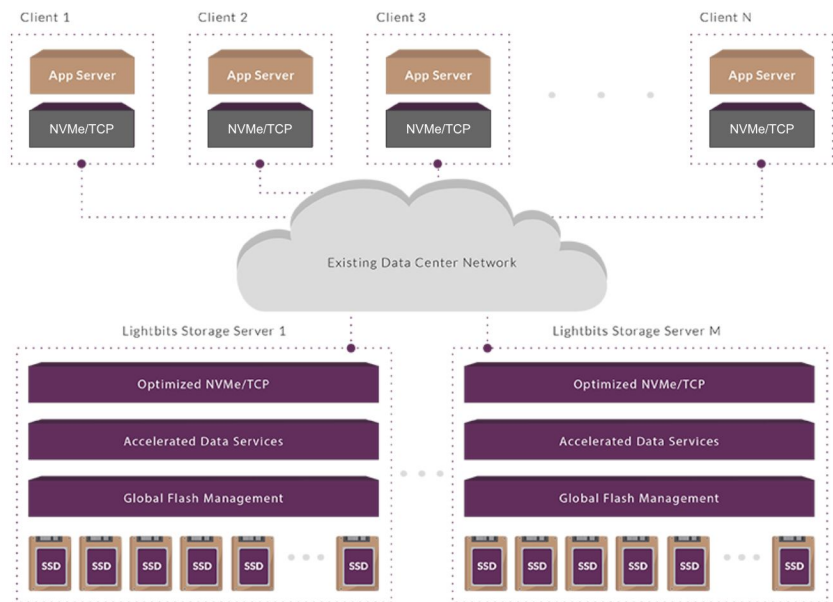# LightOS® Storage Solutions

Lightbits™ revolutionizes cloud and data center storage infrastructures with software-only or software with hardware acceleration solutions for disaggregated flash platforms.

Lightbits LightOS is ideal for containerized environments such as Kubernetes that require large scale clusters with persistent storage for rapid node migration, workload rebalancing, and recovery from failures without copying data over the network.

Installed on standard servers in large scale data centers, LightOS is optimized for I/O intensive compute clusters such as Cassandra, MySQL, FDB, MongoDB and Time Series Databases. It delivers high performance and consistently low latency based on patent-pending multi NVMe SSD management and innovative NVMe over TCP (NVMe/TCP) storage communication protocol that does not require changes to networking infrastructure or application server software.

LightOS provides rich storage services like data reduction, Thin Provisioning for best utilization of SSD capacity and Erasure Coding for protection from SSD failures to ensure service and data availability. Using the optional LightField™ hardware accelerator, LightOS can improve network processing, IOPs, and reduce latency.

LightOS Key Benefits

Software Defined Storage Solution
- Runs on standard servers with optional hardware acceleration
- Storage server (Target) only solution: no change in the host (Initiator, Client)
- Designed for multi-tenant workloads

Large Scale Application Aware
- Optimized for I/O intensive applications such as MySQL, Cassandra, MongoDB, FDB and Time Series Databases
- Persistent storage for containerized environments: Kubernetes, Mesos

High Performance and Low Latency
- 200 Gbps bandwidth to SSDs storage via data striping across SSDs
- Up to 5M IOPS (4K random I/O) in 2U x86 (Intel/AMD) server
- Consistently low read/write average and tail latency

SSD Fault Tolerance
- Elastic Erasure Coding (EC) at wire speed
- No interruption of services on SSD failure and EC rebuild

Storage Level Services
- Thin provisioning for best utilization
- Wire-speed compression/decompression
- QoS SLA configuration per volume
- Auto capacity scale at SSD failure/addition

High Capacity SSD
- Scale-up capacity with high capacity SSDs
- Reduce TCO by supporting DC and QLC SSDs grades
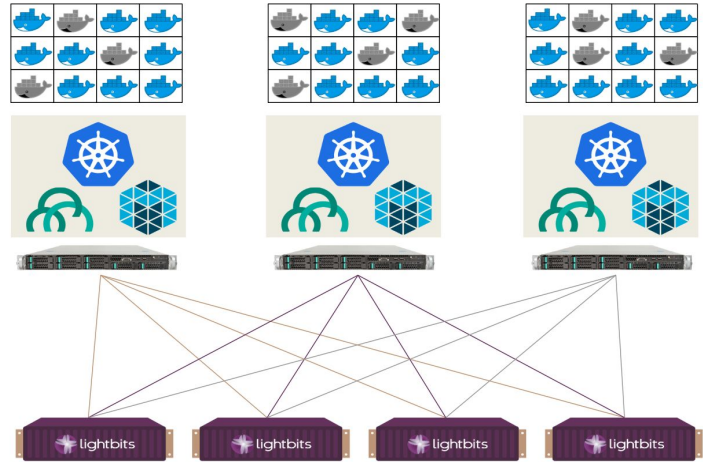
Designed for Cloud Management
- RESTful API provides a standard HTTPS-based interface
- CLI support for scripts and monitoring
- Metrics and Alerts based on Prometheus

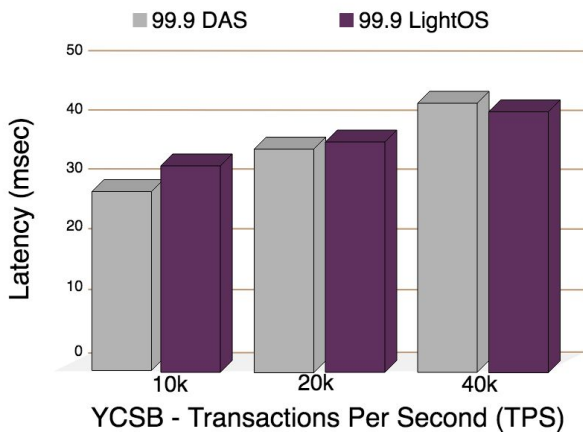# Lightbits Storage Solution in Containerized Data Centers

Understanding that scale matters and that NVMe and NVMe-oF are gaining momentum as critical enablers in meeting the demands of the modern data center, Lightbits developed game-changing NVMe/TCP solutions. These solutions can be immediately deployed in data centers and enable a lightweight containerized environment backed by a scalable, high-performance disaggregated storage system.

At the 2019 OCP Global Summit, we demonstrate a 3-node Cassandra cluster in a containerized environment that shows the enhanced service performance and high availability achieved on a real application workload, with comparable or better performance than Direct Attached SSDs.
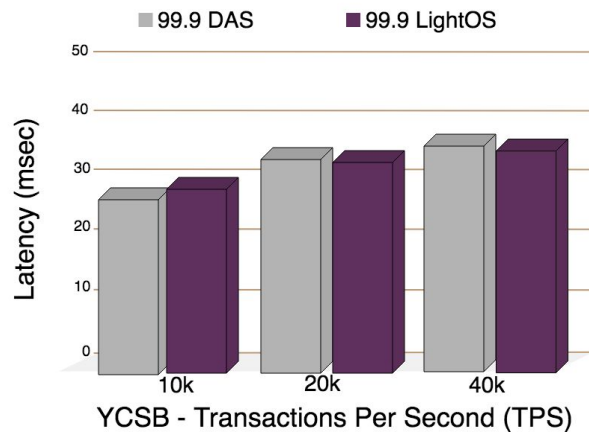
The Cassandra containers store their data in Persistent Volumes seamlessly on LightOS via a Container Storage Interface (CSI) plug-in to Kubernetes. Our demonstration proves that the Lightbits solution migrates containers in about one minute versus a slow migration of several hours in the Direct Attached SSD environment.

Read Tail Latency (99.9)
DAS vs. Lightbits
Latency Comparison as Workload Increases

■ 99.9 DAS   ■ 99.9 LightOS

Latency (msec)

YCSB - Transactions Per Second (TPS)

UpdateTail Latency (99.9)
DAS vs. Lightbits
Latency Comparison as Workload Increases

■ 99.9 DAS   ■ 99.9 LightOS

Latency (msec)

YCSB - Transactions Per Second (TPS)

About Lightbits Labs™

Lightbits Labs, founded in 2016, is remaking modern cloud infrastructure on a global scale. The company's mission is to reinvent the way storage and networking are conducted in cloud data centers. As trailblazers in this field, its solutions are successfully being used in industry-leading cloud data centers around the globe. With strategic investors including DellEMC, Cisco, Micron, Lightbits Labs is disaggregating storage and compute to improve clients' performance and latency.

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