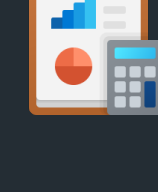


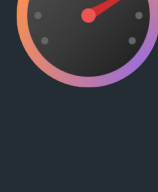
High Performance for HCI Workloads with Dell EMC VxRail & Intel Optane Persistent Memory

Dell EMC VxRail hyperconverged infrastructure (HCI) configured with Intel Optane persistent memory (PMem) enables high performance for HCI workloads. With Intel Optane PMem, performance-intensive workloads gain the benefits of memory-like performance, persistent storage, and scalability. ESG validated performance testing with VxRail using Intel Optane PMem in Memory Mode and App Direct Mode.

The Current State



HCI offers efficiency, management, flexibility, and TCO benefits.



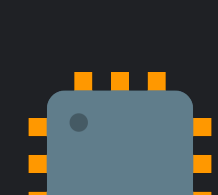
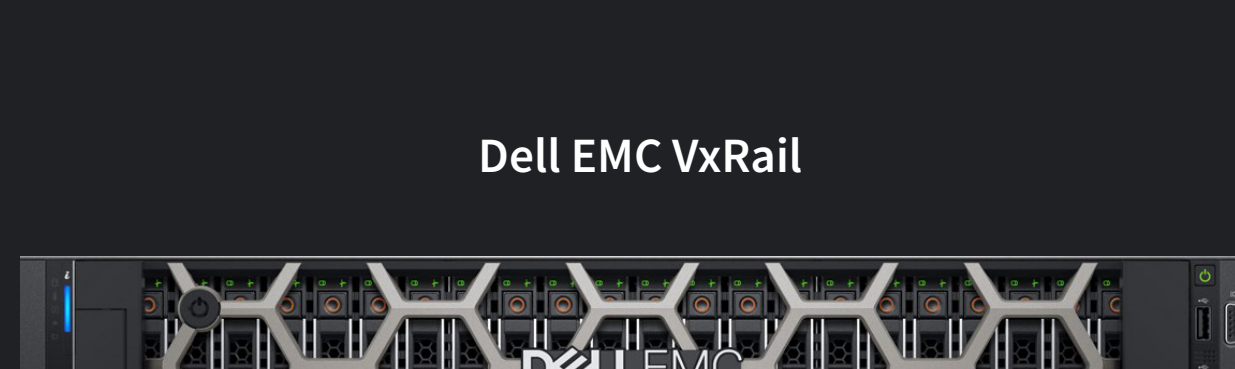
However, organizations have avoided putting applications that need consistent high performance on HCI because of performance concerns.



Real-time analytics, online transactions, content delivery, in-memory databases, and high-performance computing cannot afford to suffer the “I/O blender effect” in which consolidated, virtualized workloads suffer performance degradation.

The Solution

Dell EMC VxRail models E560, E560F, E560N and P570, P570F, P580N now support Intel Optane PMem for performance-intensive workloads.



Second Generation Intel Xeon Processors



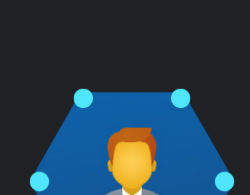
RAM



Intel Optane persistent memory



Redundant power and cooling



Network Connectivity 1/10/25Gbps



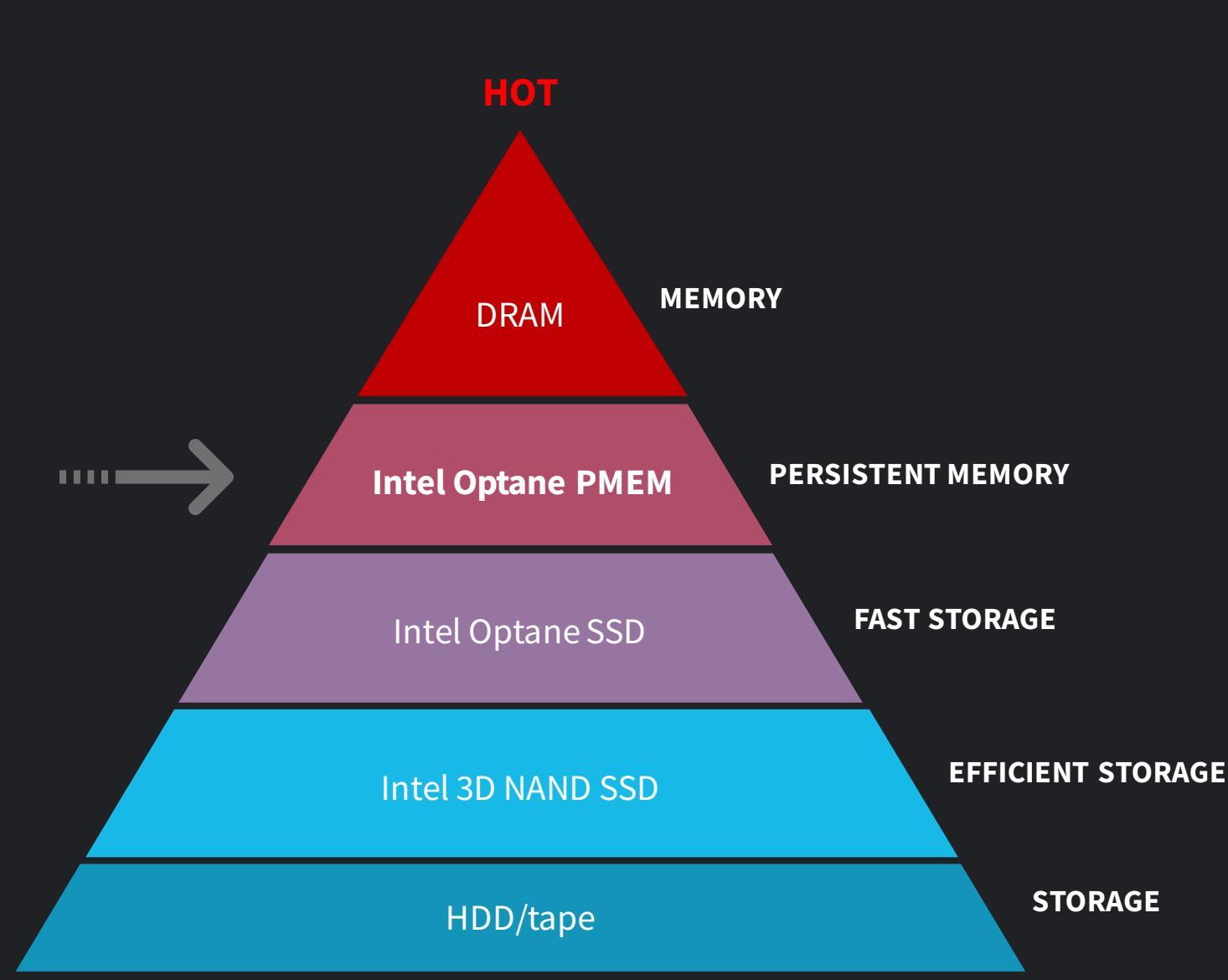
Hybrid or All-flash disk packs

How It Works

PMem is installed in the memory channel and provides a new performance tier that sits between memory and storage.

KEY FEATURES:

- High performance and low latency.
- Data persistence, so data is retained during power loss or restart.
- More affordable than DRAM.



ESG Validation Results

ESG validated Memory Mode performance, which showed that VxRail configured with Intel Optane PMem offers a lower memory cost and cost per node with minimal performance degradation than when configured with DRAM only.

VxRail with DRAM + Intel Optane PMem vs. DRAM only:



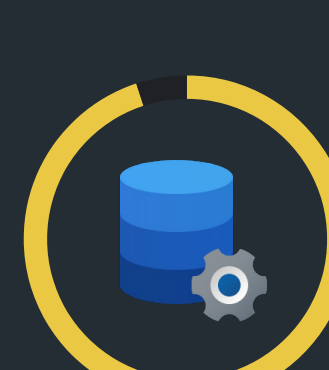
33% lower memory cost



14% lower node cost



90% performance hit rate



95% cache hit rate

ESG validated App Direct mode performance and scalability testing using FIO, with a single VxRail host, starting with a single 128GB PMem module.

We validated raw “four corners” performance that showed high IOPS and throughput for small and large block I/O, including more than 1.3M IOPS and more than 5 GB/s throughput.

We also validated near-linear IOPS and throughput scalability as the amount of PMem increased from 1 module to 12.

With 12 PMem modules, VxRail achieved 12.3M random read IOPS and 4M random write IOPS, plus more than 69 GB/s read throughput and more than 22 GB/s write throughput.

VxRail with Intel Optane PMEM 1 x 128GB PMEM, PMEM-aware NVDIMM

1.37 M
4K IOPS
100% Random Read

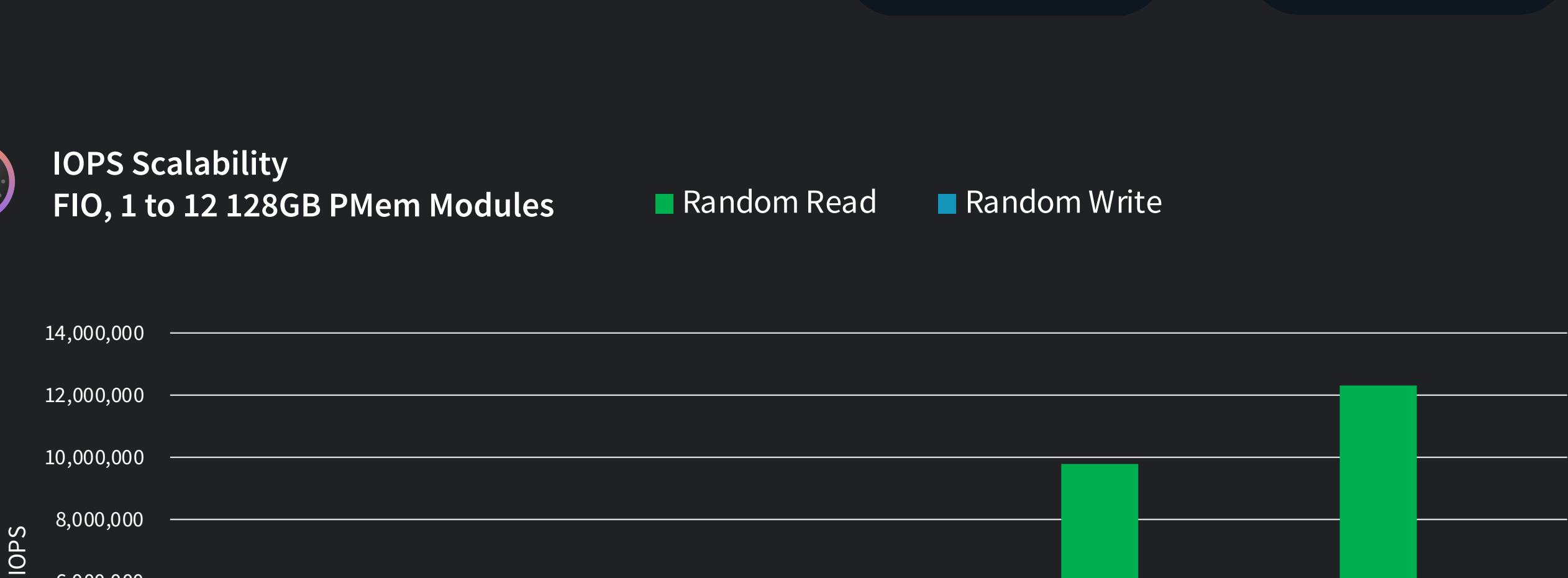
5.2 GB/s
64K Throughput
100% Random Read

414 K
4K IOPS
100% Random Write

1.5 GB/s
64K Throughput
100% Random Write

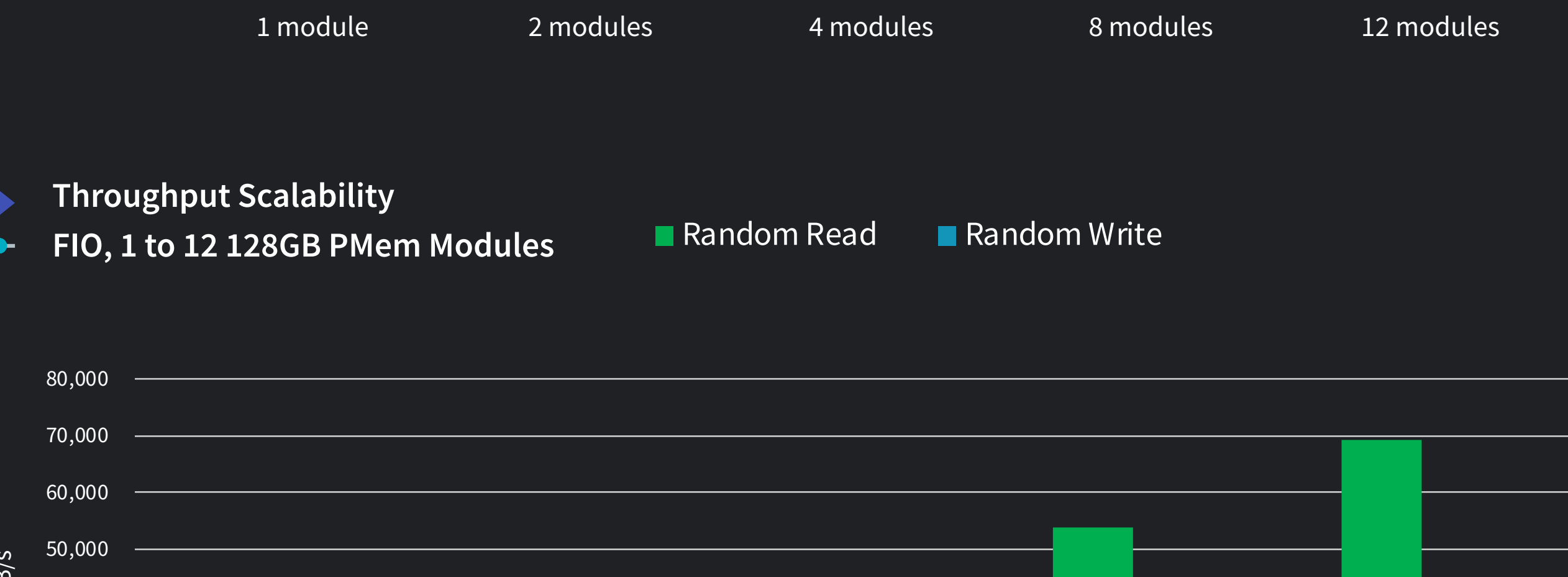
IOPS Scalability FIO, 1 to 12 128GB PMem Modules

■ Random Read ■ Random Write

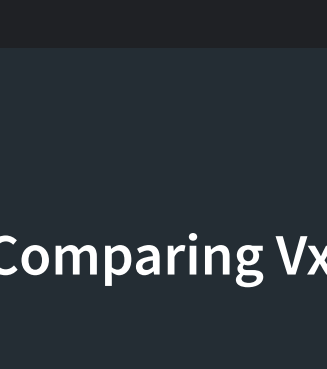


Throughput Scalability FIO, 1 to 12 128GB PMem Modules

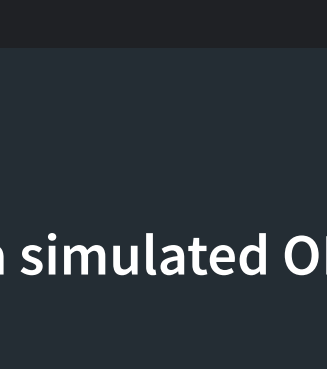
■ Random Read ■ Random Write



Comparing VxRail with PMem versus VxRail using all-flash VSAN, using a simulated OLTP workload:



93% faster response time



5.3x more IOPS

Comparing VxRail with PMem versus VxRail using all-flash VSAN using with a database workload:

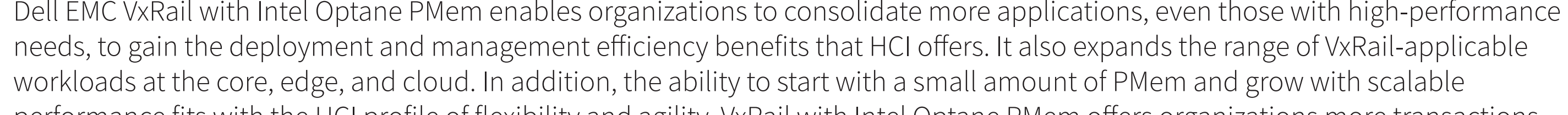


45% faster database log acceleration

This is important because when log writes are slow, they become a choke point that drags down the entire database process, delaying transactions and analysis. The ability to accelerate that process at low cost with a small amount of PMem capacity delivers significant benefit.

The Bigger Truth

Dell EMC VxRail with Intel Optane PMem enables organizations to consolidate more applications, even those with high-performance needs, to gain the deployment and management efficiency benefits that HCI offers. It also expands the range of VxRail-applicable workloads at the core, edge, and cloud. In addition, the ability to start with a small amount of PMem and grow with scalable performance fits with the HCI profile of flexibility and agility. VxRail with Intel Optane PMem offers organizations more transactions, faster insight, and better business decisions while gaining infrastructure and management cost efficiency.



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