MODERN DATA ARCHIVING AND LONG-TERM RETENTION SOLUTIONS IN THE AGE OF AI AND RAPID DATA GROWTH

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Modern Data Archiving and Long-Term Retention Solutions in the Age of AI and Rapid Data Growth

Data retention and storage have become dynamic and essential elements in today's digital and data-driven enterprises. There has been an explosion of data growth in recent years—driven by artificial intelligence, machine learning, the internet of things, and digital transformation. In the process, organizations face questions about long-term data retention, linked to their increasing reliance on data lakes, data warehouses, object storage, and cloud services for managing and maintaining both structured and unstructured data. They are realizing it's critical to retain all data indefinitely for purposes such as AI model training, analysis, insights, and innovation. The challenge is the cost and resource drains associated with traditional storage solutions, as well as the growing need for crucial data on demand. These systems are also hampered with high energy consumption, magnified by hardware inefficiencies, and the costs of many archiving systems. In addition, there are regulatory requirements for long-term data retention.

Why Current Archiving and Retention Approaches are Problematic

Many enterprises still rely on legacy storage platforms that were never designed for the scale, economics, or longevity demanded by modern data archiving and retention strategies. These conventional systems often hit architectural limits as data volumes grow and struggle to deliver efficient, long-term value.

Key limitations include the following:

- High operational costs due to aging hardware, proprietary systems, usage of outdated multi-copy approaches, and labor-intensive management.
- Technology obsolescent as new systems and platform evolve.
- Energy inefficiency, which not only impacts sustainability efforts but also drives up facility costs.
- Inflexible scalability, requiring disruptive upgrades or costly overprovisioning to accommodate growth.

Most organizations have crafted their data retention and storage strategies around rapid access to active datasets. But as data ages, the goal shifts to sustained accessibility—ensuring long-term protection and economical access without constant re-architecture. Unfortunately, traditional approaches rarely meet both needs at scale.

Enterprises now face a pivotal shift: building archival environments that are not just low-cost places to park data, but strategic infrastructure designed to preserve, protect, and provide access over decades—turning data into a gold mine that can propel AI initiatives and drive innovation.

Conventional systems often hit architectural limits as data volumes grow and struggle to deliver efficient, long-term value.

The Building Blocks of Modern Long-Term Archiving and Retention Environments

What defines a durable, future-ready archiving and retention infrastructure? Today's organizations must design environments that not only retain data securely and cost-effectively over the long term, but also scale with evolving needs and sustainability goals. A modern archiving and retention storage strategy should address the following core requirements:

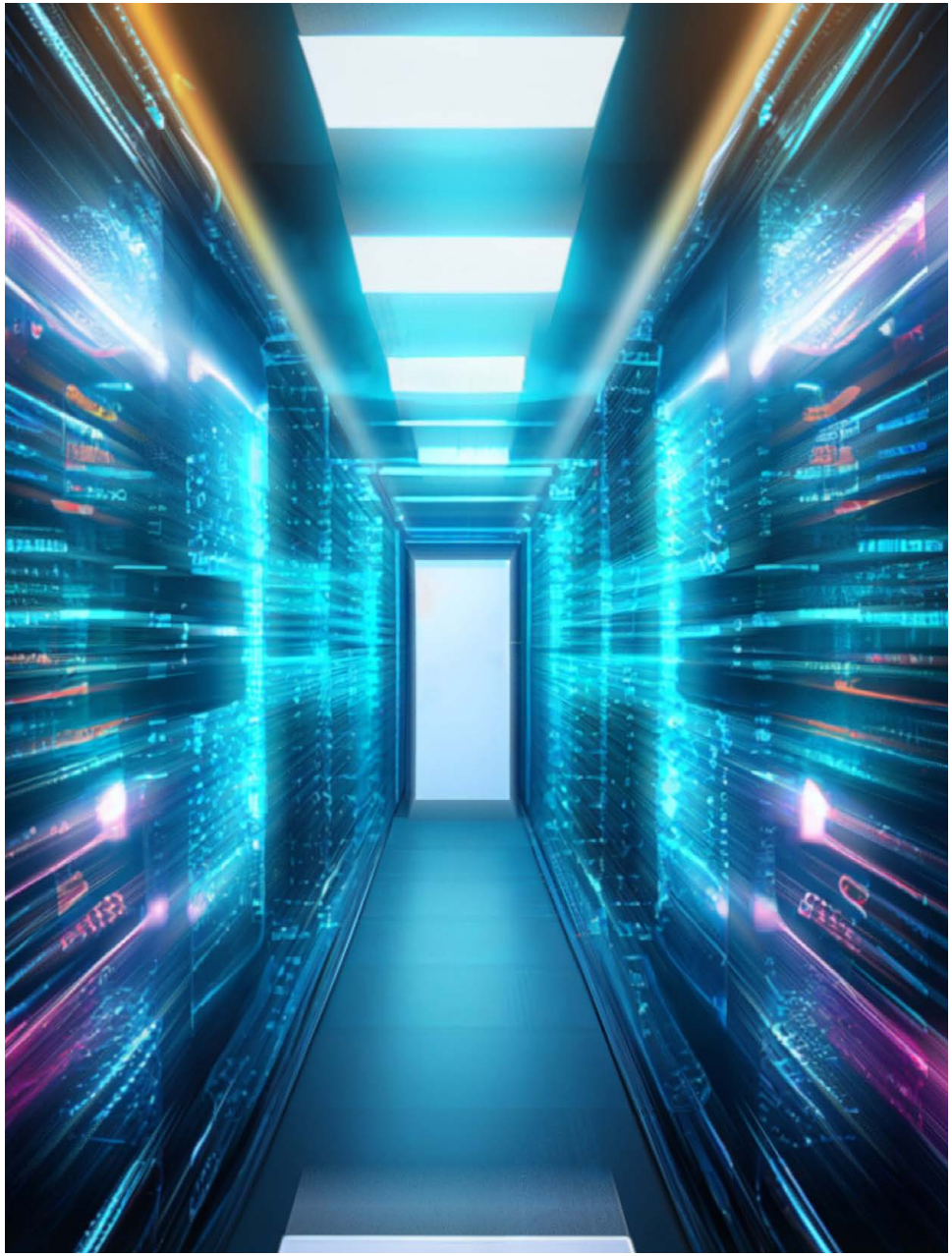
- **Cost-effectiveness:** Reduce total cost of ownership by intelligently tiering storage to balance access frequency, performance needs, and long-term economics. Archive environments should minimize cost-per-terabyte over time without sacrificing data durability or availability. In addition, erasure coding contributes to lower storage overhead and higher durability.
- **Sustainability:** Environmental impact is now a strategic consideration. Storage platforms should leverage energy-efficient technologies and architectures to reduce power consumption, carbon footprint, and data center cooling requirements.
- **Scalability:** Retention and archiving systems must support seamless growth—both predictable and sudden—without disruption. A well-designed archive should scale horizontally to accommodate increasing data volumes without requiring forklift upgrades or architectural rework.
- **Security and Data Integrity:** Modern archiving and retention isn't just about storing data—it's about preserving its integrity over years or decades. Modern long-term archive solutions must enforce strong access controls, role-based permissions, and encryption, both in transit and at rest. Additionally, they should support immutability, object locking, and audit trails to meet compliance, legal hold, and governance requirements. Built-in integrity checks and self-healing capabilities ensure long-term reliability even as hardware ages.
- **Simplified Management:** Archiving and retention managed from a single, centralized pane of glass. A next-generation environment enables automated data migration and consolidated. Policy-based management systems save time.

Retain data securely and cost-effectively over the long term, but also scale with evolving needs and sustainability goals

Today's Options in Long-Term Archiving and Retention

There are a range of options for data storage in today's technology environment to consider—hard disk drives, solid-state drives, tape storage, and cloud storage. Archival storage and retention technology is rapidly evolving.

The footprint of tape storage, for example, is shrinking while its capacity is growing exponentially. For example, today's Linear Tape-Open (LTO), systems, such as LTO Generation 10, can store from 18TBs to 45TBs on a single tape cartridge depending on compression, with even higher capacities on the horizon—scaling to 30TBs to 75TBs with the next generation. This represents a 67% increase in previous LTO tape capacity. On the warm storage side, there are solid-state drives (SSDs) that offer rapid, flash-based storage for frequently accessed, latency-sensitive data, with fast read/write speeds. Disk drives provide for high-capacity storage on demand.



Advantages of a Long-Term Modern Archiving and Retention Storage Architecture

The best way to build an archiving and retention environment is to employ a solution that uses a mix of storage types and tiers, aligned with the time the data is needed and budgets. This enables the best prices and peak performance for storage, based on the frequency that the data will be accessed.

For example, "hot" data, which is frequently accessed, will need to be immediately available to users, and require storage media such as flash drive or disk. "Warm" data, which is occasionally accessed, may not require flash capability, but mainly rely on disk-based storage. "Cold" data, which is infrequently accessed, offers a primary use case for lower-cost tape storage.

A modern long-term archiving and retention system provides unique advantages over legacy digital storage offerings in terms of cost, longevity, security, and scalability—no matter how "hot" or "cold" a company's data access requirements. A modern data archiving and retention strategy and architecture delivers the following advantages:

- **Cost-effectiveness:** Public cloud services may carry escalating access and egress fees. A modern archiving and retention storage approach enhances the ability to create an on-prem or hybrid cloud to avoid those fees, and keep data accessible and secure. In addition, today's generation of solutions include erasure coding that helps lower storage overhead. And, a private cloud archiving architecture helps overcome unpredictable access and egress charges seen with cloud-based storage.
- **Enhanced scalability and flexibility:** A modern archiving environment can be configured to support massive storage capacity for today's data volumes. In addition, modern archiving facilitates faster retrieval of large datasets—exceeding the rates of previous generations of systems. Such systems easily support and integrate with existing digital architectures.

- **Data longevity and reliability:** A modern archiving and retention environment is ideal for long-term data retention, which is important for compliance demands. It will support a mix of technologies and storage tiers. media that can last for decades, and is less susceptible to system outages, magnetic interference or physical decay. In addition, a modern archiving solution will also support automatic data migration across hardware generations.

- **Energy efficiency:** Modern archiving systems based on object storage on tape are designed to consume little to no power, contributing to lower operational costs for data centers

- **Solid security protection:** Because modern long-term archiving and retention systems feature an integrated cold tape tier, there is air-gapped protection, and thus, minimal vulnerability to cyberattacks. In addition, data can be stored in remote locations in the event of disasters or disruptions at primary site. Data is maintained separately—and can be restored—in the event of ransomware attacks. An additional aspect, Write Once Read Many (WORM), is available through object storage and tape.

An integrated approach creates a durable, scalable, and resilient "forever archive" that grows with your needs, ensuring every bit of your data is always available and ready to be leveraged again.

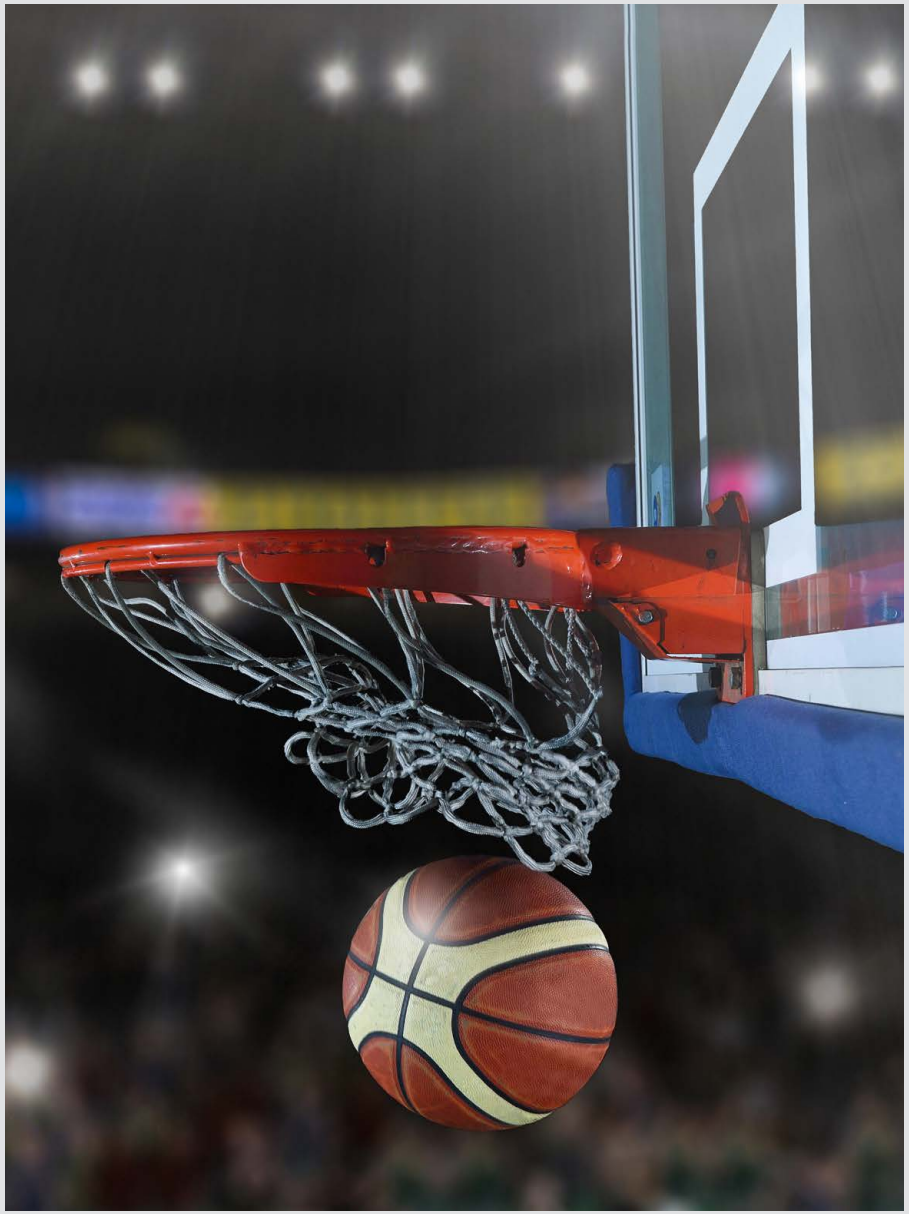
Bring on the HEAT

To efficiently archive and protect their entire asset catalog, the Miami HEAT's creative services team chose Quantum ActiveScale® object storage. As an S3-compatible object storage solution, ActiveScale enables the group to maintain online access to active, lower-resolution proxy files and full-resolution cold content for years. Using ActiveScale, the group expects to sustain its growth rate for close to a decade.

Now, the organization's 24x7 content is available to meet rapid production schedules with reliable, highly available storage. In the process, the organization achieved easy access to years of rich content with scalable, cost-effective, durable object storage.

The team implemented both ActiveScale all-flash storage for fast content recall and processing and a low-cost tier based on ActiveScale's Cold Storage feature that enables long-term, low-cost archiving using integrated LTO tape resources. With an initial deployment over 10 petabytes, ActiveScale's future expansion is seamless and low cost with anticipated growth to over 30 petabytes to meet future needs.

Using ActiveScale, the team knows they'll be able to sustain its growth rate for at least eight or nine years without having to make large capital purchases.



Storage on Tight Budgets

Cloud platforms offer a compelling alternative to the often-steep up-front costs of computing, but back-end costs for data storage can quickly wash away any savings. ASI Solutions, a technology and services solutions provider serving the New Zealand and Australian markets, recognized that many organizations, especially universities and mid-sized businesses, needed affordable cloud storage without the unpredictable costs of big cloud providers. These are typically organizations with tight budgets, who need simple pricing and top-notch data security.

To meet this demand, ASI launched ASI Cloud InfiniStor, a cloud storage service designed for small to medium-sized organizations. The goal was to provide these customers a platform that could handle large amounts of data, keep costs low, and simplify management. The company turned to Quantum ActiveScale object storage to build a solution that's cost-effective, secure, and easy to manage.

The University of Auckland, New Zealand's largest university with more than 40,000 students, became ASI's first major customer for InfiniStor. The university needed to replace its outdated tape libraries to better support its researchers and connect with the Research Education Advanced Network New Zealand (REANNZ).

They selected Quantum ActiveScale to enable fast access to active data and affordable S3 Glacier–equivalent long-term storage with its integrated tape tier, all while keeping data secure. The university could protect their research data with minimal storage space—about 40% less than other options.

ASI's InfiniStor, supported by ActiveScale, helped meet the university's local storage needs and connected to the REANNZ network, giving other research institutions access to high-speed storage as well. In addition, the solution offered local advantage—hosting InfiniStor in New Zealand data centers ensures data stays local, a priority for many organizations.

Conclusion

The rapid pace of data growth resulting from AI, machine learning, the internet of things, and digital transformation will only accelerate. Data-driven competition, compliance, sustainability, and other trends reshaping the business environment call organizations to retain all data indefinitely, which is changing long-term archiving infrastructure requirements. This calls for a strategic approach to data archiving and retention.

Evolving toward a multi-tiered storage architecture will help organizations manage data where and when it is needed, leading to lower costs, greater scalability, and enhanced sustainability. The time has come to align data archiving and retention efforts with the business's data access needs.

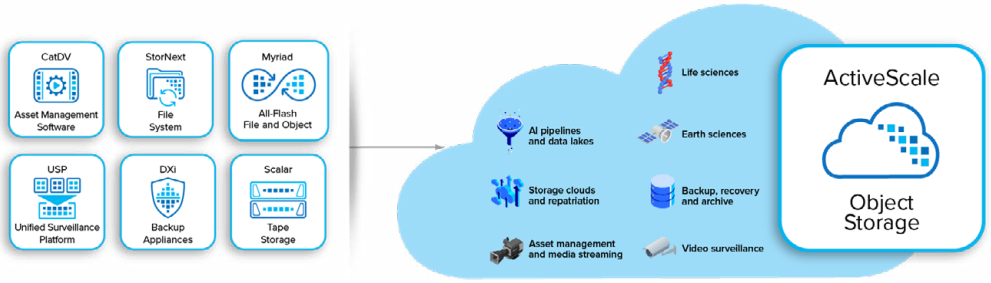
Quantum Offerings

Quantum turns long-term data retention into your strategic advantage, with solutions that cost-effectively preserve all data for decades, and even forever, while keeping it secure and accessible.

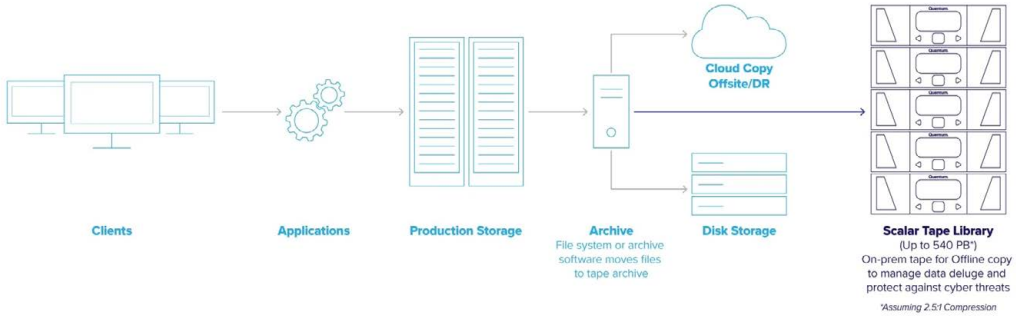
By combining high-performance, S3-compatible object storage with ultra-low-cost, secure tape, Quantum solutions intelligently manage data across multiple tiers, placing both active and cold data in the right place, at the right cost. An integrated approach creates a durable, scalable, and resilient "forever archive" that grows with your needs, ensuring every bit of your data is always available and ready to be leveraged again.

ActiveScale Object Storage

Quantum's ActiveScale provides secure, scalable S3 object storage for analyzing, managing, and retaining massive datasets coming from multiple sources in an array of formats and access requirements. ActiveScale is the only object storage solution architected for both active and cold data with an integrated tape tier. The solution is a simple, reliable object storage platform built for high-performance access, storage efficiency, and the long-term durability of massive datasets.



Scalar Tape Libraries



Quantum's Scalar® Tape Libraries provide low-cost, reliable long-term data storage for massive data growth. Scalar Tape Libraries offer a cyber resilient solution that can be as small as a few tapes, scale within a rack, or can start at a full rack to grow according to your storage needs. Automated security features enable you to efficiently store and manage your offline copies and keep them out of the reach of ransomware or other malware. The Scalar Security Framework includes exclusive features with increasing levels of security, such as Active Vault, Logical Tape Blocking, and Ransom Block. The Scalar i7 RAPTOR is a significant advancement in storage density, up to 200% better than traditional scale-up enterprise libraries and up to 82% better compared to newer scale-out high-density libraries.

For more information on long-term archiving solutions, from Quantum, click here.