Solution Brief

End User Computing & VDI | Virtualization

Nutanix Supports Intel® Optane™ Persistent Memory for VDI Workloads

Intel Optane persistent memory (PMem) provides affordable, large-capacity memory and significant cost savings for customers

Solution Benefits

Using Intel® Optane™ PMem in your Nutanix/Citrix deployments offers the following advantages:

- Up to 30% lower memory cost by replacing a portion of DRAM with Intel Optane PMem.[1]
- VDI user experience, as measured by latency, is virtually the same in most cases.[1]
- Build scalable, reliable and security-enabled VDI with Nutanix HCI, powered by Intel technology.

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Executive Summary

Virtual desktop infrastructure (VDI) is a quickly growing choice for businesses seeking to support their evolving workforce with a secure environment. Intel and Nutanix have collaborated to design a platform that meets the business goals of any organization—lower memory costs while maintaining a similar, security-enabled VDI user experience.

By combining the latest innovations included in Nutanix AOS and Intel® Optane™ PMem 200 series, enterprises can achieve cost savings while keeping their VDI users happy—a win-win for everyone.

Meet business goals of lowering VDI memory costs while maintaining a similar, security-enabled VDI user experience by using Intel® Optane™ PMem.

Business Challenge: Lower-Cost VDI

In the "new normal," the distributed workforce requires apps to maintain productivity, secure access to data wherever it resides, and the flexibility to innovate and deliver value for customers. Virtual Desktop Infrastructure (VDI) can provide these benefits; in fact, the global VDI market is expected to grow from USD 12.65 billion in 2020 to USD 33.42 billion by 2028.[2] Many enterprises recognize the advantages of VDI (sometimes called "end user computing" or EUC), such as centralized management and improved security. As companies explore VDI for the best solution, cutting costs and simplifying deployment are paramount. On the other hand, working remotely has evolved, as today's users access more apps and data. Therefore, choosing a solution that provides excellent performance and user experience is important.

HCI from Nutanix Is Ideal for VDI Deployments

The Nutanix HCI platform was designed for VDI, virtualization, databases, artificial intelligence (AI), machine learning and various other workloads. As Ruben Spruijt, Staff Engineer at Nutanix says, "Virtual applications and desktops are almost literally in Nutanix's DNA."[3] By definition, a Hyperconverged Infrastructure (HCI) node includes compute, storage, and network resources, making it much easier to scale than traditional data center infrastructure. The Nutanix platform with Intel® Optane™ PMem in Memory Mode is available on servers from a broad ecosystem of server OEMs, including Dell, HPE, and Lenovo as well as on Intel® Data Center Systems. These offerings also include Intel Optane SSDs for fast access to hot data.

Because everything is integrated, deploying a Nutanix-based HCI platform for VDI can be much simpler and faster than deploying a traditional compute-storage-network infrastructure. According to Nutanix, many customers progress from unboxing to running virtual desktops in as little as an hour.[4] Not only that—the simpler, more integrated environment provided by Nutanix reduces the time spent on management by up to two-thirds, reducing OpEx by approximately 60%.[5]

Solution Value: Lower Memory Cost

Intel has worked with Nutanix to configure the Nutanix HCI platform to optimally support VDI deployments at the lowest possible cost while delivering a rich and excellent user experience from a choice of OEMs.

The VDI use case is a natural fit for Intel Optane PMem because VDI workloads and today's applications are often memory-constrained and require larger amounts of memory—up to 1 TB or more per node—yet the cost per GB for an all-DRAM system might be prohibitive. Organizations can use Intel Optane PMem to create balanced systems with plenty of memory, instead of being limited to memory-constrained systems due to cost concerns. As shown in Figure 1, using Intel Optane PMem for system memory lowers memory cost by up to 30%.[6]

As shown in Figure 2, for the most representative VDI configuration (based on Intel's experience and data from typical Nutanix deployments), the Intel Optane PMem configuration supports the same number of VDI sessions (150 per node) with minimal difference in latency (around 10 ms).[6]

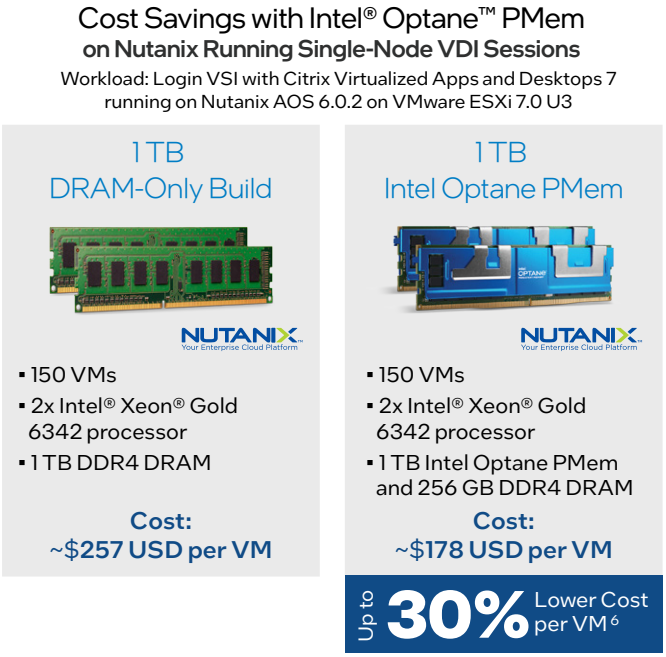

Figure 1. Replacing a portion of expensive DRAM with more affordable, large-capacity Intel® Optane™ PMem cuts memory cost by up to 30%.[6]

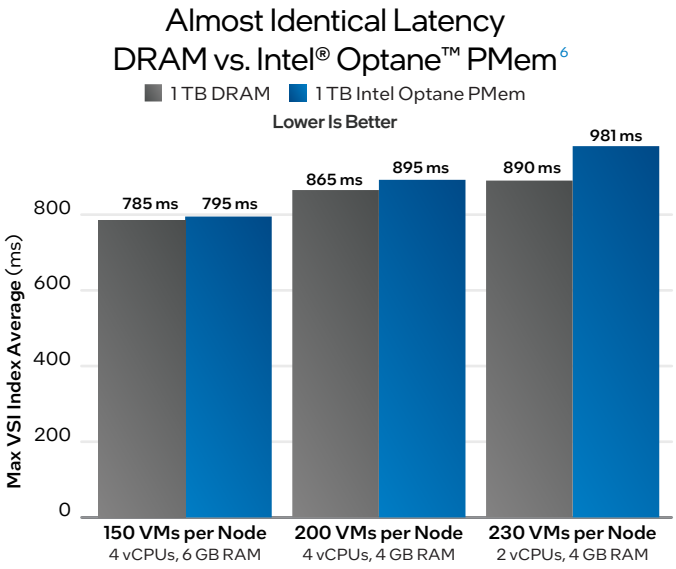

Figure 2. Scenarios representing use cases with a varying number of VDI VM sessions hosted per server node, each depicting the latency or response time difference between the DRAM-only and Intel® Optane™ PMem-based solution.

Solution Architecture: Tiered Memory in Nutanix HCI

In Memory Mode, Intel Optane PMem modules simply replace DRAM modules, with no other changes to the hardware or software stack. In this configuration, the small amount of DRAM is used as a fast-cache for hot data, while the large-capacity, low-cost/GB Intel Optane PMem comprises the main system memory (see Figure 3). The CPU memory controller handles data placement, either in the DRAM cache or in the system memory.

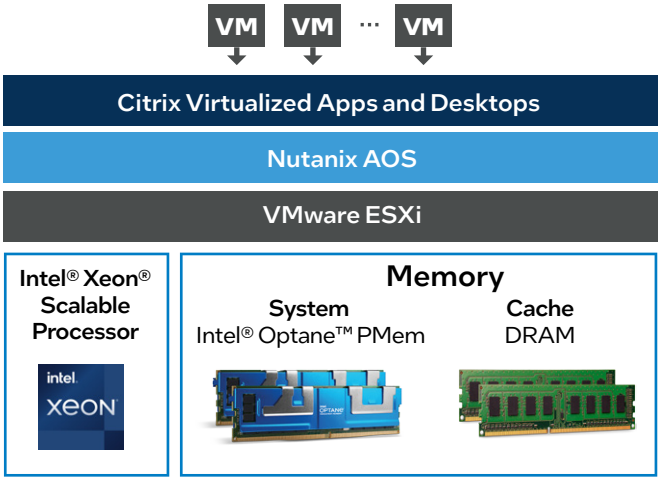

Figure 3. In Memory Mode, Intel® Optane™ PMem comprises main system memory (essentially a capacity tier), while a small amount of DRAM serves as a cache tier.

Table 1 outlines the Nutanix-supported configuration (per node) for 3rd Gen Intel® Xeon® Scalable processor-based platforms with Intel Optane PMem 200 series in Memory Mode. For VDI workloads, the most popular configuration is with 1 TB memory. The recommended DRAM/PMem configuration includes 16x 16 GB DDR4 DIMMs and 8x 128 GB Intel Optane PMem 200 Series DIMMs. This provides a PMem-to-DRAM capacity ratio of 4:1.

Table 1. Nutanix-Supported Intel® Optane™ PMem Configuration in Memory Mode

Component	Required Configuration
Mode	Memory Mode
CPU	3rd Generation Intel® Xeon® Scalable processors
Intel® Optane™ PMem	8x 128 GB Intel Optane PMem 200 Series
DRAM	16x 16 GB DDR4 @ 3200 MHz
Nutanix AOS	v6.0.2 or greater
Hypervisor	VMware ESXi v7.0U2 or greater
Platforms	Dell EMC XC 15G, HPE ProLiant Gen10 DX, Intel® Data Center Systems, Lenovo ThinkAgile HX Series

Note that it is recommended to use DRAM at 3200 MHz to enable optimal performance. Using slower memory may impact system performance.

Workloads will only support balanced configurations to help ensure optimal functionality and data transfer speeds. The Intel Optane PMem performance setting must be set to Balanced mode in the server BIOS. The Intel Optane PMem QoS setting was disabled during benchmark testing and is disabled by default. By enabling this setting, results will vary. The administrator should determine whether to enable or disable this setting. In addition, the VMware PMem support setting must be enabled.

Conclusion

VDI deployments continue to scale to meet remote worker demands and the need to lower costs. The ability to reduce memory cost by 30% by using Intel Optane PMem, with minimal effect on the VDI user experience, is compelling. The years-long collaboration between Intel and Nutanix has resulted in a Nutanix-supported VDI solution that can help enterprises continue their digital transformation and future-proof their businesses.

Learn More

You may also find the following resources useful:

- Intel Optane persistent memory
- 3rd Generation Intel Xeon Scalable processors
- Nutanix Support for Intel Optane Persistent Memory in Memory Mode article
- Nutanix HCI solutions for VDI
- Citrix Virtualized Apps and Desktops
- Announcing VMware vSphere Support for Intel Optane PMem Technology blog
- Using Persistent Memory article

Find the right solution for your organization. Contact your Intel representative or visit intel.com/optane.

Spotlight on Nutanix

In 2009, three IT experts founded Nutanix, Inc., a U.S.-based cloud computing company that sells software, cloud services (such as desktops-as-a-service, disaster recovery-as-a-service, and cloud monitoring), and software-defined storage. Since then, the company has grown quickly, acquiring more companies and going public in 2016. It now has more than 6,000 employees and has a broad portfolio of HCI-based solutions including AOS, Acropolis, Prism, Era, Frame, and Files. The 2021 Gartner Magic Quadrant for HCI named Nutanix as a Leader for the fifth year in a row.

Solution Provided By:

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[1] **Common configuration:** Test by Nutanix as of February 14, 2022. 1-node, 2x Intel® Xeon® Gold 6342 processor (24 cores, 2.80 GHz), Intel® Hyper-Threading Technology = ON, Intel® Turbo Boost Technology = ON, BIOS = WU10.104, ucode = 0x0D0002C1, VMWare ESXi 7.0 u3, Nutanix Acropolis OS 6.0.2, KnowledgeWorker/Login VSI 4.1.40.1, Citrix Virtualized Apps and Desktops 7 1912u4, number of VMs: 150, 200, 230, 300. **DRAM-only configuration:** DRAM = 1 TB (16 slots/64 GB/3200 MHz), total system memory = 1 TB, cost = ~$257 USD per VM. **DRAM + Intel® Optane™ PMem configuration:** DRAM = 256 GB (16 slots/16 GB/3200 MHz), Intel Optane PMem 200 series = 1024 GB (8 slots/128 GB/3200 MHz), total system memory = 1 TB, cost = ~$178 USD per VM. Intel Optane PMem serves as system memory, while a small amount of DRAM serves as a fast-cache. Priced at current list prices as of February 14, 2022. Prices change frequently. Your costs and results may vary. DRAM pricing referenced in TCO calculations is provided for guidance and planning purposes only and does not constitute a final offer. Pricing guidance is subject to change and may revise up or down based on market dynamics. Please contact your OEM/distributor for actual pricing.

[2] GlobeNewswire, "Global VDI Market Share Will Surpass USD 33.42 Billion by 2028 at 19.4% CAGR Growth," globenewswire.com/news-release/2022/01/17/2367880/0/en/Global-Virtual-Desktop-Infrastructure-VDI-Market-Share-Will-Surpass-USD-33-42-Billion-by-2028-at-19-4-CAGR-Growth-Says-Facts-Factors.html

[3] Nutanix, "How Nutanix Solves the Top VDI Deployment Challenges," nutanix.com/blog/how-nutanix-solves-the-top-vdi-deployment-challenges

[4] Ibid.

[5] Ibid.

[6] See endnote 1.

Performance varies by use, configuration and other factors. Learn more at intel.com/PerformanceIndex. Performance results are based on testing by Intel and may not reflect all publicly available security updates. See configuration disclosures for details. No product or component can be absolutely secure. Your costs and results may vary. Intel technologies may require enabled hardware, software, or service activation.