

A person wearing glasses and a dark shirt is standing in a server room, looking at a laptop. The room is filled with server racks, and the lighting is dim with some blue and green lights visible on the racks. The person is positioned in the center of the frame, looking towards the camera.

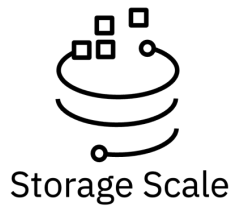
Introduction to IBM Storage Fusion

IBM Storage Scale Days 2024

March 5-7, 2024 | Stuttgart Marriott Hotel Sindelfingen

Daniel Stroh

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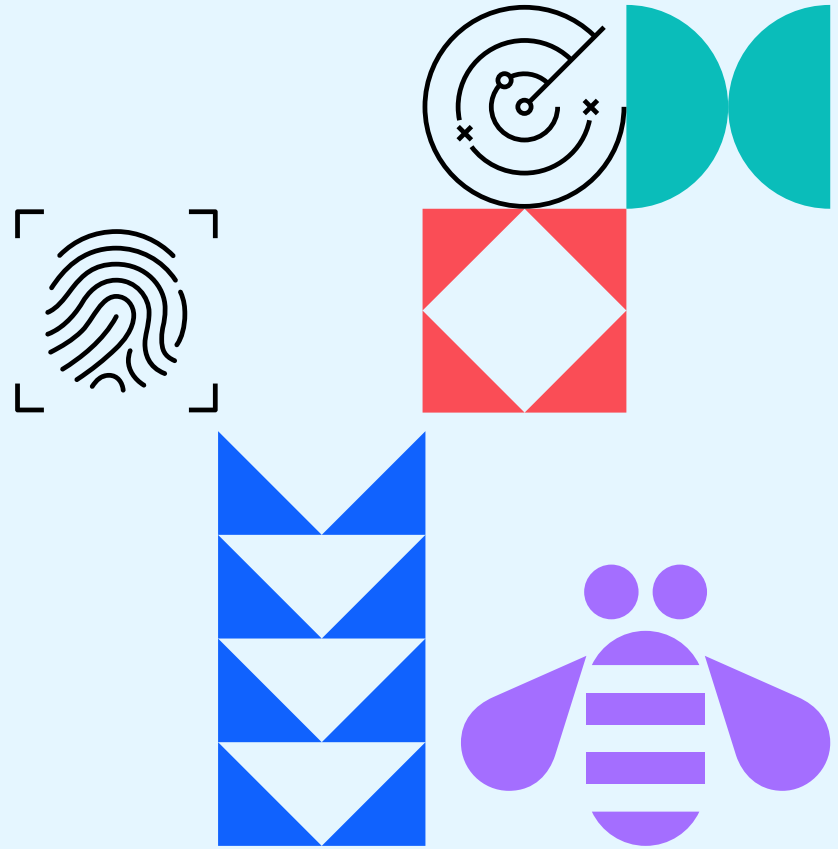
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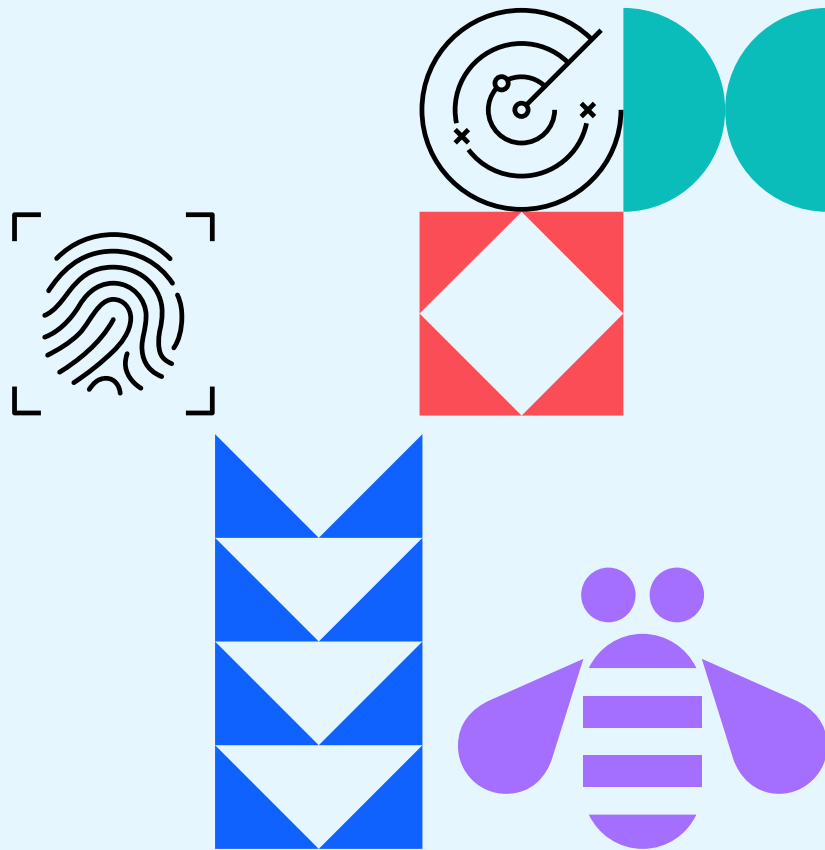
Agenda

- IBM Fusion overview
- Bare metal advantages / TCO
- OpenShift Virtualization / HCP
- HA Architectures



Agenda

IBM Fusion overview



OpenShift is the leading Kubernetes distribution!

Red Hat is a Leader in the 2023 Gartner®
Magic Quadrant™: Container Management

*“Recognized for completeness of vision
and ability to execute”*

Red Hat named a “Leader” in the 2023 Forrester
Wave™: Multicloud Container Platforms

*“Red Hat sets the pace of the market with
enterprise IT capabilities and massive market presence.”*

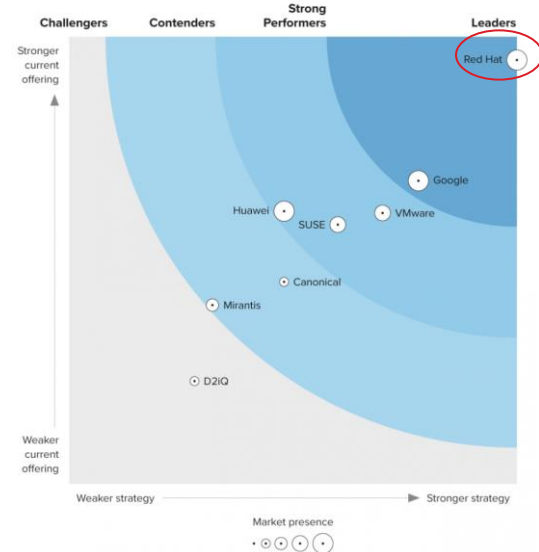
Figure 1. Magic Quadrant for Container Management



Source: Gartner



Hyper-scaler class container management ...



Consistent, everywhere!

The Digital Chasm

95% cloud-native

95% of new enterprise applications will be cloud-native by 2025

[Read the Gartner report](#)

70% struggle

70% of digital transformation efforts fail to meet objectives

[Read the BCG report](#)

Pain points

Lack of container skills, complexity of tools, timelines to get to production



IBM Storage Fusion HCI System

“Bare-metal OpenShift in a Box”

- **Scalable**
- **Resilient**
- **Highly Available**



Elements of the appliance

GPU nodes

3x NVIDIA A100 80GB (current)
8x NVIDIA L40S (future)



AFM nodes

Used for storage acceleration of object access



High speed switches

100 GbE
Dedicated storage network



Management switches

1 GbE
Used for appliance management/monitoring



Compute/storage nodes

32 or 64 core
256/512/1024/2048 GB memory
Provide compute for workloads
Storage for persistent volumes
Tier 1 cache for storage acceleration



Flexible configuration options

6-node Fusion HCI 1 rack (min size)

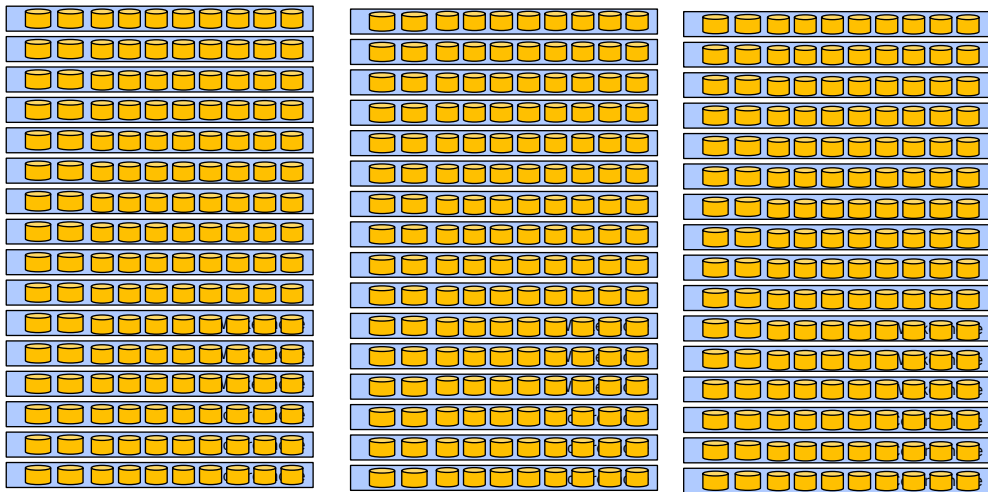
- 55 TiB usable storage
- 96 cores (192 vCPU)

16-node Fusion HCI 1 rack (max size)

- 716 TiB usable storage
- 1024 cores (2048 vCPU)

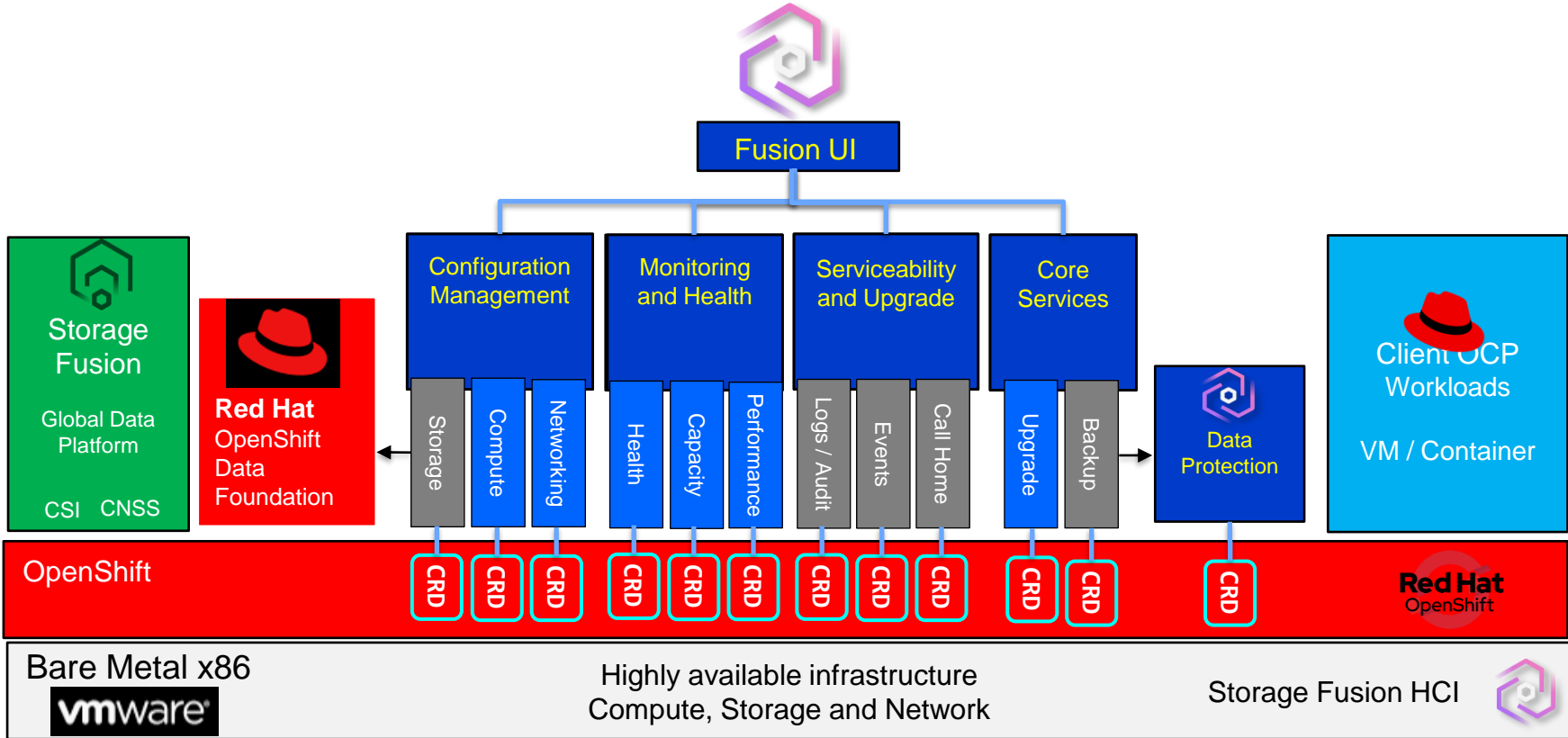
48-node Fusion HCI 3 rack (max size)

- 2148 TiB usable storage
- 3072 cores (6144 vCPU)



IBM Storage Fusion

Software Architecture



Why?

Reduce Risk

Eliminate risk of poor cluster design and missed performance objectives

Engineered for resiliency: ensure continuous operation of business-critical applications

Supported by IBM



Why?

Time to Value

You could spend six months designing an architecture and six months proving it, or

Eliminate the guess work and go with a proven solution.

Deploy a high resiliency OpenShift cluster on bare metal in less than a day

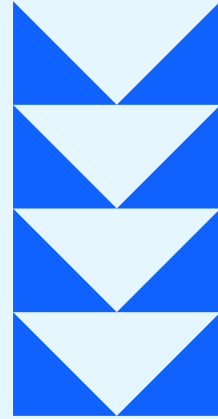
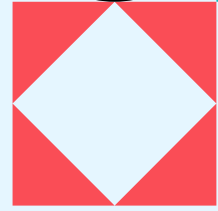
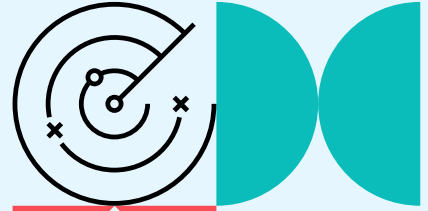
Accelerate getting OpenShift clusters into production



Agenda

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Bare metal advantages
TCO



Bare Metal is Better



Container orchestration with OpenShift

Higher Performance

- Remove OS and hypervisor layers (1)

Lower Cost

- Avoid the “VMware tax”
- Reduce OpenShift license cost (2)

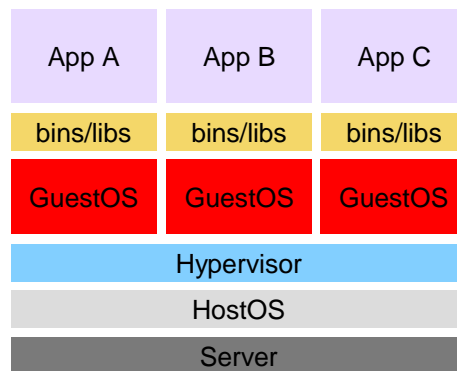
Improve Security

- Immutable CoreOS is optimized for containers

Increase hardware utilization

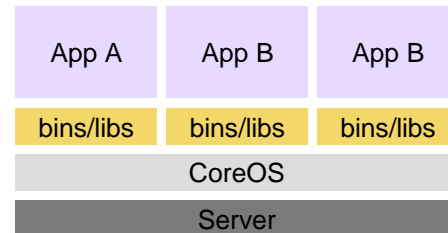
- Free up available cores by eliminating overhead and footprint

Good



Virtualized Infrastructure
with many layers

Better

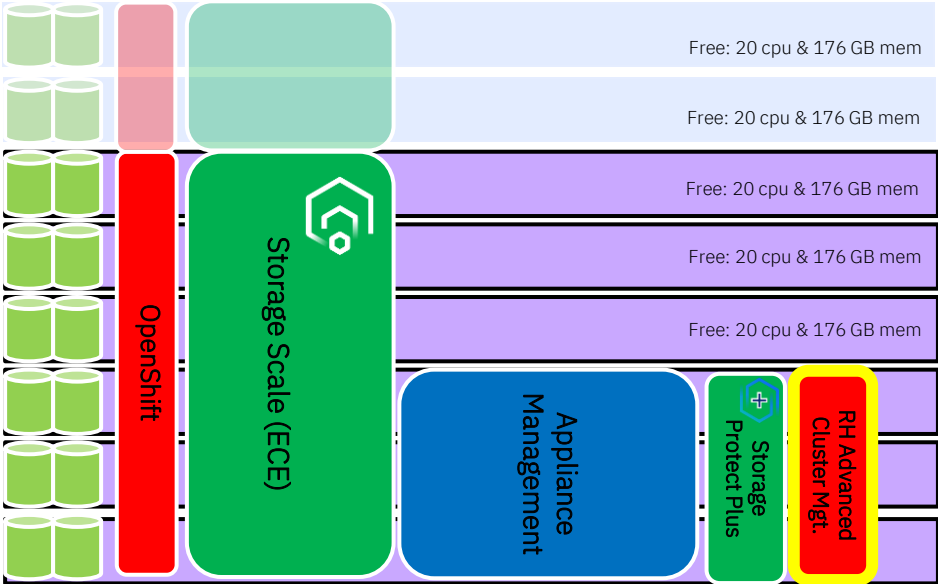


Bare metal on
Storage Fusion HCI

(1) VMs can add up to a 25% performance penalty

(2) OpenShift core-pair licensing can cost 5x or more of bare metal licensing for some configurations

IBM Storage Fusion: Licensing



+ Compute

+ Compute

Compute

Compute

Compute

Control

Control

Control

Each worker node need to be licensed! 32 Cores or 2 Sockets

No License needed!

	OCP	ECE	Appliance Management
Cores	4	8	10
Mem	16	64	48

RHACM requires
 “Red Hat OpenShift Platform Plus”
 Subscription

Reduce OpenShift subscriptions bare-metal vs VM

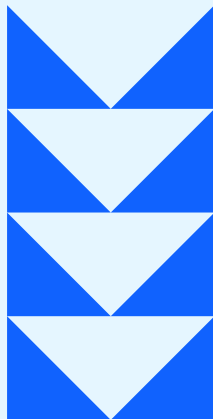
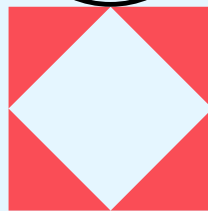
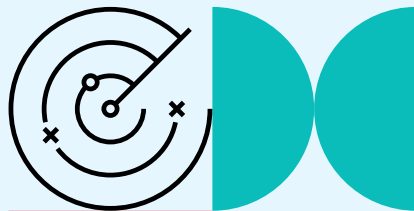
OpenShift subscriptions are up to 90% less expensive on bare-metal vs virtualized infrastructure

Red Hat SKU	Description	Metric	List Price (USD)
MW01501	Red Hat OpenShift Container Platform (Bare Metal Node), Premium (1-2 sockets up to 64 cores)	Bare Metal Node	\$12,000
MCT2735	Red Hat OpenShift Container Platform, Premium, 2-Core	2 cores or 4 vCPU	\$4,000

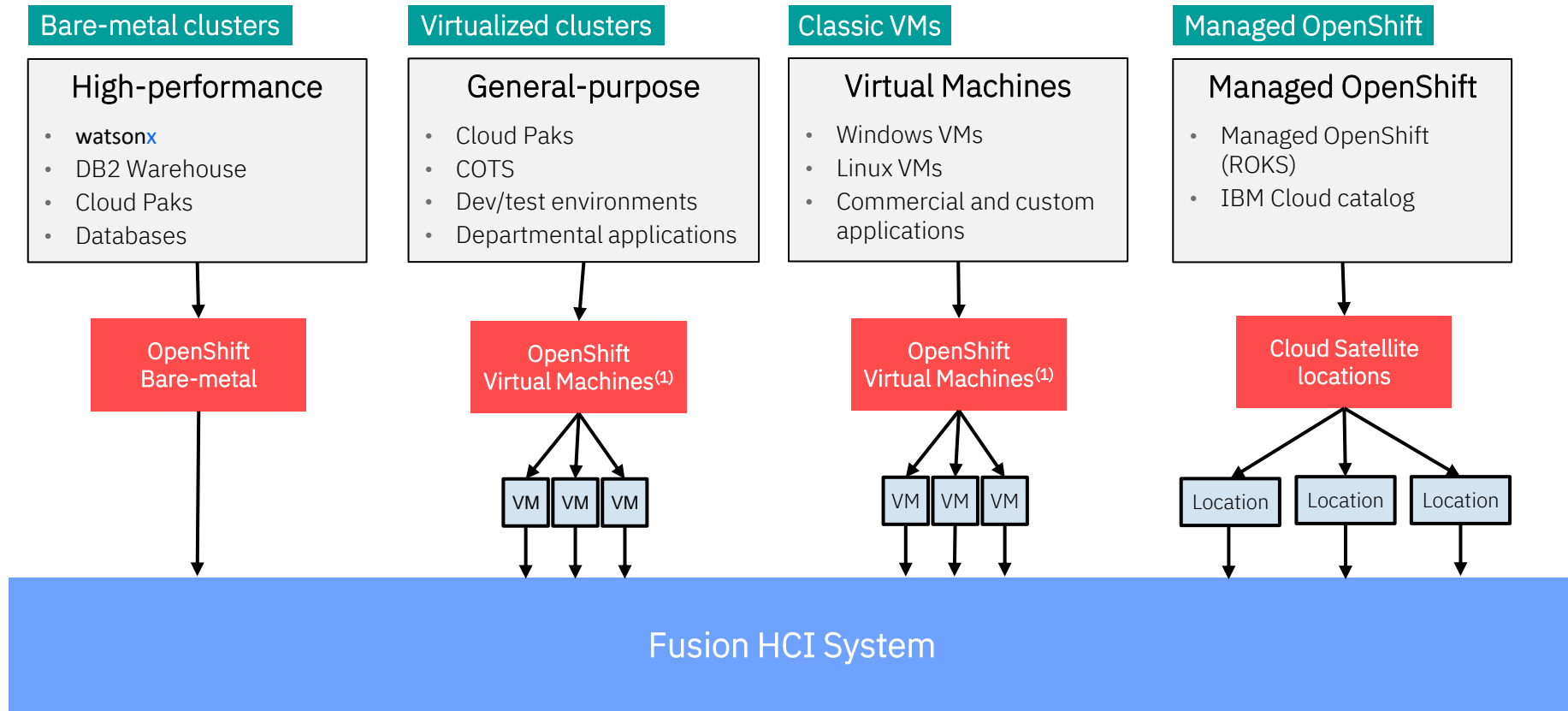
Example Calculations with List Prices

OpenShift Cluster Size	Cost of OpenShift on Bare-metal infrastructure	Cost of OpenShift on virtualized infrastructure	% savings with Openshift on bare-metal
96 Cores, 3 servers (32 cores per server)	\$36,000 per year Calculation: \$12,000 per year per server x 3 servers	\$192,000 per year Calculation: \$2,000 per year per core x 3 servers x 32 cores per server	81%
192 cores, 3 servers (64 cores per server)	\$36,000 per year Calculation: \$12,000 per year per server x 3 servers	\$384,000 per year Calculation: \$2,000 per year per core x 3 servers x 64 cores per server	90%

OpenShift Virtualization Hosted Control Planes



What kind of applications can you run on Fusion HCI System?

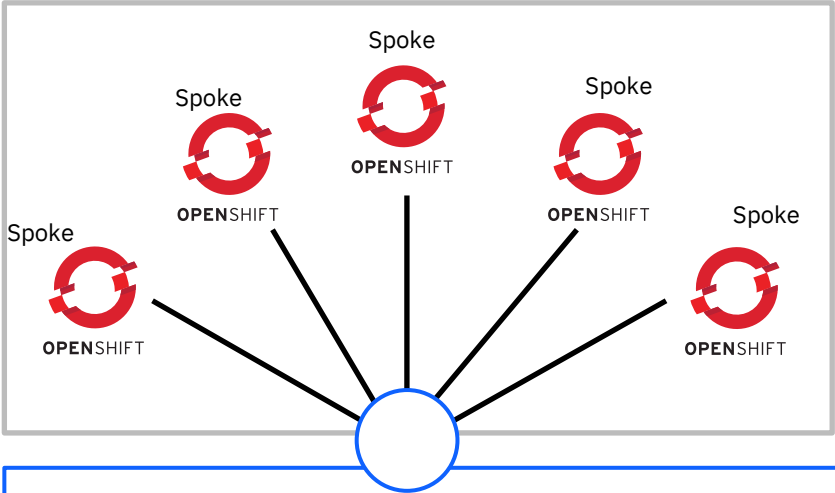


(1) OpenShift Virtualization. KVM plus KubeVirt

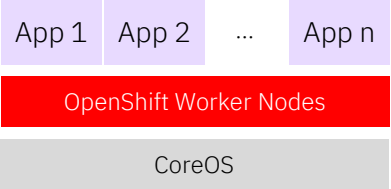
Fusion HCI System hub and spoke architecture

Personas and separation of control

Managed spoke clusters provisioned on Fusion HCI System servers

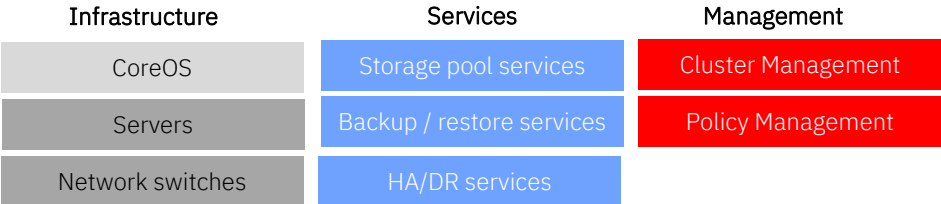
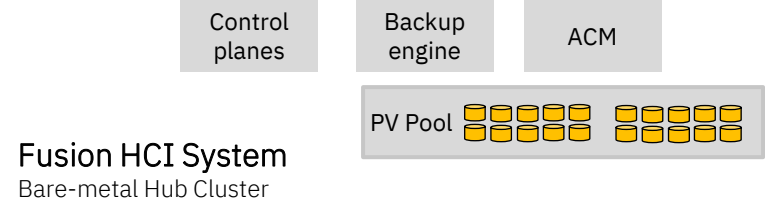


- Application Developers
- Site Reliability Engineers
- Application DevOps Team

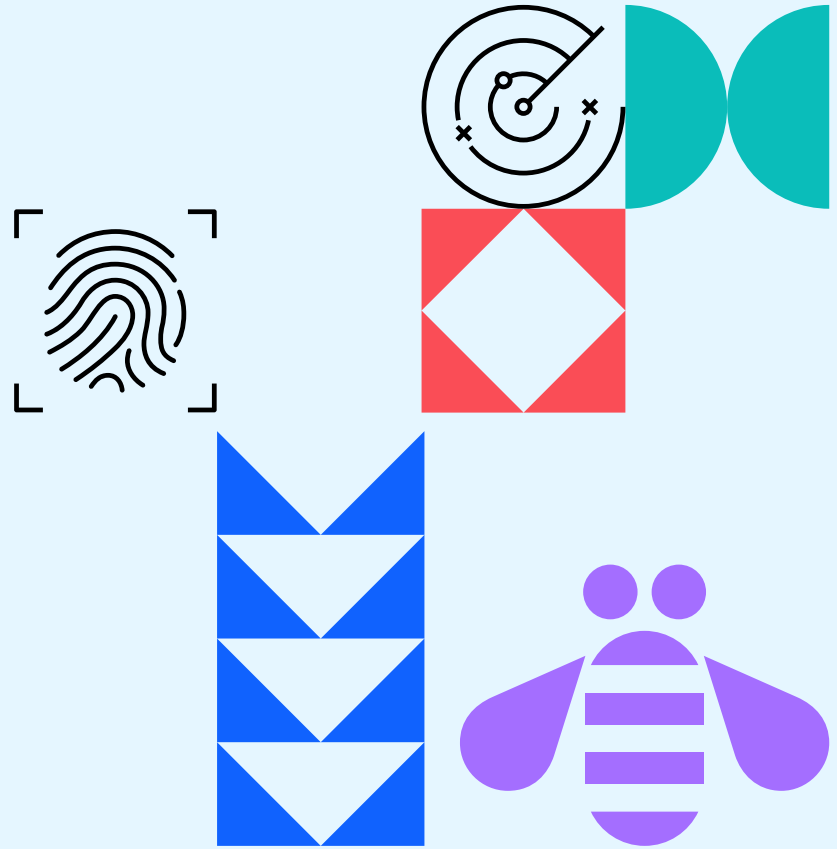


Interactions through APIs and service portals

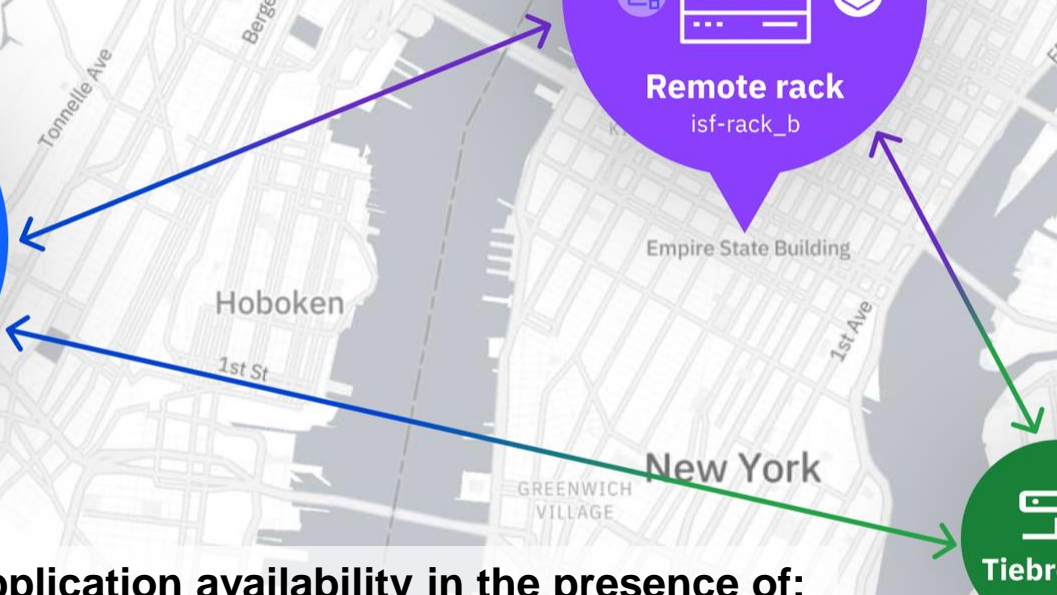
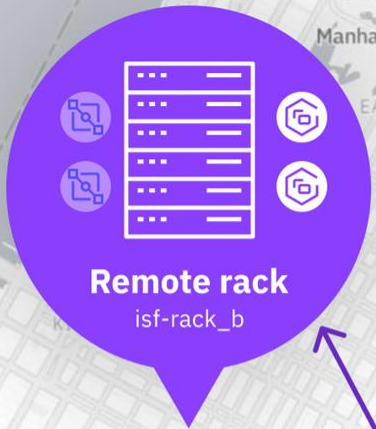
Platform Engineering



HA Architectures



Data Replication for Application HA



Use Cases: Maintain application availability in the presence of:

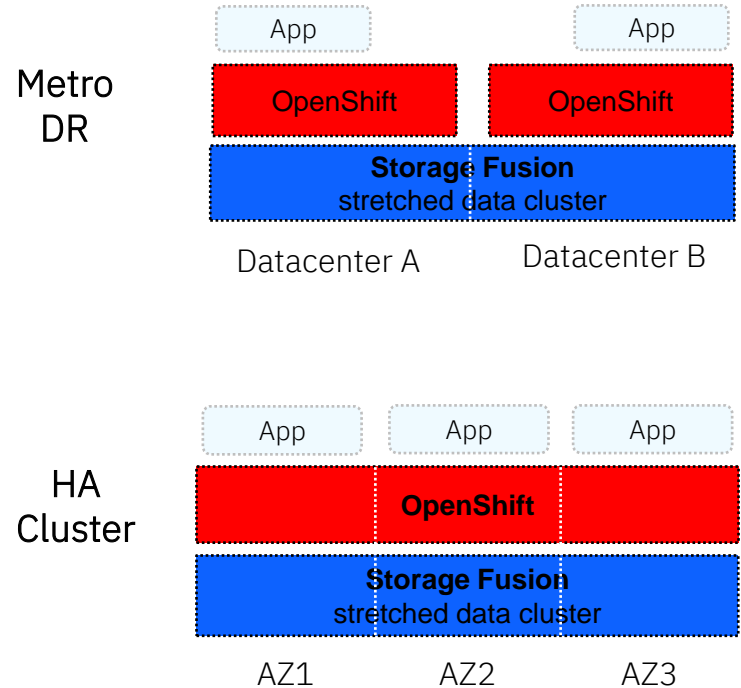
- Unplanned outages – loss of facilities
- Planned outages – facilities maintenance
- Application rollout strategies

Ensure Application Availability

Enable teams to implement easy to use HA / DR services

Metro DR

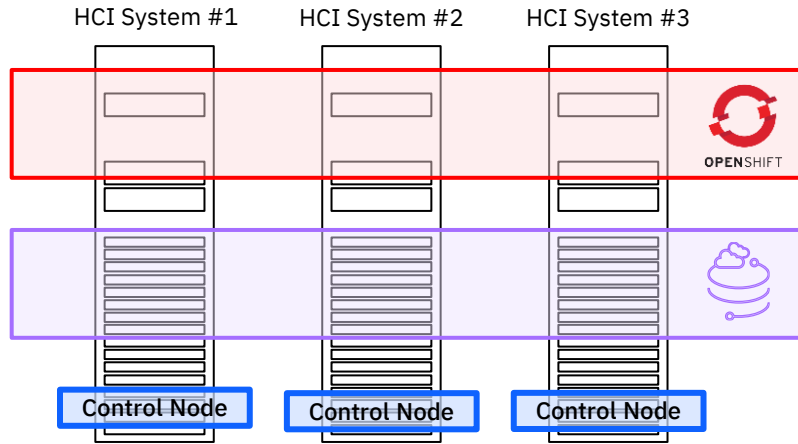
- Synchronous data replication
- Distance restriction - Regions must be connected by high-bandwidth, low latency link, < 40 ms
- “tie-breaker” application needed



HA Stretched OCP Cluster

Tolerate loss of an entire rack ⁽¹⁾

RPO = 0 RTO = 0



OpenShift Stretched Cluster spans HCI Systems

Storage Fusion Recovery Group spans HCI Systems
Erasure Coding (4+2p)

One control node per HCI System

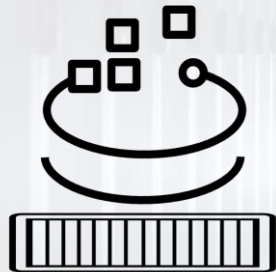
Requires a very low latency link
between HCI Systems (< 5 mS)

(1) With performance degradation

Thank you for using



Storage Scale



Storage Scale
System