Microsoft Azure

Azure Stack HCI: An overview

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Introduction

Businesses in recent years have chosen to host many of their applications in the public cloud to reap benefits such as simpler maintenance and improved scalability. But cloud hosting is not necessarily the best option for every workload, and many of these same organizations continue to host other services on local infrastructure—to keep operating expenses lower, for example, or simply to stick with a hosting strategy that already works. To support these workloads hosted on premises, businesses have increasingly been embracing hyperconverged infrastructure (HCI) as the preferred way to lower costs, improve performance and availability, and simplify operations. HCI, in short, is quickly becoming *the* way to deploy servers in the datacenter.

Microsoft has recently announced the new Azure Stack HCI – a hyperconverged infrastructure host operating system delivered as an Azure service. This white paper is designed to provide an overview of this HCI host platform and to familiarize readers with what is different about this HCI product.

What is it?

It is a hyperconverged infrastructure stack

Azure Stack HCI is a cloud-inspired HCI software stack from Microsoft that runs on your on-premises servers (or in a co-location facility) that you own, control, and manage.

Azure Stack HCI is built on the enterprise-class hypervisor, Microsoft Hyper-V, (the same hypervisor that powers Azure) which delivers efficient server virtualization with a high level of security and with broad support for Windows and Linux virtual machines (VMs).

The software stack also includes software defined storage: Storage Spaces Direct. This technology consolidates all local drives in the infrastructure, whether solid-state devices (SSDs) or hard-disk drives (HDDs), into a pool of software-defined storage (SDS) that is both fast and resilient.

The third building block in Azure Stack HCI virtualization is Software Defined Networking (SDN). SDN helps you gain productivity and reduce infrastructure costs by enabling you to centrally create, configure, and manage virtual network devices such as routers, switches, and gateways in your datacenter.

Azure Stack HCI makes use of traditional clustering capabilities and delivers a high-availability and built-in disaster-recovery capability through a new feature called *stretch clustering*. Stretch clustering can help ensure that workloads stay up and running even in the event of a site-wide catastrophe.
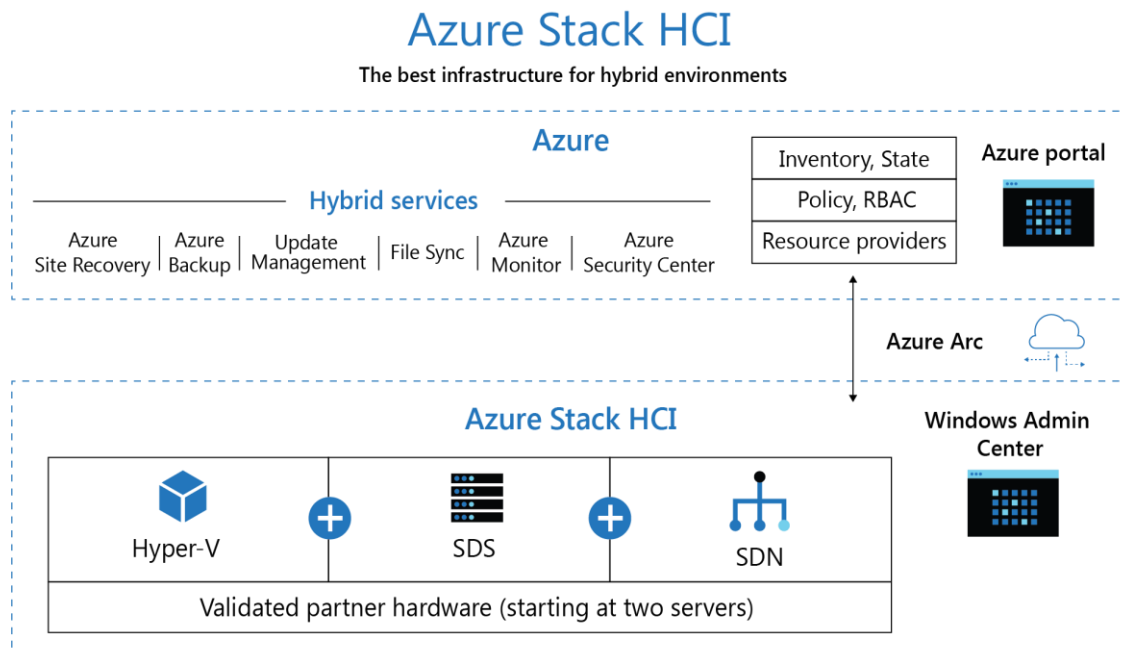

Figure 1. Architecture of the Azure Stack HCI solution

With Azure Stack HCI, you benefit from unique cloud-enhanced capabilities and features that greatly simplify administration, such as hot patching, a simpler update process for the whole stack (including the firmware, software, and BIOS/UEFI), and at-scale server monitoring.

It is an Azure service
Azure Stack HCI is available through Azure.com. You pay per cores (as opposed to per socket) through your Azure subscription, with no up-front software licensing costs. As a subscription-based model, Azure Stack HCI is always up-to-date, and you receive security updates and new features seamlessly, on an ongoing basis. You no longer need to wait for a new product release to get new features; you get them as soon as they are available.

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.

Besides these native integrations with Azure, you can add further Azure integrations through Windows Admin Center, a key management tool for Azure Stack HCI. Windows Admin Center greatly simplifies the ability to enhance Azure Stack HCI with additional Azure services, such as Azure Security Center, Azure Site Recovery, Azure Backup, Azure Monitor, and more that are added regularly. As a result of these optional integrations, Azure Stack HCI can serve as an ideal hybrid solution for customers who are just beginning to enjoy the benefits of the public cloud.

Another advantage gained by Azure Stack HCI as an Azure service is a simpler support model. Azure Stack HCI now makes available 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 through traditional support.

It is easy to manage with familiar tools
Azure Stack HCI is easy to deploy, manage, and update through new graphical user interface (GUI)-based workflows and purpose-built dashboards, as shown in Figure 2. In addition, all management tasks are completely scriptable using the popular, cross-platform PowerShell automation framework.
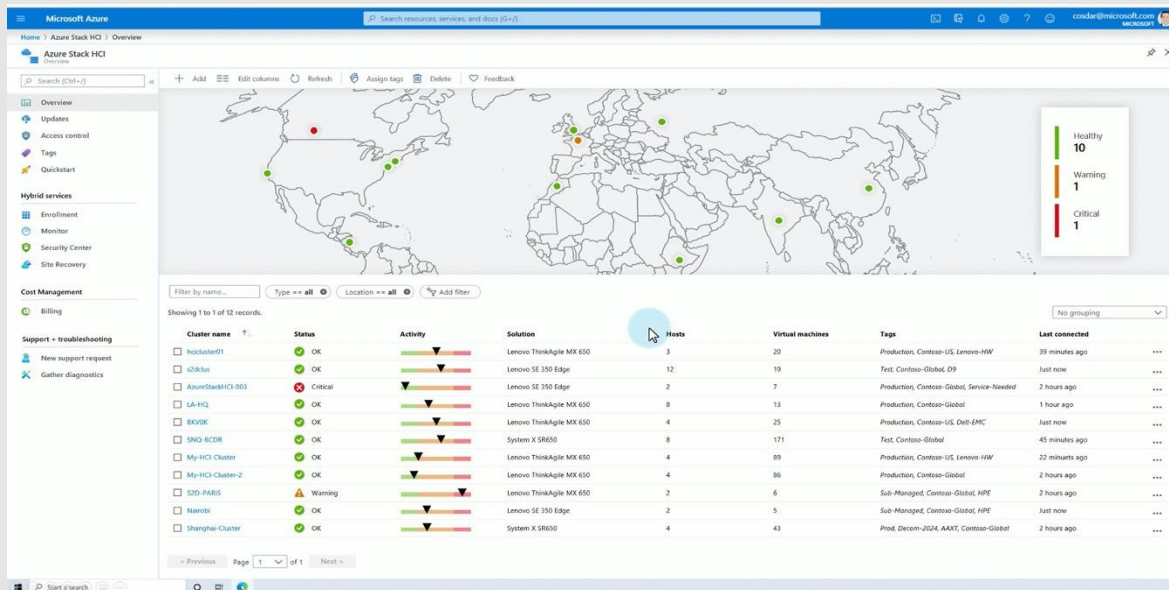
Figure 2. Azure Stack HCI simplifies administration with powerful, GUI-based tools and workflows

Azure Stack HCI is easy to deploy into your existing IT environment. It can join a pre-existing Active Directory domain or forest, fall within the scope of Group Policy, and be managed through popular tools such as Microsoft System Center. Drawing upon the strength of the broad partner ecosystem for Windows Server, Azure Stack HCI works with popular third- party tools that IT admins have long used for backup, security monitoring, disaster recovery, and more.

Azure Stack HCI is built using many familiar building blocks. Most administrators who have experience with Hyper-V or Windows Server will already be familiar with the virtualization and storage concepts used within Azure Stack HCI.

It works with your choice of hardware
With Azure Stack HCI, you choose and buy hardware from your preferred server vendor, so you can get the best available service and support in your region. Microsoft does not require any changes or get in the way of your purchasing process. Your existing hardware-procurement processes remain valid for this product.

Azure Stack HCI gives you the flexibility to start small, with just two servers, and seamlessly scale out as your organization's needs grow (up to 16 servers per cluster). Customers can opt for an integrated-system solution for Azure Stack HCI, which delivers the quickest time-to-value through the convenience of preinstalled software, integrated drivers, and firmware updates.

If you require more options in your choice of components, you can simply select from more than 150 validated nodes that utilize industry-standard x86 hardware. Azure Stack HCI requires nothing "exotic" or custom-built.

For additional flexibility, Azure Stack HCI supports repurposed, existing hardware that customers already own. Simply match systems, storage, and networking components (such as host bus adapters [HBAs]) with the validated hardware described in the Azure Stack HCI catalog to provide the right quality of experience.

What can I use Azure Stack HCI for?

In this section, we are introducing the reader to three use cases that are particularly relevant with customers of this host platform. Other use cases popular in the industry are referred to at the end of this section.

Datacenter modernization
Digital transformation in an enterprise often starts with refreshing the datacenter infrastructure. By replacing monolithic and legacy storage-area network (SAN)-based storage with Azure Stack HCI, you can reduce the footprint of your datacenter (some customers have seen a 35% reduction .[1] Replacing your SAN with the local virtualized storage in Azure Stack HCI can also reduce the overall cost of storage—some customers have seen a drop by a factor of four.[2]

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 free extended security updates 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 novel attacks like Spectre and Meltdown. Azure Stack HCI offers a broad portfolio of enterprise security features.

In the digital-transformation journey, it helps 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 realizes this unified, single-vendor vision.

The modernization benefits made available through Azure Stack HCI are even further enhanced by its upcoming integration with Azure and Azure Arc. Benefiting from this integration, your HCI cluster on premises can make use of Azure Active Directory accounts and RBAC from Azure, and you can also create and manage virtual machines in Azure. These benefits are significant for customers looking to gain datacenter efficiencies from the public cloud.

Branch office and edge

In remote office and branch office (ROBO) environments, there are often significant constraints on infrastructure. Most of these environments do not have datacenters with elevated floors or cooling, for example. Space is also at a premium, and IT equipment in ROBO scenarios often gets deployed in relatively cramped locations, such as a closet. Beyond these physical constraints, IT expertise is often limited, so the solutions deployed need to be simple to operate and manage.

Azure Stack HCI is ideal to meet the needs of ROBO scenarios. 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 networking, avoids the space and expense of a high-speed switch. Space requirements and costs are minimized because no external storage is needed in the solution. And because customers often have many branches or remote locations, these cost savings at each site can be significant. Through its compact design, affordable price, and unique features such as nested resiliency, Azure Stack HCI brings high availability and reliability to ROBO scenarios, where standalone server deployments are typical.

Azure Stack HCI partners offer solutions with low core count still capable of running the typically lower number of VMs running in ROBO therefore reducing overall solution cost.[3] This low entry price is hard to match with other HCI solutions in the market. You can further reduce capital expenditures by making use of Azure cloud services for a cluster quorum witness, or for backup and security, without having to deploy additional
on-premises infrastructure. And through integration with Azure and Azure Arc, you can manage all your Azure Stack HCI deployments from a centralized view in the Azure portal, further reducing the management burden for IT administrators.

High performance for SQL Server

The most recent release of Azure Stack HCI offers the best performing HCI solution on the market.[4]

High level performance is crucial for SQL Server deployments and Azure Stack HCI offers a high-performing, scalable, and manageable implementation for Microsoft SQL Server. Although the native SQL Server features already provide high availability for databases through AlwaysOn Availability Groups, running SQL Server in an Azure Stack HCI cluster allows you to run SQL Server and its associated applications with the added resiliency of virtualization.

When used to host SQL Server, Azure Stack HCI offers the benefit of a single vendor for its hypervisor, host operating system, and database server. This advantage allows the underlying code to be optimized for performance, and ensures a single party is responsible for resolving issues when they appear. Azure Stack HCI offers flexibility to host VMs based on both Windows and Linux, which provides the freedom to choose either the Windows or Linux version of SQL Server—whichever best suits your needs.

As a platform for SQL Server, Azure Stack HCI benefits from the broad support of the Windows Server platform for modern hardware innovations. Azure Stack HCI deployments built to support database servers are typically optimized for performance based on the latest available technologies. To support the highest performance for SQL Server, you can use high-bandwidth solid-state drives (SSDs) with NVM Express (NVMe) and Intel Optane persistent memory in a single storage tier. You can find these options in Azure Stack HCI validated nodes or integrated systems.

Azure Stack HCI use cases
This overview paper focuses on three particular use cases (datacenter modernization, ROBO, and SQL Server), but other use cases are documented in the Azure Stack HCI catalog.

How to buy Azure Stack HCI (relevant when GA lands)

Purchasing Azure Stack HCI
To get started with Azure Stack HCI, you need to acquire three components:
1. Compatible server hardware
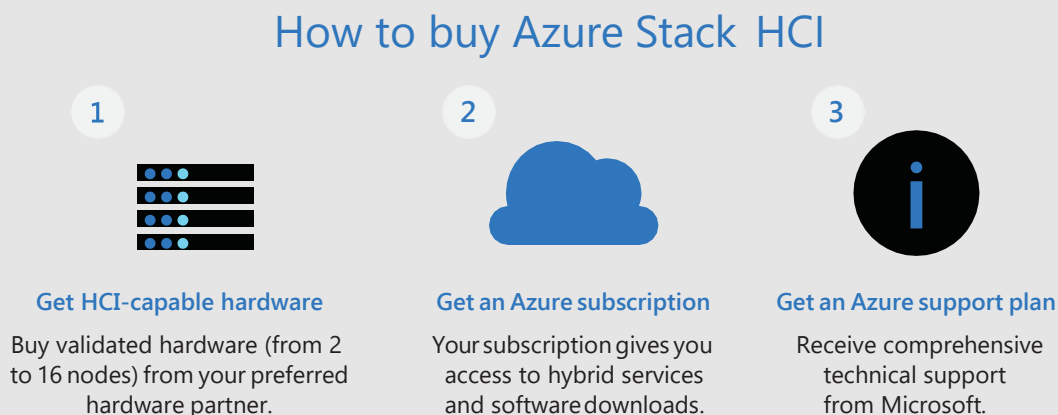2. An Azure subscription
3. An Azure support plan

How to buy Azure Stack HCI

1	2	3
Get HCI-capable hardware	**Get an Azure subscription**	**Get an Azure support plan**
Buy validated hardware (from 2 to 16 nodes) from your preferred hardware partner.	Your subscription gives you access to hybrid services and software downloads.	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

Compatible server hardware

As mentioned earlier, you have several options for acquiring the hardware for Azure Stack HCI. For the fastest, simplest deployment and quickest time-to-value, you can choose a fully integrated system as an appliance. These solutions are searchable in the [Azure Stack HCI catalog](). Integrated-system options will be available from many of the major server vendors. With this type of preconfigured solution, keeping the system up to date is easy: software, firmware, and the BIOS can all be updated in a single process, which reduces the administrative burden.

If you want more flexibility in your choice of components or configurations, you can choose from many validated reference designs available from your favorite hardware vendors. Through these reference designs, you can easily choose a solution tailored to your specific environment, selecting from a wide range of options for storage performance, capacity, and compute.

Azure Stack HCI may support hardware that you already have. To be compliant and supported, your hardware must match one of the validated node configurations.

Customers acquire hardware for Azure Stack HCI independently of Microsoft, and Microsoft is not involved in the pricing of these hardware solutions. Be sure to contact your preferred hardware provider in your region to get the most up-to-date pricing for solutions available.

Azure subscription

Because Azure Stack HCI is an Azure service, you need an Azure subscription to use it. You can use an existing Azure subscription (including an Enterprise Agreement subscription), sign up for a new Azure subscription at Azure.com, or obtain an Azure subscription through a cloud solution provider (CSP).

The Azure subscription grants you access to Azure services, and once you sign in, you can download the Azure Stack HCI host operating system and Windows Admin Center management tool, if not already preinstalled on your servers.

Azure support plan

As an Azure service, you need an Azure support plan to receive Azure Stack HCI technical support from Microsoft. You can make use of an existing Azure support plan if you already have one, or you can purchase a new Azure support plan, as long as you buy at least the "Standard" plan, which supports an unlimited number of cases for $100/month.[5] To receive Azure support, you use the built-in tool on the Azure portal to write a support ticket making it easy to get the support you need.

You also have the option of obtaining solution support through your hardware vendor. In this case, you might not need to buy an Azure support plan.

Conclusion

Azure Stack HCI is an HCI solution from Microsoft that brings together software-defined compute, storage, and networking on industry-standard x86 servers. Through Azure Stack HCI, you can run Windows and Linux VMs with high availability, on your company premises by relying on existing IT skills and familiar tools. Delivered as an Azure subscription service, Azure Stack HCI is installed on your choice of server hardware, and it is automatically kept up to date as new features are made available.

Azure Stack HCI lets you easily extend your on-premises management toolset into the cloud through Azure hybrid services for backup, monitoring at scale, and more. The integration of Azure Stack HCI with Azure services enables you to modernize your aging server and storage infrastructure in an optimal way, gaining many of the benefits of hybrid solutions.

The world of IT is undergoing constant change. To remain competitive, service providers and enterprises must keep up with the ever-growing complexity and massive speed of innovation. Azure Stack HCI from Microsoft is the next level of innovation in HCI.

Learn more about Azure Stack HCI and download the trial at **www.azure.com/hci**

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[1] A major Norwegian hoster for accounting solutions, with more than 12,000 regional customers and approximately 285,000 SQL Server databases, reduced its footprint with Azure Stack HCI from eight racks (14 clusters running Windows Server 2012 R2) to three racks (three clusters with 11 x Lenovo Think Agile MX SR650 per cluster and Intel Optane SSD DC P4800X drives running Windows Server 2019).
[2] Based on existing customers' implementation data shared internally with Microsoft.
[3] See Azure Stack HCI Catalog: **https://aka.ms/azurestackhcicatalog**
[4] Storage Review. "Microsoft Azure Stack HCI Review (DataON HCI-224 with Intel Optane NVMe)." September 2019. **www.storagereview.com/review/ microsoft-azure-stack-hci-review-dataon-hci-224-with-intel-optane-nvme**.
[5] Microsoft. "Azure Support: Standard." **https://azure.microsoft.com/en-us/support/plans/standard/**.