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Object Storage: The Solution for Collaborative Life Sciences Research and Bioimagery

Highlights

- **Explosive growth of large image files:** New lab equipment used in Digital Pathology, Microscopy and Neuroscience generate data at an ever-increasing rate.

- **Growing data retention requirements:** Funding grants frequently require research data to be kept for seven years or more.

- **Multi-platform collaboration:** Research partners across the country and around the world need continuous data access regardless of the device platform.

- **Siloed data drives up data management costs and slows discovery:** Complex storage architectures do not scale and quickly consume valuable human and economic resources that could be better spent on research.

Solution

- ActiveScale is a complete, easy-to-install, easy-to-manage object storage solution with 19 nines of data durability to protect valuable research results

- Reduced time-to-data and improved collaboration with rich metadata tagging within a single namespace

- Continuous and immediate sharing of content across geographic locations

- Can consolidate backup and archive data and restore processes for simplified management

- Pay-as-you-grow capacity expansion and performance that does not strain the budget

- Non-disruptive capacity and performance scaling, data repairs, and upgrades

Discoveries in life sciences depend on rapidly evolving laboratory technologies and data-intensive investigative procedures. These influences created a need for a new approach to storing research results. For example, investigators can now observe tissue samples only a few nanometers in size at the molecular and atomic levels through the use of confocal, light sheet fluorescence, super-resolution, and electron microscopes. Therefore, researchers rely on digital imagery to accurately measure these structure sizes, makeup and molecular densities.

A single microscope can generate three to five terabytes of image data each day, depending on factors such as image quality, depth, resolution, and the use of time-lapse techniques. Most labs have several microscopes to support the various scientific experiments that are often conducted simultaneously.

Magnetic Resonance Imaging (MRI) is a non-invasive procedure that uses strong magnetic fields and radio frequency pulses to view organs inside the body. In the field of Neurology, researchers use Functional MRI (fMRI) to map the human brain and monitor real-time changes in brain wave patterns to detect subtle changes in oxygenated blood flow to an active area of the brain. Brain activity is monitored over time, yielding a content-rich stream of image data.
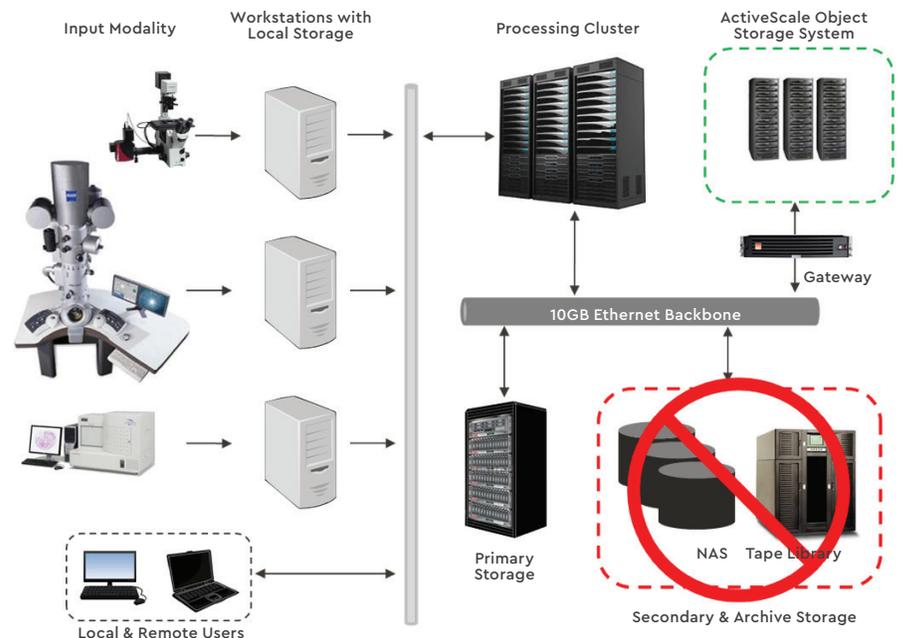

Figure 1: Example ActiveScale Architecture for Life Sciences

The result is explosive growth of unstructured data, and organizations are looking for ways to affordably capture, store, manage and share all of this data.

Advantages of Using Object Storage

Object storage is the right choice to replace traditional tape-based solutions or expensive and risky public cloud offerings. It delivers the data accessibility benefits of disk-based storage, cloud-like scalability, and extreme durability at a cost comparable with slow and opex intensive tape

Object storage also supports data access anywhere, anytime, on any device, and it minimizes the number of storage tiers below primary storage. These tiers are consolidated into a single archive tier for use as a backup target, as a long-term data archive, or as a staging area for data analysis—the latter being a distinct benefit compared to traditional tiered storage. Fewer tiers mean less complexity and cost, plus easier management.

ActiveScale Object Storage is Ideal for Bioimaging

Laboratories and research organizations continue to struggle with limited resources and exponential growth of image files. ActiveScale is an easy-to-use cloud-scale solution that enables global collaboration and long-term data retention within a pay-as-you-grow model.

Cloud Scalability and Data Durability Safeguard Research Results

ActiveScale's fully integrated design delivers the highest capacity per square foot in the industry, allowing you to optimize expensive data center floor space. Leveraging high-capacity hard drives with HelioSeal® technology, a single system holds 4.5PB of usable capacity and delivers up to 8GB/sec total throughput. Performance scales linearly with added capacity, helping to accelerate the pace of discovery.

ActiveScale ensures that valuable research results are well protected and always available, with a patented technology that delivers 19 nines of data durability. In a multi-geo implementation, data remains consistent and accessible during a full data center outage. Through drive-level background data integrity checking, the

system automatically and transparently detects and corrects data degradation, eliminating the risks and media management activities associated with tape-based archives. (Figure 1)

Easy Deployment Accelerates Discovery

The HGST Active Archive System removes many of the challenges associated with architecting, purchasing, operating, and maintaining storage. The integrated rack-level system is up and running in minutes. Put it in place, connect the power, configure the network connections, and it's online, presenting an S3-compliant object interface and global namespace. An optional NAS gateway or clustered NAS environment provides file-based access.

Global Access Enables Collaboration

Research projects are commonly awarded to consortiums, so collaboration and support for a wide variety of tools and platforms is critical. Consortium members can leverage cloud storage technology without the risks of a public cloud, the expense of building a private cloud, or the need to design around the limitations of legacy storage architectures. More importantly, there is no need to incur the expense or burden of transferring large images to the cloud, only to pay a second time to retrieve them. ActiveScale supports modern commercial and open source applications and allows for cross-platform, multi-region collaboration.

Reduced Opex Saves Money for Research

Through vertical innovation, ActiveScale delivers cloud scalability and efficiency at an unrivaled total cost of ownership. Industry leading helium-filled hard drives consume 60% less power and cooling than air-filled hard drives. Erasure coding technology further reduces the total storage capacity required when compared to traditional storage architectures by distributing a single copy of data across an entire storage rack or across multiple data centers. This distribution guarantees data availability without the need for expensive replica copies and replication software licenses, saving up to 60% in extra storage costs. Precious grant money can now be spent on research rather than infrastructure maintenance.

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