’t Leave the Good Stuff Behind
- Accelerating Workflow: Solid State Storage in Media and Entertainment
- Conversation with Independent Storytellers

www.creativestorage.org
Thanks