

Reach for the Stars

Get the portability of Kubernetes with the performance of local flash by using Lightbits Labs LightOS and Intel® technology.

eBook



intel®

Contents:

Businesses are embracing containerization and Kubernetes	2
Managing persistent storage can be challenging	3
Searching the galaxy for the best solution	4
Start your journey with LightOS, Kubernetes, and Intel technologies	5
A solution powered by advanced technologies	6
LightOS and Intel are light years ahead	7
A universe of possibility awaits you	8



Businesses are embracing containerization and Kubernetes

More and more businesses are turning to Kubernetes as a convenient way to deploy applications as containerized microservices. Kubernetes orchestration brings portability, scalability, and ease of management to containers, in addition to portability for cloud-native applications that support web-based and service-oriented architectures.

But how you manage storage for your containerized apps is critical. If you want to deploy stateful apps, like MySQL, MongoDB, Redis, or Apache Spark in Kubernetes pods, you need to provide storage with high input/output operations per second (IOPS) and low latency in order to support hundreds of clusters with thousands of database instances.

29%

expected compound annual growth rate (CAGR) for the container market over the next five years¹

48%

Kubernetes adoption rate over the next five years (up from 27% today)¹

Managing persistent storage can be challenging

When SQL, NoSQL, and in-memory database applications are deployed on bare metal, application vendors recommend using local NVM Express (NVMe) flash. That's because this configuration offers the low latency and high bandwidth performance that these applications crave.

But local flash creates a problem when you're working with Kubernetes: when persistent storage is in the application server, you lose application portability, which—in turn—can result in poor flash storage utilization.

CAUTION:
With direct-attached local flash for persistent storage, you lose application portability, which can result in poor flash utilization.

Searching the galaxy for the best solution

How do you get performance and portability for your stateful apps in Kubernetes? The options might seem limited.

One option is local persistent volume functionality. But this can lead to compromised application portability, and it can introduce poor flash storage utilization. For example, adding dedicated local flash drives to every Kubernetes server could result in 50 percent or more wasted storage.²

Another option is open source or proprietary block-based storage solutions, like Ceph or iSCSI, that use a Container Storage Interface (CSI) driver. But these can lead to increased complexity and reduced performance, while introducing vendor lock-in.

Given these limitations, how can you make full use of persistent-storage Kubernetes, without compromise, and benefit from rich data services and a lower total cost of ownership (TCO)?

Local persistent volume functionality?

Open source or proprietary block-based storage solution (like Ceph or iSCSI) with a CSI driver?



Start your journey with LightOS, Kubernetes, and Intel technologies

Many have already plotted a successful Kubernetes journey by using high-performance, software-defined block storage and Intel technologies to power their modern cloud-native applications.

Lightbits LightOS software-defined storage—optimized for a breadth of high-performance Intel technologies, including Intel® Xeon® Scalable processors, Intel® Optane™ technology, Intel Ethernet adapters, and low-cost quad-level cell (QLC) NAND solid state drives (SSDs)—offers a complete cost-effective solution for powering high-performance databases in Kubernetes environments today.

Lightbits LightOS + Kubernetes + Intel technologies align with Kubernetes values



Performance

High IOPS and low latency enabled by LightOS and Intel Xeon Scalable processors, Intel Optane technology, and Intel Ethernet adaptors



Flexibility

Persistent storage over standard TCP/IP networks



Lower TCO²

Coupling LightOS, optimized for Intel's high-performance hardware platform, with low-cost SSDs

A solution powered by advanced technologies

NVMe performance over TCP/IP

Benefit from persistent volumes with performance like—or even better than—local NVMe flash, running over TCP/IP networks. The solution is enabled by seamless integration of LightOS with optimization for high-performance hardware platforms, including Intel Xeon Scalable processors with Intel Deep Learning Boost (Intel DL Boost), Intel Optane persistent memory (PMem), and 100Gb Intel Ethernet 800 Series network adapters with Application Device Queues (ADQ) technology.

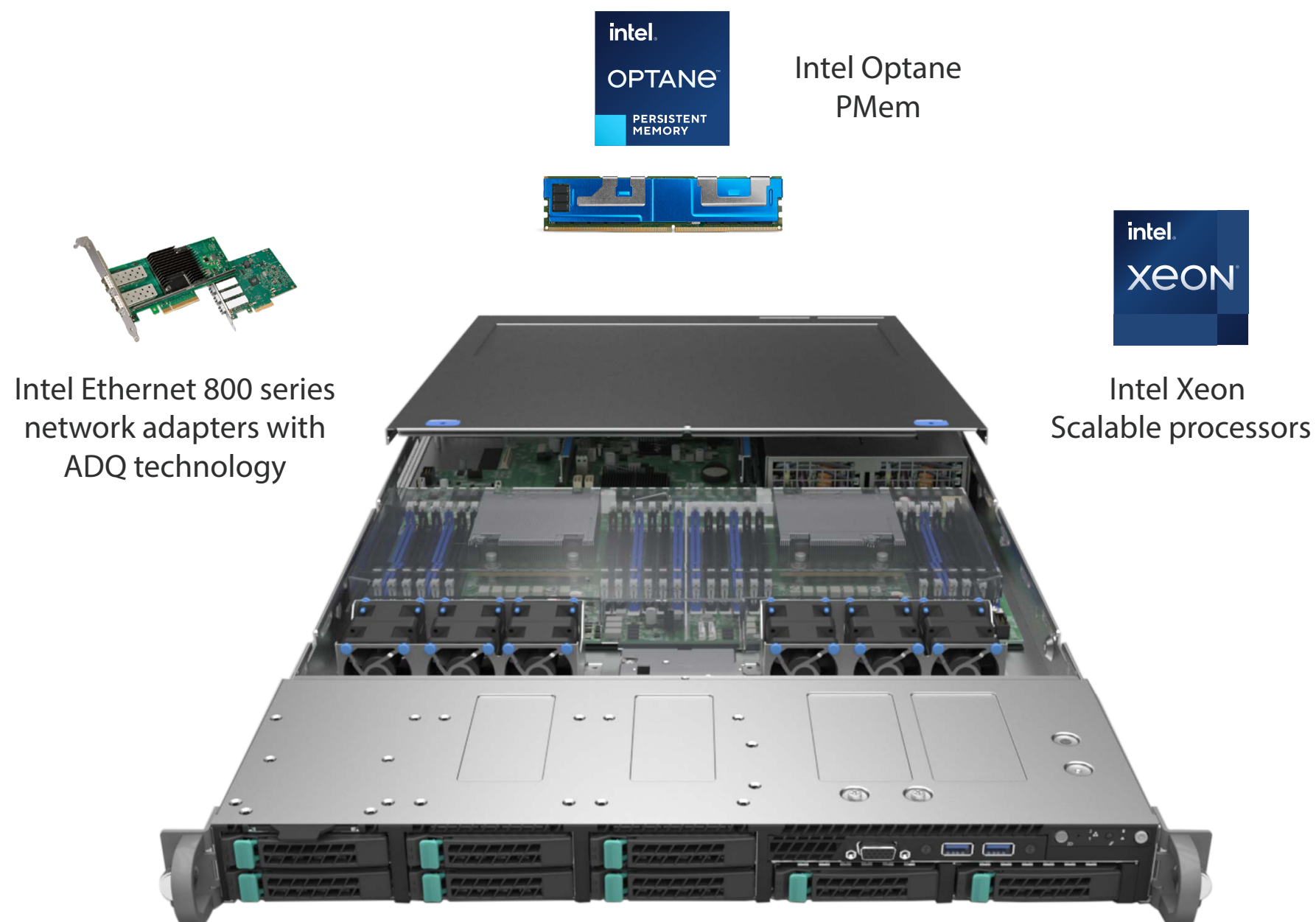
Portability with rich data services

The disaggregated solution enables application portability. LightOS uses the CSI to allow Kubernetes pods to move between servers on the network. The solution also provides rich data services for data protection, compression, replication, volume snapshots and clones, elastic RAID, and role-based access control (RBAC) for multitenant environments.

Cost-efficient storage

Coupling Intel's high-performance hardware platform with LightOS, optimized for low-cost QLC NAND SSDs, delivers a scalable solution that reduces overall TCO.²

Intelligent flash management improves flash endurance by up to 20x, while data-reduction features dramatically improve efficiency of the NVMe/TCP storage solution.³ In addition, the simple and flexible disaggregated architecture helps improve resource utilization.



Intel Ethernet 800 series network adapters with ADQ technology

Intel Optane PMem

Intel Xeon Scalable processors

2 Businesses are embracing containerization and Kubernetes

3 Managing persistent storage can be challenging

4 Searching the galaxy for the best solution

5 Start your journey with LightOS, Kubernetes, and Intel technologies

6 A solution powered by advanced technologies

7 LightOS and Intel are light years ahead

8 A universe of possibility awaits you

LightOS and Intel are light years ahead

Land with no-compromise performance, light years ahead of other software-defined or storage array solutions.

LightOS, optimized for Intel's high-performance hardware platform and low-cost QLC NAND SSDs, delivers a high-IOPS and low-latency solution with performance that is equivalent to local flash—all with fewer nodes and a lower TCO than many competing technologies.²



Up to
6x more IOPS³

Up to
55% lower TCO³

Up to
22x lower latency³

Less than
**1/2 the nodes,
same capacity**

2 Businesses are embracing containerization and Kubernetes

3 Managing persistent storage can be challenging

4 Searching the galaxy for the best solution

5 Start your journey with LightOS, Kubernetes, and Intel technologies

6 A solution powered by advanced technologies

7 LightOS and Intel are light years ahead

8 A universe of possibility awaits you

Why wait? Start navigating your way to better storage architecture.

**To learn more about
Intel technologies,
explore these pages:**

- 3rd Generation Intel Xeon Scalable processors
- Intel Ethernet 800 Series network adapters
- Intel Optane PMem



³ Source: Internal testing by Lightbits Labs.

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