Viking Technology UHC-Silo 50TB SAS SSD Evaluation

Viking Technology delivers high density and low power consumption with an SSD ideal for archival purposes.

Executive Summary

In July 2017, Viking Technology released their new UHC (Ultra High Capacity)-Silo 3.5-inch Solid State Drive (SSD). Designed to reduce both rack space and energy footprint in datacenters, the 3.5-inch drive looks to replace slow 3.5-inch 7200 RPM Hard Disk Drives (HDD) and complement high-performance but lower capacity and less power-efficient NVMe SSDs. Viking is producing drives with SATA or 6Gb/s SAS interfaces, making it as easy as possible to transition for envisioned cost and space savings.

The Viking Technology UHC-Silo SSD is designed for balanced workloads needing large capacity and good performance for datacenter applications, supporting one drive write per day (DWPD) with a 5-year warranty.

Viking Technology commissioned Demartek to evaluate the performance and power consumption of their UHC-Silo 3.5-inch SSD. Demartek installed the UHC-Silo in a SAS JBOD and tested performance. Power consumption of the JBOD was monitored before install, while the drive was installed and idle, and during performance testing. From this, approximate idle and active power consumption of the UHC-Silo 3.5-inch SSD was determined.

Key Findings

> The UHC-Silo provides 50TB of storage in a single 3.5" form factor, for unprecedented density and rack space savings.

> The UHC-Silo consumed approximately 8.8 watts while idle and an average of approximately 16 watts while performing the heaviest workloads.

> The UHC-Silo achieved 484 MB/s sequential read and 292 MB/s sequential write.

> The UHC-Silo achieved 61,106 reads/second and 22,993 writes/second for random small block synthetic workloads.

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Demartek
September 2017

Test Environment

A server and SAS JBOD were connected using an LSI 9300-8e 12Gbps SAS HBA. Wall power went through a Yokogawa WT310E digital power meter to be serviced to the JBOD. The server used a separate power source. The Viking UCH-Silo was inserted in one of the JBOD slots and all other slots were empty.

SSD

> 1x Viking Technology UHC-Silo 50TB SAS SSD

Power Measurement

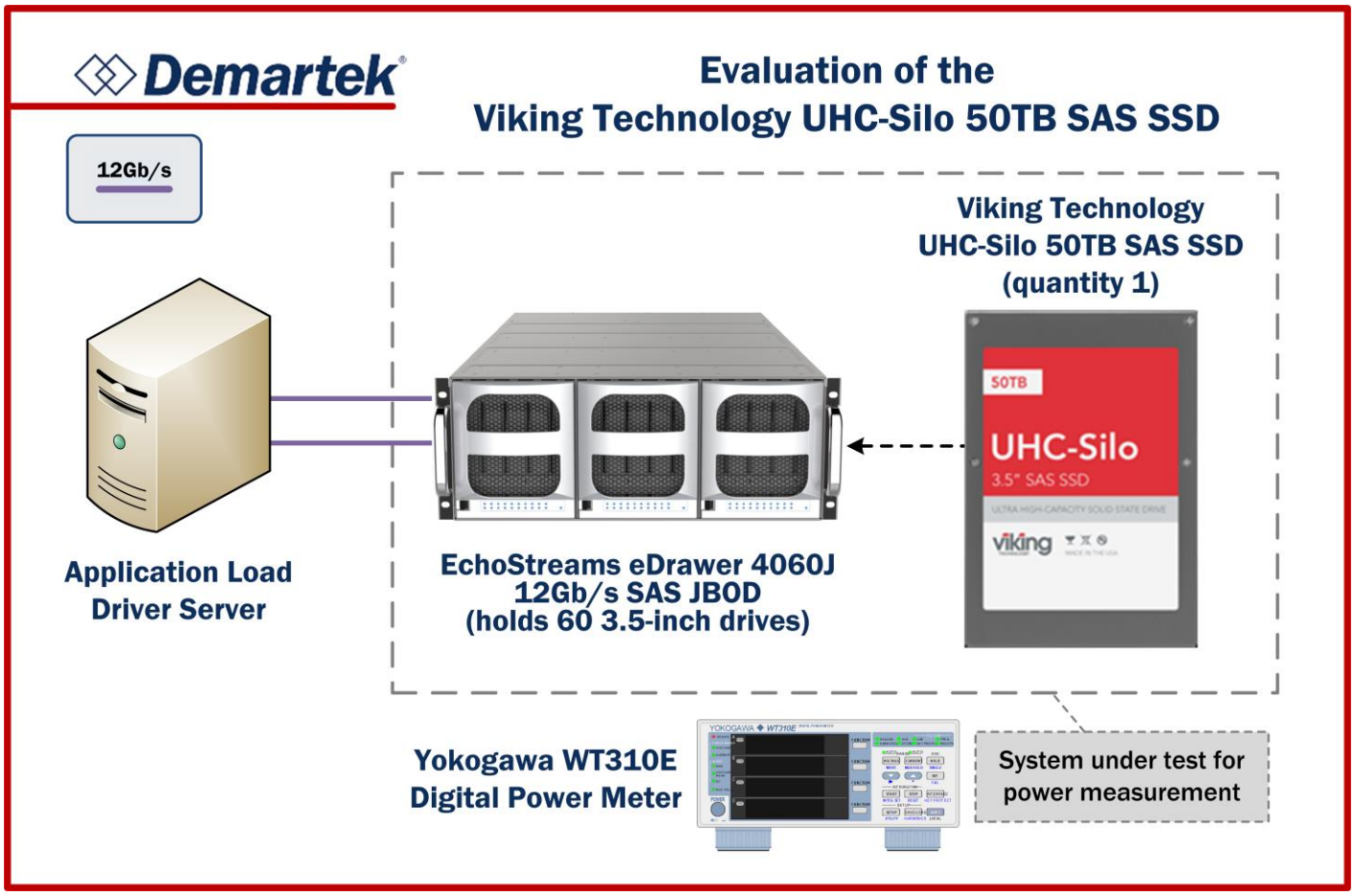
> Yokogawa WT310E Digital Power Meter

Servers – 2x Supermicro X10SRH-CF

> 1x Intel Xeon E5-1650 v3, 3.5GHz, 6 total cores, 12 total threads
> 64 GB memory
> Windows Server 2016 or RedHat Enterprise Linux Server 7.3
> Iometer 2014-1.1 or fio 2.1.0

JBOD – EchoStreams eDrawer 4060J

> 60-drive, 3.5-inch form factor
> 12Gb/s SAS



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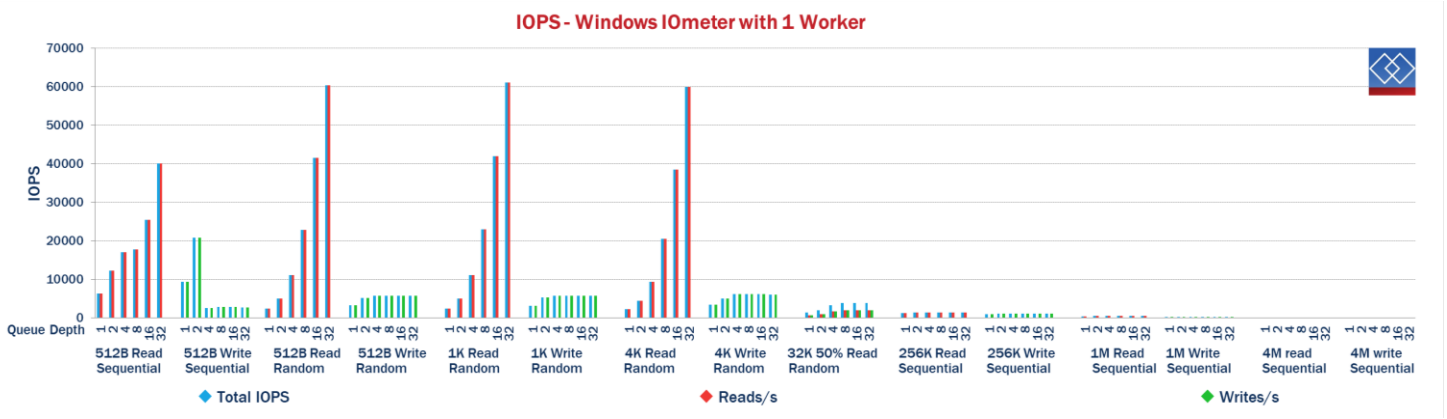
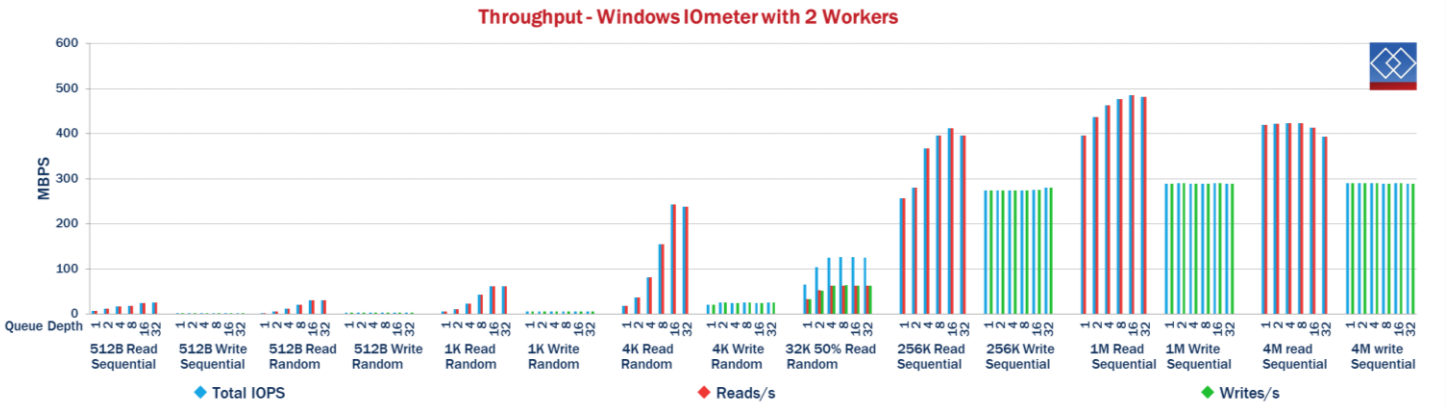
Test Results

Windows Server 2016 Performance

Windows Server 2016 and Iometer, a synthetic workload generator, was installed on our server, and various block size workloads were run against the drive. A top IOPS rate of 61,106 for reads and 20,870 for writes was achieved with small block tests. A top throughput of 484 MB/s for reads and 292 MB/s for writes was achieved for large sequential tests.





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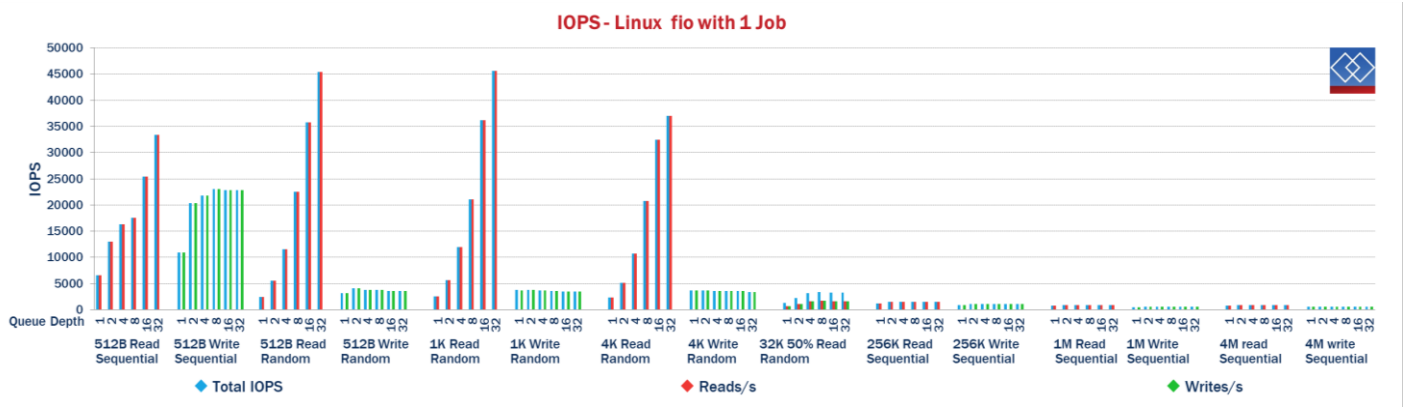
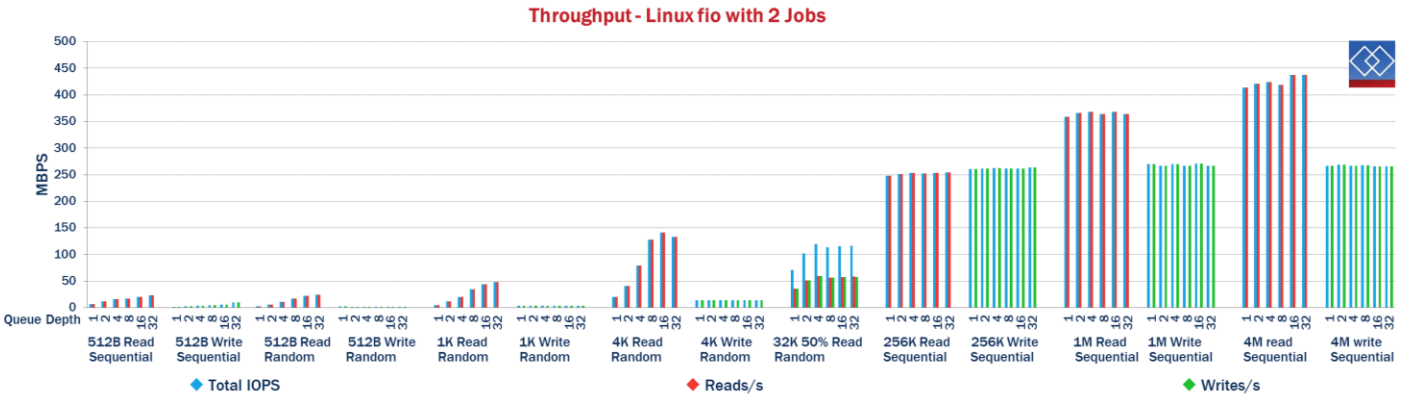
RedHat Enterprise Linux 7.3 Performance

For completeness, an identical server was installed with RedHat Enterprise Linux 7.3 and fio, another synthetic workload generator. The similar performance tests were conducted and comparable results obtained. A top IOPS rate of 50,878 for reads and 22,993 for writes was achieved with 1 KB read and 512 B write small block tests.

A top throughput of 438 MB/s for reads and 282 MB/s for writes was achieved for 4MB read and 1MB write sequential tests.





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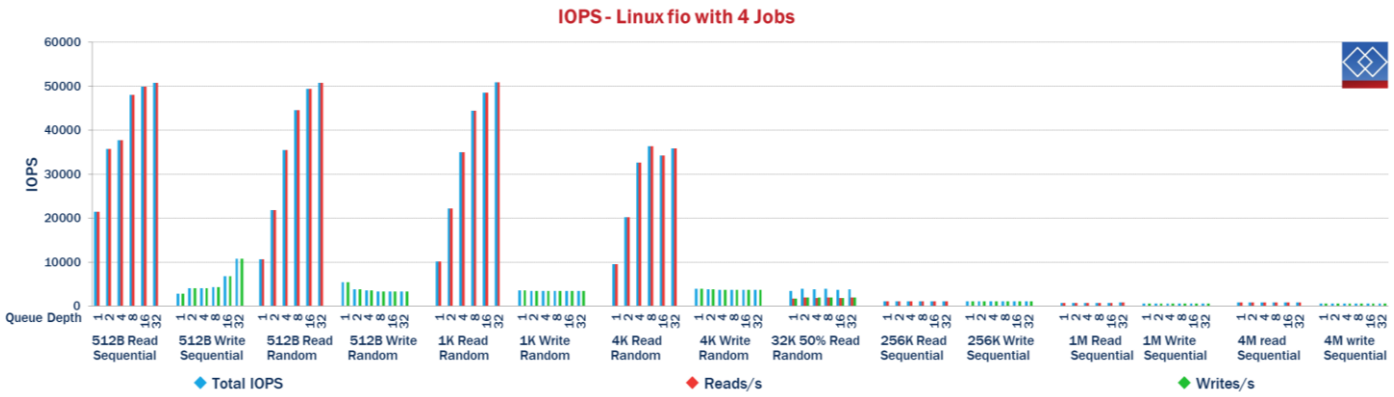

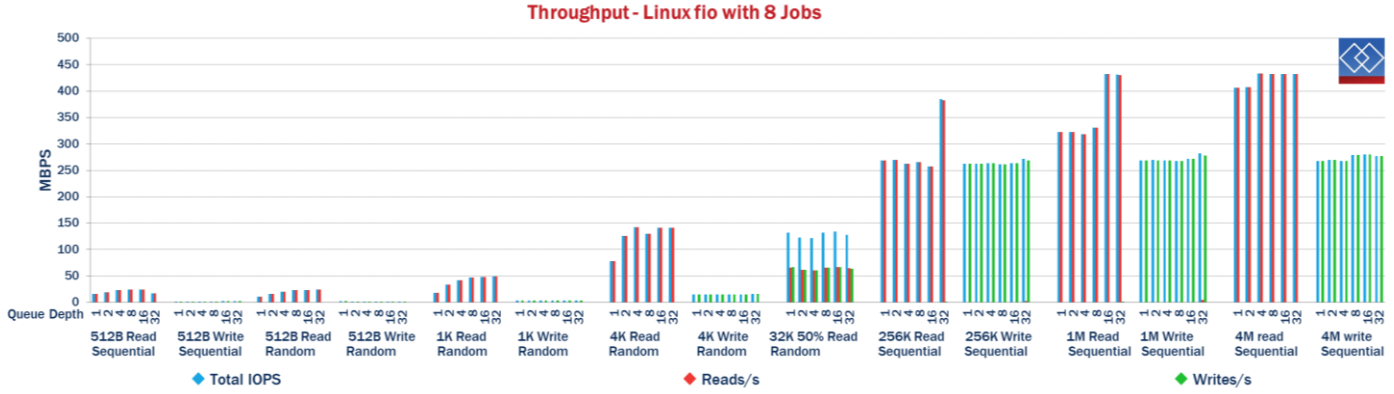

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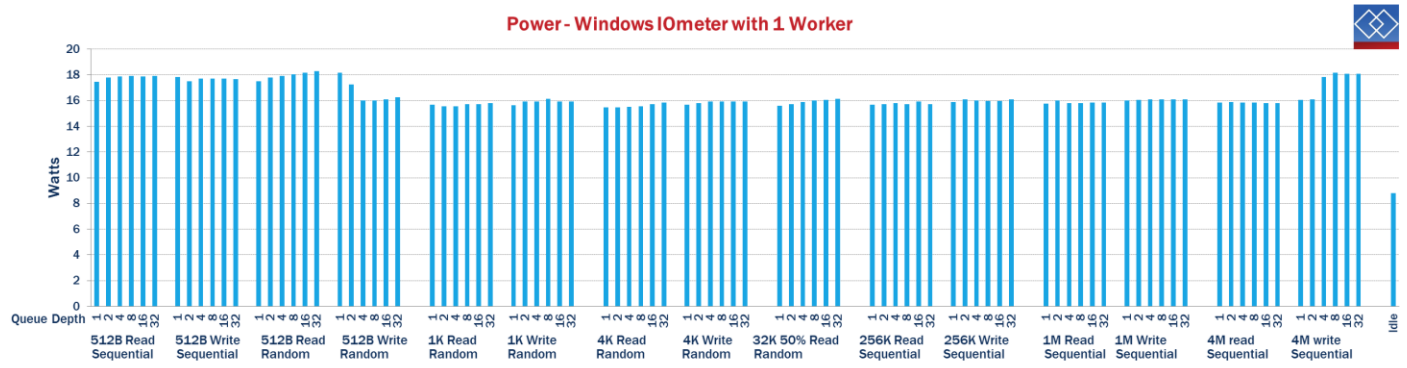
Power Consumption

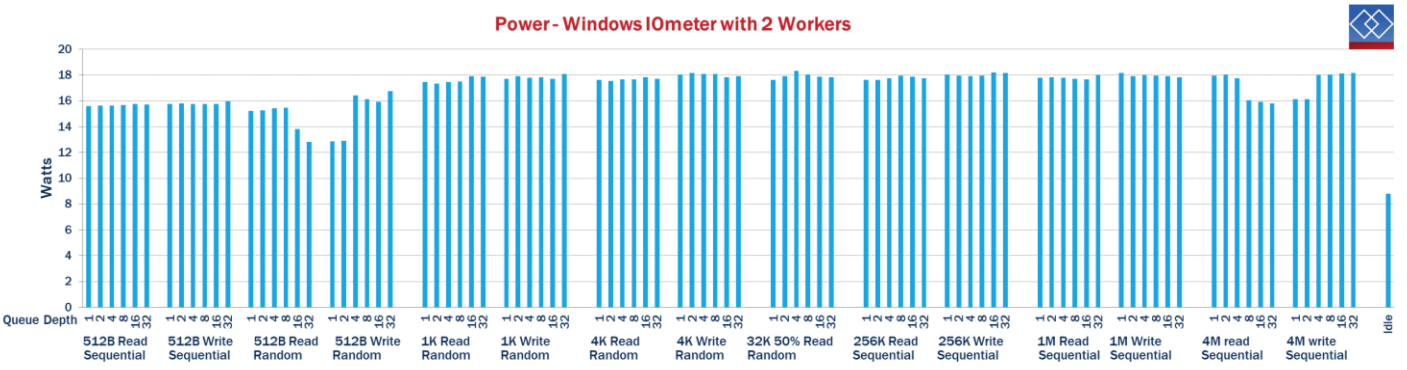
The idle power of the JBOD with no drives installed was 332.3 W. We installed the Viking UHC-Silo, refreshed our storage to discover the drive, and then waited for the drive to become idle. The power draw of the JBOD when the UHC-Silo was idle was 341.1 W.

From this, we calculate that the UHC-Silo was drawing approximately 8.8 W of power when idle. When performance testing began, doing the same arithmetic we calculate that the Viking UHC-Silo drew between 12.8 and 18.3 W, with an average draw of 16.6 W. 15.8 W was measured while performing 1 KB random reads at 61,106 IOPS, 17.48 W was measured while performing sequential 512 B writes at 20,870 IOPS.
17.7 W was measured while performing 1MB sequential reads at 484 MB/s and 16.1 W was measured while performing 4 MB sequential writes at 292 MB/s.

For comparison, most HDD on the market consume a minimum of 5W idle, and 10W or more active, for capacities of 6-10TB total. An HDD solution providing 50TB of storage would require five or more drives for a grand total of at minimum of 25W idle, and 50W or more active. The UHC-Silo provides roughly an 80% reduction in space used, 65% reduction in power consumption at idle and 67% reduction in power consumption while active.

Note: Power consumption figures may be slightly inflated, since power is monitored at the JBOD level, and the JBOD enclosure itself draws more power during tests (from higher fan speed, SAS expanders, cabling, etc).





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Summary and Conclusion

With ultra-high density and low power consumption per terabyte, the Viking Technology UHC Silo makes a compelling case for long-term storage using flash technology. With up to 68% percent lower power consumption per terabyte and 80% less rack space per terabyte, Viking Technology UHC-Silo 50TB SAS SSD can be an excellent choice for faster-performing, high-capacity storage.