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JovianDSS

ScaleFlux CSDU5SPC76 NVMe 7.68TB
Certification Report

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1.   INTRODUCTION

This hardware certification report comprehensively analyzes **the ScaleFlux CSDU5SPC76 NVMe Drives' integration with the Open-E JovianDSS software platform.** The CSDU5SPC76 achieves **top performance by offloading CPU data storage tasks through its built-in computational storage engines (CSE).** These CSEs automatically compress data before writing it to NAND and decompress it before reading it back to the system. This process is seamless and requires no special commands or software coding from the user.

Open-E JovianDSS is a software platform that provides data storage solutions for various industries and markets. It is based on the **ZFS file system and supports features such as data deduplication, compression, encryption, snapshots, replication, and High Availability clustering.** It is compatible with any hardware and hypervisor, offering flexible pricing and excellent support.

The CSDU5SPC76 supports File, Object, and Block storage, making it a superior choice for business-critical servers and storage systems. It provides unrivaled NVMe performance and endurance for the most demanding data center workloads.

Given its advertised superior performance and reliability, Open-E conducted rigorous certification tests to validate the ScaleFlux CSDU5SPC76 suitability as a data storage drive. The certification process encompassed a series of **functional and performance tests on both Single-Node systems and High-Availability data storage clusters,** ensuring the drive's compatibility and reliability across various operational conditions.

The following role was considered during the Open-E certification process:
- **data storage drive**

2. DEVICE UNDER TEST DESCRIPTION

Table 1. ScaleFlux CSDU5SPC76 NVMe 7.68TB

Product name	ScaleFlux CSDU5SPC76
Model name	CSDU5SPC76
Storage capacity	7.68 TB
Form factor	U.2 2.5"
Interface	NVMe PCIe® Gen 4
SED	TCG Opal 2.0
Sequential Read	7.2 GB/s
Sequential Write	4.8 GB/s*
Power consumption	<20W Typical, <5W Idle
Firmware Version	U5324074

* 1.2:1 CR Data

3. TESTING ENVIRONMENT DESCRIPTION

Table 2 provides a detailed list of the hardware specifications for the environments used during the certification testing. Table 3 shows the general configuration settings for Fio, which was the tool for performance benchmarking.

Table 2. Per-Node hardware specification

System name	Supermicro SYS-220U-TNR Ultra SuperServer 2U X12DPU-6, 2.5" 24 bay
Motherboard	Supermicro X12DPU-6
CPU	2x Intel® Xeon® Silver 4309Y Processor @ 2.80GHz
RAM	256GB - 4x64GB Hynix 64GB 4DRX4 PC4-21333
Drives	1x Samsung PM1633a 960GB SAS 12Gb 2,5" (boot medium) 8x ScaleFlux CSDU5SPC76 NVMe 7.68TB
System	Open-E JovianDSS up30r2 55016

Table 3. Fio test tool configuration

Version	3.28
Test size	200GB
Block size	4kB (random workload); 1MB (sequential workload)
Ramp time	30s
Runtime	90s
IOengine	libaio
Direct IO	Yes

4. FUNCTIONALITY TESTS

Open-E performed functional testing, shown in Table 4.

Table 4. Functional test results

Functional aspect	Result
Open-E JovianDSS system compatibility	passed
Stripe compatibility	passed
Mirror compatibility	passed
RAID-Z1 compatibility	passed
RAID-Z2 compatibility	passed
System stability	passed
Drive failure simulation with the replacement	passed
Hot-Plug Support	passed
Disk activity and health monitoring	passed
Disk write-back cache management	passed
LED's management functionality	passed
SED functionality	passed

5.   HA NON-SHARED STORAGE CLUSTER TESTS

Open-E performed various compatibility tests to ensure the proper operation of the ScaleFlux CSDU5SPC76 NVMe disks in the Open-E JovianDSS High Availability Non-Shared Storage Cluster environment.

All the essential and critical Non-Shared Storage Cluster Mechanisms with the tested devices were tested. Table 5 shows the list of checked functionalities.

Table 5. Results for the HA Non-Shared Storage Cluster compatibility test.

Functional aspect	Result
Manual Failover	passed
Remote disk support	passed
Automatic Failover triggered after network failure	passed
Automatic Failover triggered after system shutdown	passed
Automatic Failover triggered after system reboot	passed
Automatic Failover triggered after system power-off	passed
Failover operations under heavy load (stress test)	passed

6.　　HA SHARED STORAGE CLUSTER TESTS

Open-E performed various compatibility tests to ensure the proper operation of the ScaleFlux CSDU5SPC76 NVMe disks in the Open-E JovianDSS High Availability Shared Storage Cluster environment.

All the essential and critical shared storage cluster mechanisms with the tested devices were tested. Table 6 shows the list of checked functionalities.

Table 6. Results for the HA Shared Storage Cluster compatibility test.

Functional aspect	Result
Manual Failover	passed
Automatic Failover triggered after network failure	passed
Automatic Failover triggered after system shutdown	passed
Automatic Failover triggered after system reboot	passed
Automatic Failover triggered after system power-off	passed
Failover operations under heavy load (stress test)	passed

7. PERFORMANCE TESTS

The test cases are described in Table 7. Open-E applied every combination of thread numbers (1, 4, 8, 16) and queue depths (1, 16, 64, 128) to the Fio test tool in all instances. All tests were performed locally on the Open-E JovianDSS system.

Table 7. Test cases description

Test case	IO pattern	Read to write %	Block size
Mixed	random	70/30	4 kB
Random read	random	100/0	4 kB
Random write	random	0/100	4 kB
Sequential read	sequential	100/0	1 MB
Sequential write	sequential	0/100	1 MB

The table 8 presents the ZFS configuration used for testing.

Table 8. Tested pool configuration

Zpool configuration	2-way mirror
Write log	No
Zvol size	200 GB
Sync	Always
Provisioning	Thin
Compression	lz4
Zvol initialization:	Zvol was initialized by writing data to it before tests began.

The charts below present the following performance results:
• **Mixed Random IO Performance**
• **Random Read IO Performance**
• **Random Write IO Performance**
• **Sequential Read MB/s Performance**
• **Sequential Write MB/s Performance**

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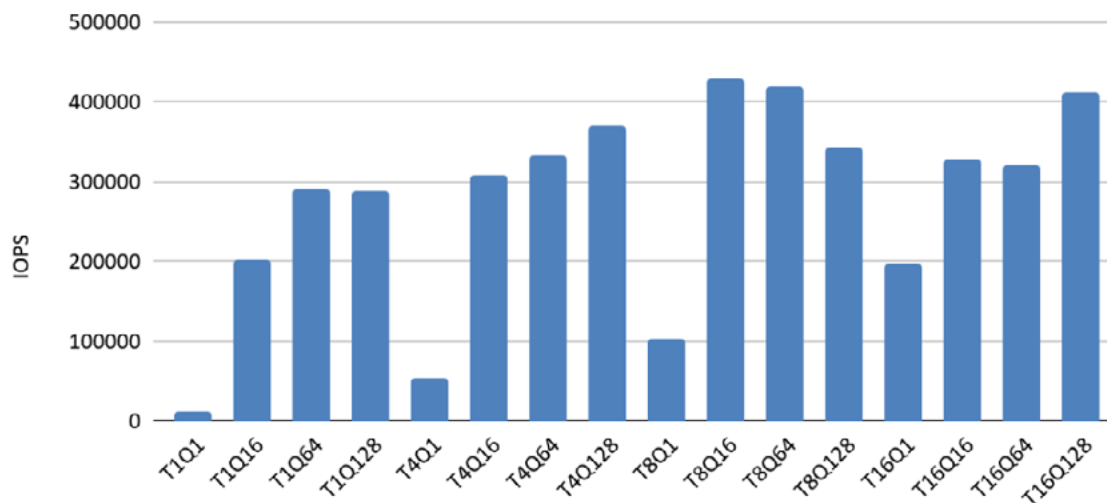JovianDSS

Mixed IOPS

Single node local test
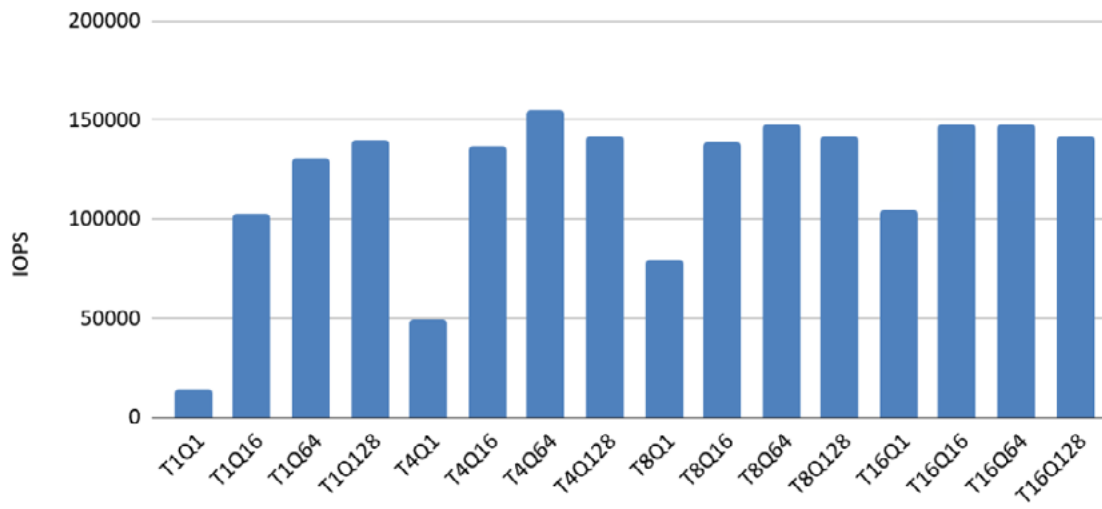
Workload profile (T- threads, Q- queue depth)

Random Read IOPS

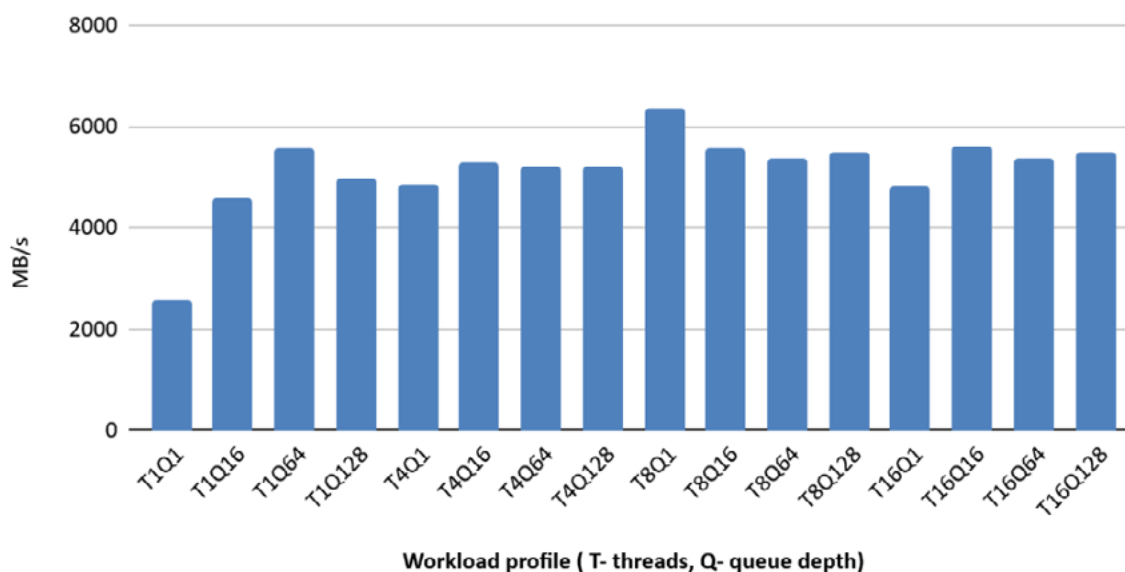*Single node local test*

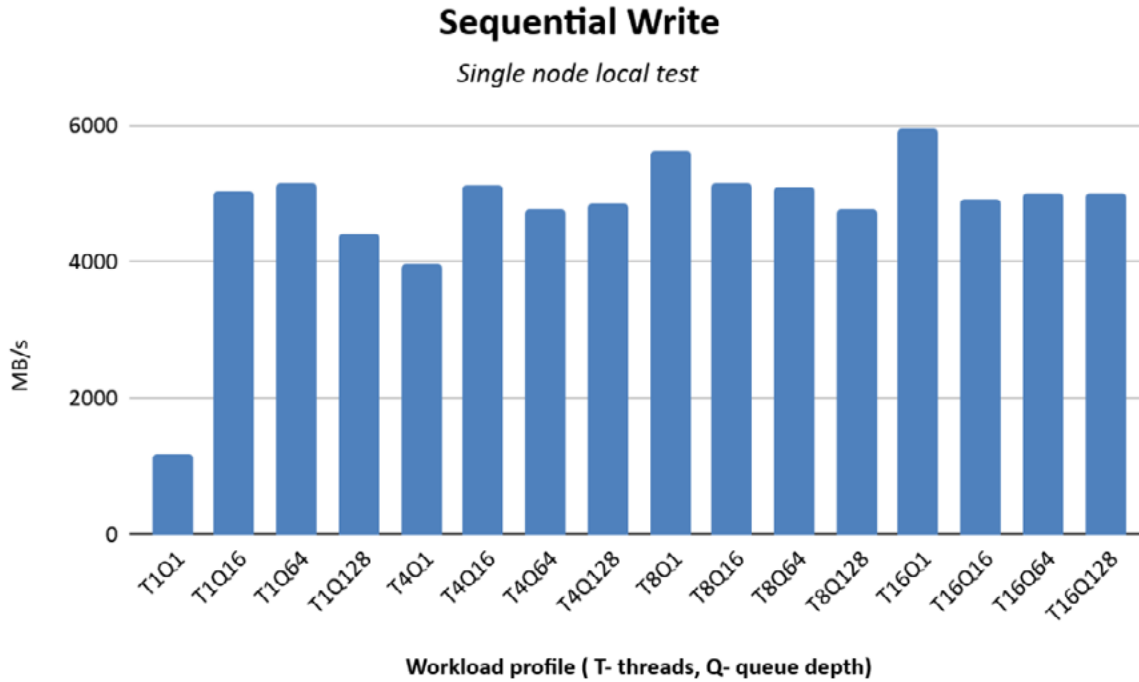Workload profile (T- threads, Q- queue depth)

Random Write IOPS

Single node local test

Workload profile (T- threads, Q- queue depth)
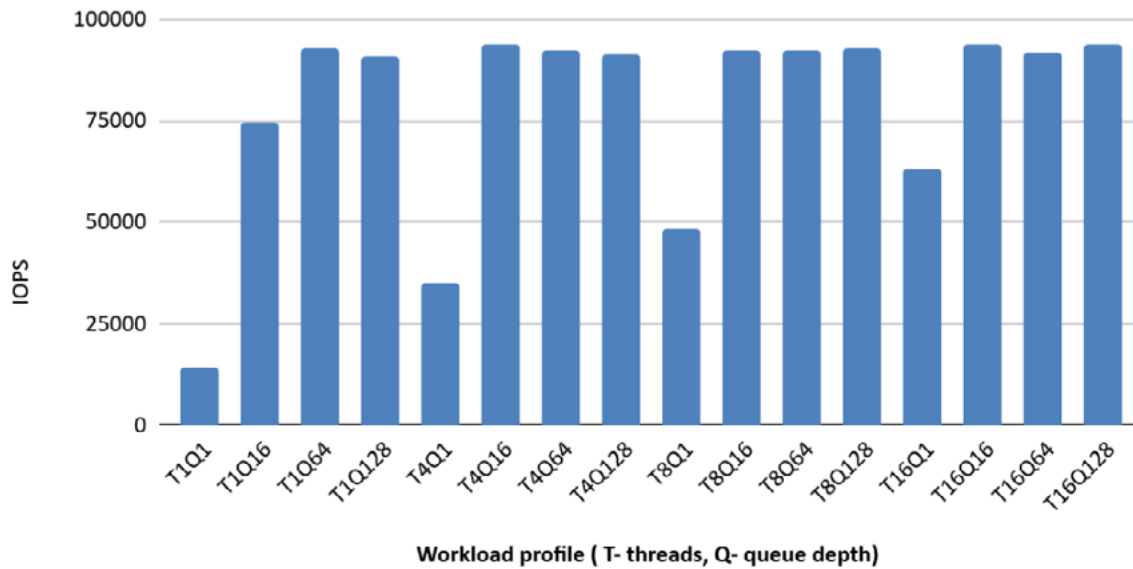
Sequential Read

Single node local test

Workload profile (T- threads, Q- queue depth)

Sequential Write

Single node local test

Workload profile (T- threads, Q- queue depth)

8.   TEST CONCLUSIONS

The **ScaleFlux CSDU5SPC76 NVMe** showed excellent performance in our evaluations, proving to be a dependable data storage option. It maintained steady performance, offered ample endurance, and de- livered high speed, making it ideal for settings that require strong data integrity, large capacity, and high availability.

Our comprehensive testing regimen, which included stress tests, read/write operations, and long-term reliability assessments, validated the CSDU5SPC76 as a high-quality enterprise data storage device.

The results confirmed that this NVMe model can manage the rigorous workloads of both Single- -Node and High-Availability configurations within Open-E JovianDSS systems.

Given its high data storage capacity and reliability, the **ScaleFlux CSDU5SPC76 U.2 NVMe** is a commendable choice for various applications. Based on the test results and the drive's specifications, Open-E recommends using this certified model in:
• **Video editing**
• **Robust database solutions**
• **Healthcare and high-quality recording**
• **AI models training**

After successfully passing all certification tests, the ScaleFlux CSDU5SPC76 has been added to the Open-E Hardware Certification List and awarded the "Certified by Open-E" status.

9.   DISCLAIMER

As the NVMe drives are known for their stability and high performance, the tests were performed using a 2-way mirror configuration, allowing us to harness the highest possible I/O performance without compro- mising data safety.