

Western Digital Ultrastar® DC SN840 Certification with Aerospike ACT 6.1

Aerospike

Aerospike is a distributed NoSQL database that provides extremely fast – and predictable – read/write access to operational data sets that span billions of records in databases of 10s – 100s of Terabytes (TB). Its patented Hybrid Memory Architecture (HMA) delivers exceptional performance using a much smaller server footprint than competing solutions. It is schema-free and supports key-value store and a document store model. The Aerospike Architecture mainly has the below key objectives:

- Create a flexible, scalable platform for web-scale applications.
- Provide the robustness and reliability expected from traditional databases.
- Provide operational efficiency with minimal manual involvement.

The Aerospike database is highly optimized to utilize fast NVMe™ SSDs. Applications can commit each write directly to the SSD. The most important SSD characteristics are low read latency under sustained write loads.

Aerospike Certification Tool (ACT)

ACT is a tool used by customers to evaluate SSDs. The ACT workload has the following characteristics

- 66% read to 33% write ratio, 1.5KB object size
- Max latency
 - < 5.0% exceed 1ms
 - < 1.0% exceed 8ms
 - < 0.1% exceed 64ms

ACT provides a pair of programs for testing and certifying SSD device performance for the Aerospike Database data and index storage. ACT measures latency during a mixed load of read and write operations while modelling the Aerospike Database server's I/O pattern as closely as practical.

act_storage performs a combination of large (128K) block reads and writes and small (1.5K) block reads, simulating standard real-time Aerospike Database data read/write and defragmentation loads.

Performance Benchmarking with ACT 6.1

The Ultrastar DC SN840 NVMe SSD offers high performance for noSQL databases. The DC SN840 NVMe SSD ACT 6.1 certification results can be found on Aerospike's website at https://www.aerospike.com/docs/operations/plan/ssd/ssd_certification.html

Speed (TPS)	Latency >1ms	Latency >8ms	Latency >64ms
570K	2.29%	0.00%	0.00%

The DC SN840 meets the Aerospike ACT 6.1 success criteria and is among the highest performing, and low latency NVMe SSDs within the certification database. The DC SN840 was benchmarked over 24 hours with the ACT 6.1 test and achieved an impressive 570K transactions per second (TPS), with low latency and good transaction consistency as shown in Figures 1-3.

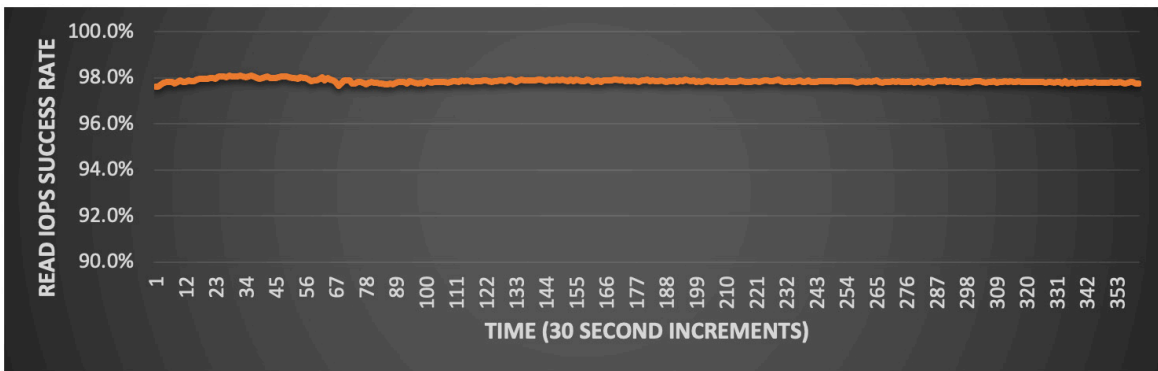


Figure 1 Consistency of Successful Transactions, measured from 1-4 hours

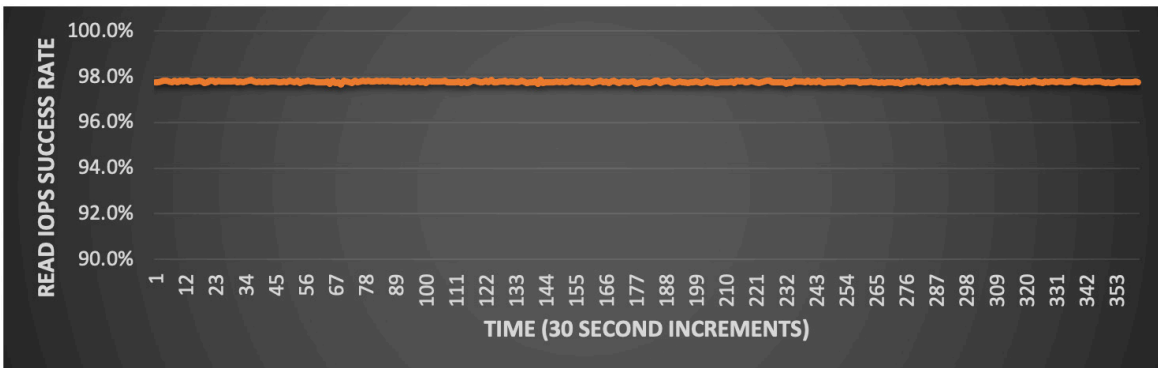


Figure 2 Consistency of Successful Transactions, measured from 4-7 hours

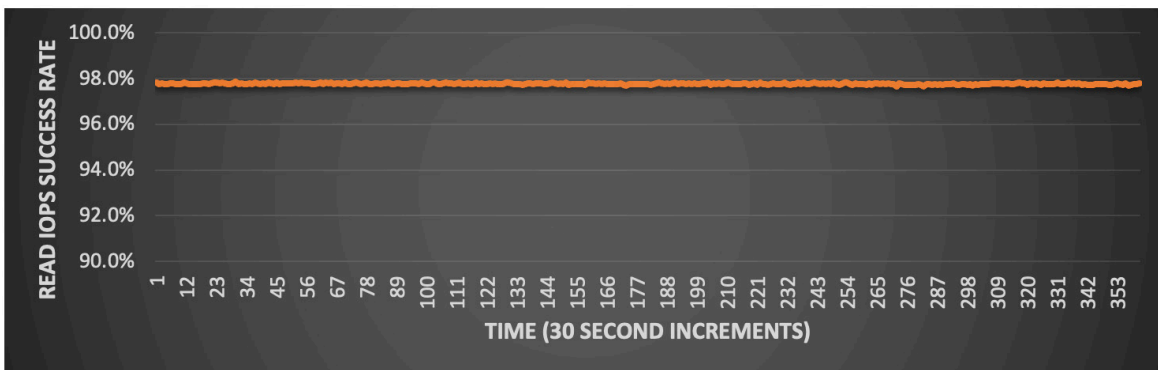


Figure 3 Consistency of Successful Transactions, measured from 12-24 hours

Summary

Aerospike is a leading noSQL database that takes advantage of fast NVMe SSD storage. The Ultrastar DC SN840 NVMe SSD meets the Aerospike ACT 6.1 success criteria and is among the highest performing, and lowest latency NVMe SSDs within the certification database.

The DC SN840 was benchmarked over 24 hours with the ACT 6.1 test. It showed an impressive 570K TPS performance with low latency and good transaction consistency throughout the benchmark test.

Server & Drive Configuration:

x86 Server

CPU op-mode(s) : 32-bit, 64-bit
 CPU(s) : 32
 Thread(s) per core : 2
 Core(s) per socket : 8
 Socket(s) : 2
 Model name : Intel® Xeon® Silver
 4108 CPU @ 1.80GHz
 Stepping : 4
 CPU MHz : 2100CPU max MHz : 3000
 CPU min MHz : 800

Ultrastar SN840

Firmware Version = 32-bit, 64-bit
 Capacity = 3.2TB
 DWPD = 3
 Namespace Count = 8
 PCI Max Link Speed = PCIe 3.0(8.0 GT/s)
 PCI Max Link Width = x4
 PCI Max Link Speed = PCIe 3.0(8.0 GT/s)
 PCI Current Link Width = x4

Test Configuration:

num-devices: 8
 service-threads: 160
 test-duration-sec: 86400
 report-interval-sec: 1
 microsecond-histograms: no
 read-reqs-per-sec: 380000
 write-reqs-per-sec: 190000
 record-bytes: 1536
 record-bytes-range-max: 0
 large-block-op-kbytes: 128
 replication-factor: 1

Note: One terabyte (TB) is equal to one trillion bytes. Actual user capacity may be less due to operating environment.

Western Digital.