Dell EMC Entry and Midrange Storage

Partner New Hire Training – Oct 2018

DELL EMC

Agenda

- Modern Data Center Criteria
- PowerVault Overview
- SC Overivew
- Unity Overview
- Product Positioning
- Q & A

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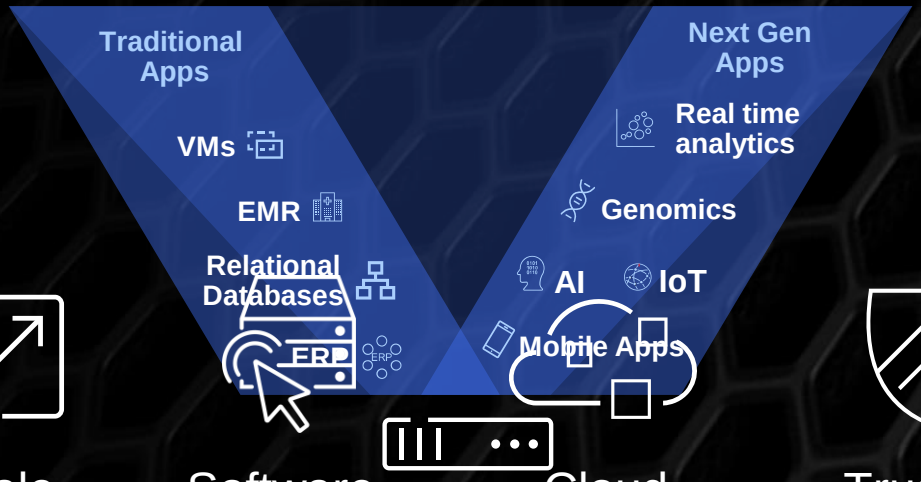

BY 2020

60-70%

OF COMPANIES

will have real time analytics workload(s)

Flash

Scale-out

Software-defined

Cloud-enabled

Trusted

AI/ML

Modern Data Center

DELL EMC Enterprise Class Architectures

Single Active Controller

Type 1:
Active/Passive
Block Only

Dual Active Controllers

Unity All Flash

Type 2:
Dual Active
Unified

Federates performance of up to 10 arrays

All Flash SC

Type 3:
Dual Active
Federated

Aggregated performance scale-up or scale-out

PowerMax
XtremIO

Type 4:
Active/Active
Scale Up/Out

Dell EMC PowerVault

PowerVault ME4 Series family

It doesn't need to be big to be powerful

ME4 Expansion Enclosures

Product Name:	ME4012	ME4024	ME4084	ME412	ME424	ME484
Configuration:	2U12 drives	2U24 drives	5U84 drives	2U12 drives	2u24 drives	5U84 drives
Max Raw Capacity	3.1PB	3.0PB	4PB			
Min/Max Drives	2/264	2/276	28/336			
Media	Hybrid (0-100% Flash)					
Protocols	8/16Gb FC, 1/10Gb iSCSI, 12Gb SAS			12Gb SAS Backend		
Data Protection	Virtual Copy, Snapshots, Async Replication, SEDs					
Performance	Tiering, Read Cache					
Integration	VMware Vcenter Plugin, SRM Plugin					
Management	ME Storage Manager					
Architecture	Thin provisioning, Adapt, Internal Key Manager (encryption)					

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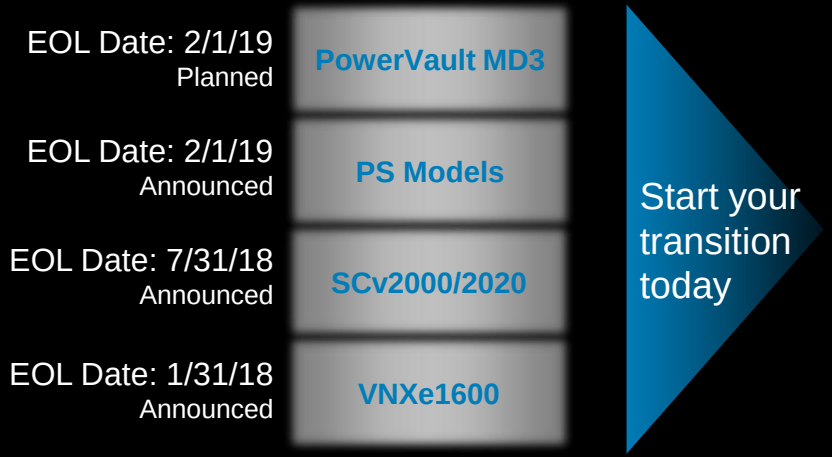
Your *"Go To"* entry level storage array



ME4 over MD3

Increased Performance

- Read IOPS: 320K[1] (4X increase)
- Backend Interface: 12G SAS (100% increase)
- Sequential Writes: 5500 MB/s[1] (2.6X increase)

Improved Scale

- Raw Capacity: 4PB (122% increase)
- Total System Drives: 336 (75% increase)
- Dense Expansion: 5U84 drives (40% increase)

More Connectivity

- Connect: 4 ports 1/10G iSCSI SFP+, 4 ports 1/10G iSCSI BaseT, 4 ports 8/16G FC, 4 ports 12G SAS

Simple Management

- Web-based GUI: ME Storage Manager

Improvements are in comparison to the MD3

1 AD# G18000167 Based on Seagate Technology's LX-3 Performance Characterization report, 2018 (Virtual Test Results)

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PowerVault ME4 software is all-inclusive

No separate licensing – everything to store, manage and protect data

BUILT-IN SOFTWARE FEATURES

ADAPT (Distributed RAID)
Improved DDP-like functionality enabling affordable capacity expansion and faster drive rebuild times.

Thin Provisioning
Allocate and consume physical storage capacity as needed in disk pools

SSD Read Cache
Increase execution speed of applications by caching previously read data

IP Remote Replication
Replicate data to any global location that includes mirroring thin provisioned pools

FC Remote Replication
Replicate data to any global location that includes mirroring thin provisioned pools

Snapshots
Easily recover files after accidental deletion or alteration with point-in-time copies of data

3 Level Tiering
Improve performance and efficiency with less hardware expense

Volume Copy
Seamlessly clone volumes for re-purposing on different spindles and drives

Encryption (SED)
Render data useless to unauthorized users with drive-level encryption, even if the drive has been removed from the enclosure

vCenter/SRM
VMware vCenter Server & SRM integration to move live VMs at scale between sites

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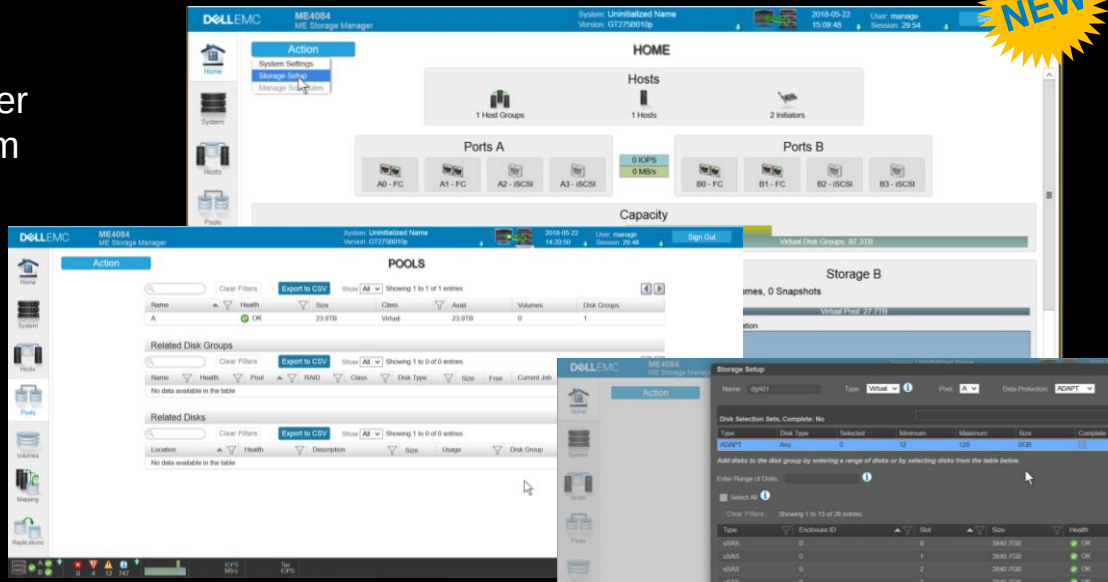
Simplified web-based management

Manage ME4 Series storage from anywhere

- HTML5
- Single-array intuitive element manager
- Use common management tasks from convenient locations
- Manage storage profiles, network connections, alerts, more
- Configure in 15 minutes

ME Storage Manager Login Screen



ME4 Series supports CLI & REST API management

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Dell EMC SC Series

SC Series Family

1PB[1]
222 drives

SCv**3000/3020**

2PB
222 drives

SC**5020**

3PB
500 drives

SC**7020**

3PB
1024 drives

SC**9000**

SC All-Flash

2PB[2]
222 drives

SC**5020F**

3PB[2]
500 drives

SC**7020F**

Memory/Proc.	32GB 6c/1.7GHz	128GB 8c/2.4GHz	256GB 2x 8c/2.5GHz	512GB 2x 8c/3.2GHz	128GB 8c/2.4GHz	256GB 2x 8c/2.5GHz
Media	Hybrid (0-100% Flash)				All-Flash	
Protocols	FC, iSCSI, SAS		FC, iSCSI	FC, iSCSI, FCoE	FC, iSCSI	
Data reduction	Compression	Compression + Deduplication				
Multi-array	Federation (Live Migrate), Snapshot Mobility, Volume Advisor, Replication					
Business continuity	Sync Replication, Auto-Failover (Live Volume), Metro DR, RecoverPoint for VM, D@RE[3]					
Management	HTML5 Unisphere[4], CloudIQ[4], Dell Storage Manager, Openstack, QoS, Vvols					
Architecture	Dynamic RAID Tiering, Always Thin, Virtualized Page Pool, Distributed Sparing[4]					

1 - SCv3xxx max capacity may be increased to 2PB using 4MB page sizes.

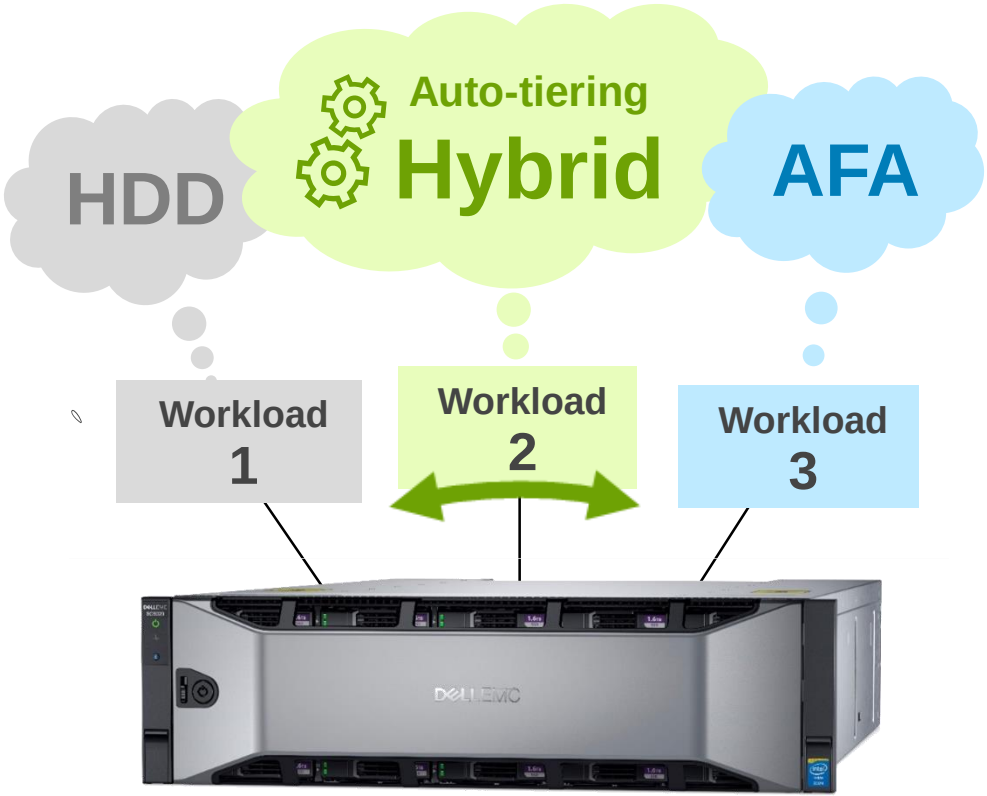
2 – With 2MB page size. For maximum flash performance, 512K page sizes are recommended. See Release Notes and Sizer for details.

3 – External key manager

4 - Planned for Q1-2018 v7.3 release

DELL EMC HEROES

Give each workload the love it deserves



Like having 3 arrays in one box

- Pin volumes to any tier
- …or let Data Progression distribute automatically

Size flash tier as needed – but $/GB remains lowest at any mix*

* Source: Based on Dell internal analysis, March 2017, compared to major-vendor midrange products. Net effective capacity after applying data reduction. Customer's price and reduction ratio may vary.

SC Software Features

Data Progression

RAID tiering

Cross-platform replication

Secure Encryption

Departmental Chargeback

VVOLs, Qos

Best-in-Class Dedupe and Compression

Business Continuity / Disaster Recovery

Replication over FC or IP

Multi-protocol

VLAN tagging

Federated scale, mobility, availability

CloudIQ

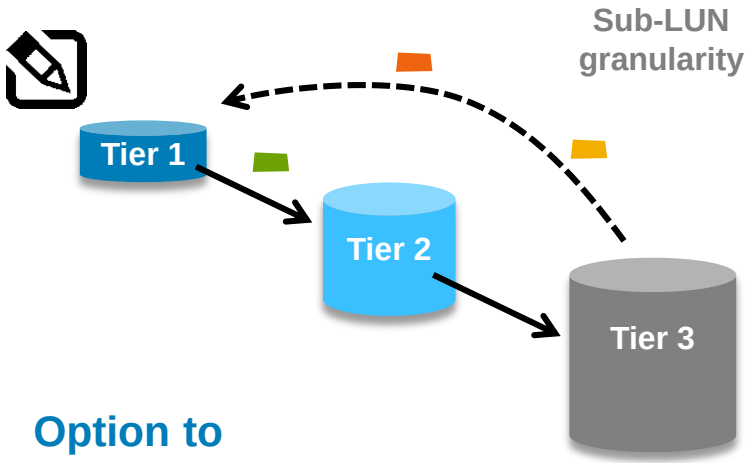
Cloud-based AI/ML

EASY to purchase, maintain – no matter how your business evolves

CloudIQ support coming 1H 2018.

Industry's most advanced auto-tiering

Drive Tiering



Option to pin volumes to any tier

RAID Tiering

Multiple RAID levels on same drives expand and contract as needed

ALL writes RAID 10

FAST!

Auto-converts to RAID 5/6

- ✓ **Same read speed**
- ✓ **50% space savings**

Get great performance with less hardware expense

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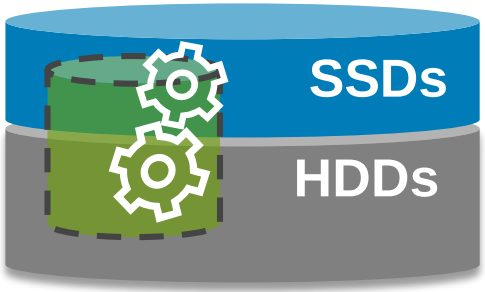
Store LESS with Intelligent Data Reduction

Dedupe & Compression

On both **SSDs** and **HDDs**

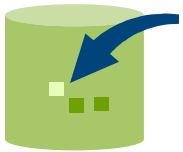
Even on volumes that auto-tier across media types!



Select by volume

- [x] Dedupe + Compression
- [ ] Compression only

Optimize automatically



Targeted at a sub-LUN level

- ✓ **Designed for performance**
- ✓ **Cost-reduce ANY config**

* Note SCv3000 Series includes compression only, but it can still be applied to both SSDs and HDDs. Deduplication AND Compression are available on SC9000, SC7020, SC5020 and SC4020 arrays.

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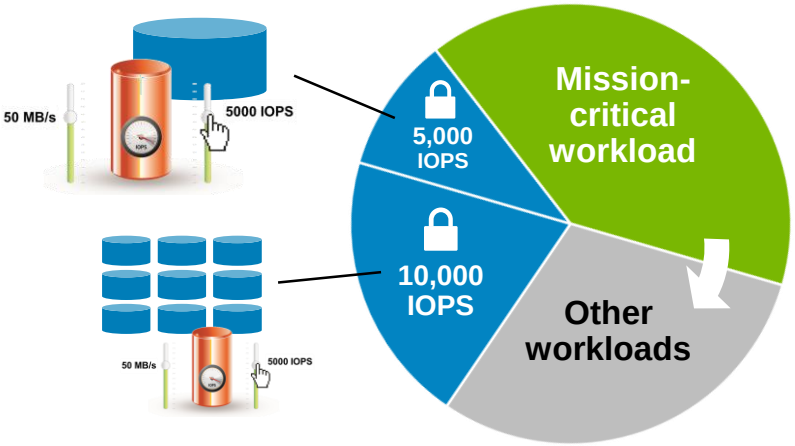
QoS (Quality of Service)

Map storage resources to match your business priorities

Define resource limits for individual volumes or groups of volumes



- **Prioritize by IOPS, MB/s or Latency**
- **Works on standard volumes or VVols**

Ensure top performance for your most important workloads

- Set relative priorities among volumes
- Eliminate “noisy neighbor” problems

Easy to customize and apply

- User-defined alerts
- Scriptable via REST
- Include in Storage Profiles

QoS reporting

- Track impact of QoS settings over time

Ideal for enterprise departments, private cloud, multi-tenancy (service providers)

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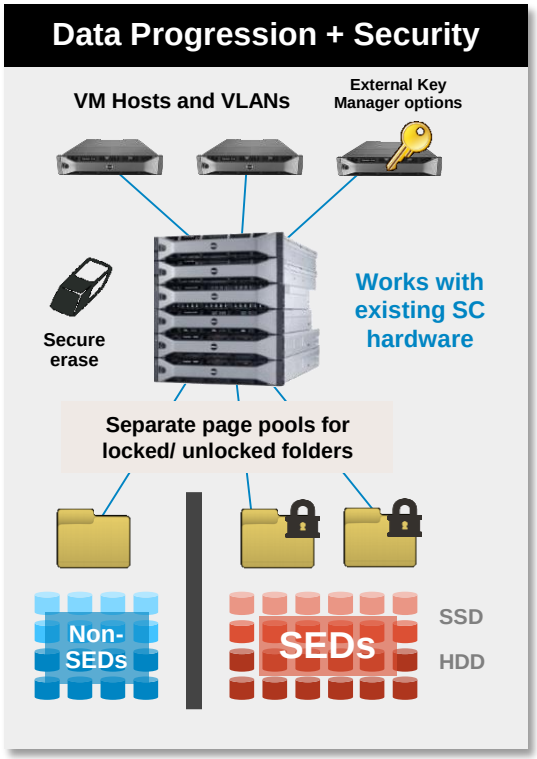
Data-at-rest encryption

Failsafe security and compliance solutions



Unique Dell Storage Encryption features

- SED/non-SEDs in same array
- Incremental SED roll-out – no forklift upgrades required
- Key FIPS 140-2 Security level 2 certification
- External Key Manager protects data against loss or theft of drives, enclosures or an entire array

Growing SED market among

- Government, Health Care
- Ecommerce/Retail
- Service Providers
- Financial Institutions

Now available with re-key functionality

Self-Encrypting Drive (SED) support

- “Data at Rest” encryption (DAR)
- External Key Management via Key Management Interoperability Protocol (KMIP) v1.0

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SC Series “storage hypervisor” features

Storage changes transparent to hosts

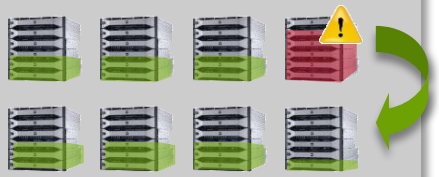
Virtualized LUN mappings increase flexibility and control

Data migration

No need to re-map servers

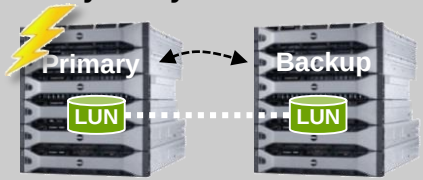
Federated systems

Balance workloads on demand



Disaster recovery

Always in sync: RTO/RPO = 0



Live Migrate, DSM | **+ Volume Advisor** | **Live Volume**

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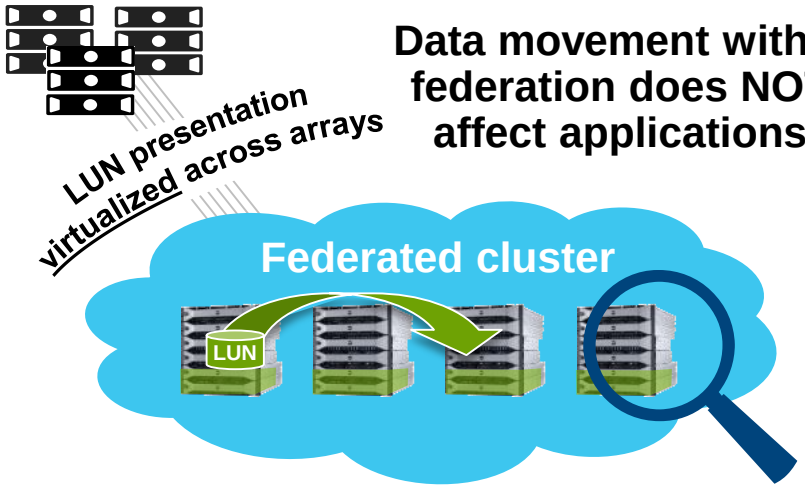
Live Migrate: Move workloads transparently



Data movement within federation does NOT affect applications

Rebalance your data center arrays in minutes!

1. **Volume Advisor sends alert**
2. **Start Live Migrate wizard, accept recommendations**
3. **Click "complete migration"**

- ✓ **Standard SC feature**
- ✓ **100% storage-side control**

Volume Advisor

Monitors cluster, recommends ideal load balancing

Live Migrate

Move volumes anywhere **without remapping hosts**

Offer a consistent, highly-available storage *service* for your IT clients

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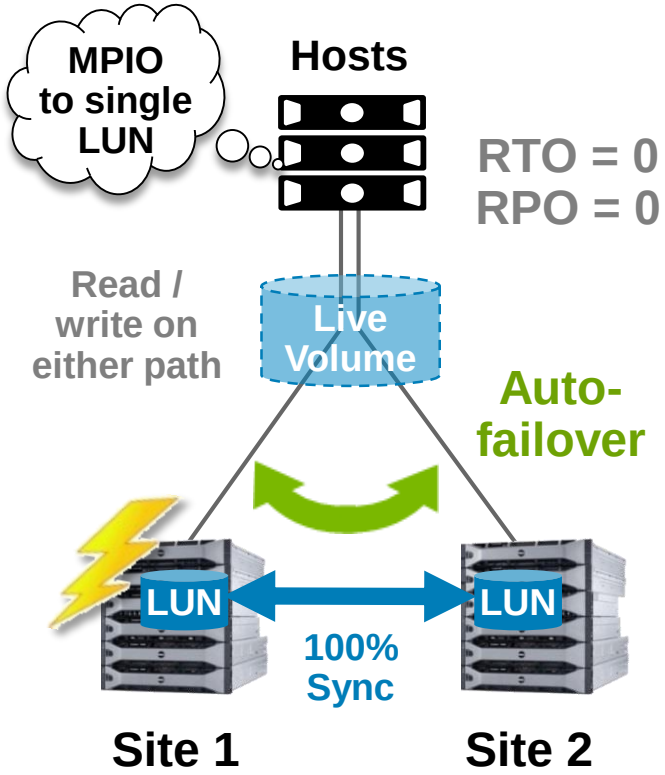
Live Volume: Built-in business continuity



ZERO workload downtime during unplanned outages

- No admin intervention
- Auto-repair (resync)
- 3rd site replication support
- **Native SC array solution**

vmware Stretch Cluster support

DELL EMC

Built-in migration

- Migrates LUNs (no snaps) from PS and MD series to SC series
- Built-in solution: self-service without requiring any third party tool
- Offers both offline and online thin import depending on use case
- Online minimally disruptive: requires unmount and mount

Dell EMC SC Series SCOS 7.3

FREE software update provides quantum leap forward in

Performance

Huge IOPS boost across all platforms

Increased max capacity
- SC9000 now 6PB (2X)
- SC7020/F now 4 PB

10X faster networks
- With 100Gb iSCSI

Simplicity

Web UI (HTML 5)
Now manage anywhere!

CloudIQ support

Easier upgrades and expansion
- DIP upgrades (SC4020)
- Full federation for SCv2000

Efficiency

Distributed Sparing

HA enhancements
- Live Volume ALUA: lower latency, less network traffic
- Up to 500 Live Volumes

Lowest $/GB for Flash and Hybrid Flash

Increase value for every SC All-Flash and Hybrid model: SC9, 8, 7, 5, 4, v3, v2

* 2MB pages

DELL EMC HEROES

Dell EMC Unity

Dell EMC Unity: Investment Protection

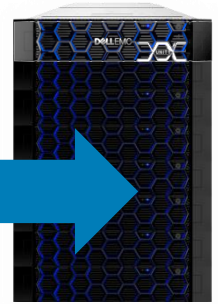
Grow with Dell EMC Unity All-Flash

ONLINE DATA-IN PLACE UPGRADE

Dell EMC Unity 350F

Dell EMC Unity 450F

Dell EMC Unity 550F



Dell EMC Unity 650F

PROCESSOR	6c / 1.7GHz 96 GB Memory	10c / 2.2GHz 128 GB Memory	14c / 2.0GHz 256 GB Memory	14c / 2.4GHz 512 GB Memory
CAPACITY	150 Drives 2.4 PB	250 Drives 4 PB	500 Drives 8 PB	1000 Drives 16 PB
LUN	1000 256 TB	1500 256 TB	2000 256 TB	6000 256 TB
FILE SYSTEM	1000 64 TB ➔ 256 TB	1500 64 TB ➔ 256 TB	2000 64 TB ➔ 256 TB	4000 64 TB ➔ 256 TB
VVOL	9000 64 TB	9000 64 TB	13500 64 TB	30000 64 TB

DELL EMC HEROES

All-Inclusive With Dell EMC Unity

With unified web-based (HTML5) management

ALL-INCLUSIVE SOFTWARE

Limited RTU Licenses Included for:
AppSync Basic
RecoverPoint Basic
RecoverPoint for VMs

SNAPS/CLONES
+ APPSYNC BASIC

UNIFIED REPLICATION
+ RP BASIC

UNIFIED INLINE
COMPRESSION

EXPANDABLE
DYNAMIC POOLS

UNIFIED CLOUD
TIERING

STORAGE
ANALYTICS

QOS (HOST
IO LIMITS)

DATA AT REST
ENCRYPTION

ANTI-VIRUS
ENABLER

APP APP VM VM
VIRTUALIZATION
INTEGRATION: VMW, MSFT,
OPENSTACK, VVOL

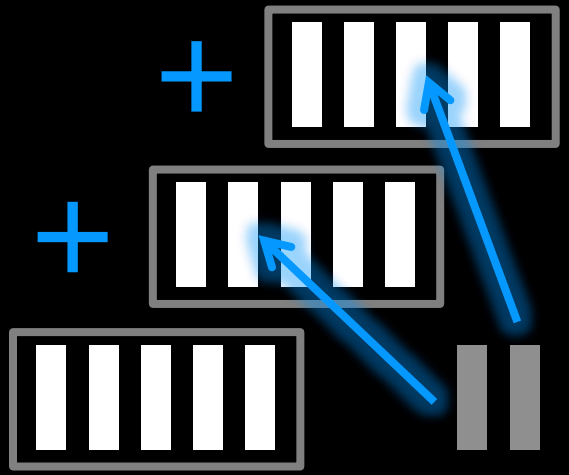
*DPE + new 80 drive 3U enclosure

DELL EMC

Expandable Dynamic Pools

Maximize performance & efficiently save space and budget

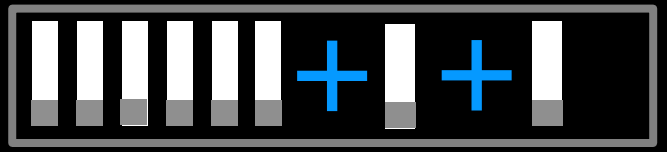
TRADITIONAL POOL



Flash drives

RAID Widths & Spares

DYNAMIC POOL

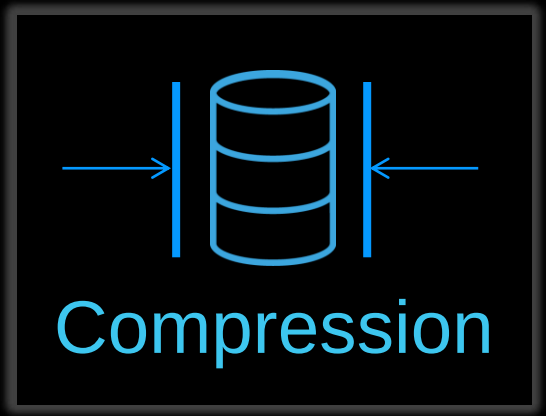


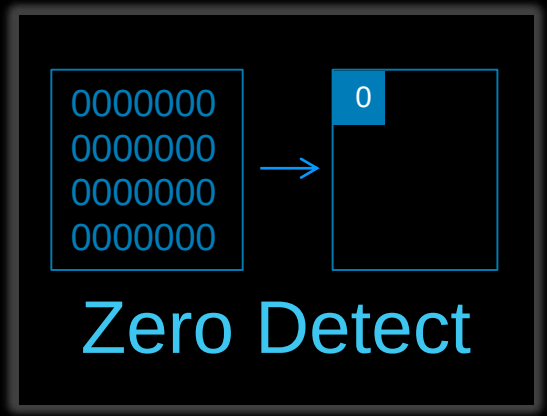
Flash drives – as needed

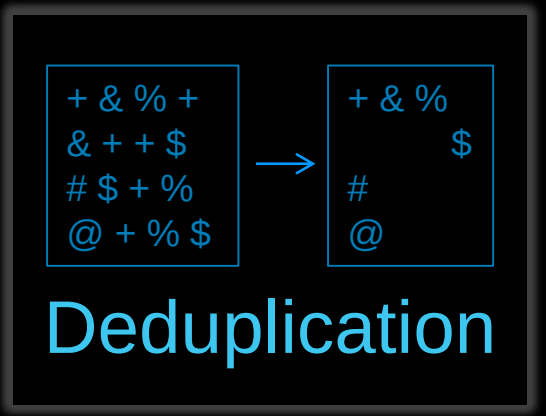
ADD SINGLE DRIVE TO POOL	HIGHER SPACE UTILIZATION
FASTER REBUILD TIME	SIMPLER AND LOWER TCO

Distributed sparing and flexible pool size

Dell EMC Unity Inline Data Reduction







- Multiple technologies supporting Dell EMC 4:1 Efficiency Guarantee
- Unified: Data reduction applicable to both file and block
- Inline: Data reduction in memory before being written to flash
- Simple: Single on/off setting – enable per LUN/filesystem

Dell EMC Unity Data at Rest Encryption

Encrypts all user data on the array—at the drive level

All Dell EMC Unity data services supported

Embedded internal key manager

Key Management Interoperability Protocol (KMIP) compliant

Advanced Encryption Standard (AES) - 256 encryption

- Drive vendor and type agnostic
- Allows use of any drive type
- Eliminates drive vendor specific overhead
- No impact to data services
- No performance impact

External Key Management

gemalto security to be free

IBM

DELL EMC

Dynamic All-Flash File

4X more file power for transactional and traditional NAS

256TB SCALE-UP FILESYSTEM

Scales to 256TB usable capacity per file system with 10M+ sub-directories and files

INLINE DATA REDEUCTION

Pointer based snaps with simple space reclaim and low IO impact

FILESYSTEM SHRINK

Reclaim free blocks and shrink file system to reflect new capacity

VMDK IMPLEMENTATION

Independent VMDK clones with up to 256 clones across multiple levels

FLEXIBLE SNAPSHOTS

Pointer based snaps with simple space reclaim and snap mobility to remote site

SIMPLIFIED QUOTAS

User and Tree Quotas with ability to change online

u64 File System

DELL EMC

Simple, Seamless Built-in Data Migration

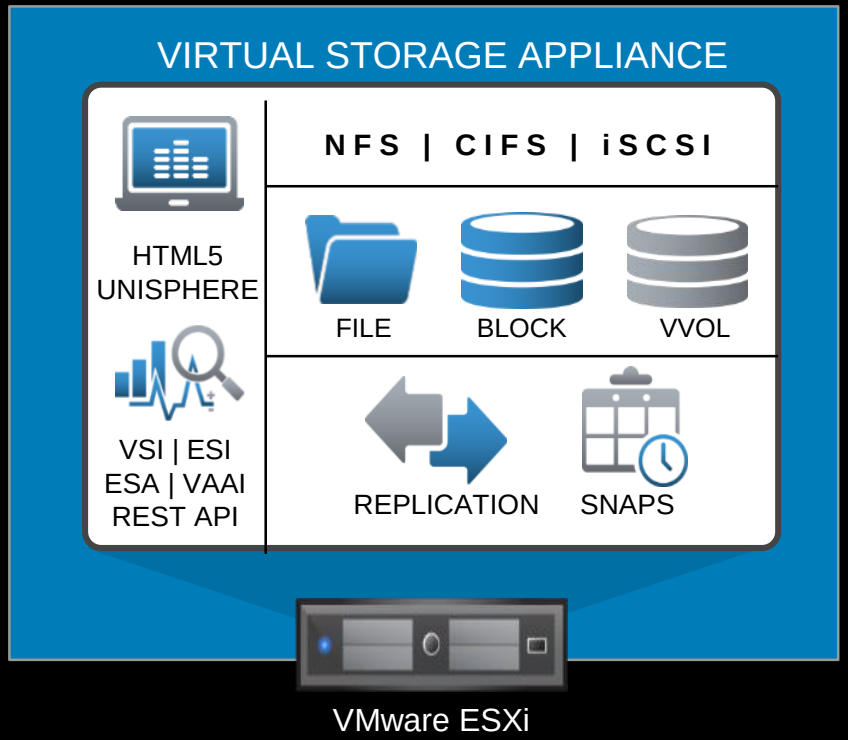
VNX1 & VNX2

Dell EMC UNITY

FC, iSCSI, NFS and CIFS/SMB migration from VNX	Migrates LUNs, file systems, quotas, ACLs, and exports
Built-in solution: self-service without requiring any third party tool	Transparent to file applications, minimally disruptive for block

Dell EMC Unity VSA Software Defined Storage

Agile, virtual storage



COMMUNITY EDITION	PROFESSIONAL EDITION
• COMMUNITY SUPPORT • FREE DOWNLOAD • 4TB CAPACITY LIMIT	• EMC SUPPORT • SUBSCRIPTION LICENSE • 10TB | 25TB | 50TB

Easy In-Place Upgrade

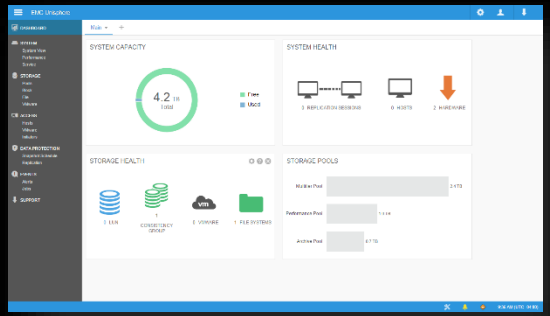
USE CASES

TEST DEV | RAPID DEPLOYMENT
REMOTE BRANCH OFFICES | LOW-COST STORAGE
RETAIL | EDUCATION | HEALTHCARE | CLOUD | NAS
IN SOFTWARE DEFINED INFRASTRUCTURE
(SCALEIO OR VSAN)

DELL EMC

Simple, Intuitive Management from Anywhere

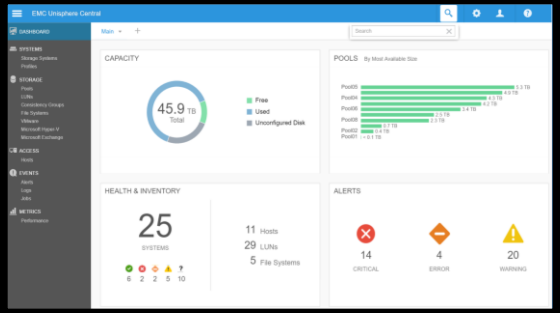
Ease of use; ease of management; ease of deployment; the GUI is very user-friendly.” *Allen Riviera, Data Center Architect, Iron Bow Technologies*



UNISPHERE

Single array unified management

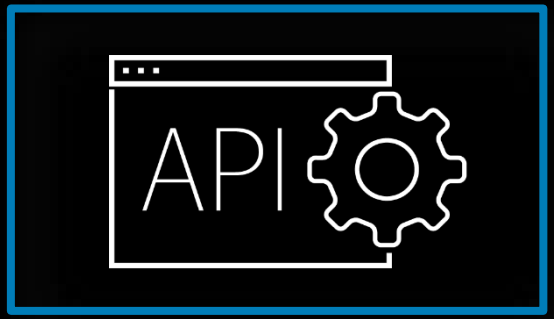
- ✓ Compatible with most modern browsers
- ✓ Easy navigation, simple workflows
- ✓ Modern look and feel



UNISPHERE CENTRAL

Centralized management

- ✓ Remotely monitor up to 1000 Dell EMC Unity arrays
- ✓ View/analyze aggregated metrics for managed systems
- ✓ Launch Unisphere for individual systems



UNIFIED CLI & REST API

Manage from the console

- ✓ Easier app integration
- ✓ Simple http commands
- ✓ API access from CLI, browser, app and script

DELL EMC

CloudIQ

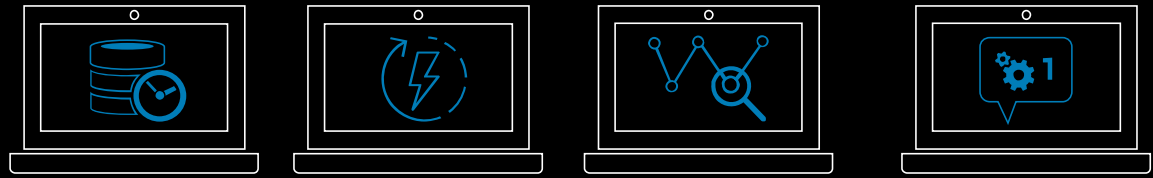
Cloud-based storage analytics

Included with every midrange array:

NO ADDITIONAL COST & NOTHING TO INSTALL

Storage Array Health Scores

Manage your entire storage infrastructure from anywhere, via the web



Efficiency Ratios | **Flash Gauge** | **Performance Anomalies** | **SW Update Notifications**

Purpose-built for the cloud

- Native cloud application
- Built on the Pivotal Cloud Foundry
- Applied machine learning
- Proactive monitoring, predictive analytics, remediation
- Comprehensive health scores for your arrays
- New features added non-disruptively in the cloud
- Independent secure portal per customer

Dell EMC Unity

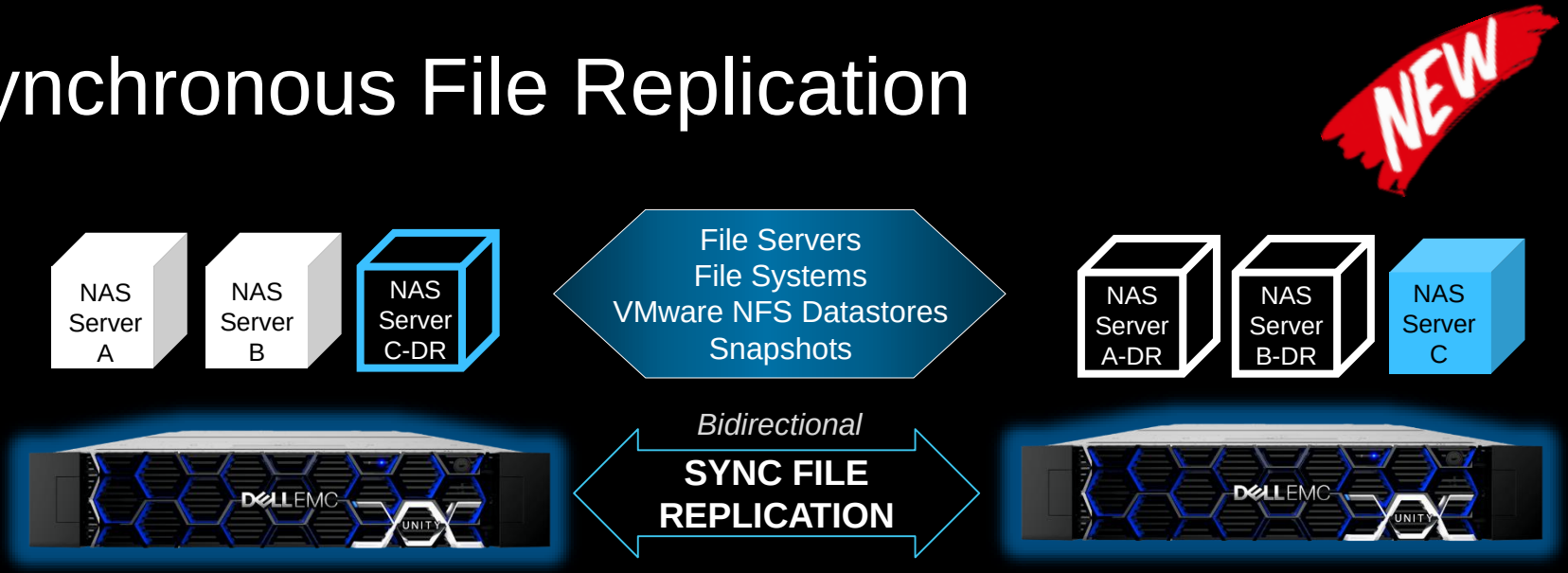
SC Series

DELL EMC

Dell EMC Unity OE v4.4

- LDAP Enhancements
  - LDAP Domain Look-Up
  - Forest Level Authentication
  - Support for Multiple LDAP servers
- SAN Copy Pull: integrated block migration from 3rd party arrays
- MetroSync- Synchronous File replication
- Snapshot shipping/replication
- Async replication to 3rd site
  - Cabinet level DR w/advanced snap scheduling
- 2-way NDMP

Synchronous File Replication



- Sync file replication to mirror site within metro distance
- Zero RPO solution for NAS data and file-based applications
- Snapshots (scheduled or user-initiated) replicated to mirror site
- Extension/shrink of source replicated to mirror

2-Way NDMP

NEW

DMA

Metadata

Data

LAN or WAN

Metadata

Data

Primary System

Data

Secondary System (TLU)

Data

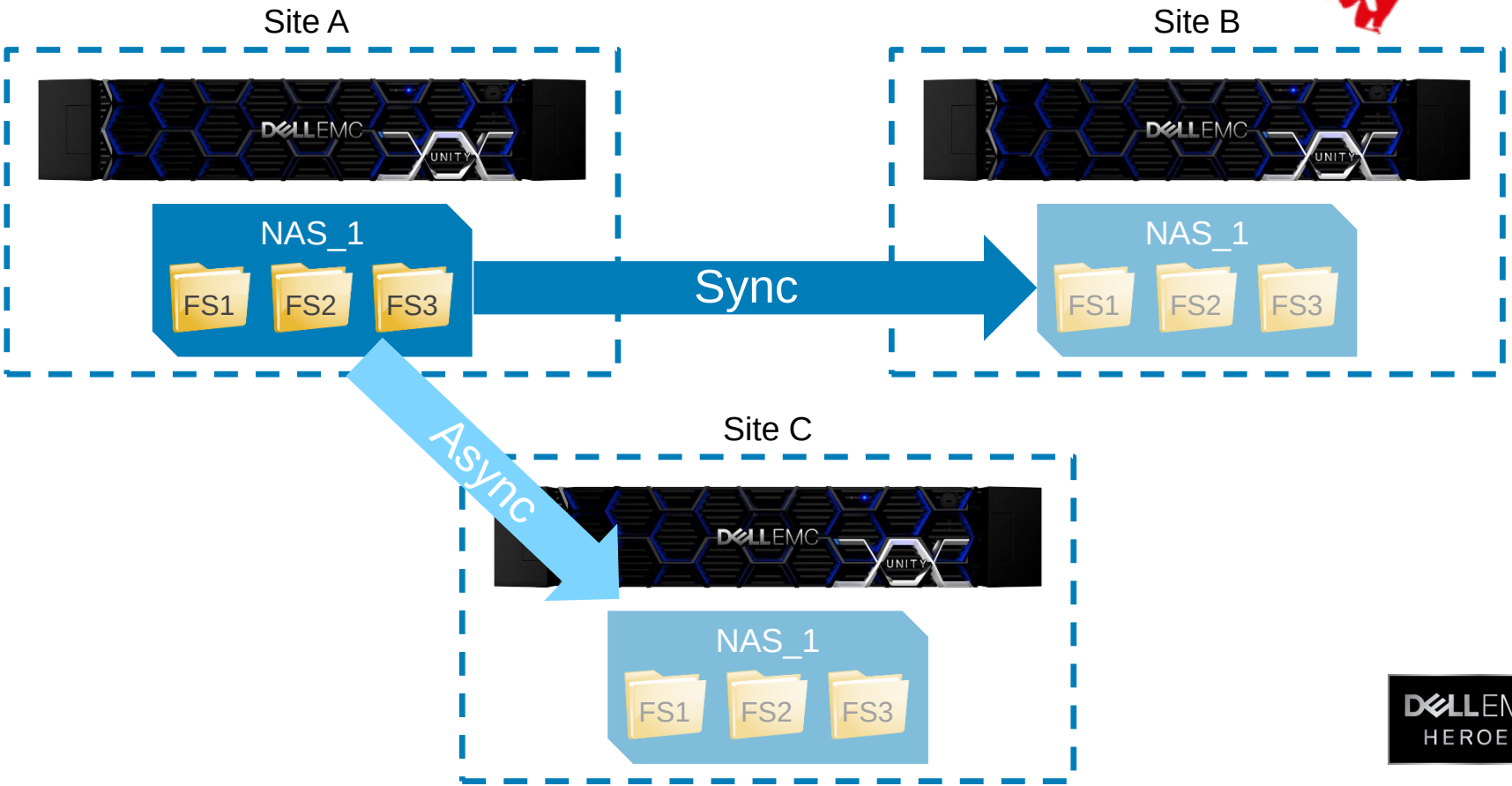
FC Connectivity

Data

BENEFITS

- Transfer data directly between Storage Array & Tape Library Unit (TLU)
- Direct attached eliminates backup data on the network
- Improves backup times
- Offsite backup for disaster recovery

Async Replication to a 3rd Site



Third-Party Block Data Migration

NEW

- ✓ Leverage SANCopy – nothing to install on hosts
- ✓ Manage with CLI or REST API
- ✓ Support Migration functionality like pause/resume, create, delete, rollback, throttle
- ✓ Ability to test destination before cutover
- ✓ Migrate multiple volumes at the same
- ✓ Report real-time migration metrics.

Support Planned for:

HP EVA

HPE 3PAR

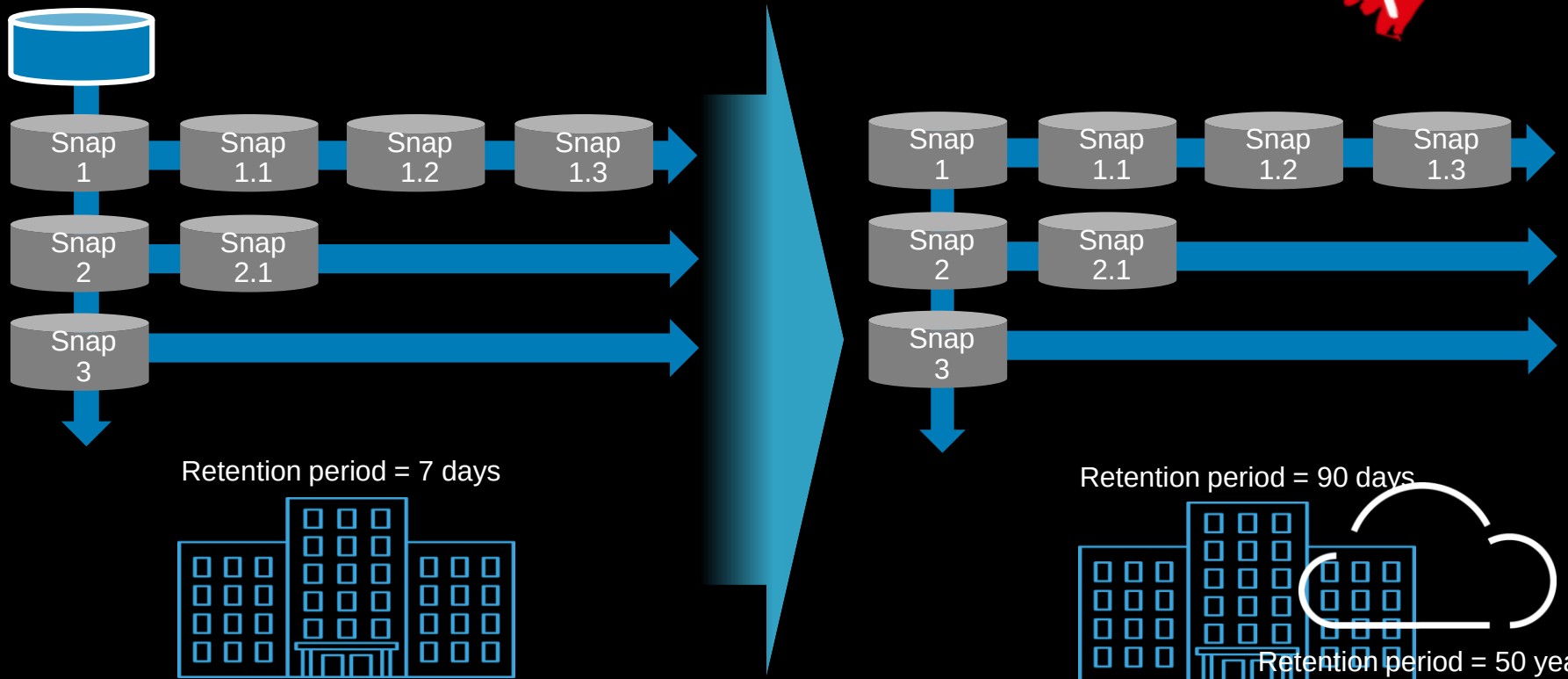
HITACHI HDS

NETAPP FAS

Plus: Dell EMC VMAX, SC Series & PS Series

DELL EMC

Snapshot Backup and Archive



DELL EMC

Cloud Tiering Appliance

Free up capacity with the benefits of cloud economics

- No cost RTU License included
- Reduce your backup windows
- Improve your TCO
- Flexibility with Physical, Virtual, HA options

Move your ‘cold’ data to cloud

FILE TIERING &
SNAPSHOT ARCHIVE

Public Clouds

Private Clouds

AUTOMATIC POLICY-BASED

PUSH OUT SELECTED DATA BASED ON POLICIES

TRANSPARENT, NON-DISRUPTIVE

NO CHANGE TO APPS; NO IMPACT TO USERS

ON DEMAND RECALL

EASILY RECALL DATA WHEN NEEDED

Midrange Product Positioning

Price Bands & Primary Storage Positioning

Price Bands*	Market Opportunity**
10: $500K+	$12.6B (PB 7 – 10)
9: $250K-$500K	
8: $150K-$250K	
7: $100K-$150K	
6: $50K-$100K	$12.9B (PB 1– 6)
5: $25K-$50K	
4: $15K-$25K	
3: $10K-$15K	
2: $5K-$10K	
1: $0-$5K	

High End

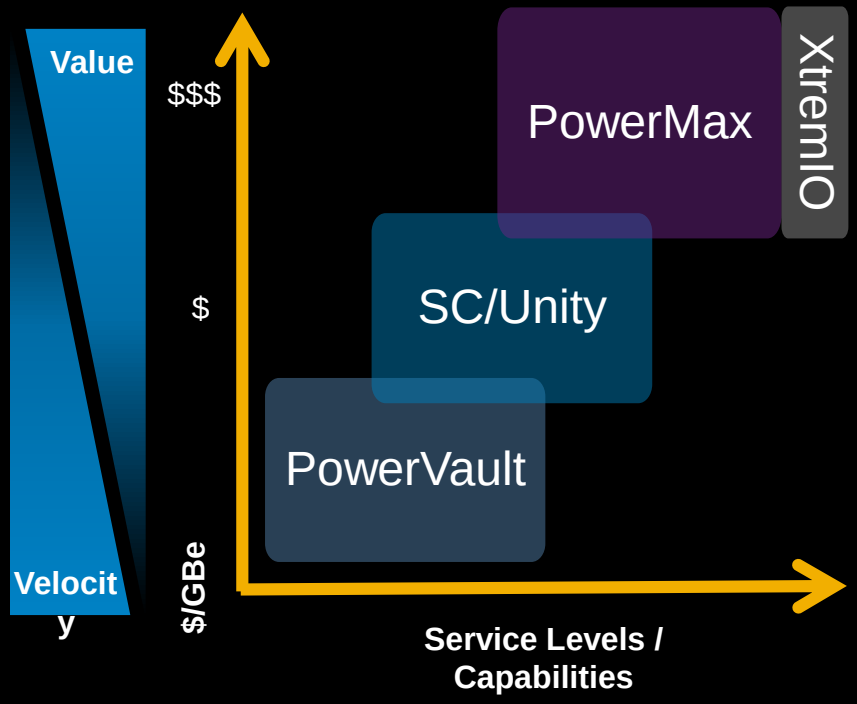
Midrange

Entry

Lead Product

- PowerMax
- XtremIO
- All Flash SC/Unity
- Hybrid
- PowerVault

Product Capability/Value



*Price Bands Based on Product Only – DO NOT USE FOR PRICING AND QUOTING;
**IDC External Storage Forecast for CY19

DELL EMC

Dell EMC Unity & SC Series benefits

Simple	Customer installable and serviceable with CloudIQ™
Inline Compression	Inline data reduction for balanced cost/performance
Unified	Transactional and traditional file workloads with block
Flexible	Converged, software defined or cloud enabled. DIP upgrades.

Dell EMC Unity

Federated	Scale-up block with the ability to federate arrays
Compression & Deduplication	Post-process compression/dedupe for flash & hybrid max cost savings
SAS Front-end	Option to connect using SAS inter-connect
Metro DR	Transparent Metro DR for block with Live Volume Auto Failover

SC Series

DELL EMC HEROES

DELL EMC