BUSINESS BRIEF

Data Center
Software-Defined Storage

Turn Massive Data into Competitive Advantage

Together, Intel® Optane™ technology and Microsoft Azure Stack HCI transform data center efficiency, with increased scalability, reliability, and affordability

Industry Strategic Challenges

Ever-growing volumes of data present both a challenge and an opportunity for organizations today. Competitive advantage hinges on how fast businesses can extract actionable insights from magnitudes of data. An efficient infrastructure that can respond to the memory and storage needs of high-demand workloads is needed to speed data access. Hyperconverged infrastructure (HCI) is recognized as the scalable solution that provides affordable handling of high-density data.

Microsoft Azure Stack HCI combines highly virtualized compute, storage, and networking on industry-standard servers and components, making it possible to run virtualized applications on premises, as well as connect to Azure for cloud services.

Microsoft Azure Stack HCI is optimized for 2nd Generation Intel® Xeon® Scalable processors. And combined with Intel® Optane™ technology, it offers a flexible, scalable solution for affordable handling of high-performance, high-density data—with higher data throughput, lower latency, increased memory capacity, and potential for consolidating workloads on a smaller data center footprint. This solution is particularly well suited for virtual desktop infrastructures (VDI); trusted enterprise virtualization; resilient, high-performance SQL Server; scale-out storage; and new edge workloads.

Business Drivers and Desired Outcomes

- Handle large datasets and demanding workloads efficiently
- Reduce latency and bottlenecks
- Speed time-to-insight
- Get more out of existing data center footprint
- Reduce cost

With Intel Optane technology, organizations don't need to choose between speed and scale. Various aspects of Intel Optane technology work together to enable organizations to process, store, and move larger and more complicated datasets. The technology bridges critical gaps in the storage and memory hierarchy to deliver a combination of persistent memory, large system memory pools, rapid caching, and fast storage, depending on which Intel Optane technology is in use. Overall, combining 2nd Gen Intel Xeon Scalable processors with Intel® Optane™ DC persistent memory and Intel Optane DC SSDs can help organizations reduce bottlenecks, achieve more VMs per server, and meet the needs of latency-sensitive workloads, while delivering greater agility and value to challenging data center environments.

Intel® Optane™ Technology Advantages

- **Intel® Optane™ DC SSDs:** Intel Optane SSDs help eliminate data center storage bottlenecks and allow affordable processing of larger datasets. The technology can accelerate applications, reduce workload latency, and decrease overall data center costs.
- **Intel® Optane™ DC persistent memory:** Intel Optane DC persistent memory is a non-volatile memory option that delivers a combination of large memory capacity and support for data persistence for easy data accessibility. The workload-optimized technology sits between the memory and storage layers and helps enable fast, actionable insights from data-intensive applications reliably and affordably.

Improve Working Storage

Intel® Optane™ DC SSDs enable greater throughput with fewer servers.[1]

Azure Stack HCI environments can benefit from Intel Optane technology in a number of ways. The following three reference architectures use Intel Optane SSDs; options two and three add in Intel Optane DC persistent memory.

- **Option 1. Increase caching speed**: Use Intel Optane DC SSDs as cache, plus SATA-based Intel® SSDs for the capacity tier, to speed caching and increase VM density—leading to server consolidation. (See Figure 2)

Figure 1: Workload simulating a mutli-VM environment on Microsoft Storage Spaces Direct, comparing a solution using SATA SSDs with one adding Intel Optane DC SSDs.

- **Option 2. Increase available memory**: Workloads that need more memory can benefit from Intel Optane DC persistent memory, in addition to the Intel Optane SSDs in the cache tier. (See Figure 3)

Figure 2: Intel Optane DC persistent memory can replace DRAM to increase overall system memory, increasing VM density and reduce costs.[2]

- **Option 3. Increase speed and memory**: Workloads that not only need additional memory but also need extremely low latency can use Intel Optane DC persistent memory in a manner that allows for much faster cache allocation and frees up drive bays for more capacity. This configuration is ideal for high-performance SQL Server use cases.

Enabling Transformation

Augmenting traditional memory and storage options with Intel Optane technology can transform how businesses capitalize on the data available to them. This solution provides a new option to expand memory and optimize storage without compromising on performance or cost. It allows for faster, better use of data and cost-effective scaling, enabling competitive advantage now and in the future.

Solution Ingredients

- 2nd Generation Intel® Xeon® Scalable processors
- Intel® Optane™ DC SSDs
- Intel® Optane™ DC persistent memory
- Microsoft Azure Stack HCI (including Microsoft Storage Spaces Direct and Microsoft Hyper-V)

Strategic Solution Partners

- Microsoft

Where to Get More Information

- Intel® Optane™ Technology
- Intel® Optane™ DC SSD Series
- Intel® Optane™ DC Persistent Memory
- 2nd Generation Intel® Xeon® Scalable Processors
- Microsoft Azure Stack HCI
- Intel® Select Solutions for Azure Stack HCI

[1] Testing by Principled Technologies as of August 7, 2019. For more information, visit https://principledtechnologies.com/Hpe/Intel-Optane-HPE-ProLiant-Storage-Spaces-Direct-0919.pdf and https://principledtechnologies.com/Hpe/Intel-Optane-HPE-ProLiant-Storage-Spaces-Direct-science-0919.pdf.
Common Configuration: 2x Intel® Xeon® Gold 6154 processor @ 3.0 GHz (18 cores); 12 x 32 GB DDR4-2666 (total memory = 384 GB); OS drive = 1x Intel® SSD DC S3700 400 GB; Intel® Hyper-Threading Technology = ON; Intel® Turbo Boost Technology = ON; BIOS = U30 v1.46 (10/02/2018); BIOS setting = Performance; OS = Windows Server 2019 Build 1809 (patched 8/2/19); Power management policy = Static High Performance Mode; NIC = 2x Intel® Ethernet Adapter XXV710 (25 GbE).
All-SATA Configuration: four-node cluster; 4x Intel® SSD D3-S4510 3.84 TB. Results: IOPS = 387,092; Latency = 6.0 ms.
SATA plus Intel Optane DC SSD Configuration: three-node cluster; 4x Intel® SSD D3-S4510 3.84 TB and 2x Intel Optane SSD DC P4800X 375 GB. Results: IOPS = 592,173; Latency = 4.4 ms.
Workload: VMFleet/DISKSPD 2.0.21a

[2] Performance results are based on testing by Intel as of January 15, 2019 and may not reflect all publicly available security updates. See the configuration disclosure for details.
Common configuration: Intel® Xeon® Gold 6230 processor @ 2.10 GHz
All-DRAM configuration: 384 GB DDR4 DRAM memory
DRAM + Intel® Optane™ DC persistent memory configuration: 192 GB DDR4 DRAM memory + 512 GB Intel Optane DC persistent memory
Benchmark Setup: VMFleet Test: Each VM with 1 core, 8 GB; memory, 40 GB VHDX; test setup: threads = 2; buffer size = 4 KB; pattern: random, duration = 300 seconds; queue depth = 16, 30% write; OS: Windows Server 2019 Standard (desktop) with updated patch.

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