



Hewlett Packard
Enterprise

HPC Data Management

DMF Zero Watt Storage

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Zero Watt Storage | Performance-Oriented and Power-Managed High-Density Storage for DMF



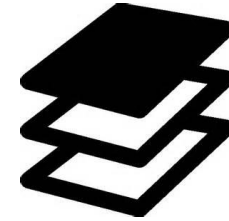
Hardware-with-software solution optimized for use with the HPE DMF data management platform



Cost-optimized
= Total cost of storage competitive with Tape and lower than Cloud



High Performance
disk based tier provides instant access to first byte and high throughput streaming



On-premise
storage tier which can be used as a capacity storage tier as well as a fast mount cache or “relief” to RAID arrays

Zero Watt Storage | Advanced Software Features

DMF “JBFS” VTL

- Group of JBODs treated as a DMF virtual “library”
- Individual disk drives treated as a DMF virtual “tape cartridge”

Advanced Drive Power Control

- Individual drive power control; spin down and power off
- Software controlled number of DMF virtual “tape drives”

Advanced Data Protection

- Inline XOR sector parity and rebuild to protect against unreadable sectors
- Automated scrubbing

Flexible Deployment Options

- Final migration target
- Fast Mount Cache

Zero Watt Storage | High Performance Power Managed Disk Tier



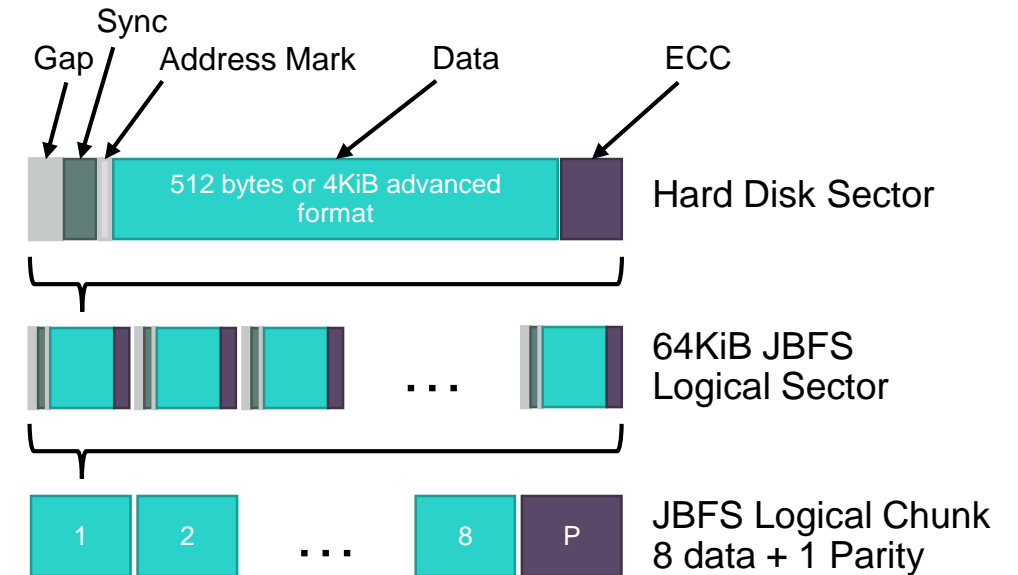
Software-based DMF warm tier storage option with minimized power utilization paired with the HPE JBODs

High Performance Power Optimized Extended Drive Lifespan

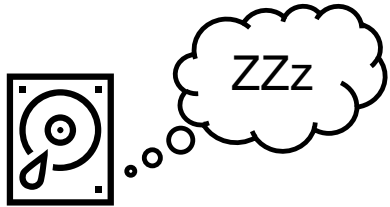
- Near 20 GB/s per JBOD performance provides ‘fast’ hard disk tier to stream data to active ‘hot’ storage
- Each drive is individually managed by DMF for optimal performance and management
- Drives can be spun down when not in use to minimize power consumption and increase drive lifespan
- JBFS on disk format includes sector parity for additional protection
- Active disk scrubbing

Zero Watt Storage | Sector Parity

- JBFS Sector Parity protects against unreadable sectors making disk drives suitable for long term archive usage
- Corrects sector read errors transparently from parity
- Will attempt to re-write faulty sectors if possible
- Periodic scrubbing to protect against bit rot
- Multiple disk sectors are collected into a 64KiB logical JBFS sector to protect against multi-sector failure in a cluster
- 128 512B sectors or 16 4KiB advanced format sectors
- 512KiB ideal IO size similar to modern tape drives
- Smaller IOs are possible with Read-Modify-Write cycle
- 8+1 gives 88.9% usable capacity (or 11.1% overhead) per drive



Zero Watt Storage | Advanced Disk Management



Integrated Disk Power Control

- Disk Power Control is configurable by the DMF administrator down to an individual drive
- DMF automatically calculates the power off delay based on drive SMART data and a 5-year drive lifespan
- The maximum number of drives that can be simultaneously access are configurable by the DMF administrator per JBFS virtual "library"



Proactive Disk Scrubbing

- All drives are proactively scrubbed in the background on a regular schedule
- Sector parity errors that can be corrected by the JBFS parity will be automatically fixed
- Drives with uncorrectable errors are flagged for administrative action
- DMF records SMART data for each drive
- Scrub progress and statistics are available to the DMF administrator

Zero Watt Storage | **DMF** Building Blocks

DL380 Gen10



DMF Server or ZWS Parallel Data Mover (PDMO) Node

E208e-p



12Gb/s SAS HBA

D6020



Data store JBOD

D8000



High Density Data store JBOD

Zero Watt Storage | HPE D6020 and D8000 Overview

D6020



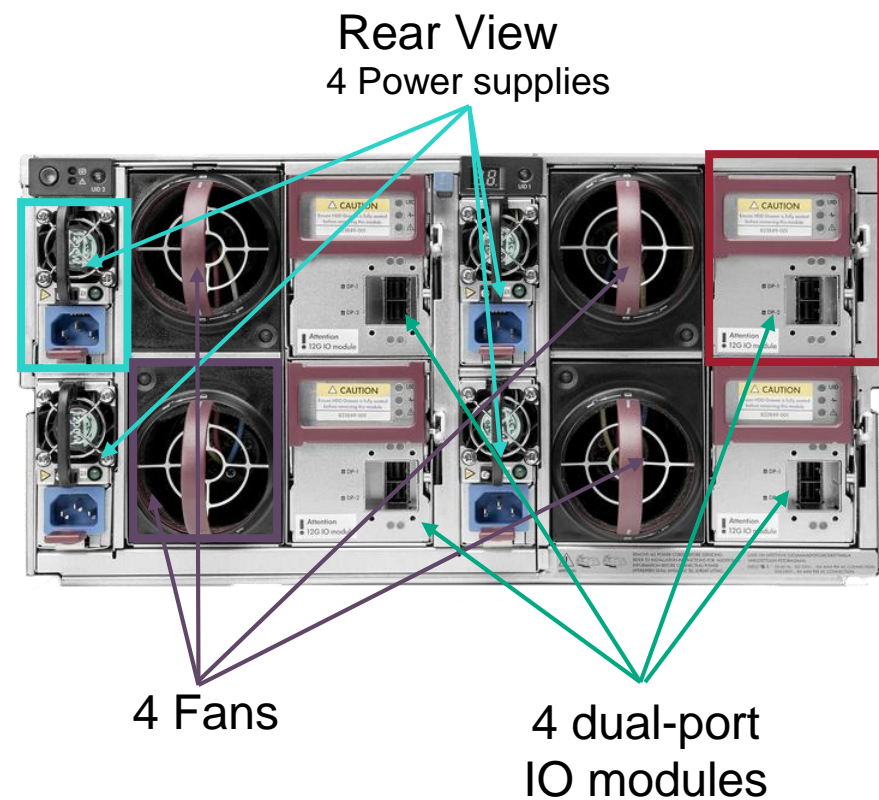
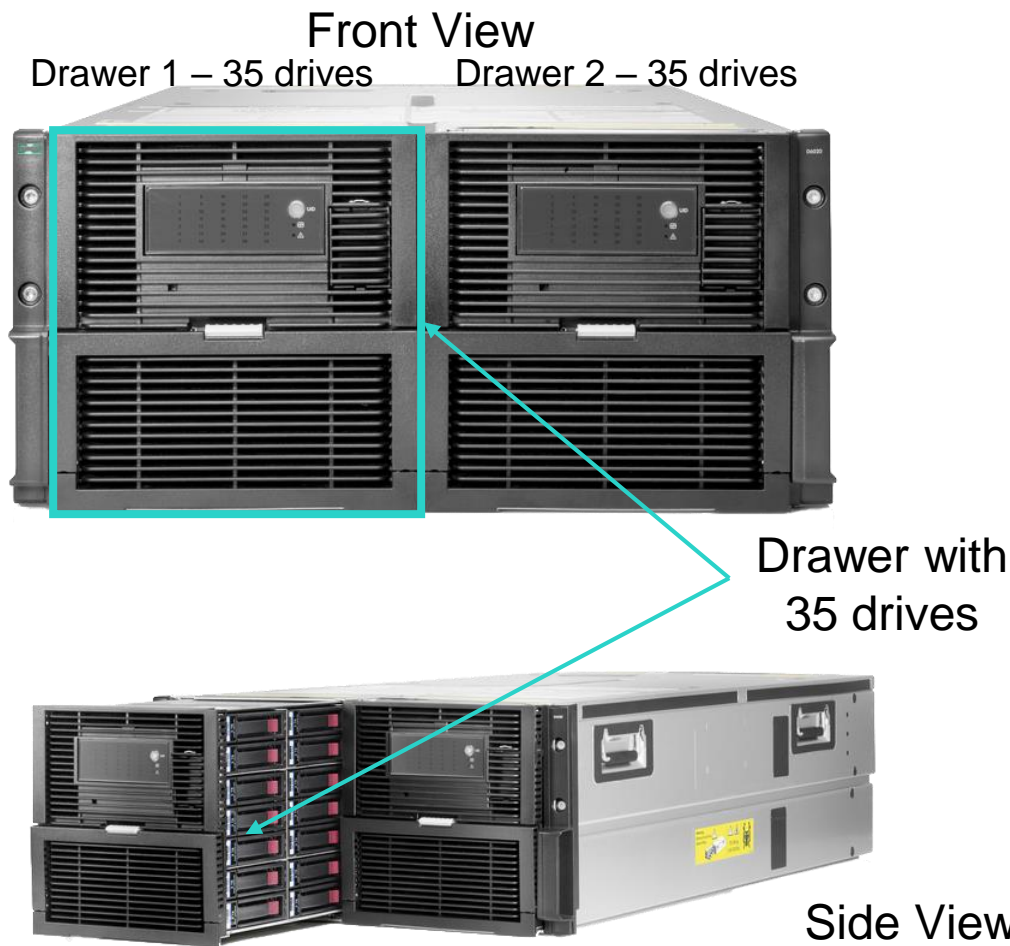
- 5U Standard Enclosure
- 70 LFF Drives per Enclosure
- 12 Enclosures (840 drives) per ZeroWatt Scalable Unit
- 746.6 TB DMF Single Copy Usable per Enclosure
- 8.96 PB DMF Single Copy Usable per Scalable Unit
- Individual Drive Spin down
- Front Serviceable
- 891mm length
- Compatible with standard depth racks
- 120 or 240 VAC

D8000



- 4U High Density Enclosure
- 106 LFF Drives per Enclosure
- 8 Enclosures (848 drives) per ZeroWatt Scalable Unit
- 1130.6 TB DMF Single Copy Usable per Enclosure
- 9.04 PB DMF Single Copy Usable per Scalable Unit
- Individual Drive Spin Down
- Individual Drive Power Off
- Top Serviceable
- 1139mm length
- Requires 1200mm racks
- Single SSU fits into HPE G2 Advanced or Enterprise Racks
- 240 VAC

Zero Watt Storage | HPE D6020 JBOD



Side View with one 35 drive drawer extended
3.5" SAS or SAS MDL drives

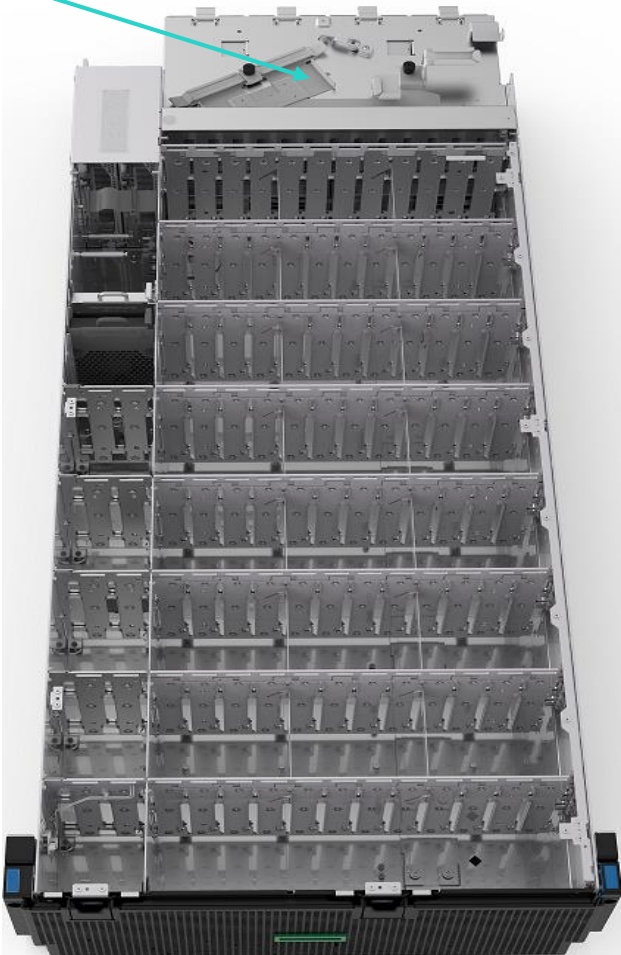
Zero Watt Storage | HPE D8000 JBOD

Front View



Cable Management

Top View



Rear View

Four (4) Fans

Dual I/O Modules

Dual Power

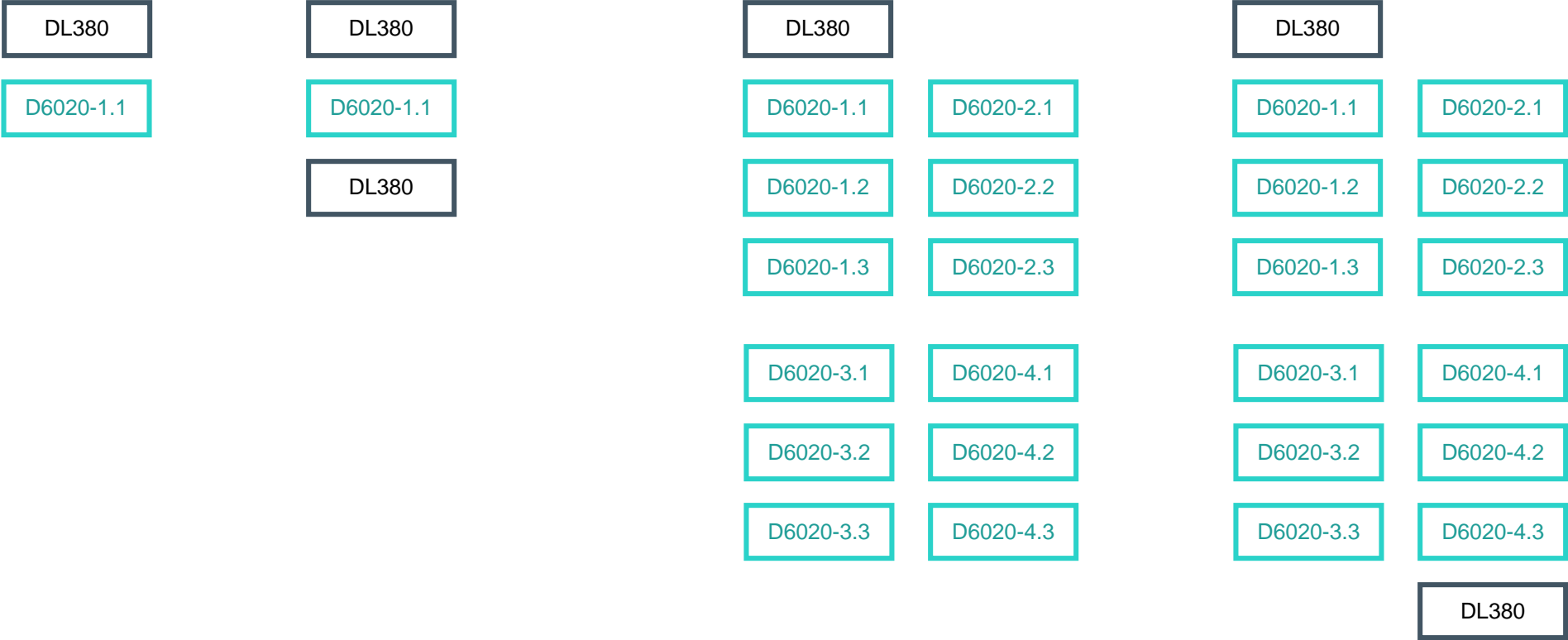


DMF ZeroWatt Storage D8000 SSU

- Scale from 1 DMF Mover and 1 D8000 to 2 Movers and 8 connected D8000s
- Scale out 1 or 2 Movers and 8 D8000 groups to add larger capacity
- Increase performance and capacity as the system grows
- 1.3 PB DMF usable per D8000 JBOD with 14TB drives
- 10.5 PB @ 10 GB/s+ per SSU
- 100 PB System Example:
 - 10 SSUs
 - 10 Movers (20 with HA)
 - 80 JBODs, 8480 drives
 - 105 PB usable single copy
 - 100 GB/s+ potential archive and recall bandwidth



Zero Watt Storage | D6020 Scaling



Up to 12 JBODs (840 drives) per scalable unit. Single server or Active/Active HA.

Zero Watt Storage | D8000 Scaling



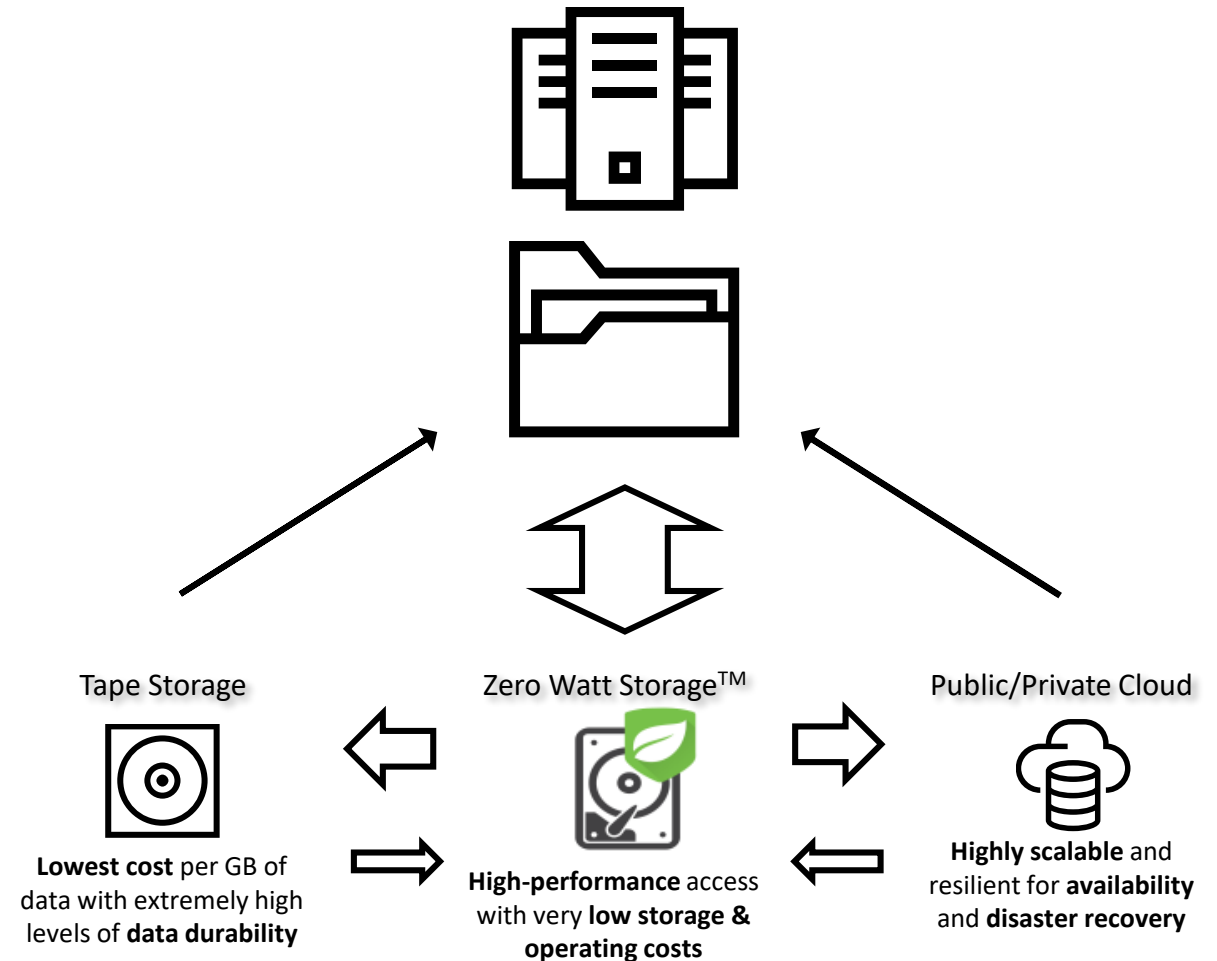
Data Management Fabric | DMF 7 Leveraging Zero Watt Backend

Key Takeaways

Zero Watt Storage as Data Cache

DMF 7 can maintain and track multiple copies of backend objects. It also supports creating and deleting the copies based on policy or request. This functionality replaces and augments DiskMSP and FMC use cases

- **Fast migration via Zero Watt:** Migrate and release space on the managed filesystem faster by creating one or two copies in ZWS then creating copies on tape and/or cloud in the background
- **Pre-stage or recall via Zero Watt:** Bring data from the tape and/or cloud into ZWS first, then quickly stage or recall into the managed filesystem
- **Fast recall from tape:** Keep one copy of data written to tape in ZWS. When the data is recalled, it will be copied from ZWS, so the tape does not need to be mounted
- **No-fee recall from cloud:** Keep one copy of data written to cloud in ZWS. When the data is recalled, it will be quickly copied from ZWS without incurring cloud data retrieval fees





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Thank you