

Oracle StorageTek

Dr. James Cates
Senior Vice President
Archive Development

james.cates@oracle.com

ORACLE®



“Don't try to frighten us with your sorcerer's ways, Lord Vader. Your sad devotion to that ancient religion has not helped you conjure up the stolen data-tapes, or given you clairvoyance enough to find the Rebels' hidden fort—”
Conan Antonio Motti



“I find your lack of faith disturbing”
Darth Vader

Star Wars - A New Hope
(1977)

Rogue One (2016)



“The Story of the Data-Tape”

<https://erikloncar.wordpress.com/film-analysis/star-wars-a-rogue-one-analysis/#jp-carousel-1644>

Rogue One



Scarif Vault - Imperial security complex holding scientific studies, government documentation and engineering plans including Death Star schematics.

<https://erikloncar.wordpress.com/film-analysis/star-wars-a-rogue-one-analysis/#jp-carousel-1644>

Star Wars Data-Tapes

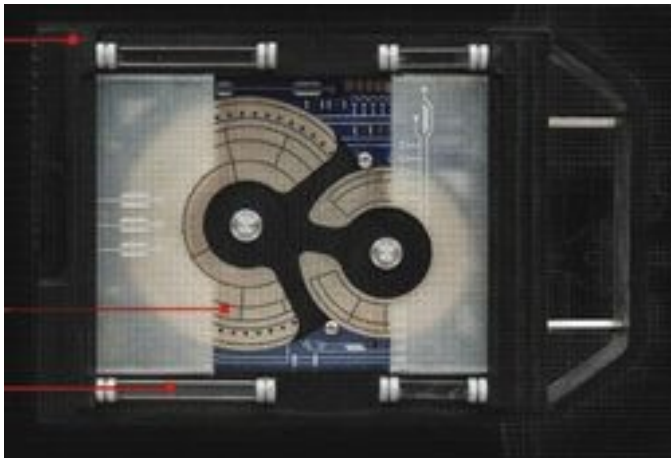


“Monomolecular-switching binary tapes ... had a 512-million exanode capacity.” ⁽¹⁾

(512,000 zettanodes > 64,000 ZB = 64 yottabytes)

(1) *Star Wars: Rogue One: The Ultimate Visual Guide*
<http://www.starwarsreport.com/2016/07/19/examining-the-rogue-one-celebration-reel-2/>
https://motherboard.vice.com/en_us/article/the-disk-formats-of-star-wars-rogue-one-spoilers

Data-Tapes



64 YB capacity (compressed)
Center-point load for fast access?

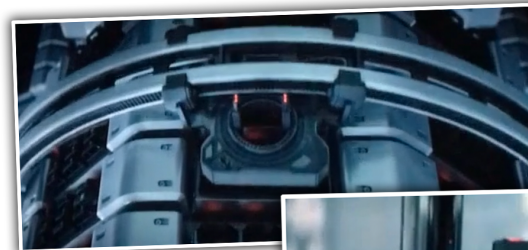
<http://starwars.wikia.com/wiki/Data-tape>



StorageTek 9840 Data Tape
40 GB capacity (native)

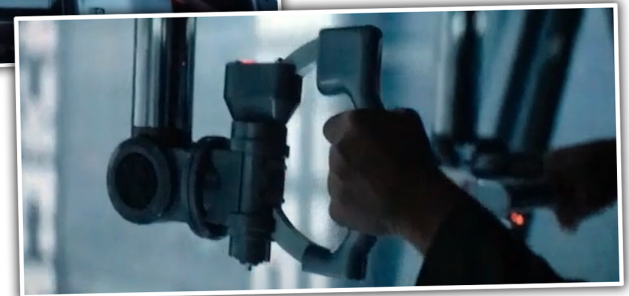
Library

"Searching... I can locate the tape but you'll need to use the handles for extraction." – K-2SO



RETRIEVAL UNIT

HAND CONTROLS



<https://www.gizmodo.com.au/2016/12/lets-geek-out-over-all-the-fascinating-technology-used-in-rogue-one/>
http://starwars.wikia.com/wiki/Scarif_vault

ORACLE®

Copyright © 2016, Oracle and/or its affiliates. All rights reserved. |

Star Wars Universe

In a world of hyperdrives, laser cannons, lightsabers, ...
Why tape storage?

Star Wars Universe

In a world of hyperdrives, laser cannons, lightsabers, ...
Why tape storage?

For the same reasons you use tape...

Data Protection and Archive

Defining Data Protection and Archive

The Most Efficient Data Protection Utilizes Proper Archiving

Data Protection

Restore lost or corrupted content

- Business Continuity – day to day restores of applications, user files, emails, etc.
- Disaster Recovery – massive restores of disk arrays, server nodes, or entire data centers.

Access strategic content

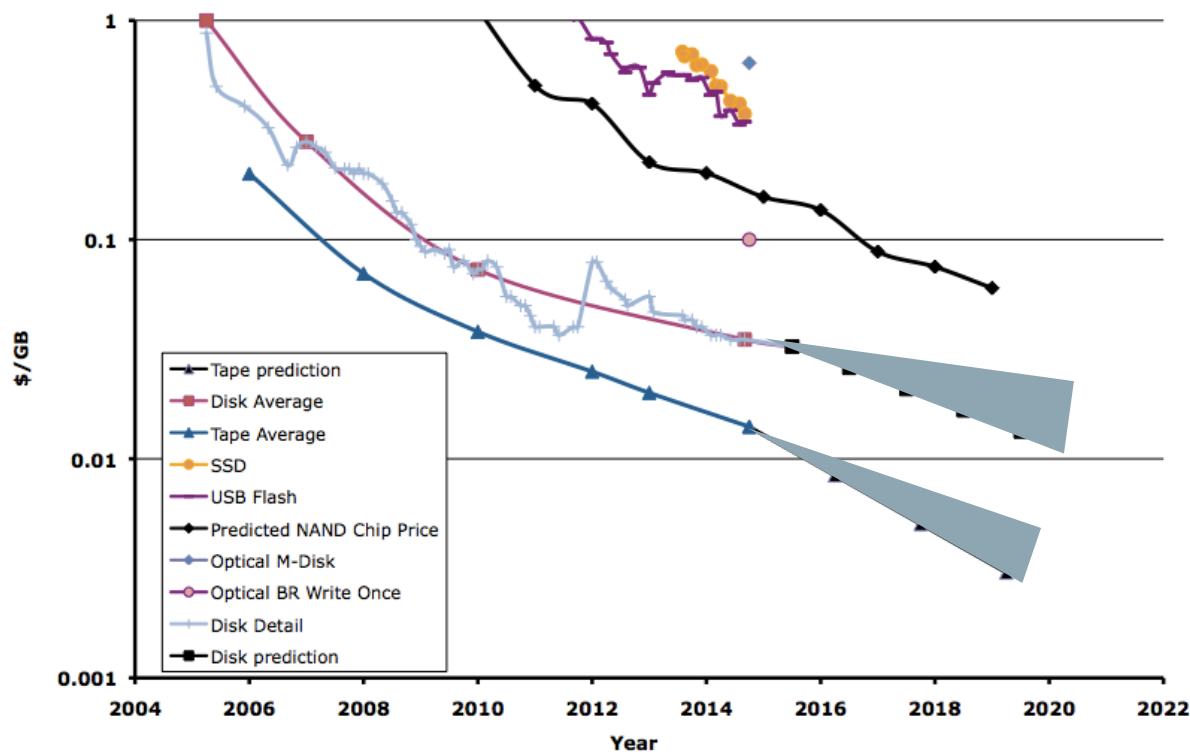
- Permanent record of fixed content
- Allows for collaboration and global sharing of archival data

Archive

Archiving Advantages with Tape

- Low cost storage
 - Tape continues to be the most cost effective storage media

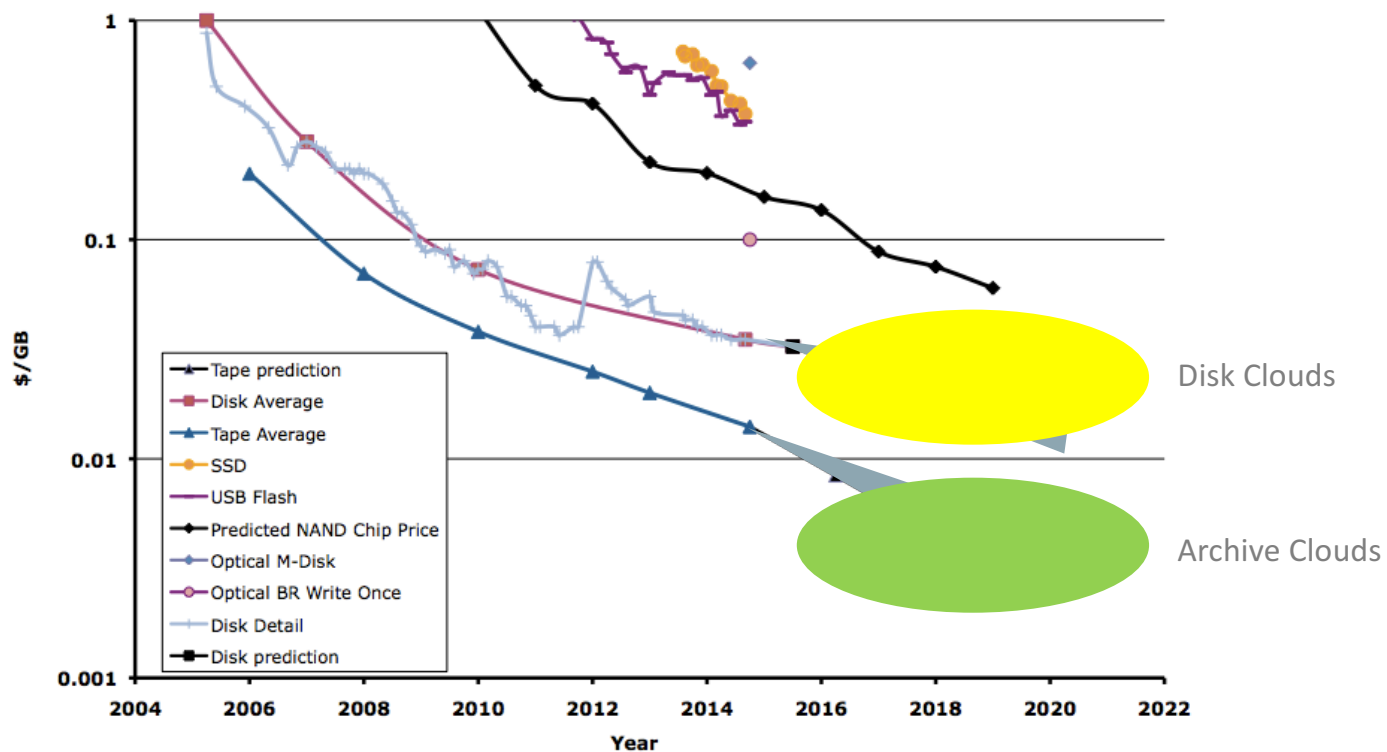
Storage Device Price Trends and Predictions



Disk price data detail:
<http://www.jcmit.com/diskprice.htm>

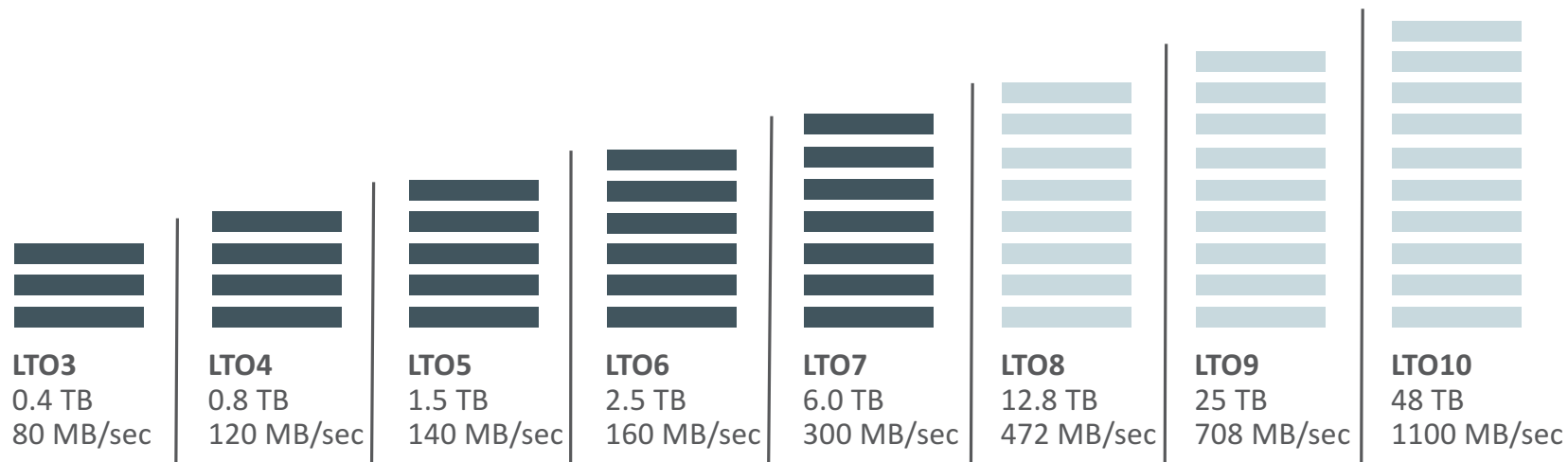
Flash price data detail
<http://www.jcmit.com/flashprice.htm>

Storage Device Price Trends and Predictions



LTO Planned Future Direction

<http://www.lto.org>



Archiving Advantages with Tape

- Off-line storage gives higher security
- Removable media
 - Value in the ability to physically move data
- Reliability
 - Longer shelf life
 - Better protection against electromagnetic pulses (EMP)

To Ensure Complete Data Protection Use the “3-2-1 Rule”

Complete Data Protection Solution

Maintain at least...

**Galactic
Empire**

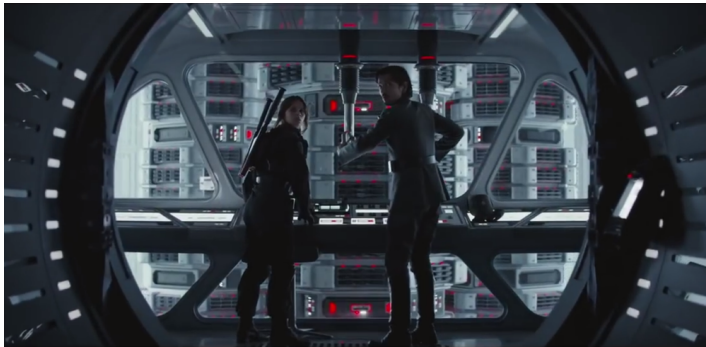
3	Copies of the Data	✓	?
2	Different Technologies	✓	✓
1	Copy Offsite and Offline	✓	✓

Data Encryption

Physical Security is not Data Security



Automation for Archive



30 exchanges per hour



High reliability and redundancy
900 exchanges per hour

ORACLE®

Copyright © 2016, Oracle and/or its affiliates. All rights reserved. |

NEW: StorageTek SL4000 Modular Library System

Legacy StorageTek

Now Powered by Oracle

Leverages the latest Oracle technology:

- Oracle Database
- Oracle RAC
- Oracle Fusion Middleware
- Oracle Enterprise Linux



- ✓ Higher Scalability
- ✓ Simplified Management
- ✓ Higher Availability
- ✓ Improved Serviceability
- ✓ Investment Protection

NEW: StorageTek SL150 Expanded



Increased Scalability:

- Base + 14 Expansion Frames (31U)
- 30 to 450 Slots
- 1 to 30 Tape Drive

Higher Capacity:

- Over 5 PB (LTO8) in ~3/4 Rack

StorageTek SL8500 Modular Library System

Industry-Leading Enterprise Tape Automation

Up to 100,000 Slots
Up to 2,880 CAP slots
Up to 640 Drives



- **Highest Availability**

- Redundant and hot-swappable electronics
- Redundant and hot-swappable robotics
- Quad-redundant and hot-swappable pass-through ports

- **Fastest Performance**

- 8 robots operate in parallel
- Centerline architecture maximizes mount / dismount performance

- **Best Consolidation**

- Any cartridge any slot technology supports enterprise and LTO drives and media
- Dynamic partitioning supports sharing across heterogeneous environments

ORACLE®

Copyright © 2016, Oracle and/or its affiliates. All rights reserved. |

Enabling Your Cloud Integration

Complete Deployment Choice



**Same Standards
Same Products
Unified Management**



Move Workloads Between On-Premises and Public Cloud

ORACLE®

Oracle Archive Portfolio

Cloud Gateways

Data Protection

Oracle VSM

- On-premise and cloud data protection
- Extreme reliability and scale
- Fastest performance



Archive

Oracle HSM

- Storage optimization
- Create on-premise archival cloud services
- Tier data across flash, disk, tape, and cloud



Oracle DIVA

- Rich media archives
- Leader in securely migrating, managing and delivering media content on-site and in the cloud



TB

StorageTek Tape

EB

LTO7

- 6 TB
- 300 MB/sec

T10000D

- 8.5 TB
- 252 MB/Sec

SL150

- 30-450 slots / up to 2.7 PB
- 1-30 HH LTO drives

SL4000

- Up to 9,000+ slots / 76 PB
- 1-120 LTO or T10k drives

SL8500

- Up to 100,000 slots / 850PB
- 1-64 LTO or T10k drives

Software

- ACSLS • OKM
- Tape Analytics

Storage

ORACLE CLOUD

Archive

ORACLE CLOUD

ORACLE®

Copyright © 2016, Oracle and/or its affiliates. All rights reserved. |

ORACLE®