We love the simplicity, ease of use, and architecture of the ActiveScale systems. These systems are truly designed to scale seamlessly to exabyte-scale deployments.

- David Ardley, Head of Technical Delivery, Genomics England
ActiveScale Object Storage

With ActiveScale, performance, capacity, and scaling are seamless. As new nodes are added, network and computing resources come online immediately to load balance data requests and system tasks. New storage is added to the capacity pool and write activity is optimally distributed across storage resources using Dynamic Data Placement heuristics.

Key Features

Two Layer Hybrid Storage Architecture
ActiveScale’s unique scale-out architecture employs high levels of parallelism throughout to achieve high performance without high cost. Within the Access Layer, system performance is optimized by load balancing across all cluster nodes. Object metadata is stored in NVMe storage for high performance. The Data Layer provides unlimited scalability of active and cold data at consistent levels of availability and performance at scale.

Active and Cold Storage Classes
As the industry’s only object storage platform with Active and Cold Storage Classes, ActiveScale configurations and data layouts are easily optimized for both performance and affordability, even at massive scale. Dedicate Active Storage to those data sets that you are currently working on. Dedicate Cold Storage to data that is not accessed frequently. Simply restore cold data sets to Active Storage when it makes sense, typically in minutes, with no access or storage fees.

Cold Storage is a low-cost S3 Glacier-compatible storage class based on Quantum’s RAIL Architecture (Redundant Array of Independent Libraries) and patented two-dimensional erasure coding (2D EC). 2D EC distributes object shards within and across tapes, drives, libraries, and data centers, simultaneously maximizing performance, durability, and efficiency. ActiveScale Cold Storage inherits tape’s outstanding economics, reliability, and security, while dramatically simplifying tape management.

Advanced Erasure Coding
ActiveScale software enables high-data resiliency with configurable erasure coding policies for both Active and Cold Storage Classes, so you can confidently optimize deployments according to capacity, performance, availability, and durability needs. Objects written to the Cold Storage Class achieve up to 40% better storage efficiency than replication or two-copy approaches, and orders of magnitude greater data durability than any other cold data solution.

Dynamic Data Placement (DDP)
ActiveScale DDP intelligently erasure codes your data, equally balanced across all available storage resources according to policies that you set. DDP prevents hot spots over time and simply overcomes hardware failures. Best of all, DDP easily allows for resource expansion without the painful rebalancing typical of static, deterministic policies that prevent scaling in other systems.

Dynamic Data Repair (DDR)
DDR provides out-of-band continuous system monitoring, data integrity verification, predictive failure detection, and self-healing of object data to ensure the highest durability of all data objects. The DDR self-healing process is not dependent on replacing failed drives, and is performed in parallel to shorten rebuild times.
ActiveScale Object Storage

**Data Services**

**S3 Standard, S3 Glacier, and NFS Compatibility**
ActiveScale supports an S3-compatible API for easy integration of S3 and S3 Glacier-enabled applications and workflows. ActiveScale supports file system volumes, accessible via NFS to simply access and manage file-based data.

**Account Quotas**
Account quotas allow you to easily set and limit capacity usage with hard or soft limits on a per account basis, applicable to both object buckets and NFS volumes.

**Lifecycle Policies**
Define Object Lifecycle policies on a per bucket basis to easily expire or archive data automatically. Transitioning objects between Active and Cold Data Classes incurs no storage, access, or restoration charges that inhibit your access to your archived data.

**Strong Consistency**
ActiveScale leads the industry in strong, immediate data consistency across all nodes to ensure that accurate data is presented with no performance impact, whether in a single site or 3GEO deployment.

**Object Versioning**
For rapid recovery of data due to ransomware, inadvertent deletion, or just to maintain data history, Versioning systematically saves versions of objects. Users can easily set bucket policies to retrieve and restore prior object versions.

**Object Notifications**
Object Notifications enable you to trigger workflow processing via Kafka clusters. Deploy end-to-end data pipelines and streaming applications for real-time analytics, IoT, mobile apps, and media workflows.

**S3 Standard, S3 Glacier, and NFS Compatibility**
ActiveScale supports an S3-compatible API for easy integration of S3 and S3 Glacier-enabled applications and workflows. ActiveScale supports file system volumes, accessible via NFS to simply access and manage file-based data.

**Account Quotas**
Account quotas allow you to easily set and limit capacity usage with hard or soft limits on a per account basis, applicable to both object buckets and NFS volumes.

**Lifecycle Policies**
Define Object Lifecycle policies on a per bucket basis to easily expire or archive data automatically. Transitioning objects between Active and Cold Data Classes incurs no storage, access, or restoration charges that inhibit your access to your archived data.

**Strong Consistency**
ActiveScale leads the industry in strong, immediate data consistency across all nodes to ensure that accurate data is presented with no performance impact, whether in a single site or 3GEO deployment.

**Object Versioning**
For rapid recovery of data due to ransomware, inadvertent deletion, or just to maintain data history, Versioning systematically saves versions of objects. Users can easily set bucket policies to retrieve and restore prior object versions.

**Object Notifications**
Object Notifications enable you to trigger workflow processing via Kafka clusters. Deploy end-to-end data pipelines and streaming applications for real-time analytics, IoT, mobile apps, and media workflows.

**Large/Small Object Optimization**
ActiveScale is optimized for both large and small objects. Large objects performance policies are built for durability and economics. Small object policies are designed to minimize latency when storing and retrieving large numbers of small objects.

**Availability Services**

**Inflight & Keyless At Rest Encryption**
For maximum security, encrypt your data in-flight with SSL/TLS and at-rest with ActiveScale. ActiveScale encrypts both object data and metadata, including custom metadata, in both Active and Cold Storage Classes.

**Immutable Object Locking**
Object Lock prevents objects from being deleted to help you protect against ransomware and meet regulatory requirements for write-once-read-many (WORM) storage and retention policies.

**Continuous Data Availability With 3GEO Deployment**
3GEO configurations deliver the highest availability and protection against disaster, automatically erasure coding objects across all three locations. Even with a data center outage, the two remaining locations host all the data and parity required to continue servicing all data requests.

**2GEO Deployments and Cloud Replication**
ActiveScale also provides uni- and bi-directional asynchronous per-bucket replication between ActiveScale clusters or to public cloud services for data protection, backups, and disaster recovery. Features include the abilities to replicate between storage classes, and to replicate immutable objects with the same retention policy in place. Plus, ActiveScale provides the industry’s one and only Glacier-to-Glacier replication capability, providing a low-cost, multi-copy tape-based data protection solution.

**Unified Management**

**Web UI, CLI, API**
The System Management (SM) web-based interface lets you: manage accounts, users, and access keys, monitor system health, capacity and performance, retrieve reports and logs, configure notifications, and perform upgrades and expansions. To automate tasks, RESTful APIs and a command line interface are also available.

**Prometheus Monitoring & Alerts**
ActiveScale maintains local and global metrics that can be downloaded to your local Prometheus database for long-term retention and viewed using Grafana visualization tools.

**Predictive Cloud Monitoring**
Cloud Management (CM) is a cloud-based tool that receives telemetry data from ActiveScale systems to create standard and custom reports. Features include basic management, historical trends, capacity modeling, usage, and forecasting, to help identify conditions for preemptive action.
## ActiveScale Object Storage

### Active Storage Capacity

<table>
<thead>
<tr>
<th></th>
<th>P100E3</th>
<th>P200</th>
<th>X200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base unit capacity options (raw)</td>
<td>432 TB</td>
<td>648 TB</td>
<td>1,62 PB, 3.24 PB, and 4.86 PB</td>
</tr>
<tr>
<td>Max capacity (raw)</td>
<td>1,008 TB</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

### Cold Storage Capacity (Optional)

<table>
<thead>
<tr>
<th></th>
<th>P100E3</th>
<th>P200</th>
<th>X200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min/max capacity (raw)</td>
<td>1 PB/Unlimited</td>
<td>1 PB/Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Base unit max objects</td>
<td>235 M</td>
<td>1.25 B</td>
<td>10 B</td>
</tr>
<tr>
<td>Max objects</td>
<td>470 M</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Maximum multi-part object size</td>
<td>50 TB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Software

- **Operating system software**: ActiveScale OS 6.0
- **Storage Classes**: Active (S3 Standard-compatible), Cold (S3 Glacier-compatible)
- **Management interfaces**: ActiveScale SM Real-time System Management Console, CLI, RESTful API, ActiveScale View
- **System analytics**: ActiveScale CM, a cloud-based storage analytics service
- **Security**: Data encryption in flight SSL/TLS using AES-256, Data encryption at rest using AES-256
- **Management services**: User accounts, Authentication, Quotas, Notification Services, Prometheus Monitoring and Alerting, Active and Cold Storage Class Management, Lifecycle Policies
- **Data protection**: Strong/Immediate Consistency, Advanced Active and Cold Erasure Coding, Dynamic Data Placement, Versioning, Object Locking, 3GEO Geospreading, Replication
- **Data durability**: Up to 19 nines for both Active and Cold Storage Classes
- **HW/SW/FW upgrades**: Non-disruptive rolling upgrades and seamless system expansion

### Client Connectivity

- **Base unit network ports (auto-negotiating)**: 6 x 10 Gb, 6 x 25 Gb, 12 x 25 Gb ports
- **Max network ports**: 12, Unlimited, Unlimited
- **Protocols**: RESTful S3, NFS v3 compatibility

### Base Unit Physical Size and Power

<table>
<thead>
<tr>
<th></th>
<th>P100E3</th>
<th>P200</th>
<th>X200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space requirements</td>
<td>3 RU</td>
<td>3 RU</td>
<td>12 RU</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>17.6 in (448.2 mm)</td>
<td>17.6 in (447 mm)</td>
<td>17.68 in (449 mm)</td>
</tr>
<tr>
<td>Height</td>
<td>51 in (132 mm)</td>
<td>51 in (129 mm)</td>
<td>20.88 in (531 mm)</td>
</tr>
<tr>
<td>Depth</td>
<td>35 in (881 mm)</td>
<td>37 in (940 mm)</td>
<td>42.9 in (1,091 mm)</td>
</tr>
<tr>
<td>Configuration weight (kg/lbs)</td>
<td>96 kg/210 lbs.</td>
<td>81.7 kg / 180 lbs.</td>
<td>267 kg/588 lbs.</td>
</tr>
<tr>
<td>Power consumption – typical/max (W)</td>
<td>0.69/0.76 KW</td>
<td>1.3/1.3 KW</td>
<td>5 / 7.5 KW</td>
</tr>
<tr>
<td>Power supplies</td>
<td>100-240 VAC</td>
<td>100-240 VAC</td>
<td>200-240 VAC</td>
</tr>
</tbody>
</table>

---

1. One MB is equal to one million bytes, one GB is equal to one billion bytes, one TB equals 1,000 GB (one trillion bytes), and one PB equals 1,000 TB when referring to storage capacity.
2. Usable capacity will vary from the raw capacity due to object storage methodologies and other factors.
3. ActiveScale P200 requires ActiveScale OS 6.0.2. ActiveScale Cold Storage support requires ActiveScale OS 6.1.