DMFUG 2018

Enhanced Tape Features for DMF

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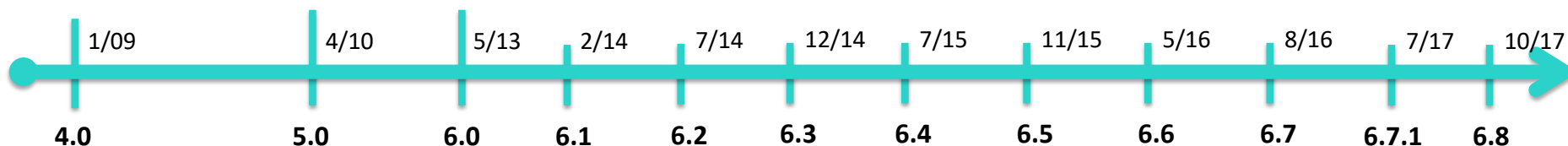

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HPC Data Management | **DMF Release Continuity**

Changes through DMF 6.7.1:

– Testing on complete HPE hardware platforms

– Support RHEL 6.9 for servers and movers

– Add drivers for HP LTO-7, HPE StoreEver MSL6480 and ESL G3 libraries

– Release ZeroWatt Storage platform

– Support Recommended Access Order on T10kD drives

– Improve recall queue efficiency

Changes for DMF 6.8 and beyond:

– Support SLES12 SP3 and RHEL 7.4 for servers and movers

– Support the TS1155 drive and bring LBP and RAO to the TS drive family

– LTO-8 drive support for both L8 and M8 media

– Multi-mount LCP for IBM TS and Spectra T-Finity libraries

– Support HPE MSL3040 library

– Recall redirect

1/09	4/10	5/13	2/14	7/14	12/14	7/15	11/15	5/16	8/16	7/17	10/17
4.0	**5.0**	**6.0**	**6.1**	**6.2**	**6.3**	**6.4**	**6.5**	**6.6**	**6.7**	**6.7.1**	**6.8**

DMF 1.0: Sometime in 1989

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Data Management | **DMF** Advanced Tape Storage Integration

- DMF is certified with the HPE portfolio of tape libraries plus libraries from Spectra Logic, Oracle (StorageTek) and IBM.

- Support for latest LTO and Enterprise-class drive technology

- Advanced feature support for accelerated retrieval and automated library management

- Certification guide for libraries and drives is available – and updated regularly

LTO-8
Support
For DMF

Data Management | **DMF** Recall Redirect

- Allows recall requests to be redirected by the admin
- Available for recall and krclrea request types
  - Investigate support for dmcopy
- Uses the same Command Link and ETRYANOTHER interface as dmcancel and dmrepri
- New dmredirect command takes a request ID and a VG/MSP list
  - Passing a list will create a new recall order
  - Any VG or MSP that contains the data not on the command line will still be tried if all others fail
- Can redirect between any LS VGs or from any LS VG to any MSP
- Cannot redirect from a non-LS MSP
- Cannot redirect to a VG/MSP that has already failed the recall
- Files being actively read from tape will be interrupted, made PAR state if possible, and the remaining ranges redirected

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Data Management | **DMF** Support for LTO-8 and TS1155

LTO-8 and TS1155 support added to DMF 6.7.1 and newer.

LTO-8
- Support for both the IBM and HP drive variants
- Support both the LTO-8 native and Type M media
- Only pre-initialized and bar coded Type M media is supported

TS1155
- Support for Logical Block Protection
- Support for Recommended Access Order

Data Management | **DMF** LTO-8 Type M

What is LTO-8 Type M initialized LTO-7 Media?

A new capability with LTO-8 drives, that allows customers to increase the capacity of **new** LTO-7 cartridges by up to 50% to store 22.5TB* of enterprise data (9TB Native) instead of 6TB as specified by the original LTO-7 format.

Customer benefits derived from using LTO-8 Type M formatted LTO-7 Media?

– Up to 50% higher storage density compared to an original 6TB LTO-7 Ultrium cartridge.

– Increase tape library storage capacity by up to 50% without increasing physical data center footprint.

Precautions and advisory's

– *Only new, unused and labelled M8* LTO-7 cartridges may be formatted as LTO-8 Type M media. Once a cartridge is formatted as Type M, it *cannot* be changed back to a 6TB LTO-7 cartridge.

– LTO-8 Type M cartridges will be recognisable by the customer from the automation barcode label ending with "M8". *Regular 12TB LTO-8* cartridges will be marked with an automation barcode label ending with "L8".

– LTO-8 Type M cartridges can only be written and read in an LTO-8 drive. LTO-7 drives are not capable of reading LTO-8 Type M cartridges.

– LTO-8 Type M cartridges will not be compatible with LTO-9 drives.

Data Management | **DMF** LTO Media

Cartridge Barcode Suffix	DMF Cartridge Type Name	Native Capacity	Drive Compatibility	Cost / TB Compressed
L8	Ultrium8-12000	12 TB	LTO-8, LTO-9	$7.53
M8	Ultrium8M-9000	9 TB	LTO-8	$4.04
L7	Ultrium7-6000	6 TB	LTO-7, LTO-8	$6.06

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Data Management | **DMF** Support for HPE Tape Portfolio

DMF SUPPORT

HPE T950   HPE TFinity ExaScale

MSL6480

LTO Ultrium Tape Drive   1/8 G2 Autoloader   MSL2024   MSL4048   MSL3040

	Entry level	SMB & distributed environments			Mid-Range		Enterprise	
Form factor	Half Height	1U Form Factor	2U Form Factor	4U Form Factor	Scales from 3U-21U	Scales from 6U-42U	47U Form Factor	
Max. slots	1 slots	8 slots	24 slots	48 slots	32 slot base module 40 slot expansion module Scales from 32-272 slots	Scales from 80-560 slots	50 to 10,020 LTO slots 45 to 7,614 TS11xx slots	50 to 53,460 LTO slots 45 to 40,680 TS11xx slots
Max. drives	1	1	2	4	21HH	42HH	120 FH	144 FH

Data Management | **DMF** Recommended Access Order

- Feature of T10000D and TS1140/50/55 drives

- Implemented in DMF for the T10kD and TS1155 drives

- Drive provides 2 IOCTLs (GRAO/RRAO) which allows the software to ask the drive for the optimal read order

- DMF uses these IOCTLs to sort the request list in the read child

- Implementation required the read child internal queue to be re-implemented

- New implementation is much more efficient for insert

RAO Benefit
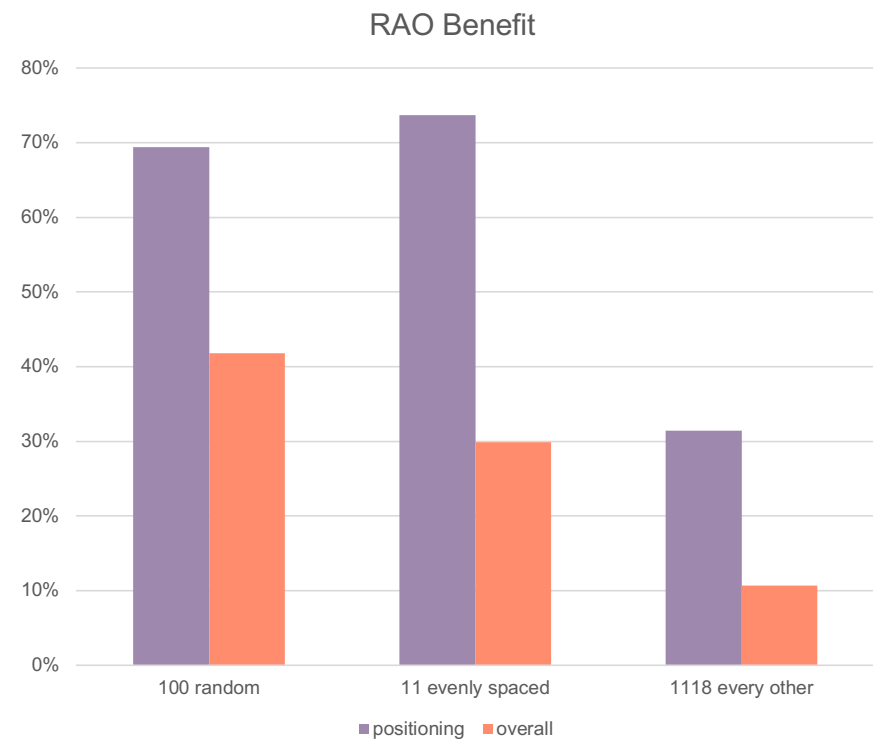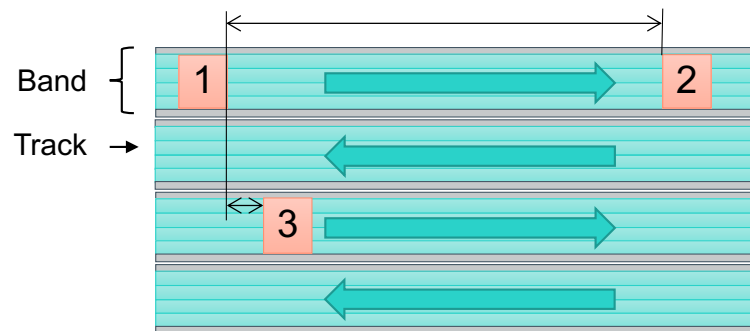
Data Management | **DMF** Multi Mount LCP for TFinity and TS

- OpenVault LCPs are multi-threaded and support multiple outstanding mount requests
- Asynchronous mount was originally only implemented in the ACSLS LCP
  - SL8500 supports 8 asynchronous mounts per silo
  - DMF can achieve very high mount rates
- IBM and Spectra Logic now have multi robot libraries
  - TFinity, TS3500, and TS4500
- SCSI protocol does not allow for async requests down a single path
- These libraries allow robotic control over multiple paths
  - TS exports the library interface out multiple drives in the same partition
  - TFinity uses multiple RIMs
- Asynchronous SCSI LCP supports up to 32 paths
- The LCP will send as many asynchronous requests as there are paths to the library
- The library reorders the requests for optimal mount order
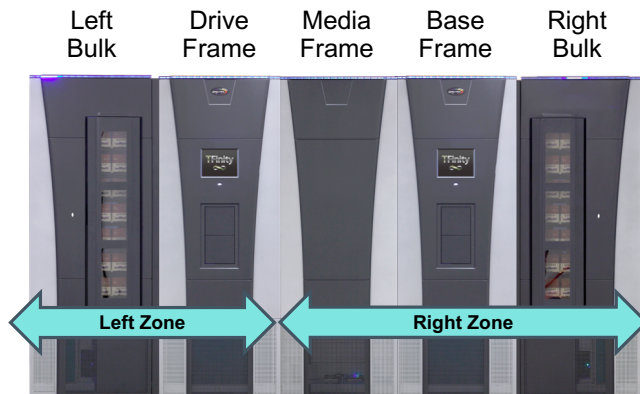
Data Management | **DMF** Zoning Support for Multi-frame TFinity

- On multi-frame TFinity libraries with 2 or more drive frames, the library is divided into two Zones

- Each transporter can service mounts within a zone without contention

- OpenVault reads the Zone information and assigns each drive and each slot to one of two Bays

- The DMF drive scheduler will then attempt to select a drive in the same Bay as the cartridge to minimize transporter contention

- Minimum Configuration
  - 1 Base Frame + 1 Drive Frame + 1 Media Frame with 2 RIMs

- Ideal Configurations
  - Even number of frames with media frames on both sides of the drive frame and the base frame
  - 4 or more RIMs

- With odd number of Media Expansion Frames, the extra frame will be added to the Right Zone

- Zoning is used by DMF in conjunction with Async mounts
  - 2 RIMs: A RIM is assigned for each Zone
  - 3 RIMs: A RIM is assigned for each Zone and the 3rd is used for inventory
  - 4 or more RIMs: Multiple RIMs assigned to each Zone with async mount

- Requires BlueScale 12.7.04.03 or later

Left Zone   Right Zone

Data Management | **DMF** Zoning Support for Multi-frame TFinity

Left Bulk | Drive Frame | Media Frame | Base Frame | Right Bulk

Left Zone | Right Zone

Minimum Config

- 1 Base Frame
- 1 Drive Expansion Frame
- 1 Media Expansion Frames
- 2 RIMs

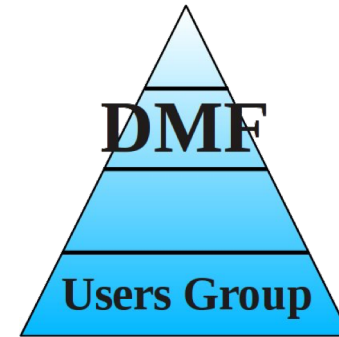Left Bulk | Drive Frame | Media Frame | Media Frame | Base Frame | Right Bulk

Left Zone | Right Zone
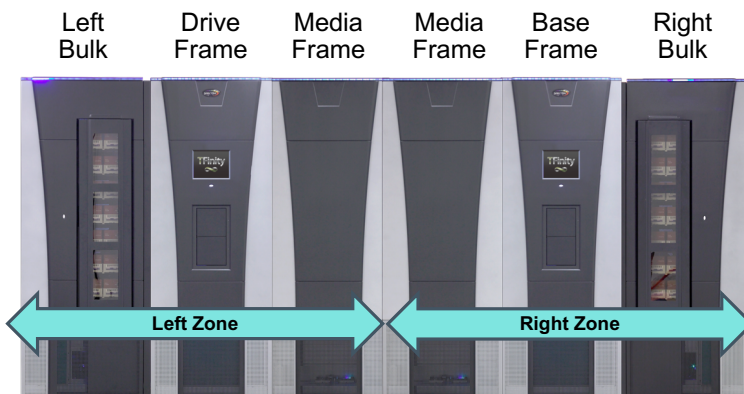
Ideal Minimum Config

- 1 Base Frame
- 1 Drive Expansion Frame
- 2 Media Expansion Frames
- 4 or more RIMs

Thank You