Introduction to Hyperconverged with Cisco Hyperflex

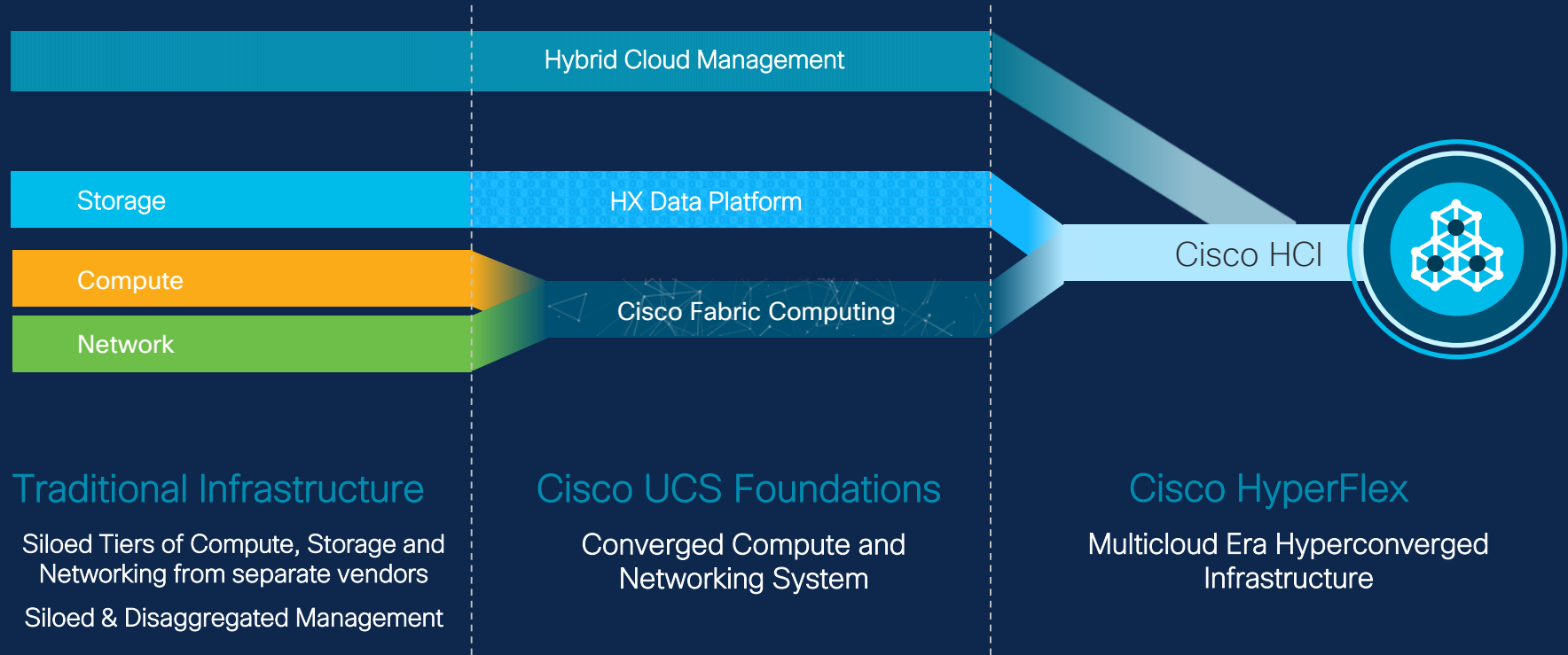Serge Charles TSA
BRKCOM-1110

Agenda

- Cisco Hyperflex Data Platform
- Platform Resiliency and scaling options
- Deployment and management options
- HX Connect demo

Cisco Hyperflex Data Platform

Complete Hyperconvergence
Compute, Network, HCI Software Engineered Together

Hybrid Cloud Management

Storage | HX Data Platform

Compute | Cisco Fabric Computing

Network

Cisco HCI

Traditional Infrastructure

Siloed Tiers of Compute, Storage and Networking from separate vendors

Siloed & Disaggregated Management

Cisco UCS Foundations

Converged Compute and Networking System

Cisco HyperFlex

Multicloud Era Hyperconverged Infrastructure

The Cisco HX Data Platform

**HX LOG STRUCTURED FILE SYSTEM
DESIGNED SPECIFICALLY FOR HYPERCONVERGENCE**

DISTRIBUTED

Object-Based File System
Architected for Scale-Out,
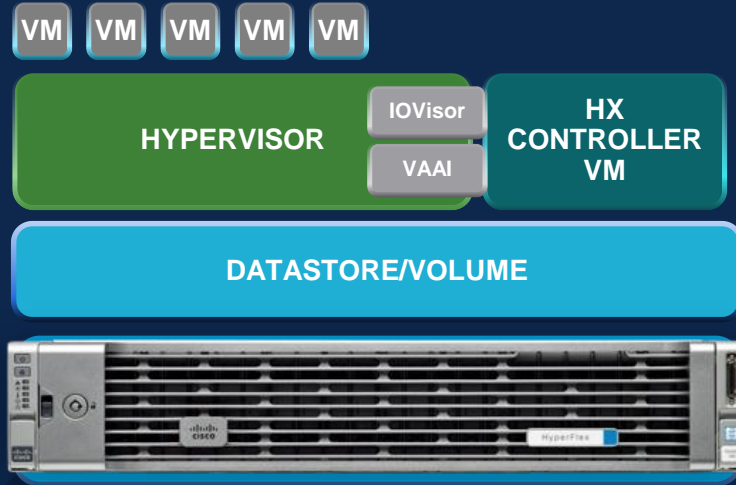Distributed Storage

ADVANCED DATA SERVICES

Built Into File
System Architecture

FUTURE READY

Designed for Containers
and Next-generation
Applications

Inside HX Data Platform Node

| VM | VM | VM | VM | VM |

HYPERVISOR   IOVisor   VAAI   **HX CONTROLLER VM**
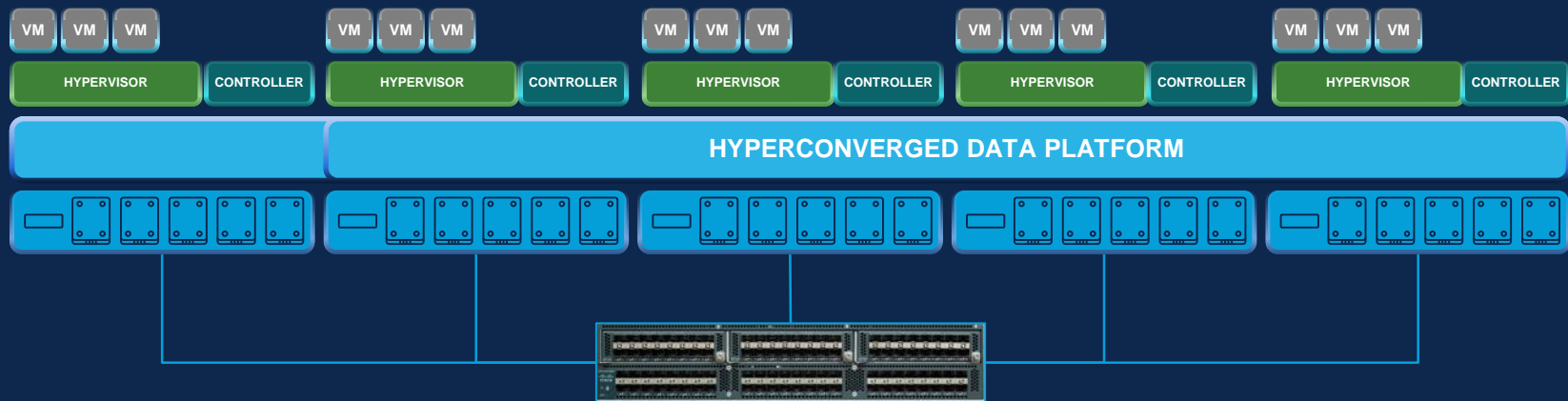
DATASTORE/VOLUME

HX Controller VM Assumes Direct Access of Local Storage

IOVisor Module Presents Pooled Storage to HyperVisor and Stripes IO

Data Services are Offloaded to HX Data Platform

Hyperconverged Scale Out and Distributed File System

VM VM VM | HYPERVISOR | CONTROLLER

VM VM VM | HYPERVISOR | CONTROLLER

VM VM VM | HYPERVISOR | CONTROLLER

VM VM VM | HYPERVISOR | CONTROLLER

VM VM VM | HYPERVISOR | CONTROLLER

HYPERCONVERGED DATA PLATFORM

Start with as Few as Three Nodes

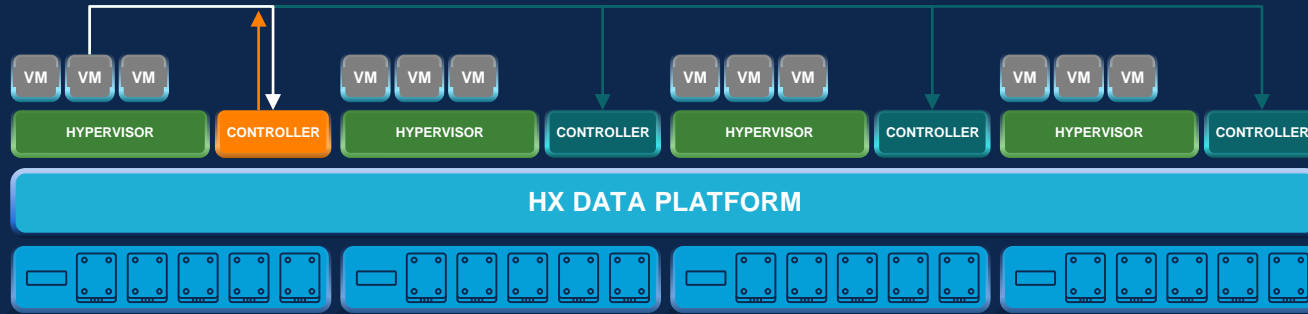Hyperconverged Data Platform Installs in Minutes

Network Fabric Policy Configures QoS Settings

Add Servers, One or More at a Time

Distribute and Rebalance Data Across Servers Automatically

Retire Older Servers

Dynamic Data Distribution

Systems Built on Conventional File Systems Write Locally, Then Replicate, Creating Performance Hotspots

HX Data Platform Stripes Data Across All Nodes Simultaneously, Leveraging Cache Across all SSDs for Fast Writes

Balanced Space Utilization: No Data Migration Required Following a VM Migration

Capacity and Network Utilization

- HX balances space utilization: no data migration required following a VM migration
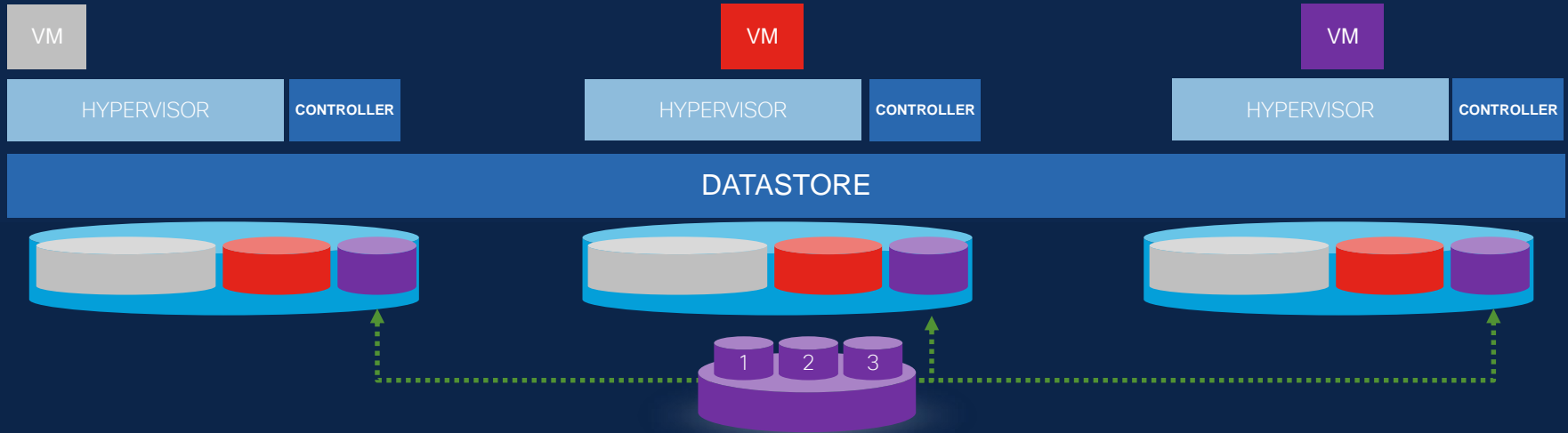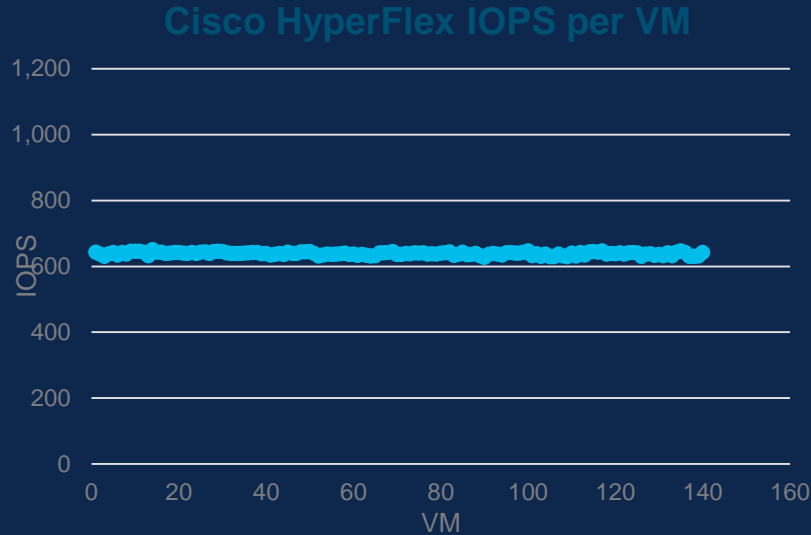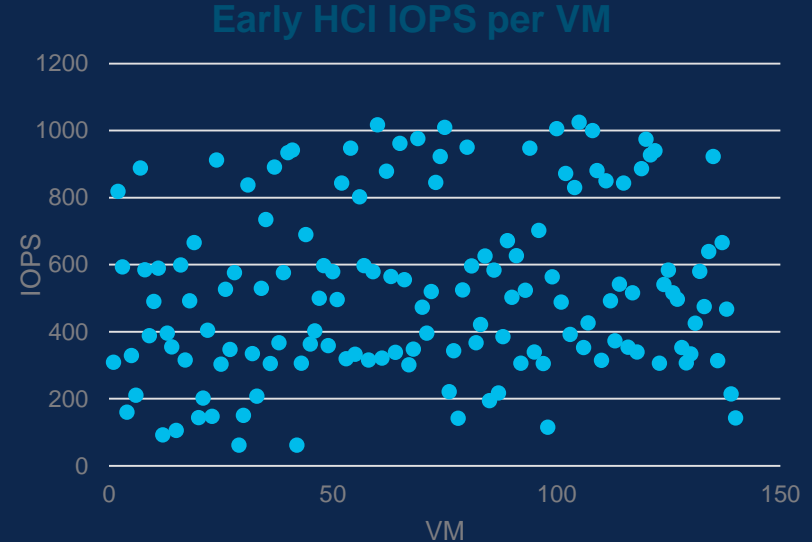

Balanced Space Utilization

No Data Migration on VM Migration
Less Stress on Network

HyperFlex All–Flash Performance Consistency

Each dot represents a Virtual Machine and its average IOPS over an hour of load

Cisco HyperFlex IOPS per VM

**Consistent Performance for
All VMs on the Cluster**
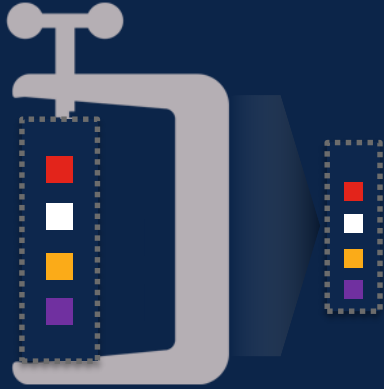
Early HCI IOPS per VM

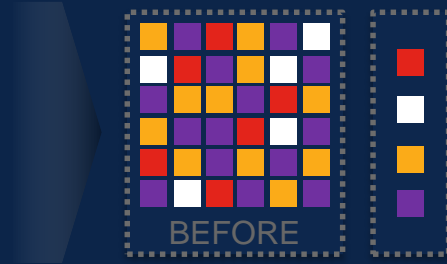**Wildly Inconsistent VM
Performance Across the Cluster**

Continuous Data Optimization

Log-Structured File System Yields More Efficient Data Optimization
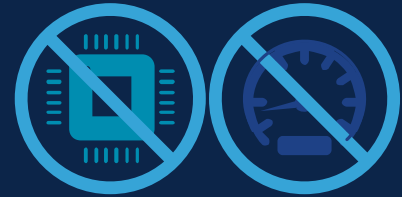
Inline Compression

30–50% space savings

Inline Deduplication

BEFORE

20–30% space savings

No Special Hardware
No Performance Impact
No Config lock-in
No Additional License

Lower Cost

UCS: Embedded Automation
Rapid Deployment of HyperFlex with Service Profiles

Server SME

Network SME

Storage SME

Server Policy

Storage Policy

Network Policy

Virtualization Policy

Application Profiles

Service Profile Templates Pre-Defined at the Factory

Uplink port configuration, VLAN, VSAN, QoS, and EtherChannels

Server port configuration including LAN and SAN settings
Network interface card (NIC) configuration: MAC address, VLAN, and QoS settings; host bus adapter HBA configuration: worldwide names (WWNs), VSANs, and bandwidth constraints; and firmware revisions

Unique user ID (UUID), firmware revisions, and RAID controller settings

Service profile assigned to server, chassis slot, or pool

Quick Deployment

configuration: MAC address, VLAN, and QoS settings; host bus adapter HBA configuration: worldwide names (WWNs) VSANs.

configuration: MAC address, VLAN, and QoS settings; host bus adapter HBA configuration: worldwide names (WWNs) VSANs.

configuration: MAC address, VLAN, and QoS settings; host bus adapter HBA configuration: worldwide names (WWNs) VSANs.

HX Ready
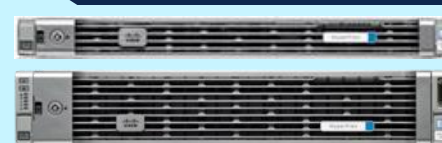
1 Subject Matter Expert Define Policies

2 Policies Used to Create Service Profile Templates

3 Service Profile Templates Create Service Profiles

4 Associating Service Profiles with Hardware Configures Servers Automatically
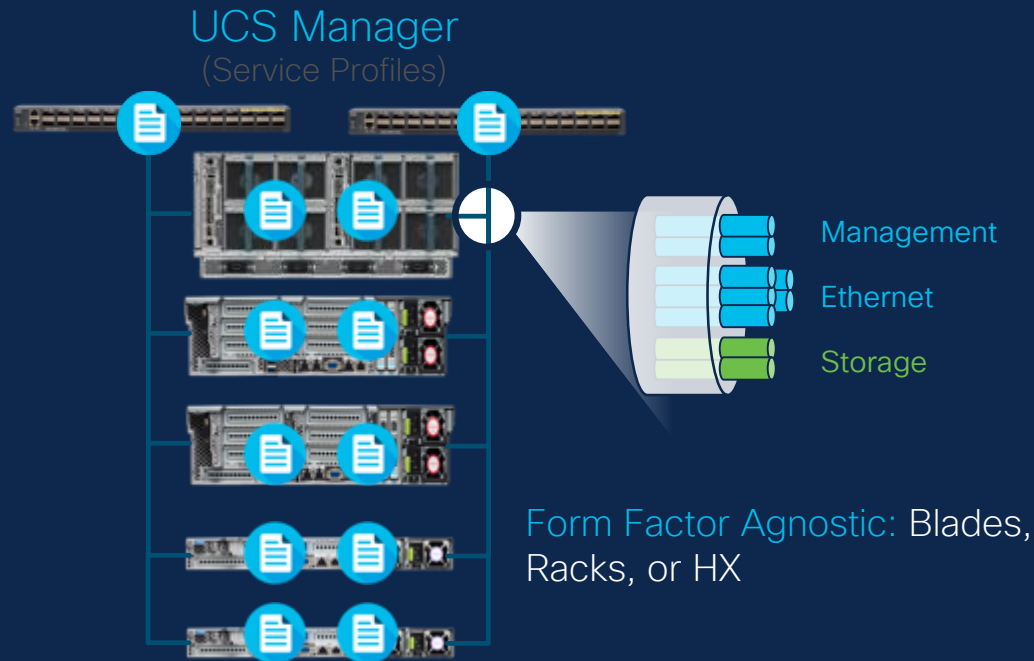
Fabric Centric Design

High Performance
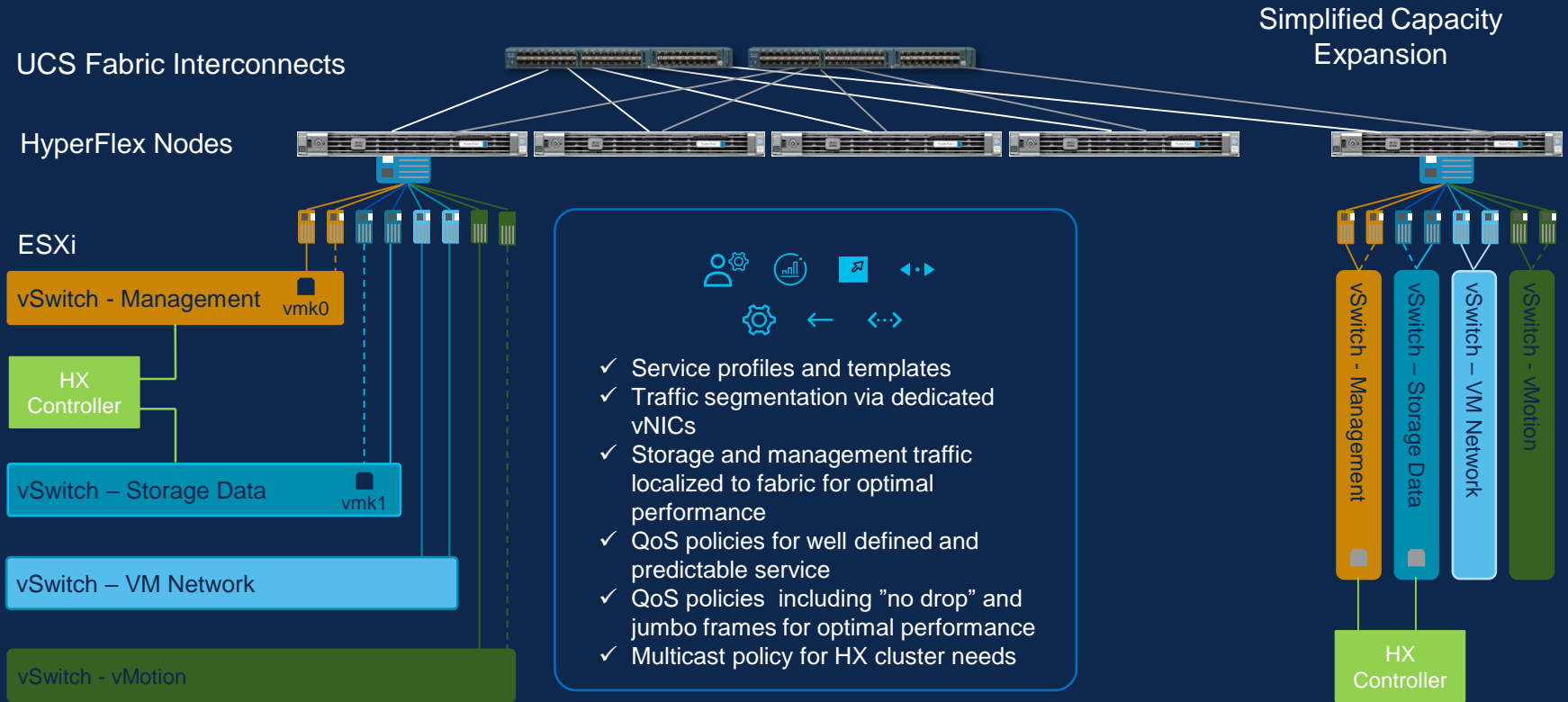40 GB/s Ethernet; 320 GB/s
per Chassis

Unified Fabric
Single Cable for Network,
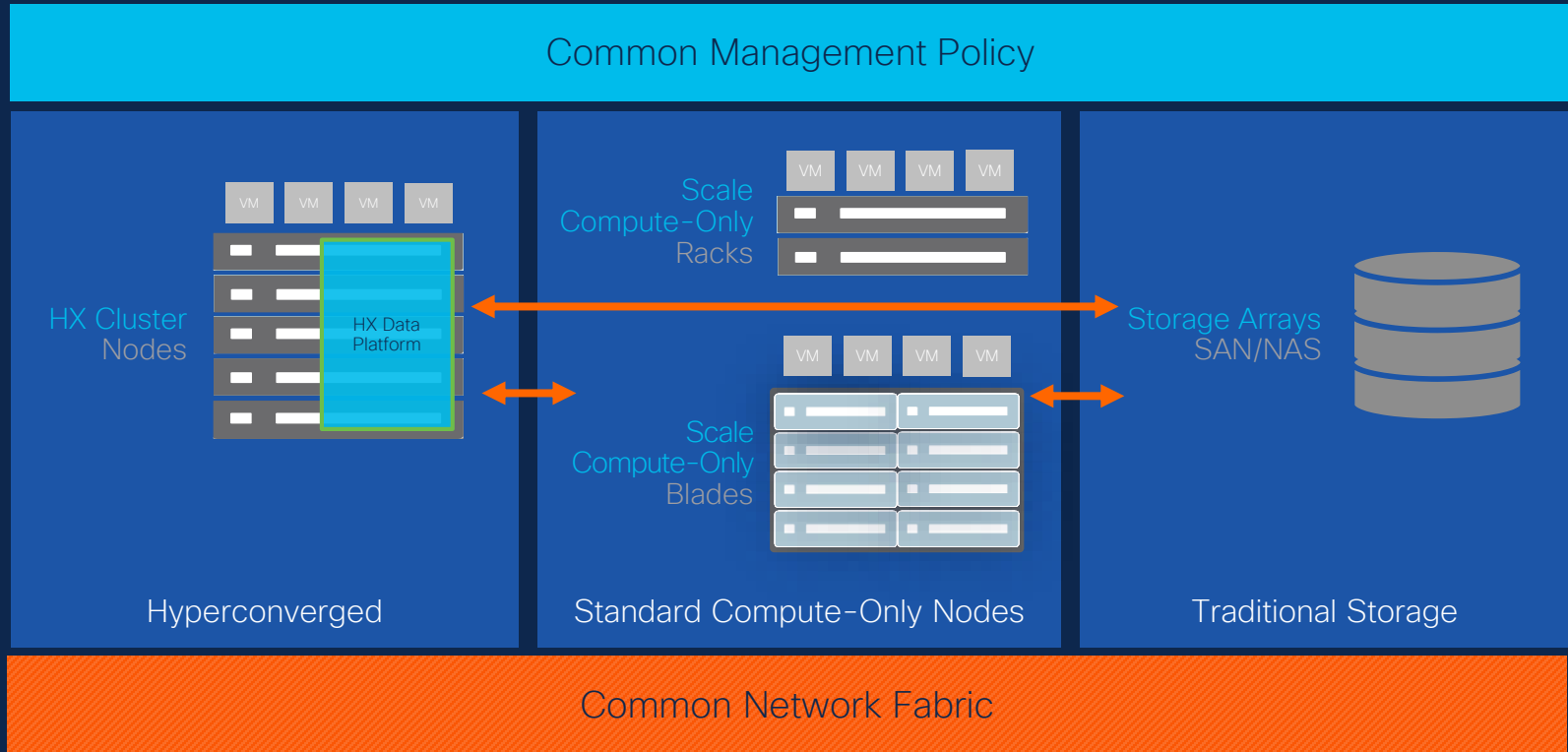Storage, and Management Traffic

Easy to Scale
Single Point of Management:
Add Cables for Bandwidth
vs. Fabric Type

UCS Manager
(Service Profiles)

Management

Ethernet

Storage

Form Factor Agnostic: Blades,
Racks, or HX

Current Networking model for HX

UCS Fabric Interconnects

HyperFlex Nodes

Simplified Capacity Expansion

ESXi

vSwitch - Management
vmk0

HX Controller

vSwitch – Storage Data
vmk1

vSwitch – VM Network

vSwitch - vMotion

vSwitch - Management

vSwitch – Storage Data

vSwitch – VM Network

vSwitch - vMotion

HX Controller

- ✓ Service profiles and templates
- ✓ Traffic segmentation via dedicated vNICs
- ✓ Storage and management traffic localized to fabric for optimal performance
- ✓ QoS policies for well defined and predictable service
- ✓ QoS policies including "no drop" and jumbo frames for optimal performance
- ✓ Multicast policy for HX cluster needs

Integrate Into Your Existing Infrastructure

Common Management Policy

HX Cluster Nodes

HX Data Platform

Scale Compute-Only Racks

Scale Compute-Only Blades

Storage Arrays SAN/NAS

Hyperconverged

Standard Compute-Only Nodes

Traditional Storage

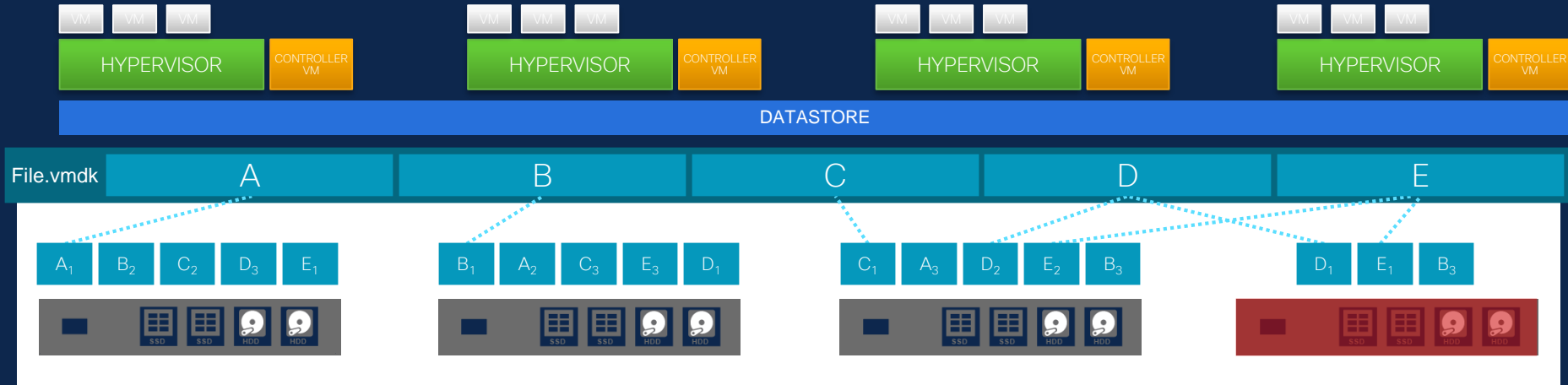Common Network Fabric

Platform Resiliency and scaling options

Non-Disruptive Operations

- Stripe blocks of a file across servers
- Replicate one or two additional copies to other servers
- Handle entire server or disk failures
- Restore back to original number of copies
- Rebalance VMs and data post replacement
- Rolling software upgrades

Data Protection and High Availability
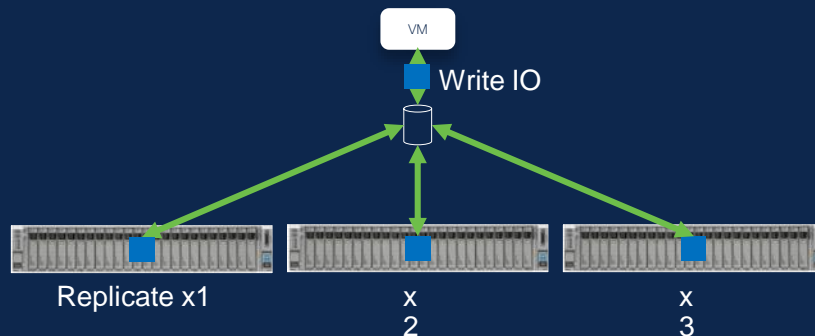## Data Protected by Replication of Data Across the Cluster Nodes

Replication Factor 3 (RF3)

- Default and **Recommended is Replication Factor = 3**
- Every block is written to 3 different nodes in the cluster
- Higher availability to survive multi-point failures; Higher device protection
- Reduces raw disk capacity to 33%

VM

Write IO

Replicate x1   x 2   x 3

Note: **RF3 is strongly recommended** for high availability

Replication Factor	3 or 4 Node Cluster	5+ Node Cluster
3	Simultaneous Failures Supported: 1 node / 2 drives*	Simultaneous Failures Supported: 2 nodes / 2 drives*

*drives across different nodes

Data Protection and High Availability
Data Protected by Replication of Data Across the Cluster Nodes
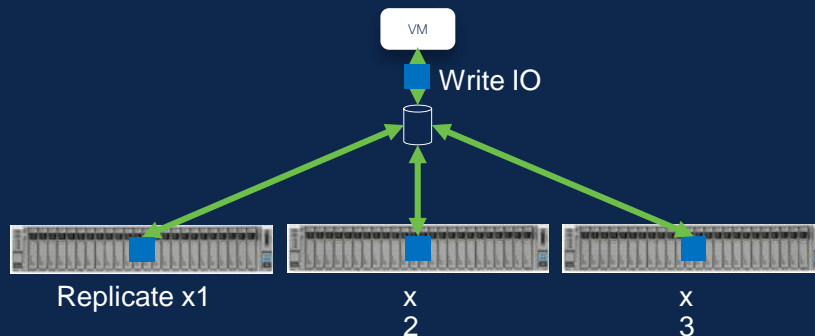
Replication Factor 2 (RF2)

Default and **Recommended is Replication Factor = 3**

Every block is written to 2 different nodes in the cluster

Lower availability to survive failures; Lower device protection

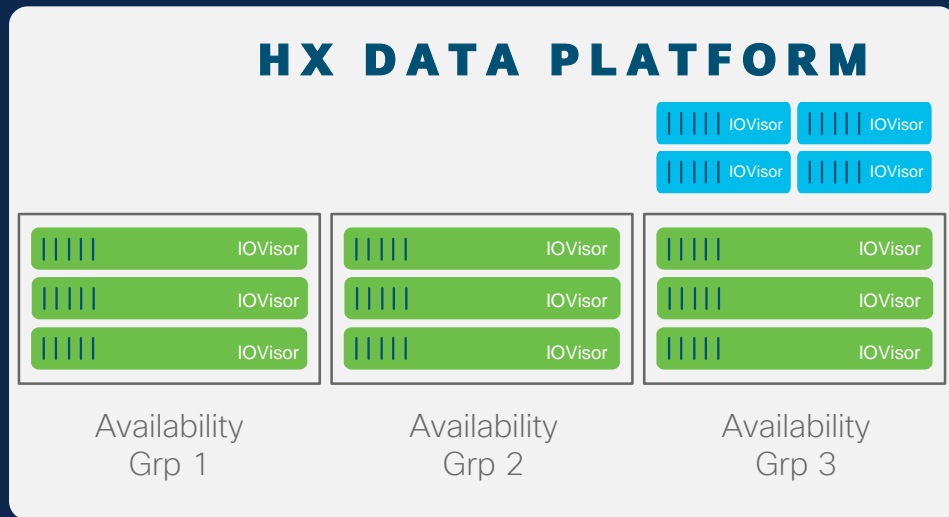Reduces raw disk capacity to 50%

VM

Write IO

Replicate x1

x 2

x 3

Note: **RF3 is strongly recommended** for high availability

Replication Factor	3 or 4 Node Cluster	5+ Node Cluster
2	Simultaneous Failures Supported: 1 node / 1 drive	Simultaneous Failures Supported: 1 node / 1 drive

*drives across different nodes

Logical Availability Zones (LAZ)

- Cluster Scale With High Availability

- Increased resiliency without added manageability overhead

- How does it work?
  - HX nodes grouped into logical "availability groups" (N/A for compute nodes)
  - HXDP never places 2 copies of the data in the same availability group
  - Clusters with LAZ can survive > 2 simultaneous node failures without data loss or loss of availability
  - Tolerate more independent failures

HX DATA PLATFORM

IOVisor IOVisor
IOVisor IOVisor

IOVisor	IOVisor	IOVisor
IOVisor	IOVisor	IOVisor
IOVisor	IOVisor	IOVisor

Availability Grp 1   Availability Grp 2   Availability Grp 3

LAZ Failure Scenario

Cluster State: **Online**

LAZ: **Off**

HyperFlex Data Protection
Fast and Flexible Native Snapshots

- Pointer-based snapshots
  - Space-efficient with no performance penalty vs. Vmware Redo Log Snaps
  - Fast creations and deletions
- Fine-grained or coarse-grained
  - VM-level or VM folder-level
- VAAI-integrated
  - Quiesced and crash-consistent
- Use vCenter Snapshot Manager
- Policy-based schedules and retention

Schedule Snapshot for workload_vm_a1

Hourly Snapshot ☑ Enable Hourly Snapshot

Schedule
Start At 10:00 AM
Until 05:00 PM
On ☐ Sunday ☑ Monday ☑ Tuesday
☑ Wednesday ☑ Thursday ☑ Friday
☐ Saturday

Retention
◉ A maximum of 10 snapshot per VM
○ Never Expires

Daily Snapshot ☑ Enable Daily Snapshot

Schedule
Start At 09:00 PM
On ☐ Sunday ☑ Monday ☑ Tuesday
☑ Wednesday ☑ Thursday ☑ Friday
☐ Saturday

Retention
◉ A maximum of 7 snapshot per VM
○ Never Expires

Weekly Snapshot ☑ Enable Weekly Snapshot

Schedule
Start At 05:00 AM
On ○ Sunday ○ Monday ○ Tuesday
○ Wednesday ○ Thursday ○ Friday
◉ Saturday

Retention
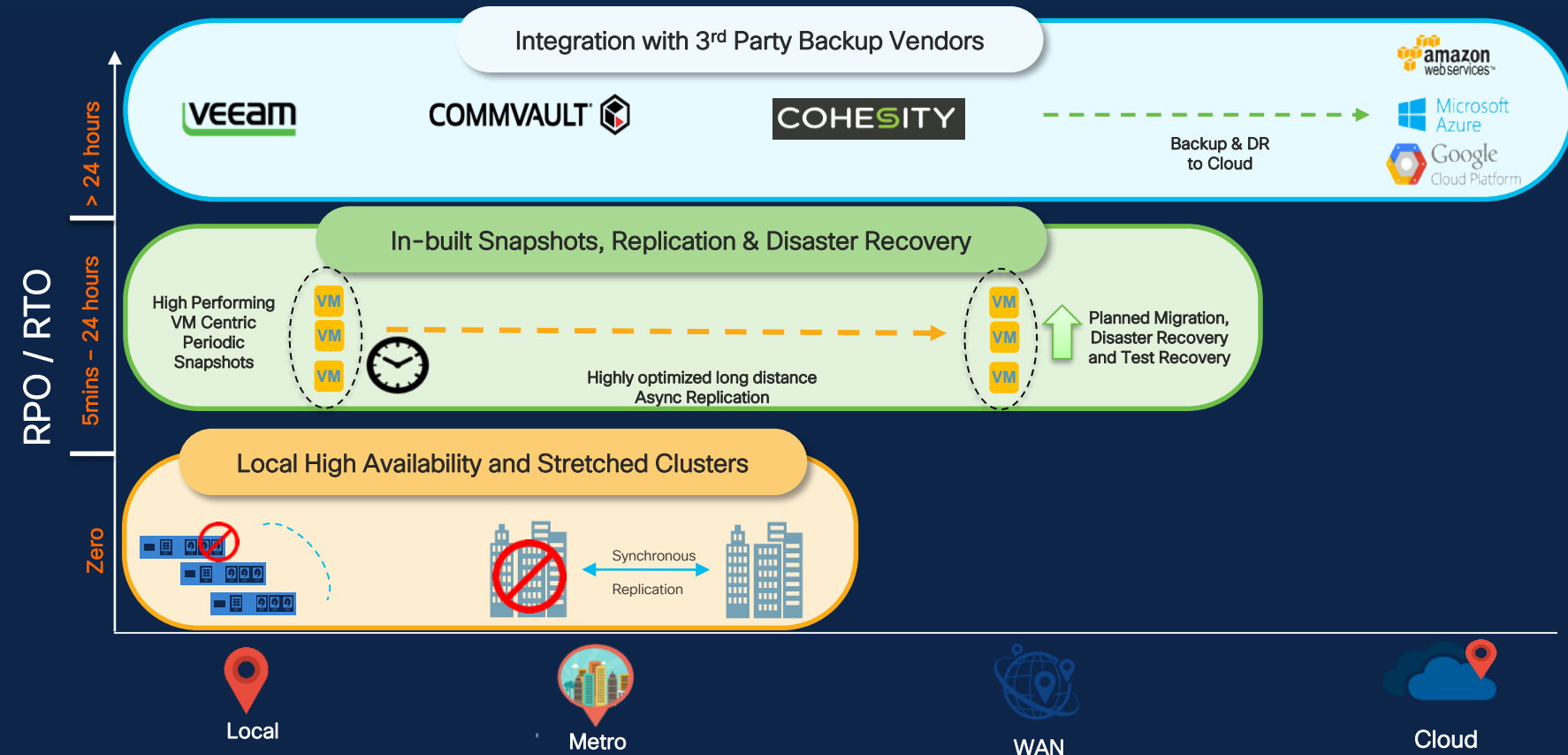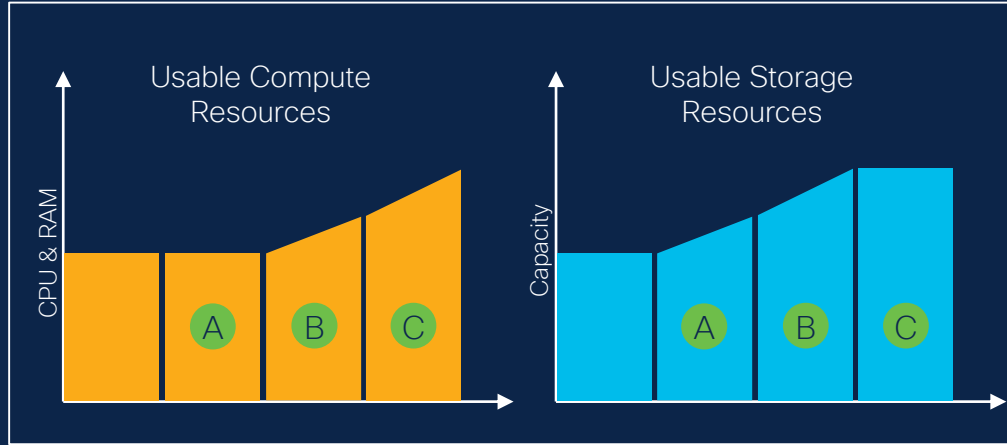◉ A maximum of 4 snapshot per VM
○ Never Expires

OK   Cancel

All This Functionality Enabled with the HX Data Platform Filesystem

HyperFlex Data Protection
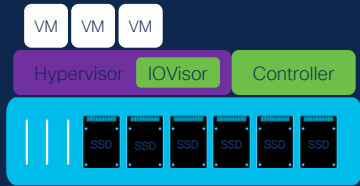## Flexibility to meet business needs

RPO / RTO

> 24 hours | 5mins – 24 hours | Zero

Integration with 3rd Party Backup Vendors

VEEAM **COMMVAULT** **COHESITY**

amazon web services™
Microsoft Azure
Google Cloud Platform

Backup & DR to Cloud

In-built Snapshots, Replication & Disaster Recovery

High Performing VM Centric Periodic Snapshots

VM VM VM

Highly optimized long distance Async Replication

VM VM VM

Planned Migration, Disaster Recovery and Test Recovery

Local High Availability and Stretched Clusters

Synchronous Replication

Local   Metro   WAN   Cloud

Independent Scaling of Compute and Capacity

Usable Compute Resources — CPU & RAM (A, B, C)

Usable Storage Resources — Capacity (A, B, C)

C Add Compute-Only Nodes
Non-HyperFlex hosts can connect to storage with IOVisor

VM VM VM
Hypervisor IOVisor

VM VM VM
Hypervisor IOVisor

+

VM VM VM
Hypervisor IOVisor Controller
SSD SSD SSD SSD SSD SSD

VM VM VM
Hypervisor IOVisor Controller
SSD SSD SSD SSD SSD SSD

VM VM VM
Hypervisor IOVisor Controller
SSD SSD SSD SSD SSD SSD

+

VM VM VM
Hypervisor IOVisor Controller
SSD SSD SSD SSD SSD SSD
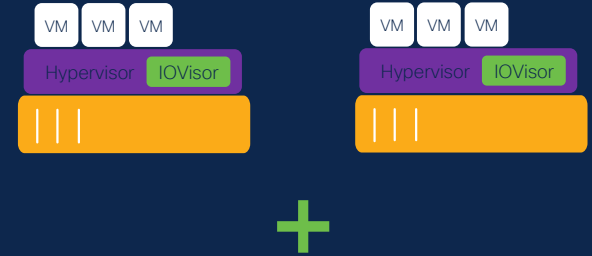
A Scale Capacity Within Converged Nodes
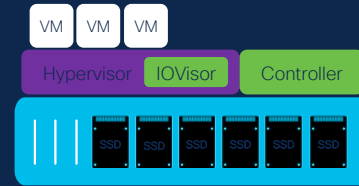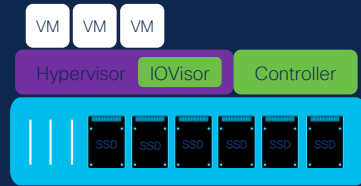
B Add Converged Nodes
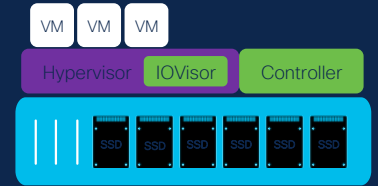
Scaling Options in HXDP 4.0.1a

VMware			HyperV	
SFF (excluding All-NVMe)	**LFF**	**All-NVMe**	**SFF**	**LFF**
Converged Nodes 3-32	Converged Nodes 3-16	Converged Nodes 3-16	Converged Nodes 3-16	Converged Nodes 3-16**
+	**+**	**+**	**+**	**+**
Compute-Only Nodes 0-32	Compute-Only Nodes 0-32	Compute-Only Nodes 0-16	Compute-Only Nodes 0-16	Compute-Only Nodes 0-16
✓ Expansion Supported	✓ Expansion Supported	✓ Expansion Supported	✓ Expansion Supported	✓ Expansion Supported
2:1 Max ratio Compute to Converged Nodes*	**2:1** Max ratio Compute to Converged Nodes*	**1:1** Max ratio Compute to Converged Nodes*	**1:1** Max ratio Compute to Converged Nodes*	**1:1** Max ratio Compute to Converged Nodes*
Max Cluster Size **64**	Max Cluster Size **48**	Max Cluster Size **32**	Max Cluster Size **32**	Max Cluster Size **32**
	! Hybrid Only	! Requires Enterprise License		! Hybrid Only

* 2:1 – Enterprise license (HXDP-P) if # of Compute > # of Converged Nodes.
* 1:1 – Standard license (HXDP-S) if # of Compute <= # of Converged Nodes.
** Max LFF cluster size currently limited to 8 Converged nodes when using new LFF 12TB drives.

Scaling Options in HXDP 4.0.1a (cont.)

Edge

SFF
(excluding All-NVMe)

Converged Nodes
2-4

Expansion Not Currently Supported

1GbE and 10GbE Network Options Available

Single and Dual Switch Support

Deploy and Manage via Cisco Intersight

! HX*220 Nodes Only

Stretched Cluster**

SFF

Converged Nodes
2-16 / Site (4-32 / Cluster)

+

Compute-Only Nodes
0-21 / Site (0-42 / Cluster)
[Limited by Max Cluster size]

✓ Expansion Supported***

2:1
Max ratio Compute to Converged Nodes*

Max Cluster Size
32/Site | **64**/Cluster

LFF

Converged Nodes
2-8 / Site (4-16 / Cluster)

+

Compute-Only Nodes
0-16 / Site (0-32 / Cluster)

✓ Expansion Supported***

2:1
Max ratio Compute to Converged Nodes*

Max Cluster Size
24/Site | **48**/Cluster

! Hybrid Only

* 2:1 – Enterprise license (HXDP-P) if # of Compute > # of Converged Nodes.
* 1:1 – Standard license (HXDP-S) if # of Compute <= # of Converged Nodes.
** Stretched cluster requires Enterprise license (HXDP-P)
*** Requires uniform expansion of converged nodes across both sites

Deployment and management options

Cluster Deployment

- Download latest OVA from Cisco.com

- Deploy on existing infrastructure

- Run single cluster deployment

- Deploy from anywhere!

- No need for existing infrastructure or OVA setup

- Latest version always available

- Reusable policy for rapid & consistent deployment

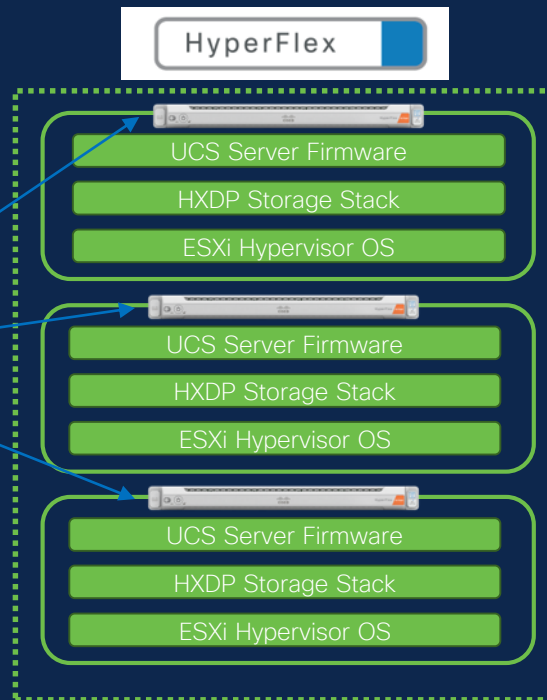- Simple ramp-up of large HX projects with simultaneous background deployment

One-Click Full Stack HyperFlex Upgrades
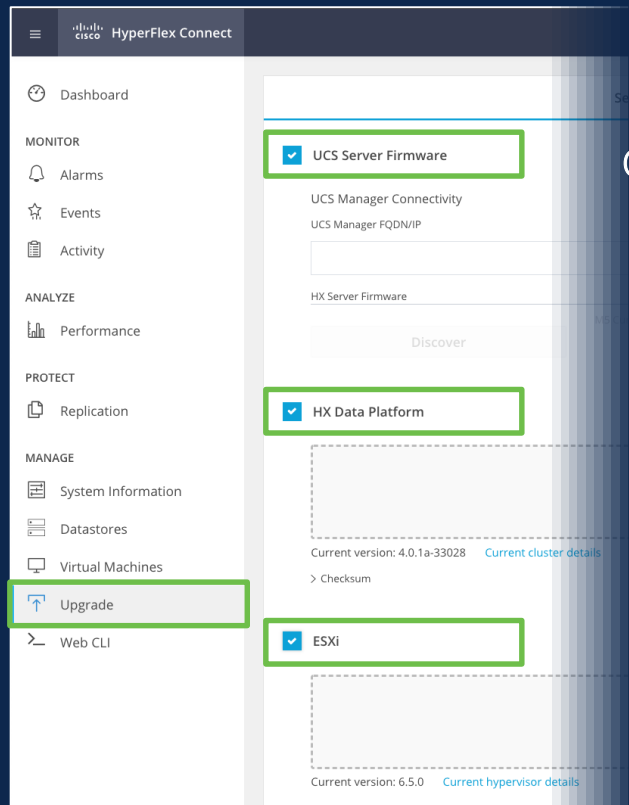
One-click, fully integrated stack upgrades via HX Connect.

Non-Disruptive online upgrades!

HX Connect demo

Enterprise Application Ready

Enterprises Run Mission Critical Apps on HyperFlex

CITRIX · Exchange · Cisco webex · Microsoft SQL Server · ORACLE DATABASE · ORACLE E-BUSINESS SUITE

Microsoft · SharePoint · Cisco Unified Contact Center · MySQL · SIEBEL · PeopleSoft

vmware · McKESSON · Epic · MUREX · SAP · kubernetes by Google

Common HCI Apps → Business Critical Apps

#1 in Performance

ESG

1. 3x higher VM density
2. 3x reduced read/write latency
3. 7:1 reduction IOPS variability

→ 3x better TCO

More workloads On Hyperconverged

Predictable End User Experience

Enterprise Grade HCI

+35%
Clusters Running Databases(ASUP data)

25+%
Enterprise scale deployments

10+
New CVDs/Solution Guides for DB Apps

Thank you

You make **possible**