All-Flash Ceph Platform Powers Content Management Solutions

Red Hat® Ceph® is the go-to scalable, open-source storage solution for a broad set of business solutions. Supporting both object and block storage use cases, Ceph provides clear value to data-centric solutions like content distribution networks (CDNs) and OpenStack® virtualized solutions. While each leverage different Ceph functionality, both benefit from the strengths of Ceph when paired with cost-effective SSDs like the Micron® 5210 ION.

- **CDNs:** Use Ceph to provide large-scale object storage services that deliver high-bandwidth performance that meets the read-intensive requirements of video streaming and archival repositories in an efficient manner.

- **OpenStack solutions:** Depend on Ceph to host virtualized, hyper-converged deployments. Many hosted virtual machines (VMs) can provide high-performance server instances for data analytics and data security standard (DSS) services requiring high-performance I/O at relatively large block sizes (16KB and higher).

Ceph has not historically been known for strong performance; however, Ceph's Bluestore storage engine is optimized to take full advantage of the performance of SSDs. Strategic placement of high-endurance triple-level cell (TLC) SSDs for write-intensive functions along with read-intensive quad-level cell (QLC) SSDs for scalable capacity provides high performance along with cost-effective data retention and management capabilities. Micron's Accelerated Solutions for Ceph Storage place the Ceph Bluestore RocksDB instance and write-ahead logs on Micron 9200 MAX TLC SSDs with NVMe and the Ceph object storage daemons on Micron 5210 ION SATA QLC SSDs with a replication factor of two to provide a high-performance, low-cost SSD-based solution.

Testing Micron's Solution for Ceph Storage

CDNs have low write workloads focused on initial data loading that are constantly accessed (nearly 100%) in a read-intensive way as the data is distributed on demand. To simulate these workloads, Micron tested a 1MB object storage

Key Benefits

Better Value
Realize the benefits of all-flash without breaking your budget. All-flash Ceph solutions using Micron SSDs are optimized at the platform level for better results and better value.

Higher Performance
Dramatically increase application I/O with Micron's NVMe and SATA SSD families. Micron's 5210 ION in conjunction with the Micron 9200 with NVMe used for Ceph Bluestore write-ahead logs can fully saturate a 25 Gb/s Ethernet interface.

Scalable
Ensure your solution is always running at peak performance. Using cloud-native, shared-nothing software architectures, Ceph solutions can grow to support hundreds of nodes utilizing the latest SSD technologies as they become available.
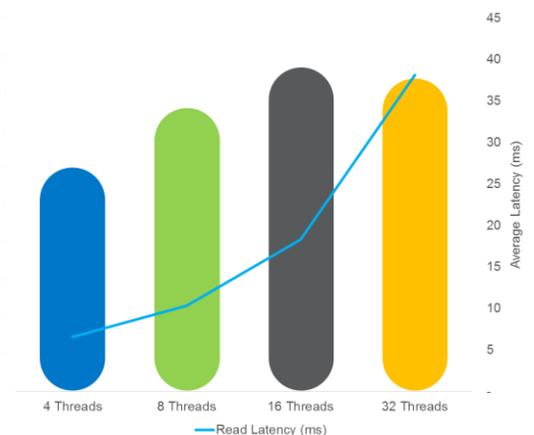

Figure 1: 100% 1MB Object Read Results

solution with a 100% read I/O profile. The results show that a three-node Ceph cluster can easily fully utilize the 25 GbE network port on each node when reading object data (8.6 GB/s) with an average latency of 20ms (see Figure 1).

Ceph block mode I/O fully utilizes the performance of the QLC SSDs. With 100% of all reads coming from the Micron 5210 ION SSDs, performance scales with SSD and node count. Low-ingest solutions are less susceptible to write performance penalties of data protection methods such as mirroring, making the Micron 5210 ION the right drive for these types of solutions as they avoid the cost overhead of an all-NVMe drive architecture. Large block reads can take full advantage of the network bandwidth available to each node with extremely low latency (see Figure 2). As write percentage increases, block performance decreases, but the 5210 ION still provides more than 18X the write IOPS than an equivalent HDD[1]. This decrease in throughput results from several factors including the Ceph solution's replication factor used for data protection and the write overhead of SSDs relative to their read performance (see Figure 3).

Test Configuration

Server Node Hardware Details

Model:	3x Supermicro® SYS-1029U-TR25M
CPU:	2x Intel® 6148 Xeon™, 2.4/3.7 GHz, 20-core
Memory:	12x 32GB Micron DDR4-2666 RDIMM
Network Adapter:	1x Mellanox® Dual-port 25Gb Ethernet -Port 1: client network -Port 2: cluster storage network
Acceleration Drives:	2x 1.6TB Micron 9200 MAX SSDs with NVMe
Capacity Drives:	8x 7.8TB Micron 5210 ION SATA SSDs

Ceph Configuration

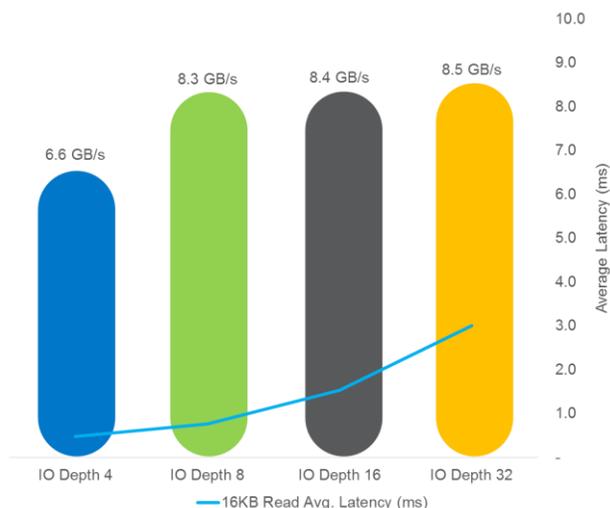|	
Operating System:	Red Hat Enterprise Linux 7.5
Ceph:	Version 12.2.5 (Luminous)
Storage Pool:	2x replication factor 8192 placement groups 50x 115GB RBD images (Total: 11.6TB)
Test Tools:	Block: FIO RBD Object: RADOS bench
Test Run Time:	10 minutes + 5-minute ramp-up
Test Passes:	3 per test configuration

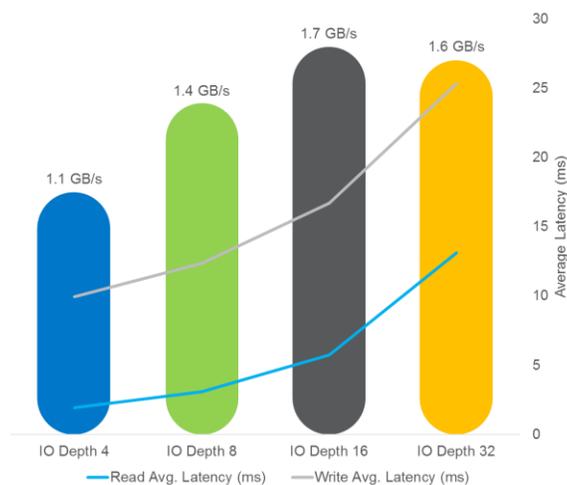**Figure 2: 100% 16KB Block Read Results**

Figure 3: 90% Read/10% Write 16KB Block Results

Learn More About All-Flash Ceph Solutions With Micron SSDs

Visit http://www.supermicro.com/solutions/storage_ceph.cfm to buy Micron Accelerated Solutions for Ceph Storage. Learn more at micron.com/accelerated-solutions about performance for your Ceph data lake.

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