What’s new in Windows Server 2025 Hyper-V & Storage

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Ihr starker IT-Partner.
Heute und morgen.

BECHTLE

Agenda

Data & Storage
Hyper-V
Hotpatching
Upgrade Pfade

Windows Server 2025 Storage

Accelerate Mission Critical Workloads

Optimize for NVMe Storage

Improved performance

Lower CPU utilization

Reduce Storage Costs

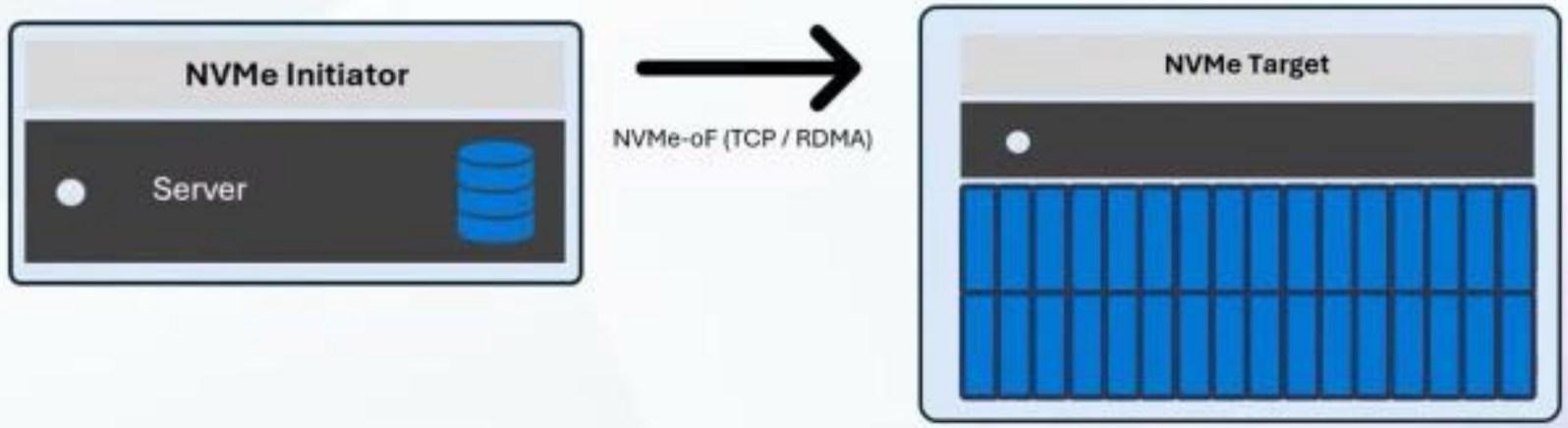
Coming soon to Windows Server 2025

Full stack, Native NVMe Support

- WS2025 delivers up to 70% more IOPS on NVMe SSDs
- After GA, WS2025 will bring up to 90% more IOPS
- This innovation in full stack NVMe
  - Lowers host CPU consumption = More VMs per node
  - Increases IOPS = increased performance per VM

NVMe-oF Initiator

- Built-in NVMe-oF client for connecting to NVMe SANs
- Enables additional storage topologies
- TCP for traditional workloads
- Roadmap: RDMA support for lowest latency workloads



25% of Enterprises will deploy NVMe-oF solutions by 2027

Gartner - Top Trends in Enterprise Data Storage 2023

WS 2025 delivers up to 90% more IOPs on NVMe SSDs

with future Native NVMe Enhancements

1.1M IOPs

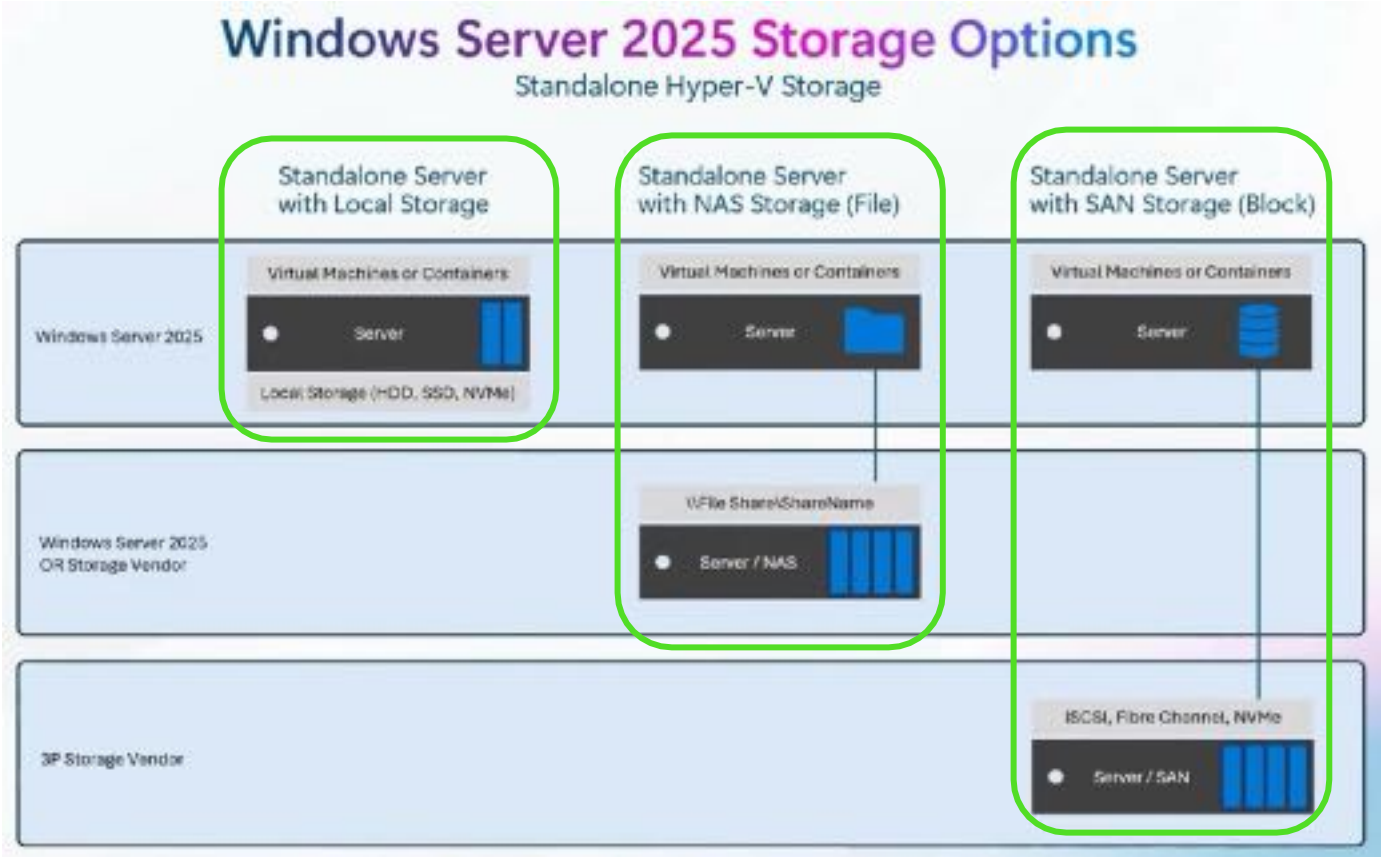
2.1M IOPs

Single device, running a synthetic IO workload with 8 threads, queue depth 64.

Storage Options

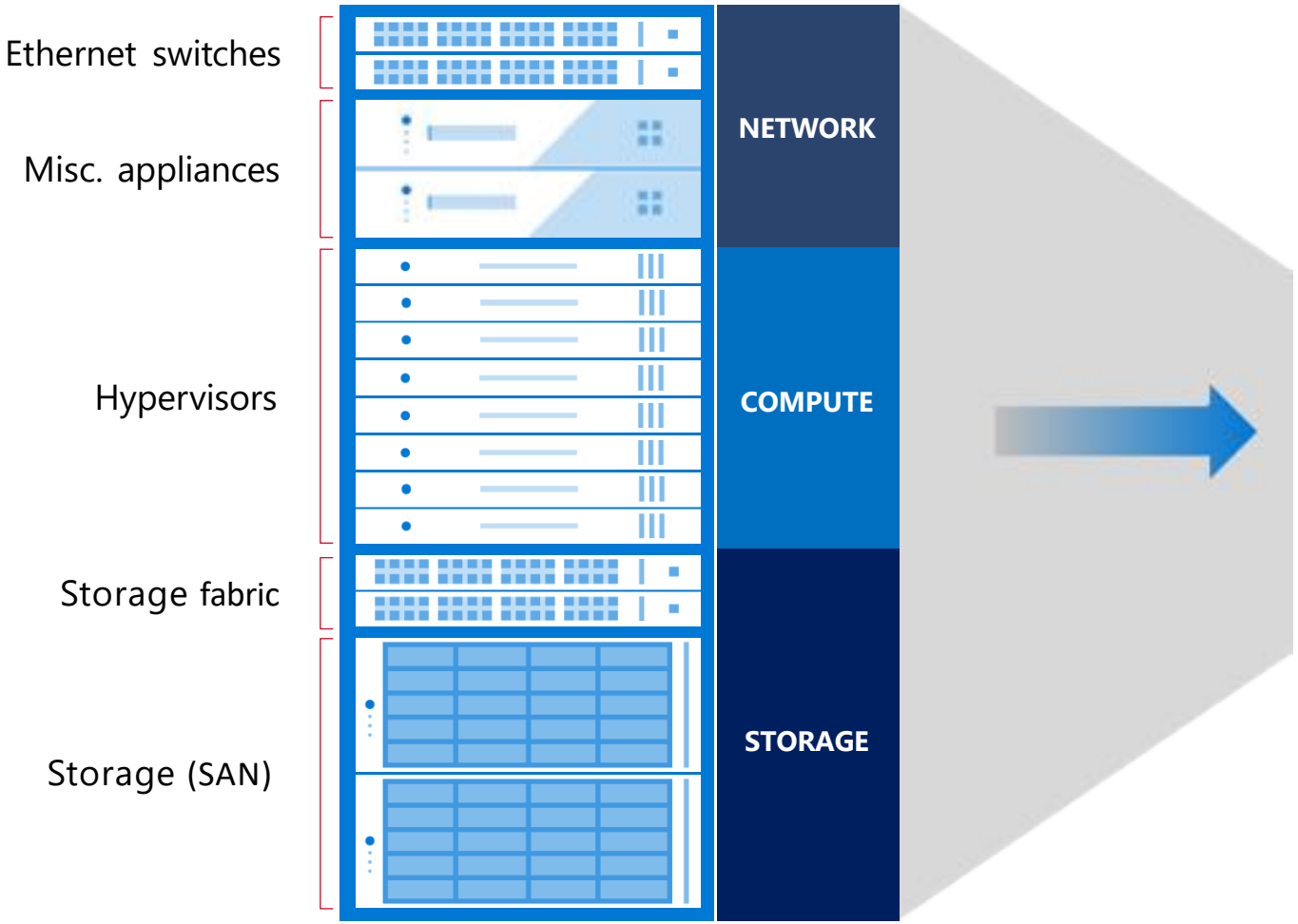
Standalone Server Storage Optionen

- Standalone Server
  - Local Storage
    - NVMe, SSD, HDD
    - RAID-Controller
    - Storage Spaces
- Standalone Server with SMB Storage
  - NAS (with SMB3 Support)
  - File Server
- Standalone Server with SAN
  - iSCSI, Fibre Channel, NVME-oF

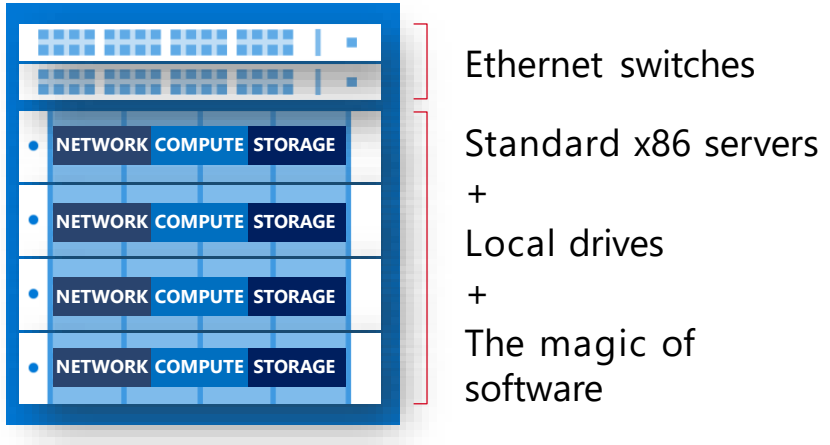


Classic Cluster-Storage and Hyper-Converged infrastructur

Legacy “three tier” infrastructure



Hyperconverged infrastructure (HCI)

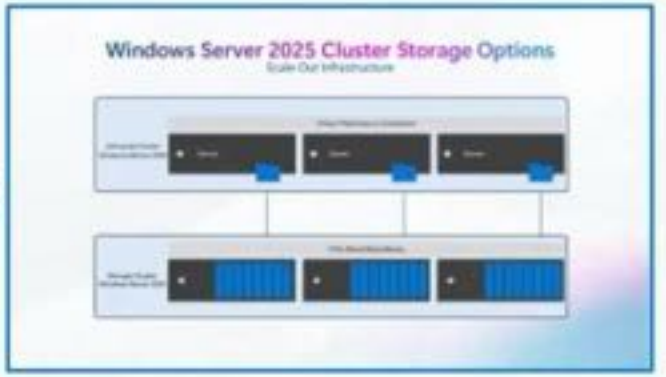


HCI is a software-defined, unified system that combines all the disparate and siloed elements of a traditional datacenter

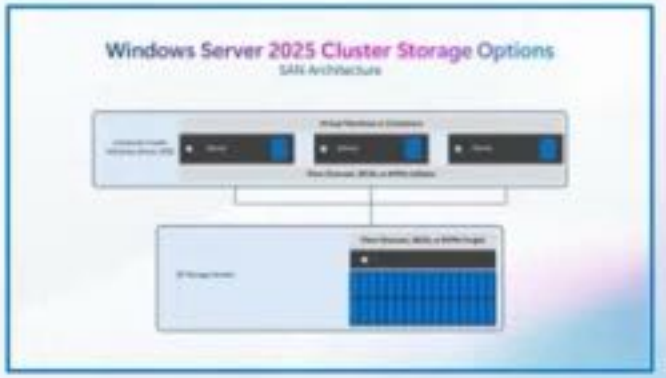
Cluster Storage Options

Hyperconverged Infrastructure

Scale-out Storage



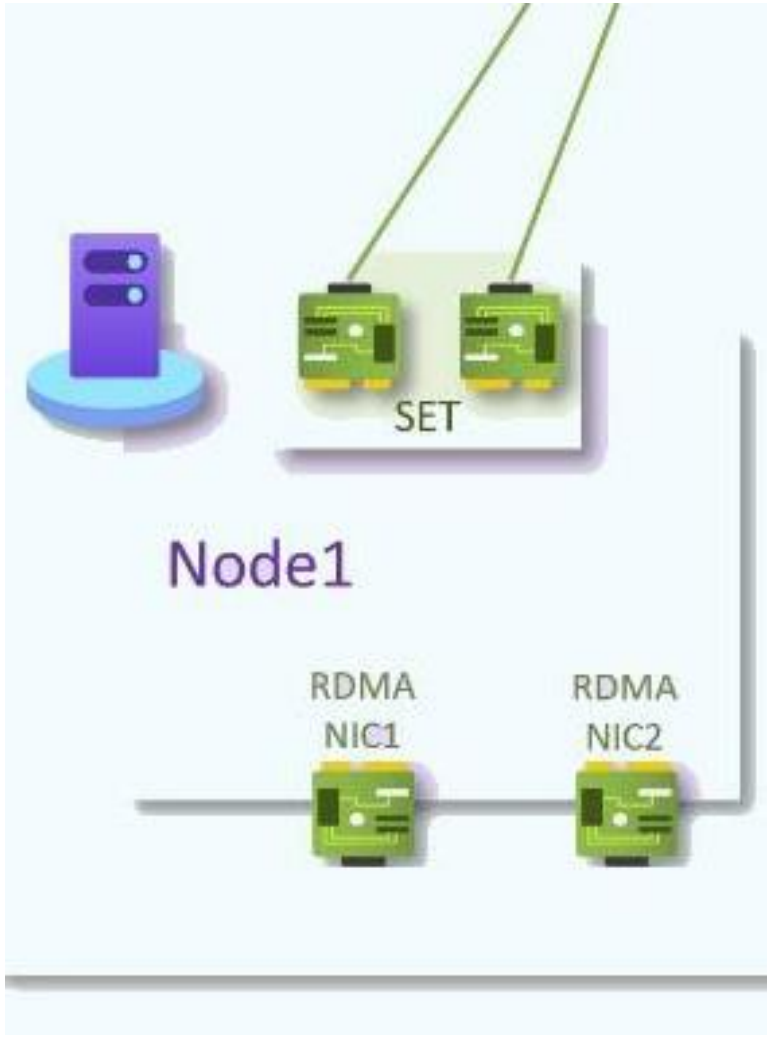
SAN Storage



Single Node Cluster

Single Node Cluster

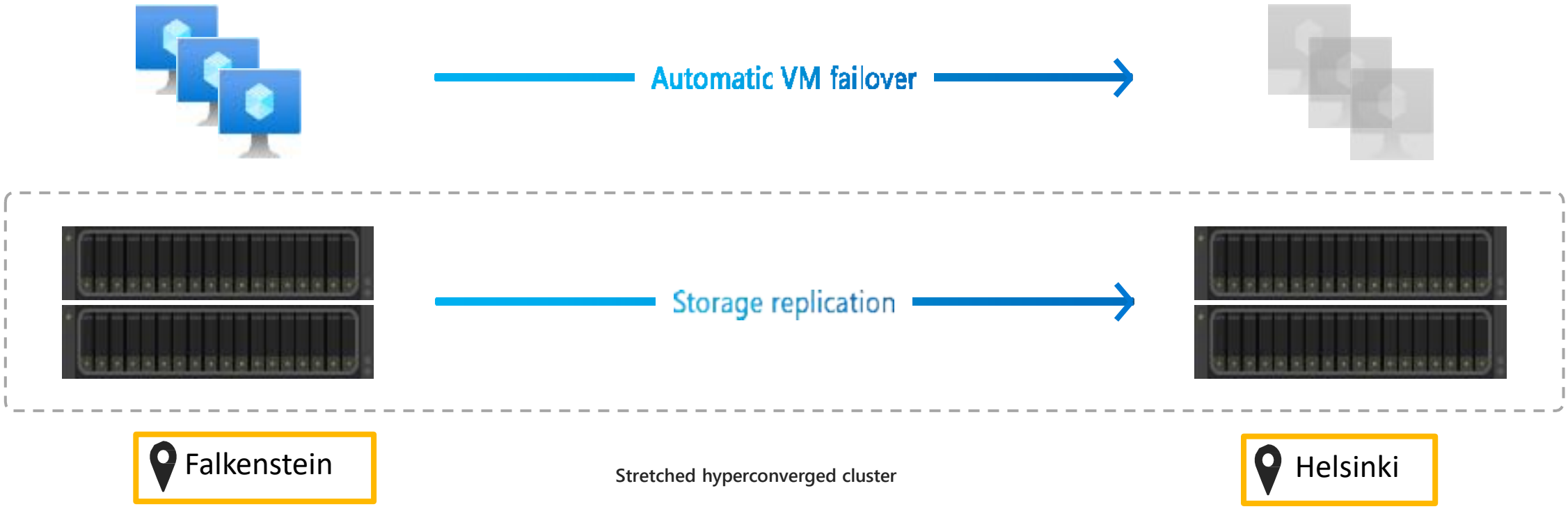
- Windows Server 2025 Single Node S2D Cluster
  - Local Storage Spaces Direct
    - Needs only two Flash Devices
    - Distribution of Extents over Storage Devices
  - easily expandable to more nodes, incl. recalculation of Storage Resiliency
  - Supports VMs and Containers



Stretched Cluster

Stretched Cluster

What is a Stretched Cluster for Microsoft?



Stretched Cluster

Metro Cluster

- Distance of the sites many hundreds to thousands of kilometers
- Network between sites usually via WAN or leased connections
- Network speed between 1 Gbit/s and 20 Gbit/s
- Mostly Layer 3 connections
- Little or no redundancy in network paths
- Different IP ranges for the workloads (Re-IP)
    - Metro Stretched S2D Cluster
        - Stretched Support like ASHCI
        - Storage Replica as technology
            - Synchronous or Asynchronous
            - Improved performance through new raw log
        - Support for Clusters with 4 to 16 Nodes
        - Evenly distributed over 2 sites (2-2, 3-3, ...)
        - Witness on third Site or Azure

Stretched Cluster

Campus Cluster

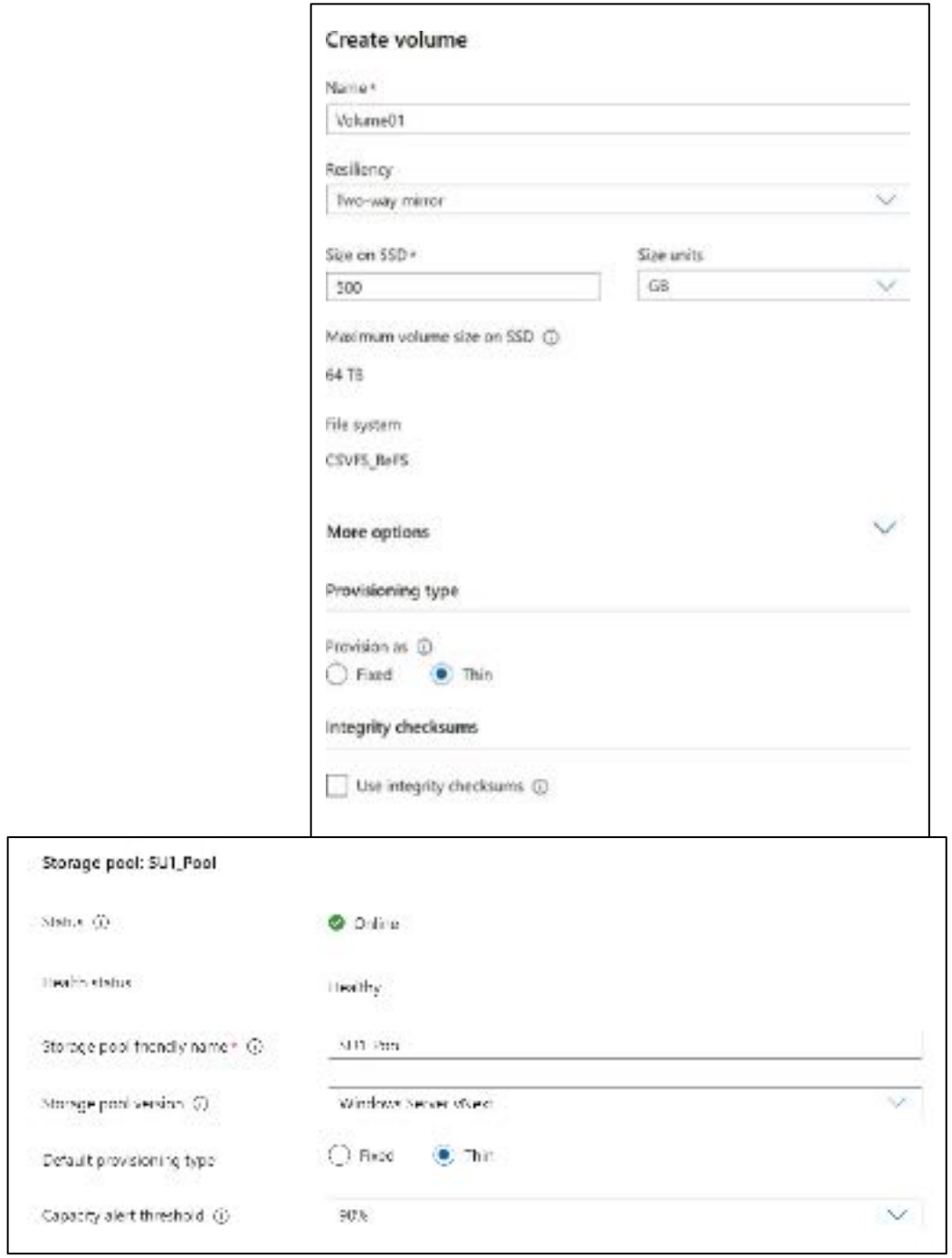
- Sites on the same campus a few meters to kilometers away
- Own network infrastructure, often with dedicated switches
- High Speed Ethernet (=> 20 Gbit/s) network between sites
- Mostly Layer 2 connections
- Many redundant network paths
- Same IP ranges for the workload

- Campus Stretched S2D Cluster
  - Uses Extent Distribution as Redundancy Technology in S2D
    - Always synchronous
  - Simpler network design
    - Storage traffic in the same subnet
    - No routing necessary but possible
  - Support minimum for 2 and 4 node clusters (maximum 16 nodes)
    - Evenly distributed over 2 sites (1-1, 2-2, …)
  - Witness in third room or Azure

Thin Provisioned Cluster Volumes

Thin Provisioned Volumes

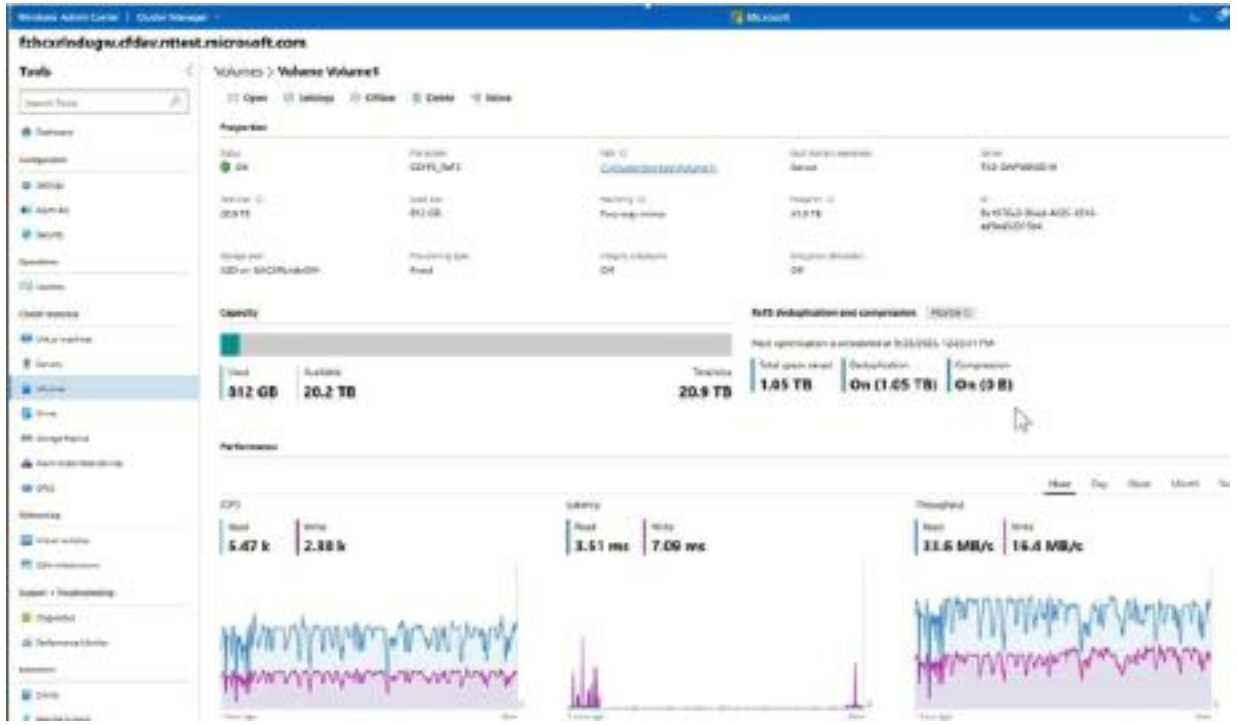
- Allows over-provisioning
- Extents are only assigned when they are occupied
- can be converted from “Fixed” to “Thin”
- can be selected for individual volumes
- can be set as default in the storage pool settings



ReFS Deduplication and Compression

ReFS Deduplication and Compression

- Saving Storage Space
  - Over 60% space savings in virtualization, backup and file server workloads
- Easy management
  - Windows Admin Center or PowerShell
  - plan, monitor and start the optimization
- Smart and efficient
  - Cluster aware, low overhead (<1 ms)
  - Deduplicates only new or changed data
- Multiple modes
  - Deduplication only, compression only, or both (default)
  - Compression has two different algorithms

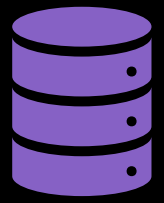


Summary Storage Enhancements

Storage Replica

Performance enhancements with enhanced log

SR compression now available in all editions of Windows Server



ReFS

ReFS Native Deduplication and Compression

File Servers: Save ~60% of storage

VHD/ISO/Backups: Save ~90% of storage

Storage Spaces

Thinly Provisioned Storage Spaces

Stretch Cluster Support

Hyper-V:
Robust hardware-based virtualization and isolation

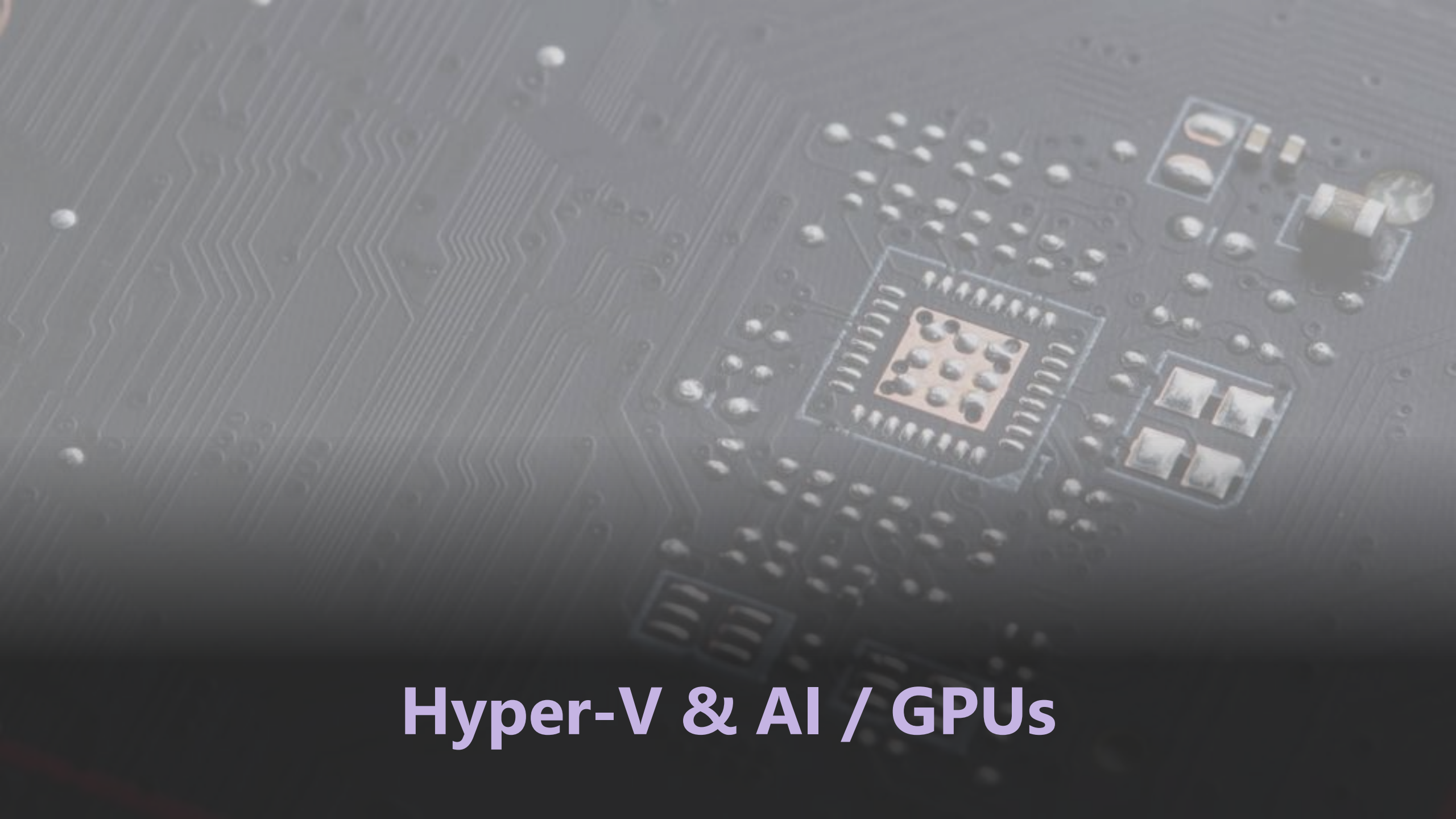
Azure Hypervisor System

Azure Stack Family

Windows Server/Windows Containers with Hyper-V Isolation

Platform Security

Xbox



Hyper-V & AI / GPUs

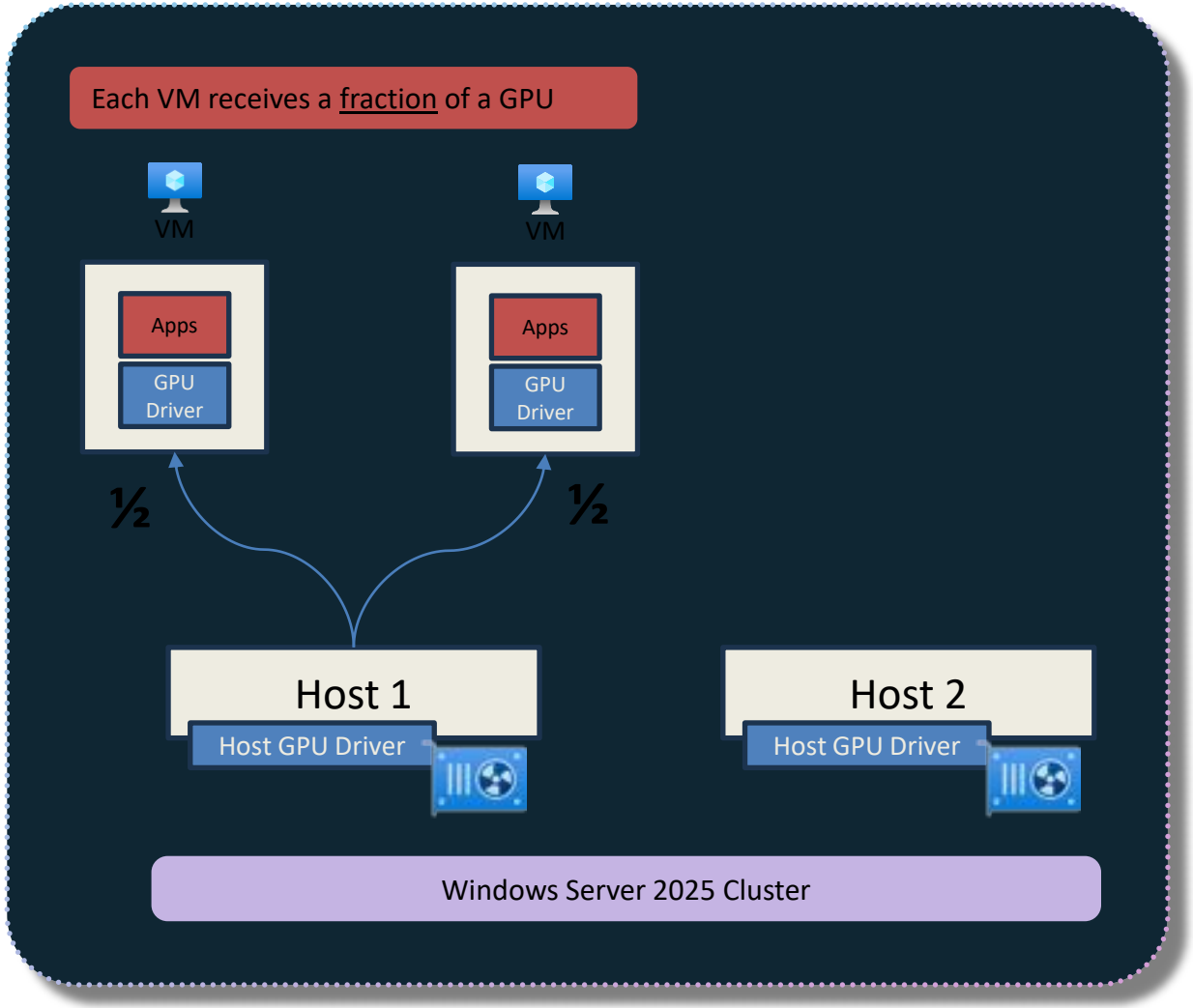
Windows Server 2025
GPU-P Support

GPU Partitioning (GPU-P)

Share a GPU across multiple VMs

- Create GPU Partitions
- Assign each partition to a VM that supports a set of users (multi-session)
- PS or WAC management

Support for Live Migration and failover clustering



GPU-P – Hardware & Live Migration

GPU-P Server Requirements

SR-IOV required

AMD Milan or later

Intel Sapphire Rapids or later

GPU Requirements

nVidia A2, A10, A16, A40 GPUs (Symmetric)

https://docs.nvidia.com/grid/15.0/grid-vgpu-release-notes-microsoft-azure-stack-hci/

GPU-P

Both Live Migration & High Availability Supported

Live Migration Scenarios for GPU-P

Works in a clustered environment

Works with standalone servers

(outside of a cluster)

Live migrate from one standalone host to another standalone host

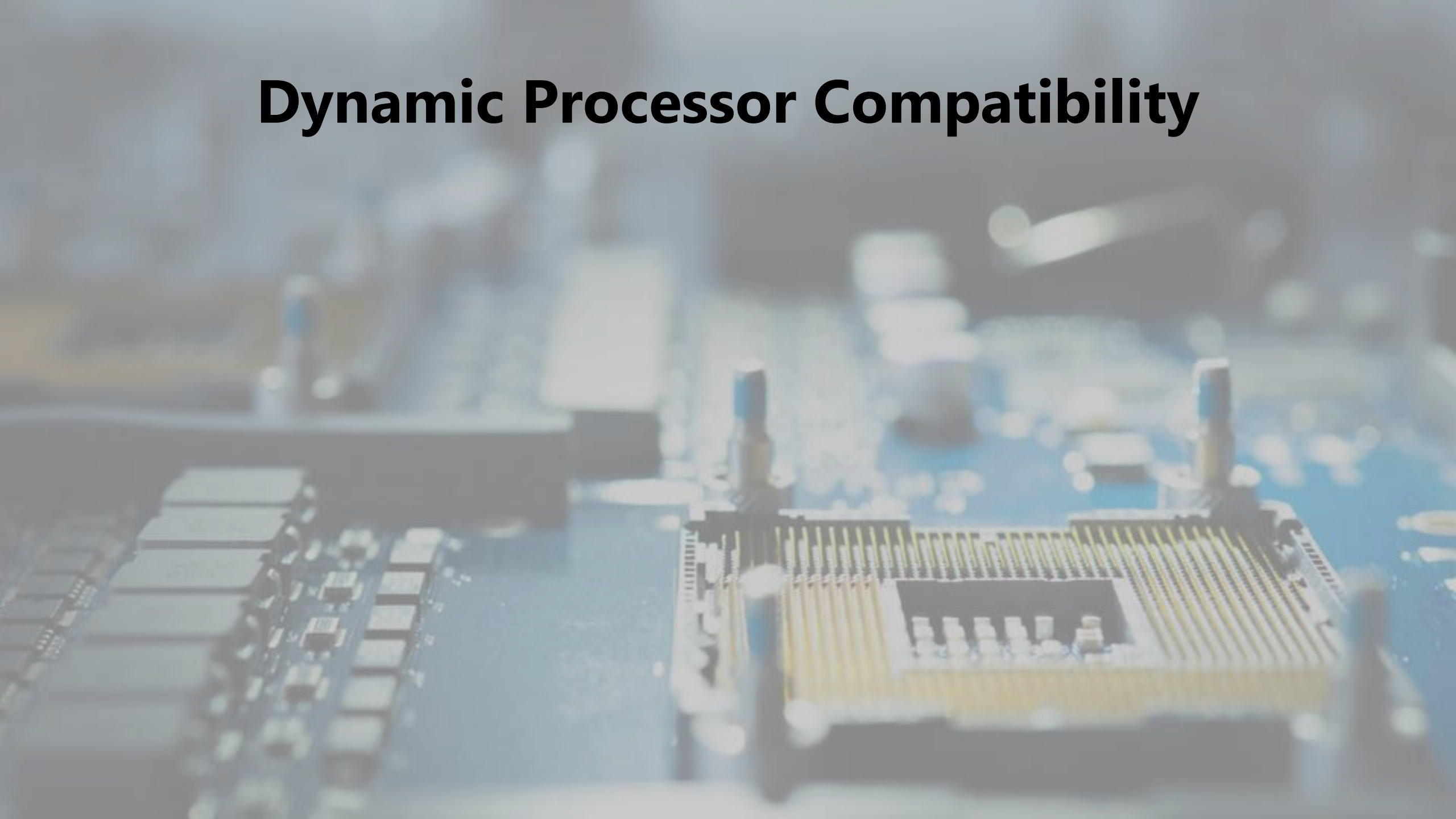
Supported Guests

Windows 10/11

Windows Server 2019/2022

Linux Ubuntu 18.04 LTS, 20.04 LTS

Dynamic Processor Compatibility

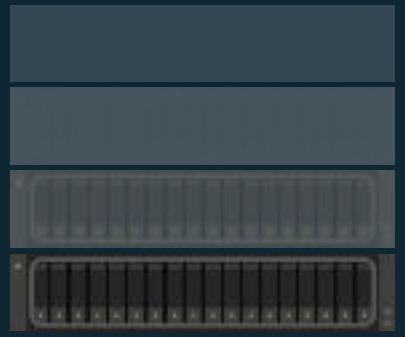


Scale out with confidence

No need to order last-gen hardware for compatibility

3rd Gen
Intel® Xeon® Scalable processors

+



4th Gen
Intel® Xeon® Scalable processors

Same Windows Server 2025 cluster

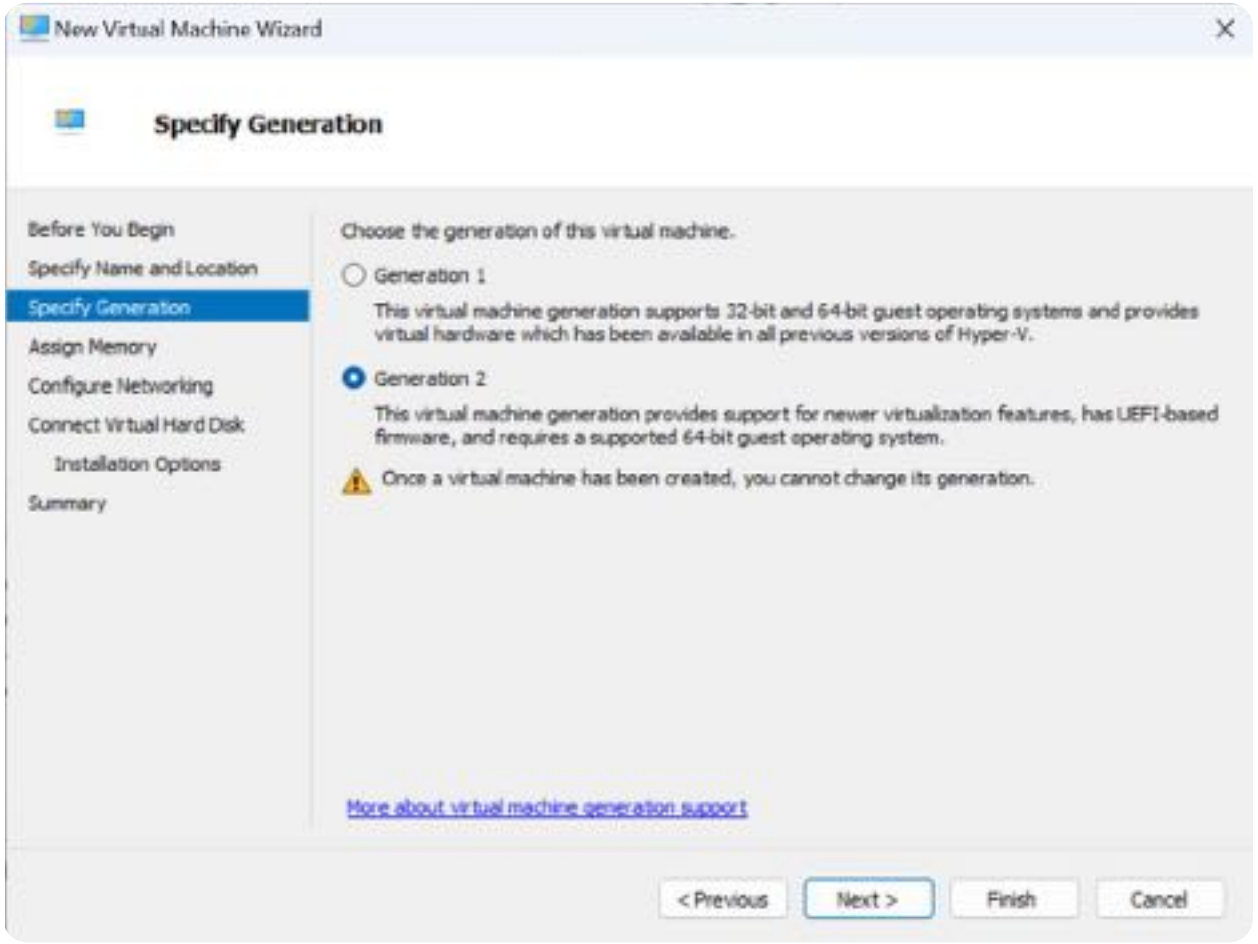
Embrace Generation 2 VMs

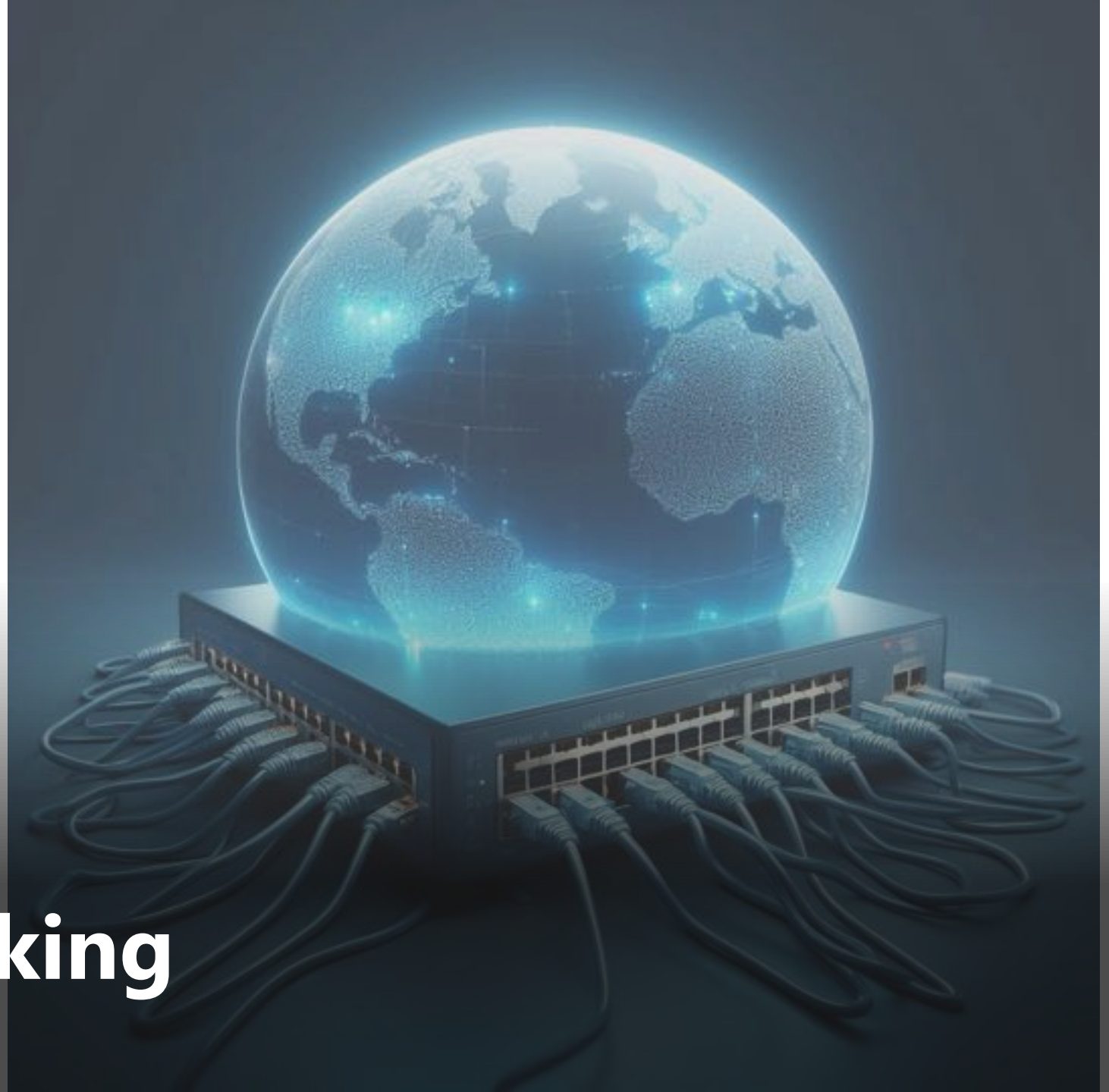
Use Generation 2 VMs at this point

Generation 2 VM advantages:

- **Better performance**
  - Supports more VPs (240 vs 64)
- **Improved Security**
  - Secure Boot & TPM support
  - UEFI FW support
- **Dynamic Features**
  - Hot Add/Remove vNICs

GUI's now default to Generation 2 VMs





Networking

Networking

Network ATC

One-click deployment and drift remediation of host network configuration across the cluster

Network HUD

Always-on alerting and remediation of operational network issues and inefficiencies

SDN Multisite

Native L2 & L3 Connectivity for workloads in multiple locations.. Parity with stretch clusters

Unified network policy management for these workloads.

Eliminates need to update policies when workloads move across locations

SDN Gateway Performance Improvements

20%-50% performance improvements with lower CPU utilization

Empowering Modern AKS Applications

Secure, scalable & Adaptive SDN infrastructure for Hybrid AKS

Hybrid AKS workloads can now be put on SDN networks for Windows Server

Enforce customer network policies & routing rules for microservices & applications

Introducing

Arc-enabled Windows Server 2025 Hotpatching

Arc-enabled Hotpatching Everywhere

- Arc-enable your Windows Server
  Standard or Datacenter Edition
  Physical, Virtual, other clouds
- Enable Hotpatching via Azure Portal
  Monthly subscription
- Hotpatching on Azure/Azure Stack properties included at no additional cost when using Windows Server Azure Edition

Mission Critical: Hotpatching with Windows & SQL Server

Xbox Footprint (partial)

- 1000 Servers running 18 different services
- Each services running between 2-120 SQL Servers; Some workloads running for 15+ years
- Workloads used to be physical, now Azure VMs

Before Hotpatching

3 weeks every month to roll out updates without downtime; 12 times a year.

With Hotpatching

1000 servers patched in <48 hours without downtime

Hotpatching Demo

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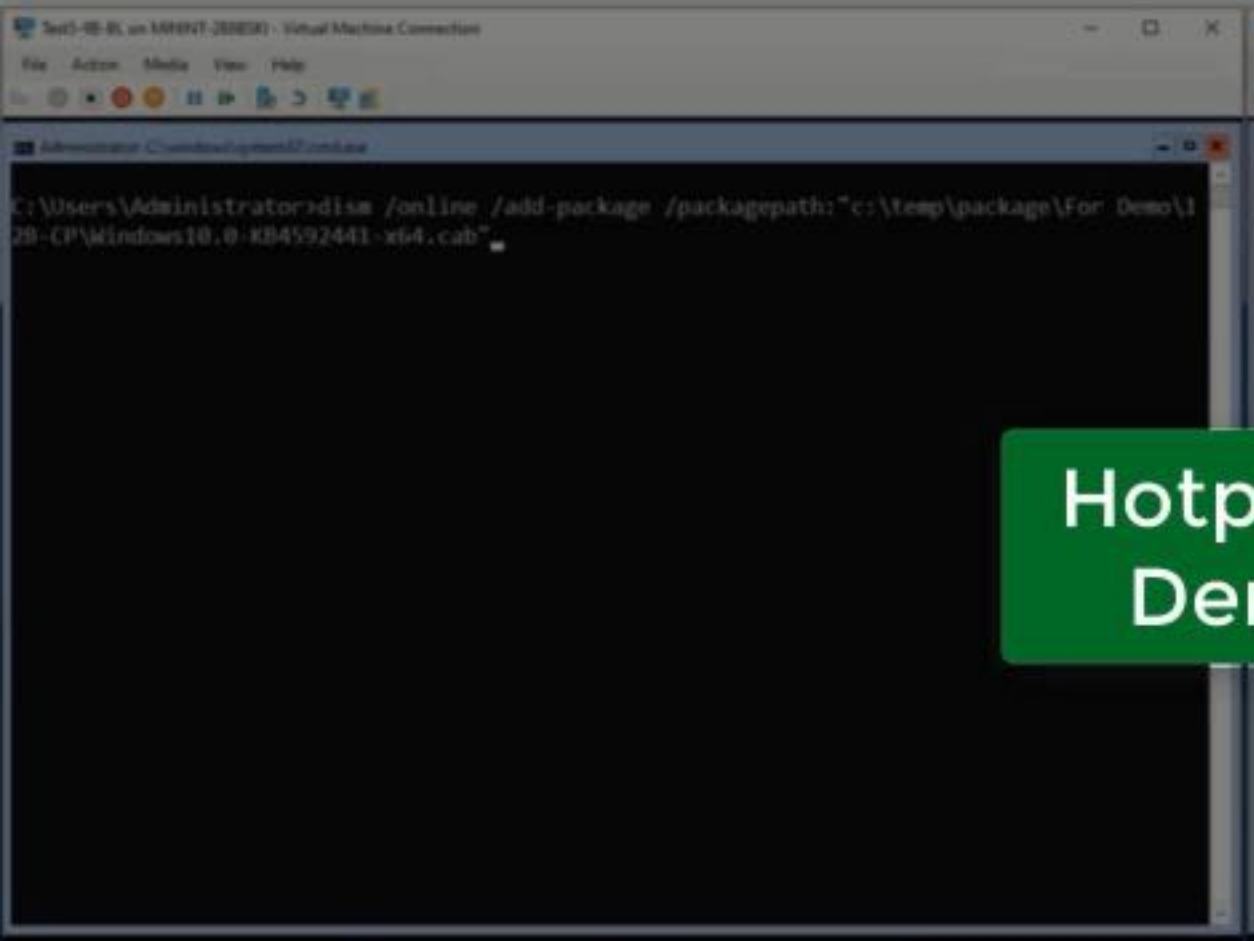
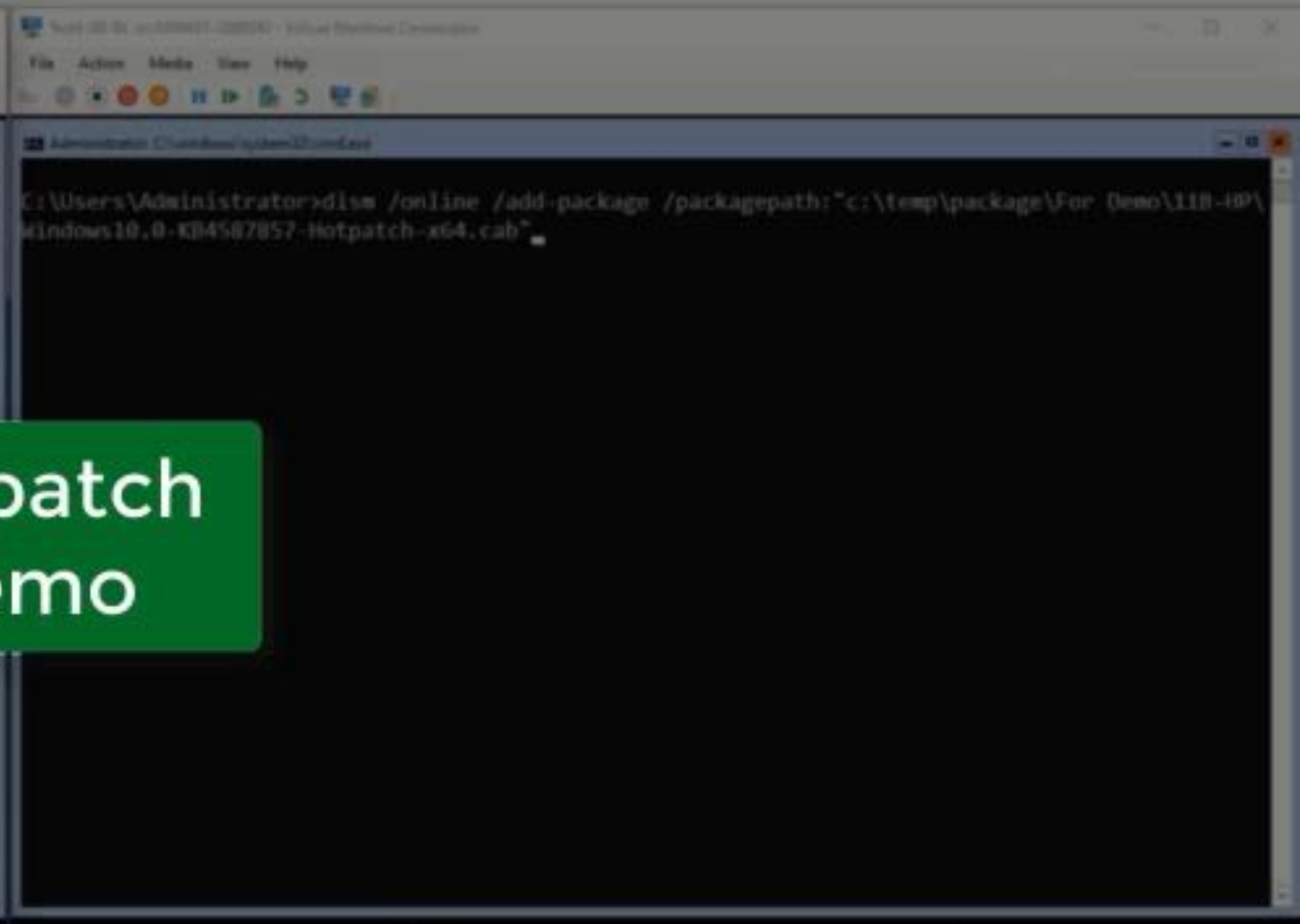
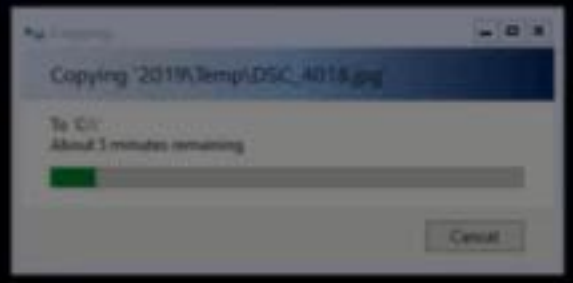
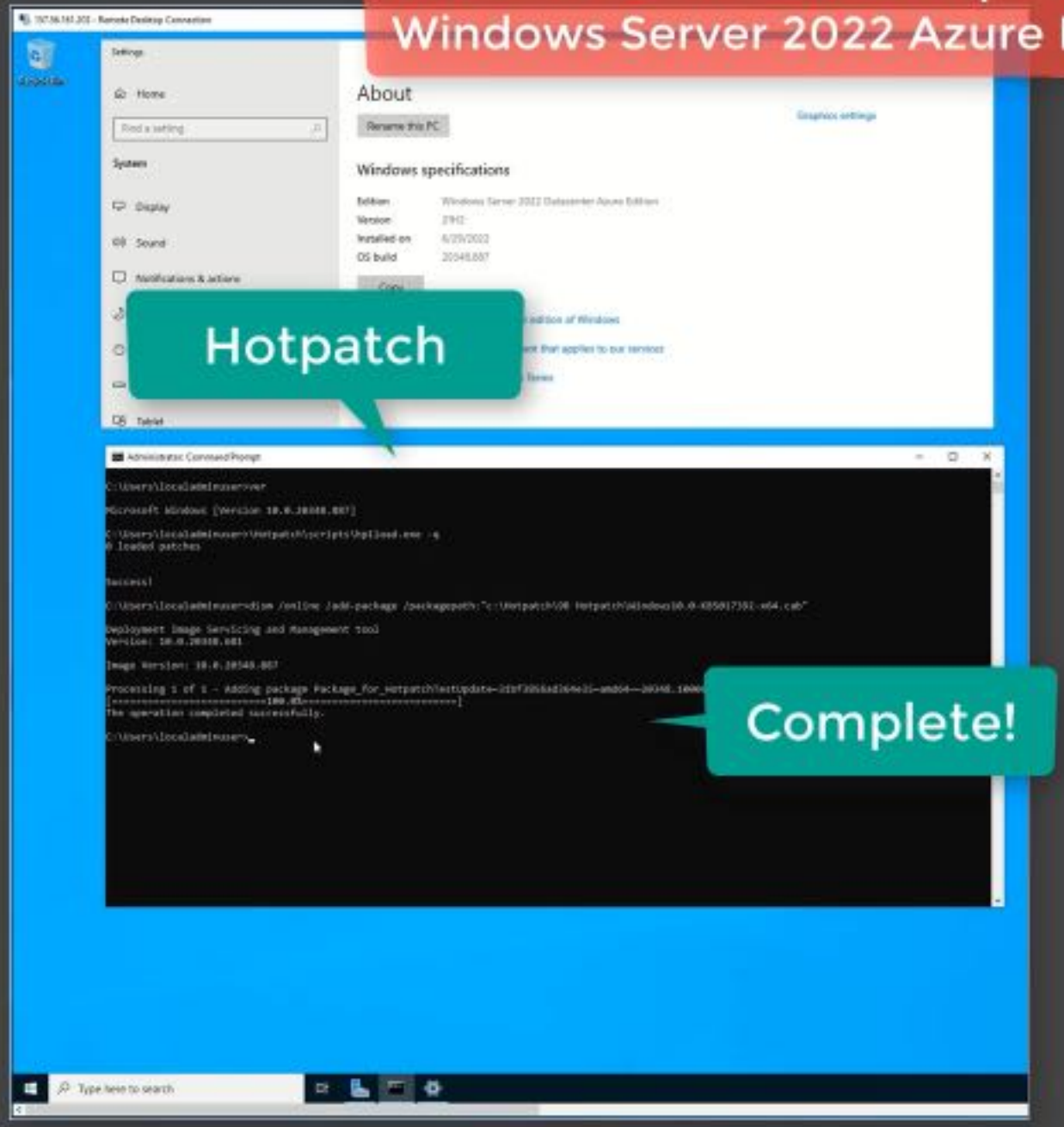


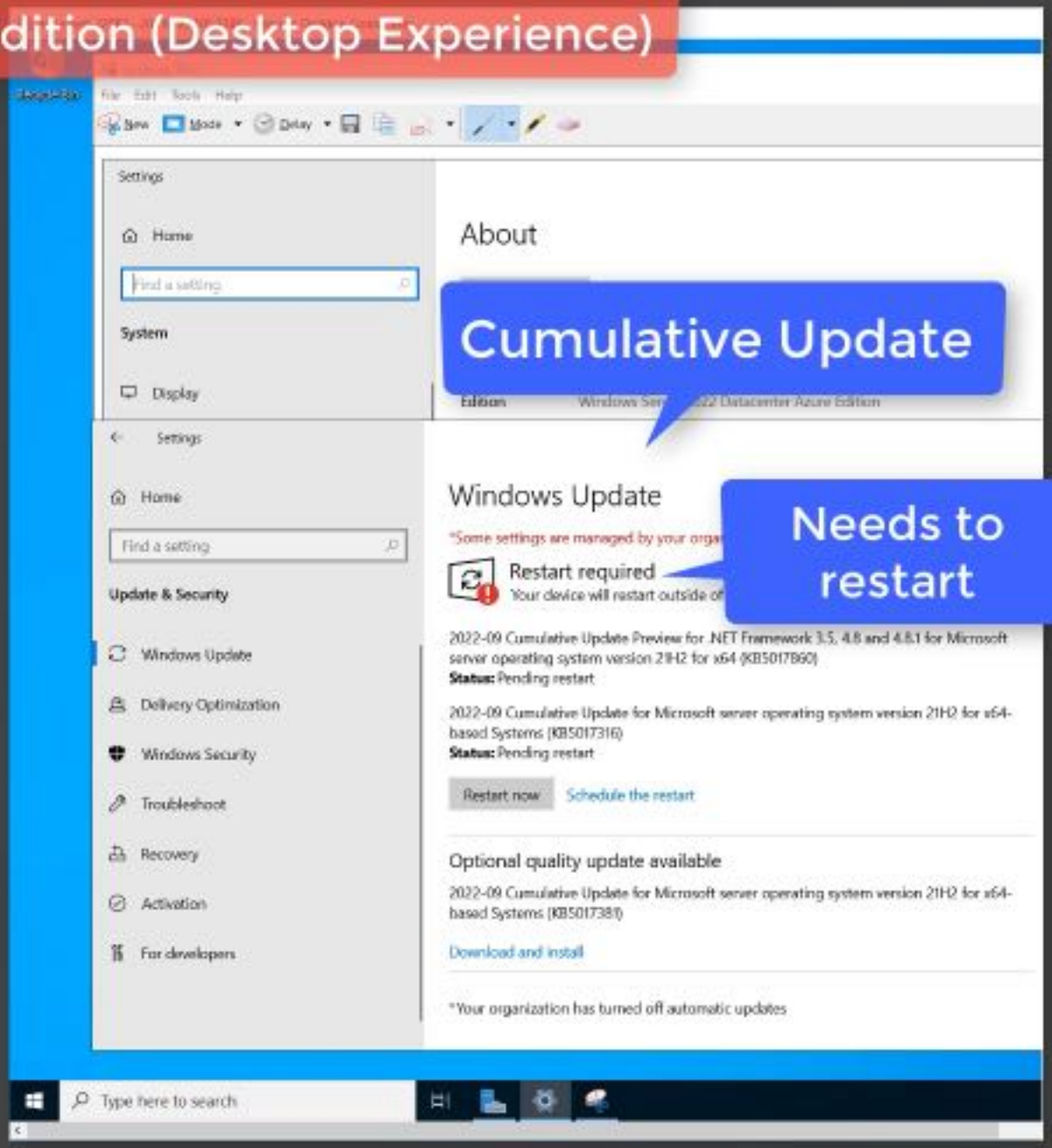


Hotpatch Demo



Hotpatch POC
Windows Server 2022 Azure Edition (Desktop Experience)





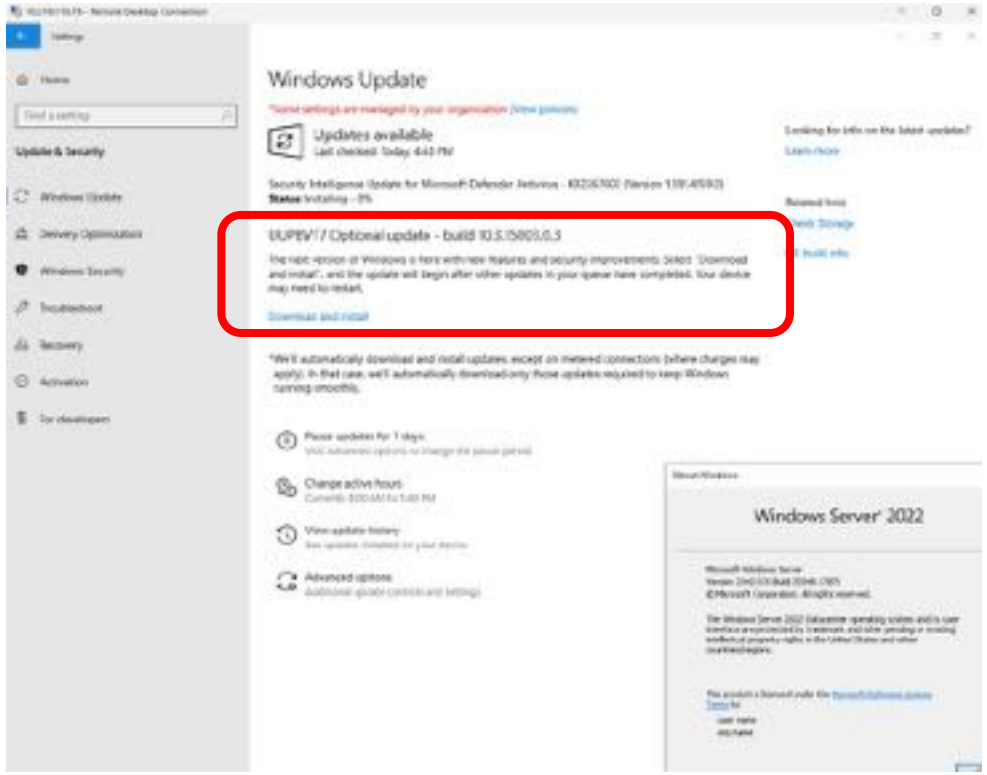
Windows Server 2025 Upgrade Pfade

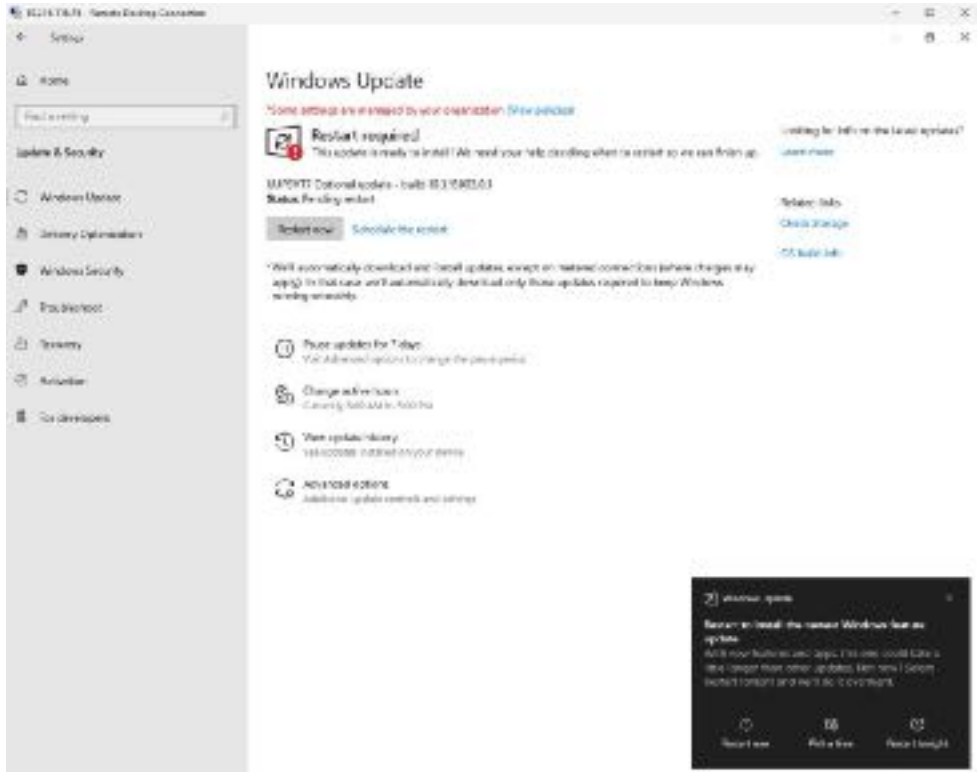
Easiest Upgrades EVER!!

Upgrade from Windows Server 2022 to 2025 with Windows Update

Same great experience you are used to on Windows 11

Makes Upgrading to Windows Server 2025 simple!





Vielen Dank für Ihre Aufmerksamkeit!

Fragen?