What's New in IBM Cloud Infrastructure Center

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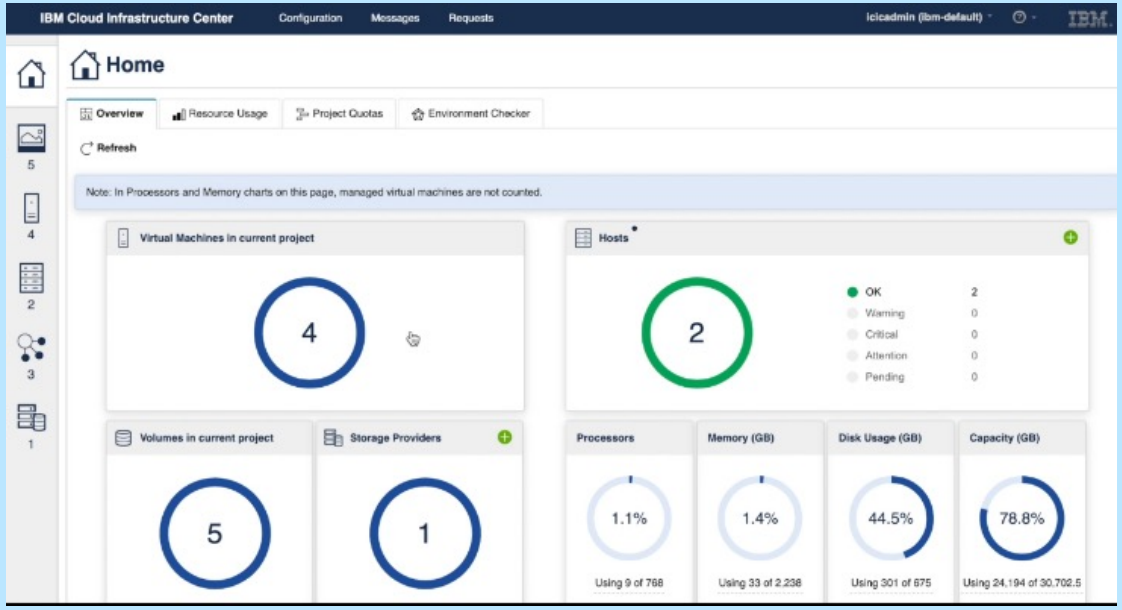
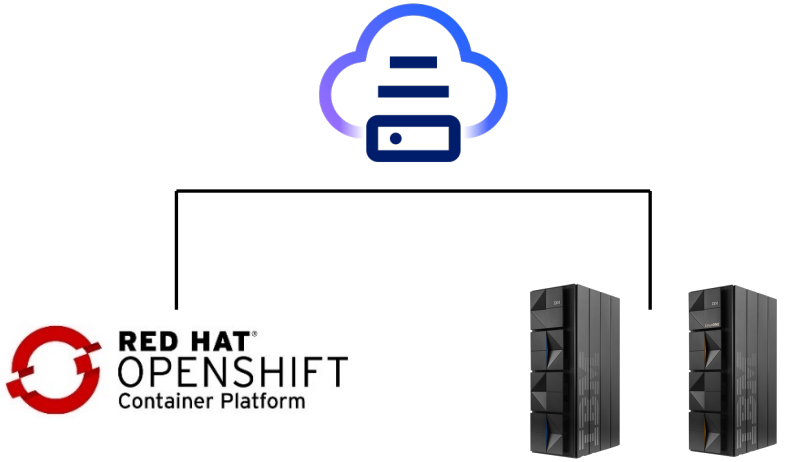
Agenda

- Overview of IBM Cloud Infrastructure Center
- Release 1.2.0 new features and functions
  - High Availability management cluster
  - Multiple FLAT networks
  - Two Factor Authentication (MFA)
  - Later 3 networking for RHEL KVM
  - And more!
- Demo of High Availability management cluster
- Q&A

IBM Cloud Infrastructure Center

Foundation for scalable Infrastructure-as-a-Service (IaaS) management of noncontainerized and containerized workloads across the enterprise and hybrid cloud





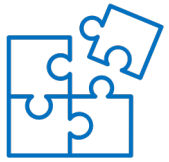
IaaS layer for Red Hat OpenShift deployments (hybrid cloud stack)

Guest provisioning for noncontainerized workloads

IBM Cloud Infrastructure Center

Fast deployment

- Manage your virtual machines from a single point of action
- Create and deploy images of Linux operating systems, incl. applications
- Instantiate, define, and capture virtual machines with a single mouse click



Integrated tooling

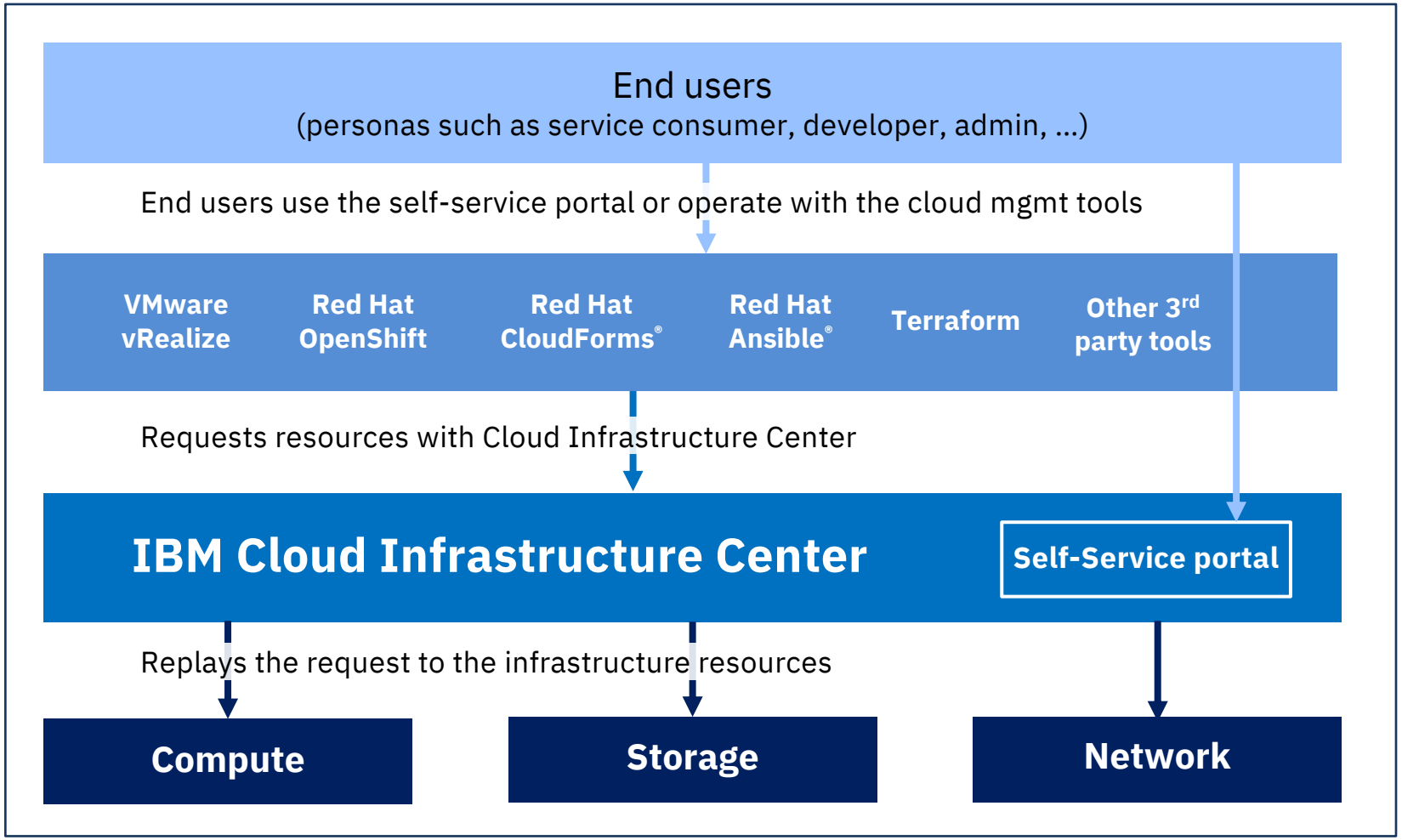
- Integrate your infrastructure-as-a-service platform on IBM Z / LinuxONE with the enterprise service platforms of your choice
- Seamless integration with automation tools such as VMWare vRealize, and Red Hat tooling
- Support for Red Hat CoreOS as part of Red Hat OpenShift
- Automated deployment via Red Hat CloudForms, Terraform, Ansible

Convenient usage

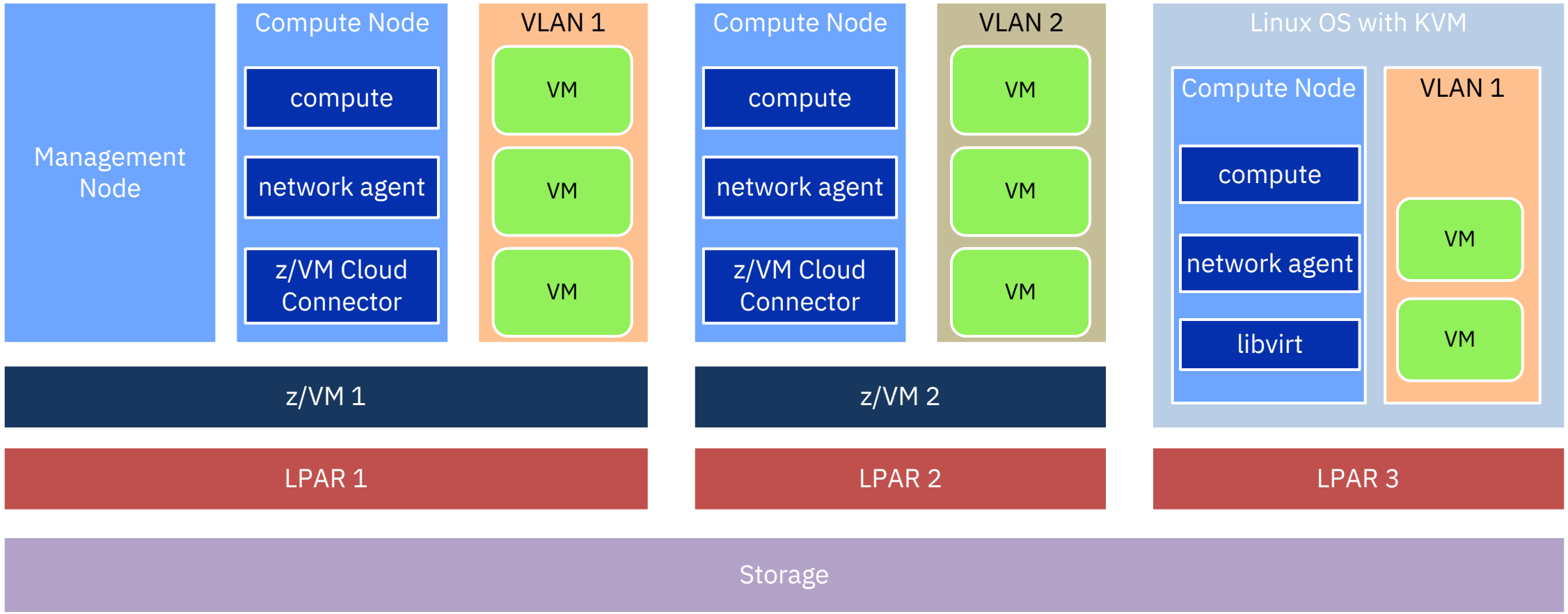
- Contract, create and allocate infrastructure from a web-based self-service portal
- Deliver fast service to multiple tenants and different roles (end users, developers, admins, …)
- Built on the DevOps model to support business agility and consistency across cloud platforms

IBM Cloud Infrastructure Center

- Administration for configured resources and provide tenancy via projects, resource quotas, role assignments
- Instantiate virtual machines using the self-service portal, cloud management tools, APIs, or CLI
- Utilize openstack telemetry APIs for resource monitoring and chargeback for allocation modeling



Example Architecture



Use Cases

Simplified experience with virtualization

"Simplify"

Industry standard based and vendor-agnostic technology for simplified IaaS management

Deployment of Red Hat OpenShift clusters

"User Provisioned Infrastructure"

Support to help simplify and automate Red Hat OpenShift cluster deployments

IaaS management for service providers

"Tenant-safe services"

Service providers can offer tenant-safe IaaS, in a virtual environment

Deployment of on-premises database-as-a-service

"Data Gravity"

Select a database and automate deployments in an as-a-service model at scale.

Use Case: IaaS management for service providers

Service providers can accelerate the deployment of Linux images in a virtual environment, integrate the environment across the enterprise, and thereby reduce cost and complexity.

Linux Community Cloud

- **Challenges**
  Supporting home-grown OpenStack solution required more and more effort & skills.
- **Solution**
  Use Cloud Infrastructure Center to replace the home-grown solution.
- **Benefits**
  - Official support
  - Feature enhancements
  - Simplified operations

Community Cloud has 3 production clusters and 1 test cluster over z/VM & KVM, runs 1700+ VMs and deploys 1200+ VMs per month for their users.

An EU service provider for Government

- **Challenges**
  Provide diversified services across multiple platforms.
- **Solution**
  Integrate Cloud Infrastructure Center into their cloud platform to provide IaaS service on LinuxONE.
- **Benefits**
  - Tenant-safe services for individual clients
  - Easy integration into existing solutions
  - Unified user experience

Cloud Infrastructure Center enables the client to provide high secured services to their security sensitive customers, with similar user experience on their existing x86 cloud platform.

Use Case: Deployment of Database as a Service

Select a database and deploy it in an as-a-service model with simple IaaS management via Cloud Infrastructure Center.

Production example: MongoDB-as-a-service is used as a caching database for read-only queries of the backend database.

A Financial Industry client

- **Challenges**
  Industry **regulation** and sustainability business objectives are vital.
- **Solution**
  Cloud Infrastructure Center as the infrastructure management layer provides automation and simplification on provisioning and operations.
- **Benefits**
  - 50% more efficient in terms of Data Center Space, Power, Cooling, on IBM LinuxONE platform.
  - Automate deployments of MongoDB instances at scale using IBM Cloud Infrastructure Center

The client has been running thousands of MongoDB instances over dozens of LPARs across multiple data centers and keeps growing more database workload.

Solution elements

Function	on IBM zSystems
Deployment Catalog	Integrated with existing tools
Automation	Provision via Ansible / IBM Cloud Infrastructure Center
Mongo Instance	Mongo Enterprise on IBM zSystems
OS Hypervisor	RHEL 8 IBM z/VM
Encrypt Data @ Rest	H/W accelerated on IBM zSystems + FS9200
Compression	H/W accelerated on IBM zSystems + FS9200
FFIEC Appendix J	IBM Safeguarded Copy
Logging	Mongo Ops Manager

IBM Cloud Infrastructure Center History

2019	2020	2021	2022
1.1.0 – Initial Release • VM lifecycle mgmt • Volume attach	**1.1.1 Update** • Added VM Guest support • Boot from Volume • Onboard VMs • LDAP authentication	**1.1.3 Update** • Telemetry support • Availability zone and collocation • VM migration and resize support • Console output	**1.1.5 Update** • Multi-attach volumes • Secure Execution • Chargeback integration • Live guest relocation in z/VM SSI environment
	1.1.2 Update • KVM hypervisor • RHEL8 host support • DS800 storage support • Openstack version upgrade	**1.1.4 Update** • Fabric Zoning • Improved onboarding • LVM support with BFV • Environment health checker	**1.1.6 Update** • Hybrid environment support • FCP multipath templates • Consistency group + snapshots • BFV on KVM

Key new functions with Cloud Infrastructure Center 1.2.0

- High availability management nodes
  - Updated CLI management tooling
- Multiple FLAT network
- Two factor authentication (MFA)
- Usability improvements
- Layer3 network for RHEL KVM
- Boot from volume through FCP based backend on RHEL KVM
- iothreads on RHEL KVM VM

High Availability management cluster

High availability of management nodes

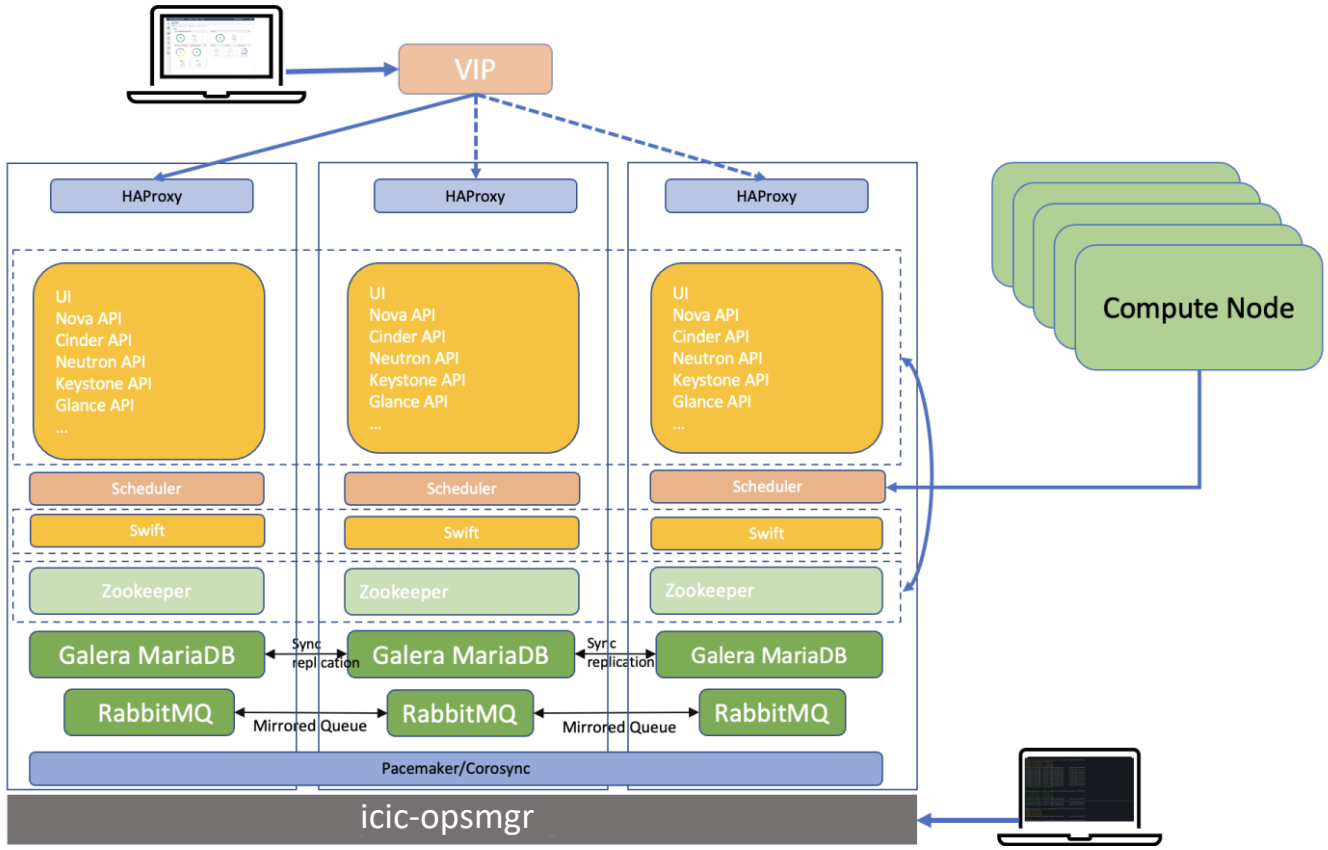
- Install or upgrade Cloud Infrastructure Center to 3 management node cluster on 1.2.0 with the high available control plane to guarantee business resiliency during expected and unexpected outage of individual management node(s).

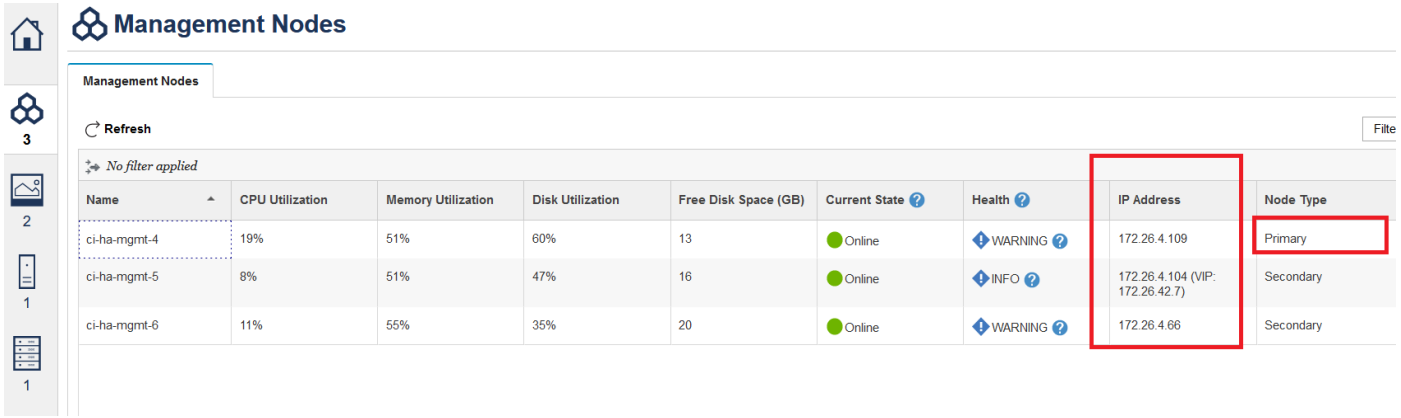
Value

- Prevent single point of failure
- Distribute load across multiple nodes to support more scale numbers with the same deployment.

Technical components

- HAProxy, Pacemaker and Corosync
- MariaDB Galera Cluster
- RabbitMQ cluster
- Zookeeper





High Availability Management Cluster

New management node cluster

- Create new 3-node HA cluster during new installation or upgrade/convert from standalone environment to HA cluster
- Management nodes can be distributed across LPARs or CECs within Metropolitan distance

Management operations

- Single access point to control plain – UI, CLI, API
  - icic-opsmgr for cluster deployment, recovery
- Failover and fencing support
- Distributed workload across services on different management nodes

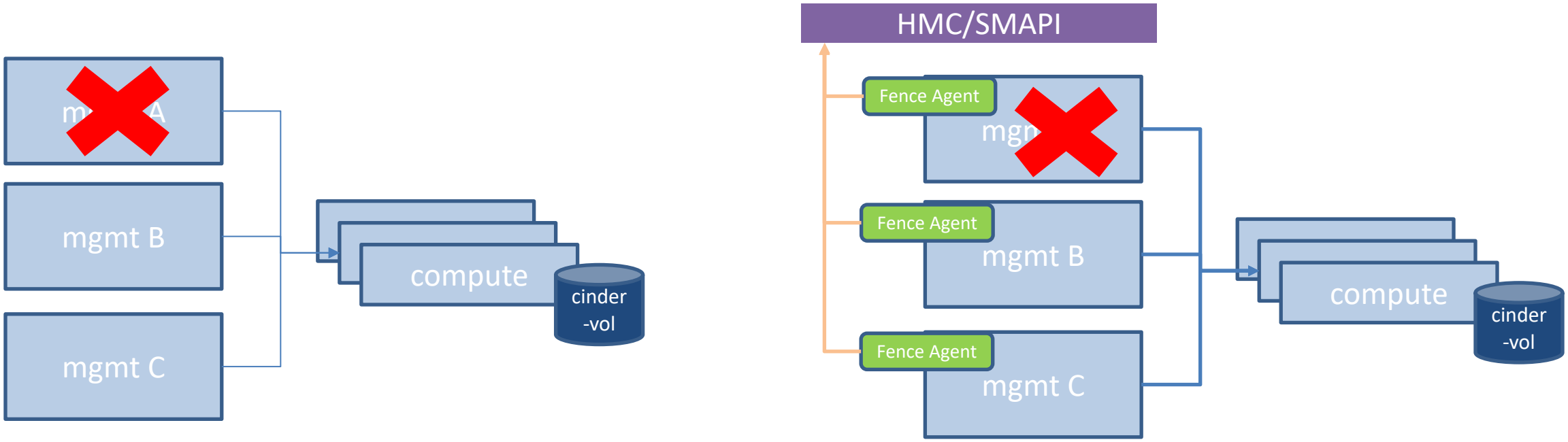
Pre-Requirements:

Red Hat Enterprise Linux High Availability
Red Hat Ansible Automation Platform

High Availability Management Cluster

Toleration of management node failure – management services remain available or failover from primary node.

Fencing support with configured fence agents to shutdown management node during error scenarios



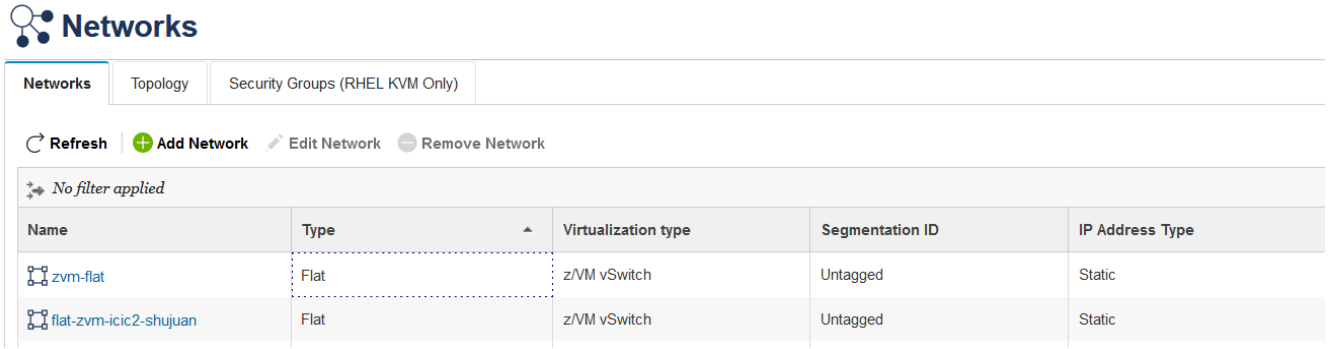
Multiple FLAT network support

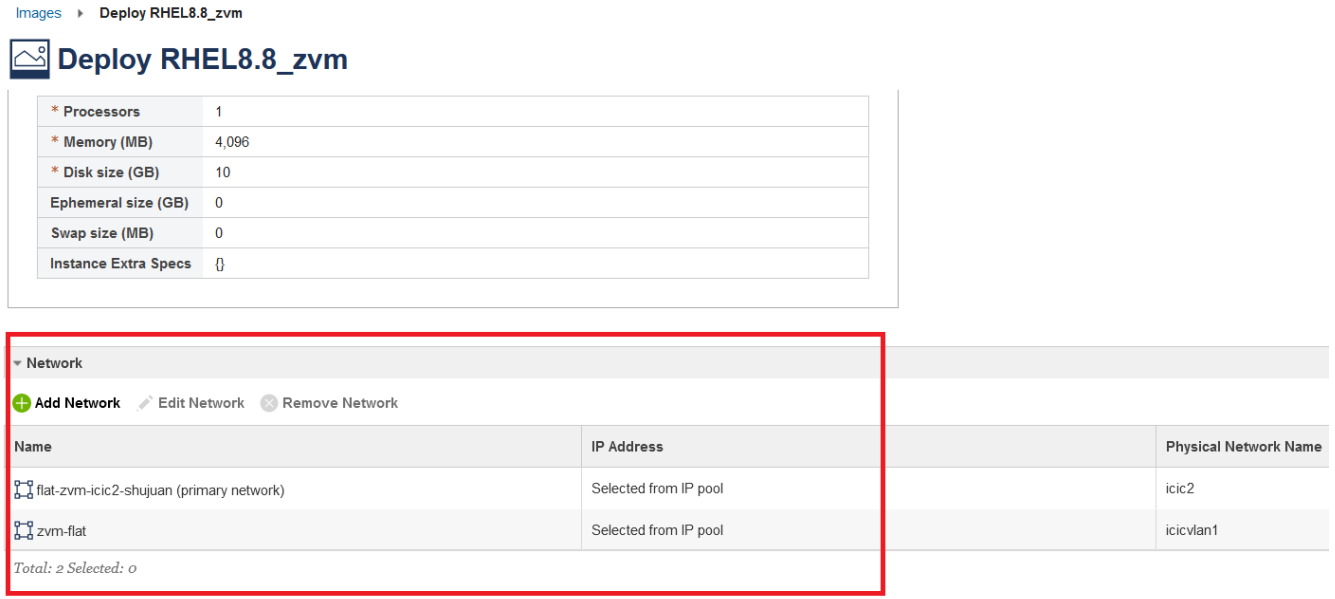
Multiple FLAT network support

- Provide configuration support for more than 1 FLAT network
- During VM deployment select from multiple networks

Value

- More than one FLAT network can allow for multiple NIC on one virtual machine to guarantee network connectivity for internal and external network interfaces





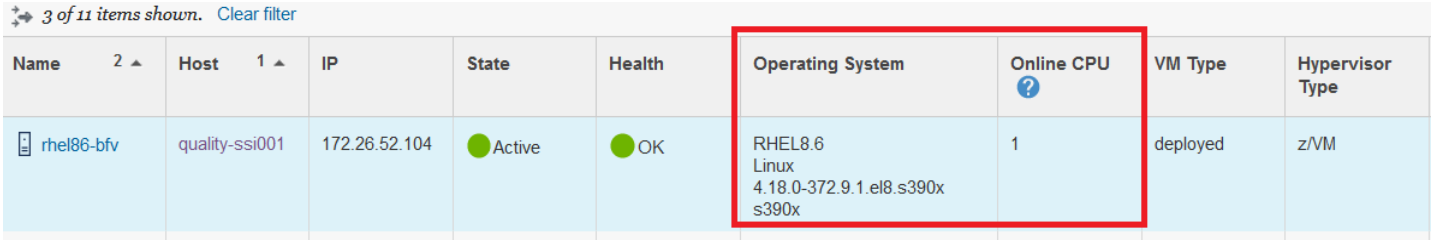
Multi-Factor Authentication

Multi-Factor Authentication

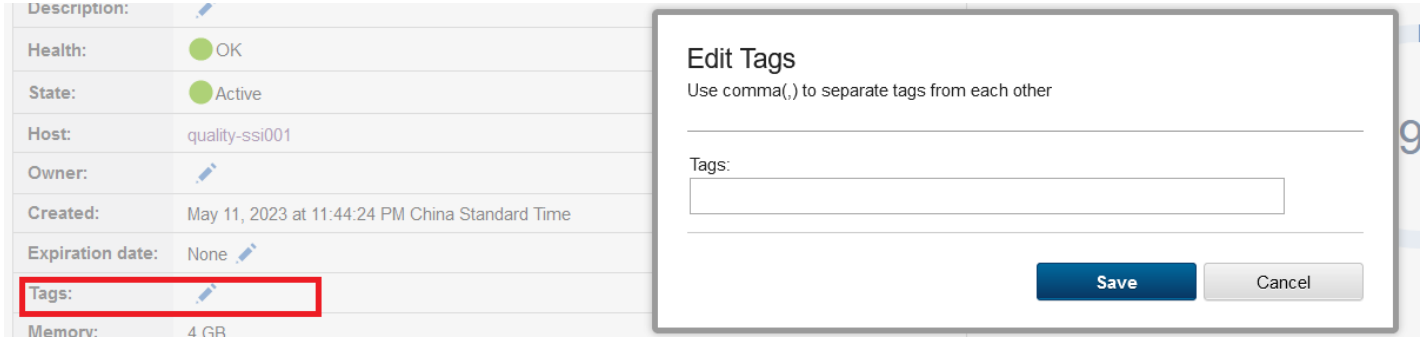
- Enable Multi-Factor authentication for a particular user
- Instead of password only auth, if MFA (two-factor) enabled, user will enter login code provided via email

Usability improvements

- Virtual Machine updates to CPU count or Operating System will be updated directly in UI and API responses
  - Changes applied outside of ICIC now reflected



- Optional tags for virtual machines that can be used for filtering and grouping



- Performance and functional improvements to CLI commands

Layer 3 network support for RHEL KVM

Layer3 support for RHEL KVM

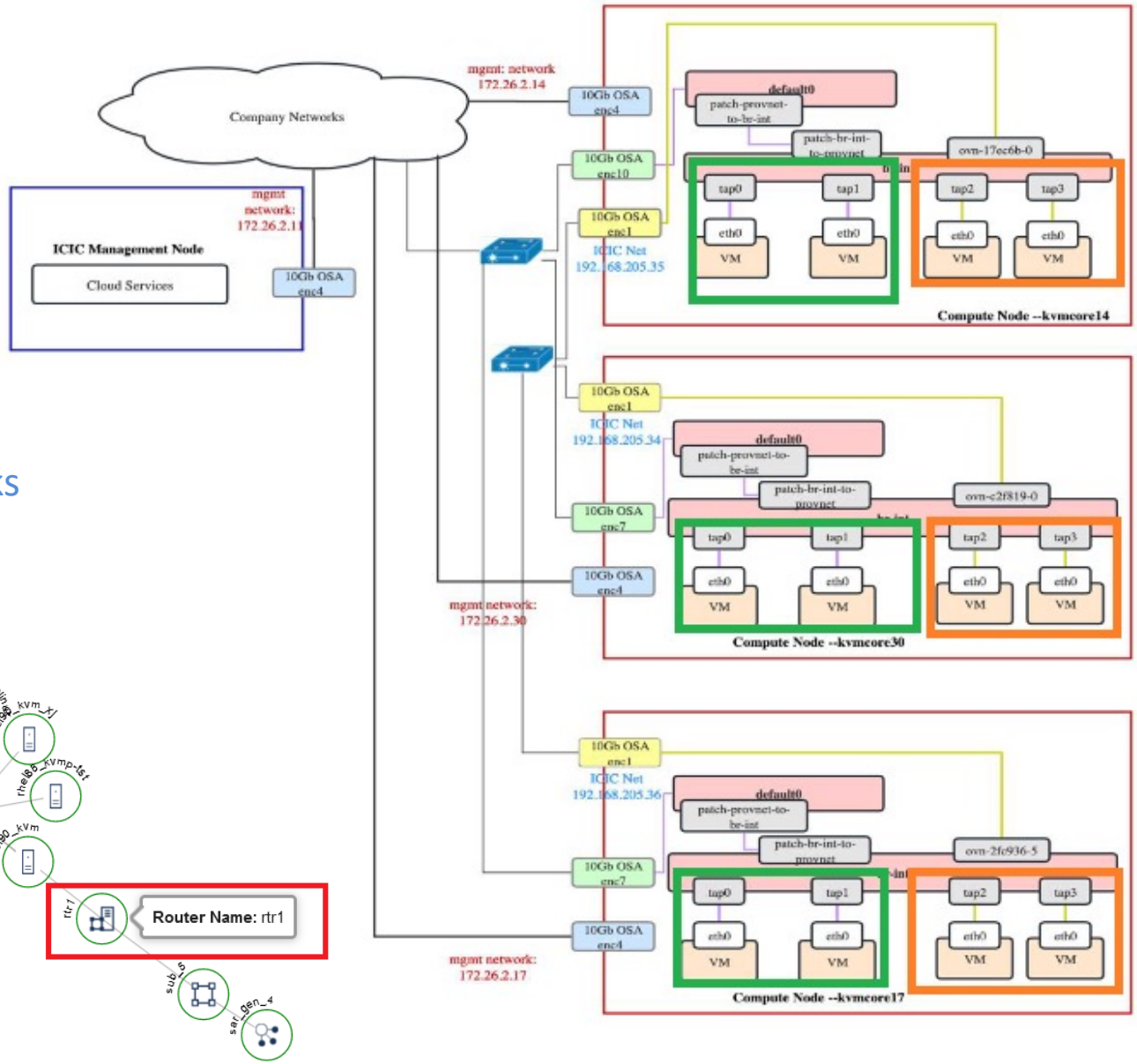
- Network isolation for tenants
- On prem cloud virtual private network (VPC)

Value

- Service provider can provide separated networks
- Tenant safe networking can provide enhanced security and still have external access through router/floating ip
- Network as a Service model

Technical components

- OVN (open virtual network)
- Openflows



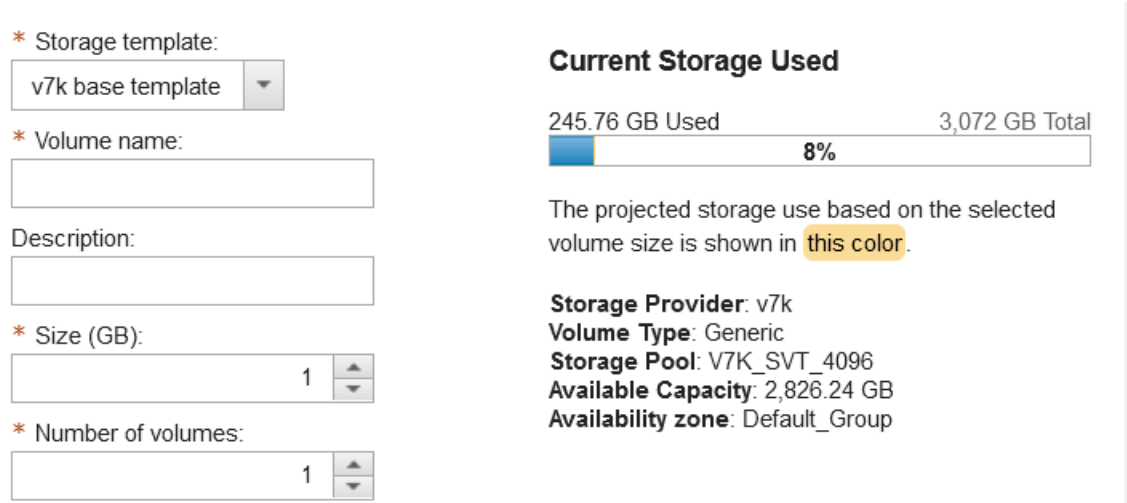
Boot from volume through FCP on RHEL KVM

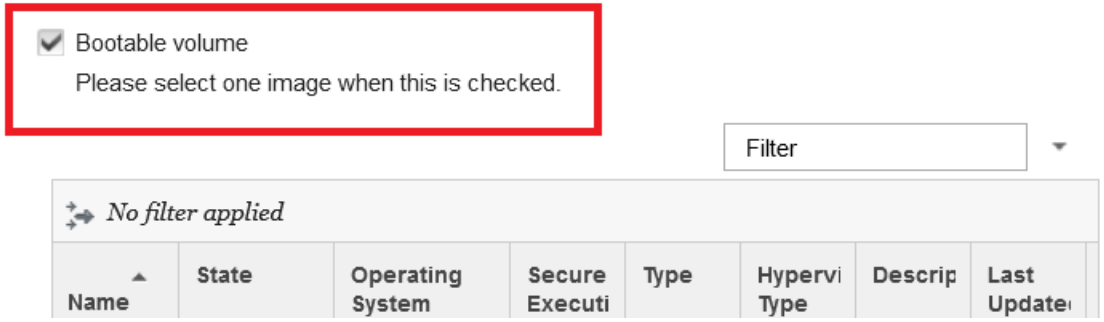
Boot from volume through FCP based backend on RHEL KVM

- Boot a virtual machine from storage backend directly , support DS8K and FS family or compatible APIs

Value

- Performance improvement compared to use of qcow2 (local disk) from compute node directly
- Eligible to backup a VM including its root disk and data disk through consistency group to achieve guaranteed data consistency






```
<disk type='block' device='disk'>
  <driver name='qemu' type='raw' cache='none' io='native'/>
  <source dev='/dev/disk/by-id/dm-uuid-mpath-3600507640083826de00000000000df84' index='1'/>
  <backingStore/>
  <target dev='vda' bus='virtio'/>
  <serial>338b1976-4cde-4745-bbc4-2360f96db433</serial>
  <alias name='virtio-disk0'/>
  <address type='ccw' cssid='0xfe' ssid='0x0' devno='0x0000'/>
</disk>
```

iothreads on RHEL KVM VM

Set iothreads on RHEL KVM VM

- iothreads put into VM definition through compute template (flavor)
- Cloud Infrastructure Center use iothreads based on pre-defined pattern for the disks to gain performance improvement

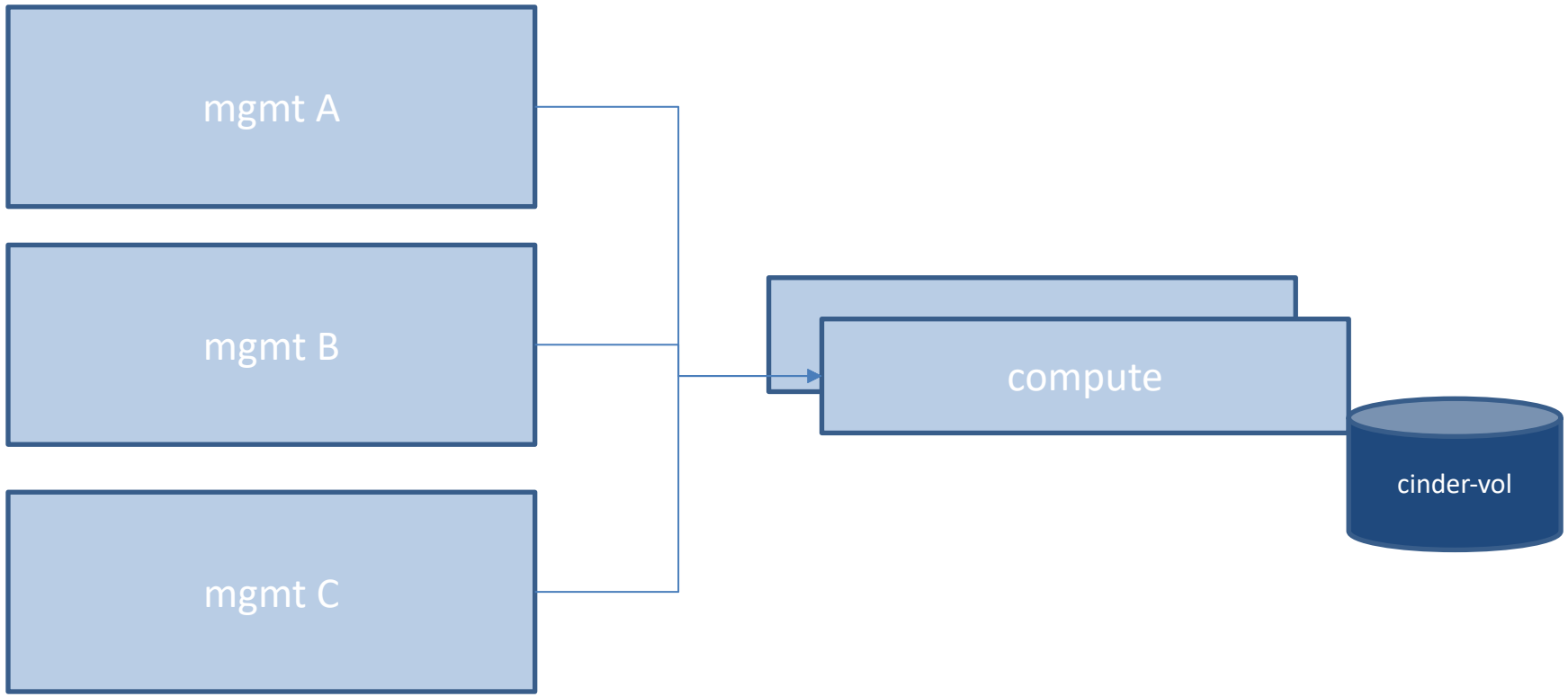
Value

- Performance improvement on part/all disks (e.g., for DB workload) of the RHEL KVM VM through dedicated iothread

```
<iothreads>3</iothreads>


<devices>
    <disk type="block" device="disk">
        <driver ... iothread="1"/>       <<<< specify iothread_id to use for attach root disk vda
        <target dev='vda' bus='virtio'/>
   </disk>
   <disk type="block" device="disk">
        <driver ... iothread="2"/>
        <target dev='vdb' bus='virtio'/>
   </disk>
   <disk type="block" device="disk">
        <driver ... iothread="3"/>
        <target dev='vdc' bus='virtio'/>
   </disk>
</devices>
```

High Availability Management Cluster Demo



1.2.0 - supported hypervisors, operation systems & servers

As a managed hypervisor:
- z/VM 7.3 or z/VM 7.2
- KVM as part of RHEL 8.6 or 8.8

As a host environment on z/VM or KVM:
- RHEL 8.6 or 8.8

As a deployable guest operating system instance on z/VM:
- RHEL 7.9, 8.2, 8.4, 8.6, 8.8, 9.0, or 9.2
- Red Hat CoreOS 4.10, 4.11, or 4.12 as part of Red Hat OpenShift Container Platform
- SUSE Linux Enterprise Server 15 SP2 or SP3
- Ubuntu 20.04 or 22.04

As a deployable guest operating system instance on KVM:
- RHEL 7.9, 8.2, 8.4, 8.6, 8.8, 9.0, or 9.2
- Red Hat CoreOS 4.10, 4.11, or 4.12 as part of Red Hat OpenShift Container Platform

Hardware platforms:
- IBM z16™ (all models)
- IBM z15™ (all models)
- IBM z14® (all models)
- IBM z13® and IBM z13s®
- IBM® LinuxONE 4 (all models)
- IBM® LinuxONE III (all models)
- IBM® LinuxONE II (all models)
- IBM® LinuxONE I (all models)

Thank You

Questions?

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