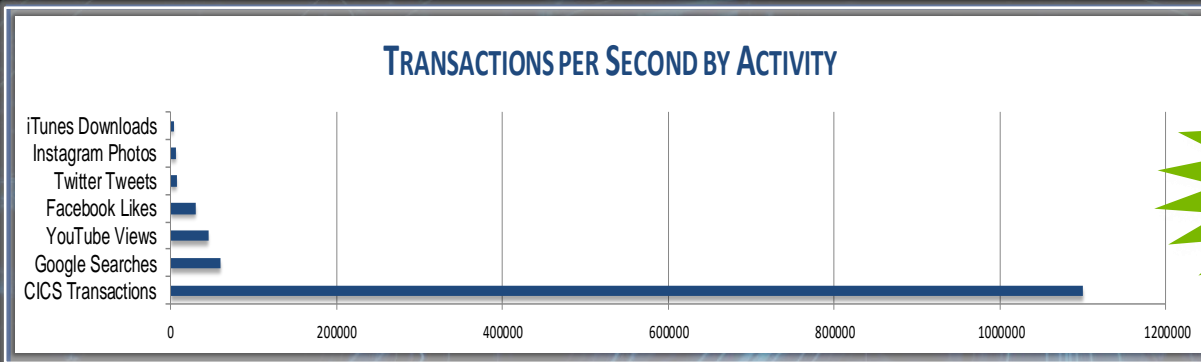


Mainframe Backup Modernization

Disk Library for mainframe



Mainframe is more important than ever



60X more MF
transactions/sec vs.
popular internet
activities combined

Dell EMC's Growth and Investment

'Commitment to the Mainframe Tape Market'

Dell EMC Mainframe Division: Storage & Tape

Global Sales and Service team

Dell EMC DLM proven technology endorsed by Gartner, IDC, Evaluator Group, ESG

Dell EMC tape market share grew to 51+%

Market leader for dedupe storage on mainframe (90%+ market share)

Shared mainframe and Open Systems support

Partnerships and strategic initiatives with strategic ISVs and consultants

IBM Partnership: CSA/100% licensed compatibility



Dell EMC storage sweeps the January 2016 Independent Brand survey by ITBRANDPulse

<http://itbrandpulse.com/2017-brand-leader-survey-results/>

	BRAND LEADER	MARKET LEADER	PRICE LEADER	INNOVATION LEADER	RELIABILITY LEADER	SERVICE LEADER	INTEGRITY LEADER
Converged Network Adapters	Broadcom / Emulex	Cisco	Broadcom / Emulex	Cisco	Cisco	Broadcom / Emulex	
Deduplication Backup Target Appliances	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC
Enterprise HDDs	Seagate	WD	Seagate	Seagate	Seagate	Seagate	Seagate
FCoE Switches	Cisco	Brocade	Cisco	Cisco	Cisco	Cisco	Cisco
Fibre Channel Disk Arrays	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC	Dell EMC

WHY DLM FOR MAINFRAME TAPE?

Single Vendor Support Model

- Dell EMC has a global **mainframe division** and global **mainframe support organization**
- Support is a single call to Dell EMC; customer never “in the middle”
 - **IBM Systemz Agreements: FICON Specification, Cooperative Support Agreement, Compatibility Agreement**
 - 100% licensed compatibility with System z: FICON specification that describes in detail the FICON channel interface
 - A cooperative support agreement that ensures cooperation and describes detailed escalation procedures for problems between the z server and DLM
 - A compatibility agreement that requires we acquire each other’s equipment and test in our own labs for compatibility
 - Dell EMC is a trusted member of the z Systems ecosystem
 - Regular visits between Poughkeepsie and Hopkinton

High Availability – No Single Point Of Failure (No SPOF)

- Mainframe tape environment is protected
 - The HA architecture means 99.999% RAS
 - HA Achieved with Single DLM System

Non-Disruptive Code Updates (virtual tape engines and storage)

- Outage not required for code updates
- High availability architecture of DLM allows for non-disruptive code updates of virtual tape engines (VTE) and storage
 - No downtime = cost savings

WHY DLM FOR MAINFRAME TAPE?

Superior Scalability & Throughput – performance & capacity unmatched by other providers

- No forklift upgrade for additional tape drive support, performance, or capacity
 - Up to 8GB/sec. per DLM – up to 90% faster than the leading competitor
 - DLM can support over 17PB's of Capacity

Breakthrough disaster recovery

- Improved RPO/RTO: DLM replicates as data is written not at close of tape!
- With DLM customer can remotely perform a DR test at any time and not dependent on other business entities within its organization
 - Mock DR testing can be performed at customers discretion
- Read / Write Point-In-Time copies enable fully destructive disaster recovery testing without compromising production replication

Provides the option for private or public cloud

- Tape Assessment includes 'cloud eligible data'
 - Private cloud allows for additional cost savings and can be implemented at any time

WHY DLM FOR MAINFRAME TAPE?

Years of proven Integrated data de-duplication capability

- DataDomain is the industry leader for mainframe deduplication storage
- Data Domain provides reduction in power/cooling/floor space
 - DLM DD solution provides additional savings at DR Outsourcing facility
 - Power/Cooling/Floor Space
- Inline data de-duplication improves storage efficiencies and reduces data replication bandwidth requirements
 - When comparing Data Domain to any compression only storage solution the bandwidth savings with Data Domain will be greater than 50%

Migration to DLM is simple fast and easy

- Keeps all tape data intact, which pleases the auditors
 - Creation Date / Expiration Date / Volume Serial number
- Low CPU overhead
- Very Fast Data movement

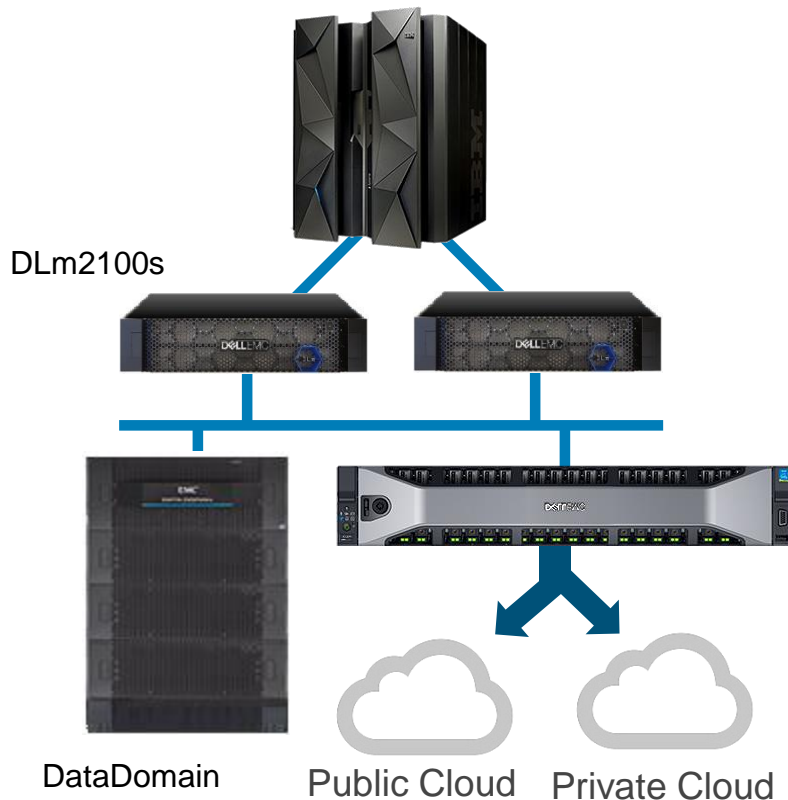
What Is EMC's Disk Library For Mainframe?

- Not virtual tape, but tape on disk
- True IBM tape emulation
- Transparent to mainframe operations
- Leverages low-cost SAS disk drive technology
- High performance read and write
- Unmatched remote replication capability
- EMC branded product
 - QA/tested by EMC
 - Manufactured by EMC
 - Maintained by EMC
 - Professional Services by EMC



DLM2100

Flexible Configurations using Data Domain AND / OR Cloud-based storage



- Ideal for mid-sized environments with backup as a primary use case.
- Configurations can be 1 or 2 DLM2100s
- Can share a common Data Domain or cloud provider
- All Data Domain models are supported.
- Sharing storage with open systems is supported.

DLm8100 Capabilities

- 1 to 8 Virtual Tape Engines (VTEs)
 - › 256 to 2048 Virtual IBM tape drives
- Concurrent & mixed storage (Data Domain, VNX, VMAX)
 - One or two VNX7600(s) or VNX5400(s)
 - One or two DD9500(s) or DD9800(s)
 - One VNX and one DD
 - VMAX
- Highly scalable performance and capacity
 - 20 TB to 17.3 PB
 - Up to 6.4 GB/sec. throughput (800MB/s per VTE)
 - › Measured at 16k blocksize greater performance with larger blocksize

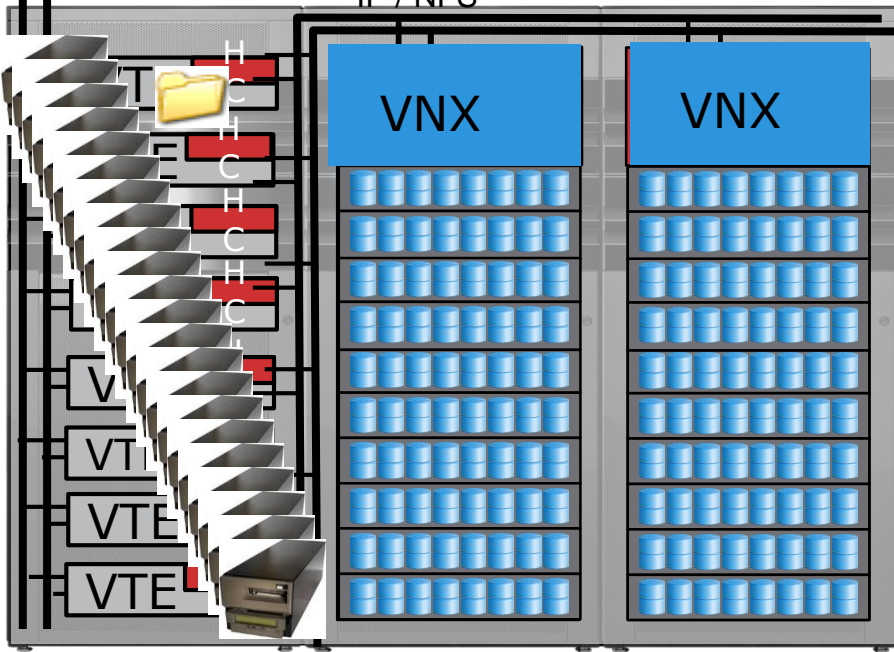


DLm8100 Components



Ficon up to 16

IP / NFS



EMC DLm8100

Virtual tape emulation controller

From 2 to 8 VTE (Incl. HW Compression Card)

FICON connectivity

Performance over 6.7 GB/s

840MBytes/sec per VTE

Emulates IBM 3480/3490/3590 tape drives

256 tape drives per VTE (with 8 VTE max 2,048)

Virtual cartridge size up to 16 TB

No limitation in number of tapes volsers

Storage capacity is the limit

Disk consumption is based on data written

Back-end storage (IP)

Supports traditional NFS storage (1 or 2)

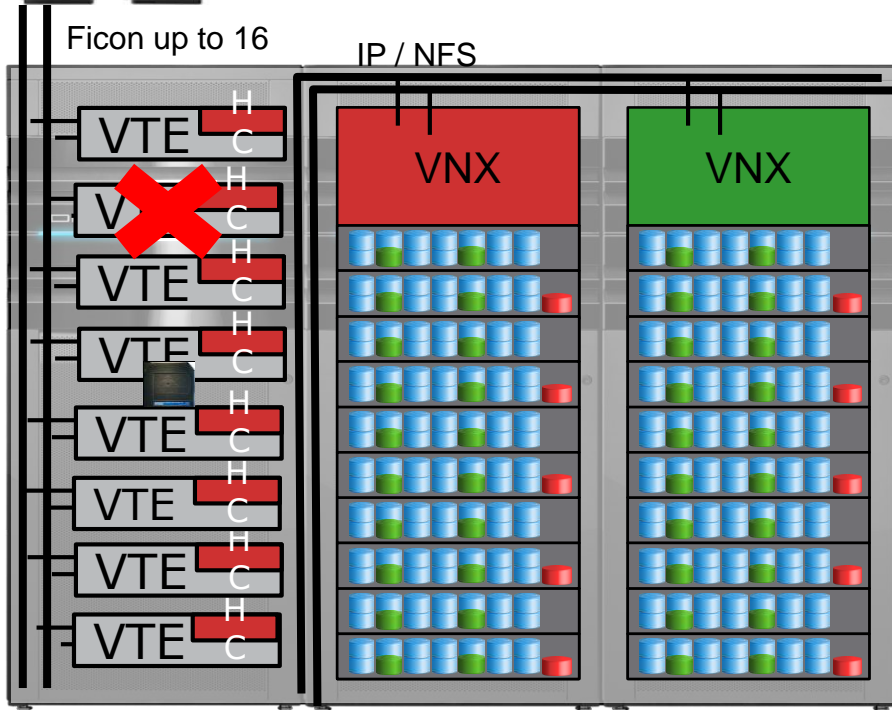
Supports deduplication storage (1 or 2)

Or both storage types concurrently

Supports VMAX storage

Stores all tape images as files

No Single Point of Failure



All VTEs can see all tape volumes

If a VTE fails...

- Job will abend with tape error (same as with regular tapes)

- Tape volumes are still available through alternate VTE

- VTE does not contain metadata

Disk drives are RAID 6 protected

- 6 + 2 protection: the best protection

- Virtual Provisioning is used

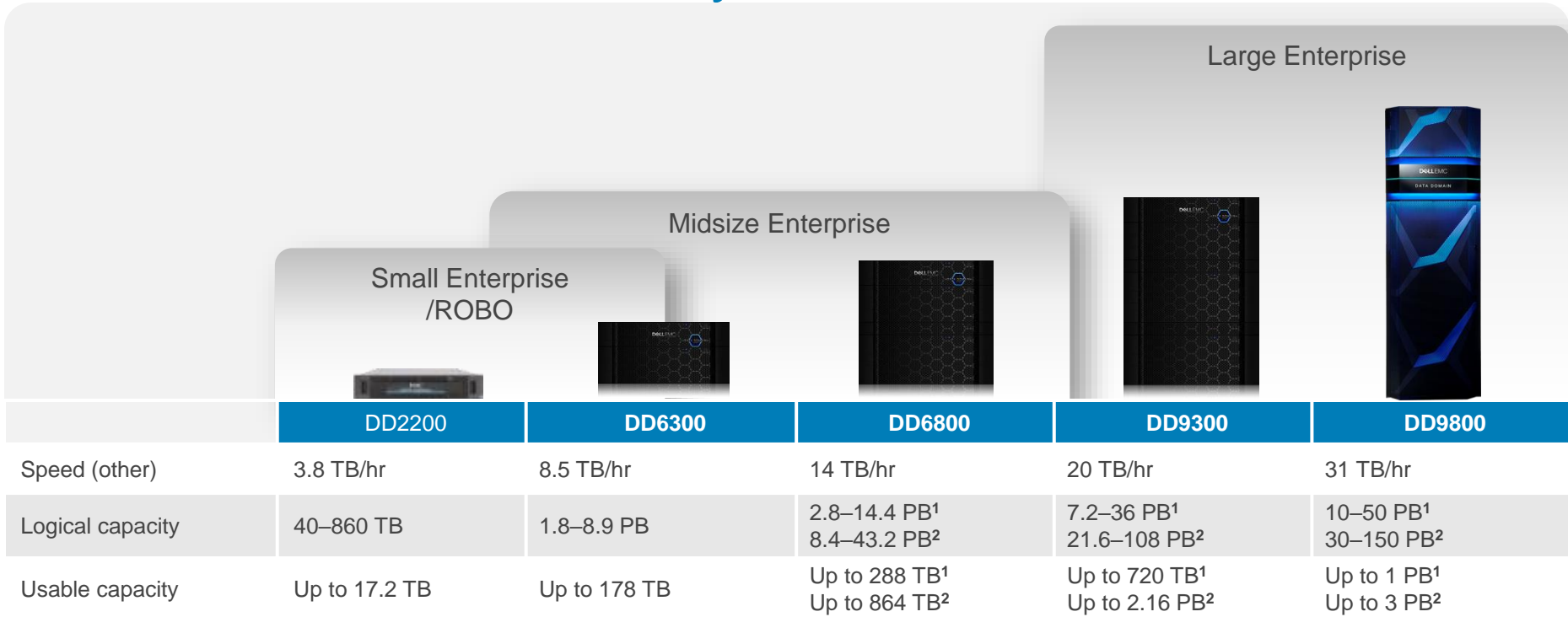
- Global Hot spares drives are located in the Vault Disk Array Enclosure (DAE)

Data Domain High Availability



- High availability of backup, archive, and recovery data on Data Domain ensures operational continuity to minimize downtime for users and processes.
- HA configurations are supported on DD9800, DD9300 & DD6800 and the legacy DD9500
 - Delivering business continuity for both Large and Midsized Enterprises

The Data Domain Family for DLM



¹ With DD Extended Retention software option

¹ Total capacity on Active Tier only

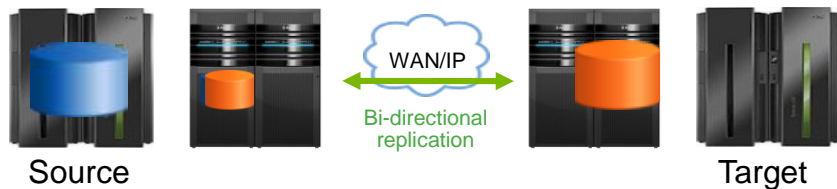
² Total capacity with DD Cloud Tier software for long-term retention

DLm MultiTenancy Support: Outsourcer 'Ready'

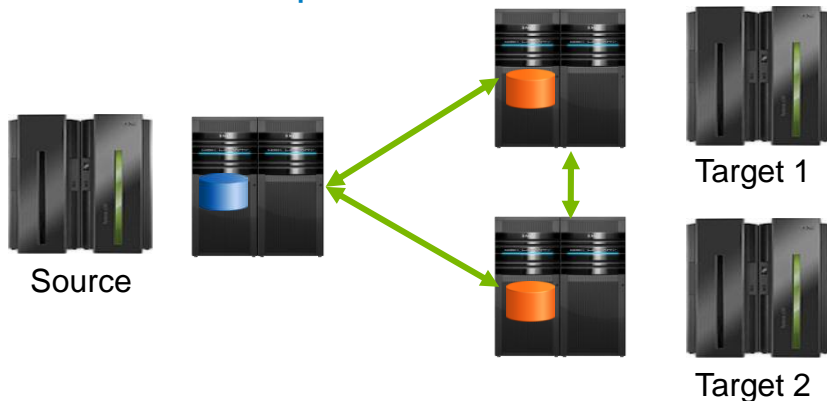
- Separate RPO/RTO
- Separate Maintenance Windows
- Dedicated Tape Drive Addressing
- Dedicated Virtual Tape Engines/Storage
- IP Replication provides for multiple DR Sites as needed
- Replicate by tape drive or tape range
- TPF, Unisys, z/OS, VM, & VSE Support
- **Summary**
 - Customer's appear to have a completely independent DLm system for their use
 - Customer's workloads are separate and segregated from each other
 - Customer's workload can have the characteristics applied to it that work best for that customer
 - Customer's replication session(s) are independent and can have different bandwidth and priorities assigned to it
 - Customer's workload's can have same volume serial numbers without any problems and each can run different tape management systems
 - Management is on a customer basis not a DLm basis

Remote Replication

Single Remote Site



Multiple Remote Sites



Compression yields less data

Without extra CPU Cycle (done by DLM)

Deduplication yields even less data

Less bandwidth needed for replication

No performance penalty on mainframe host

Compression or Deduplication

Back-end dedup storage IP replication

Only changes are replicated

Flexible replication configurations

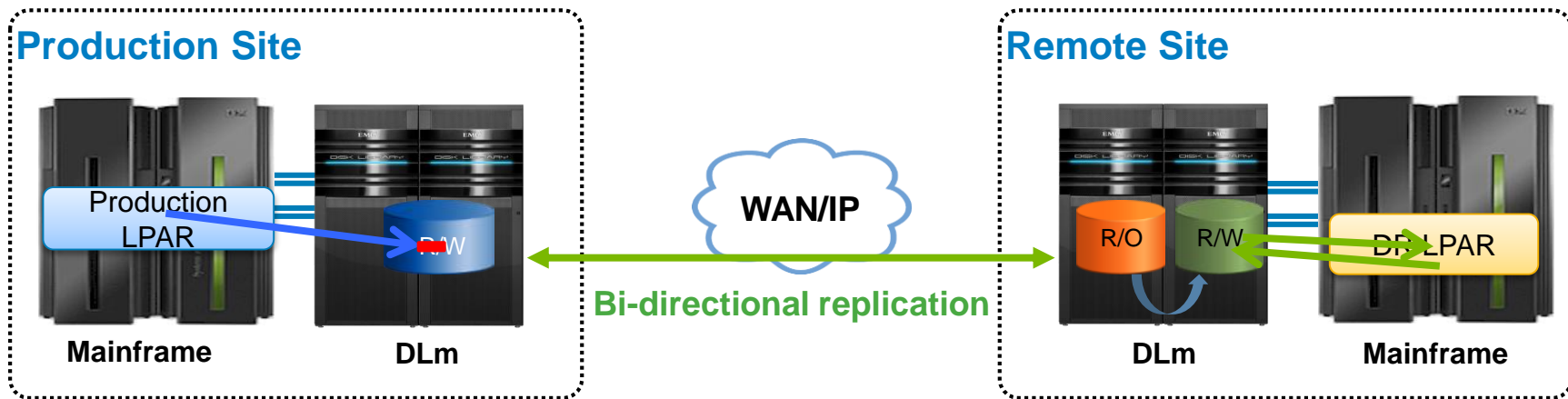
Replicate to one or more sites

Reduce current tape RPO/RTO

From days to hours or minutes

Snapshot Support for DR Testing

Testing the Disaster Recovery Environment



Read-only mounts

- Disk arrays allow instant “read-only” copies
- Confirm that tapes can be mounted and all required data can be accessed
- No incremental storage capacity required

Snapshots

- Disk arrays allow creation of “read-write” checkpoint
- Confirm operation at the disaster recovery site
- Some incremental storage capacity required

Remote replication is uninterrupted during testing

LTR and DLm File systems

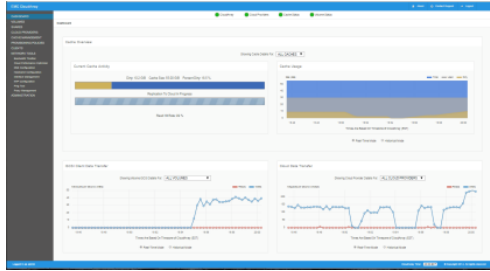


LTR storage is defined and created in the same manner that other file systems are defined and created. (/ltr)



You simply need to enable LTR for the file systems in DLm Console.

DLm Policy manager

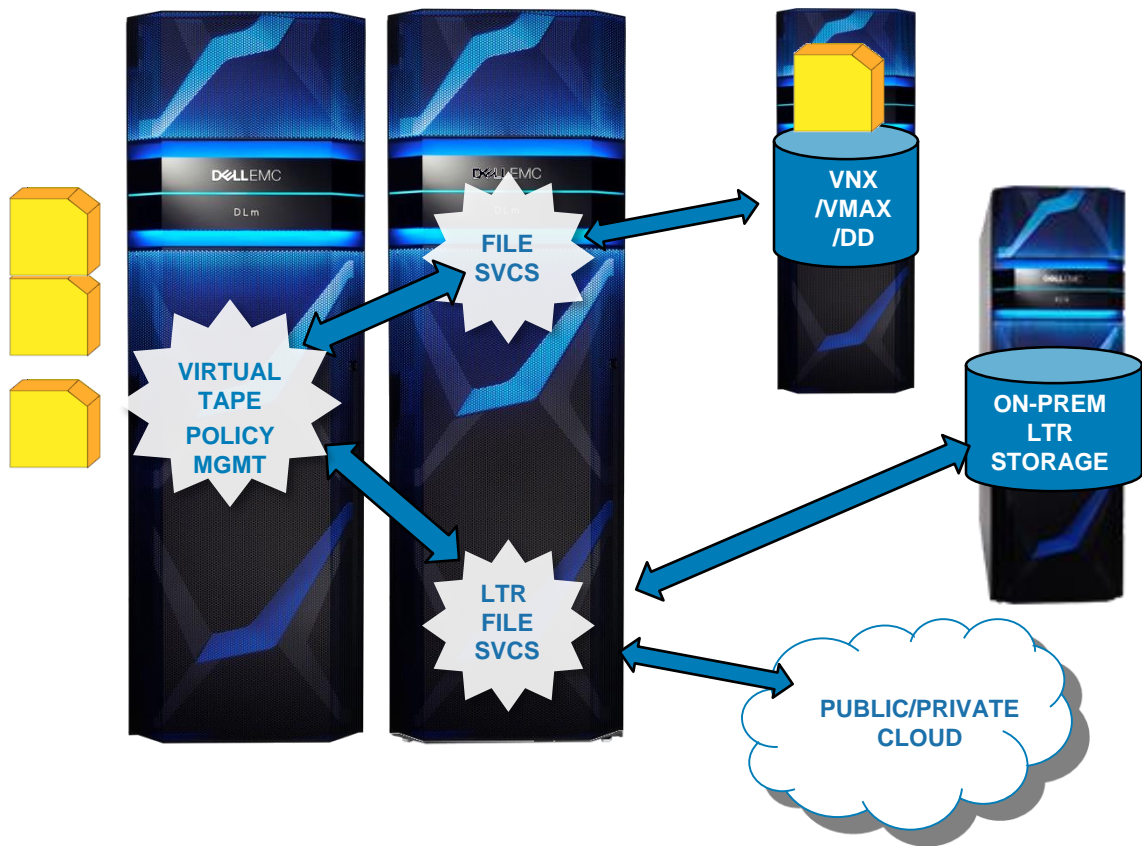


DLm Web console



- Library/class
- Age of tape volume
- Size (Kb/Mb/Gb)
- Scheduler
- Type
- VTEs

DLm for Long-Term Retention (LTR)



- Tape drives write /read to conventional or de-dupe storage
- LTR file services allow tape drives write /read directly to LTR storage and/or private / public cloud
- Policy management moves tape images for long-term retention

THANK YOU!

