Microsoft Azure

intel.

White paper

Datacenter Modernization through Azure Stack HCI
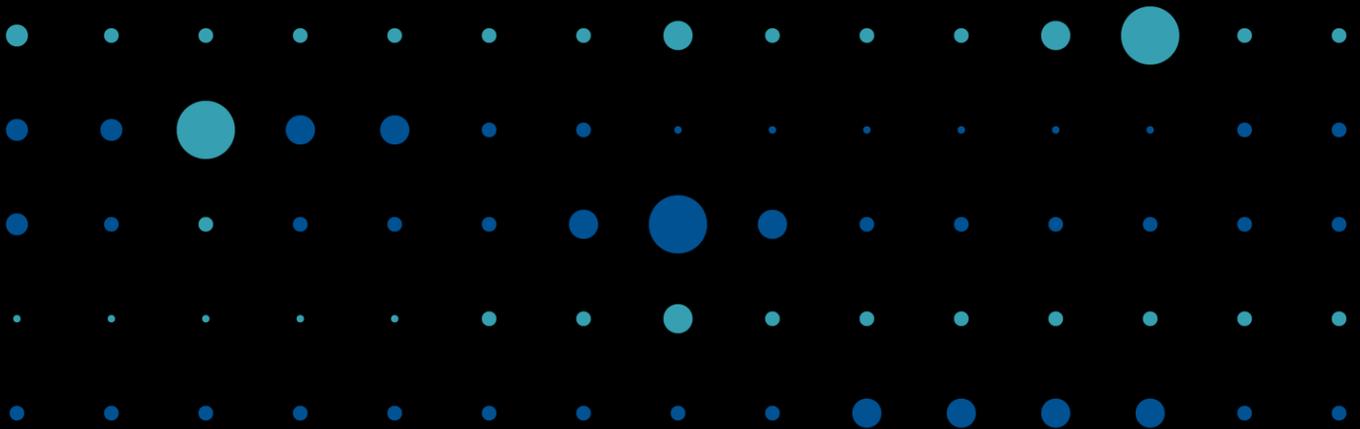
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Introduction

As a Hyper-V user, you understand the power and value of top-tier virtualization. Microsoft is committed to giving Hyper-V users the ongoing support and functionality they need to stay on the cutting edge of virtual computing. Azure Stack HCI is the latest and most potent step forward for Hyper-V and its users.

Businesses are seeing incredible benefits from the latest cloud technology and migrating more and more of our resources and compute power in that direction is the way to go... but not everything can go to the public clouds. Microsoft and Intel recognize and embrace that as we continue to march into a cloud-controlled future, some workloads need to remain on-prem, and it's time to lean into that.

Azure Stack HCI delivers the technology infrastructure to modernize your datacenters, simplify your management of both on-prem and cloud resources, integrate your edge and remote branches into your core infrastructure, and give you more control over your own hardware, scalability, and cloud environment than you've ever had before.

The power of modernization

Modernizing isn't merely necessary, it's ultimately inevitable... and extremely beneficial

The tech world looks incredibly different today than it did even a few years ago, let alone back when Hyper-V was first introduced. Hyper-V remains an elite hypervisor, but it was ultimately built as a hypervisor not as a full-service solution for a 2020 enterprise datacenter. Introducing Azure Stack HCI, a new hyperconverged infrastructure host operating system delivered as an Azure service providing latest and up-to-date security, performance, and feature updates.

Let's dig deeper on what has changed since Hyper-V was introduced - SSD drives dramatically outperforming HDD, the exponentially increased number of cores and RAM required by modern hosting, and the advent of cloud, edge, and cluster computing. Remote work was on the rise even before world events accelerated the scale of its adoption. Hyper-V adapted to the changes and while it's performed admirably in that role, a complete solution built for today's world is better suited for the modern computing ecosystem.

The reality is that your competitors will also be leaving legacy systems behind if they haven't already. Modernizing your older Hyper-V based systems to Azure Stack HCI will provide an invaluable competitive advantage. Hyper-V remains crucial, but it becomes much more powerful with HCI infrastructure on top of it, powered by Intel technologies.

There is an opportunity cost to waiting too long to modernize. Every day you're not using Azure Stack HCI is a day where you're using more space, more power, and more cooling... and spending more money doing it. The sooner you modernize, the sooner you benefit from Azure Stack HCI's greater compute density, reduced carbon footprint, and reduced overall costs. Considering that some hardware products have a 3-year warranty forcing regular upgrades or replacements, it makes sense to upgrade to Azure Stack HCI to save yourself on-prem space now and out-of-pocket upgrade and replacement costs for the foreseeable future.

You'll see the benefits of modernizing your datacenter once you have a stable new infrastructure in place - improvement in the nuts-and-bolts functionality, compute power, and time saved thanks to streamlined system management and a unified tool chain. You'll be able to reduce both cost and complexity while ramping up your efficiency, maximizing virtualization, and further benefitting from Azure integrations and native disaster recovery.

Why Hybrid? Why HCI?
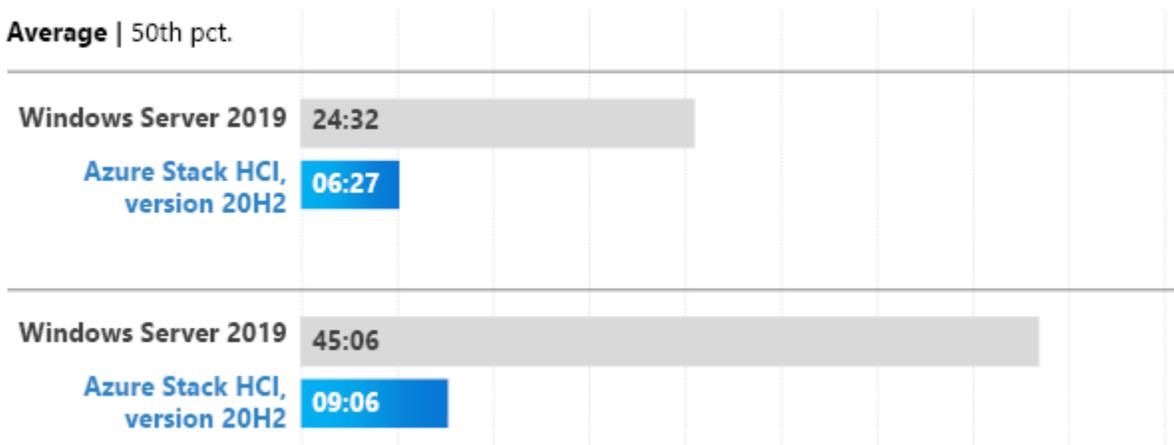
Hybrid computing combines the best of both worlds

Hybrid computing allows you to connect your on-prem and cloud resources. While clearly this is an improvement over managing them separately, pain points remain inherent to non-HCI hybrid computing, as those resources, while connected, are still discrete. While this allows VMs to simultaneously live on-prem while still connected to the cloud, it may also impose compute, storage, and networking limitations on the on-prem side of the system. Upscaling to meet higher demand on the cloud side of the system can likewise become untenably expensive. Often, these limitations necessitate additional products, fixes, or workarounds that can increase cost, complexity, or potential for error.

For example, a hybrid system may suffer from lackluster at-scale management. The best solution is using Microsoft System Center to manage more than a few VMs at a time. If you've already invested in System Center for management, it will work in concert with Azure Stack HCI, and you can further augment that combination with Azure-based hybrid tooling such as Site Recovery and Azure Monitoring.

Valuable scaling features such as granular auditing and fleet management are good examples that HCI can boast over legacy options, while Azure's monitoring and management tools grant you the elusive "single pane of glass" interface (through integration with Azure Arc) to manage everything in one place.

Below is an example of improvements that can be made in this new offering. Microsoft has optimized previous aspect of the solution to be more efficient on this new hyperconverged host.

Resync duration for Storage Spaces Direct (shorter is better)

Average | 50th pct.

Windows Server 2019	24:32
Azure Stack HCI, version 20H2	06:27
Windows Server 2019	45:06
Azure Stack HCI, version 20H2	09:06

Average results from internal testing, measured by applying a typical monthly OS patch under moderate-intensity I/O across several representative storage access patterns

HCI is the next evolution of hybrid computing

Hyperconvergence is an IT framework that combines virtualized storage, virtualized computing, and networking into a single optimized computing package to reduce data center complexity and increase scalability. Hyperconverged platforms include a hypervisor for virtualized computing, software-defined storage (SDS), and software defined networking (SDN).

With a hyperconverged infrastructure, you benefit from greater simplicity and flexibility than with legacy solutions. The integrated storage systems, servers and networking fabric are designed to be managed as a single system, across all instances of a hyperconverged infrastructure.

HCI pools all of your compute, storage, and network resources in one place, so they can be leveraged by whatever part of your system needs them most. It also brings them all together under one management umbrella, so you can control and manage everything—up to and including your Edge and remote offices—from one unified interface, streamlining not only the management, but shortening the learning curve for new admins by reducing the number of tools they need to master. If you're already a Hyper-V expert, then great news: you're already on your way to becoming an Azure Stack HCI expert, too.

One example of how HCI's resource pooling can make life easier: if you have performance-sensitive apps, like demanding SQL databases that are struggling in your legacy environment, Azure Stack HCI can help solve that problem.
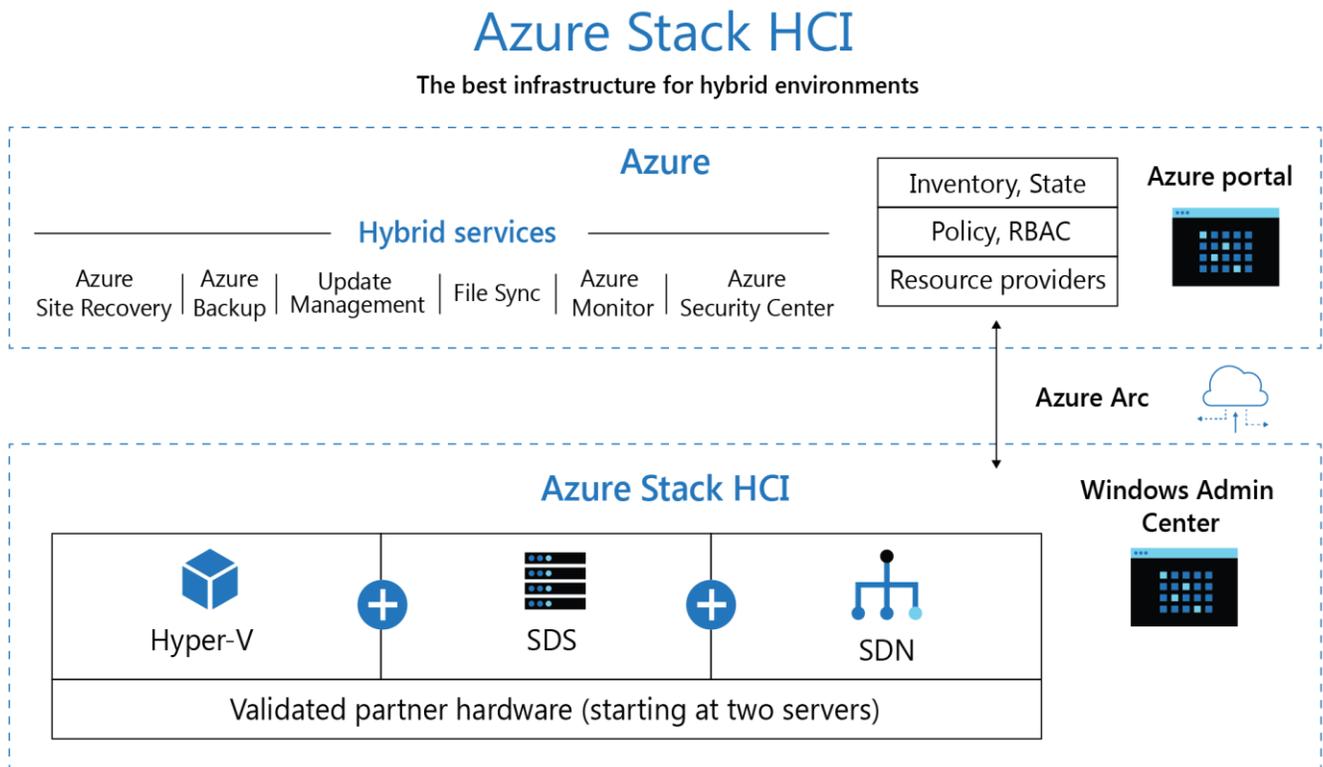
Why Azure Stack HCI?

Azure Stack HCI utilizes the virtualization capability of Hyper-V—which remains as Azure's hypervisor—and augments it with the power and versatility of hyperconverged infrastructure technology, giving you familiar tools with enhanced performance behind them. It also utilizes the efficiency of an HCI system to reduce your TCO by unifying resource management, leveraging Azure resources and reducing reliance on expensive legacy on-prem infrastructure such as SAN hardware.

The diagram below shows that Azure Stack HCI offers great Infrastructure as a Service (IaaS) with easy to use and manage capabilities for IT Admin daily operations, and integration to Azure through Azure Arc.

Azure Stack HCI

The best infrastructure for hybrid environments

Azure hybrid by design

Azure Stack HCI is built to work natively with Azure products and integrations, such as Azure Arc and Azure Portal, giving you familiar management tools. It can also connect to Azure hybrid services like Azure Security Center, Azure Backup, Azure Monitor, and Azure Site Recovery, among others. Your existing Azure Support contract covers Azure Stack HCI too; and you pay for Azure Stack HCI through your existing Azure subscription. This also means that as future Azure Stack HCI capabilities are introduced through Azure, you're in the best position to take advantage of them.

Natively integrates with Azure

Azure Resource Manager (ARM) resource represents each on-premise Azure Stack HCI cluster
Visibility in the Azure Portal and foundation for hybrid management
No fuss with agents or scripts – it's built-in!

The hybrid design of Azure Stack HCI allows you to monitor and manage your clusters at scale from the Azure Portal, enabling you to benefit from fleet management for hosts and VMs. This folds in nicely with your existing Azure workflows, allowing you to control the entire workflow—including apps, DBs, VMs, networks, storage, and individual projects—from a single interface. You can also view every single one of your Azure Stack HCI deployments at once, from New York to Tokyo to Paris and back; your entire operation is now one unified system. Instead of needing dozens of specialized tools to manage or monitor each individual piece of the puzzle, now you just need one.

Hardware partners and solution builders can plug into Windows Admin Center and develop extensions to keep firmware, drivers, and server BIOS up-to-date and consistent across all cluster nodes. Intel and other Microsoft partners provide a wide variety of solutions, including both validated hardware nodes and pre-racked integrated systems. Customers who purchase an integrated system with Azure Stack HCI already installed can easily upgrade to new capabilities using the new full stack update feature. Customers who simply purchase validated hardware nodes may need to perform the updates separately, according to the hardware vendor's recommendations, though even in this case it's a comparatively painless process.

Azure Stack HCI as an Azure Service

With Azure Stack HCI, you pay per physical core per month (as opposed to per socket) through your Azure subscription. Use of Hyperthreading does not impact license cost. No up-front software licensing costs. As a subscription-based model, Azure Stack HCI stays up-to-date, and you receive new features as they're released.

As an Azure service, customers can see and manage Azure Stack HCI using Azure Resource Manager. And you can extend role-based access control (RBAC) from Azure to your on-premises infrastructure with the help of Azure Arc.

As an Azure service, Azure Stack HCI boasts a simple support model. Customers using Azure Stack HCI can leverage the Azure support capability that comes with built-in product expertise and a direct-ticket process. This model offers a much simpler, more direct, and less expensive support experience than is available for competitive solutions.

As part of the Azure hybrid technologies suite, your HCI-as-a-service benefits from consistent feature and security updates on a regular cadence. Customers likewise benefit from Extended Security Updates (ESU) at no extra cost for workloads currently based on Windows Server 2008/R2. Essentially, you're always up to date, not just with your core Azure Stack HCI service, but with all of your native Azure integrations. With activation of the cluster and integration through Azure, you'll benefit from unified Azure billing and be able to leverage Azure support plans.

Converting your system to one unified Azure experience ultimately creates a single unified, powerful system that takes less effort to manage, backed by one of the most robust and comprehensive development and support environments in the world. Hyper-V will remain that system's beating heart, with Azure Stack HCI serving to provide it more a robust skeleton, musculature, and nervous system to work from.

Enterprise scale

Azure Stack HCI was designed to be a scalable solution, from a simple two-node system all the way up to enterprise-level deployments with 16 nodes running hundreds or thousands of VMs (for a single site). Scalability is accomplished through consolidating your hardware with increased server density and reduced overhead (as Azure can manage many services that once required local resources). By reducing those hardware needs, limiting your on-prem footprint, and virtualizing your system, Azure Stack HCI allows for agile scaling, while reducing your costs-per-node.

Azure Stack HCI generates savings by eliminating the need for SAN storage which can be complex, expensive, with limited scalability and hard to manage. Azure Stack HCI also brings your storage and compute closer together while reducing the complexity and physical on-prem requirements of a SAN. This equates to significant savings—paying a simple $10 per core per month—and with Azure Stack HCI, you can manage one intuitive system instead of dozens of complicated ones. Unlike SAN systems, which typically charge for storage capacity by the GiB, Azure Stack HCI does not penalize you for adding storage capacity.

There's also a meaningful distinction between the license-based model of most traditional systems, and an Azure subscription which includes Azure Stack HCI. A license gets you static access to a product, but a subscription provides ongoing access to product improvements and innovations. While Azure Stack HCI is already superior to many traditional deployments, it's still a comparatively young service. Think of how much more your Office 365 subscription can do today compared to even a few years ago. That's the sort of ongoing evolution inherent in a subscription model.

That digitization of your datacenter is an element of Azure Stack HCI's wider theme: integrating more and more of your system into the cloud. One facet of this development is the way in which Azure Stack HCI can virtualize your tried-and-true enterprise apps like Exchange, SharePoint, and SQL Server. Another is its capacity to virtualize Windows Server roles like File Server, DNS, DHCP, IIS, and AD. All of this comes while retaining unrestricted access to all of Hyper-V's best features, such as Shielded VMs.

Migrating that much of your system to the cloud naturally translates to on-prem benefits; specifically, less reliance and upkeep on physical space and hardware. At the simplest level, it means less hardware to worry about:
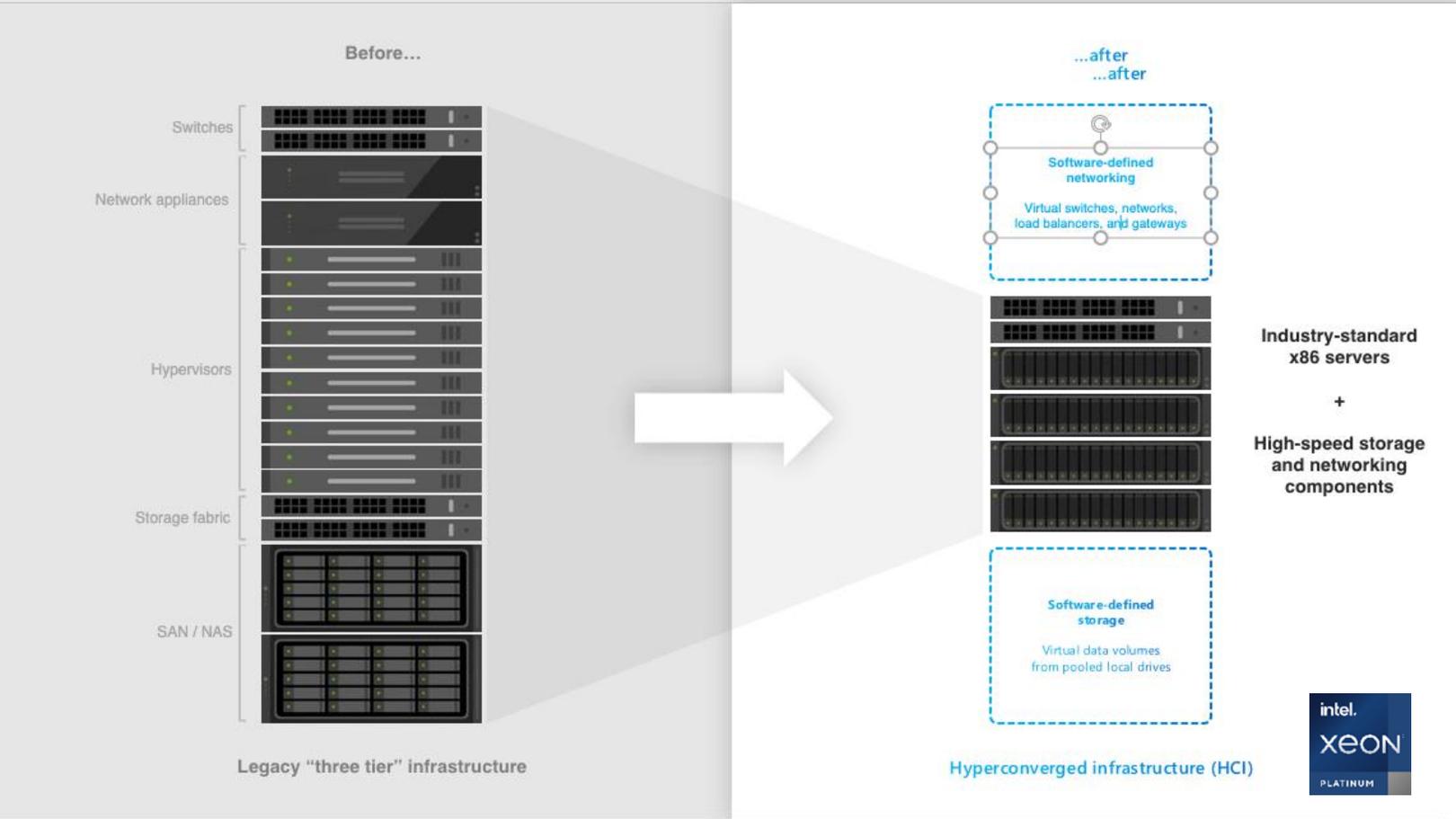
Less tech translates directly to smaller space, which then translates to less rent, lower property tax, or upkeep... which then translates to less money spent. Additionally, Azure Stack HCI requires a lot less to maintain—especially with the Azure Support subscription—which presents another form of savings, either in the cost of staff or in the opportunity cost erased by freeing up more of their time to be used elsewhere.

There's an ecological benefit to HCI as well; fewer machines mean reduced production, reduced waste, and ultimately, carbon footprint reduction as high as 67%[1]. Depending where you're operating there may be additional financial benefits, but we feel like those are merely a bonus; the real reward is that it's easier on the world we live in (and easier on you).

While we are in the section of enterprise scale, this is a good place to show the linear scalability of performance with Azure Stack HCI. As you add more nodes to your clusters, performance will grow nearly linearly making it much easier to do capacity planning and management. Other popular HCI solutions in the market are notoriously nonlinear in performance as you add nodes making capacity planning more of a guesswork exercise.
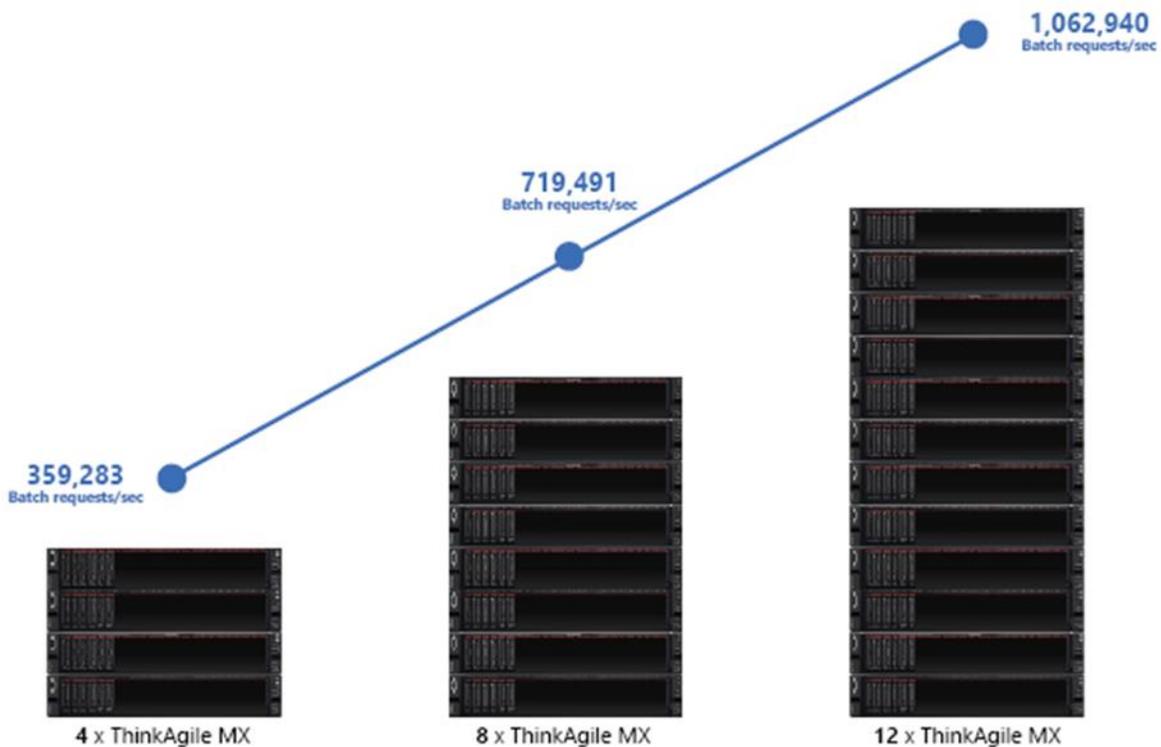
Powered by Intel Xeon Scalable processors

Simplify operations

We've already touched on examples of simplification, but it really is one of the core benefits of Azure Stack HCI. One element of that simplification people don't always think about is how valuable it is to have a single-source software vendor. Microsoft provides not only Hyper-V and all the software defined datacenter features in Azure Stack HCI, but the public cloud with Azure, SQL Server, and countless other products and services every business uses. That means that Microsoft is uniquely qualified to support, improve, or if necessary, troubleshoot the interactions between all of those critical elements.

Azure Stack HCI offers you a single software vendor, integrated experience across your edge, ROBO, data center, hybrid, and cloud deployments. You're likely already using Microsoft server software, and the adoption of Azure Stack HCI limits the need for additional training or support. Put another way, you get to keep all your favorite tools, Azure Stack HCI just makes sure they're all playing nicely together.

Familiar management tools like Azure Portal, Window Admin Center, and PowerShell are still present, incorporated into a single management console and control plane that covers your entire system, from compute to storage to networking to clustering.

With a single software vendor solution, you have one point of contact for everything software related. With that vendor being Microsoft, you keep all your core programs and functionality, and reduce adoption complexity.

Deployment flexibility

Another advantage of Azure Stack HCI is sheer versatility; unlike other solutions that can require extremely specific (and often expensive) hardware, Azure Stack HCI offers lots of flexibility. Azure Stack HCI works on over 200 validated solutions from over 25 Microsoft partners, many of them based on Intel technologies, so you can choose the partner who offers the best support and selection for your specific needs. If you have various needs and environments, nearly all the solutions can be configured by varying the processor, memory, storage, and network speed. All the most popular 2U rackmount servers today are validated, as top vendors including Dell Technologies, Hewlett Packard Enterprise, Lenovo, and Fujitsu count themselves among partners that support Azure Stack HCI.

While obviously every configuration is different, there's a good chance your existing hardware can run Azure Stack HCI, as it's supported by one of the largest computing ecosystems in the world. The broad Microsoft ecosystem will support a wide range of hardware innovations, such as RDMA, NVMe, and persistent memory. One notable change from previous offerings is that repurposed hardware is now supported by Microsoft, which represents another good opportunity for savings. For many companies, using existing hardware may present a budgetary advantage, as the associated expenses will then fall under operational expenses rather than capital expenses.

If your existing hardware is not able to take advantage of recent innovations or deliver adequate performance, you can deploy Azure Stack HCI either via validated nodes or integrated systems. Validated nodes are multi-part solutions offered by Microsoft partners that have already passed

validation tests. Azure Stack HCI is available in a wide variety of configurations, so whatever functionality you're looking for, it's likely the [Azure Stack HCI catalog](#) has the right solution for you.

Integrated systems, meanwhile, come pre-wired, pre-racked, and pre-configured. They're already optimized and ready to go, the most plug-and-play deployment option. A specific suite of hardware options that present an excellent upgrade opportunity is the DataON HCI Intel Select Solutions suite. Many solutions leveraging Intel hardware are configured and shipped in their own rack, ready for immediate deployment; this is especially a value-add at the edge, where existing IT infrastructure is minimal or absent entirely. Edge deployments may need as little as 2 server nodes, and we offer solutions with as little as 4 cores in a tower server form factor well suited for remote office/brand office environments at the edge. A plug-and-play solution that brings your full compute power to bear for your edge and branch office deployments can save you not only money, but more importantly, time and stress; Intel's Select Solutions and Azure Stack HCI combine to circumvent a lot of potentially painful migration headaches by providing an out-of-the-box solution pre-loaded with familiar tools and functionality. Intel Select Solutions are based on extensive testing to determine the best price/performance configurations to meet the requirements of a range of workloads. Each configuration is verified to meet or exceed a specific performance threshold, providing confidence that the solution can meet your needs without extensive additional testing or POCs. Multiple OEMs deliver these Integrated Systems to market.

Stretch clustering

Azure Stack HCI brings a stretched cluster solution for BCDR (Business Continuity and Disaster Recovery) to Hyper-V users for the first time.

Stretch clustering provides automatic failover to restore production quickly, and without the need for manual intervention. Storage Replica provides the replication of volumes across sites for disaster recovery, with all servers staying in sync.

Storage Replica supports both synchronous and asynchronous replication. Synchronous replication mirrors data across sites in a low-latency network with crash-consistent volumes to ensure zero data loss at the file-system level during a failure. Asynchronous replication mirrors data across sites beyond metropolitan ranges over network links with higher latencies, but without a guarantee that both sites have identical copies of the data at the time of a failure.

There are two types of stretched clusters, active-passive and active-active. You can set up active-passive site replication, where there is a preferred site and direction for replication. Active-active replication is where replication can happen bi-directionally from either site.

An *active* site is one that has resources and is providing roles and workloads for clients to connect to. A *passive* site is one that does not provide any roles or workloads for clients and is waiting for a failover from the active site for disaster recovery.

Sites can be in two different states, different cities, different floors, or different rooms. Stretched

cluster using two sites provides disaster recovery and business continuity should a site suffer an outage or failure. If you're locally replicating (within a low latency zone), you can use active-active replication, while if your datacenters are far from one another geographically, you'll instead use active-passive replication. Either way, you're covered against catastrophe in case one of your datacenters unexpectedly goes down.

Since Azure Stack HCI's stretch clustering is built-in at the platform level, it's much easier and less expensive to deploy than non-HCI options or alternatives. It offers built-in encryption, as well as cluster validation to protect against potential hardware or configuration problems before a cluster goes into production. Cluster validation helps to ensure that the Azure Stack HCI solution that you're about to deploy is truly dependable. You can also use cluster validation on configured failover clusters as a diagnostic tool.

Stretch clustering not only protects your data and progress, it presents opportunities for greater synchronicity across your system. One valuable example might be operating a single dev environment simultaneously in two datacenters. Functionally, Azure Stack HCI's stretch clustering creates an on-premises cloud environment, with many of the usual benefits you'd associate with such a resource: security, agility, and redundancy.

## Use cases

Datacenter modernization

Digital transformation in an enterprise starts with refreshing the datacenter infrastructure. By replacing monolithic and legacy storage-area network (SAN)-based storage with Azure Stack HCI, you'll dramatically reduce the footprint of your datacenter from 30% to as much as 60%[2].

An example of this reduced footprint is shown below with a customer who has been able to reduce their footprint while achieving a higher level of performance. The reduction in rack space also provides power and cooling savings.
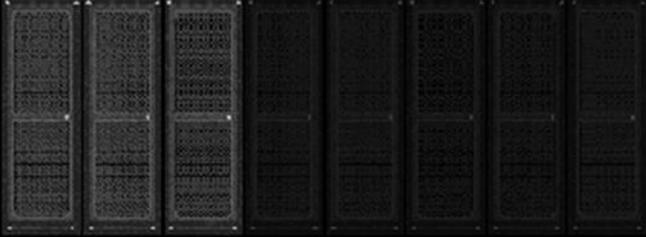
Before, datacenter footprint with 8 racks...
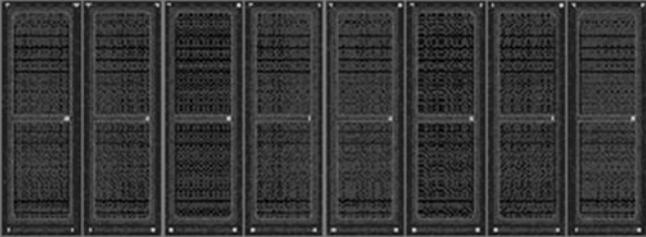
14 clusters · Windows Server 2012 R2 · SAN

After Azure Stack HCI implementation, datacenter footprint with three racks.

3 clusters · 11 x ThinkAgile MX SR650 per cluster · Intel® Optane™ P4800X

RESULT IN MAJOR SAVINGS IN POWER, SPACE,COOLING

Example courtesy of Lenovo

All the above clusters are powered by Intel Xeon Scalable processors

Azure Stack HCI transforms your datacenter by enabling you to virtualize and consolidate aging physical servers onto a modern, more secure platform. You can better secure older VMs with no cost Extended Security Updates (ESU) for Windows Server 2008 and Windows Server 2008 R2, and you can improve security for the host with Secure Boot, Trusted Platform Module (TPM) 2.0, BitLocker encryption, and built-in mitigations for hardware and firmware-based attacks. Azure Stack HCI offers a broad portfolio of enterprise security features such as Secure Boot, Unified Extensible Firmware Interface (UEFI), and Trusted Platform Module settings (TPM).

Modernization benefits made available through Azure Stack HCI are even further enhanced by integration with Azure and Azure Arc. Thanks to this integration, your Azure Stack HCI cluster on premises can make use of Azure Active Directory accounts and RBAC from Azure. Critically, you can and will also be able to create and manage virtual machines from the Azure Portal leveraging Azure Arc (not available at GA, but in an upcoming update). It's an integration designed to maximize your datacenter efficiencies by leveraging the public cloud.

As part of this digital-transformation journey, it's important to simplify datacenter operations by using tools that unify management of compute, storage, clustering, and networking and provide a single point for technical support. Through Microsoft tooling and support, Azure Stack HCI delivers a unified, single software vendor vision.

Edge computing and branch offices

Azure Stack HCI represents a renewed focus and investment from Microsoft in edge infrastructure. With that investment in mind, Azure Stack HCI makes sure branch offices and edge locations that have unique space, noise-level, cooling, form factor, and mounting requirements now have access to the on-prem resources and security needed for particularly demanding jobs. Gone are the days when you were limited by your physical location for what work you could do; with a small Remote Office Back Office (ROBO) Azure Stack HCI solution you can now access a VM to perform virtually any job.

For that ROBO scenario, Azure Stack HCI keeps size requirements and per-location costs low by providing an option for HCI in just two nodes and through direct, back-to-back—or switchless—networking , avoiding the space and expense of a high-speed switch. Space requirements and costs are minimized because no external storage is needed in the solution. If you have multiple branches or remote locations, these cost savings at each site rapidly add up in your favor. The combination of compact design, affordable price, and unique features such as nested resiliency brings both availability and reliability to ROBO scenarios, while the Azure integration allow you to monitor all of your ROBO scenarios from a single interface, accessible from the convenience of your home office.

Additionally, Azure Stack HCI partners offer solutions with low core count still capable of running the typical number of VMs running in ROBO, as another cost-cutting option. An entry price that low is extremely hard to match with other HCI solutions. You can further reduce costs by making use of Azure cloud services for the cluster quorum witness, or for backup and security, without having to deploy additional on-premises infrastructure. Once again, Azure Stack HCI's integration with Azure and Azure Arc empowers you to monitor all of your Azure Stack HCI deployments from a centralized view in the Azure Portal - which can significantly lighten the management burden on your IT administrators.

In simple terms, Azure Stack HCI reduces on-prem needs in ROBO or edge scenarios while simultaneously improving performance and minimizing cost. Specifically, with a per core per month cost, you can save significantly by utilizing one of the low core count servers available from the [Azure Stack HCI catalog](). Many ROBO scenarios run fewer than 12 VMs and in those cases 4-8 core count servers can handle the entire workload with Azure Stack HCI. The graph below demonstrates how Azure Stack HCI allows edge scenarios to scale gracefully.
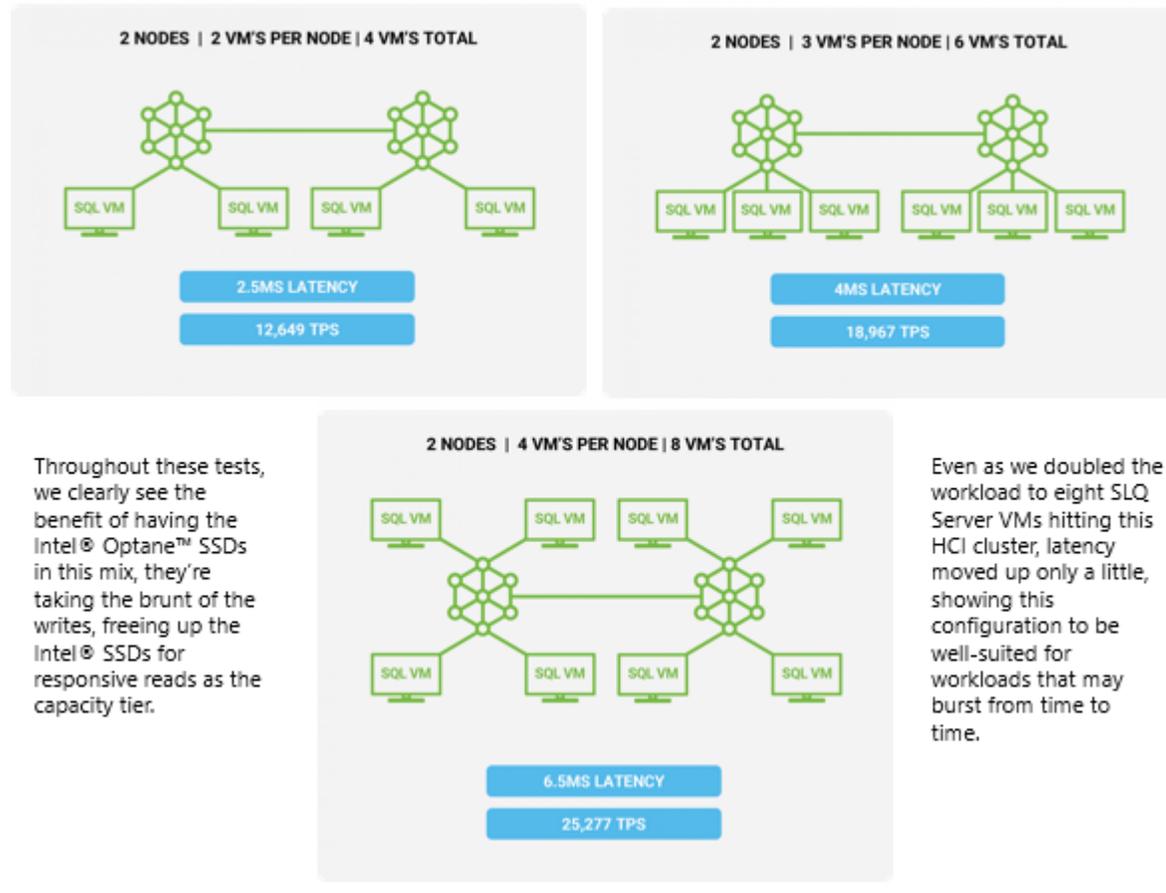
This graphic is courtesy of DataOn and StorageNewsletter.

High performance SQL

Azure Stack HCI can achieve industry-best performance for SQL Server databases. This is accomplished in part by the ability to run SQL on HCI without the need of an agent in kernel mode, removing a dependency from the process and accelerating performance. If your current SQL databases are struggling in your legacy environment, Azure Stack HCI is both an instant fix and a meaningful leap in modernizing your datacenter. Lenovo has demonstrated the ability to reach

1,062,940 batch request/sec using the TPC-C benchmark workloads.

Benchmark Set-up (courtesy of Lenovo)
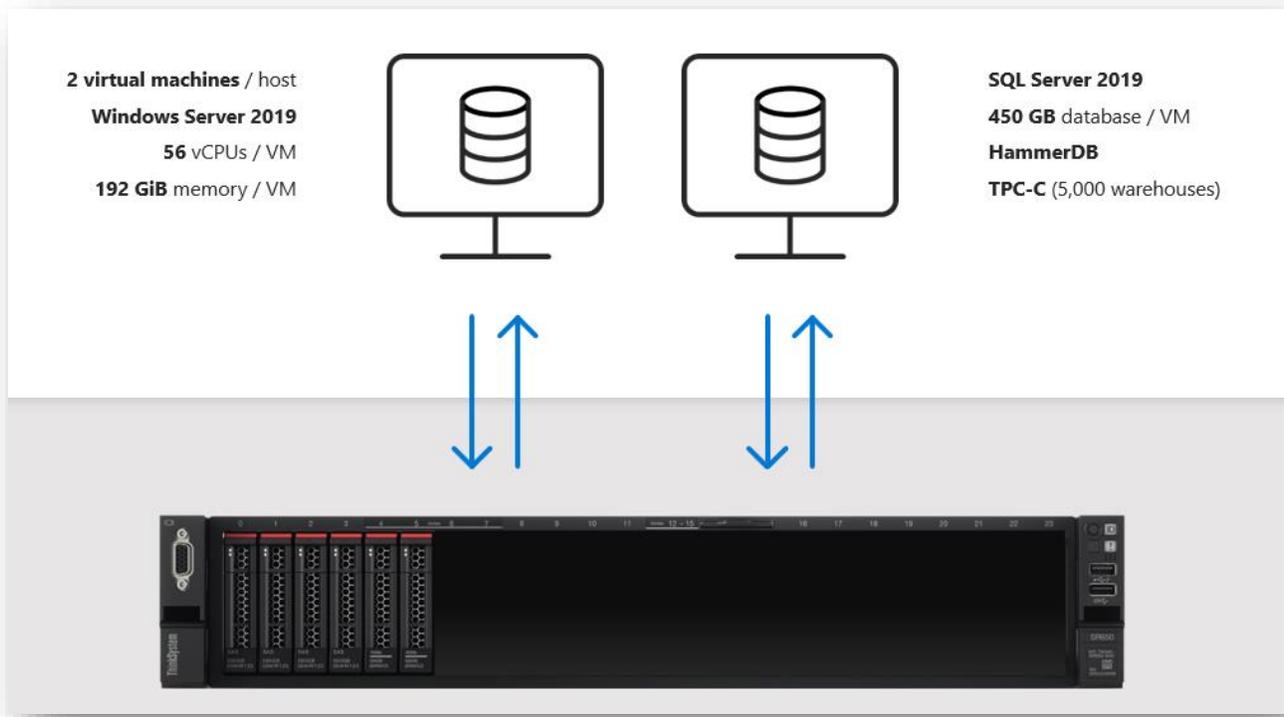
Storage Spaces Direct | Three-way mirror | Volumes delimited to 4 servers each | In-memory CSV read cache disabled

Credit to http://www.tpc.org/tpcc

Intel delivers breakthrough memory for Azure Stack HCI

Intel has been collaborating with Microsoft to optimize its technology portfolio as the foundation for Azure Stack HCI. To support the maximum performance for SQL Server, you can use high-bandwidth solid-state drives (SSDs) with NVM Express (NVMe) and Intel® Optane™ persistent memory (PMem) in a single storage tier. You can find these options in Azure Stack HCI validated nodes or integrated systems. Intel Optane PMem is strongly correlated with the best performance of SQL databases. As you can see below, Optane PMem has more than doubled the performance on its latest 2nd Gen Intel®
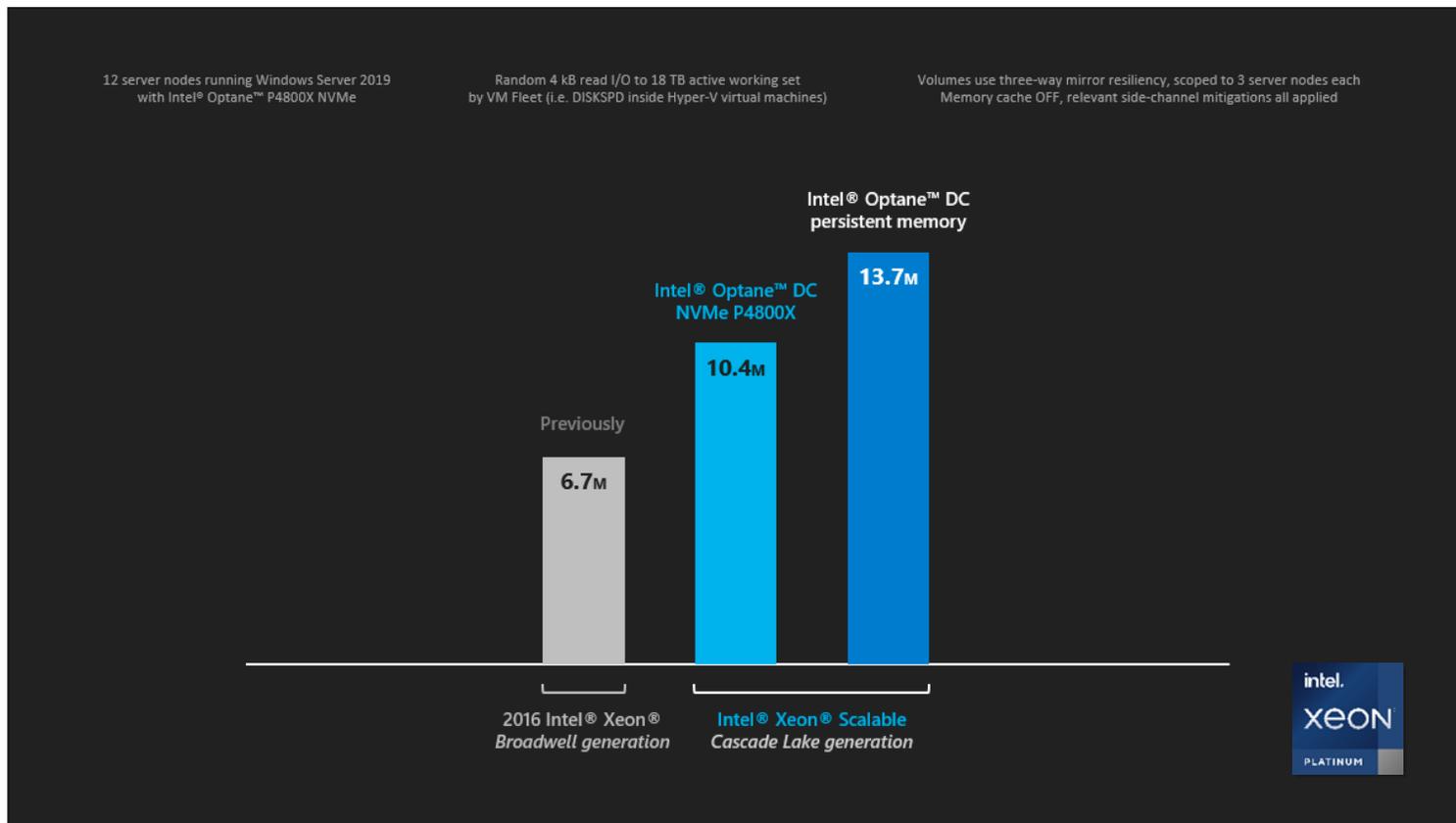
Xeon® Scalable processors.

Figure 1: Intel Optane Performance

Price and business model

Azure Stack HCI is significantly cheaper than traditional server/storage architecture solutions

Azure Stack HCI represents a tremendous savings opportunity, by eliminating SAN costs, both financial and physical. It synergizes with many of the Windows or Azure services you're already paying for, scales with your business, and reduces carbon footprint. It saves on security as well, shipping with Defender ATP already built-in, Virtualization Based Security (Credential Guard, Remote Credential Guard, etc.) and Azure Security Center only a few clicks away.
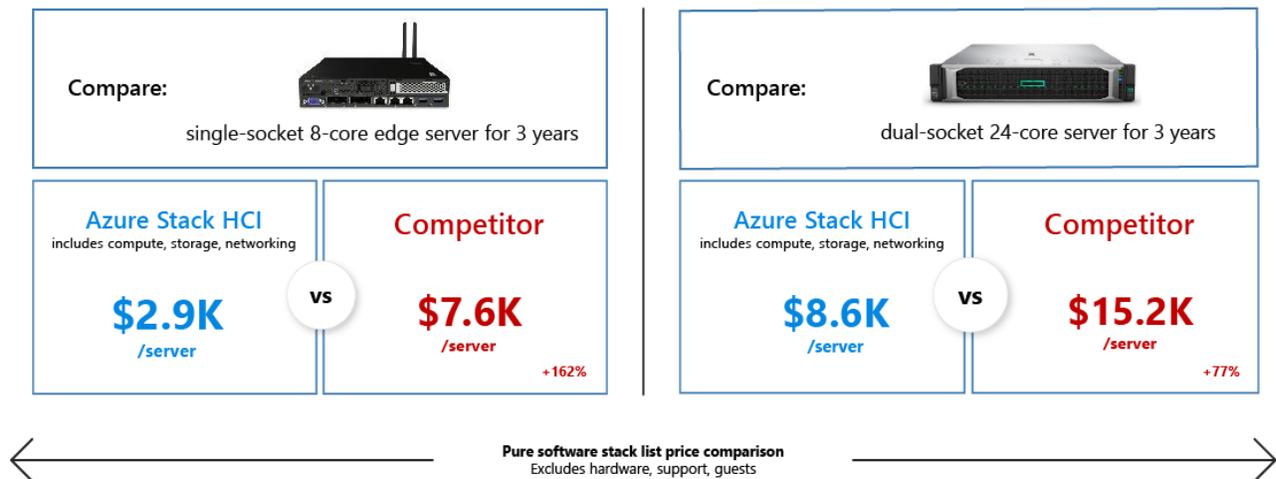
Azure Stack HCI can save you up to 72% versus popular competing options (based on competitor public list price), and that's before factoring in additional savings on support, security, or hardware. It also doesn't factor in all the built-in savings associated with Azure Stack HCI being a part of your Azure subscription, as opposed to a less-integrated third-party solution that likely requires additional hardware, training, maintenance, and integrations to use.

As a subscription service, Azure Stack HCI is more of a future-focused investment than a one-time

purchase. You'll continue to benefit from new features, integrations, and updates in perpetuity, so the value of your subscription will only increase while your TCO stays low.

It's the rare solution that improves performance and lowers cost at the same time, and it's significantly cheaper than competing HCI options, while still outperforming their offerings in important arenas like SQL Server performance.

Better value for money with Azure Stack HCI

Compare:	single-socket 8-core edge server for 3 years		Compare:	dual-socket 24-core server for 3 years	
Azure Stack HCI includes compute, storage, networking		**Competitor**	**Azure Stack HCI** includes compute, storage, networking		**Competitor**
$2.9K /server	VS	**$7.6K** /server +162%	**$8.6K** /server	VS	**$15.2K** /server +77%

Pure software stack list price comparison
Excludes hardware, support, guests

Hardware Considerations

- Intel has been collaborating with Microsoft to optimize their technology portfolio as a foundation for infrastructure modernization with Azure Stack HCI. We have been working with Intel on two critical fronts, performance, and security. By providing the flexibility to securely move, store and process data across any environment from cloud to edge, Microsoft Azure Stack HCI combines high performing virtualized compute, storage, and networking on industry-standard servers with components optimized for 2nd Generation Intel Xeon Scalable processors.

- 2nd Gen Intel Xeon Scalable processors provide a broad range of SKUs to help users to scale the performance of their Azure Stack HCI clusters to meet the requirements of different workloads.

- Azure Stack HCI takes advantage of Intel Optane persistent memory, large-capacity memory combined with data persistence. As a result, you can consolidate workloads with greater levels of performance and capacity. Intel and Microsoft also are partnering together on advancing protection for you using Intel's Total Memory Encryption technology to help increase VM protection.

- Adding Intel® Optane™ Solid State Drive (SSD) to Microsoft Azure HCI can help organizations eliminate data center storage bottlenecks and allows bigger, more affordable data sets. It can

accelerate applications, reduce transaction costs for latency-sensitive workloads, and improve overall data center TCO with a smaller data center footprint.

- The Intel Ethernet 800 Series network adapters enable Microsoft Azure Stack HCI to move volumes of data efficiently and securely across clouds, on-prem and edge environments, supporting multiple storage protocols and maximizing virtual resources.   With Intel Ethernet 800 Series network adapters, Azure Stack HCI users have choice when selecting storage protocols with both iWARP and RoCEv2 RDMA supported. The Intel Ethernet 800 Series network adapters deliver up to 2X more virtualization resources than the previous generation network adapters.

- As part of the continuous improvements offered by an Azure Stack HCI and through collaboration with Intel, Azure Stack HCI users can also look forward to a pair of upcoming Intel features: MKTME and Secure Core, both of which will be available with the 3rd Gen Intel Xeon Scalable processors (code named *Ice Lake*). These innovations were designed at Microsoft's request, and are specifically designed with Azure Stack HCI in mind.

How do I get started?

If you'd like to use your existing hardware, you'll need to check our Azure Stack HCI catalog to verify if it's HCI capable, then simply set up or modify your Azure subscription and download the software. Otherwise, you can simply start by picking out your hardware. Azure Stack HCI offers both a wide variety of validated nodes and pre-racked integrated system solutions, with a low barrier to entry. Intel Select Solutions for Azure Stack HCI in the Azure Stack HCI catalog are the best place to start, as these are already validated by the server OEM, performance verified by Intel, as well as certified by Microsoft for Azure Stack HCI. Once you've picked out your preferred hardware, it's just a question of setting up your subscription and support plan to make sure you've got all the integrations and backup you need.

When it's time to decide on your hardware choice, please visit the Azure Stack HCI catalog and take a look at different validated configurations. There are over two hundred configurations provided by over twenty-five device partners. Nearly all of these solutions are running on various Intel Xeon Scalable processors, Intel Optane technologies, and Intel Converged Network Adapters.

How to buy Azure Stack HCI

1

Get HCI-capable hardware

Buy validated hardware (from 2 to 16 nodes) from your preferred hardware partner

2

Get an Azure subscription

Your subscription gives you access to hybrid services and software downloads

3

Get an Azure support plan

Receive comprehensive technical support from Microsoft

Figure 3. To deploy Azure Stack HCI, you need to buy compatible hardware, an Azure subscription, and a support plan

Conclusion

Azure Stack HCI offers the optimal infrastructure for Hyper-V users, building a scalable, high-efficiency system around your existing Hyper-V and Windows Server expertise.

Azure Stack HCI lets you easily extend your on-premises management to the cloud through Azure hybrid services for backup, monitoring at scale, disaster recovery, and more. Hyper-V remains the core of your virtualization efforts, and all your skills and expertise remain as valuable and applicable as ever. Azure Stack HCI just allows them to leverage more tools, more compute flexibility, and more support.

Azure Stack HCI also helps you scale your business by consolidating on-prem infrastructure more efficiently with lower costs without sacrificing storage, functionality, or power. It brings everything together as a single software vendor solution and unified experience, meanwhile streamlining service and support.

An Azure Stack HCI experience can be optimized on a single underlying platform from Intel that provides scalable compute, storage and networking capabilities with the broad range of Intel Xeon Scalable processors, Intel Optane technologies, and Intel Ethernet 800 Series network adapters.

As an Azure service, Azure Stack HCI helps you benefit from the wider Azure ecosystem, in addition to ongoing updates, improvements, and features throughout your subscription.

Azure Stack HCI is a new beginning for Hyper-V users, providing needed updates and additions to provide you with the virtualization capabilities, at-scale management, and autonomy the ever-changing IT world demands.

It isn't an update to Hyper-V so much as an innovation, bringing Hyper-V back to the cutting edge of virtualization, and putting your business in the best possible position for ongoing success, flexibility, and evolution.

Learn more about Azure Stack HCI www.azure.com/hci
Learn more about Intel technologies www.intel.com