

Intel® Select Solutions for Nutanix HCI

Simplify deployment of a hyperconverged infrastructure (HCI) solution and fast-track your move to hybrid/multicloud

Solution Benefits

- HCI helps modernize data center infrastructure and speed time to value.
- Simplified scalability enables enterprises to rapidly add new or additional applications and data on a workload-optimized and cloud-ready infrastructure.
- Co-engineered and qualified HCI hardware/software solution takes the guesswork out of moving to hybrid/multicloud.
- Enhanced serviceability for storage devices and expansion of high-performance NVMe SSDs using Intel® VMD.



Executive Summary

What differentiates a flood of data from a treasure trove of data? For many businesses, it comes down to infrastructure. Legacy compute, memory and storage, and networking infrastructure cannot easily or economically scale to cost-effectively meet data-intensive enterprise needs. With legacy architecture, the data tends to become siloed in different systems that can't easily or quickly share resources. The result is inefficient use of infrastructure, because some systems go under-utilized while others are over-utilized. In addition, critical insights may go undiscovered because the data can't be analyzed across disparate systems. Enterprises spend too much time maintaining infrastructure that cannot adapt to new demands, leaving little time to focus on strategic initiatives that can drive business benefits.

Nutanix hyperconverged infrastructure (HCI) software running on Intel® architecture-based platforms helps enterprises reduce IT complexity, utilize their data better, and speed time to value. With easy-to-manage, high-performing HCI, enterprises can readily innovate and develop new business models using data analytics and artificial intelligence (AI), enterprise resource planning (ERP), collaboration, databases, and virtual desktop infrastructure (VDI)—all on a workload-optimized, cloud-ready, and security-enabled infrastructure.

Intel® Select Solutions for Nutanix HCI offer a faster, simpler path to infrastructure modernization and a hybrid/multicloud, while providing efficient use of infrastructure and performance for demanding, latency-sensitive workloads in the data center. The solutions combine a Nutanix HCI software stack with hardware built on 2nd Generation Intel® Xeon® Scalable processors, the Intel® SSD Data Center family, and other Intel® technologies. In addition, they are pre-configured and verified to help you quickly modernize infrastructure to support multiple complex workloads simultaneously.

Intel Select Solutions for Nutanix HCI—available in Base and Plus configurations—help improve both capital expenditure (CapEx) and operating expense (OpEx) efficiency by offering high-performing, scalable HCI solutions; the ability to consolidate multiple workloads; and the flexibility to simplify deployment and management. Improvements in the latest Nutanix HCI software stack, along with high-performance Intel® processors and SSDs, provide a turnkey solution that can help enhance storage performance and application responsiveness.

Business Challenge: Dealing with Today's Data on Yesterday's Infrastructure

Enterprises need to tap into their vast quantities of data for better decision making and increased competitiveness. But they cannot do so on complex, legacy IT infrastructure. HCI is a fast-growing segment of the data center market that is a popular strategy for infrastructure modernization. HCI is critical for enterprises that want to make the most of their data in any cloud—public, private, or hybrid/multicloud. As a result, the global HCI market is anticipated to reach a total annual value of USD 31.36 billion by 2026.¹

But knowing what the problem is—siloes data and outdated infrastructure—and solving it are two different things. IT leaders struggle to rapidly provision legacy IT environments. Researching, evaluating, and testing various certified solutions with the right options to meet enterprise needs is time-consuming. Wouldn't it be nice if there was an easy-button for building an HCI solution that is ready for today's demanding workloads?

Solution Value: High Performance and Scalability without Complexity

Nutanix HCI is a comprehensive software-defined stack that integrates compute, virtualization, storage, networking, and security to power applications at scale. It delivers high performance, availability, and simplified management for multiple workloads by offering flexible orchestration and control across on-premises and cloud environments.

Intel® architecture-based platforms running Nutanix HCI software help enterprises reduce IT complexity, utilize their data better, and speed time to value. Using Intel® Select Solutions for Nutanix HCI, enterprises can support many types of workloads—including data analytics and AI, ERP, collaboration, databases, and VDI—on a workload-optimized, cloud-ready, and security-enabled infrastructure. Nutanix and Intel architects and engineers collaborate to optimize HCI software that takes advantage of the underlying hardware technologies—including Intel® Xeon® Scalable processors, Intel® Optane™ SSDs, Intel® 3D NAND SSDs, and Intel® Ethernet Adapters—to bring the most benefit to customers.

By modernizing legacy infrastructure to a platform based on Intel® technologies and the Nutanix HCI solution, enterprises can cost-effectively scale to support increasingly demanding workloads. Intel architecture-based Nutanix HCI allows enterprises to scale out incrementally, one node at a time, as businesses require, for reduced capital expenditures (CapEx outlays). Nutanix HCI solutions and Intel technologies can be tailored to a variety of private or hybrid cloud use cases and workloads, providing the right balance of compute, storage, or memory.

Intel Select Solutions for Nutanix HCI help simplify IT with a co-engineered and qualified software and hardware solution that also provides the flexibility to choose from various server platform manufacturers and hypervisors, including Nutanix AHV, VMware vSphere, and Microsoft Hyper-V.

Intel Select Solutions further simplify Nutanix HCI deployments by:

- Optimizing configurations for Nutanix HCI software
- Reducing the time to evaluate, select, and purchase necessary hardware components
- Streamlining the time to deploy new infrastructure
- Delivering verified performance optimized to a specific threshold across compute, storage, and network on Intel architecture

A streamlined and consolidated virtualized infrastructure provides enterprises with an easier path to a hybrid cloud for current and future needs.

High Performance for Your Workloads

Intel Select Solutions are validated and benchmarked by Intel to provide a verified minimum level of performance. For Intel Select Solutions for Nutanix HCI, Intel ran two sets of performance tests. The first set of tests used Nutanix X-Ray to simulate I/O or storage workloads, while the second set of tests used Microsoft SQL Server with HammerDB to simulate a compute workload. **For I/O workloads**, the **Plus Configuration** delivered a 13 percent improvement in IOPS, and a 5 percent improvement in throughput, compared to the Base configuration³ (Figure 2). **For compute workloads**, the **Base Configuration** supported up to 3 million transactions per minute, while the Plus configuration boosted this performance by up to 73 percent to over 5 million³ (Figure 3).

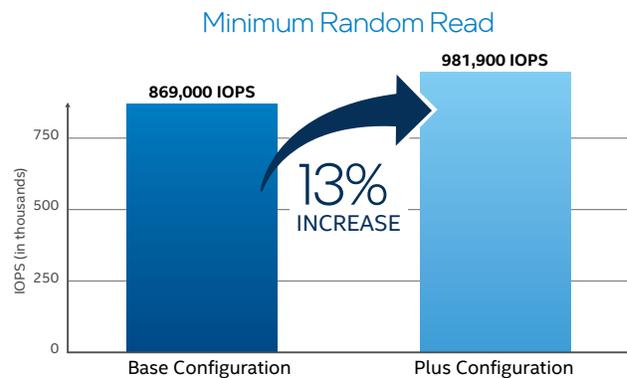


Figure 2. For I/O-intensive workloads, the Plus configuration boosted performance by up to 13 percent.

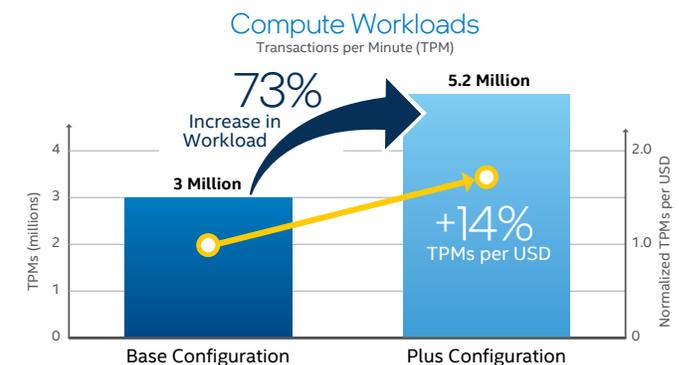


Figure 3. For compute workloads, the Plus configuration boosted performance by up to 73 percent.

Together, these tests prove that the Base configuration provides excellent I/O and compute performance, while the Plus configuration takes advantage of additional Intel technology advances, such as Intel Optane SSDs, to further boost performance. For additional information on test configurations, see [Appendix A](#) in this document, and also refer to the accompanying Reference Design document.

Solution Architecture: Latest Intel® Technology Combined into a Single HCI Solution

Intel Select Solutions for Nutanix HCI combine the latest hardware innovations from Intel to provide a high level of performance and scalability (see Figure 4). Below are the highlights of this pre-verified reference design.

2nd Gen Intel® Xeon® Scalable Processor Family

The [Base Configuration](#) uses the Intel Xeon Gold 6226 processor, while the [Plus Configuration](#) uses the higher-frequency Intel Xeon Gold 6246R processor. These processors are equipped with features that enhance multi-processor data flow and offer six memory channels using up to DDR4-2933 MT/s.

2nd Gen Intel Xeon Scalable processors offer high scalability that is cost-efficient and flexible, from the multicloud to the intelligent edge. They also accelerate AI performance across the data center.

Intel® SSDs

For the capacity tier, the Base configuration uses a high-capacity SATA drive, the Intel® SSD D3-S4510. Because the Plus configuration is designed to handle larger amounts of data, it uses a faster (and larger) NVMe drive, the Intel® SSD DC P4510.

Both configurations use NVMe-based drives for the persistent write buffer. The Base configuration uses two Intel SSD DC P4510 SSDs, which are based on 3D NAND technology. The Plus configuration is upgraded to the Intel® Optane™ SSD DC P4800X. The unique design of Intel Optane SSDs provides low latency, up to 60 drive-writes-per-day endurance, and high IOPS per dollar.² The P4800X accelerates applications for fast metadata, logging, caching, and fast storage to increase scale per server and reduce transaction costs for latency-sensitive workloads. All these SSDs are optimized for cloud infrastructures, offering large capacities with outstanding quality, reliability, advanced manageability, and serviceability to minimize service disruptions.

Intel® Select Solutions for Nutanix HCI

The Intel Select Solutions for Nutanix HCI have been validated and optimized on a 2U 1-node system that was based on the Intel® Server Board S2600WF family, using the 2nd Gen Intel Xeon Scalable processor family.

Intel® Ethernet Network Adapters

Intel Ethernet Network Adapters accelerate the delivery of new services and capabilities by increasing the speed and efficiency of network infrastructure. The Intel Ethernet 700

Series is the foundation for server connectivity, providing broad interoperability with multiple speed and media types; critical performance optimizations using intelligent offloads and accelerators to unlock network performance using Intel Xeon processors; and increased agility by supporting both kernel and DPDK for scalable packet processing.

Intel Xeon Scalable Platform Technologies

Along with high-performance processors and SSDs, Intel Select Solutions for Nutanix HCI include other innovative Intel technologies such as the following:

- **Intel® Volume Management Device (Intel® VMD).** A robust solution for enterprise-class hot swap with LED management of NVMe SSDs, with broad ecosystem support.
- **Intel® Hyper-Threading Technology (Intel® HT Technology).** Enables multiple threads to run on each core, so that systems can use processor resources more efficiently and also increases processor throughput, improving overall performance on threaded software.
- **Intel® Turbo Boost Technology.** Accelerates processor and graphics performance for peak loads, automatically allowing processor cores to run faster than the rated operating frequency if they're operating below power, current, and temperature specification limits.
- **Intel® Platform Trust Technology (Intel® PTT).** Root of trust with full Trusted Platform Module (TPM) functionality integrated into platform firmware. The new Intel PTT feature is available as an integrated versus discrete chip, to simplify integration and activation.
- **Intel® Boot Guard.** Hardware-based boot-integrity protection that prevents unauthorized software and malware takeover of boot blocks critical to a system's function, which provides an added level of security.
- **SPDK.** Provides a set of tools and libraries for writing high-performance, scalable, user-mode storage applications. SPDK is supported in beta mode in Nutanix AOS 5.18, but is fully supported in Nutanix 5.19.1 (now available).



Figure 4. By combining compute, memory and storage, and network hardware from Intel—along with other technologies that can boost security and manageability—Intel® Select Solutions for Nutanix HCI provide the modern infrastructure enterprises need.

Fast-Track Your Move to HCI and a Hybrid Cloud

Intel Select Solutions for Nutanix HCI offer a fast path to an efficient, scalable hybrid cloud architecture. The solutions let you replace complex legacy infrastructure with an optimized, performance-tuned HCI configuration verified for predictable performance—without the time and effort required to configure the stack.

Learn More

You may find the following resources helpful:

- [Intel Select Solutions](#)
- [2nd Generation Intel Xeon Scalable processors](#)
- [Intel Data Center Blocks](#)
- [Intel SSD Data Center Family](#) (includes Intel Optane SSDs and Intel 3D NAND SSDs)
- Intel Select Solutions are supported by [Intel Builders](#)
- [Nutanix HCI](#)

Find the solution that is right for your organization. Contact your Intel representative or visit [Intel Select Solutions](#).

What Are Intel® Select Solutions?

Intel Select Solutions are predefined, workload-optimized solutions designed to minimize the challenges of infrastructure evaluation and deployment. Solutions are validated by OEMs/ODMs, certified by ISVs, and verified by Intel. These solutions are developed by Intel in extensive collaboration with hardware, software, and operating system vendor partners on optimized Intel® L9 server systems and with the world's leading data center and service providers. Every Intel Select Solution is a tailored combination of Intel data center compute, memory, storage, and network technologies that deliver predictable, trusted, and compelling performance.

To refer to a solution as an Intel Select Solution, a vendor must:

- Meet the software and hardware stack requirements outlined by the solution's reference design specifications
- Replicate or exceed established reference benchmark test results
- Publish solution content to facilitate customer deployment

Solution providers can also develop their own optimizations in order to give end customers a simpler, more consistent deployment experience.

Appendix A

Table A1 provides the bill of materials for the Base and Plus configurations of Intel® Select Solutions for Nutanix HCI. Table A2 provides information about the reference design's network switch configuration. Table A3 provides the details about required software for benchmarking the Intel Select Solution. Table A4 provides information about the BIOS and firmware settings.

Table A1. Hardware Bill of Materials

Hardware	Base Configuration	Quantity per Node	Plus Configuration	Quantity per Node	Recommended or Required
CPU	Intel® Xeon® Gold 6226 processor at 2.70 GHz (12 cores/24 threads, 125W) or higher number SKU	2	Intel Xeon Gold 6246R processor at 3.40 GHz (16 cores/32 threads, 205W) or higher number SKU	2	Required
Memory (minimum)	384 GB (12 x 32 GB 2933 MT/s DDR4 DIMM)	12	768 GB (24 x 32 GB 2666 MT/s DDR4 2 DIMMs per channel or 2933 MT/s DDR4 1 DIMM per channel)	24	Required
Boot Drive	Intel® SSD D3-S4510 240 GB M.2 SATA	1	Intel SSD D3-S4510 240 GB M.2 SATA	1	Recommended
Oplog Persistent Write Buffer	Intel SSD DC P4510 2 TB 2.5" PCIe	2	Intel® Optane™ SSD DC P4800X 750 GB	2	Required
Capacity Tier (minimum)	Intel SSD D3-S4510 1.92 TB 2.5" SATA (or larger)	4	Intel SSD DC P4510 4 TB 2.5" PCIe (or larger)	4	Required
PCIe Switch	N/A	0	Intel® 4-Port PCIe Gen3 x8 Switch AiC AXP35WX08040	2	Recommended
Data Network (minimum)	10 GbE or higher Intel® Ethernet Network Adapter	1	2x 25 GbE RDMA-capable Ethernet adapter	1	Recommended
Management Network	Integrated 1 GbE or better	1	Integrated 1 GbE or better	1	Required

Note that the system must include at least four hardware nodes. All components have been integrated, validated, and optimized on a 2U 1-node system that was based on the Intel® Server Board S2600WF family, using the 2nd Gen Intel® Xeon® Scalable processor family. Testing conducted by Intel as of December 23, 2020.

Table A2. Network Switch Configuration

Hardware	Description	Required or Recommended	Quantity
Top of the Rack Switch	Base: Full-duplex 10 GbE SFP+ Switch with redundancy Plus: 25 or 40 GbE SFP+ Switch with redundancy	Recommended	1
Management Switch	1 GbE Switch	Recommended	1

Table A3. Software Versions

Component	Software	Required or Recommended
Operating System	Nutanix 5.18.06 STS <ul style="list-style-type: none"> NCC 3.10.1 LCM 2.4 	Minimum version required
Hypervisor	Nutanix 20190916.294 (or later)	Required
CPU Microcode	0x0500002c	Required
Operating System	Windows Server 2019 17763.1518	Required
Database	Microsoft SQL Server 2019 15.0.2000.5	Required
Benchmarking Tools	<ul style="list-style-type: none"> Server X-Ray 3.9.3 HammerDB 3.3 <ul style="list-style-type: none"> Windows Server 2019 17763.1518 ODBC Driver 17 for SQL Server 	Required

Table A4. BIOS/Firmware Settings Requirements and Recommendations

BIOS/Firmware Option	Set to	Required or Recommended
Intel® Hyper-Threading Technology	Enabled	Required
Intel® Turbo Boost Technology	Enabled	Required
XPT Prefetch	Disabled	Required
Enhanced Intel SpeedStep® Technology	Enabled	Required
CPU Power and Performance Policy	Performance	Required
C-states	Disabled	Required



¹ Gartner. "Global Hyper-Converged Infrastructure (HCI) Market Report 2020." [globenewswire.com/news-release/2020/12/01/2137378/0/en/Global-Hyper-Converged-Infrastructure-HCI-Market-Report-2020-Market-is-Expected-to-Reach-31-36-Billion-by-2026-Growing-at-a-CAGR-of-26-1-from-2019-2026.html](https://www.globenewswire.com/news-release/2020/12/01/2137378/0/en/Global-Hyper-Converged-Infrastructure-HCI-Market-Report-2020-Market-is-Expected-to-Reach-31-36-Billion-by-2026-Growing-at-a-CAGR-of-26-1-from-2019-2026.html).

² Intel. Product Brief: "Intel Optane SSD DC P4800X Series." [intel.com/content/www/us/en/solid-state-drives/optane-ssd-dc-p4800x-brief.html](https://www.intel.com/content/www/us/en/solid-state-drives/optane-ssd-dc-p4800x-brief.html).

³ Testing conducted by Intel as of December 23, 2020.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Performance varies by use, configuration and other factors. Learn more at [intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex).

Your costs and results may vary.

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