Object Storage: Trends, Use Cases

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SNIA-at-a-Glance

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iSCSI, NVMe-oF™, NFS, SMB

Virtualized, HCI, Software-defined Storage

Storage Protocols (block, file, object)

Securing Data
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Agenda

- Object Storage Characteristics
- Object Storage Use Cases
- Object Storage Acceleration with Computational Storage
- Roundtable Q&A
Object Storage Characteristics

Alex McDonald
Object Storage

- How can we visualize object storage?

(Hugely simplified!)
Object vs. Key Value

- **Similarities:**
  - The object identifier or the URI (the equivalent of the key) can be an arbitrary string
  - The data part can be any size

- **Differences:**
  - Object stores can have metadata or attributes
  - Key value offers strong consistency
  - Key Value storage is device level only; object stores can span many devices and can have location independence

- **An object is made up of**
  - A unique key (the object ID)
  - A value (the data associated with the key)
  - Zero or more metadata attributes (which may not be unique)
Objects, Amazon S3 and Kubernetes COSI

- Amazon S3
  - Internet based object store & access via HTTP
  - Not quite a flat nameless environment
    - Objects stored in named buckets

- Kube COSI: Why another object interface?
  - “Kubernetes abstracts file/block storage via the CSI standard”
  - “Primitives for file/block storage do not extend well to object storage”
  - “No common protocol for consumption across various implementations of object storage” (!)
Object Storage Use Cases

Jon Toor
Ransomware Protection

1. Backup your data
   - Object Storage Backup Target

2. BU software applies Object Lock
   - Object Lock

3. Ransomware cannot change it
   - Ransomware protection as part of automated backup workflow

4. Clean copy for restore!
Media and Entertainment

Before

- Months until media become searchable
- Time-sensitive material loses its value

After

- Searchable as soon as the media enters the workflow
- Archive process immediately adds value to the media
- Monetize more media sooner
Cloud Services

Objective:
• Scalable storage service
• Backup as a service

Requirements:
• Compatible with backup solution
• S3 API

Solution:
• S3 compatible object storage
• Distributed across two sites
Data Sovereignty

• Data privacy concerns when using U.S.-based public cloud
• Opportunity for regional cloud service providers

Object Storage = Cloud storage within geographic boundaries
Data Management

Objective:
• Scalable storage for video and digital evidence management
• Disaster Recovery (DR) capability (Hurricane risk!)

Requirements:
• Compatible with Getac evidence management
• AWS S3 compatibility

Solution:
• Object storage at two sites
• Replication to AWS S3 for DR
IoT / Video Surveillance

Requirements

• S3-compatible object storage
• Multi-part upload
• Rich metadata tagging

Solution

• Object storage at central location
• Configurable metadata tag sizes
• Collects sensor data + video data
In 2025, 75% of Enterprise-Generated Data Will Be at the Edge

- Distributed storage becomes critical
- Centrally managed, locally sited

Source: Seagate diagram
https://www.seagate.com/datasphere-2021/
Object Storage Acceleration with Computational Storage

David McIntyre
High Performance Object Storage Acceleration on S3 SELECT

Object Storage Queries
1) Data transformed to Key Value stores
2) Data is tagged and portioned
3) Queries are run on computational storage as NVMe-oF target

Benefits
• Faster queries
• Lesser network traffic
• Lower TCO due to reduced CPU and network traffic

Use Cases
Large scale real time analytics - Smart City, Smart Home, eHealth, IoT, Images, Video, Security
Near Data Processing for S3 Select with Computational Storage

Processing Task:
S3_Select(Artist, 'SELECT COUNT from 'MSD' where year < 1995');

### Million Song data Record

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### AWS Baseline

Client running AWS-S3 BOTO package

S3_Select query

S3_Select response

S3 Object Store

### High Performance Object Store (HPOS)

On Premise

Client running AWS-S3 BOTO package

S3_Select query

S3_Select response

Accelerator

Object store
End-to-End S3_Select with HPOS
AWS S3 Select vs HPOS* S3 Select

- **Total Throughput in MB/sec**: HPOS has 6x Better performance compared to AWS.
- **Average Latency in Milliseconds**: HPOS has 5x Lower latency than AWS.

HPOS CPU Utilization Percentage: HPOS CPU utilization under 0.15%

* HPOS: High Performance Object Store
Summary

- AWS’ S3 object storage service introduced object storage to a broader audience
- The growth of object storage has mirrored the growth of containers
- Object storage is suitable for a broad range of today’s essential use cases
- Object storage and Computational storage can be complementary technologies used to improve performance
Roundtable Q&A
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