Hewlett Packard Enterprise

NonStop Technical Boot Camp 2023 TBC23-TB56 Provide the Mission-Critical Advantage to Workloads in your Private Cloud with HPE Virtualized NonStop

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Forward-looking statements
This is a rolling (up to three year) Roadmap and is subject to change without notice

This document contains forward looking statements regarding future operations, product development, product capabilities and availability dates. This information is subject to substantial uncertainties and is subject to change at any time without prior notification. Statements contained in this document concerning these matters only reflect Hewlett Packard Enterprise's predictions and / or expectations as of the date of this document and actual results and future plans of Hewlett Packard Enterprise may differ significantly as a result of, among other things, changes in product strategy resulting from technological, internal corporate, market and other changes. This is not a commitment to deliver any material, code or functionality and should not be relied upon in making purchasing decisions.

Agenda

HPE Virtualized NonStop overview

Implementing Virtualized NonStop

HPE Virtualized NonStop adoption and hardware environments chosen by customers

HPE Virtualized NonStop customer feedback

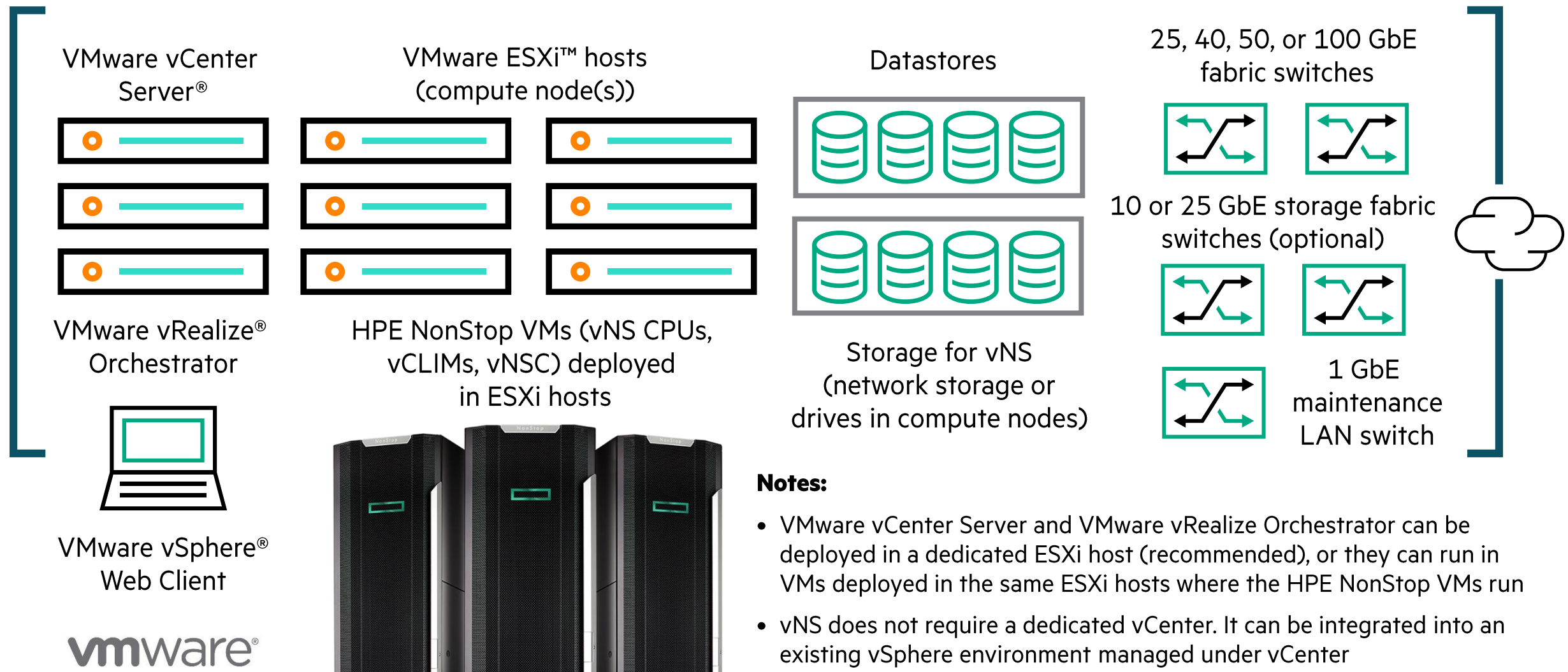HPE Virtualized NonStop environment preparation, deployment, and maintenance

HPE Virtualized NonStop futures and conclusion
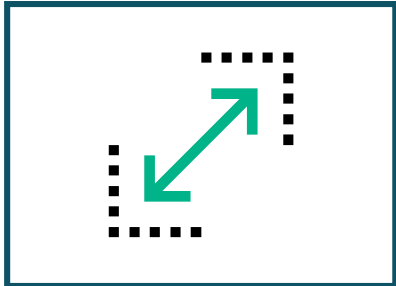
HPE Virtualized NonStop overview

VMware Cloud for HPE Virtualized NonStop

VMware vCenter Server®

VMware ESXi™ hosts (compute node(s))

Datastores

25, 40, 50, or 100 GbE fabric switches

VMware vRealize® Orchestrator

HPE NonStop VMs (vNS CPUs, vCLIMs, vNSC) deployed in ESXi hosts

Storage for vNS (network storage or drives in compute nodes)

10 or 25 GbE storage fabric switches (optional)

VMware vSphere® Web Client

1 GbE maintenance LAN switch

vmware®

Notes:

- VMware vCenter Server and VMware vRealize Orchestrator can be deployed in a dedicated ESXi host (recommended), or they can run in VMs deployed in the same ESXi hosts where the HPE NonStop VMs run

- vNS does not require a dedicated vCenter. It can be integrated into an existing vSphere environment managed under vCenter

HPE Virtualized NonStop
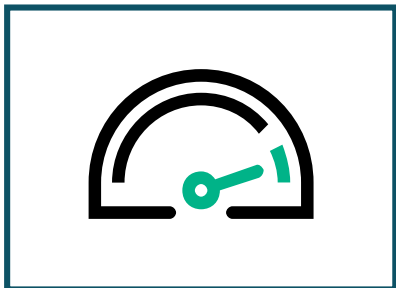## Comparison with HPE NonStop X

Scalability, Availability, and Security

- Equivalent configurations (Class, CPUs, CLIMs)
- Same availability (on reference architecture)
- Expandability (Expand, clustering)

Software

- Runs the L-series RVU
- All NED products offered on L-series are available on vNS
- No rebuild required to run on vNS

Performance

- Depends on your choice of hardware!!
- On equivalent processor, estimate a 20% virtualization overhead for I/O intensive workloads*

* As per the tests in HPE lab. Your mileage may vary.

HPE Virtualized NonStop—a comparison with HPE NonStop X
Little difference at a system level

Feature	HPE Virtualized NonStop	HPE NonStop X
System class & cores per CPU	High-end (2, 4 & 6 cores; NSDC✔) Entry-class (1 and 2 cores)	
Number of CPUs	High-end: 2 to 16 (even count only); Entry-class: 2 to 4 (even count only)	
Memory per CPU	High-end: 64 GB to 256 GB; Entry-class: 32 GB to 64 GB	
Number of IP/Telco CLIMs	High-end: 2 to 54 (total of IP/Telco and storage CLIMs <= 56); Entry-class: 2 and 4	
Cores per IP/Telco CLIM	8 (default), **4 (user option)**	8
Number of storage CLIMs	High-end: 2 to 54 (total of IP/Telco and storage CLIMs <= 56); Entry-class: 2 and 4	
Cores per storage vCLIM	8 (default), **4 (user option)**	8
System fabric	**RDMA over Converged Ethernet (RoCE)**	RDMA over InfiniBand
Availability	vNS implemented in compliance with the Reference Architecture has the same availability as NonStop X	
Support for native clustering	High-end => Yes; Entry-class => No	

* Differences compared to HPE NonStop X shown in **Bold**

Resources required to deploy a vNS system

| **1** **Servers**	**2** **Storage**	**3** **Networking**	**4** **Software**	**5** **Services**
• Based on Intel® Xeon® x86 processors (minimum E5-2600 v3 family)	• Block level storage • External network storage or internal server storage • Use HPE NonStop's storage mirroring design or vSAN RAID1 mirroring • No sharing of storage hardware between primary and mirrored volumes	• System interconnect: redundant Ethernet switches with minimum 25GbE ports • System interconnect NICs: Mellanox ConnectX®-6 (100 GbE) or ConnectX®-4 Lx (25 GbE) • IP vCLIM: 10 GbE NICs based on specific Intel® or Broadcom® processors	• vSphere Enterprise Plus Edition (6.5 or above) • vCenter and vRO (not dedicated) • Windows Servers 2022 Standard Edition • HPE NonStop L-series SUT • vCLIM • vNSC • Virtual BackBox (for BR)	• Hardware installation & startup • VMware installation & startup • vNS installation & startup

Refer to the **Hardware architecture guide for HPE Virtualized NonStop on VMware** for more information

Which hardware is certified for HPE Virtualized NonStop?

- HPE does not "certify" any hardware make or model as "HPE Virtualized NonStop ready"
- Any industry-standard hardware can run vNS provided:
  - It is qualified for or compatible with VMware vSphere
  - Meets the hardware requirements (explained earlier)
- Key is to comply with VM deployment and resource configuration guidelines provided by HPE

? **The right question to ask:** "How do I build my vNS system using xyz products?"
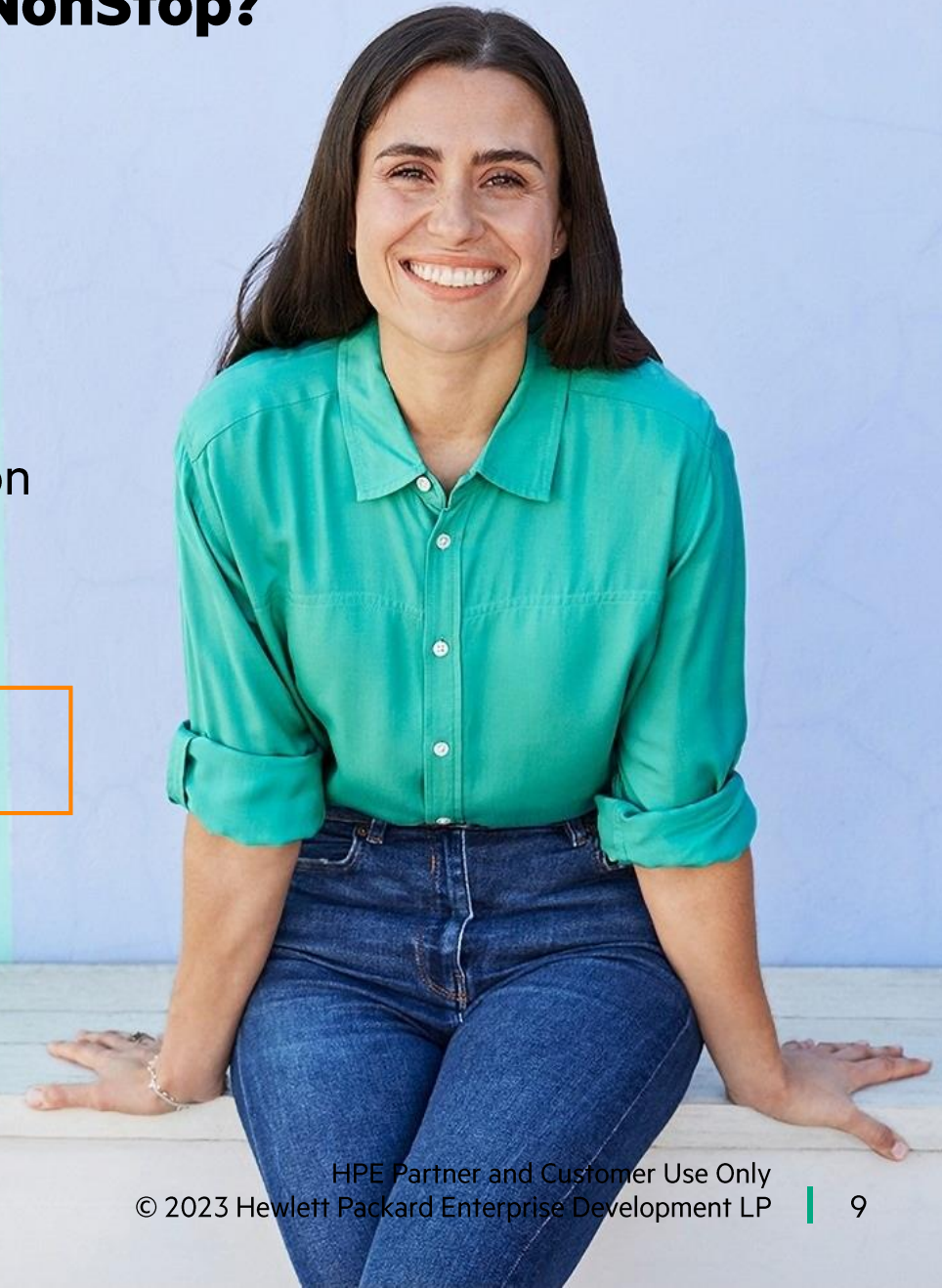
A note on applications on HPE virtualized NonStop

- The HPE NonStop L-series RVUs support vNS, NSX and NS2 platforms
- Applications developed for L-series are compatible with all these supported platforms
  - "Build once and run on bare metal or VM"
- All HPE products offered on L-series support all the above platforms
- Benefits:
  - Applications built on/for NSX do not require recompile or QA to be run on vNS (and vice versa)
  - Applicable for both native and non-native applications (including OCA'd binaries)
  - Utilities/procedures/tasks used for NSX are applicable "as-is on vNS", except the ones related to hardware

# vNS vs NSX—The difference is in how to deploy and manage

	vNS	NSX

Hardware	• Wide set of design choices
	• Including but not limited to
	  • Server—make and model
	  • Storage—make and model
	  • Storage technologies (vSAN, FC/iSCSI connected external storage arrays, internal drives without vSAN)
	  • Switches—make and model
		• Choices between:
		  • NS8 High End
		  • NS4 Entry Class
		  • NS2

Management & administration	• Hardware & VMware managed by the "cloud team" • Software stack managed by NonStop administrator/s	• Hardware managed by NonStop administrator/s • Software stack managed by NonStop administrator/s
Vendor Support	• Hardware vendor/s • GNSC for NonStop	• GNSC

Implementing Virtualized NonStop

Implementing NonStop — Converged vs Cloud based
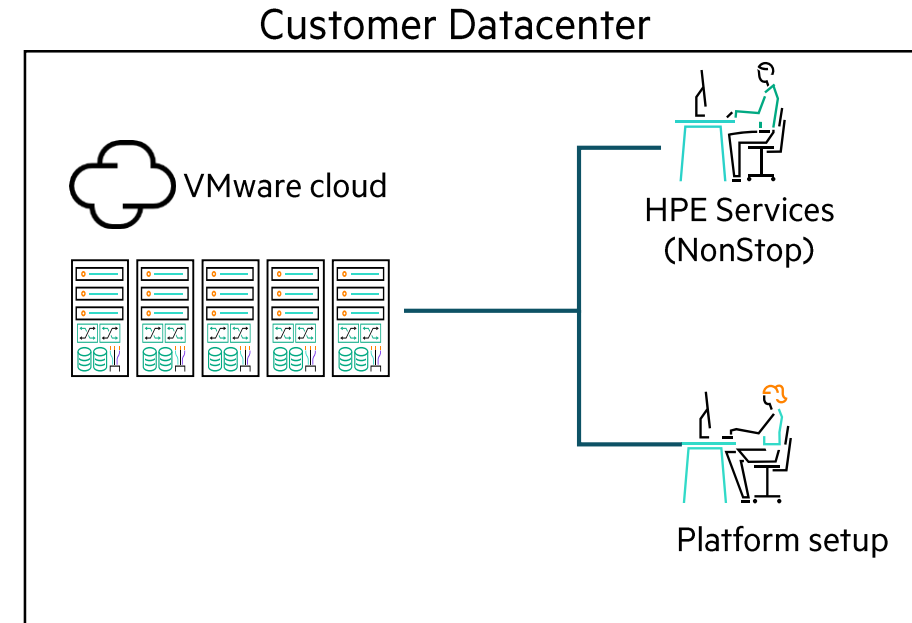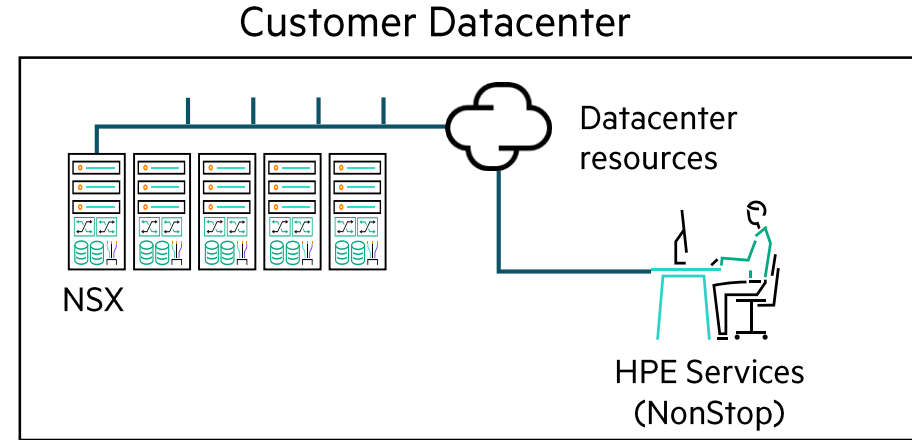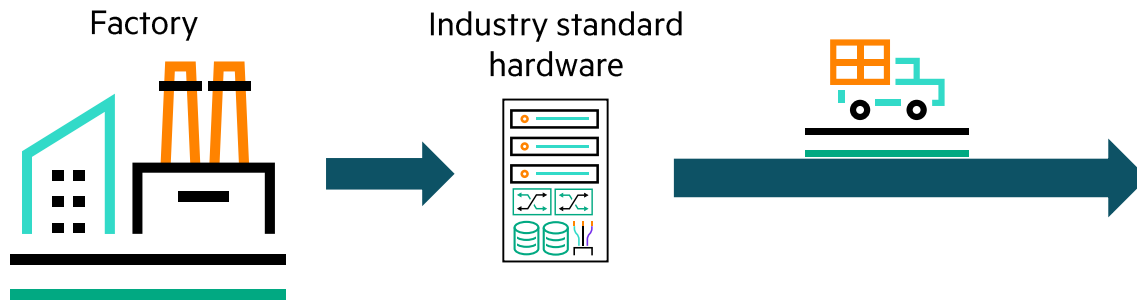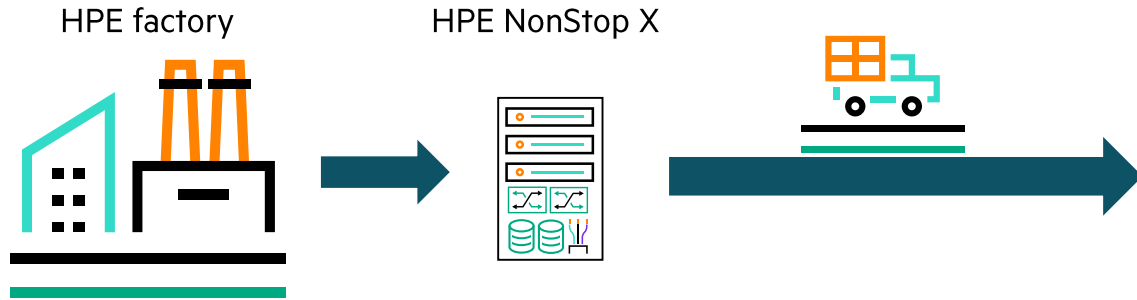
A typical vNS scenario

Key stake holders

- Business groups owning the workload
- Cloud IT groups
  - Architects
  - Security experts
  - Administrators and support personnel
- NonStop team
  - Developers
  - System administrators
- "Sharpen the saw"[1]
  - Plan, practice and prepare well

[1] Seven habits of highly effective people — Stephen Covey

Start small & get familiar

- Start with a development/test system OR select a small workload to begin with
- Choose the configuration
  - One or two vNS systems can be deployed on two DL380s and a pair of switches
- Objectives
  - System implementation
  - Hardware, storage, and cloud management with minimal or no interference with vNS
  - Performance "indicators"
  - Scenario simulations
  - Define "rules of engagement and operation" between the stake holders

This is the hardware you need to host two vNS systems!!
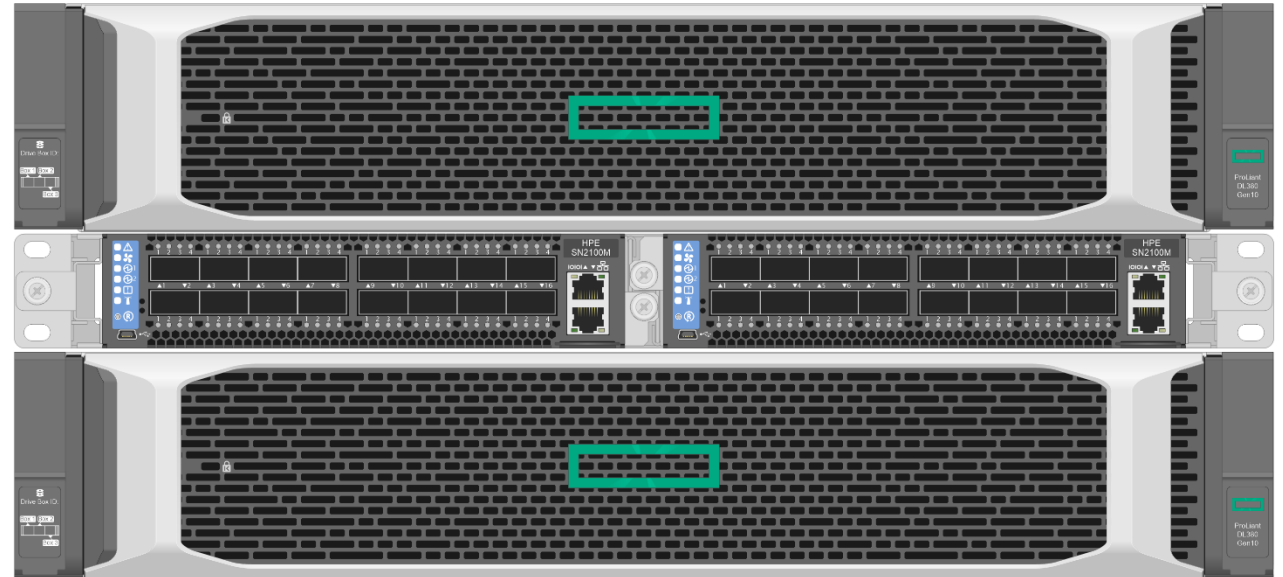
Start implementing your vision

Possible options

Key success factors

- Select workloads and add new ones
- Production vs DR
- Large system vs several smaller systems
- Single site vs multi-site
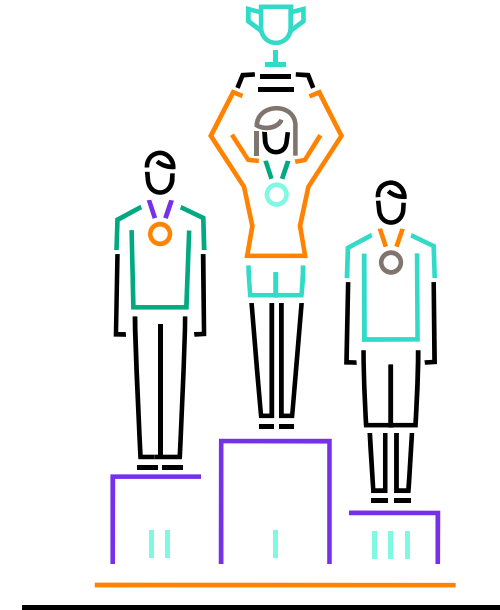
- Close interworking and clear rules of engagement between cloud and NonStop administrators
- Vendor support SLAs

HPE Virtualized NonStop security

Security of HPE NonStop software

- Nothing changes!!
  - All security features are available
  - All security practices are applicable
- OS security features are intact
- PCI related practices continue to be applicable
- Secure the stack referring to the *HPE NonStop Security Hardening Guide*

Security of the platform

- Responsibility of the private cloud
- Follow VMware and hardware vendor's security guidelines
- Best practices:
  - Deploy HPE NonStop in the most secure area of the cloud with both physical and logical security
  - Physically isolate the switches used for the fabric
  - Secure and protect HPE NonStop volumes
  - See section **Securing Virtualized NonStop (vNS) systems** in the *HPE NonStop Security Hardening Guide* for more details

HPE Virtualized NonStop adoption and hardware environments chosen by customers

HPE Virtualized NonStop adoption

- Several in production, more are getting ready

- 75% on HPE hardware

- Several customer and partner testimonials in the public domain

- Published case studies and testimonials: Dell, EuroClear, Sumitomo Mitsui Card, Red Link S.A., and 4Tech Software

HPE-IT business applications running on vNS

- A total of 13 vNS systems
- Twelve ESXi hosts for the production VMware environment +
- Twelve ESXi hosts for the DR VMware environment
  - One rack at each data center
  - Major reduction in footprints
  - Reduced electrical feeds
  - Multiple vNS systems share the ESXi hosts
  - For example, ESXI hosts 1 – 6 are shared by two vNS systems
  - For those six ESXi hosts, HPE-IT assigned NonStop systems with lower workloads
- Eight ESXi hosts for development and QA VMware environment
  - One rack at development data center
- Add a full DR environment for all production systems
  - Shadowbase
  - AutoSYNC

- NonStop systems reduced from ten to seven
  - Added one more development vNS system
- Maximum vNS processor memory
- Two IP vCLIMs per vNS system
- Six Storage vCLIMs per production vNS system
  - Lots of archival NonStop DP2 volumes
  - Continued use of SMF
- One pair of vNSC for all vNS systems
- Retain Expand-over-IP configuration

Hardware environments

Type	What is deployed
System configurations	1c, 2c, 4c, 6c; 2 to 8 CPUs
Hardware vendor	HPE (75%), non-HPE (25%)
IT design	Private cloud
Server categories	Rackmount Blades
Storage	Internal Hyperconverged External: iSCSI and FC
Ethernet fabric switches	HPE StoreFabric M-series HPE FlexFabric Cisco Dell
Maintenance LAN switch	HPE Aruba Cisco Dell

HPE Virtualized NonStop customer feedback

Virtualized NonStop customer feedback

- HPE NonStop R&D actively seeks feedback from the field to plan our vNS roadmap
- In recent years, we have surveyed:
  - Customers that deployed vNS
  - ISV partners that deployed vNS
  - HPE Services professionals that assisted customers in their vNS deployments
  - HPE Solution Architects that deployed vNS internally and/or worked with vNS customers
  - NonStop customers that have not deployed vNS yet
- Our goals from these interviews were to:
  - Get feedback on customer satisfaction with the platform
  - Identify key challenges and customer asks for vNS deployment and operations
  - Prioritize new features to enhance the customer experience based on the above
  - Learn from the field on best practices that facilitated their journey to vNS
  - Determine future directions for our vNS solution

Lessons learned from the field: positive feedback

- Positive feedback from customers and ISV partners:
  - vNS is rock-solid once it is up and running
  - Awesome platform transparency
    - Applications run without changes just as in any L-Series RVU system
    - Users cannot tell that the application is running on vNS versus converged NonStop
  - Proven fault tolerance
    - System continues to run fine in the presence of CPU halts, cable pulls, switch power cycles, etc.
  - Very fast performance
  - RVU upgrades have the same NonStop "look and feel" and are much faster
    - Example: a customer carried out an RVU upgrade in their vNS system without any issues in just 30 minutes, as opposed to hours
    - A key reason for this are CLIM upgrades (about 1 minute for a vCLIM versus several minutes for a hardware CLIM)

vNS customer experience
Latest enhancements

- Significant vNS customer experience enhancements have been steadily rolled out in our four most recent RVUs (L21.06, L21.11, L22.09, and L23.08)
- These enhancements include:
  - Automated pre-deployment checks through the vNS Readiness Analyzer tool
  - Faster and simpler deployment with deployment automation features
  - Support for rolling upgrades leveraging VMware VM migration
  - Support for VMware vSAN storage
  - Option to create vNS system in phases
  - vNS App action to increase NSK volume size
  - New NonStop $SYSTEM disk snapshot and restore feature
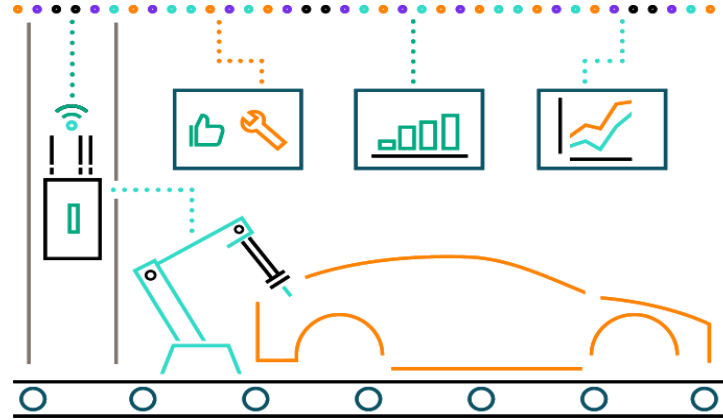 - Support for Automatic TCP/IP Connection Failover

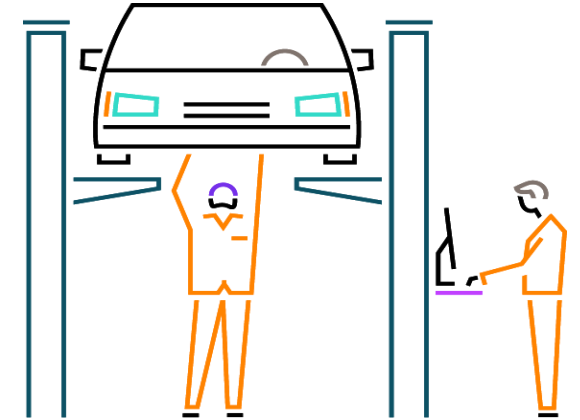# vNS Environment Preparation, Deployment, and Maintenance

vNS – Environment Preparation, Deployment, Management Aides
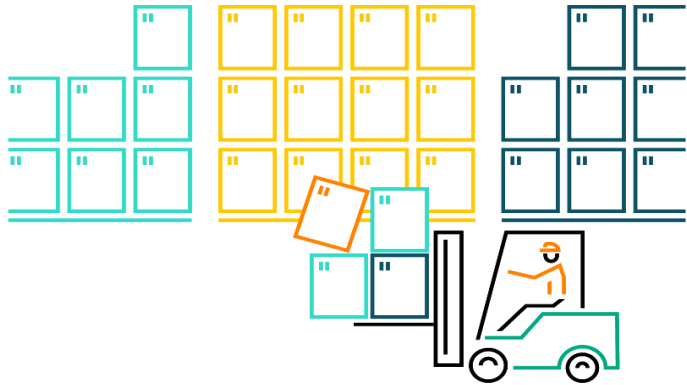
Prepare the cloud environment

Deploy the system

Maintain the system

vNS Readiness Analyzer Tool:

- Pre-deployment checks for cloud readiness
- Know the gap between needed vs available

User access management:

- Define user classes and access privileges on the vNS system

Configure vNS resources:

- Classify resources to be used in vNS auto-deployment

vNS deployment features:

- User selecting resources or auto-selecting resources for VMs, networks, volumes, etc.
- Small/Medium/Large scale system template
- Deploy the system in phases: minimal system before the remaining portion

VMware maintenance capability:
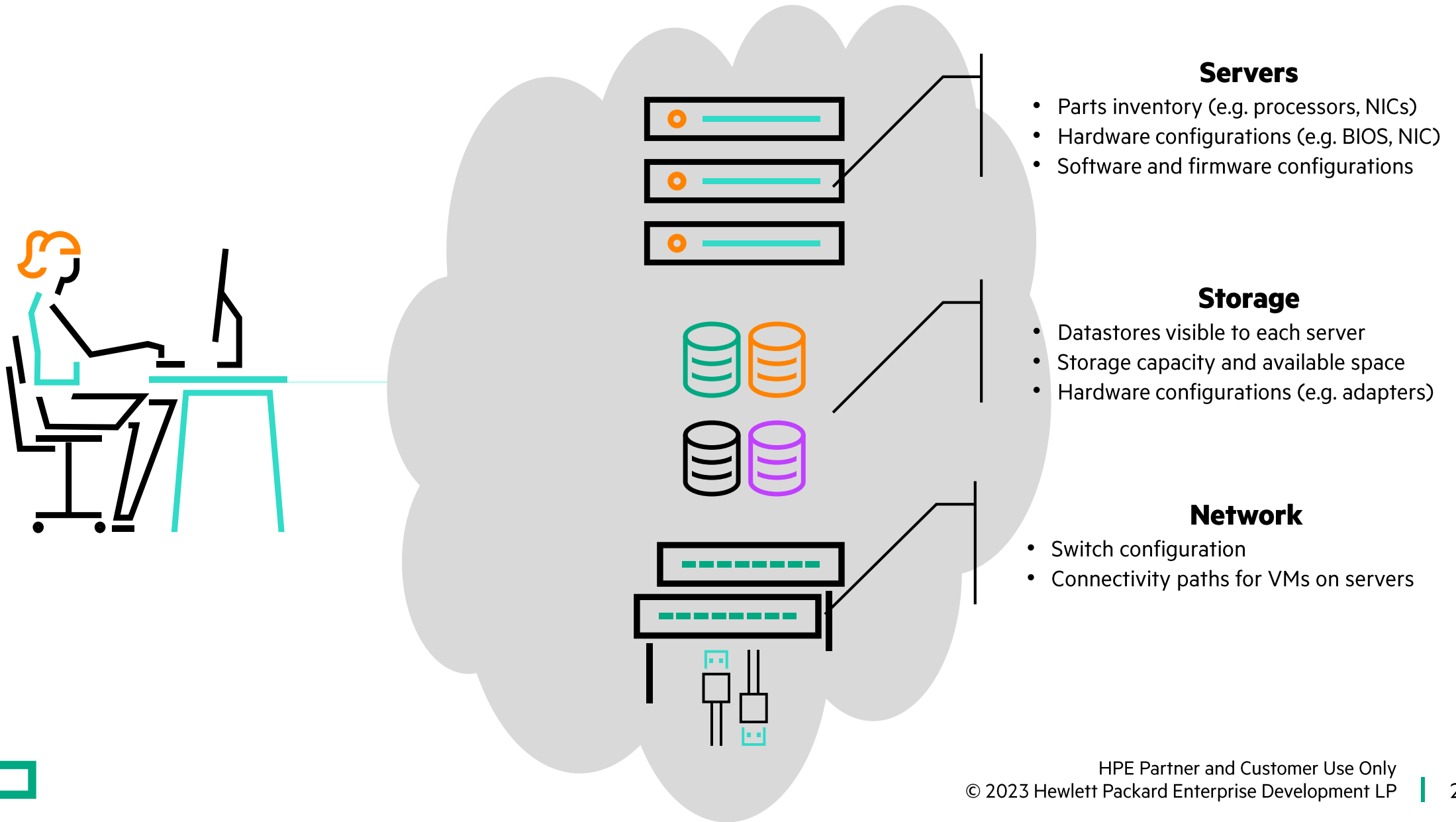
- Migrate VMs to different hosts / datastores
- Migrate NSK volumes to different datastores
- Tear down a vNS system and cleanup resources

vNS system management:

- Change Expand Node Number
- CPU, CLIM VMs addition & deletion
- Reconfigure NSK Volumes
- Update HSS Files
- Reimage CLIMs
- Reconfigure VM Networks
- Expand NSK Volume Disk Size (online)
- $SYSTEM disk snapshot and restore

Virtualized NonStop Readiness Analyzer

Servers
- Parts inventory (e.g. processors, NICs)
- Hardware configurations (e.g. BIOS, NIC)
- Software and firmware configurations

Storage
- Datastores visible to each server
- Storage capacity and available space
- Hardware configurations (e.g. adapters)

Network
- Switch configuration
- Connectivity paths for VMs on servers

vNS App - An intuitive GUI plugin for vCenter
for vNS system creation and management

Select an action

vm vSphere Client   Menu ⌄   🔍 Search in all environments

vNS List   10

vNS List
- EZ01   >
- EZ02
- EZ03
- EZ04   Select a system ➜
- EZ05
- EZ07
- EZ08
- EZ06
- ICELK
- HICELK

vNS List

➕ Add vNS Role   ➕ Create System   ✏ Classify Networks for vNS   ➕ Migrate VM Over Host   ➕ Migrate vNS Volumes   ➕ Create System From File   ➕ Create System using Template
✏ Classify Clusters for vNS   ✏ Classify Datastores for vNS   ➕ Migrate VM Over Datastore

System Name ↑

- EZ01
- EZ02
- EZ03
- EZ04
- EZ05
- EZ07
- EZ08
- EZ06
- ICELK
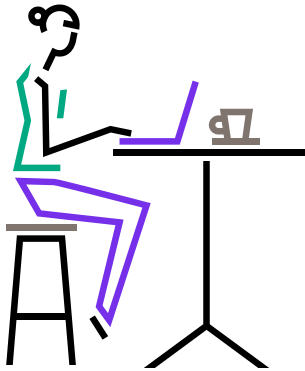- HICELK

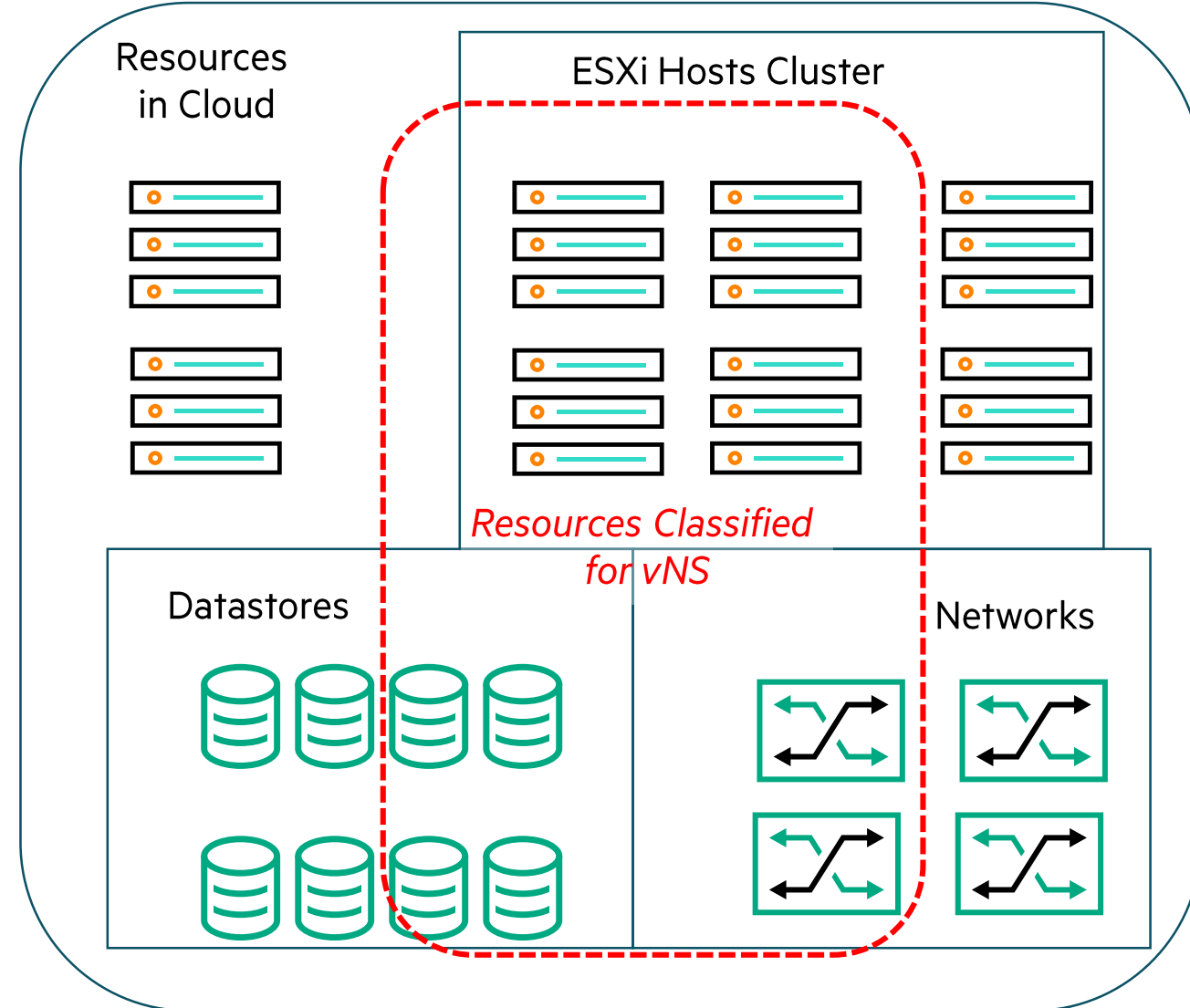# vNS App - Classify Resource for vNS and vNS System Creation

User

1. Classify resources for vNS:

- Datastore – VM image, Volume vDisk
- Network – VM fabric, CLIM mlan, $ztc
- Cluster – VM host

2. vNS System Creation:

- Create System: Resources selected by user or auto-selected by deployment tool
- Create System using Template: Small/Medium/Large with resources auto-selected
- Create System in Phases option: minimal system deployed first, ready for configuration and bringing up NSK while the remaining portion of the system being deployed

Resources in Cloud

ESXi Hosts Cluster

Resources Classified for vNS

Datastores

Networks

Option to create vNS system in phases

Virtual machines deployed for the minimal system

vNS management
- Virtual NSC
- vNS Deployment Tools

Application
Virtual NonStop CPU
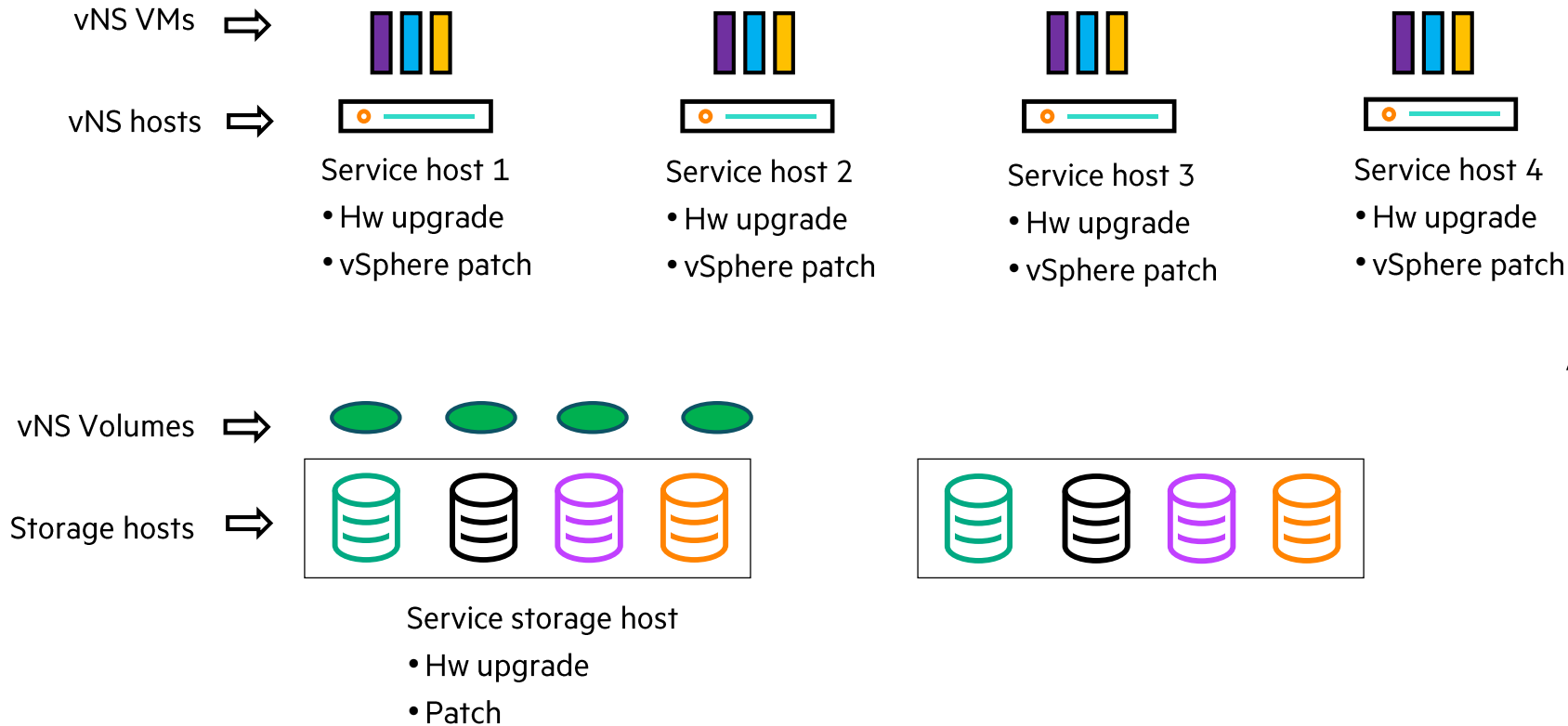CPU cores | Memory | RoCE NIC

Network I/O handler
Virtual IP CLIM
CPU cores | Memory
Ethernet NICs | RoCE NIC

Storage I/O handler
Virtual Storage CLIM
CPU cores | Memory
Ethernet or FC NICs | RoCE NIC

Virtualized NonStop

Hypervisor: VMWare ESXi

Cloud management

Intel X86 servers

Redundant storage arrays or internal drives in x86 servers

Redundant Ethernet fabric switches

Maintenance LAN Ethernet switch

External network Ethernet switch(es)

Cloud resources required by Virtualized NonStop

Resources needed for the minimal system

Remaining resources needed for the complete system

Rolling Upgrades
Online upgrade and patching of compute and storage hosts

vNS VMs

vNS hosts

Service host 1
- Hw upgrade
- vSphere patch

Service host 2
- Hw upgrade
- vSphere patch

Service host 3
- Hw upgrade
- vSphere patch

Service host 4
- Hw upgrade
- vSphere patch

vNS Volumes

Storage hosts

Service storage host
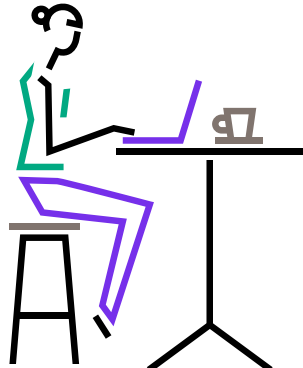- Hw upgrade
- Patch

A combination of actions using

- OSM guided procedure and
- vNS deployment tool
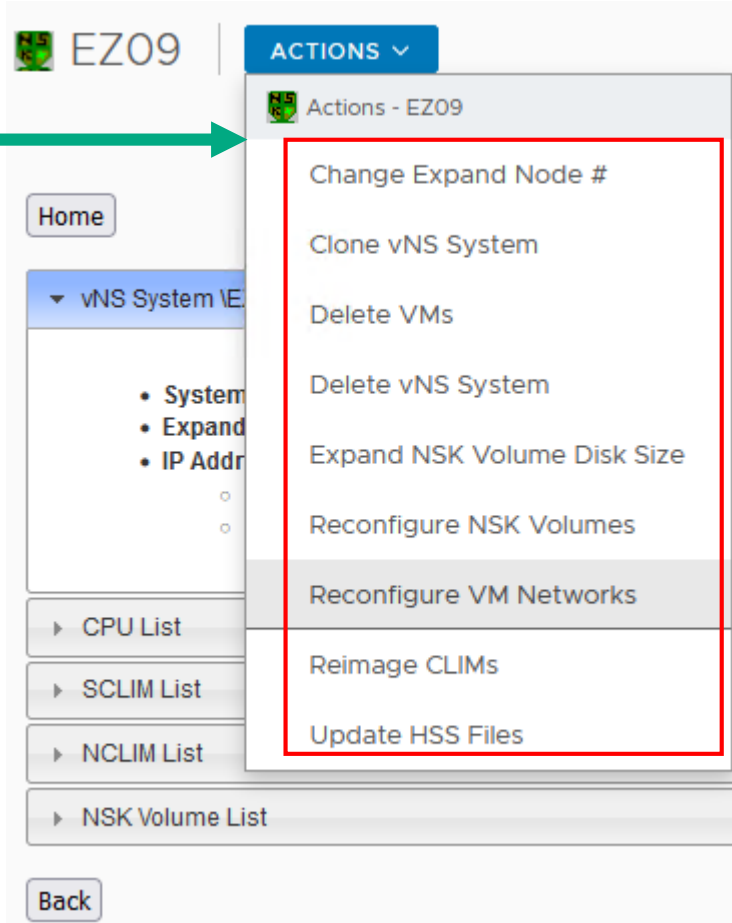 - **Migrate vNS VMs**
  - **Migrate vNS Volumes**

vNS App - system management actions
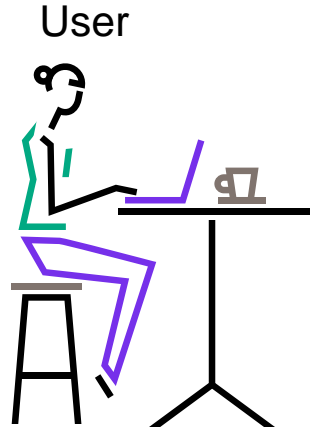

User

Select an action →

EZO9 | ACTIONS ⌄

Actions - EZO9

Home

- Change Expand Node #
- Clone vNS System
- Delete VMs
- Delete vNS System
- Expand NSK Volume Disk Size
- Reconfigure NSK Volumes
- Reconfigure VM Networks
- Reimage CLIMs
- Update HSS Files

vNS System \E.

- System
- Expand
- IP Addr

CPU List

SCLIM List

NCLIM List

NSK Volume List

Back

vNS App action - Expand NSK Volume Disk Size
Online guided procedure to increase the NSK Volume size

User

A. Expand Primary or Mirror disk selected by user

1. **Precondition:** Paths to the mirror vDisk are up and paths to primary vDisk are stopped (SCF action).

2. **Action:** vNS workflow to increase the chosen vDisk size is triggered

3. **Post step 1:** Update lun config on the associated primary/backup SCLIMs (lunmgr command)

4. **Post step 2:** Start the Volume paths to the primary (SCF action).

B. Expand the other disk of the disk pair

(Same steps as above)

1. Paths to the primary vDisk are up...

2. vNS workflow to increase disk size triggered...

3. Update lun config ...

4. Bring up paths to the mirror vDisk...

vNS NSK Volumes

One Volume

SCLIM VM

Datastores

SCLIM VM

Primary vDisk

Mirror vDisk
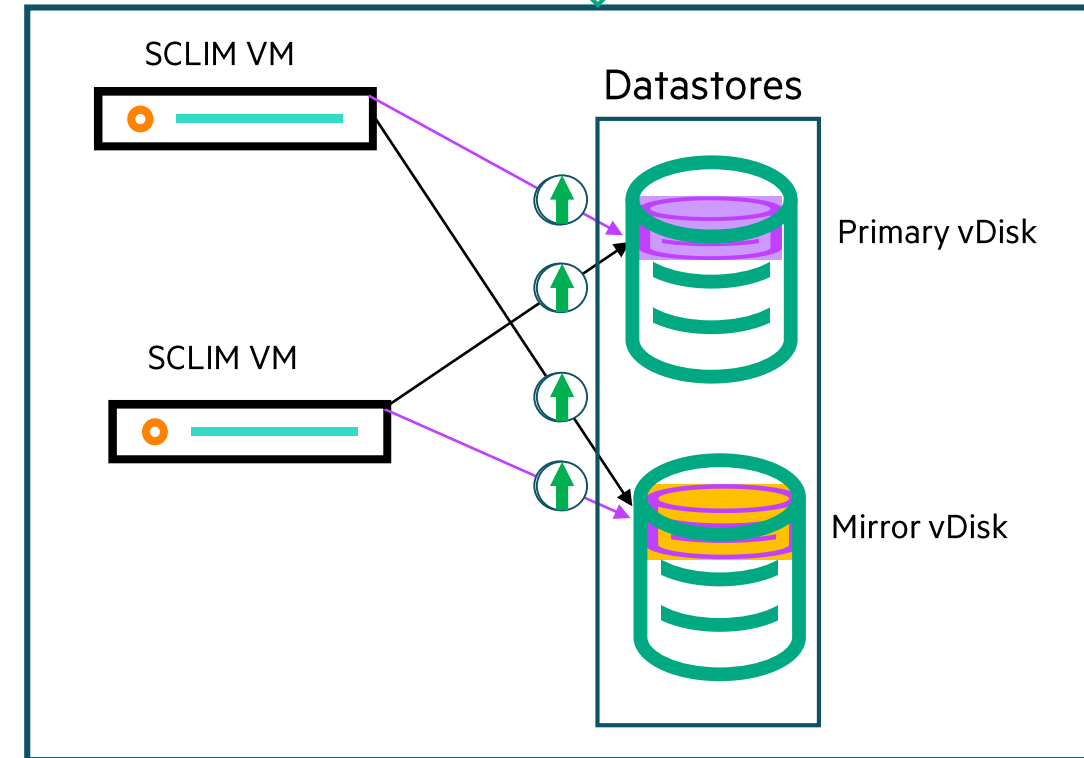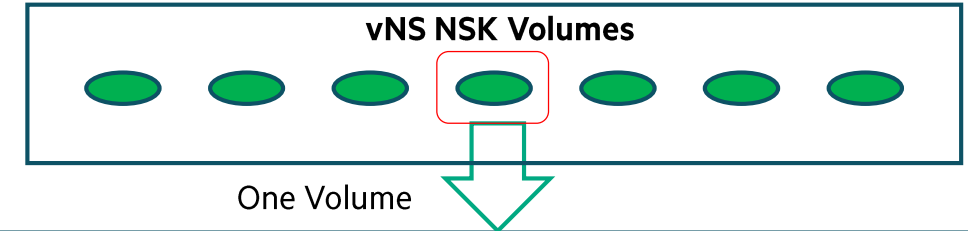
New NonStop $SYSTEM disk snapshot and restore feature

- New feature released with L23.08. Relevant SPRs:
  - T0853L03^DCR   CLIM DVD Software
  - T0682L02^BBN   OSM Service Connection Suite
  - T0634H06^ACY   OSM Console Tools
  - T0954V04^AAV   ETI-NET BackBox H4.11 (required only if backup destination is tape)
  - T0964V01^AAJ   VTR R1.05 (required only if backup destination is tape)
- Minimum required RVU: L21.06 plus the SPRs above
- Supported HPE NonStop systems:
  - HPE Virtualized NonStop
  - Converged HPE NonStop   NS4 X4, NS8 X4, NS7 X2 & X3, and NS3 X2 & X3
  - Virtualized Converged NonStop   NS2 X2 & X3
- Requirements:
  - Either disk or tape devices can be configured as the destination for $SYSTEM disk snapshots
  - The destination disks or tapes used must be connected to the same storage CLIM pair as $SYSTEM is connected
  - The size of the destination disks or tapes must be equal to or greater than those of the $SYSTEM volume

Automatic TCP/IP Connection Failover on vNS

- The L23.08 RVU introduces Automatic TCP/IP connection failover for IPv4 connections on HPE Virtualized NonStop vCLIMs
- This feature was originally introduced in L19.03 RVU with Gen9 and Gen10 IP and Telco CLIMs on HPE NonStop X platforms
- As of L23.08 the same feature is supported on HPE Virtualized NonStop systems
- For more information, see the *Cluster I/O Protocols (CIP) Configuration and Management Manual*
- Automatic TCP/IP Connection Failover can be configured on PCI pass-through, SR-IOV, or VMXNET3 network interfaces. Considerations:
  - VMXNET3 interfaces do not have visibility to physical link pulse loss
  - Thus, automatic failover of a VMXNET3 network interface upon physical link pulse loss is not supported
  - However, automatic failover of a VMXNET3 network interface is supported in case of a vCLIM failure or interface failure
  - vCLIM failover pairs (primary and backup vCLIMs) in the same vNS system must be deployed in different ESXi hosts for fault tolerance

vNS Futures

Fabric on standard Ethernet

- Eliminate the need for specific RoCE NICs

Public cloud deployment

- Deploy vNS in public clouds

Support platform evolution

- vSphere 8.0 support
- New Intel® Xeon® Processors

Conclusion

- HPE Virtualized NonStop enables mission-critical workloads in modern private cloud environment
- Offers yet another choice for your future path for HPE NonStop and your IT
- Opens up new possibilities of deploying, managing and consuming HPE NonStop

Any challenges or new ideas on HPE NonStop? Talk to us
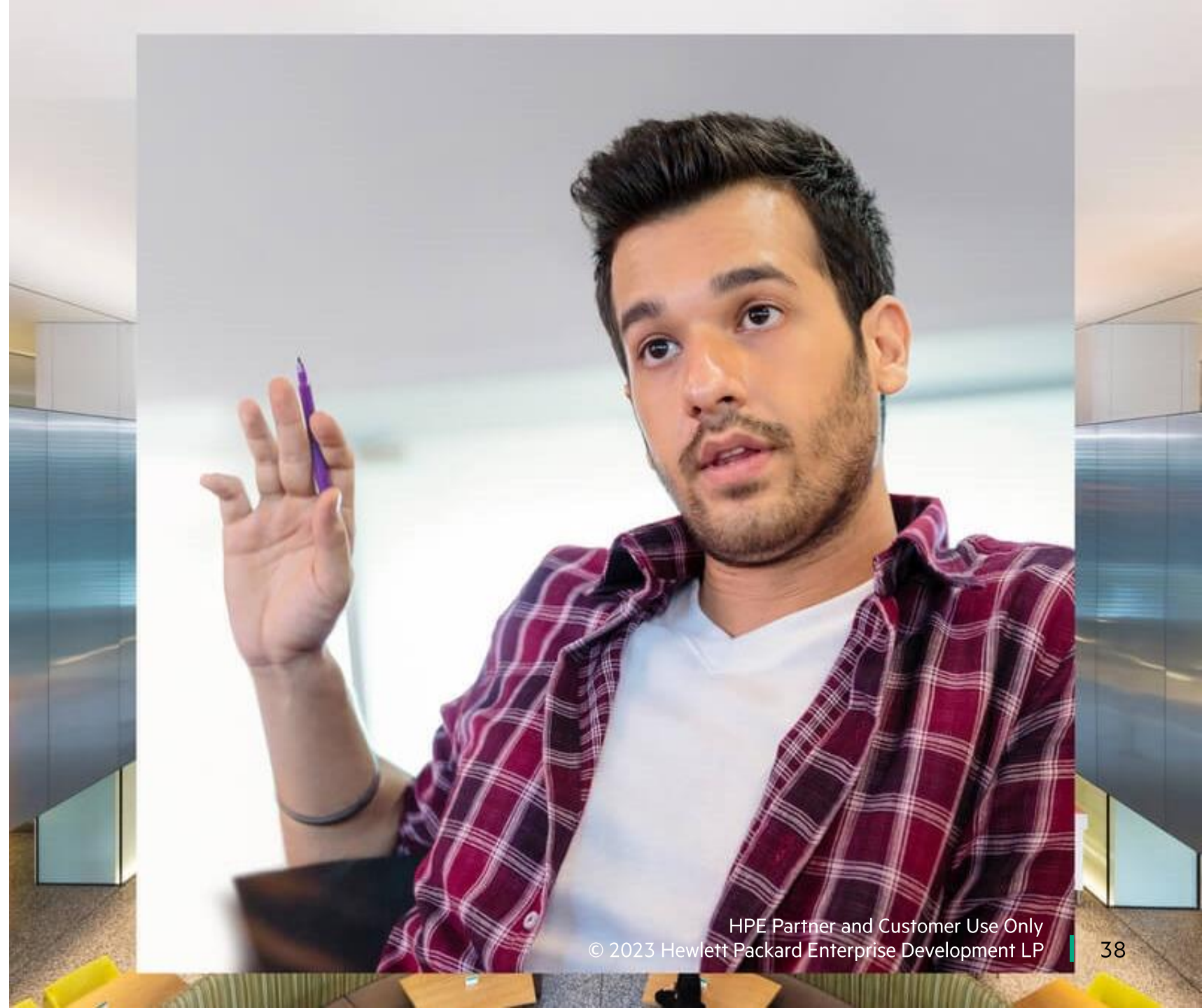
Related or recommended talks on the subject

Talk ID	Title	Presenter	Date & Time
TBC23-TB55	HPE Virtualized NonStop Continues the Journey to the Cloud (repeats on Wednesday)	Marcelo de Azevedo Ken James Bryce Kosinski Spencer Kropp Lars Plum	Tuesday, Sep 12, 2023 11:00 AM - 12:00 PM Wednesday, Sep 13, 2023 10:30 AM - 11:30 AM
TBC23-TB58	Best Practices for Configuring and Managing HPE Virtualized NonStop Systems for Mission Critical Workloads	Marcelo de Azevedo Lars Plum Bryce Kosinski Mark Thompson John Zimsky	Tuesday, Sep 12, 2023 2:15 PM – 3:15 PM
TBC23-TB63	Evolving Your vNS Environment to Keep Your NonStop Business Running	Mark Thompson	Wednesday, Sep 13, 2023 11:30 AM - 12:30 PM
TBC23-DEV3	HPE Virtualized NonStop developer chat room	Marcelo de Azevedo Lars Plum Bryce Kosinski	Thursday, Sep 14, 2023 9:00 AM – 10:00 AM
TBC23-TB57	HPE Virtualized NonStop Storage	Marcelo de Azevedo Lars Plum	Thursday, Sep 14, 2023 11:15 AM - 12:15 PM

Resources

- Product Website: **https://www.hpe.com/us/en/servers/nonstop.html**
- Technical Manuals (available at **www.hpe.com/info/nonstop-ldocs**)
  - *HPE Virtualized NonStop deployment and configuration guide for VMware*
  - *Hardware architecture guide for HPE Virtualized NonStop on VMware*

NonStop Partnership– It's a Beautiful Thing!

Thank you for attending this talk TBC23-TB56 Provide the Mission-Critical Advantage to Workloads in your Private Cloud with HPE Virtualized NonStop

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