Solution Brief
High Availability HDD Storage Cluster with RDMA Replicated Write Log for Excellent Performance

ATTO — The Power Behind the Storage

open-e

> Utilize the synergy of ATTO, Western Digital®, and Open-E JovianDSS to ensure high capacity & excellent performance of your data storage appliance.

KEY BENEFITS:

→ Best-in-Class **ATTO** and **Western Digital®** hardware components and outstanding **Open-E JovianDSS** software

→ **Up to 1.3 PB capacity** scalable data storage solution

→ All-HDD server supported by **the read cache and RDMA replicated write log** for the best price-to-performance ratio

→ **High data safety level**, thanks to the HA clustering and the RDMA replicated write log

→ **Data storage software compatibility**, thanks to the Open-E JovianDSS certification

THE BEST PRODUCTION DATA STORAGE SETUP FOR:

Virtualized infrastructure

Media postproduction

Data storage for CCTV video recorder

NAS storage filer

EXECUTIVE SUMMARY

Open-E, Western Digital®, and ATTO data storage experts and engineers joined forces to deliver an HDD-based data storage appliance, that combines the massive capacity of Western Digital® Ultrastar® Data60 JBOD populated with Ultrastar® series HDDs and accelerated performance thanks to the ATTO HBA SAS controllers and 100GbE NICs, as well as data caching and replication features of Open-E JovianDSS. The collaboration paid off with the solution that is **perfectly** balanced in terms of the price-to-performance ratio, linking the cost-effectiveness of HDDs, and excellent performance of NVMe-based caching devices (Ultrastar® DC SN840 1.6 TB NVMe SSD) supported by the state-of-the-art connectivity hardware and software features, such as the RDMA replicated write log through the mirror path connection.

High Availability HDD Storage Cluster with RDMA Replicated Write Log for Excellent Performance
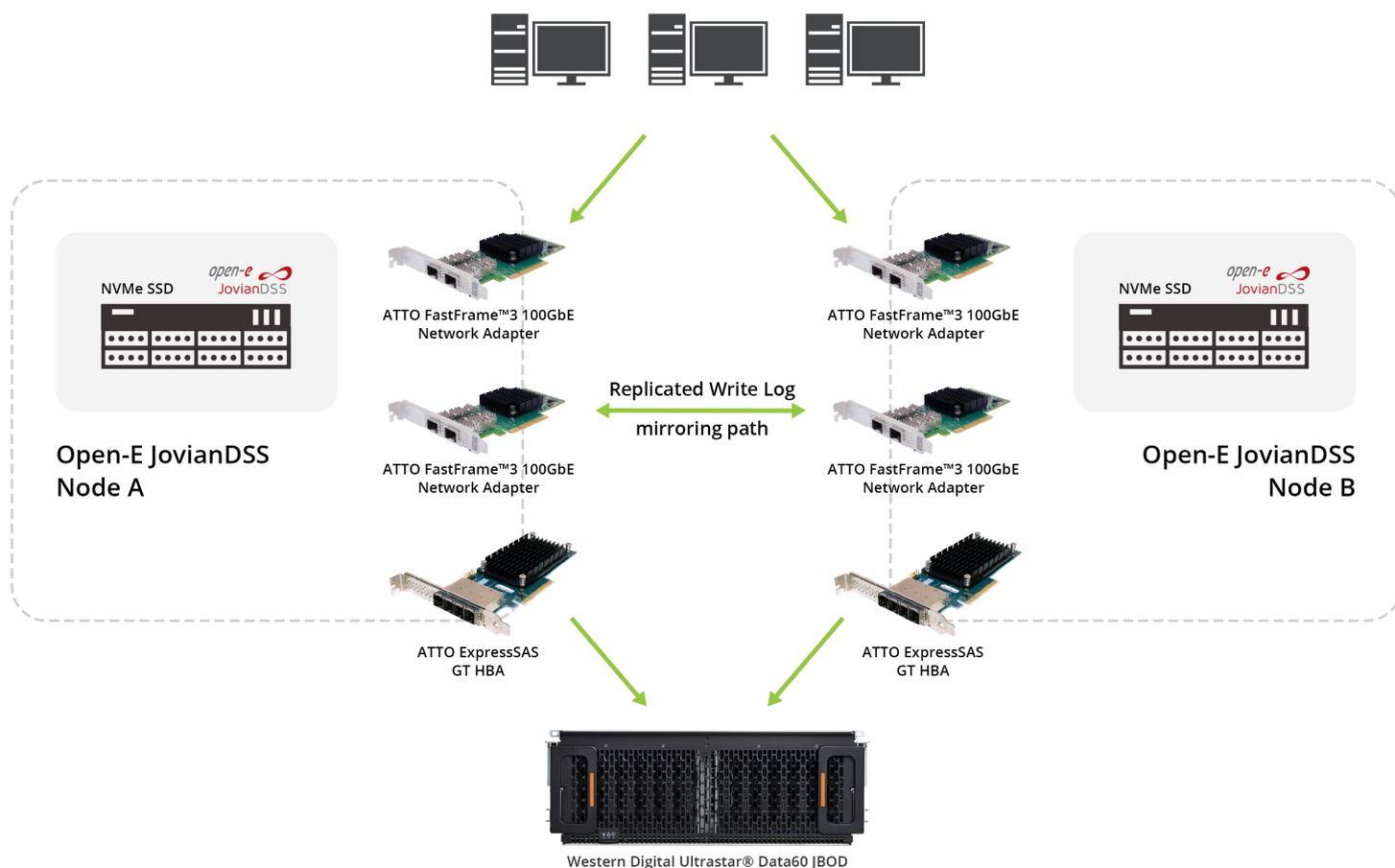
CUSTOMER NEEDS

The world of modern data storage solutions includes a broad spectrum of demands for implementations from HDD-based large-capacity storage setups up to high-performing All-Flash types of storage. Solution providers are challenged to develop solutions to meet different requirements for various data storage real-life business uses. It should guarantee the ability to bring out the best of each data storage technology, like scalable and cost-efficient capacity of HDDs and high performance of NVMe SSDs.

To achieve this goal, data storage engineers and experts from Western Digital®, ATTO, and Open-E worked together to build the solution with a perfect balance between TCO and performance. As a result, Western Digital® hardware, ATTO adapters, and Open-E JovianDSS advanced caching features **have been certified together to enhance the crucial parameters of the whole data storage solution based on HDDs**.

SOLUTION TOPOLOGY & DESCRIPTION

NVMe SSD — Open-E JovianDSS

Open-E JovianDSS Node A

ATTO FastFrame™3 100GbE Network Adapter

ATTO FastFrame™3 100GbE Network Adapter

Replicated Write Log mirroring path

ATTO FastFrame™3 100GbE Network Adapter

ATTO FastFrame™3 100GbE Network Adapter

NVMe SSD — Open-E JovianDSS

Open-E JovianDSS Node B

ATTO ExpressSAS GT HBA

ATTO ExpressSAS GT HBA

Western Digital Ultrastar® Data60 JBOD

The certified solution is **an Open-E JovianDSS HA Shared Storage Cluster**, based on the **Ultrastar® Data60 JBOD** with the **Ultrastar® DC HC510 10TB 3,5" SAS HDD** data drives connected through **ATTO ExpressSAS® GT HBAs** controllers to 2 server nodes. **ATTO FastFrame™3 100GbE NICs** are used for both the client connection and the replicated write log (based on the super-fast **Ultrastar® DC SN840 1.6 TB NVMe SSD drives**) that provides extra security and performance levels. Additionally, ATTO 100GbE NICs used to replicate the write log enable the RDMA (Remote Direct Memory Access) connection, making the solution performance even better.
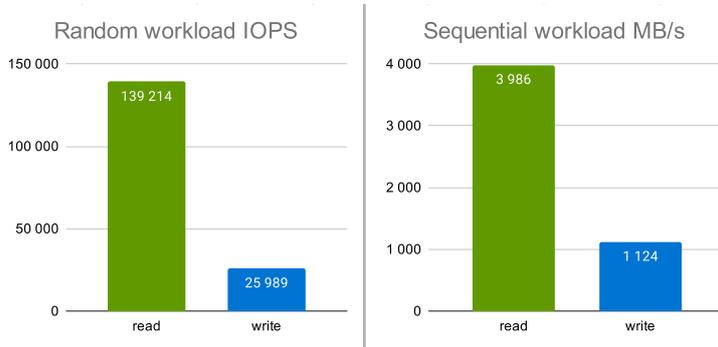
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[1] ZFS configuration details: auto trim: yes, write log: 2-way mirror replicated write log, read cache: single disk. ZFS parameters: zfs_vdev_max_active = 1000, zvol: 200 GB - volblocksize 64 kB; the rest of the parameters are default; zvols were initialized before tests. Dataset: sync=always. Record size: 64 kB, the rest of the parameters are default.
[2] IOmeter details: version: iometer-2006.07.27, outstanding IOs: 128. test size: 8 GB, block size: 1 MB (sequential) / 4 kB (random).

Read & Write Performance Tests Results (iSCSI)
Tested configuration: 10x6 drive RAID-Z2

Random workload IOPS — read: 139 214, write: 25 989
Sequential workload MB/s — read: 3 986, write: 1 124

HARDWARE SPECIFICATION

ATTO ExpressSAS® GT HBAs (H1244GT)
ATTO ExpressSAS GT HBA is a **4-Port External 4-Port Internal 12Gb/s SAS to PCIe 4.0 Host Bus Adapter** built to handle the scalability and availability needs for the next generation of data processing.

- The ExpressSAS® GT line's PCIe 4.0 capabilities **increase user bandwidth resulting in reduced downtime and improved efficiency**.
- With unique ATTO features and extensively tested hardware, you can expect a performance-engineered product with data protection and management at no extra cost.
- Provide the ability to develop unique, quick-to-market solutions with Open-E JovianDSS support.

ATTO FastFrame™3 100GbE NICs
ATTO FastFrame™3 100GbE NICs are suitable for a wide variety of high-performance applications and provide a high-quality and high-performance experience. ATTO NIC supports the Ethernet standard in a single- or dual-port configuration.

- **ATTO FastFrame™3 NICs and Open-E JovianDSS are certified to support RDMA for mirroring path.**
- The brand-new Ethernet Suite for Windows & Linux.
- Built-in hardware offloads.
- Erasure coding offload.

Western Digital® Ultrastar® Data60 Storage Platform
The Western Digital® platform provides up to 1.3 PB of raw storage using DC HC570 22TB CMR HDDs in a compact and efficient form factor. Ultrastar® Data60 addresses the demanding storage needs of large enterprise customers, storage OEMs, cloud service providers, as well as resellers/integrators requiring dense, shared HDD.

- **Low power consumption** leveraging WDC Helioseal® and ArcticFLow™ technologies.
- **Stable throughput performance** from IsoVibe™ under all workloads.
- **Lower return rate** from a cool and vibration-free operating environment.
- Easy serviceability and **component hot-swap capability.**
- Versatile connectivity with 2x6 miniSAS HD ports, offering: redundant connections and expansion of storage capacity by additional daisy-chained JBODs.
- Enabling multi-server access for instant failover.

Western Digital® Ultrastar® TB 3,5" SAS HDD Family
The Western Digital® Ultrastar® series HDDs enable an incredible capacity **to maximize data storage, especially in footprint- and power-constrained environments**. Performance-optimized for heavy application workloads

- CMR recording format.
- Helioseal® technology for low power and longevity.
- **20** and **22 TB** versions with **OptiNAND™** EPO-protected write caches .
- Projected **2.5M h MTBF** at **workloads of 550TB per year** and a **5-year limited warranty** to meet strict data center reliability requirements.

Western Digital® Ultrastar® DC SN840 1.6 TB NVMe SSD
Performance-optimized Ultrastar® DC SN840 1.6 TB NVMe SSDs target the cloud computing and enterprise workloads that require low latency and high availability of data.

- 3rd generation of performance NVMe SSD for data center.
- PCIe Gen 3.1 (dual-port), NVMe 1.3.
- Up to 3,470/3,300 MB/s Sequential Read/Write and up to 503K IOPS mixed random 70/30 read/write performance.
- **Read cache- and write log-ready device**.

Open-E JovianDSS Data Storage OS System
With Open-E JovianDSS you can achieve advanced levels of data protection since you can utilize not only a High Availability clustering to ensure zero-downtime data accessibility but also consistent data snapshots that can be stored both locally and remotely on the external backup machine. This way you can build your Business Continuity strategy against

all the threats such as hardware failures, power outages, human errors, ransomware attacks, natural disasters, and much more.

- Consistent Data Snapshots & Flexible Retention Plans.
- On- & Off-Site Data Protection.

- High-Availability Clustering.
- Hardware agnostic software certified for both Western Digital® and ATTO.
- RDMA support for mirroring path in non-shared storage nodes.

CONCLUSIONS

The technology used in the Western Digital®, ATTO, and Open-E joint solution takes full advantage of the hardware components: the high capacity of the HDDs and the super-high performance of the NVMe SSDs that build an appli- ance that can meet even the most demanding requirements of the data centers and enterprise customers in terms of **centralized NAS filers, media postproduction, CCTV, backup servers, or even virtualization, and more.**

"Our long-term partnership with Western Digital® and ATTO gives us the opportunity to work closely with world-class data storage experts on the solutions that bring a brand-new value for our customers and resellers. And our latest project is a great example of this synergy" **- SAID KRISTOF FRANEK, CEO OF OPEN-E.**

"You couldn't pull together three better companies to partner on an end-to-end business solution like this. Each of us put our specialties on the table and the result is an amazing solution that stands out in the market" **- SAID TIM KLEIN, ATTO TECHNOLOGY CO-FOUNDER, PRESIDENT, AND CEO.**

"Once again I'm impressed by the ease of installation and smooth interaction of the three key storage technology elements making up this solution: Software-defined storage intelligence by Open-E, dependable network and SAS connectivity by ATTO and the high-density Ultrastar® storage platform made by Western Digital®" **- SAID MANFRED BERGER, SENIOR BUSINESS DEVELOPMENT MANAGER AT WESTERN DIGITAL®.**

Server	Intel M50CYP2UR
CPU	2x Intel Xeon Gold 6334 CPU @ 3.60GHz
RAM	16x 16GB Samsung M393A2K40DB3-CWE
NIC	ATTO FastFrame N312 Dual-Port QSFP28 100GbE
HBA	ATTO ExpressSAS H1244GT 4-internal 4-external 12Gb SAS/SATA
JBOD	Western Digital® Ultrastar® Data60 60-Bay Storage Platform (H4060-J)
Drives	60x Western Digital® DC HC510 (HUH721010AL4201) 10TB 3,5" SAS
Write log	2x Western Digital® 1.6 TB Ultrastar® DC SN840 WUS4C6416DSP3X3
Read cache	2x Western Digital® 1.6 TB Ultrastar® DC SN840 WUS4C6416DSP3X3
OS	Open-E JovianDSS v.1.0 Up29r2
HA	Shared Storage Cluster with replicated write log
Mirroring path	Single direct connection 100 GbE with RDMA