

Bringing Hyperscale Efficiency On-Premises

Cloud-scale economics. Unparalleled performance.
Enterprise-grade flexibility.

Overview

Data-driven organizations face unprecedented storage demands, rising costs, and the limitations of existing storage frameworks across backup, archive, analytics, and content-rich workflows. From safeguarding data integrity and ensuring immutability to enabling flexible expansion, IT leaders are constantly seeking solutions that combine performance, reliability, and operational agility to support next-generation applications.

Until now, hyperscale storage ecosystems have long been exclusive to cloud providers – offering exabyte scale capacity, automated data resilience, and unmatched efficiency. Leil Storage, in collaboration with ATTO Technology, is introducing these capabilities to the enterprise market and service providers – blending massive scalability, high performance, energy efficiency, and seamless adaptability with uncompromising control, predictability, and security of enterprise infrastructure.

Highlights

- 🔗 Power data-intensive workloads with a dense software-defined solution engineered for managed reliability, intelligent architecture, and greater efficiency at scale.
- 🔗 Handle everything from small-scale file management to multi-petabyte datasets with Leil Storage, a robust yet versatile distributed parallel file system.
- 🔗 Deliver low-latency, high-bandwidth access to HM-SMR drives with ATTO ExpressSAS® host bus adapters achieving peak PCIe throughputs through streamlined data handling.
- 🔗 Reduce energy use by over 25% with Leil's Infinite Cold Engine technology, which powers down idle drives for maximum efficiency – with even greater savings expected in future releases.
- 🔗 Ensure predictable performance with ATTO Advanced Data Streaming™ technology for precise control over connected storage, improving overall system responsiveness.

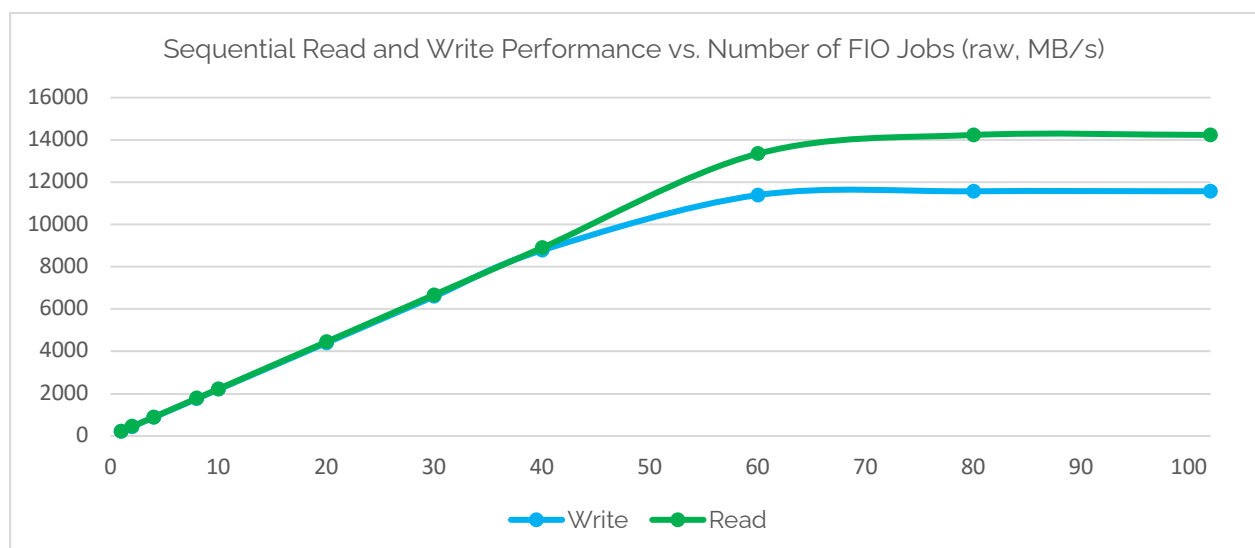
Unmatched Performance & Reliability at Scale with Significantly Lower Footprint

Leveraging the close-knit synergy between Leil Storage's software solution and ATTO ExpressSAS host bus adapters, this joint solution empowers enterprises to simplify data management, reduce operational costs, advance sustainability goals, and expand infrastructure seamlessly to meet their evolving business needs. By delivering peak performance and enterprise-grade agility in a power-efficient design, ATTO adapters optimize host server configurations to support large bandwidth I/O transactions. This allows for achieving higher aggregate data transfer rates across a dense pool of connected drives managed via Leil's proprietary distributed file system platform.



Flexible Connectivity Solutions

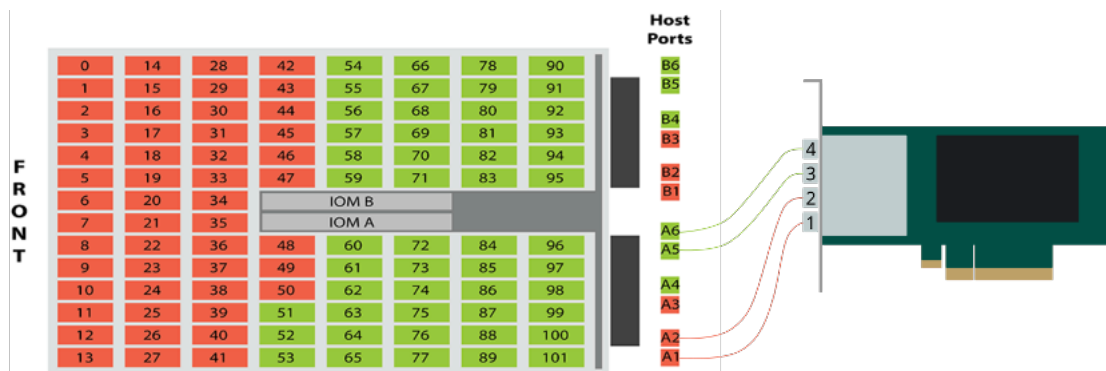
[ATTO ExpressSAS](#) host bus adapters provide high-performance data protection to direct-attached SAS and SATA storage. With a wide variety of port configurations and built-in RAID for performance and protection, these adapters offer flexibility for every range of application – to support dense and efficient connections to storage from rack mounted servers and workstations in datacenter, data warehouses, video-on-demand and other high-availability, high-performance applications.



[Fig: Raw performance as observed in the test setup without SMR optimization]

The graph above displays the observed results for up to 100 FIO jobs using the following hardware:

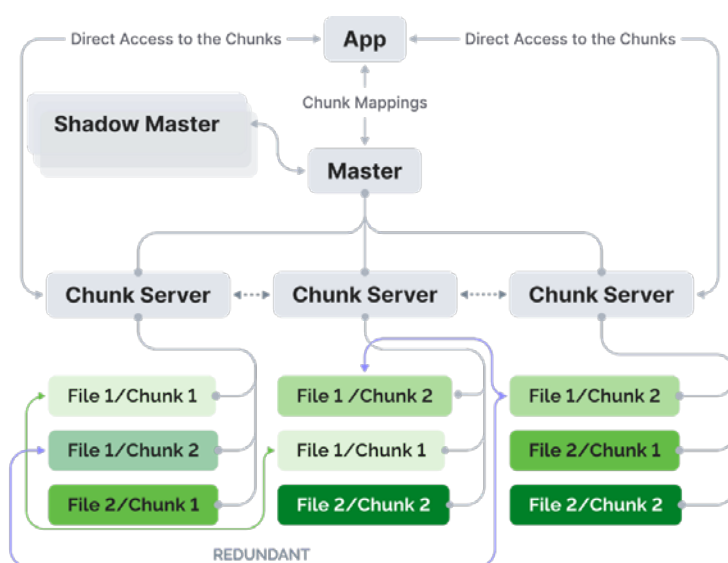
- 🔗 **HDD:** 30TB SMR Drives
- 🔗 **Platform:** JBOD with 102 drives
- 🔗 **Drive connectivity:** ATTO ExpressSAS HBA



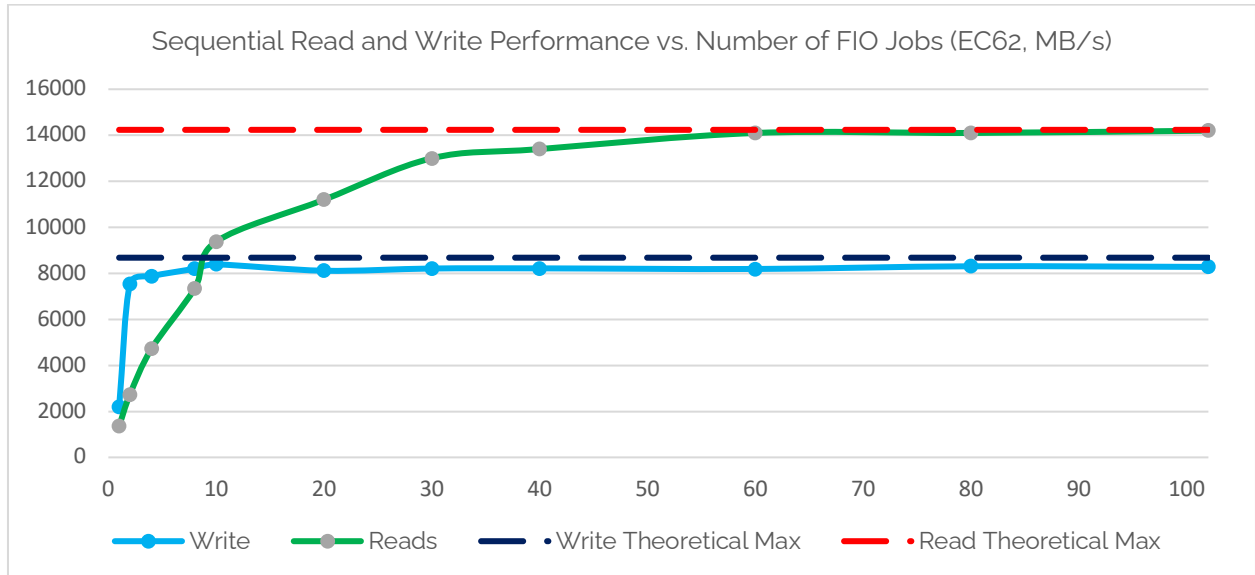
[Fig: JBOD is split into equal zones 51 drives each using an ATTO ESAH 12Fo-GT]

Enhanced Data Resiliency

Leil Storage is a robust distributed POSIX file system meticulously designed to revolutionize your storage solutions by offering unmatched efficiency, security, and redundancy. It incorporates instant copy-on-write snapshots to ensure immutability and integrity of data while also optimizing storage space by only storing changes with copy-on-write mechanism. Its flexibility enables organizations to upgrade hardware without downtime, energy, and cost savings while also scaling their storage infrastructure to meet growing data demands effortlessly.



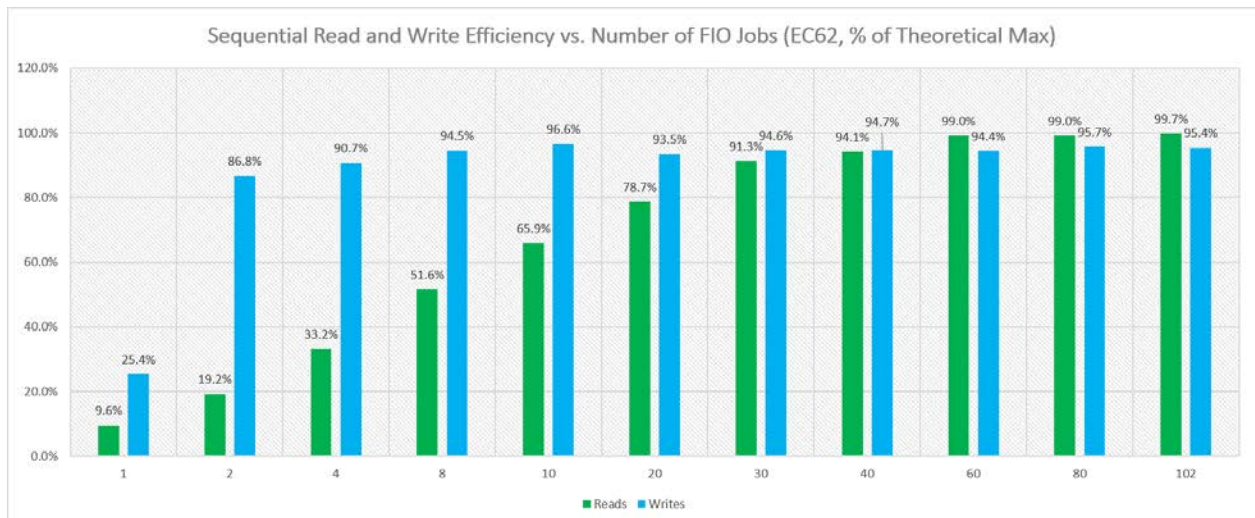
With Leil Storage, users can choose the code rate of Erasure Coding to balance between better capacity usage and better data resilience. Leil Storage supports all capacities of HM-SMR drives, including drives with variable capacities. It also supports the use of CMR drives, as well as a mix of CMR and SMR drives and mixed capacities. It incorporates instant copy-on-write snapshots to ensure immutability and integrity of data while also optimizing storage space by only storing changes with copy-on-write mechanism. Leil Storage supports NFS and SMB and comes with a native Windows and Linux client.



[Fig: Read-Write performance achieved with Leil's SMR optimization]

The theoretical read line represents raw read performance measured using a single FIO job per drive (102 total), with offsets applied to avoid random zones and start from the outer zones for optimal performance. The theoretical write line reflects raw write performance reduced by 25%, representing the Erasure Coding 6+2 overhead (theoretical physical limit being 75% of raw write speed).

By aggregating multiple physical links into a unified, high-bandwidth data stream, the platform delivers read-write performance orders of magnitude higher than those attainable on general-purpose designs while simultaneously reducing overall hardware and cabling requirements across host systems.



[Fig: Read-Write performance efficiency as seen on the preliminary tests]

Achieving approximately **95% of the theoretical peak write performance** and **over 99% of the theoretical peak read performance**, as illustrated in the graph above, this achievement

underscores the synergy between ExpressSAS's high-efficiency SMR drive storage connectivity and Leil Storage's SMR drive optimized architecture – all within a smaller, power-efficient footprint that redefines the balance between performance and efficiency in modern storage infrastructure.

The next release will provide an S3-compatible object storage interface designed for scalability, resilience, and simplicity. It enables organizations to store, manage, and access unstructured data using the familiar Amazon S3 API, ensuring seamless integration with backup, analytics, and other applications. In the future, additional features such as Autonomous Drive Regeneration (ADR) / RDP (Repurposing Depopulation) will be supported to reduce system downtime due to maintenance, enhance the life cycle of drives, and decrease the risk of data loss. Leil Storage will also allow drives to be powered off if they contain cold and not often accessed data to reduce the power consumption. An open-source version with reduced feature set and support for CMR drives only is available as well.

Use Cases:

- 🌀 AI & HPC research needing accelerated data retrieval for orchestrating intelligent modeling, real-time access to large datasets, and continuous inferencing on-premise and at the edge.
- 🌀 Enterprise Data Management and Security for ensuring data integrity and immutability with cost control across the IT ecosystem while simplifying management.
- 🌀 Media & Entertainment workgroups demanding large-file transfers for streamlined production and rich media post-production processes with dedicated low-latency data streams.
- 🌀 Managed Service Providers (MSPs) and IT Solution Providers seeking to provide cloud-like scalability and serviceability for their customers on locally deployed purpose-built infrastructure.

About Leil Storage:



Leil Storage develops an HDD-native data storage software that makes high-density shingled magnetic recording (SMR) drives practical for mainstream enterprises, unlocking approximately 20 per cent more capacity per disk and reducing power consumption. The resilient and high-performing platform is offered in editions tailored to customer needs, with an open-source variant providing core features. Founded in Estonia in 2022 by engineers Aleksandr Ragel and David Gerstein, who have nearly 30 years' combined storage-infrastructure experience, Leil Storage aims to make hyperscale storage economics accessible to the wider market.

Discover more at leil.io

Follow [Leil Storage on LinkedIn](#).

About ATTO Technology:



ATTO Technology, Inc., is a globally recognized leader in storage and network connectivity solutions for data intensive workflows and performance-driven environments. For over 35 years, ATTO's innovative technologies have empowered organizations worldwide - from enterprise IT and data centers to media production studios - to fully leverage their data, optimizing performance, enhancing reliability, and driving competitive advantage in the digital era.

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