

# Microsoft HCI Solutions from Dell

Presenter: Elmar Szych – Cloud Sol. Architect



**DELL**Technologies

# C4 Mission Statement



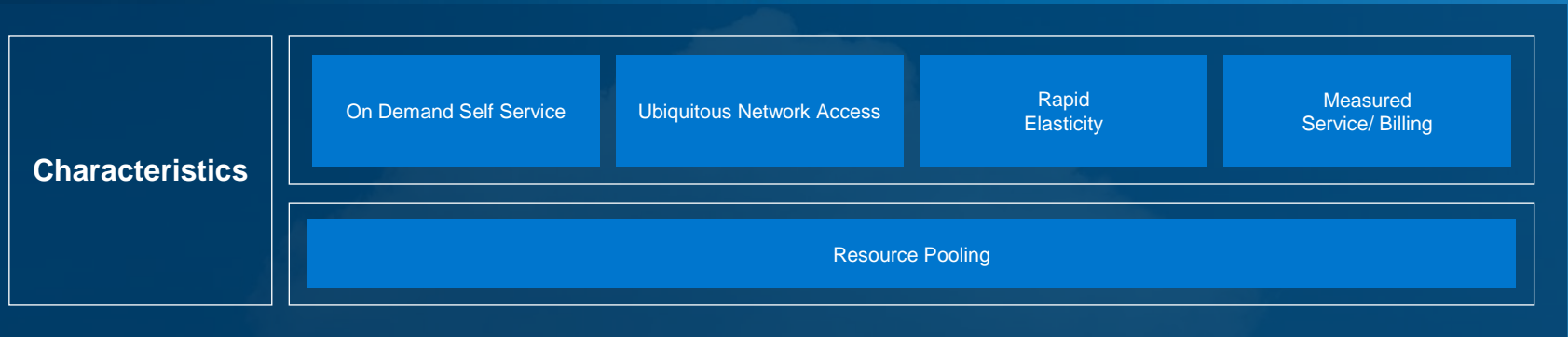
„ Our Goal is **to support** the Account teams  
on **every Cloud or Container** related  
Customer **Opportunity**.

From **inital talks** until the order is **booked**.“

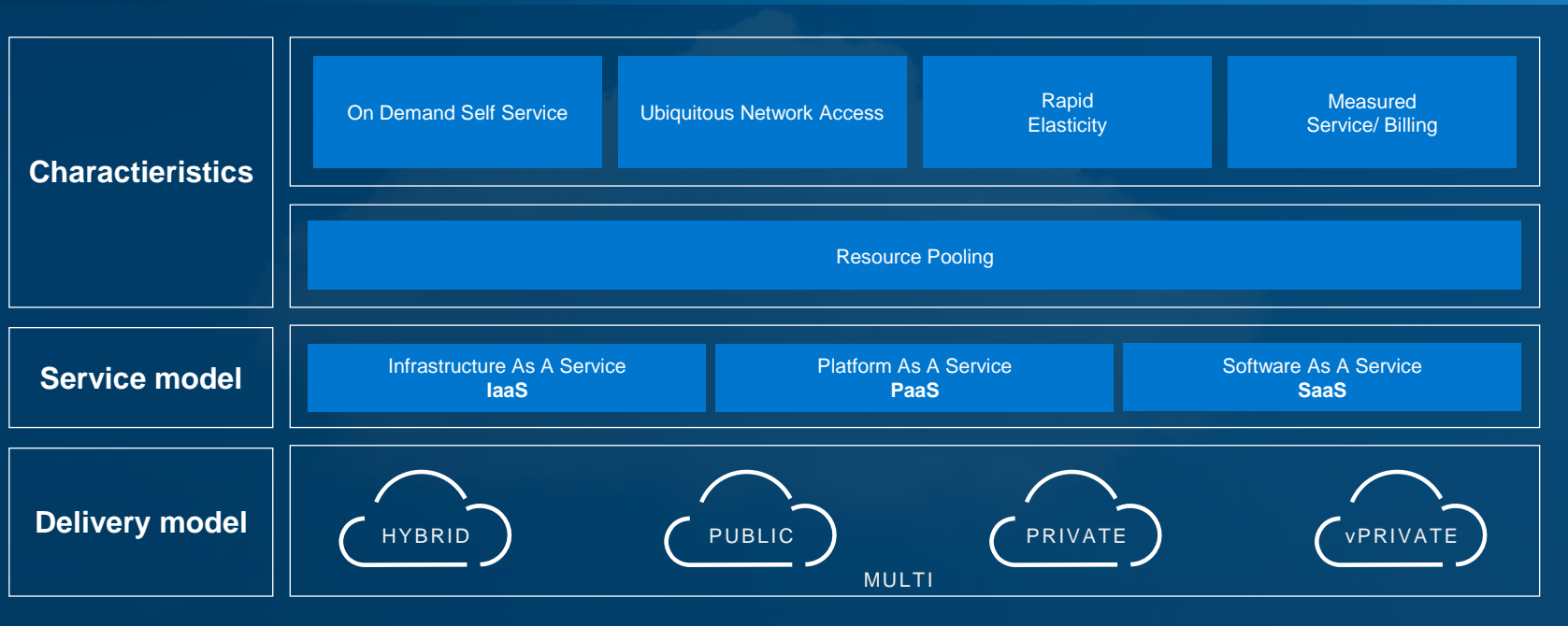


**Cloud is not a place,  
it is an operating model**

# Cloud Models & Characteristics (NIST)

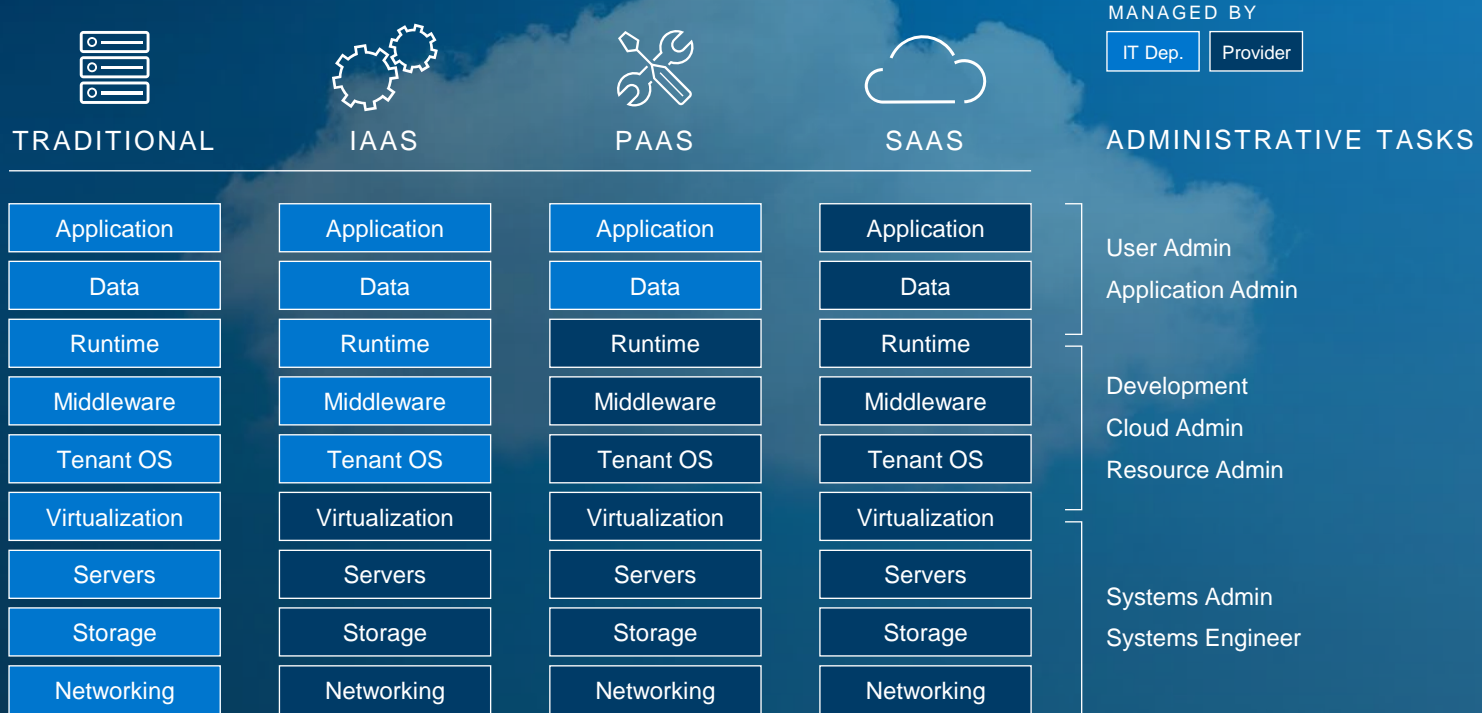


# Cloud Models & Characteristics (NIST)



# Cloud Management Overhead

Responsibility across the “Cloud Platform Solution Stack”



# Digital Transformation

Every organization is rethinking how they engage with customers, employees, partners and vendors



New demands and requirements from developers, end users and existing workloads



Every corner of the business is being impacted, from the core to the edge



IT environments are becoming more complex



All these challenges must be resolved with limited human interaction

# Customer environments are evolving

IT is increasingly playing a more strategic role within the business

## 100's–1,000's of apps

 VMs  Databases

 Containers  Serverless



## Diverse infrastructure

 Datacenters  Hyperscalers

 Branch offices  Colocation and Service Providers

 IoT devices  Edge

## Multi-cloud

 Microsoft Azure

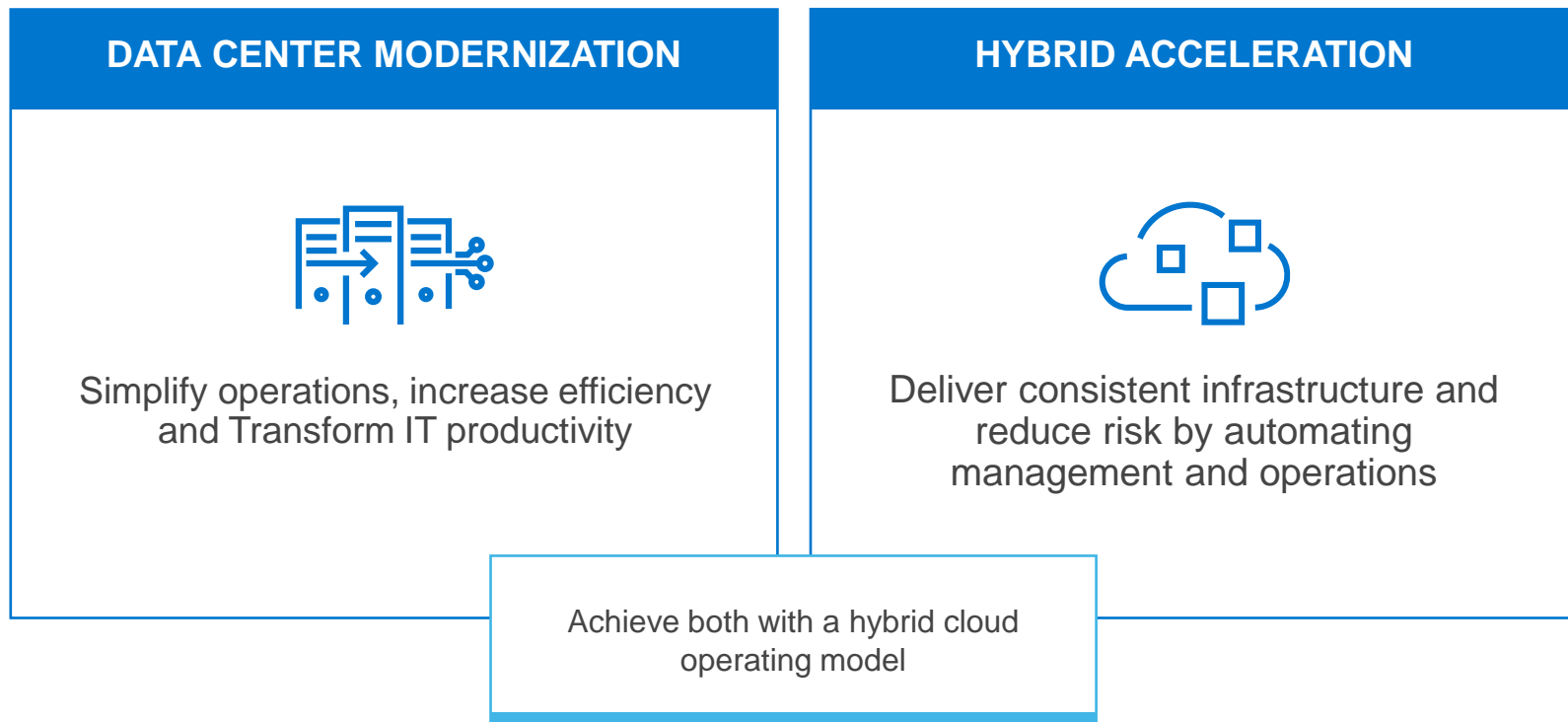


 Google Cloud



# Desired IT infrastructure outcomes

Modernize and transform the on-premises operational experience



# Modernize and Transform your operational experience



## Modernization

- Refresh aging infrastructure to HCI
- Migrate existing Hyper-V deployments
- Use familiar management tools
- Expand and accelerate consolidation
- Improve reliability and performance



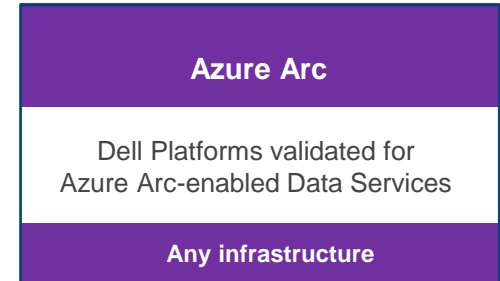
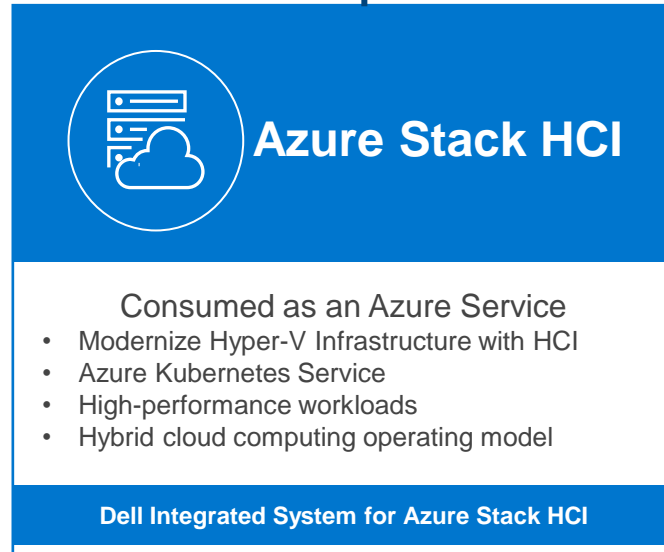
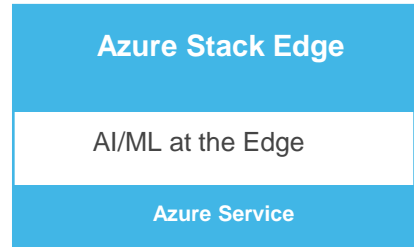
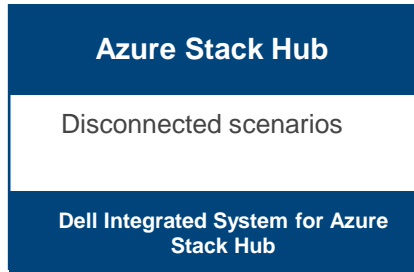
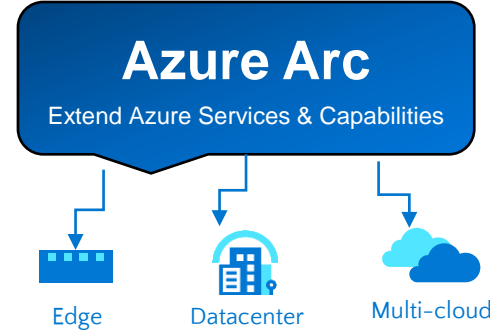
## Transformation

- Leverage Azure hybrid by design
- Build cloud-native applications using containers
- Manage fleets of containers with Kubernetes
- Empower XaaS with flexible consumption options

# Microsoft Hybrid Cloud

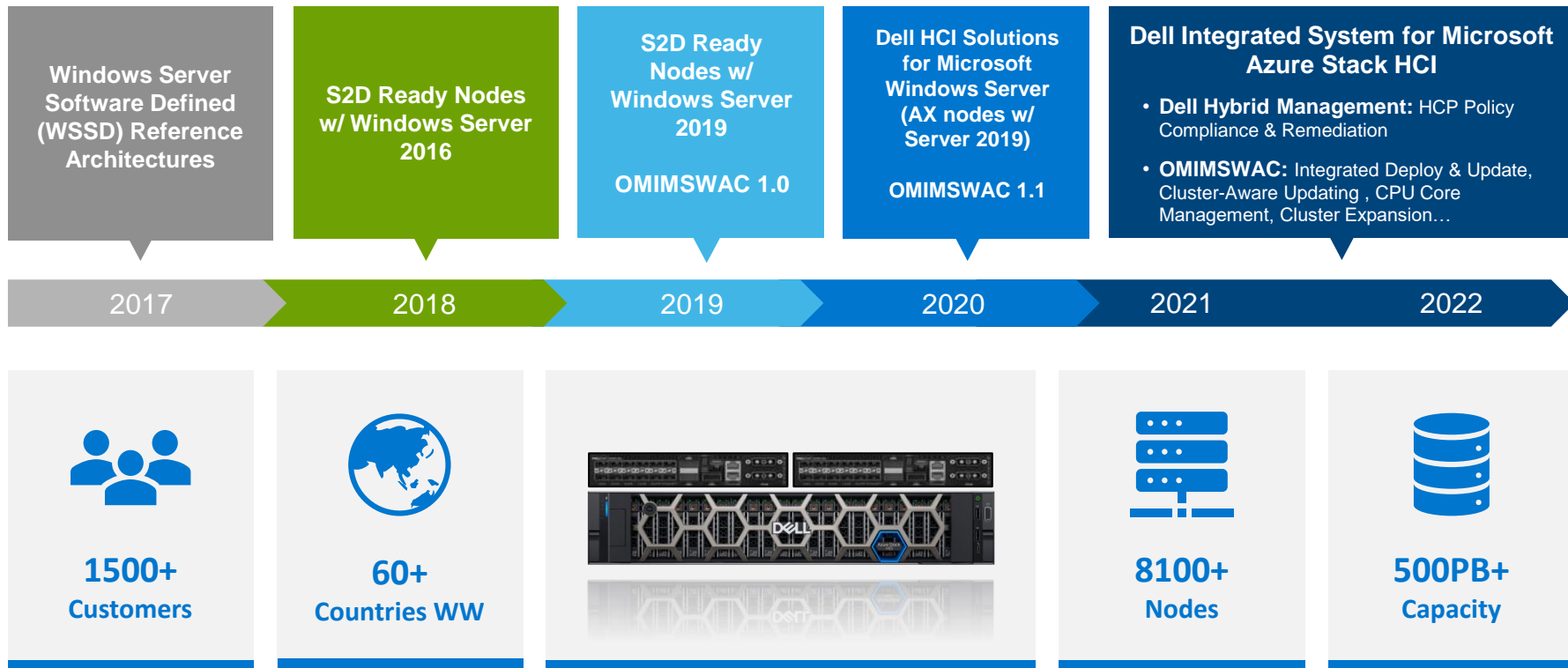
## Azure Stack Portfolio

HCI, Hub and Edge



# Evolutionary journey

# Delivering value via continuous innovation



# What is Azure Stack HCI

Purpose-built HCI operating system delivered as an Azure service



## Enterprise class hyperconverged infrastructure



**Hyper-V** for secure, efficient virtualization of Windows and Linux



**Storage Spaces Direct** for fast enterprise-grade storage



**Azure inspired** software defined networking



**Stretch clustering** for disaster recovery



## Azure hybrid by design



Azure Stack HCI **resource provider**



Management and governance via **Azure Arc**



**Always up-to-date** subscription



**Native integration** with Azure services



## Familiar management and operations



Leverage **existing concepts and skills** in virtualization and storage



Manage with **Windows Admin Center**, System Center, PowerShell



Continue to leverage **3<sup>rd</sup> party tools** for monitoring, security and backup



## Dell Integrated System for Microsoft Azure Stack HCI



# Comparing Windows Server with Azure Stack HCI

New and distinct product line



## Windows Server

- Exciting roadmap of new releases
- Innovation focused on being the **best guest** and **traditional server**
- **All other Windows Server roles** - IIS, File Services, DNS, DHCP, AD/DS<sup>1</sup>
- Runtime for Windows apps like SQL Server
- Runs **anywhere**
- Windows Server host and VM licensing will continue with the same traditional licensing options



## Azure Stack HCI

- Exciting roadmap of new releases
- Innovation focused on being the **best virtualization host**
- **Future of Hyper-V virtualization**, Storage Spaces Direct, and networking
- Run apps inside Windows or Linux virtual machines and containers
- Runs on-prem on **your hardware**
- Azure subscription-based billing, no perpetual license
- There is no guest VM licensing included with the Azure Stack HCI host OS, which is similar to other virtualization platforms

<sup>1</sup>Existing features like Hyper-V will not be removed unless deprecated (not planned)

# Choosing the correct Microsoft HCI Solution



## Dell HCI Solutions for Microsoft Windows Server



Run connected and disconnected from Azure



Less need for hybrid management capabilities



Hardware updates with Cluster-Aware Updating and on-premises monitoring with WAC and SC sufficient



Use Windows Server Data Center licensing for unlimited Windows Server VMs



Traditional approaches for disaster recovery are meeting SLAs



## Dell Integrated System for Microsoft Azure Stack HCI



Stable Azure connectivity



Customer wants cloud operating model on-prem using Azure management, governance, data and application services



Automate cluster creation and orchestrate seamless full stack Cluster-Aware Updates



Majority of VMs running Windows 10 or Linux OS  
Unlimited Windows Server VMs optional



Extended use cases:

- Stretched clustering to improve BCDR readiness
- Extended Security Updates benefit for WS/SQL 2008/2008 R2



# Dell Integrated System for Azure Stack HCI

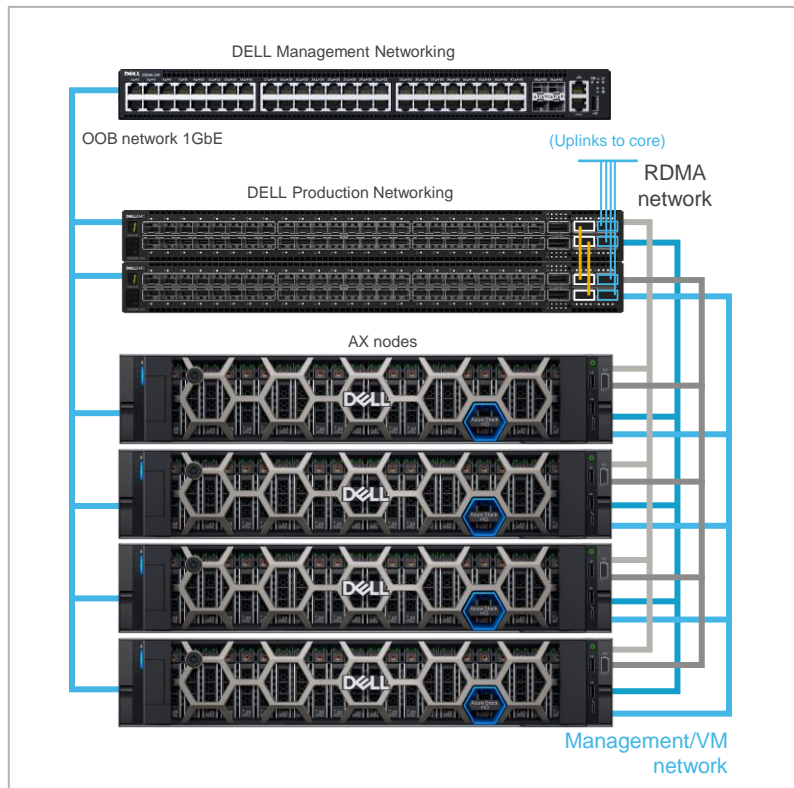
## **Microsoft strongly recommends choosing Integrated Systems**

Integrated Systems provide the best customer experience for Azure Stack HCI. They come with the operating system pre-installed on high quality, integrated hardware that is optimally configured for Azure Stack HCI and has completed Microsoft's clustered solution validation testing.

<https://azurestackhcisolutions.azure.microsoft.com/#/catalog>

# Dell Integrated System for Microsoft Azure Stack HCI

Designed for **99.9999% hardware availability\***



\* Based on Bellcore component reliability modeling across all AX-nodes



## Integrated System features and benefits



**Fully productized** HCI solution with foundational AX nodes, network switches, support and deployment services



**Wide portfolio** of offerings optimized for multiple use cases, application performance and capacity needs



**High performance architecture** that leverages technologies such as 25/100Gb RDMA networking and all flash storage

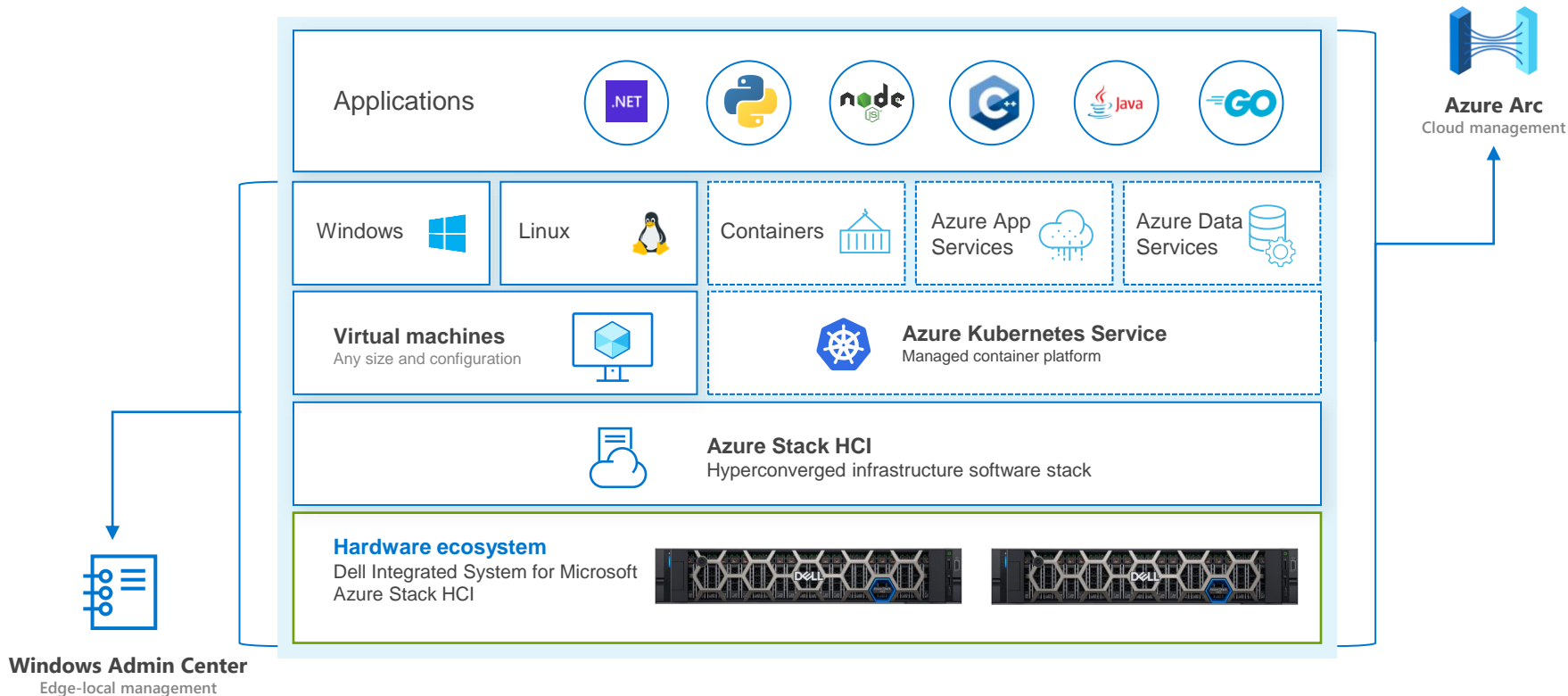


**Integrated LCM** including automated cluster creation, 1-click full stack Cluster-Aware Updating, cluster expansion, and CPU core management using OMIMSWAC



**Global availability** backed by Dell trained technical support, deployment & consulting services professionals

# Azure Stack HCI solution architecture



# Azure Stack HCI Use Cases



Infrastructure  
modernization



Virtual Desktop  
Infrastructure  
(VDI)



Edge and Remote  
Office (ROBO) and  
Infrastructure



Microsoft  
applications  
modernization



DevOps and Cloud  
Native application

# Azure Kubernetes Service (AKS) on Microsoft HCI Solutions

Familiar Kubernetes application platform available on-premises with Microsoft HCI Solutions



## Azure Hybrid by Design

Azure connected

Built-in Azure Arc capability

Always up-to-date with Azure



## Consistent with Azure Kubernetes Service

Single-step installation and update of fully-conformant Kubernetes cluster

AKS-consistent Kubernetes cluster management\*

Familiar Azure experience



## Familiar capabilities for Windows apps

Differentiated container solution for Windows host

Local administration with Windows Admin Center

Built-in support for Windows and Linux



## Built-in Security

Secure and trusted platform

Single and consistent identity

Secure and resilient infrastructure

\* check notes for details and considerations

# Azure Virtual Desktop

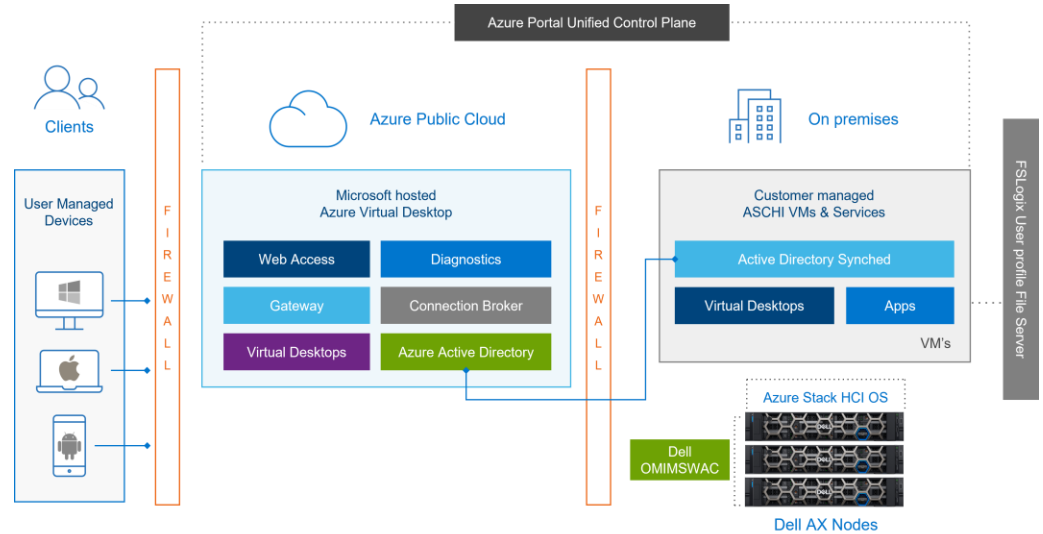
## Dell test results shows

- 1200 concurrent users' sessions on a 3-node cluster\*
- 850 Virtual Machines single sessions OS on a 3 node clusters\*

## Use cases

- Hybrid workforce needs
- Data regulatory and compliance requirements

## Simplifies deployment and maintenance

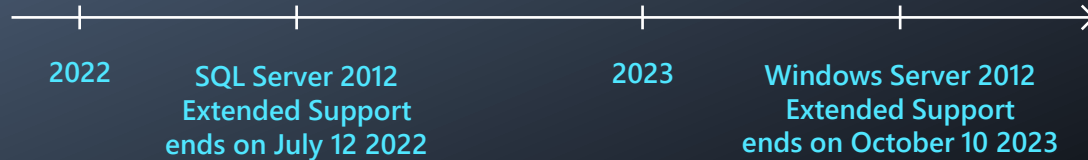


# Extended Security Updates only on Azure

Extended Security Updates for SQL Server 2012

Extended Security Updates for Windows Server 2012 and 2012 R2

One additional year extended Security Updates only on Azure for  
Windows Server and SQL Server 2008 and 2008 R2



[Extended Security Updates for SQL Server and Windows Server 2008 and 2008 R2 | Microsoft](#)

# Azure Stack HCI 22H2 and beyond...



# What's new for Azure Stack HCI

at Microsoft Ignite 2022



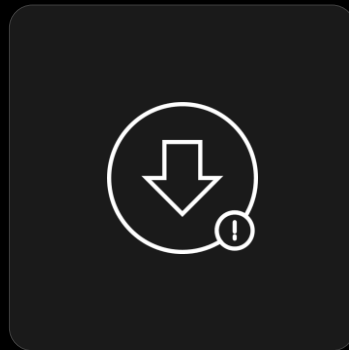
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**Making it easier to switch  
from WS to HCI**



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Arc-enabled VM mgmt.  
Public Preview 2



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22H2 feature update  
Operating system

# Eliminating the licensing cost barrier

Fall 2022

Swap your Hyper-V hosts for Azure Stack HCI

New Software Assurance benefit \*



Licensed cores of WS Datacenter  
with Software Assurance



Cores of Azure Stack HCI  
at no additional cost

\* 1 physical core license of Windows Server Datacenter with Software Assurance (SA) entitles you to use 1 physical core of Azure Stack HCI at no additional cost. You must register your Azure Stack HCI cluster to claim this benefit in the Azure Portal. Once your SA contract is verified, the monthly service fee for that cluster changes to zero. Target effective date (subject to change) October 12, 2022. Please note that add-on services like Microsoft Defender for Cloud are still sold separately.

# What's new for Azure Stack HCI

at Microsoft Ignite 2022



Making it easier to switch  
from WS to HCI



**Arc-enabled VM  
mgmt.  
Public Preview 2**



22H2 feature update  
Operating system

Microsoft Azure

Home > ContosoCluster

## ContosoCluster | Virtual machines

Azure Stack HCI

Search resources, se

Search

+ Create VM Refresh Delete

Preview functionality- This may not be the full list of VMs on

Search to filter items...

	Name
<input type="checkbox"/>	Vm-01
<input type="checkbox"/>	linuxvm2
<input type="checkbox"/>	newimageamemplate6
<input type="checkbox"/>	test-vm-0627

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Windows Admin Center (preview)

Extensions

Configuration

Locks

Resources (preview)

- Virtual machines
- Virtual networks
- Disks
- VM images

Monitoring

Insights (preview)

Logs

Workbooks

Automation

Reminder:

# What is Arc-enabled VM management?

- ✓ Provision and manage on-prem VMs from Azure
- ✓ Cloud-edge UX consistency in Azure Portal
- ✓ Included with Azure Stack HCI (no additional cost)

Public Preview 1: March 2022

Learn more:

<https://learn.microsoft.com/azure-stack/hci/manage/azure-arc-enabled-virtual-machines>

# New in Public Preview 2: Access VM images from Azure Marketplace

- ✓ **Quick to get started**  
Fewer steps than preparing a custom image
- ✓ **Always the latest image**  
From trusted publishers (e.g., Microsoft)
- ✓ **Image lifecycle management**  
Easily add, remove, update from the Portal
- ✓ **Coming soon...**  
*Third-party publishers!*



Preview includes Azure Virtual Desktop  
and WS Azure Edition images

The screenshot shows the 'Create an image' page in the Azure Portal. The page title is 'Create an image' and it has tabs for 'Basics', 'Tags', and 'Review + create'. Below the tabs, there is a section for 'Image to download' and 'Save image as'. A dropdown menu is open, showing a list of VM images from Azure Marketplace. The list includes:

Azure Marketplace images	Downloaded
Windows Server 2022 Datacenter: Azure Edition Core - Gen2	✓
Windows Server 2022 Datacenter: Azure Edition - Gen2	🔄
Windows 11 Enterprise multi-session, version 21H2 + Microsoft 365 Apps - Gen2	🔄
Windows 10 Enterprise multi-session, version 21H2 + Microsoft 365 Apps - Gen2	🔄
Windows 10 Enterprise multi-session, version 21H2 - Gen2	✓
Windows 11 Enterprise multi-session - Gen2	🔄

At the bottom of the page, there are buttons for 'Review + create', 'Previous', and 'Next : Tags'.

New in Public Preview 2:

# Guest management and VM extensions

- ✓ **Guest automatically Arc-enabled**  
When created through Arc VM management
- ✓ **Install and configure your applications**  
With Custom Script extension
- ✓ **Automate OS configuration**  
Join domain, apply policies, and more
- ✓ **Coming soon...**  
*More Azure VM extensions*



## Public Preview 2



Custom Script  
extension



Domain Join  
extension



Azure Policy  
Machine Config

## On the roadmap



Azure Monitor  
(Logs, Metrics,  
Alerts)



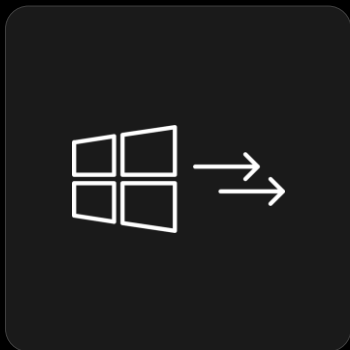
Microsoft  
Defender for  
Cloud



Azure Update  
Management  
Center

# What's new for Azure Stack HCI

at Microsoft Ignite 2022



Making it easier to switch  
from WS to HCI



Arc-enabled VM mgmt.  
Public Preview 2



**22H2 feature update**  
**Operating system**

# What's new in the 22H2 OS feature update

Fall 2022

Quality-of-life improvements in across all areas

## What's new in Storage



- ✓ Convert 2-way to 3-way mirror during expansion
- ✓ Convert existing volumes from fixed to thin provisioning
- ✓ Optional compression in Storage Replica for stretch clustering

## What's new in Virtualization



- ✓ GPU partitioning (GPU-P) with high availability (failover)
- ✓ Tested with Nvidia A2, A16 and Azure Virtual Desktop workload

Embargo until  
mid-December 2022

## What's new in Networking



- ✓ Automatic IP addressing for storage network adapters
- ✓ Automatic contextual cluster network naming (e.g., "storage 1", etc.)
- ✓ Network ATC manages live migration settings (incl.: network, transport, bandwidth)
- ✓ Stretch clustering support for Network ATC

## What's new in Management



- ✓ Redesigned cluster manager navigation and Settings, including search
- ✓ Improved HCI cluster deployment and registration
- ✓ **Windows Admin Center GPUs tool GA, incl. GPU-P (NOTE: EMBARGO)**
- ✓ Support for new Azure Stack HCI lifecycle orchestrator (preview)

...plus, many more little features, improvements, and bug fixes.



# “Are these features coming to Windows Server?”

## Short answer: No.

There is no Windows Server LTSC release this year or next year.

More importantly,

- ✓ Network ATC is **only available** with Azure Stack HCI.
- ✓ Thin provisioning is **only available** with Azure Stack HCI.
- ✓ HCI stretch clustering is **only available** with Azure Stack HCI.
- ✓ GPU partitioning (GPU-P) is **only available** with Azure Stack HCI.
- ✓ The new orchestrator (preview) is **only available** with Azure Stack HCI.

You get the idea. :-)

# Integrated system portfolio

# Spec Sheet-at-a-Glance



	AX-640	AX-740xd	AX-6515	AX-7525	AX-650	AX-750
Processor	Intel Xeon 2 <sup>nd</sup> Gen Scalable Processors		2 <sup>nd</sup> /3 <sup>rd</sup> Gen AMD EPYC Processor		Intel Xeon 3 <sup>rd</sup> Gen Scalable Processors	
Core Count	16 to 56	16 to 56	8 to 64	16 to 128	16 to 80	16 to 80
Memory	96 GB to 1.5 TB	96 GB to 1.5 TB	64 GB to 1 TB	128 GB to 2 TB	128 GB to 4 TB	128 GB to 4 TB
Storage Configurations						
Min/Max Raw Storage	3.2 to 92 TB	3.84 to 192 TB	3.2 to 61 TB	3.2 to 368 TB	3.2 to 154 TB	3.2 to 368 TB
All Flash (All-NVMe)	☑️ 🟢 🟡	☑️ 🟢 🟡 ⭐		☑️ 🟢 🟡 ⭐	🟢 🟡 ⭐	🟢 🟡 ⭐
All Flash (All-SSD)	☑️ 🟢 🟡 ⭐	☑️ 🟢 🟡 ⭐	☑️ 🟢 🟡 ⭐		🟢 🟡 ⭐	🟢 🟡 ⭐
All Flash (NVMe + SSD)	☑️ 🟢 🟡	☑️ 🟢 🟡		☑️ 🟢 🟡		
All Flash with persistent Memory (Intel Optane PM)	☑️ 🟢					
Hybrid (NVMe AIC + HDD)		☑️ 🟢				
Hybrid (NVMe + HDD)	☑️ 🟢 🟡	☑️ 🟢 🟡				🟢 🟡
Hybrid (SSD + HDD)	☑️ 🟢 🟡	☑️ 🟢 🟡			🟢 🟡	🟢 🟡

☑️ WS2019

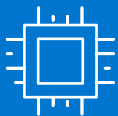
🟢 WS2022

🟡 HCI 21H2 (v2)

⭐ Stretch clustering validated

**DELL**Technologies

# Security features incorporated into integrated system



## Secured-core\* Server

- Windows HLK System Certified, UEFI Secure Boot, TPM 2.0 v3, HVCI/VBS, DRTM protection (AMD SKINIT, Intel TXT), DMA boot protection

## Trusted Platform Module (TPM)

- Secure crypto-processor that can store cryptographic keys that protect information (disk encryption, digital rights management, software licensing and password protection)



## Lock Server Configuration and Firmware

- System Lockdown prevents system configuration and firmware changes after admin locks down the profile
- Prevent configuration “drift” in your datacenter
- Protect against malicious attacks against embedded firmware
- Alerts when configuration or FW deviates from baselines



## Secure Default Password for iDRAC

- Prevents against accidental exposure of new iDRAC's on unprotected networks
- Helps encourage effective password usage
- Customers can obtain a list of server passwords, service tags and iDRAC MAC addresses for deployment prep and planning



## Securely Erase & Secure Boot

- Quickly and securely erase local storage devices including HDD, SSD, and NVMe drives
- Repurpose or retire servers in minutes rather than hours or days
- End to end verification of server boot firmware
  - Server Hardware Root of Trust
  - iDRAC Hardware Root of Trust



## High Assurance, Cyber-Resilient Architecture

- Chain of trust rooted in silicon only runs authenticated code
- Signed firmware updates for all key components
- Security-Enhanced Linux OS (iDRAC)
- Dynamic USB port enable for authenticated crash cart usage
- FIPS 140-2 Certification (iDRAC, CMC)
- Customizable security banner on iDRAC login page



## BitLocker & Shielded VMs

- BitLocker Drive Encryption addresses the threats of data theft or exposure from lost, stolen, or inappropriately decommissioned computers, TPM version 1.2 or later
- Shielded VMs are protected against inspection, theft and tampering from malware running on a Hyper-V host as well as the fabric admins administering it (secure boot, TPMs and disk encryption, Host Guardian Service)

\* Check notes for details

# AX-750

Intel 15G capacity and performance optimized node for applications needing compute and storage balance



## Targeted Workloads and Use Cases

- Software Defined Storage
- Big Data, Unstructured data, Analytics
- Service providers: data tier



## Benefits

- Multi Vector Cooling design enables tremendous configuration flexibility and industry leading energy efficiency
- Capable of more than double the capacity of the AX-650 platform
- Higher count of PCI slots for NIC and GPU upgrades (when available)
- BOSS-S2 support for hot-plug M.2 OS drives
- Intel Secured-core (starting with Azure Stack HCI version 21H2)



## Key Capabilities



### Azure Stack HCI & Windows Server HCI



- 2 RU, Dual Intel Xeon 3rd Gen Scalable Processors (Silver/Gold/Platinum)
- 16 to 80 cores
- 128 GB to 4 TB of memory
- 24 x 2.5" drives
- 3.2 to 368 TB Min/Max Raw Storage
- All Flash (All-SSD, All-NVMe)
- Hybrid (SSD + HDD, NVMe + HDD)
- 4 x PCIe Slots, NICs: 1-4 (1 minimum), GPUs: 0-2
- Check spec sheet for details on supported configurations

# AX-650

Intel 15G density optimized node for applications needing high-performance storage and compute balance



## Targeted Workloads and Use Cases

- Virtualization: dense, powerful compute node
- Database with very high-performance storage
- Service Providers: application tier



## Benefits

- Improved Data Center performance and lower storage latency
- BOSS-S2 support for hot-plug M.2 OS drives
- Intel Secured-core (starting with Azure Stack HCI version 21H2)
- GPU ready configurations (when available)



## Key Capabilities



### Azure Stack HCI & Windows Server HCI



- 1 RU, Dual Intel Xeon 3rd Gen Scalable Processors (Silver/Gold/Platinum)
- 16 to 80 cores
- 128 GB to 4 TB of memory
- 10 x 2.5" drives
- 3.2 to 154 TB Min/Max Raw Storage
- All Flash (All-SSD, All-NVMe)
- Hybrid (SSD + HDD)
- 3 x PCIe Slots, NICs: 1-3 (1 minimum), GPUs: 0-1 (when available)
- Check spec sheet for details on supported configurations

# AX-7525

Highly scalable two-socket node for demanding workloads



## Targeted Workloads and Use Cases

- Dense virtualization
- Database with very high-performance storage
- Data analytics
- Compute intensive workloads requiring high core count



## Benefits

- Provides increased security through processor diversification
- NVMe drives direct attach with no PCIe switch providing full x4 PCIe to each device resulting in massive IOPS and throughput at minimal latency
- Processor density a 512 cores per 4-node cluster
- BOSS-S2 support for hot-plug M.2 OS drives



## Key Capabilities



### Azure Stack HCI & Windows Server HCI



- 2 RU, dual-socket 2nd/3rd Gen AMD EPYC (ROME/Milan) Processor
- 16 to 128 cores
- 128 GB to 2 TB of memory
- 4 – 24 x 2.5" drives
- 3.2 to 368 TB Min/Max Raw Storage
- All NVMe (non-blocking) and Two Tier All Flash (NVMe + SSD)
- Onboard LOM, optional OCP, and up to 4 x add-in NICs
- RDMA/add-in NIC options – Mellanox with speeds up to 100GbE
- Check spec sheet for details on supported configurations

# AX-6515

Optimized for Value



## Targeted Workloads and Use Cases

- Virtualization
- Enterprise LOB
- Databases
- Retail
- ROBO



## Benefits

- Provides increased security through processor diversification
- Short 657.25mm (25.88") depth node
- Only single socket CPU offering in the portfolio



## Key Capabilities



### Azure Stack HCI & Windows Server HCI



- 1 RU, Single-socket 2nd/3rd Gen AMD EPYC (ROME/Milan) Processor
- 8 to 64 cores
- 64 GB to 1 TB of memory
- 8 x 2.5" drives
- 3.2 to 61.4 TB Min/Max Raw Storage
- All Flash SSD (SAS, vSAS, or SATA SSDs)
- Onboard LOM
- RDMA NIC (Mellanox or QLogic/Marvell) – Single dual-port NIC only
- Check spec sheet for details on supported configurations



# AX-740xd

Intel 14G capacity and performance optimized node for applications needing compute and storage balance



## Targeted Workloads and Use Cases

- Software Defined Storage
- Big Data, Unstructured data, Analytics
- Service providers: data tier



## Benefits

- Multi Vector Cooling design enables tremendous configuration flexibility and industry leading energy efficiency
- Capable of more than double the capacity of the AX-640 platform
- Enough PCI slots for dual-link full mesh switchless storage networking for a 4-node cluster



## Key Capabilities



### Windows Server HCI

- 2 RU, Dual Intel Xeon Scalable Processors, Cascade Lake
- 16 to 56 cores
- 96 GB to 1.5 TB of memory
- 12-18 x 3.5" drives or 24 x 2.5" drives
- 3.2 to 192 TB Min/Max Raw Storage
- Hybrid (SSD + HDD, NVMe + HDD, NVMe + SSD)
- All Flash (SSD, NVMe, NVMe AIC)
- 2-4 PCIe Slots for NICs
- Check spec sheet for details on supported configurations



### Azure Stack HCI

- 2 RU, Dual Intel Xeon Scalable Processors, Cascade Lake
- 16 to 56 cores
- 96 GB to 1.5 TB of memory
- 12-18 x 3.5" drives or 24 x 2.5" drives
- 3.2 to 192 TB Min/Max Raw Storage
- Hybrid (SSD + HDD, NVMe + HDD, NVMe + SSD)
- All Flash (SSD, NVMe)
- 2-4 PCIe Slots for NICs
- Check spec sheet for details on supported configurations

# AX-640

Intel 14G density optimized node for applications needing high-performance storage and compute balance



## Targeted Workloads and Use Cases

- Virtualization: dense, powerful compute node
- Database with very high-performance storage
- Service Providers: application tier



## Benefits

- Improved Data Center performance and lower storage latency
- Only server with [Intel Optane persistent memory and SSD](#) for ultra-high performance (Optane only available on Dell HCI Solutions for Microsoft Windows Server)



## Key Capabilities



### Windows Server HCI

- 1 RU, Dual Intel Xeon Scalable Processors, Cascade Lake
- 16 to 56 cores
- 96 GB to 1.5 TB of memory
- 10 x 2.5" drives
- 3.2 to 92 TB Min/Max Raw Storage
- Hybrid (SSD + HDD, NVMe + HDD, NVMe + SSD)
- All Flash (SSD, NVMe), Optane
- 0-1 PCIe Slots for NICs
- Check spec sheet for details on supported configurations

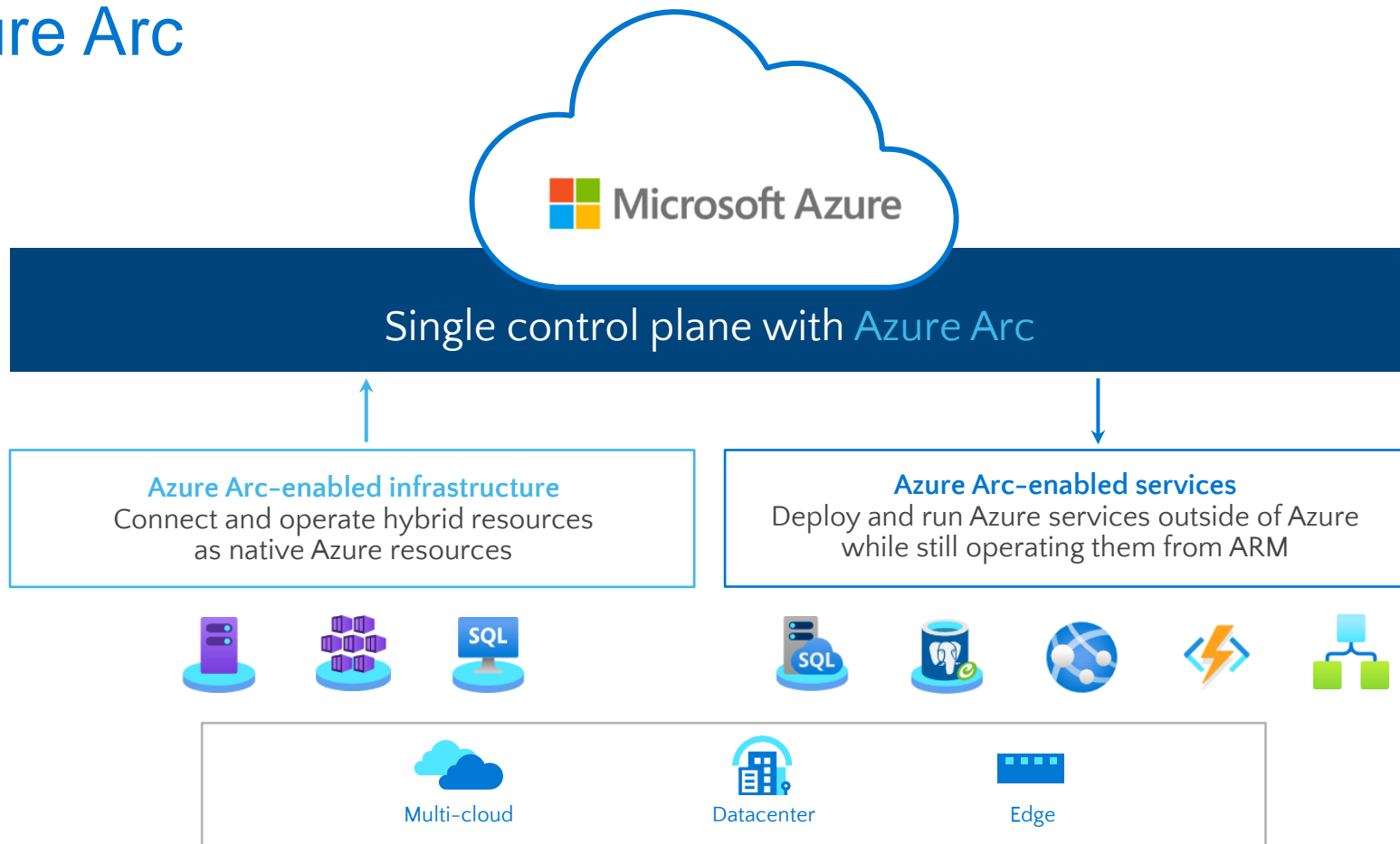


### Azure Stack HCI

- 1 RU, Dual Intel Xeon Scalable Processors, Cascade Lake
- 16 to 56 cores
- 96 GB to 1.5 TB of memory
- 10 x 2.5" drives
- 3.2 to 92 TB Min/Max Raw Storage
- Hybrid (SSD + HDD, NVMe + HDD, NVMe + SSD)
- All Flash (SSD, NVMe)
- 1 PCIe Slots for NICs
- Check spec sheet for details on supported configurations

# Hybrid cloud management

# Azure Arc



# Azure Arc-enabled infrastructure

Bring on-premises and multi-cloud infrastructure to Azure



Azure Arc-enabled servers



GENERALLY AVAILABLE



Azure Arc-enabled SQL Server



GENERALLY AVAILABLE



Azure Arc-enabled Kubernetes



RHEL

GENERALLY AVAILABLE

# Azure Arc-enabled services

Run Azure services anywhere



Azure Arc-enabled data services



GENERALLY AVAILABLE (Indirect Mode)



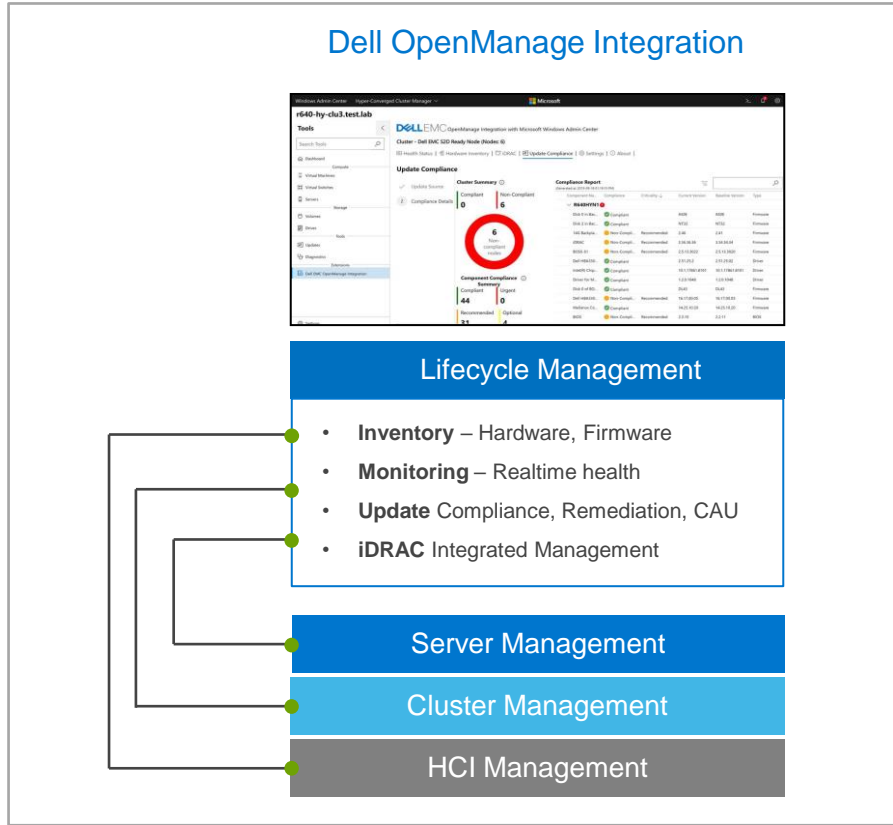
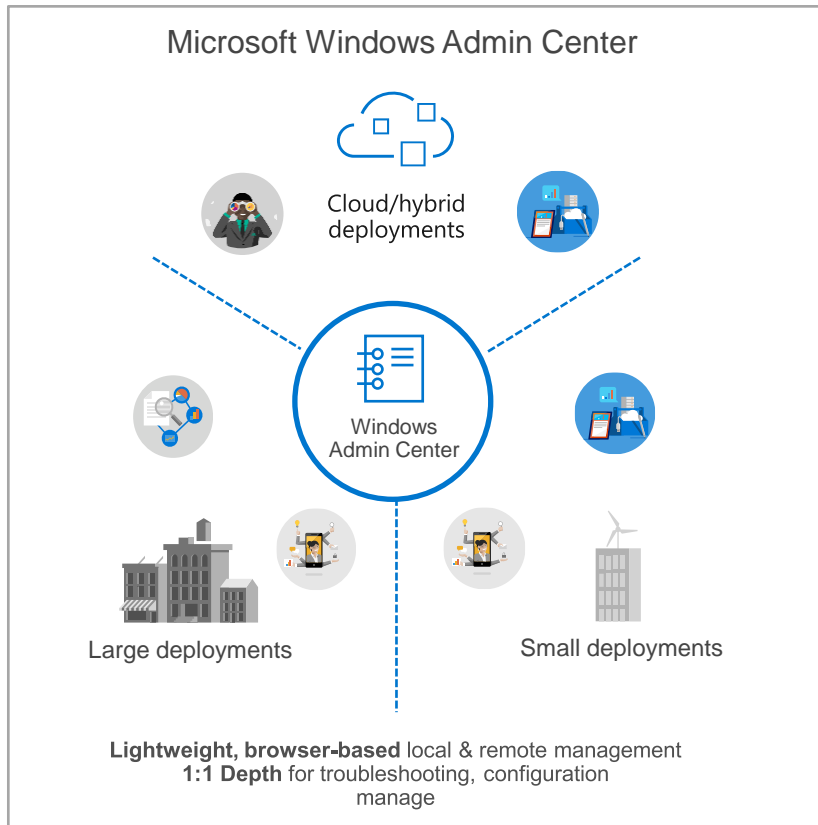
Azure Arc-enabled application services



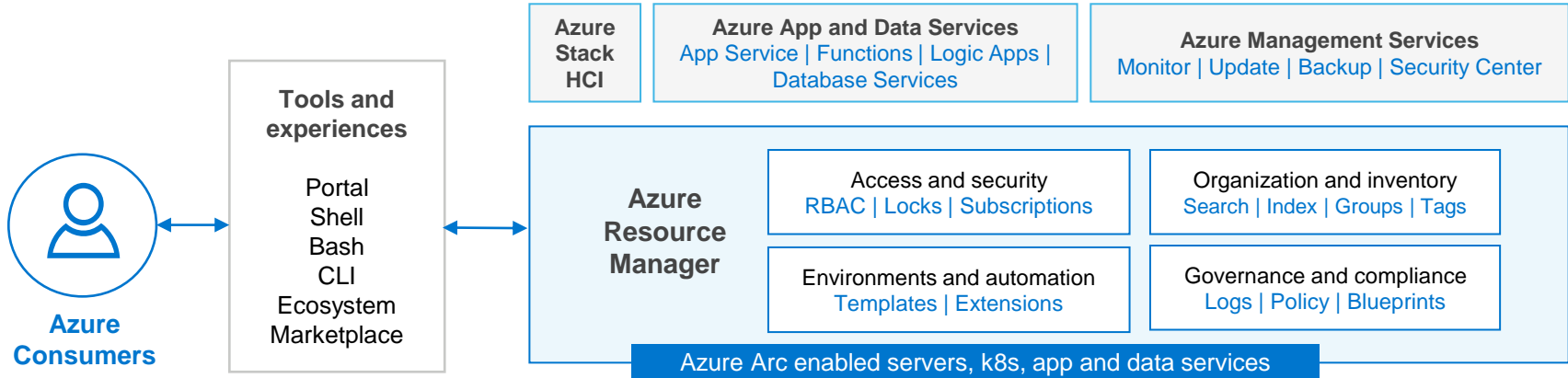
PUBLIC PREVIEW

# OpenManage Integration with Microsoft Windows Admin Center

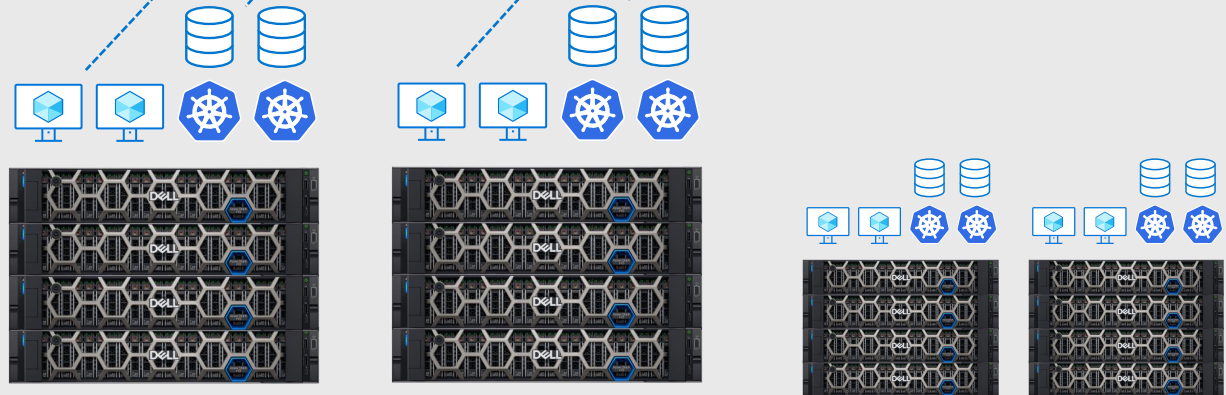
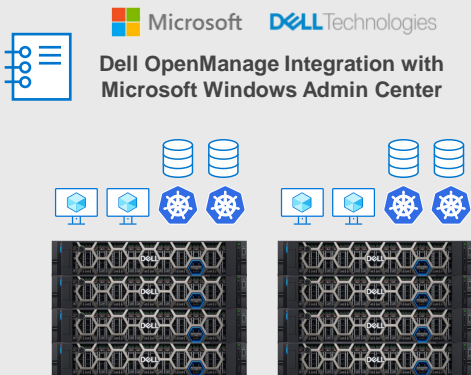
Windows platform management – servers, clusters, HCI management with a simplified modern application



# Managing Azure Stack HCI at scale



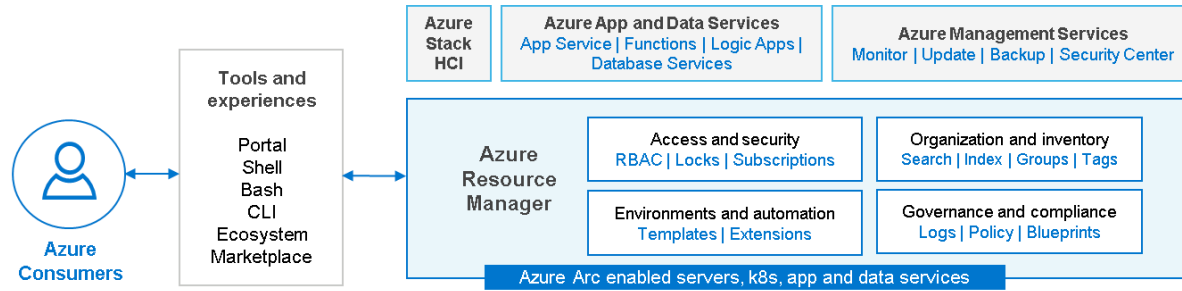
## Edge/On-Premises Location





# Dell Hybrid Management – Dell HCP Policies for Azure

## HCP Policy Compliance & Remediation



### Edge/On-Premises Location

Microsoft Dell Technologies   
 Dell OpenManage Integration with Microsoft Windows Admin Center



### Dell HCI Configuration Profile (HCP) Policies for Azure

- HCI Cluster periodic compliance checks for Hardware, cluster and OS
- Reports compliance or non-compliance and **remediation**
- HCP checks\*
  - Cluster State
  - S2D Cache State
  - Cluster Physical Disk Count
  - Cluster Witness
  - Storage Pool Health Status
- HCP Azure Arc Integration\*:
  - IDRAC, BIOS and NIC policies are clubbed into Hardware initiative
  - OS & Cluster initiatives are introduced
  - Added support for AX-650 & AX-750 platforms

\* check notes for more details

# Dell Hybrid Management – Dell HCP Policies for Azure Onboarding Dell HCI Configuration Profile

Single policy definition with Dell HCI Configuration Profile (HCP) and consistent hybrid management experience

Choose your own control plane



Dell OMIMSWAC for local management

Azure Portal for management at-scale

**OpenManage Integration**

**Onboard Dell HCI Configuration Profile Policies for Azure**

This step helps user onboard Dell recommended configuration policies into Azure. Once onboard you can login into Azure and check view the compliance status of your cluster.

You have following policies available as part of the Dell HCP policy with version 1.0.

- Del HCI Hardware configuration policy
  - PreOSInstallation
  - PreOSZigzag
  - NameServerPerNIC
  - IPv6Router
  - ServerGlobalSettings
  - SystemSecurity
  - AntiPerfPolicy
  - AntiPerfPolicyDelay
  - SerialBIOS
  - SecurePort 1\_PSPoolPolicy
  - OS-BMCA 1\_Advanced
  - ELUC\_RDMAPerformanceModePort
  - ELUC\_DCCSPerformance

Buttons: [Cancel] [Onboard]

Name	Definition location	Policy	Type	Definition type	Category
[Del] Embedded Policy	AES HC1 & Hub - ENG (D Dollar)	Custom	Policy		
[Del] [B0-ae019-ae0] Cluster Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	2	Custom	Initiative	Cluster Attributes
[Del] [B0-ae019-ae0] Hardware Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	14	Custom	Initiative	HW Attributes
[Del] [B0-ae019-ae0] OS Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	16	Custom	Initiative	OS Attributes
[Del] [B0-ae019-ae0] Cluster Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	2	Custom	Initiative	Cluster Attributes
[Del] [B0-ae019-ae0] Hardware Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	15	Custom	Initiative	HW Attributes
[Del] [B0-ae019-ae0] OS Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	23	Custom	Initiative	OS Attributes
[Del] [B0-ae019-ae0] Cluster Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	2	Custom	Initiative	Cluster Attributes
[Del] [B0-ae019-ae0] Hardware Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	14	Custom	Initiative	HW Attributes
[Del] [B0-ae019-ae0] OS Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	16	Custom	Initiative	OS Attributes
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[Del] [B0-ae019-ae0] OS Configuration Policy	AES HC1 & Hub - ENG (D Dollar)	16	Custom	Initiative	OS Attributes

# Dell Hybrid Management – Dell HCP Policies for Azure HCP Policy Compliance & Remediation

The screenshot shows the Dell OpenManage Integration interface in Windows Admin Center. The main window displays the compliance status for the cluster `bdc-ax7525nvme1.test.lab`. The overall compliance is 0%, with 46 compliant components, 3 warnings, 4 errors, and 0 unknown components. A donut chart shows 53 total components.

**Compliance Summary**  
Check if your HCI cluster is compliant with Dell HCI Configuration Profile (HCP) policies

**Policy Summary**  
Indicates the summary of compliance status of HCI clusters against the Dell HCI Configuration Profile policies

To check the firmware and driver compliance of your HCI cluster against Dell recommended catalog and fix the non-compliant components, go to the Update tab.

Policy Name	Description	Overall Status	Overall State	Errors	Warnings	Unknown
Dell Infrastructure Lock Policy	Indicates compliance with Infrastructure lock policy recommended by Dell for HCI clusters	Partial-compliant	0% (0 out of 1)	0	1	0
Dell Hardware Configuration Policy	Indicates compliance with hardware configurations recommended by Dell	Non-compliant	82% (9 out of 11)	2	0	0
Dell Hardware Symmetry Policy	Indicates compliance with support matrix requirements and best practices recommended by Dell and Microsoft.	Partial-compliant	94% (16 out of 17)	0	1	0
Dell OS Configuration Policy	Indicates compliance with OS configurations recommended by Dell.	Non-compliant	88% (21 out of 24)	2	1	0

# Dell Hybrid Management – Dell HCP Policies for Azure HCP Policy Compliance & Remediation

**Compliance Summary**  
Check if your HCI cluster is compliant with Dell HCI Configuration Profile (HCP) policies

Compliance last checked 31-Mar-2022 19:40:25 IST

Overall Compliance  
87%  
46 out of 53

**Policy Summary**  
Indicates the summary of compliance status of HCI clusters against the Dell HCI Configuration Profile policies

● To check the firmware and driver compliance

Policy Name	Description	Overall Status	Overall State	Err
Dell Infrastructure Lock Policy	Indicates compliance with Infrastructure lock policy recommended by Dell for HCI clusters	Partial-compliant	0% (0 out of 1)	0

**Fix Compliance**  
By default, all mandatory policies are selected. You can exclude optional policies, if any. To resolve issues in hardware configuration policies, nodes must be restarted. Select any one restart option. To start the remediation operation, click Finish. This may take some time.

**Manual Fixes**

- ▲ Dell Hardware Symmetry Policy
  - Remediate the policy by adding, removing, or replacing devices. Please follow Dell recommendations. [help](#).
- ▲ Dell HCI OS Configuration Policy
  - Remediate the policy by adding, removing, or replacing devices. Please follow Dell recommendations. [View Recommendations](#) [Export](#)
- ▲ Dell Infrastructure Lock Policy
  - Dell Technologies recommend to enable the infrastructure lock from the Security tab.

**Automatic Fixes**

- ▲ Dell Hardware Configuration Policy
  - BIOS Configuration Policy
    - Remediation of the above policies shall bring the hardware configuration settings as per Dell recommended values. Also, selection of NIC or BIOS shall involve rebooting of the nodes. Please select below one of the reboot option.
    - Apply and Reboot Now
    - Apply at Next Reboot  Schedule Reboot

● Apply the configuration on all nodes and reboot the cluster in the cluster aware manner (without impacting the cluster workload).

# OMIMSWAC – Security

Detect | Protect | Recover



Security



Protect

## 0. New OS support

- AS HCI OS 21H2 (v2)
- Windows Server 2022

## 1. Infrastructure lock



- Secured Infrastructure – Cluster lockdown
- Dell Tech’s Cyber Resilient Architecture



- Provides robust protection against unauthorized access to resources and data
- Restore lockdown state post Update (CAU)

## 2. Secured-core



- Hardware root-of-trust
- Firmware protection
- Virtualization-based security



- BIOS Settings – Cluster-Aware – OMIMSWAC
  - Status – ON / OFF
  - Enable – Immediate, Staged
- OS Settings – OMIMSWAC / MSFT extension
  - Status - OMIMSWAC
  - Enable – MSFT extension

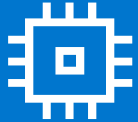
## 3. Kernel Soft Reboot

- KSR improves reboot performance
- Reboot the servers faster than a normal reboot

- Use KSR for updates that do not require a firmware/BIOS reboot
- Needs to be disabled for WAC extensions to work
- Disabled by default

# OpenManage Integration with MS Windows Admin Center

## New features in OpenManage Integration



Azure Stack HCI – Day-N Operations  
**CPU Core Management**  
Maintain the right **balance** between  
**cost** and **performance**

Dynamically adjust the CPU core count BIOS settings without leaving the OpenManage Integration extension in Windows Admin Center

- Uses Cluster-Aware Updating for reboots ensuring no interruption to running workloads
- Supported in Azure Stack HCI clusters, Windows Server HCI clusters, and individual nodes
- Requires OMIWAC Premium License on each node

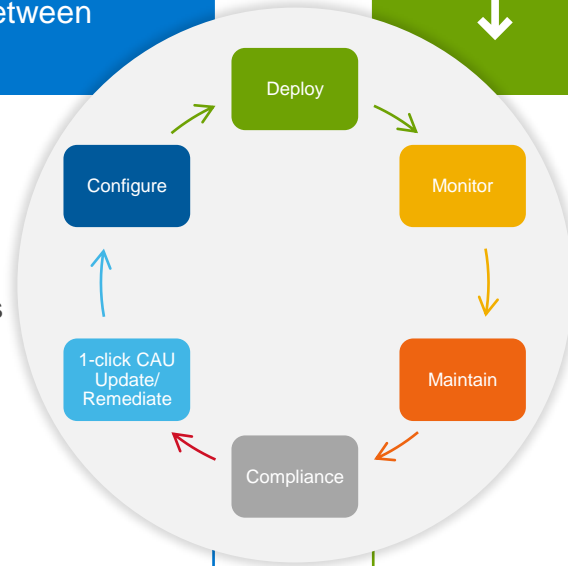


Azure Stack HCI – Day-N Operations  
**Cluster Expansion**  
Prepare new cluster nodes before adding to the cluster

Simplify the cluster expansion process:

- High level compatibility, licensing, and Dell HCI Configuration Profile checks
- +
- BIOS, Firmware & Driver compliance updates

Supports Azure Stack HCI and Failover clusters. Hardware updates can use online catalog or offline catalog with Dell Repository Manager.



[Dell OpenManage Integration with Microsoft Windows Admin Center page](#)



# CPU cores management for MSFT HCI Solutions

Right size CPU - Hybrid Cloud Infrastructure to reduce subscription costs based on workload



## Hybrid Cloud deployments

- Right size CPU cores for workload performance and reduce **Hybrid core-based subscription cost**
- CPU sizing applied at Cluster level for cluster nodes, **no workloads interruption**
- Ability to apply CPU core changes **immediate** or at **next reboot**
- Fully automated experience optimizing **TCO**, visibility to current & total CPU cores
- Supported for **MSFT HCI Solutions** based of AX nodes, S2D Ready Nodes and PowerEdge Servers (node level)

Windows Admin Center | Cluster Manager | Microsoft

bdc-ax6515clu.test.lab

Tools

Search Tools

Dashboard

Compute

Virtual machines

Servers

Azure Kubernetes Service

Volumes

Drives

Storage Replica

Networking

Virtual switches

Tools

Azure Monitor

Updates

Diagnostics

Performance Monitor

Extensions

Dell EMC OpenManage Integration

Settings

DELL EMC OpenManage Integration with Microsoft Windows Admin Center

HCI Cluster - Dell EMC Integrated System for Microsoft Azure Stack HCI (Nodes: 3) Azure Stack HCI Certified

Health | Inventory | IDRAC | Update | **Configure** | Settings | About |

Compute Resources

Expand Cluster

**CPU Core Management**

Update CPU Core

**CPU Core Configuration Summary**

■ Current Core: 72 ■ Available Core: 0 Maximum Core: 72

Current Configuration

3 Nodes, 3 CPUs, 72 Cores, 12 CCDs

3 x AMD EPYC 7402P 24-Core Processor

Show Node Level Details

Node (FQDN)	CPU Model/Family	Number of slots/CPUs	Number of Cores
aa6515m1.test.lab	AMD EPYC 7402P 24-Core Processor	1	24
aa6515m2.test.lab	AMD EPYC 7402P 24-Core Processor	1	24
aa6515m4.test.lab	AMD EPYC 7402P 24-Core Processor	1	24

Update CPU Core

This wizard will help you to configure the active number of CPU cores in cluster nodes to keep the Total Cost of Ownership at an optimal level.

Nodes: 3 CPUs: 1 CCDs/Processor: 12 Cores/CCD: 4 Total Cores: 36

CCDs/Processor

Cores/CCD

Apply and Reboot Now

Apply at Next Reboot

Selecting this option will activate the same number of cores across all cluster nodes and reboot the cluster in Cluster-Aware Updating method.

Do you want to enable CredSSP and update all the nodes? The update operation will enable the CredSSP to improve security. Microsoft recommends to manually disable the CredSSP after the update operation is complete. For more information, see the [link](#).

Cancel Confirm

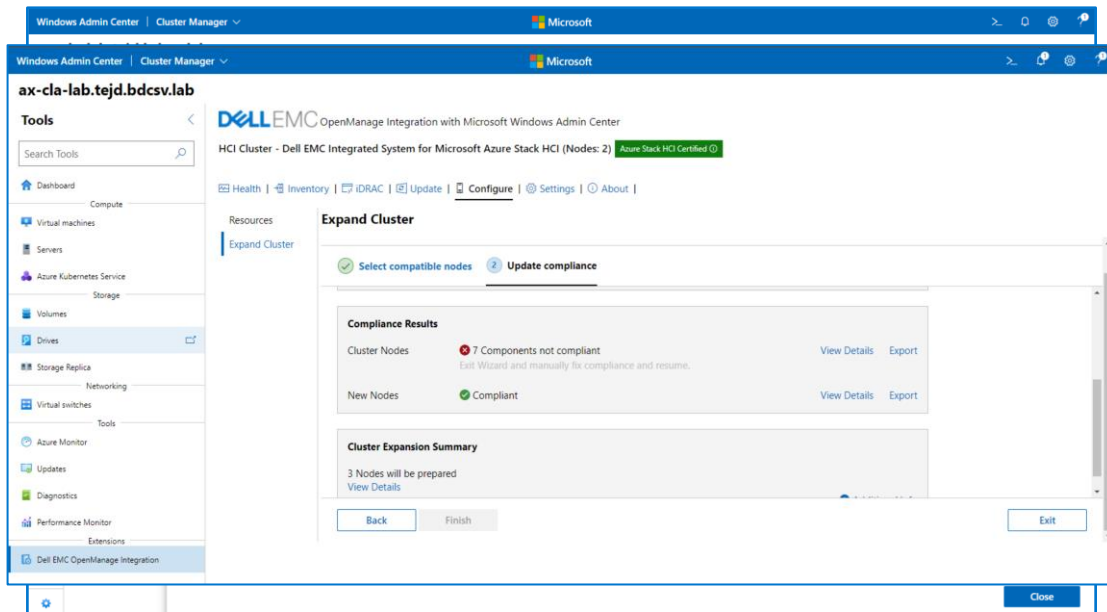
# Streamlined Cluster Node Expansion - Scale out HCI

Prepare to Add Nodes to the existing Microsoft HCI Solutions and Failover Clusters



**Eliminate time consuming guess work in cluster expansion**

- Ability to select compatible nodes from WAC for **node expansion**
- **HCI Configuration Profile** checks for new nodes to be added to the cluster
- Update Compliance of new nodes before adding for **Optimal cluster scale out**
- **Scale-out Microsoft HCI Solutions clusters**
  - AX nodes, S2D Ready Nodes
- **Failover Clusters expansion**
  - based of PowerEdge Servers





# OpenManage Integration with MS Windows Admin Center

Features in OpenManage Integration with WAC Extension / Snap-ins



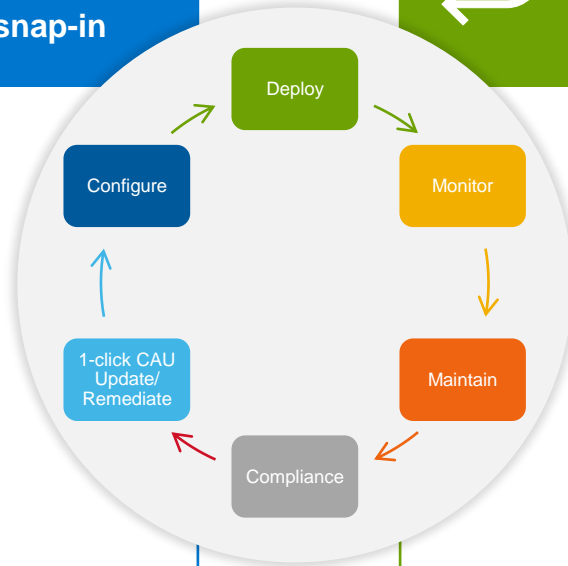
Azure Stack HCI Cluster Deploy – Day-1  
Dell HCI Configuration Profile  
Integrated Deploy & Update snap-in



Azure Stack HCI – Day-N Operations  
Dell 1-click full stack updates snap-in  
Integrated CAU - OS P&U + hardware updates

## Day-1: Deployment Automation

- Deploy Azure Stack HCI with Dell HCI Configuration Profile for optimal cluster performance
  - Nodes HCL/compatibility check
  - Unified Patching - OS & hardware solution update in cluster creation process
  - Save time, eliminate manual patch & updates during cluster creation with a single reboot



## Day-90/180: Update operations streamlined

- **Cluster-Aware Updating of Azure Stack HCI Solution**
  - OS Patch & Updates of the Azure Stack HCI OS
  - +
  - Dell BIOS, Firmware & Driver updates

Single reboot per node in the cluster with no business impact to running roles on the cluster

[Dell OpenManage Integration with Microsoft Windows Admin Center page](#)



# Automated cluster creation

Deploy Azure Stack HCI with Dell HCI Configuration Profile for optimal cluster performance

- Save time and reduce risk associated with manual deployment efforts
- Optimal cluster configuration using a consistent, repeatable, and guided process
- Hardware compatibility and symmetry checks ensure hardware configurations are validated against Dell HCI Configuration Profile
- Perform hardware updates connected or edge/disconnected
- Compliance report of OS, BIOS, firmware, and drivers. Remediation before cluster build

The screenshot shows the 'Deploy an Azure Stack HCI cluster' wizard in Windows Admin Center. The 'Install hardware updates' step is selected, showing a 'Component Compliance Summary' with 75 Compliant, 0 Urgent, 16 Recommended, and 0 Optional items. A 'Compliance Report' table lists various components with their compliance status, current version, baseline version, type, and compliance type.

Component Name	Compliance	Criticality	Current Version	Baseline Version	Type	Compliance Type
740-xxxx-xxxx-bios	Non-Compliant	Recommended	15.05.12	15.10.06	Firmware	Upgradeable
[B04] Qlogic BCM5700 ...	Non-Compliant	Recommended	15.05.12	15.10.06	Firmware	Upgradeable
[B04] Qlogic BCM5700 ...	Non-Compliant	Recommended	15.05.12	15.10.06	Firmware	Upgradeable
[B04] Qlogic BCM5700 ...	Non-Compliant	Recommended	15.05.12	15.10.06	Firmware	Upgradeable
[B04] Qlogic BCM5700 ...	Non-Compliant	Recommended	15.05.12	15.10.06	Firmware	Upgradeable
BIOS	Compliant	Same	2.10.0	2.10.0	BIOS	Same
Dell HBA300 Adp Driver	Compliant	Same	2.01.25.2	2.01.25.02	Driver	Same
Qlogic Family of Server A...	Compliant	Same	35.17.03	35.17.03	Driver	Same
Chipsat HFI	Compliant	Same	10.1.16243.8188	10.1.16243.8188	Driver	Same
ROSE	Compliant	Same	2.0.13.2024	2.0.13.2024	Firmware	Same
Driver for Wavelet Unity C...	Compliant	Same	1.0.0.1091	1.0.0.1091	Driver	Same

# 1-Click Full Stack LCM using Cluster-Aware Updating

Streamline and automate Day 90/180 maintenance operations

- Single workflow orchestrates OS, BIOS, firmware, and driver updates
- One reboot per cluster node with no interruption to workloads
- Node validation checks ensure cluster update readiness
- Fully automated experience with online solution catalog
- Dell Repository Manager created solution catalog for edge/disconnected scenarios
- Compliance report and remediation

The screenshot displays the Windows Admin Center interface for Cluster Manager, showing the 'Install updates' section. The interface is for a cluster named 'ax640-6f.tejd.bdcsv.lab'. The 'Hardware updates' tab is active, showing a 'Component Compliance Summary' bar chart and a 'Compliance Report' table. The summary bar shows 32 Compliant, 2 Urgent, 2 Recommended, and 0 Optional updates, with a total of 36 updates. The compliance report table lists various components and their update status.

Component Name	Compliance	Criticality	Current version	Baseline version	Type	Compliance Type
BIOS	Non-Compliant	Urgent	2.15.0	2.15.1	BIOS	Vegetative
Mellanox WinOF 2 Driver F...	Non-Compliant	Recommended	32.240.02	32.093.02	Driver	Vegetative
Dell HBA330 Mini Driver	Compliant		2.31.25.2	2.31.25.02	Driver	Same
Chipset INF	Compliant		16.1.10404.8158	16.1.10404.8158	Driver	Same
BIOS	Compliant		2.3.1.3024	2.3.1.3024	Firmware	Same
Driver for Marvell Unity Con...	Compliant		1.2.3.1051	1.2.3.1051	Driver	Same
OMAC	Compliant		4.45.15.00	4.45.15.00	Firmware	Same
Firmware for -Disk 0 in Bac...	Compliant		A510	A510	Firmware	Same

# Cluster monitoring and management

Monitoring, inventory, and troubleshooting capabilities

The screenshot shows the Windows Admin Center interface for a Dell EMC OpenManage integration. The top section displays the overall health status of the cluster, which is 'Healthy' with 4 nodes. Below this, there are two circular gauges for 'Nodes' and 'CPUs', both showing a green '4' and 'Healthy' status. The main content area shows the 'Overview' for 'AXNode01', with a 'Physical Disks' table listing various disk components and their health status.

Components	Physical Disks
Disks	SSD 1
Disks	SSD 2
Disks	Solid State Disk 0-17
Disks	Solid State Disk 0-18
Disks	Solid State Disk 0-19
Disks	Solid State Disk 0-20
Disks	Solid State Disk 0-21
Disks	Solid State Disk 0-22
Disks	Solid State Disk 0-23
Disks	Solid State Disk 0-24
Disks	Solid State Disk 0-25

## List of value-add capabilities

- Real-time health status
- Overall cluster status
- Status by node
- Component level health
- iDRAC integrated management
- Hardware and firmware inventory and compliance
- Support for traditional or new dark theme

# Scheduled hardware life cycle management

BIOS, firmware, and driver updates using Cluster-Aware Updating

The screenshot shows the Windows Admin Center interface for Cluster Manager. The main content area is titled 'Update' and contains the following elements:

- Navigation tabs: Update source, Compliance report, Summary, Cluster aware update.
- Update options:  Run now,  Schedule update (with a date/time picker set to 1/28/2021, 6:08:41 PM).
- Instructions: 'Following components have been selected for the update. Please click **Cluster aware update** to start the update. Note: The Update process may take several hours and the target node(s) will be rebooted if needed.'
- Table of components:

Component Name	Compliance	Criticality ↓	Current Version	Baseline Version	Type
> ax740xdazosn0					
> ax740xdazosn1					
- Buttons: Back, Next: Cluster aware update, Exit.

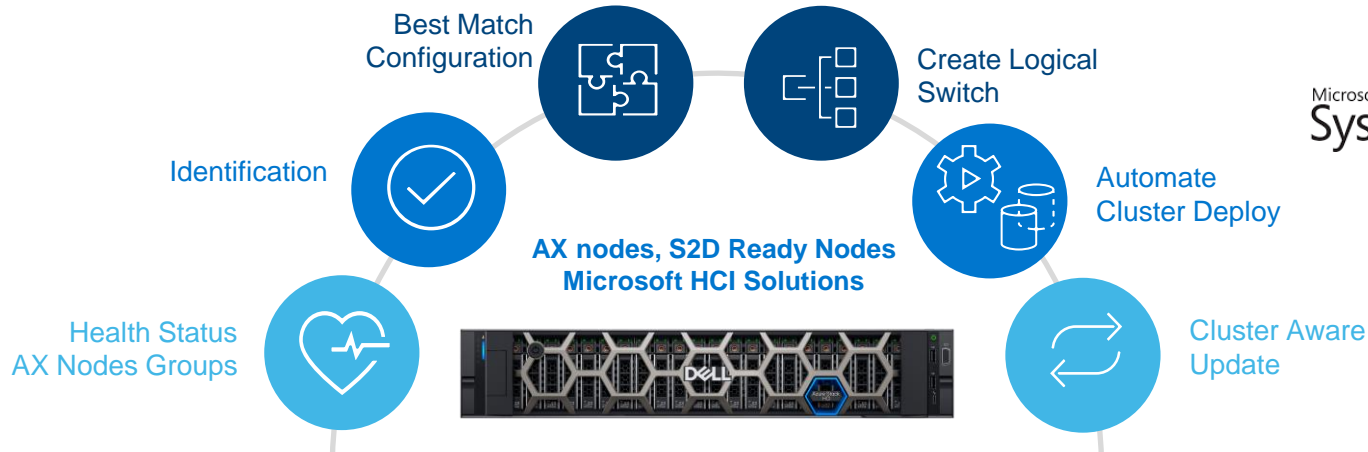
Requires iDRAC Premium License for Windows Admin Center

## Life cycle management functionality details

- Scheduled updates of BIOS, firmware, and OS drivers
- Automation prevents potential for human error and downtime
- Upgrade and downgrade
- Use catalog from Dell Repository Manager (DRM) or online-based PDK/MX catalogs
- Compliance report to verify update success

# Dell OpenManage Integration for System Center (OMIMSSC & OMIMSOM)

Automated Cluster Deployment & Management – Dell Microsoft HCI Solutions



## Windows Server HCI

OpenManage Integration for Microsoft System Center Virtual Machine Manager - Virtual, SDDC, Clusters, HCI

- Bare-metal, zero-touch deployment
- Automated cluster deployment
- Cluster-Aware updating (CAU)

## Microsoft HCI Solutions from Dell



## AS HCI OS + WS HCI

OpenManage Integration for Microsoft System Center Operations Manager - **Monitoring**

- Proactive monitoring and alerts Health status, performance and power, Detailed & Scalable mode, Feature Mgmt Dashboard

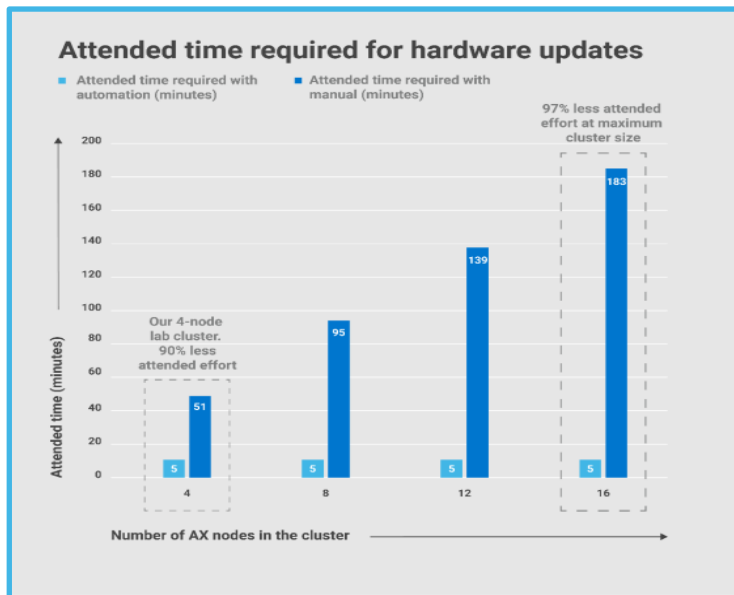
[Dell OpenManage Integrations for Microsoft System Center page](#)

# Automation simplifies LCM of Microsoft HCI Solutions

Dell OpenManage Integration for Windows Admin Center saves time and reduces risk

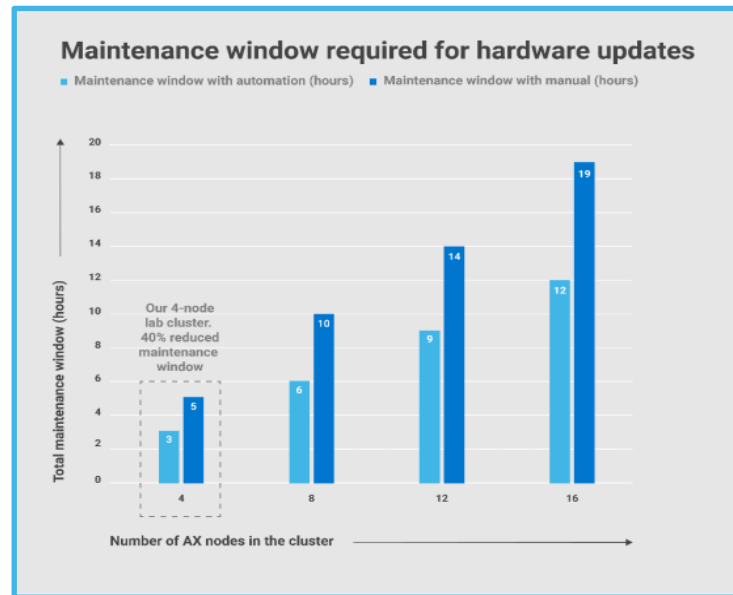
97%

Less attended time required for infrastructure updates<sup>1</sup>



40%

Reduced maintenance window for a 4 node cluster<sup>1</sup>

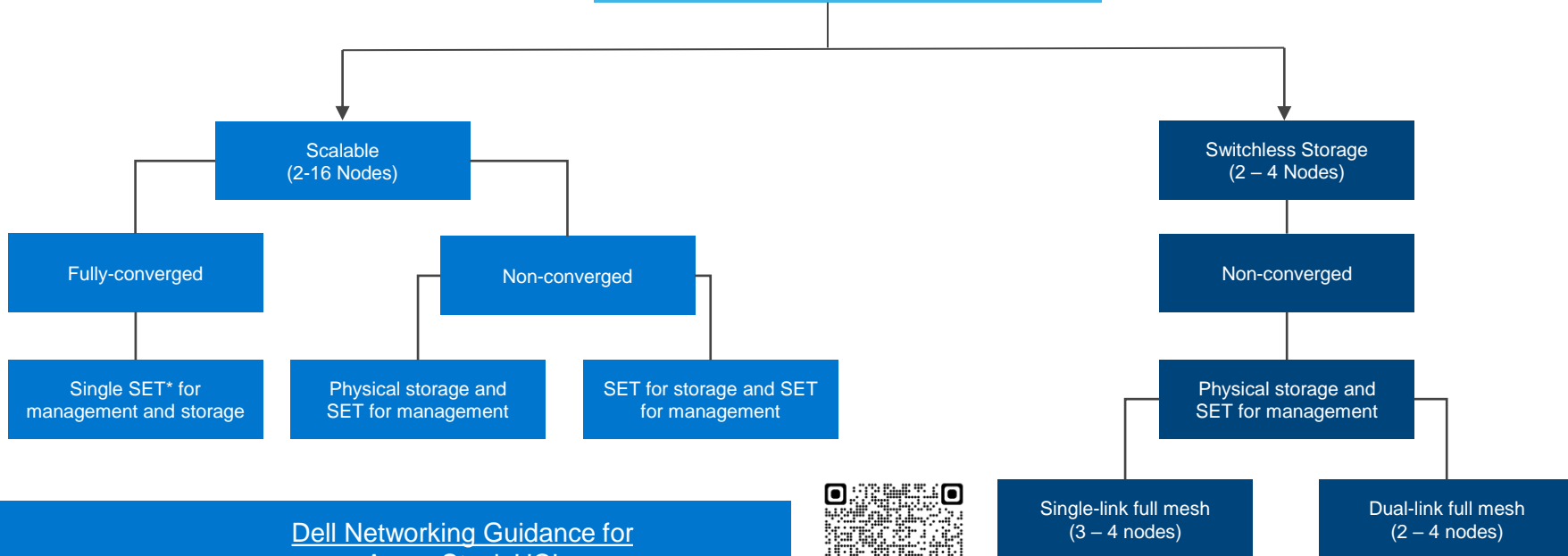
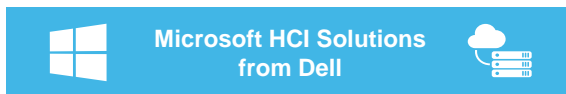


<sup>1</sup> Based on Dell internal testing <https://infohub.delltechnologies.com/t/dell-emc-solutions-for-microsoft-azure-stack-hci-life-cycle-management-approach-comparison-1/>

# Dell Networking



# Network integration and host network configuration options



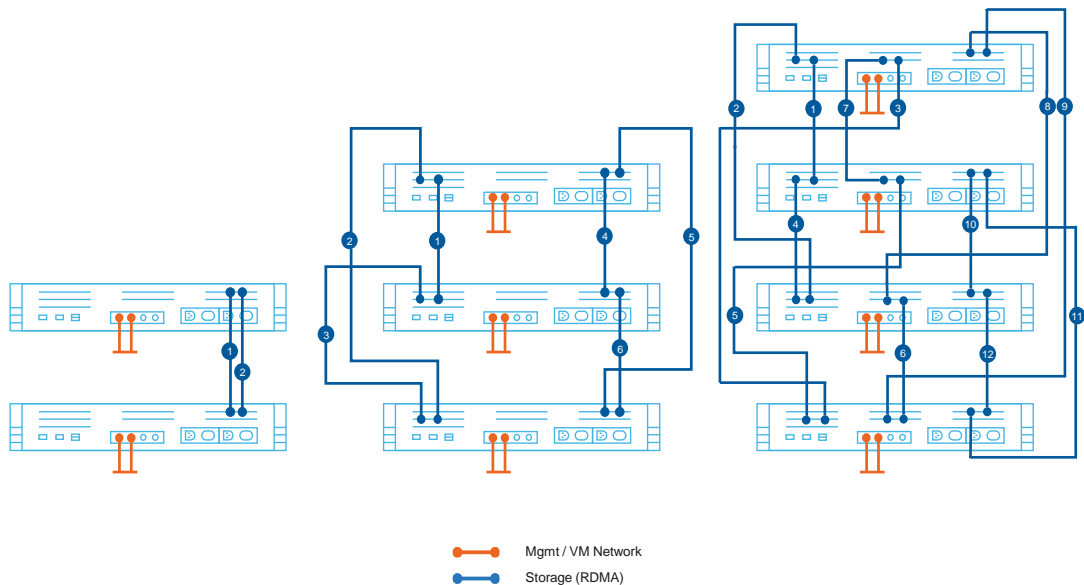
[Dell Networking Guidance for Azure Stack HCI](#)

\*SET: Switch Embedded Teaming, see notes

# Switchless storage network topology

## Full Mesh Switchless Storage

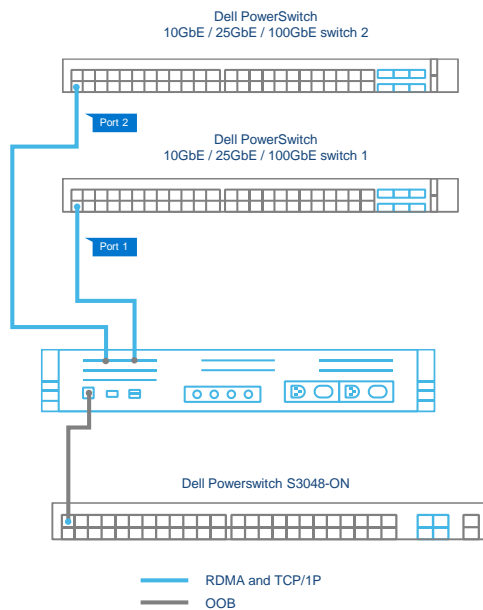
- Mesh configurations for smaller deployment sizes of 2 to 4 nodes makes such configurations a good fit for Edge/ROBO/Departmental use cases
- AX-650 and AX-750 only support 2-node switchless storage configuration.
- Simplifies storage networking using direct connections among cluster nodes
- Improves TCO by not requiring switches for storage interconnect – only need to connect nodes to client switches for host management and VM traffic.
- Simplifies integration into environments that use third party switches



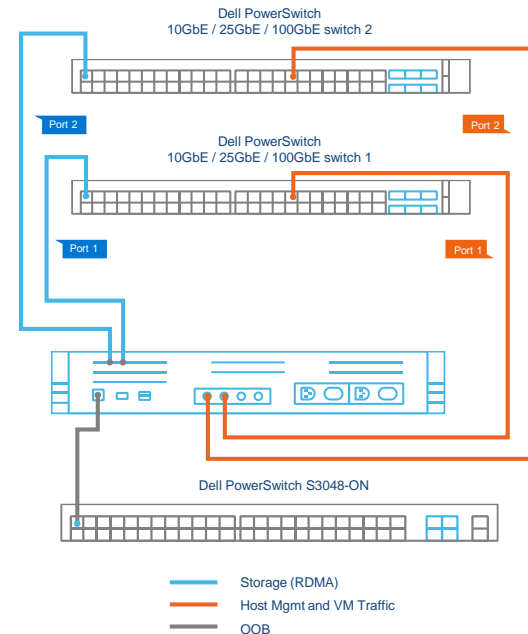
# Scalable networking topologies

## Scalable Infrastructure

- Choose to implement a scalable network topology to expand to maximum cluster size of 16 nodes.
- Fully converged - RDMA, cluster management, and VM traffic traverse the same Ethernet connections thus conserving on switch ports and cabling required per node.
- Non-converged - Separates RDMA and host management / VM traffic onto separate network adapter interfaces. Ensures no contention between storage and LAN communications and can be easier to troubleshoot.



Fully Converged



Non-Converged

# Scalable infrastructure switch options

## Dell PowerSwitch family

- Fully **tested and validated** with Microsoft HCI Solutions configurations
- Low-cost fixed form factor top-of-rack switches offering multiple options of **25GbE SFP28** ports for in-rack AX nodes and **100GbE QSFP28 & QFSPDD-28** ports for uplink and clustering
- 25GbE ports are **backwards compatible** with 1/10GbE to accommodate iDRAC, management, VM, and storage traffic
- Form factors for every cluster size
  - **S5212F-ON** – 1RU, half-width, 12 x 25GbE ports and 3 x 100GbE ports – **Ideal for the ROBO use case**
  - **S5224F-ON** - 1RU, 24 x 25GbE ports and 4 x 100GbE ports
  - **S5248F-ON** – 1RU, 48 x 25GbE ports and 8 x 100GbE ports **Ideal for scaling to 16-node clusters**
  - **S5232F-ON** – 1RU, 32 x 100GbE ports



**S5212F-ON**



**S5224F-ON**



**S5248F-ON**



**S5232F-ON**

## Dell PowerSwitch S5200-ON

**2.5X**

Throughput

**32**

100GbE  
ports in  
1RU

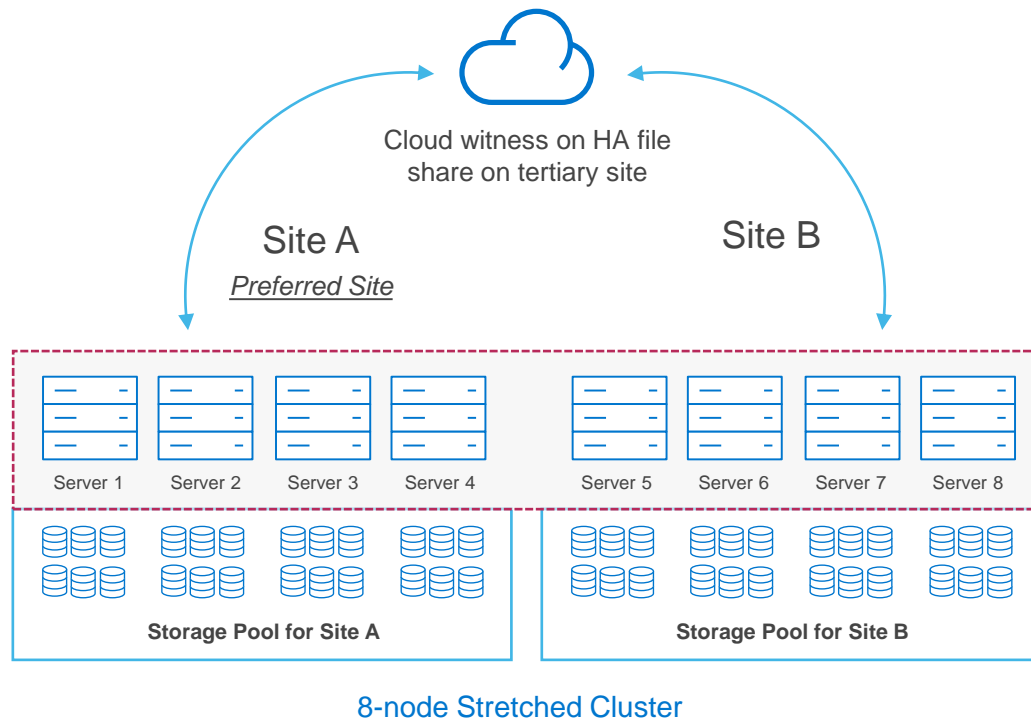
# Stretch clustering

# Native disaster recovery with stretch clustering

## Azure Stack HCI stretch clustering



- Span an Azure Stack HCI cluster across two rooms, two buildings, or two cities
- Storage Replica provides synchronous and asynchronous replication of volumes
- Automatic VM failover removes the need for any manual intervention
- Changes made to underlying Storage Spaces Direct to allow for 2 storage pools within one cluster
- VM affinity and anti-affinity can be used to create Azure-like availability zones across multiple fault domains



[Engineering Reference Architecture](#)



[Failure Scenario POCs White Paper](#)

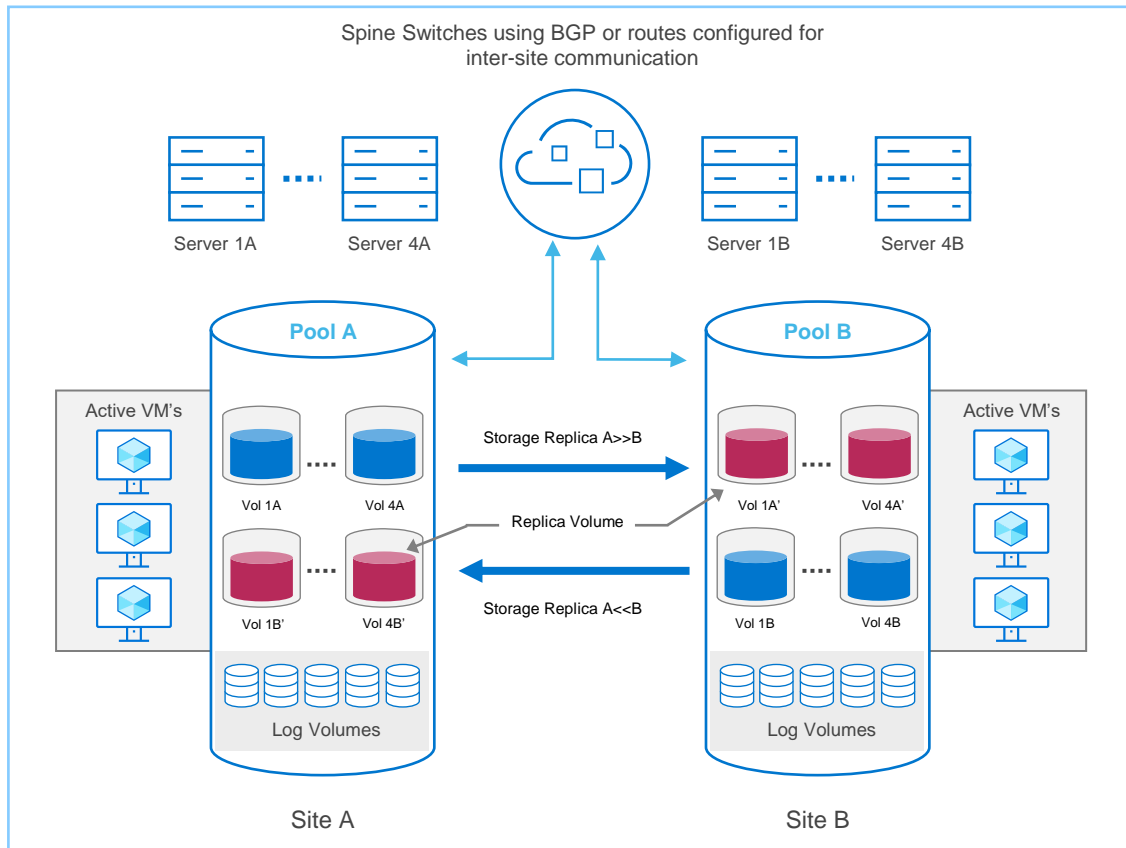


# Traditional vs. Stretched Cluster

Traditional	Stretched
Single Site	Two Site
Site failure will cause complete outage	VMs restart on secondary site in case of site outage – Automated failover
Single Storage Pool	Two Storage Pools
2x to 3x data resiliency <sup>1</sup>	4x to 6x data resiliency <sup>1</sup>
No performance impact	Performance impact can occur due to inter-site throughput and latency. Additional writes to volumes and their respective log volumes on secondary site can cause overhead.
Complete data loss in case of a calamity <sup>1</sup> Based on mirrored volumes	Zero data loss – for synchronous replication Based on RPO for asynchronous

# Active/Passive and Active/Active setups

- **Active Site:** Site which provides workloads for clients to connect to
- **Passive Site:** Dormant Site which receives replication data from the active site and waits for failover from active site
- **Active/Passive Design:** Only one site is actively hosting workloads, and the passive site remains idle until a failover occurs
- **Active/Active Design:** Both sites actively host workloads
- *Note: Active Virtual Machines cannot be hosted on replica volumes*





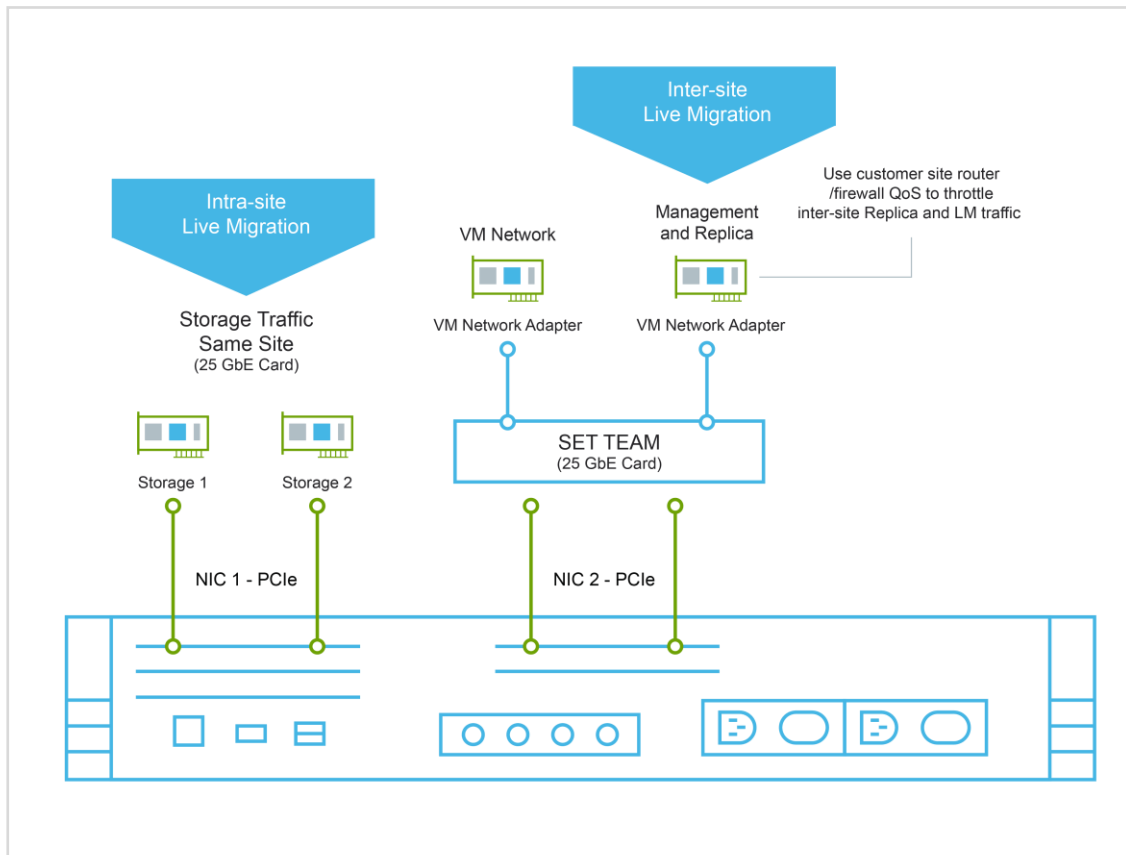
# Volume Resiliency and Efficiency

Resiliency	Failure Tolerance (single site)	Failure Tolerance (stretched)	Storage Efficiency (single site)	Storage Efficiency (stretched)
Two-way Mirror	1	2	50.0%	25.0%
Three-way Mirror	2	4	33.3%	16.6%
Dual parity	2	4	50.0% - 80.0%	Not recommended
Mirror Accelerated Parity	2	4	33.3% - 80.0%	Not recommended

# Host Networking – Option 1

## Basic Configuration

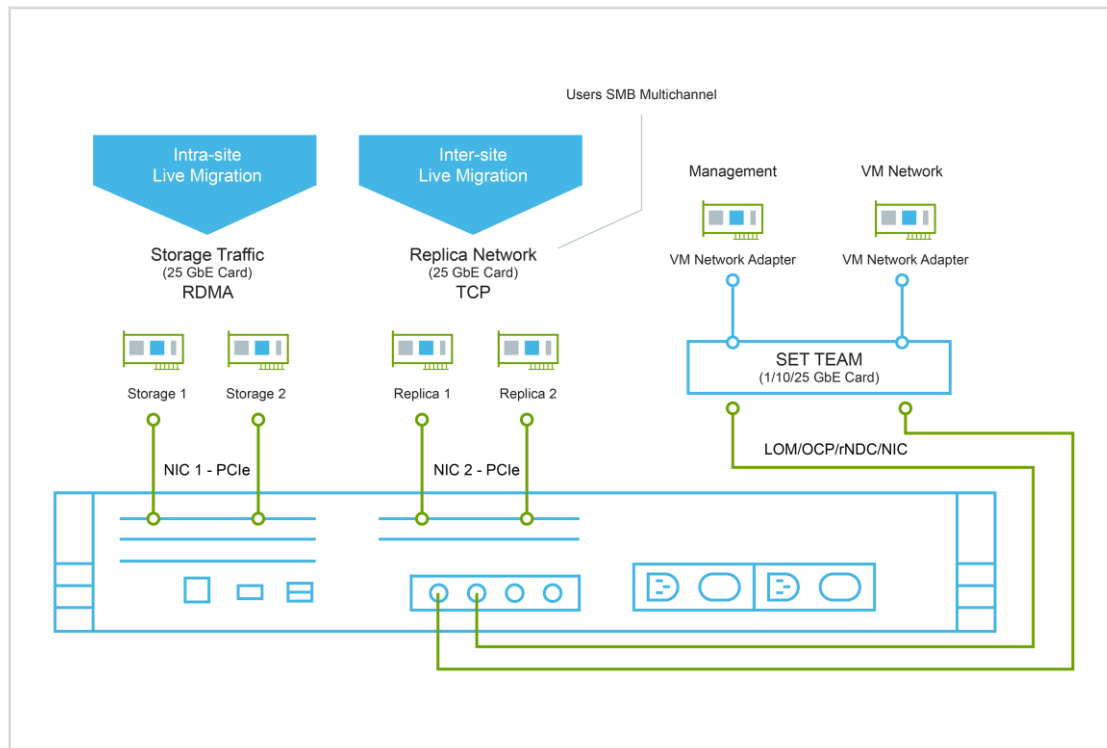
- Ease of configuration
- Will require two PCIe NICs & rNDC is not used
- RDMA over replica network is not supported by Microsoft
- Use customer router/firewall QoS to throttle inter-site Replica/LM traffic so that it doesn't choke the VM/Mgmt traffic



# Host Networking – Option 2

## High Throughput Configuration

- Consider this topology when two sites are within close proximity, and you have higher than 10Gbps network speed between the two sites
- Use of SMB-Multichannel will help in higher throughput
- Minimum of three NICs required (2 PCIe + rNDC)
- Set-SRNetworkConstraint will ensure use of Replica NICs for replication

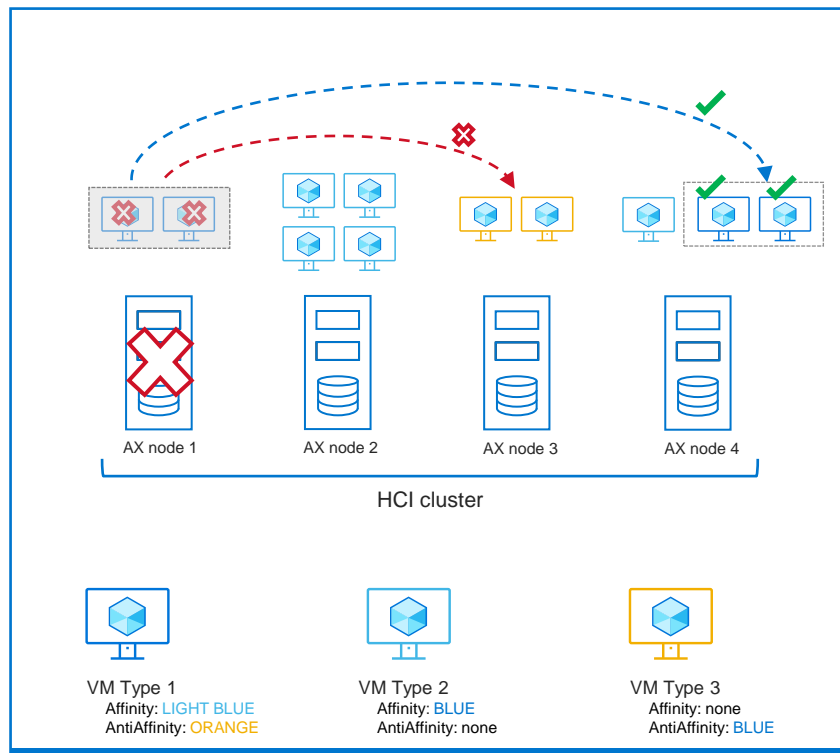


# Virtual Machine Affinity/Anti-Affinity

## Server and site affinity rules for VMs



- Keep VMs/Roles together or apart
- Site awareness
- Multiple options:
  - Same node
  - Different node
  - Same Fault Domain
  - Different Fault Domain
  - Storage Affinity



# Support and Services

# Dell makes implementation simple, flexible and worry free!



## Installation and configuration

### Deployment

- Certified engineers ensure speed and accuracy
- Less risk and downtime
- Free your IT staff to work on other priorities
- Flexible options to fit your needs and budget
- Simplified Windows Server custom upgrade path



## Single Source Support

### Support

- One-stop cluster level support for hardware & software
- Covers OS, hypervisor and Storage Spaces Direct
- Comprehensive coverage whether your license was purchased from Microsoft or Dell
- Timely, reliable issue resolution

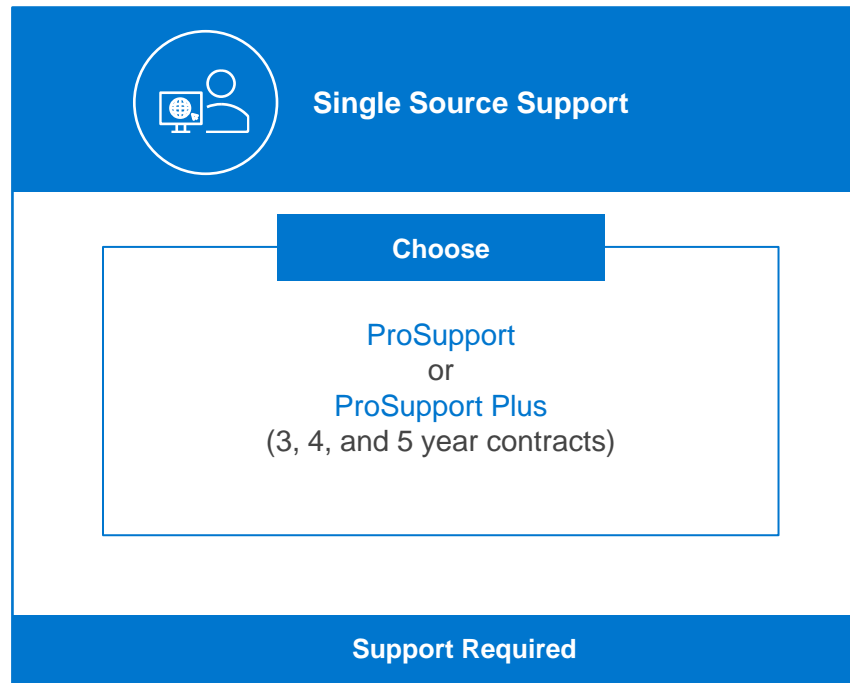
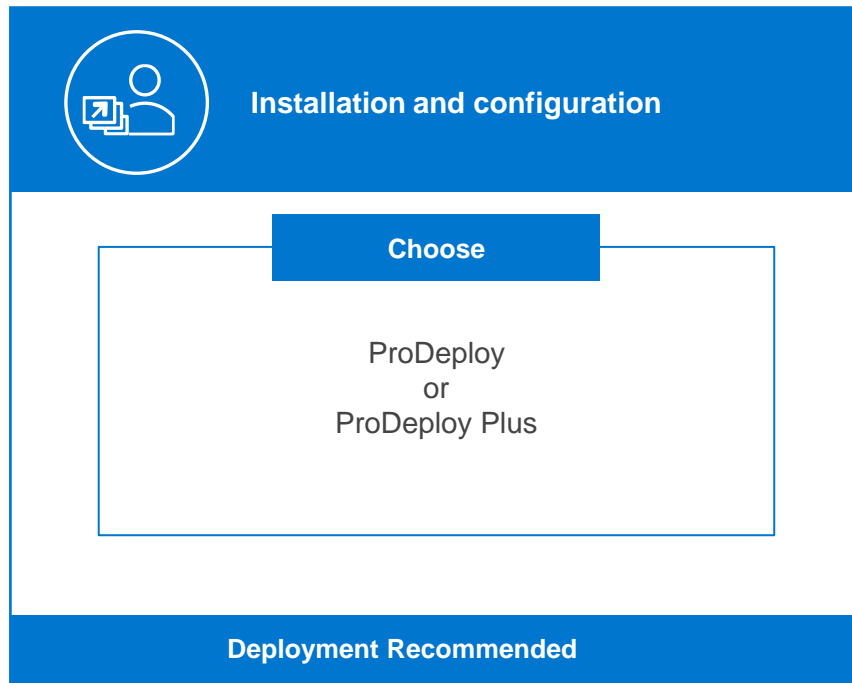
Up to **66%** faster time to deploy<sup>1</sup>

Up to **82%** less project-planning time<sup>1</sup>

Up to **72%** faster issue resolution<sup>2</sup>

**#1 Microsoft Partner** 16 Competencies  
35-year relationship

# Solution-level service experience from a single vendor



# Streamlined deployment

Get more out of your technology starting from day one

Hardware and software deployment

## ProDeploy

Expert installation and configuration services to get your AX nodes up and running quickly.

or

## ProDeploy Plus

The most complete deployment offer in the market

- 30-days of post-deployment configuration assistance
- Training credits
- Service Account Manager (SAM) engagement with ProSupport Plus entitlement

- Deployment of hardware, OS and hypervisor.
- Configuration of Storage Spaces Direct software
- Solution-specific configuration of Windows Server and virtual switch
- System Center Integration

- Install and configure WAC (Windows Admin Center) and the Dell OpenManage Integration with Microsoft Windows Admin Center
- Product orientation
- Validation of installed environment
- Onsite installation for ROBO locations with no IT staff with ProDeploy Plus



# Solution-level single source support

## ProSupport

Comprehensive hardware and software support<sup>1</sup> with 24x7 access via phone, chat and email

or

## ProSupport Plus

The most complete support offer in the market

- Designated Service Account Manager
- Priority access to support experts
- Systems Maintenance guidance
- Call-routing, phone home, and automated case creation supported with Secure Connect Gateway (SCG) and iDRAC Service Module (iSM)

- Support for hardware, OS and hypervisor
- One-stop cluster-level issue and escalation support for *Storage Spaces Direct*
- Comprehensive coverage whether the license is purchased from Microsoft or Dell
- Onsite diagnosis for ROBO locations with no IT staff

# Azure Stack HCI is an integral part of cloud

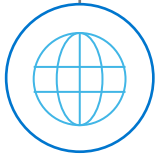
Microsoft Azure



Anywhere you want

off-premises

on-premises



**Azure Cloud**  
located in any country



**Local Azure cloud**  
located in your country



**Sovereign Azure Cloud**  
located in your country and owned by local entity



**Government Azure Cloud Secret Top Secret**  
secured for government workloads



**Azure Stack HUB**

- Data Center
- Edge
- Disconnected
- Tactical



**Azure Stack HCI**

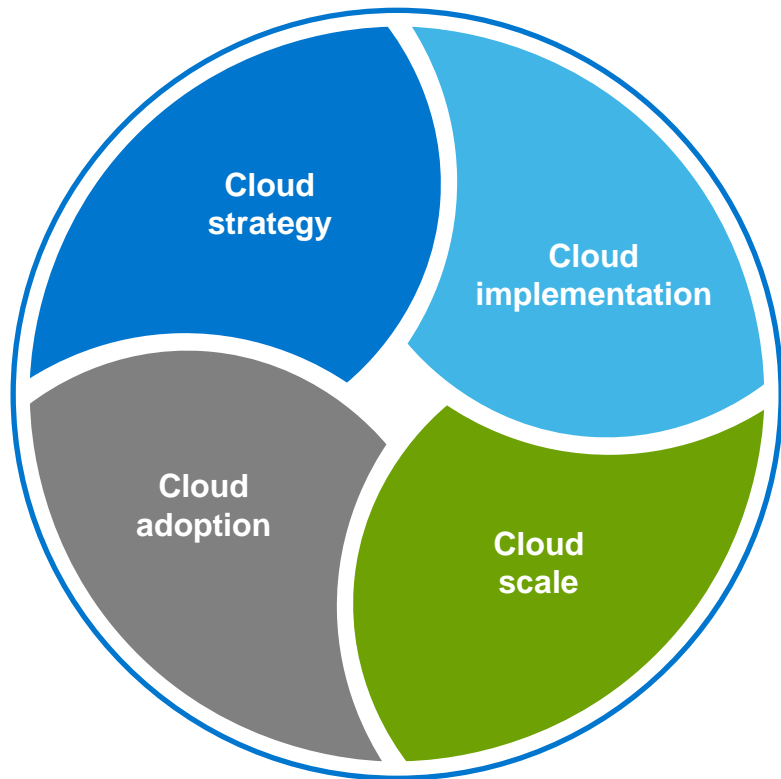
- Data Center
- Branch/remote office
- Edge

# Deliver your hybrid cloud operating model

Dell services will support ongoing development and innovation in your cloud

- Align on strategy across business, dev and IT
- Architect desired future state
- Plan actionable roadmap
- Identify KPI/program success metrics

- Create cloud/SRE operating model
- Migrate workloads, apps and data to run on infrastructure
- Enact policy and governance program
- Monitor performance and productivity



- Validate operational readiness
- Deploy and support Azure Stack Hub and HCI
- Create on-demand, self-service catalogue
- Integrate with core IT operational systems
- Innovate with containers

- Integrate roadmap for business and technology
- Analyze and validate success metrics
- Capture employee experiences

# Microsoft Cloud Solution Provider (CSP) program from Dell

# Microsoft Cloud Solution Provider (CSP) program from Dell

Enable customers to purchase their Azure Stack HCI OS service from Dell



## What is the Program

- Resell of the Azure Stack HCI OS via existing Dell Microsoft CSP program, with current ProSupport included
- Sales, Billing and Operations of subscription done at Dell
- Available in 18 countries



## Why is important

- Retains customer relationship by providing an end-to-end offering: Infrastructure and Azure Stack HCI OS subscription via Dell
- New customers can start their Azure subscription with Dell or transfer from another CSP, and existing Dell CSP customers can activate their ASHCI OS using their Subscription
- Step towards transacting as-a-Service
- Strategic to Dell and Microsoft partnership



## DT Sells and Supports

- Hardware Infrastructure
- Dell Software
- OEM Windows Guest OS
- Azure Subscriptions\*
  - **Azure Stack HCI OS**

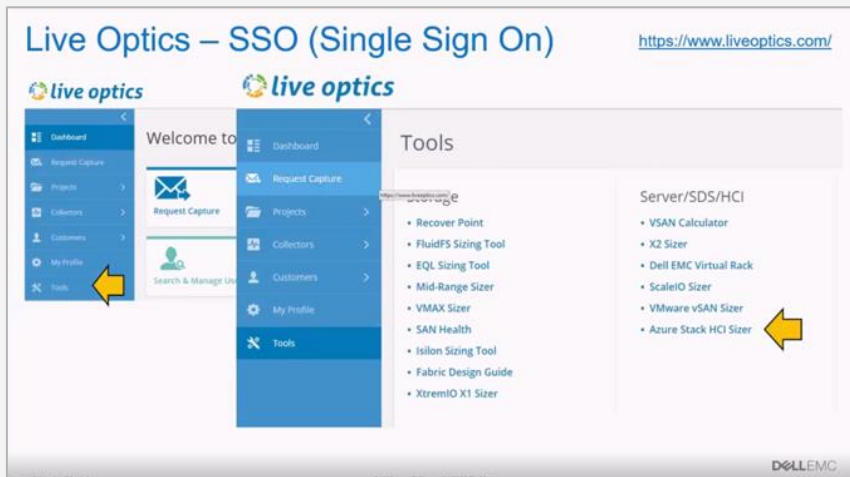
\*Additional Azure services (AKS, SQL, etc...) are still not available with Pro Services.



# Sizing and configuration tools

# Live Optics

Capture, collect, and analyze performance information from various operating systems



[Live Optics](#)

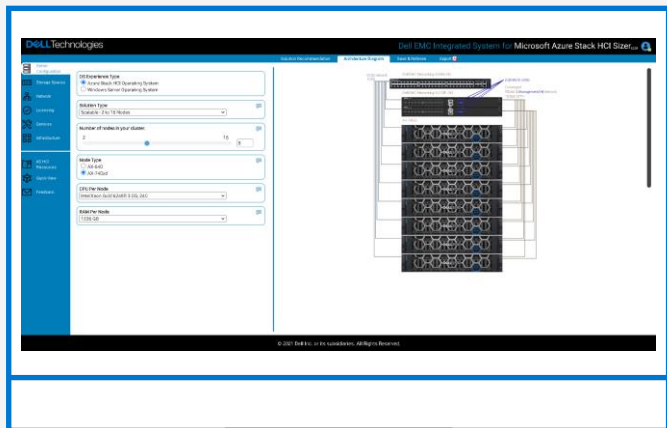


## Live Optics - Real-world data for IT decisions

- Uses [host-based performance collector](#), Optical Prime (formerly known as DPACK)
- Live Optics software is designed to be used in both small and large IT environments
- Live Optics allows users to request project preparation and analysis to view [analytic performance metrics](#) in the project they create
- Download the software, run the collector and create/view your project in 3 simple steps
- Includes link to [Azure Stack HCI Sizer Tool](#).

# Azure Stack HCI Sizer Tool

Create validated Azure Stack HCI configurations based on workload requirements



Please reach out to your account team to begin the sizing exercise



## Explore configuration options

- Quickly match business requirements to appropriate configuration
- Great deal of flexibility and ease of use



## BOM made easy

### Detailed BOM and architecture diagram

- Visual images for ease of understanding / usability
- Easily share and fine tune configurations



# Fabric Design Center

Automate the planning, design, and deployment of network fabrics



## Overview

- Cloud Based Fabric Design & Deployment
- Simplifies and automates new fabric deployments and scale out of existing fabrics in the data center.
- Accelerates new service roll out and reduces time to value.



## Highlights

- Turn-key solutions for Dell Reference Architectures.
- Pre-defined and customizable fabric architectures.
- Available at no charge for Dell Networking Customers, Partners and SEs



## Key Features

- Fabric design driven by specifying business intent.
- Generates Logical and Physical Network Views, Bill of Materials & Cabling Diagrams.
- Deployment automation via Switch ASCII configuration generation & DevOps Integration

[Fabric Design Center](#)



# Best practices and example configurations

# Getting the most out of Azure Stack HCI



**Unrivaled Performance:** Use **single-tier, all-flash** drive configuration. For storage networking, configure **RDMA** over **25 GbE** connections – **iWARP** recommended.



**Manageability:** Full stack **life cycle management** of OS, BIOS, firmware, and drivers. Manage at scale with **Azure Resource Manager** and **Azure Arc**, and natively integrate with other Azure services.



**Scalability:** Scale to 16 nodes in a cluster. Cluster nodes must be **homogenous**. Two-node and switchless storage cluster scale-out not supported, but **Cluster Sets** can be leveraged. Use cluster expansion preparation feature in OpenManage Integration.



**Simplicity:** **Productized** and **validated** AX nodes. Create clusters following our Deployment Guide or using automated cluster creation in Windows Admin Center. Leverage **ProDeploy** and **ProSupport** creates turn-key, solution-level experience.



**Resiliency:** Start with **4-node or greater** clusters. Disaster recovery with stretch clustering available with integrated system.

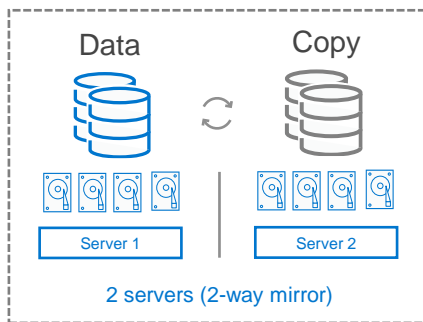


**Resource Efficiency:** Right-sized and future proofed. **Live Optics, HCI Sizing Tool, and Fabric Design Center** optimize price, performance, and capabilities. Use CPU core management in OpenManage Integration to achieve balance between cost and performance.

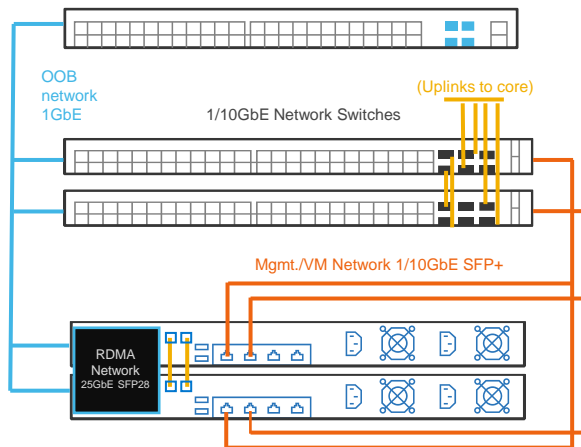
# Example of Entry Offer for ROBO

## Customer Requirements

- ROBO focused
- Cost conscious
- Small storage capacity (5 TB useable)
- Fleet management
- Existing network switching inadequate for RDMA requirements
- Space constraints
- Predictable performance
- Not looking to scale-out, but want to scale-up



DELL Networking S3048-ON



## Recommended Configuration

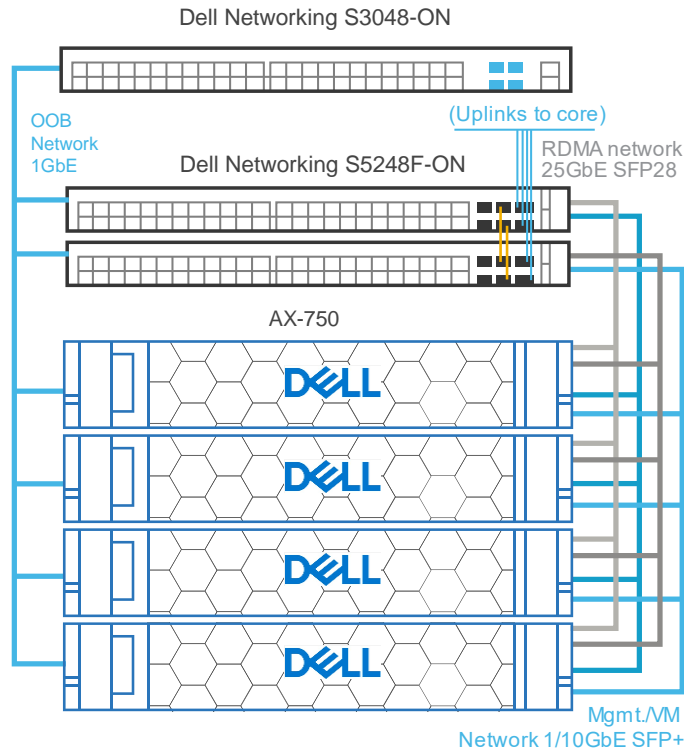
2 x AX-650

- Dual-link full mesh switchless storage network topology
- All flash- 4 x 1.92TB MU SAS
- 2 x 4310 2.1GHz, 12 core (cores can be disabled in the BIOS to reduce cost)
- 256 GB RAM
- 1 x Mellanox ConnectX-5 (Dual Port 25 GbE)
- (Optional) Use Dell PowerSwitch S Series 10GbE Switches, future proof your investment with 25GbE switch

# Example of Most Popular Offer for VDI

## Customer Requirements

- Scale-out and scale-up
- Support 500+ users (576)
- Fully self-contained with both OS and user data
- 50 TB useable storage
- Knowledge users with a lot of storage required
- No graphics acceleration required
- Mirror accelerated parity config



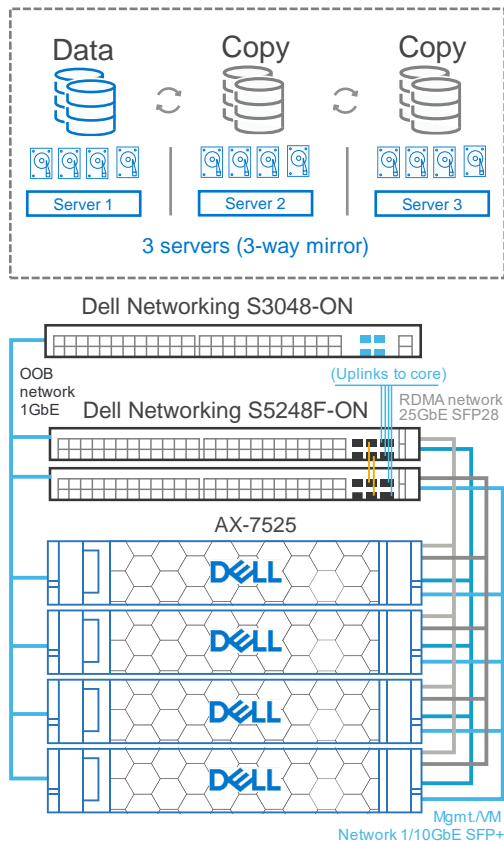
## Recommended Configuration 4 x AX-750

- All-flash – 12 x SAS-3.84TB-MU
- 2 x 6342 2.8G, 24 core
- 512 GB RAM
- 2 x Mellanox ConnectX-5
- Non-converged network topology
- Use Dell PowerSwitch S Series 25+GbE Switches for storage traffic and 10GbE or better for management/VM traffic

# Example of High Performance Offer for SQL

## Customer Requirements

- High performance, low latency – sub millisecond latency
- Predictable, linear scale
- Scale-out / scale-up
- Response time consistent paramount
- Maintain peak performance even in the case of hardware failures
- 35 TB usable for databases



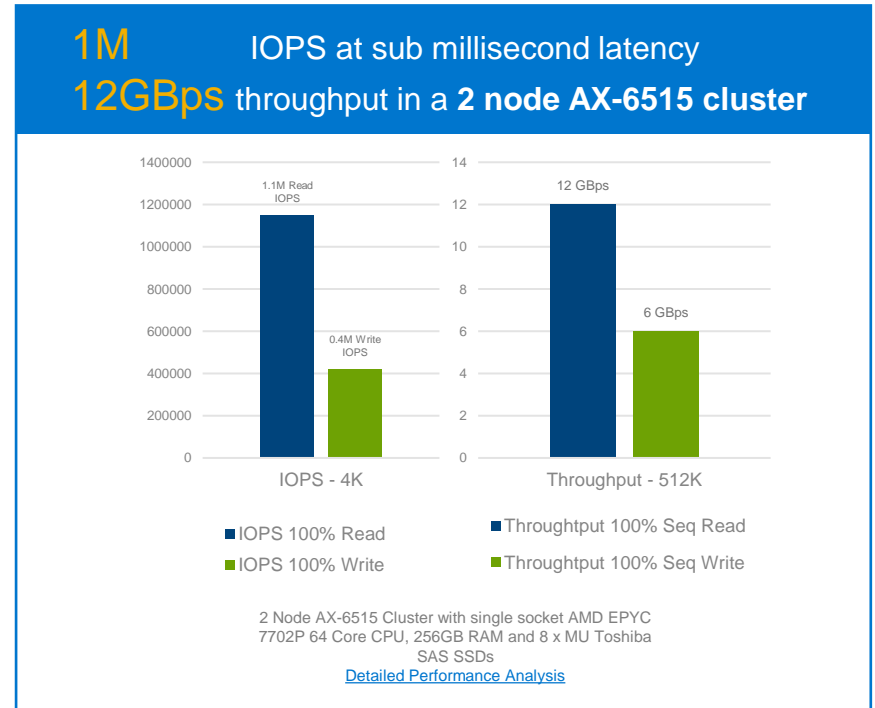
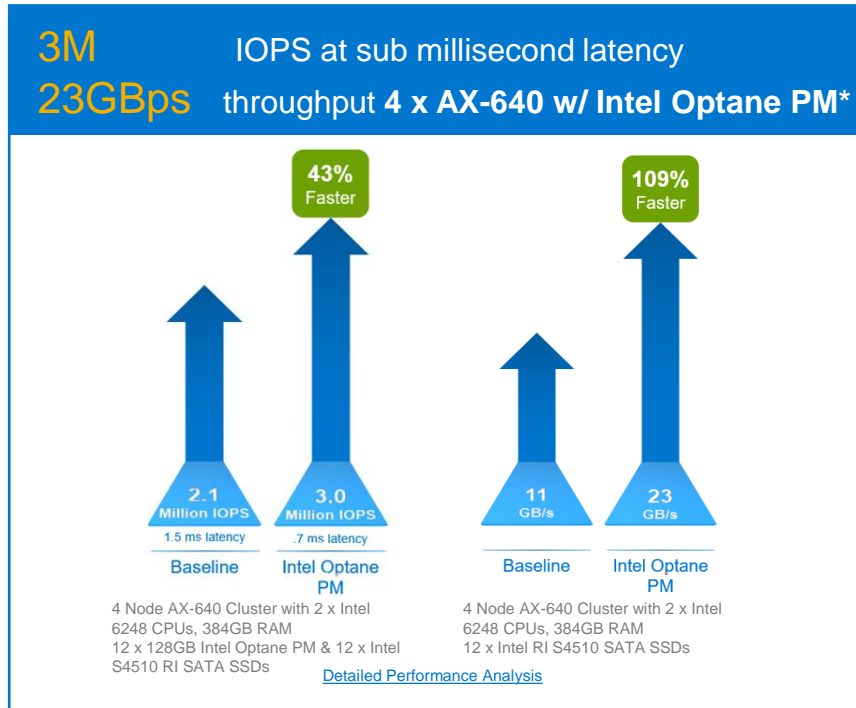
## Recommended Configuration 4 x AX-7525

- All NVMe – 12 x NVMe-3.2TB-MU (for up to 42TB usable in 3-way mirror)
- 2 x 7302 3.0G, 16 core
- 1 TB RAM
- 1 x Mellanox ConnectX-5 (Dual Port 25 GbE)
- Use Dell PowerSwitch S Series 25+GbE Switches for storage traffic and 10GbE or better for management/VM traffic

# Proof Points


# AX Nodes deliver high performance architecture

Built-in, always on cache | Remote Direct Memory Access | Kernel Embedded Architecture  
 Persistent Memory | All-NVMe | All-Flash | Hybrid | 25 & 100GbE Ethernet





# Analysts put Microsoft SQL on Windows Server HCI to the test

 **PROWESS**

## Modernize or Perish: Dell EMC™ Solutions for Microsoft® Azure® Stack HCI Throw a Lifeline to Your Database Workloads

Prowess Consulting's testing shows that Dell EMC AX-740xd nodes provide near-linear scalable performance for Microsoft® SQL Server® 2019 coupled with modern manageability.


### Executive Summary


Data drives business, but businesses too often struggle to keep up. Nowhere is this more evident than with databases. Business and IT leadership look to database administrators (DBAs) to modernize the data estate, but DBAs are just trying to coax performance out of their current infrastructure. Overall, IT today is held back by legacy systems that grow ever more costly to operate, all while budgets are shrinking. DBAs and IT leadership alike are wrestling with outdated data-management solutions and processes, with results that hurt the organization at large.


Hyperconverged infrastructure (HCI) can act as a lifeline for organizations who need to modernize. HCI promises to reduce expenses, increase agility, and simplify operations, but the choice of HCI solution is crucial. For an HCI solution to be effective, it needs to meet current and future performance needs while reducing total cost of ownership (TCO) and management complexity.


Prowess Consulting evaluated one such solution, Dell EMC™ Solutions for Microsoft® Azure® Stack HCI, with an eye toward performance and overall value. Our testing and research showed that this Dell EMC HCI solution running

### Highlights

  
Performance that scales with the cluster

  
Lower TCO and

 **StorageReview**

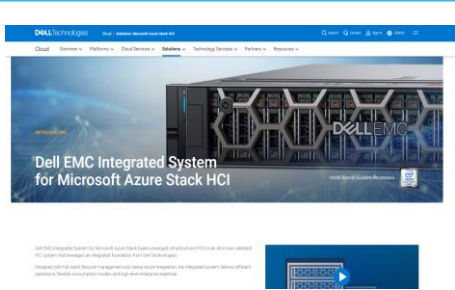


## The Importance of Resiliency and Cluster Management in ROBO HCI

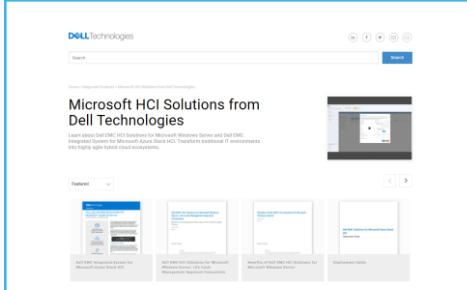
WITH DELL EMC SOLUTIONS FOR MICROSOFT AZURE STACK HCI

# Call to action

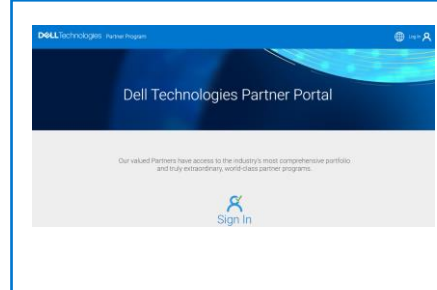
# Further Learning



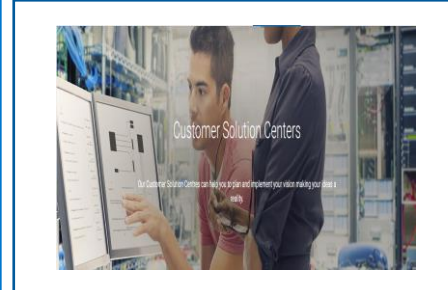
**Product Page** – Dell Integrated System for Microsoft Azure Stack HCI



**Info Hub** - Guides, Solution Briefs, White Papers, Blogs, Videos, etc.



**Dell Technologies Partner Portal**



**Customer Solution Centers**



**Demo Center**



# Conclusion

# Microsoft HCI Solutions from Dell



## Confidence

Fully productized portfolio of integrated systems form an enterprise class foundation for building hybrid cloud



## Convenience

Accelerate your time to value with ProDeploy options



## Customer Support

Global Dell ProSupport for the solution-level support, including hardware and software



## Comprehensive Management

Dell OpenManage Integration for Windows Admin Center and Azure Arc enables life cycle management of a hybrid cloud operating model

# DELLTechnologies

