High Performance Object Storage

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HPOS S3 SELECT w/ Computational SSD Acceleration

Use Cases
Large scale real time analytics - Smart City, Smart Home, eHealth, IoT, Images, Video, Security

Benefits
• Faster queries
• Lesser network traffic
• Lower TCO due to reduced CPU and network traffic
Near data processing for S3_Select

AWS Baseline

Client running AWS-S3 BOTO package

S3_Select query

S3_Select response

Object Store

S3_Select evaluation

Customer’s Sample Dataset

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S3_Select Query ('Select COUNT(*) FROM S3Object s WHERE dayofyear < 55');

HPOS Setup (OnPrem)

Client running AWS-S3 BOTO package

S3_Select query

S3_Select response

HPOS server

Accelerator

S3_Select evaluation

Object store
End-to-End S3 Select with HPOS

Open source High Performance KV Storage

KV Select() path

Put()/Get() path

libnv Library

KV Library

KV-NVMe Driver

KV – of Target

KV Select() implementation

KV to Block orchestrator for Put()/Get()

Orchestrator

SQL Query

Smart SSD API

NVMe Driver

Accel. CMA SSD

Smart SSD 1

Accel. CMA SSD

Smart SSD N

Normal data path

Path for SmartSSD offload

CMA Computational Memory Area

AWS-SDK BOTO Client

HPOS SW

Computational SSD
AWS S3 Select vs HPOS S3 Select

Throughput in MB/sec

- AWS: 8.98 MB/sec
- HPOS: 977.34 MB/sec

**100X Better**

Latency in Seconds

- AWS: 77.32 seconds
- HPOS: 0.26 seconds

**250X Less**

HPOS CPU Utilization Percentage

- Time: 1 to 13
- CPU Utilization: 0.07 to 0.14
Power Savings Analysis

Observations

- On average there is ~6 Watts/hr of power saving using single Smart SSD
- Amounts to ~2% of total power usage

Average watts/hr during test run

- ~6 Watts/hr (2%) of power saving using single Smart SSD

Graph showing average watts/hr for Server 1, Server 2, Server 3, and Server 4 with and without acceleration (Accl.).
Thanks