

**NT**  
**KONFERENCA**  
**2022**

**NT KONFERENCA 2022**

26. – 28. september 2022

**#ntk22**



# **Azure Stack HCI - delček Azure infrastrukture pri vas**

Slavko Kukrika

([Slavko.Kukrika@Outlook.com](mailto:Slavko.Kukrika@Outlook.com))

MCT in prijazen fant

# Agenda

- ➔ What is Azure Stack HCI?
- ➔ Azure Stack HCI vs. Windows Server 2022
- ➔ Technologies in Azure Stack HCI
- ➔ Azure Arc
- ➔ Questions & Answers

# What is Azure Stack?

Extension of Azure to consistently run hybrid applications

## Azure Stack HCI

Hyperconverged solution



Operating system and hardware  
Scalable virtualization and storage  
High-performance workloads  
AKS on Azure Stack HCI  
Integration with Azure Arc

## Azure Stack Edge

Cloud-managed appliance



Compute, AI & IoT  
at the edge

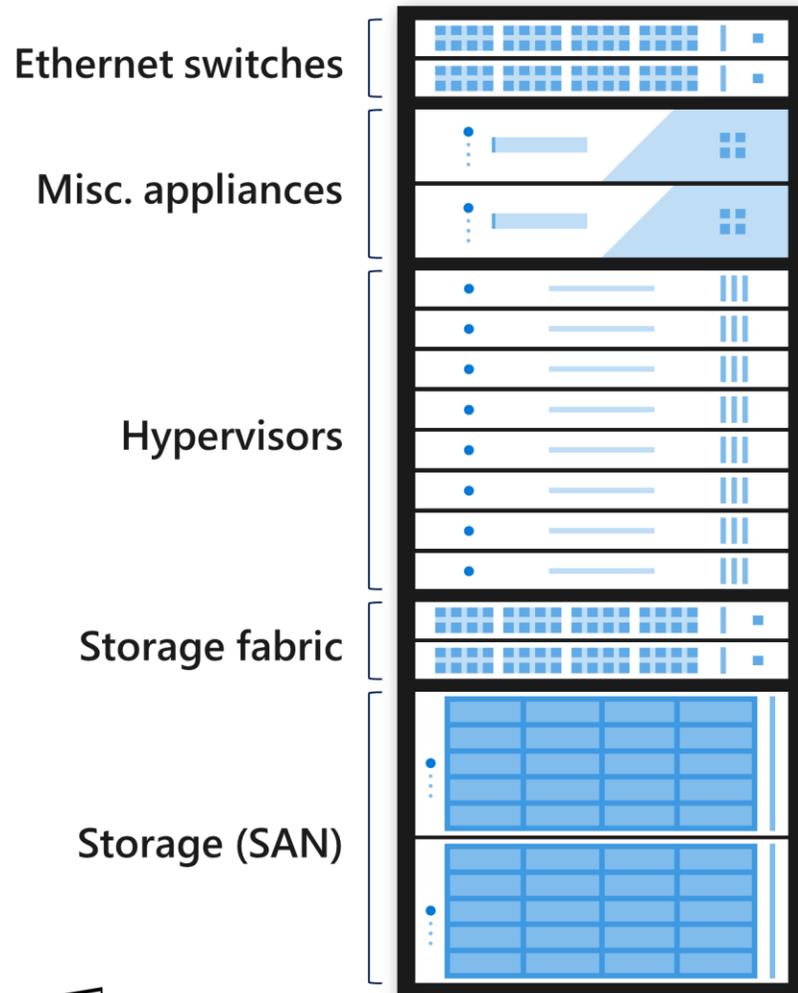
## Azure Stack Hub

Cloud-native integrated system



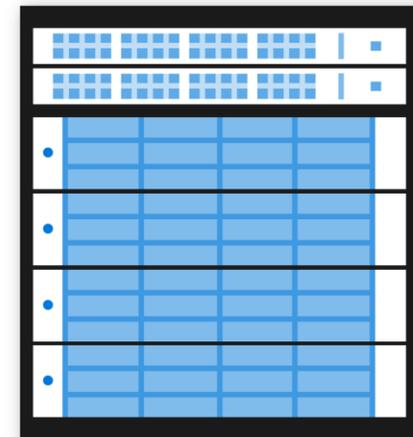
Disconnected  
scenarios

# Hyperconverged infrastructure (HCI)



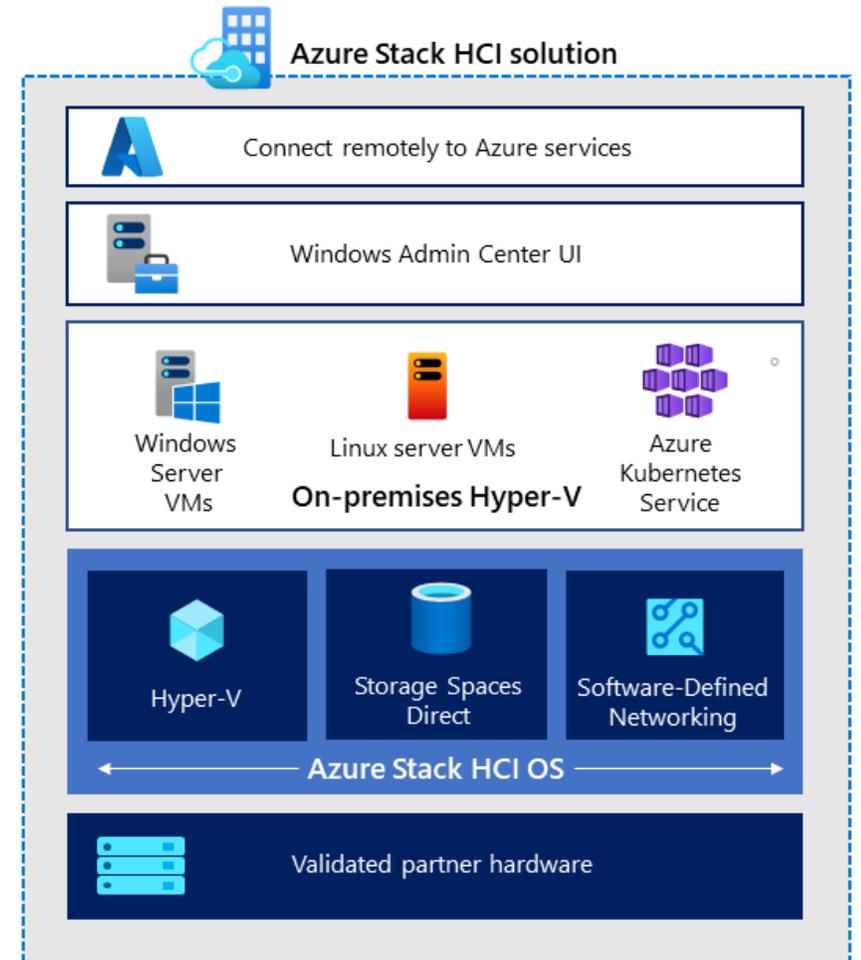
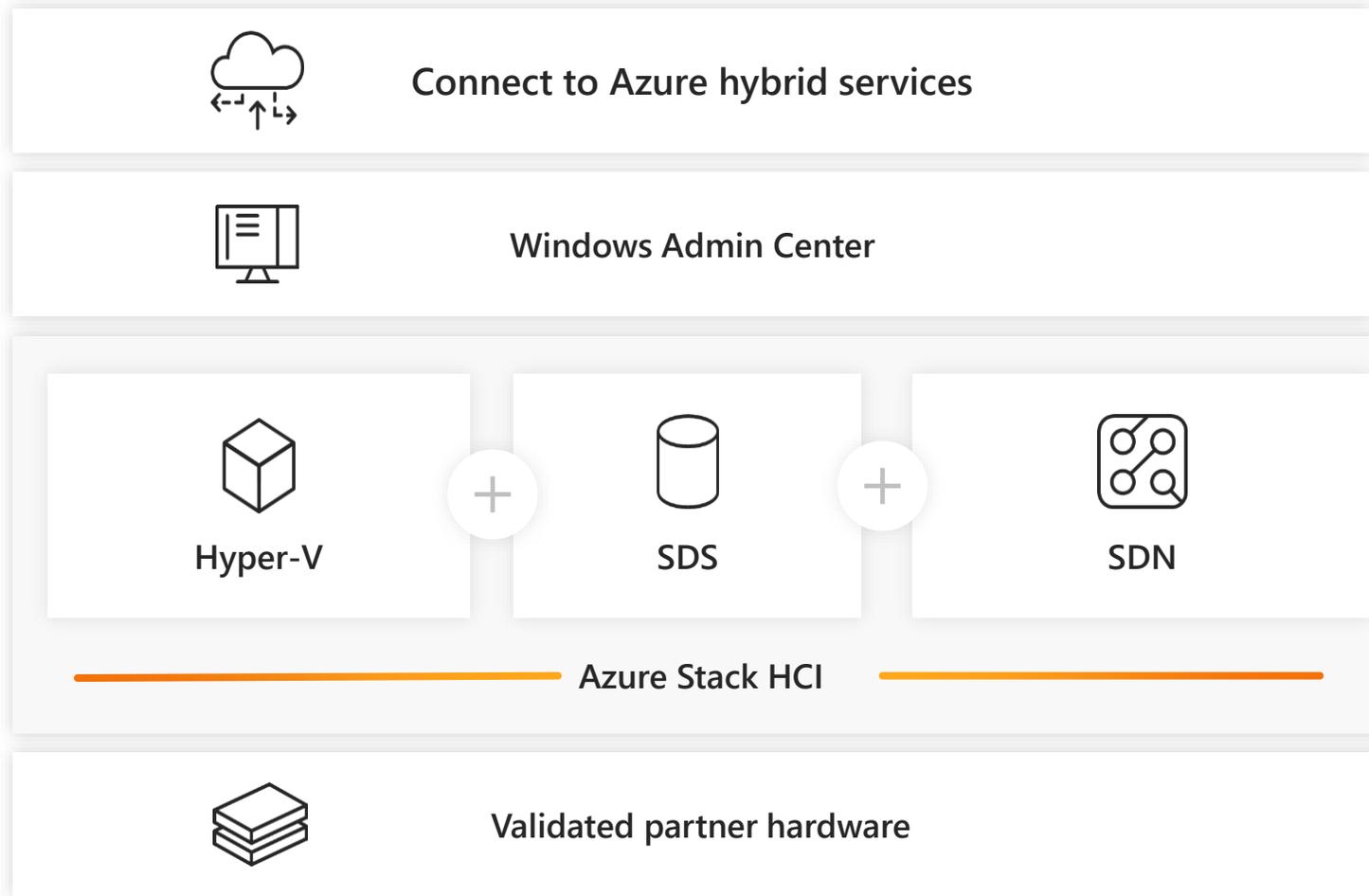
Traditional "three tier" infrastructure

Removes limits of physical hardware components  
Separates management from the physical hardware  
Uses virtualization to provide abstraction and agility  
Hardware agnostic, centrally configured, policy managed



Hyperconverged infrastructure (HCI)

# What is Azure Stack HCI?



# Azure Stack HCI is delivered as Azure hybrid service



No software licenses to buy and track

Automatically billed to your Azure subscription



No standalone legal agreement to read and sign

Covered by Azure services terms



No separate support contract number

Azure Support from the Azure Portal



No versions to upgrade

Continuous feature updates



# Windows Server and Azure Stack HCI



## Azure Stack HCI

✓ Exciting roadmap of new releases

Innovation focused on being the **best virtualization host**

**Future of Hyper-V virtualization,** software-defined storage and networking

Azure **subscription-based** model at \$10 per core per month

Runs on **your hardware**



## Windows Server

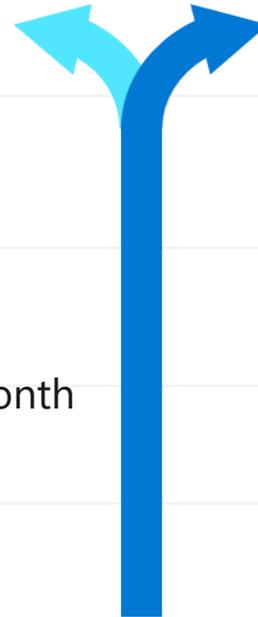
✓ Exciting roadmap of new releases

Innovation focused on being the **best guest** and **traditional server**

**All other Windows Server roles,** like IIS, File Services, DNS, DHCP, AD/DS

**Traditional** licensing model

Runs **anywhere**



# Windows Server and Azure Stack HCI



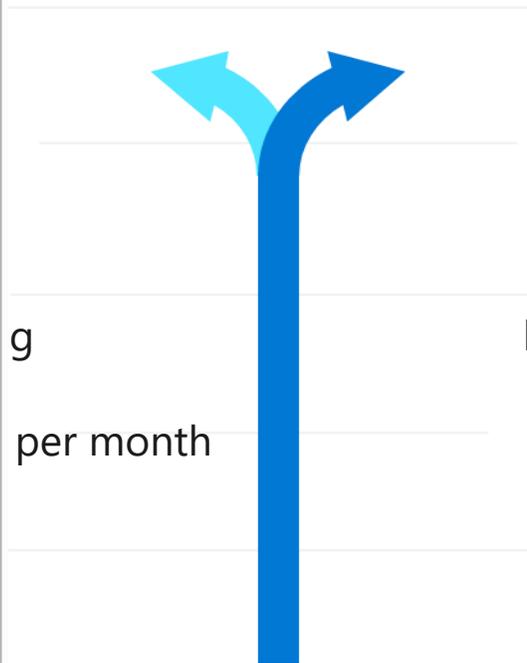
Azure Stack HCI



Windows Server

- File and Storage Services (1 of 12 installed)
- Hyper-V (Installed)
- Network Controller
- Remote Access
- Web Server (IIS)

Azure subs



g  
per month

- Active Directory Certificate Services
- Active Directory Domain Services
- Active Directory Federation Services
- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Device Health Attestation
- DHCP Server
- DNS Server
- Fax Server
- File and Storage Services (1 of 12 installed)
- Host Guardian Service
- Hyper-V (Installed)
- Network Controller
- Network Policy and Access Services
- Print and Document Services
- Remote Access
- Remote Desktop Services
- Volume Activation Services
- Web Server (IIS)
- Windows Deployment Services
- Windows Server Update Services

# Annual updates are free and non-disruptive

Azure Stack HCI, version 20H2    Azure Stack HCI, version 21H2    Azure Stack HCI, version 22H2    Azure Stack HCI, version 23H2    Azure Stack HCI, version 24H2

A horizontal timeline with a purple line and arrow pointing right. Five purple dots are placed along the line, corresponding to the years 2020 through 2024. Above each dot is the text 'Azure Stack HCI, version [year]H2'. Purple curved arrows connect each dot to the next one to its right, indicating a sequence of updates.

2018 — 2019 — 2020 — 2021 — 2022 — 2023 — 2024 — 2025

**Windows Server**  
2019 LTSC

A horizontal timeline with a blue line and arrow pointing right. Three blue dots are placed along the line, corresponding to the years 2019, 2022, and 2024. Below each dot is the text 'Windows Server [version]'. The text '2019 LTSC' is positioned below the first dot, '2022 LTSC' below the second, and 'vNext' below the third.

**Windows Server**  
2022 LTSC

**Windows Server**  
vNext

Subscription business model = customers are always entitled to updates

# Comparing Azure Stack HCI and Windows Server 2022

## Azure Stack HCI

- Premier platform for running VMs
- Stripped-down version of Windows Server
- Cloud service that includes an OS
- Subscription based
- Includes Azure benefits
- Does not include virtualization rights
- Focuses on infrastructure level
- Run workloads in VMs or containers
- Clients don't connect directly to it

## Windows Server 2022

- Latest Windows Server version
- Multi-purpose OS with many different roles
- Can run anywhere
- Clients can connect directly

# Comparing Azure Stack HCI and Windows Server 2022

Attribute	Azure Stack HCI	Windows Server 2022
Hyper-V	Yes	Yes
Storage Spaces Direct	Yes	Yes
Software-Defined Networking	Yes	Yes
Adjustable storage repair speed	Yes	Yes
Secured-core Server	Yes	Yes
Stronger, faster network encryption	Yes	Yes
4-5x faster Storage Spaces repairs	Yes	Yes
Stretch clustering for disaster recovery with Storage Spaces Direct	Yes	No
High availability for GPU workload	Yes	No
Restart up to 10x faster with kernel-only restarts	Yes	No
Simplified host networking with Network ATC	Yes	No

# Comparing Azure Stack HCI and Windows Server 2022

Attribute	Azure Stack HCI	Windows Server 2022
Stretch clustering for disaster recovery with Storage Spaces Direct	Yes	No
High availability for GPU workload	Yes	No
Restart up to 10x faster with kernel-only restarts	Yes	No
Simplified host networking with Network ATC	Yes	No
Single-node clusters with Storage Spaces Direct	Yes	No
Storage Spaces Direct thin provisioning	Yes	No
Dynamic processor compatibility mode	Yes	No
Cluster-Aware OS feature update	Yes	No
Integrated driver and firmware updates	Yes (Integrated Systems only)	No

# NT KONFERENCA 2022

Technologies in Azure  
Stack HCI

# Software-Defined Compute

Workloads can transparently move and run on any host

Failover clustering, Hyper-V virtualization

Some of Hyper-V features for Software-Defined Compute

Live Migration

Hot add/resize VHDX

Runtime resize of VM memory

Hot add and vNIC naming

Dynamic processor compatibility

Hyper-V Replica

Shielded VMs

PowerShell Direct

Discrete Device Assignment

Capability	Azure Stack HCI
Physical (Host) Memory Support	Up to 24 TB per physical server
Physical (Host) Logical Processor Support	Up to 512 LPs
Virtual Machine Memory Support	Up to 12 TB per VM
Virtual Machine Virtual Processor Support	Up to 240 VPs per VM

# Software-Defined Storage

Removes separation between local storage and SAN

Policy configured, feature-rich cloud scale storage on standard HW

Some of Azure Stack HCI features for SDS

Storage Spaces Direct - software-defined, shared-nothing storage

Server Message Block 3 (Transparent Failover, Scale Out, Multichannel, Direct, ...)

Storage Quality of Service (QoS)

Scale-Out File Server (SoFS)

Storage Replica

Stretch clustering with S2D

	Azure Stack HCI
Max servers per cluster	16
Max storage per cluster	16 PB
Max storage per server	400 TB
Max volumes per cluster	64
Max volume size	64 TB

# Supported Drive Types

Faster



Slower



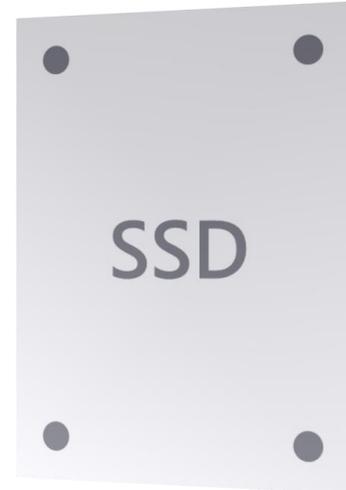
Persistent Memory  
(Storage Class Memory)

~ 1  $\mu$ s  
1,000 ns



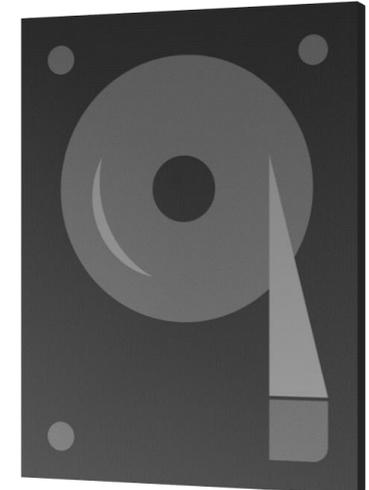
Non-Volatile Memory  
Express

~ 0.1 ms  
100,000 ns



Solid-State Drive

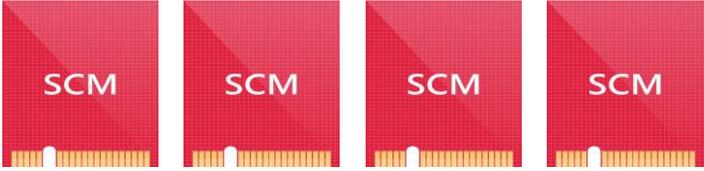
~ 0.1 ms  
100,000 ns



Hard Disk Drive

~ 10 ms  
10,000,000 ns

# S2D storage



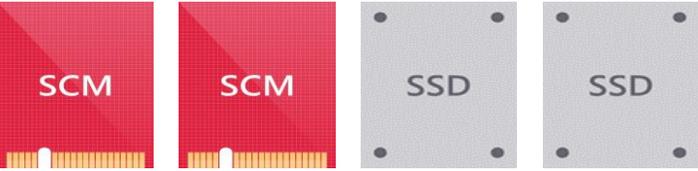
SCM for Capacity

OR



SCM + NVMe for Capacity

OR



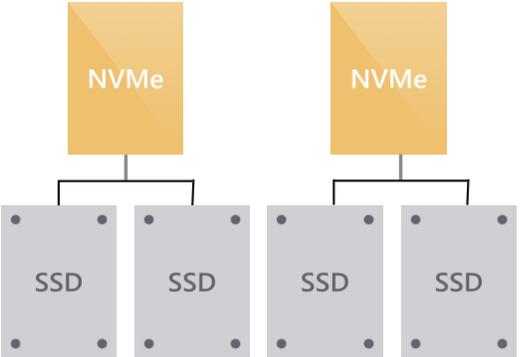
SCM + SSD for Capacity

Flat design of all flash delivers the best IOPS and throughput



NVMe for Capacity

OR

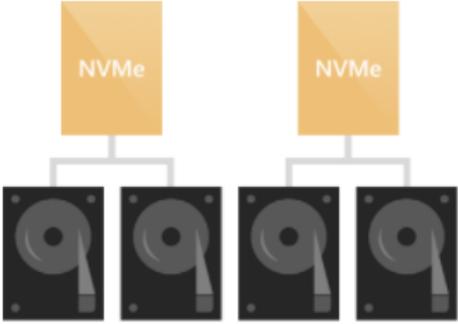


NVMe for Cache & SSD for Capacity

OR

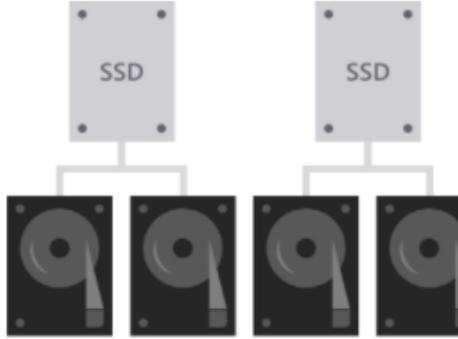


SSD for Capacity



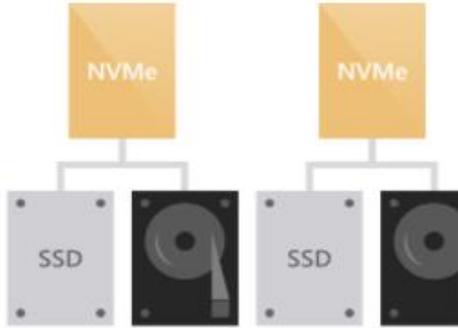
NVMe for Cache HDD for Capacity

OR



SSD for Cache HDD for Capacity

OR



NVMe for Cache SSD + HDD for Capacity



# S2D Storage Resiliency Types



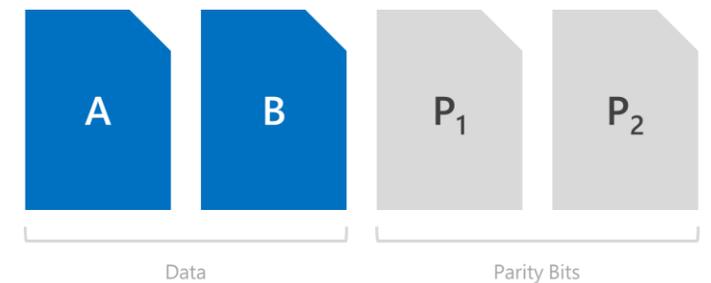
**Two-way mirror**  
2 servers



**Three-way mirror**  
3+ servers



**Single parity**  
Possible but not recommended



**Dual parity**  
4+ servers

# Software-Defined Networking

Separates network control and forwarding functions from the network topology

Some of Azure Stack HCI features for Azure-inspired SDN

Remote Direct Memory Access (RDMA)

NIC Teaming

Switch-Embedded Teaming (SET)

Receive Side Scaling (RSS)

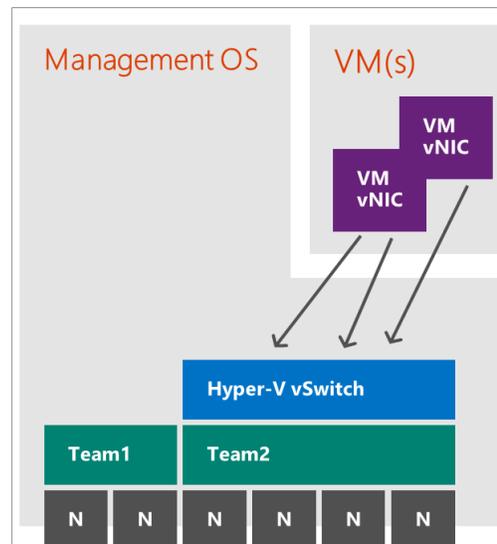
Virtual Machine Queue (VMQ)

Data Center Bridging

Network Virtualization

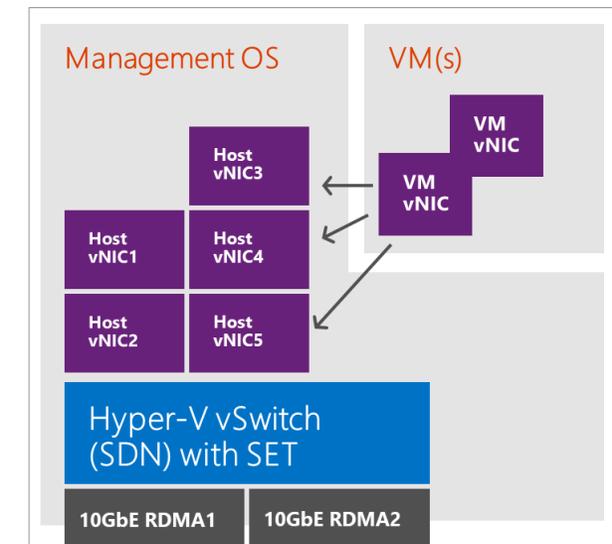
Network Controller

Non-converged network



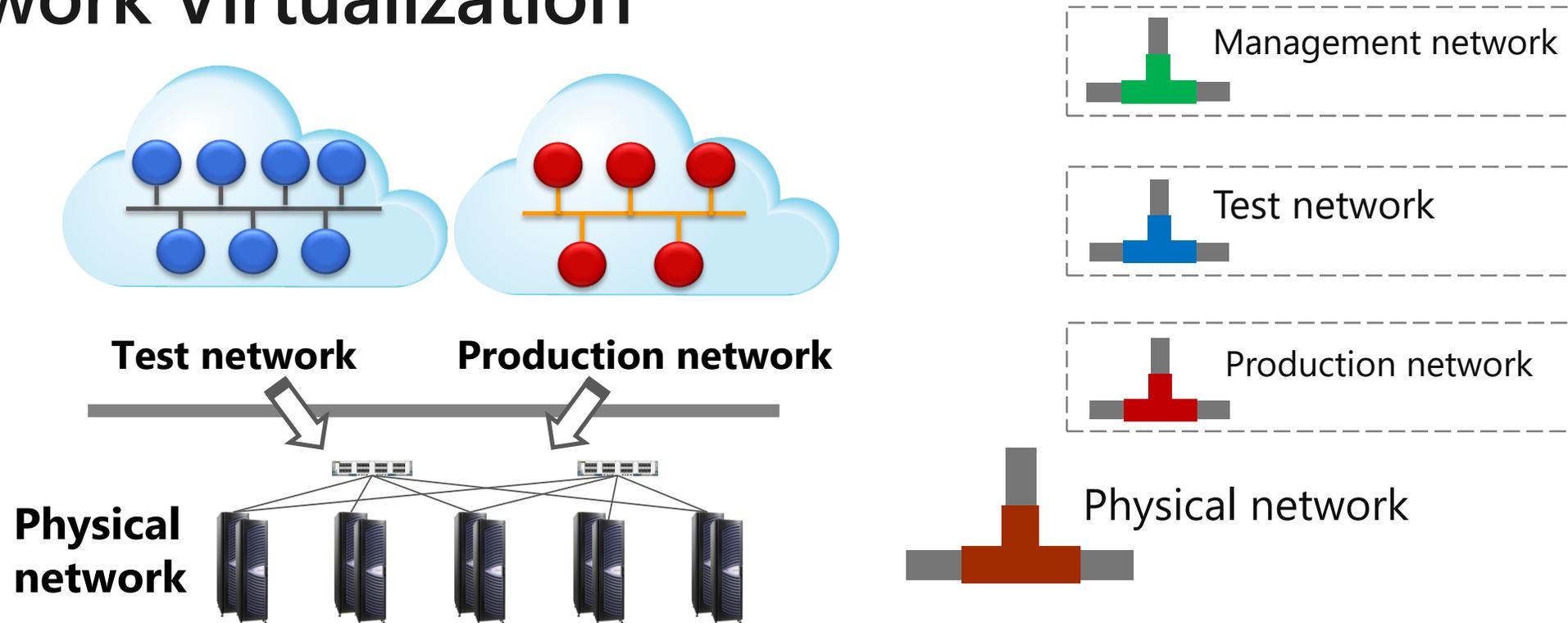
Traditional Hyper-V Host  
Example 6 x 1GbE NICs

Converged network



Azure Stack HCI Host  
Example 2 x 10GbE RDMA NICs

# Network Virtualization



Multiple virtual networks on a same physical network

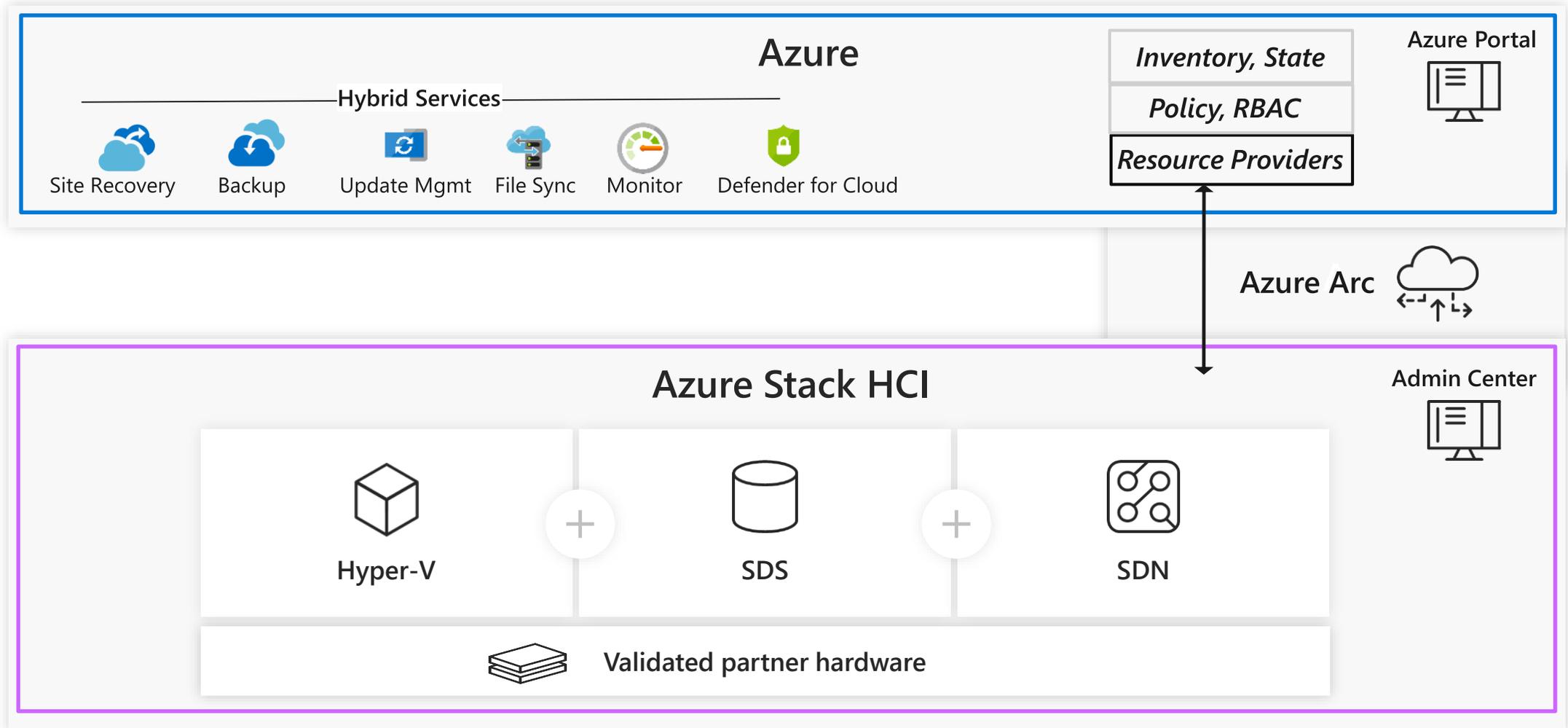
Each virtual network is isolated from others

Can be implemented on any network infrastructure

# NT KONFERENCA 2022

Azure Arc

# Azure Stack HCI and Azure Arc



# Azure Arc

## Infrastructure



Multi-cloud



Azure Arc virtual machines  
(preview)



Azure Stack HCI



Kubernetes clusters



Servers



SQL Servers



VMware vCenters (preview)



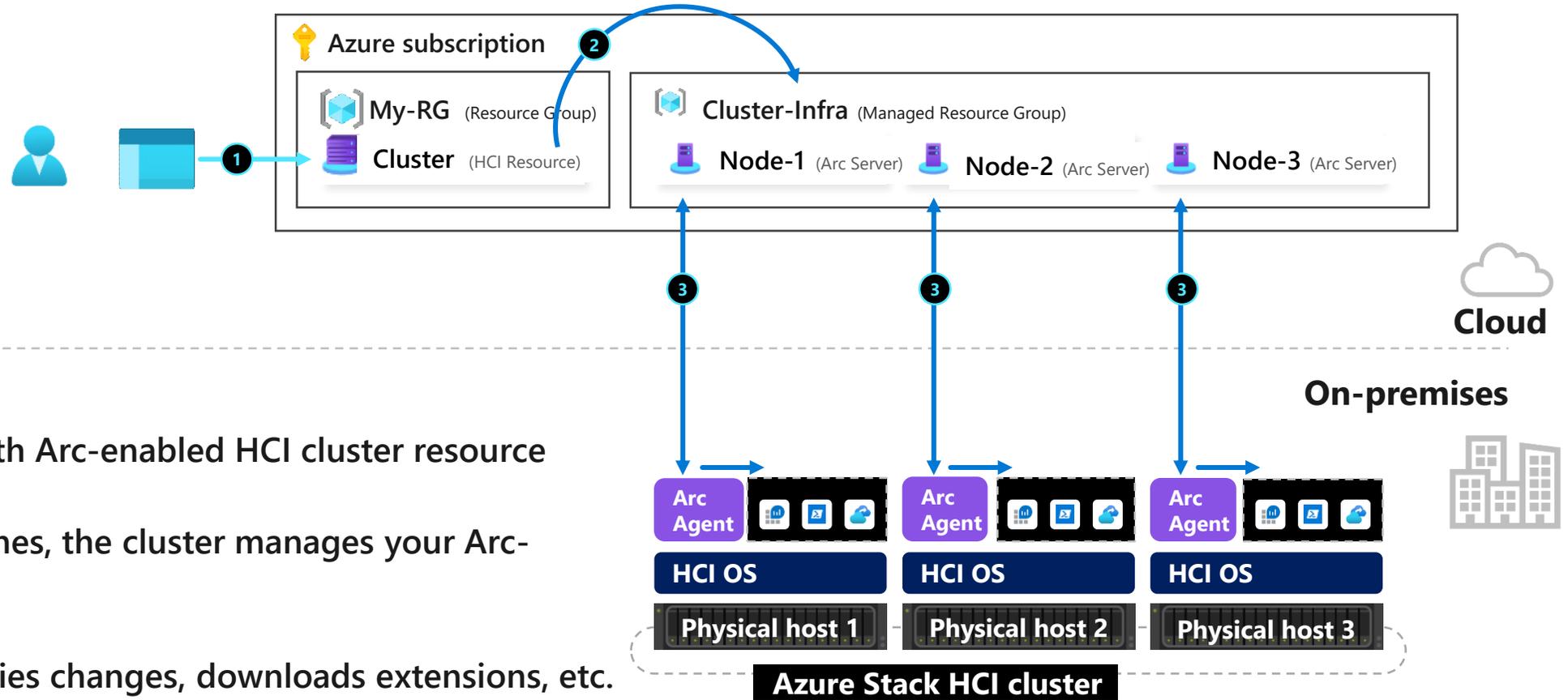
SCVMM management servers  
(preview)



Edge



# Every Azure Stack HCI node is Arc-enabled



- 1 You interact with Arc-enabled HCI cluster resource
- 2 Behind the scenes, the cluster manages your Arc-enabled nodes
- 3 Each node applies changes, downloads extensions, etc.

# Azure Stack HCI integrates with Azure Arc



**Manage HCI infrastructure**

with Arc-enabled hosts



**Create and manage VMs on HCI**

with Arc resource bridge



**Manage guest OS inside VMs**

with Arc-enabled VMs



**Manage K8s clusters**

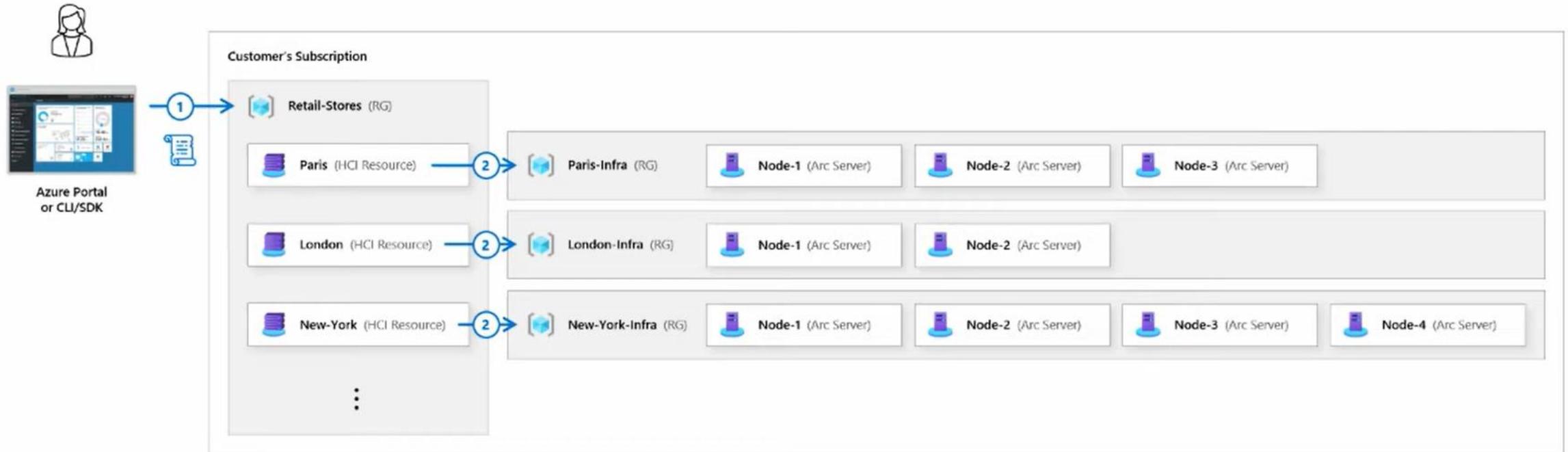
with Arc-enabled Kubernetes



**Run PaaS services locally**

with Arc-enabled services

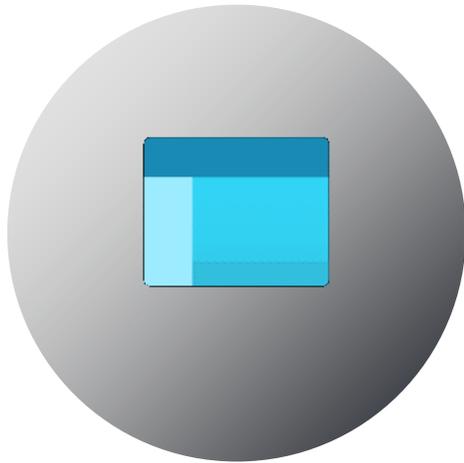
# At-a-scale Azure Stack HCI management



User applies Azure policy to resource group containing HCI resources  
HCI cluster forwards the policy to every Arc-enabled member node

# Provision and manage VMs from the Azure Portal

with Arc-enabled VM management for Azure Stack HCI (preview)



## Azure Portal

Consistent user experience  
across cloud and edge



## ARM templates

Automate VM deployments  
with ARM templates



## RBAC and self-service

Users can access their VMs  
only, not the host fabric



## Arc-enabled guests

Manage and monitor the  
guest OS and apps

# Summary

Azure Stack HCI evolved from Windows Server

HW + Azure Stack HCI OS + Azure Subscription

Best virtualization host from Microsoft

On-premises part of Azure - includes Azure benefits

Pay-as-you go subscription based service

# Additional information

## Azure Stack HCI documentation

<https://docs.microsoft.com/en-us/azure-stack/hci/>

## Azure Stack HCI foundations

<https://docs.microsoft.com/en-us/training/paths/azure-stack-hci-foundations/>

## Azure Arc overview

<https://aka.ms/AzStackHCISandbox>

## Try out the Azure Stack HCI Sandbox

<https://aka.ms/AzStackHCISandbox>

## Jumpstart ArcBox sandbox environment

<https://aka.ms/JumpstartArcBox>



# Questions?

[Slavko.Kukrika@Outlook.com](mailto:Slavko.Kukrika@Outlook.com)

# INT KONFERENZ 2022

This is not school, but we **love** to get grades. Please fill out our questionnaires and leave us your feedback. You may even **win** some cool rewards.