vesper technologies

StorPool DISTRIBUTED STORAGE

# Solution brief:
# Fast and efficient Storage by Vesper Technologies and StorPool Storage

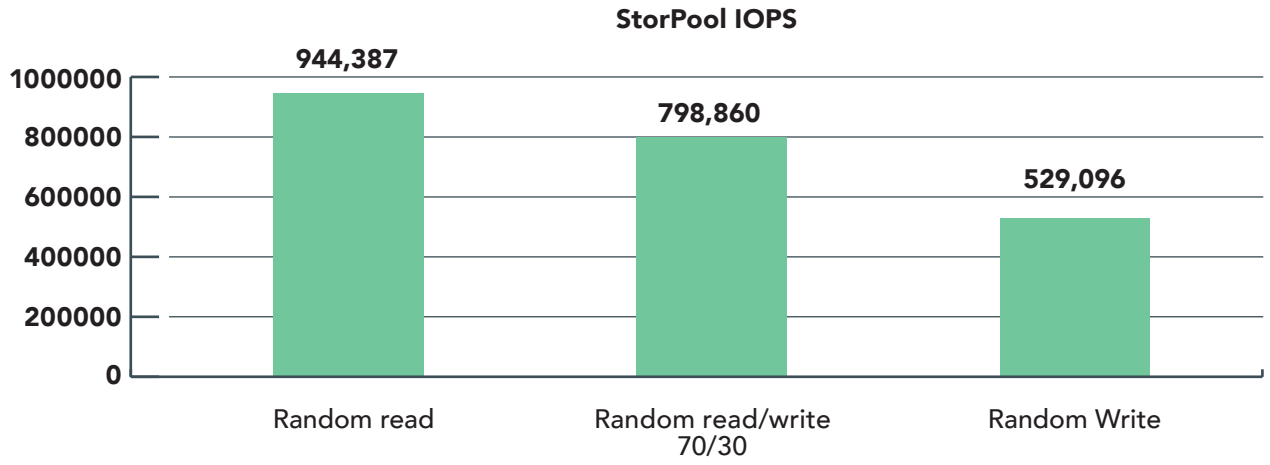
**$61,000 all-flash shared storage system with 944,000+ IOPS and 6.3 GB/s**

## Executive summary

Here we showcase an outstanding block-storage system which provides immense performance at fraction of the cost of a comparable solution. This is a software-defined storage system provides shared storage with both scale-out and high availability functions. The system as tested delivers 10.5 TB usable with 944,000+ IOPS, with sub-millisecond latency, for approximately $61,000 over 3 years.

> "A storage system with nearly 1 mln IOPS for $61,000 over three years. This is unheard of. It is the true value of software-defined storage".

## Graph 1: IOPS




## Table 1: performance metrics summary

| Test | Result | Test parameters | | |
|---|---|---|---|---|
| | | Block size | Queue depth | |
| | | | Per client host | Total |
| Random read, IOPS | 944,387 | 4K | 256 | 1024 |
| Random read/write, 70/30, IOPS | 798,860 | 4K | 256 | 1024 |
| Random read/write, 50/50, IOPS | 669,440 | 4K | 256 | 1024 |
| Random write, IOPS | 529,096 | 4K | 256 | 1024 |

# Introduction

When you build a cloud you reach a point where you have to make a trade-off between performance and cost. Your customers have high demands on performance in terms of speed, but even more so in terms of low latency. Thus the trade-off is whether you decide to curb performance and temper cost or decide to go for all-flash storage array, which comes at a hefty price. The latter reduces your profit margins and the competitiveness of your service.

Not anymore. For just $61,000 your Cloud can be powered by a shared storage system which peaks at 944,000 IOPS and does 122,000 IOPS at just 0.26 ms! All this bundled with 8x5 hardware support and 24/7 support and proactive monitoring on the software-defined storage solution by StorPool, so you can focus on making your customers happy. This system can be scaled linearly in performance and capacity in two ways: 1) by adding more (or larger) SSDs in each server and/or 2) adding more servers. In both cases the expansions are online and non-affecting production workloads. This shared storage system can grow to over 1 petabyte in scale.

The system delivers outstanding performance not only in terms of IOPS, but also as throughput:

**Performance test results:**

- Random read, IOPS: 944,387
- Rand. R/W, 50/50, IOPS: 669,440
- Random write, IOPS: 529,096
- Sequential read, MB/s: 6,309
- Sequential write, MB/s: 3,928
- 0.15-0.26 ms latency under load

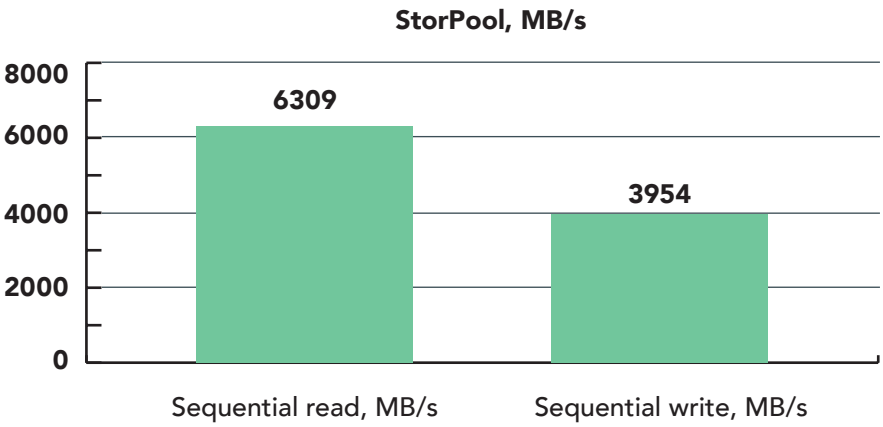
**Test configuration**

**Servers:**
4x Intel servers, each with:
- 1x Intel Xeon E5-2630 v4 CPU - 10 cores, 2.2 GHz
- 32 GB RAM
- Intel RMS3VC160 HBA (w/ Avago 3216 chipset
- Mellanox MCX4121A-ACAT - Dual-port 25 GbE NIC
- 12x Intel S3610 480GB SATA SSDs
- StorPool software version: 16.01.814.130500f

**Network:**
- Mellanox ConnectX-4 Lx - 2x 25G NICs
- 2x Mellanox SN2100 switches

**Total storage system resources as tested:**
- 4 stand-alone nodes (serving as both storage and compute)
- 8x 25GbE ports Total 23.04TB raw space, 10.47 TB usable space (before gains from space saving features in StorPool)

## Graph 2: Throughput




## Table 2: Throughput

| Test | Result | Test parameters | | |
|---|---|---|---|---|
| | | Block size | Queue depth | |
| | | | Per client host | Total |
| Sequential read, MB/s | 6,309 | 1M | 256 | 1024 |
| Sequential write, MB/s | 3,954 | 1M | 256 | 1024 |

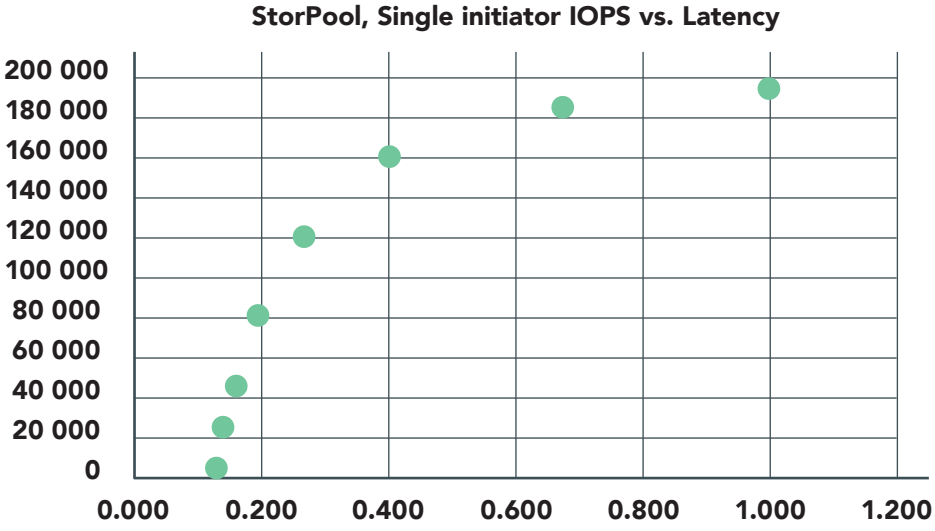
An often overlooked metric of storage systems and Cloud set-ups are their latency metrics. Actually latency is in many cases more important than IOPS, since most workloads cannot run many parallel requests to the storage system and thus are latency bound. When a storage system can deliver low latency it significantly improves the work of applications and customer satisfaction.

As visible from the table below this StorPool powered Cloud solution delivers extremely low latency, even under severe system usage.

## Table 3: Latency under stress

| Test | Result | | Test parameters | |
|---|---|---|---|---|
| | Average latency (ms) | IOPS | Block size | Queue depth |
| Random read + write 50/50 | 0.150 | 6,609 | 4K | 1 |
| Random read + write 50/50 | 0.157 | 25,189 | 4K | 4 |
| Random read + write 50/50 | 0.168 | 47,193 | 4K | 8 |
| Random read + write 50/50 | 0.193 | 82,418 | 4K | 16 |
| Random read + write 50/50 | 0.260 | 122,536 | 4K | 32 |
| Random read + write 50/50 | 0.399 | 159,776 | 4K | 64 |
| Random read + write 50/50 | 0.694 | 184,049 | 4K | 128 |
| Random read + write 50/50 | 0.992 | 193,269 | 4K | 192 |

## Graph 3: Latency under load




Even more impressive is the spread of the latency under load, which is hardly achieved by competing high-end SAN or all-flash storage arrays.

"Performance and especially low latency are crucial for today's workloads. We have astounding numbers for both".
Boyan Ivanov, CEO, StorPool Storage.

This distributed storage solution has 10.5 TB usable of all-flash storage with an estimated end user cost over 3 years of $61,000, which includes hardware (except networking), software licenses, 24/7 enterprise-grade support and proactive monitoring of the software. The system can be scaled down in half or seamlessly scaled-out in both capacity and performance.

All changes to the system are done online, while customer workloads are running. Software or hardware upgrades also happen online, without disruption to the cloud service. This allows true high-availability and leaves expensive fork-lift upgrades and risky data-migration operations in the past.

The storage sub-system, can be additionally optimized for more demanding use cases by using CPUs with higher frequency. This will improve performance of the system both in terms of IOPS & MB/s and also in lowering latency.

The impressive performance figures are due to the outstanding performance and latency metrics of Intel S3610 SSDs, Intel Xeon Processors and Mellanox network equipment.

Using standard components from Intel has allowed Vesper Technologies to build a solution which comes at just $0.08/IOPS.

> "We are not aware of an alternative as fast or as cost efficient."
> Allan Kaye, Director, Vesper Technologies.

## Conclusion

**When a cloud company is looking to differentiate, its biggest competitive advantage lays in its infrastructure layer. It is at the core of its business. The solution presented herein can be used to build extremely fast and cost efficient Clouds, which will set your business miles ahead of your competitors.**

To learn more or request a tailored solution, please contact
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