

IBM Cloud Infrastructure Center

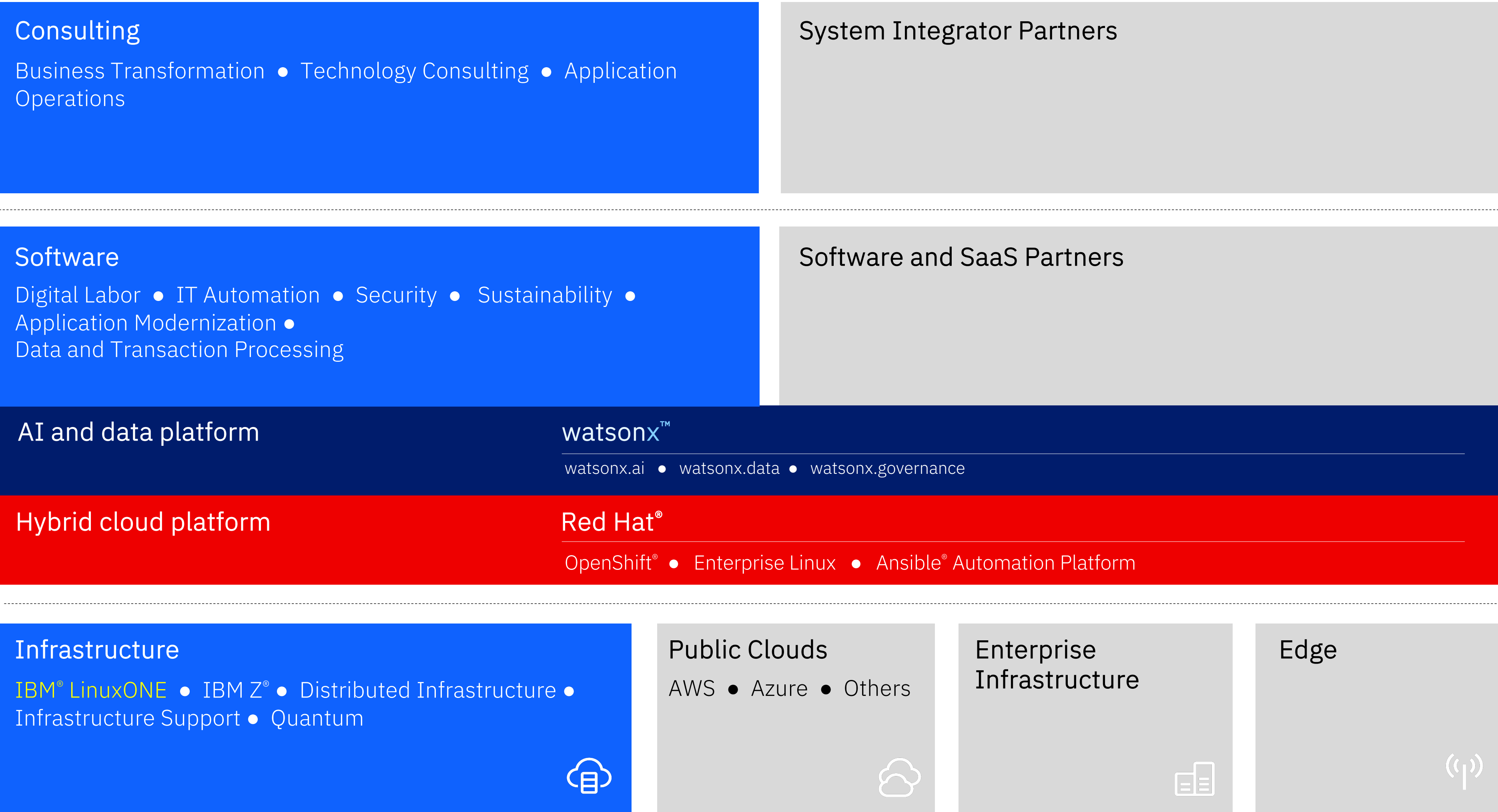
Stev Glodowski
Product Management Lead IBM Cloud Infrastructure
Center, Red Hat OpenShift, and Red Hat Synergy
stev.glodowski@de.ibm.com

Michael Snihur
Solution Architect
snihur@us.ibm.com



Hybrid Cloud is core to IBM's strategy

IBM® Z and LinuxONE participates across the stack



IBM Cloud Infrastructure Center



Infrastructure-as-a-Service for IBM Z/IBM® LinuxONE



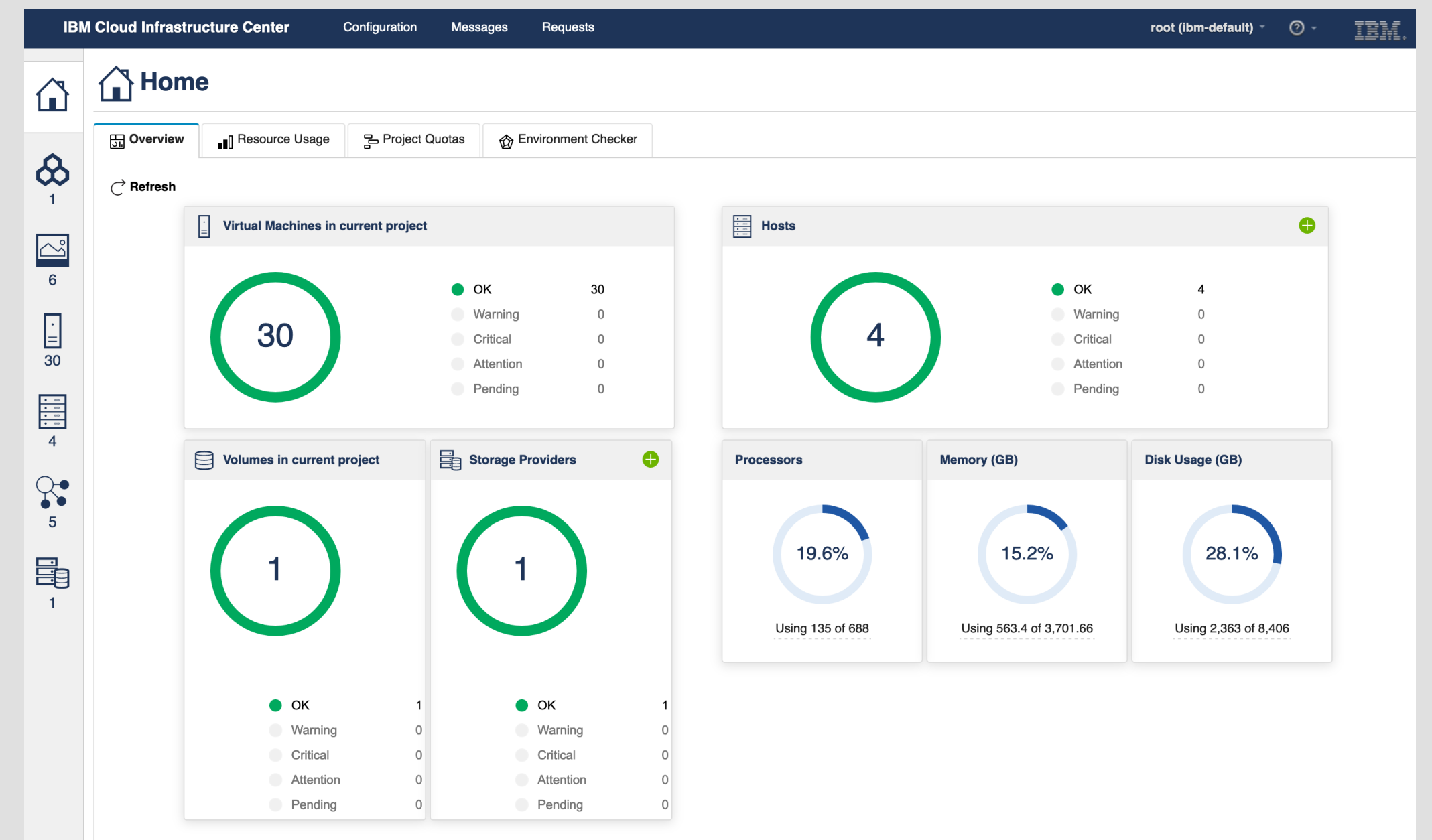
Hybrid Cloud

IaaS layer for hybrid cloud deployments



Guest provisioning for noncontainerized workloads

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



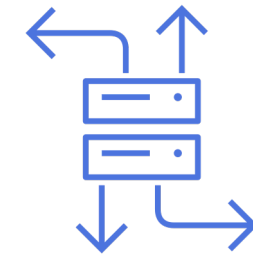
Infrastructure-as-a-Service for IBM Z/IBM® LinuxONE

Management dashboard for single system, multiple system, and multiple site administration



Capabilities

Modernize for hybrid cloud – empower how you manage, automate, and integrate infrastructure as a service



Infrastructure management

Instantiate, define, capture, and manage the full lifecycle of the virtual machines based on IBM z/VM[®] and Red Hat KVM on IBM Z / IBM[®] LinuxONE.



Service automation

Automate infrastructure management services for users via the Cloud Infrastructure Center self-service portal, while leveraging IBM Z / IBM[®] LinuxONE investments.



Cloud integration

Integrate the IBM Z / IBM[®] LinuxONE infrastructure across the enterprise and hybrid cloud by connecting the layers of cloud computing via OpenStack-compatible APIs.

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.

Simplified experience with virtualization

As the platform's infrastructure solution, Cloud Infrastructure Center simplifies client experience with IBM Z / IBM® LinuxONE

Challenges

- Get started fast with first deployments
- New clients lack of skills
- Clients want to leverage exist skills and tooling

Solution

- Consistent, industry-standard user experience to manage lifecycle of virtual infrastructure based on IBM z/VM® and Red Hat KVM
- Built-in OpenStack compatible APIs enable usage of common mgmt. tools, such as IBM Cloud Paks, Red Hat tools, Terraform, or VMware vRealize Automation

Benefits

- Simplify client experience with virtualization
- Vendor-agnostic IaaS management
- Provide 'private cloud' infrastructure as a service via OpenStack for z/VM, KVM
- IaaS automation via Terraform, VMware vRealize, etc... using the API/CLI layer

Simple management of z/VM virtual machines and tooling integration

Challenge

The client has a large Linux environment running in z/VM based virtual machines (VM) and was looking to

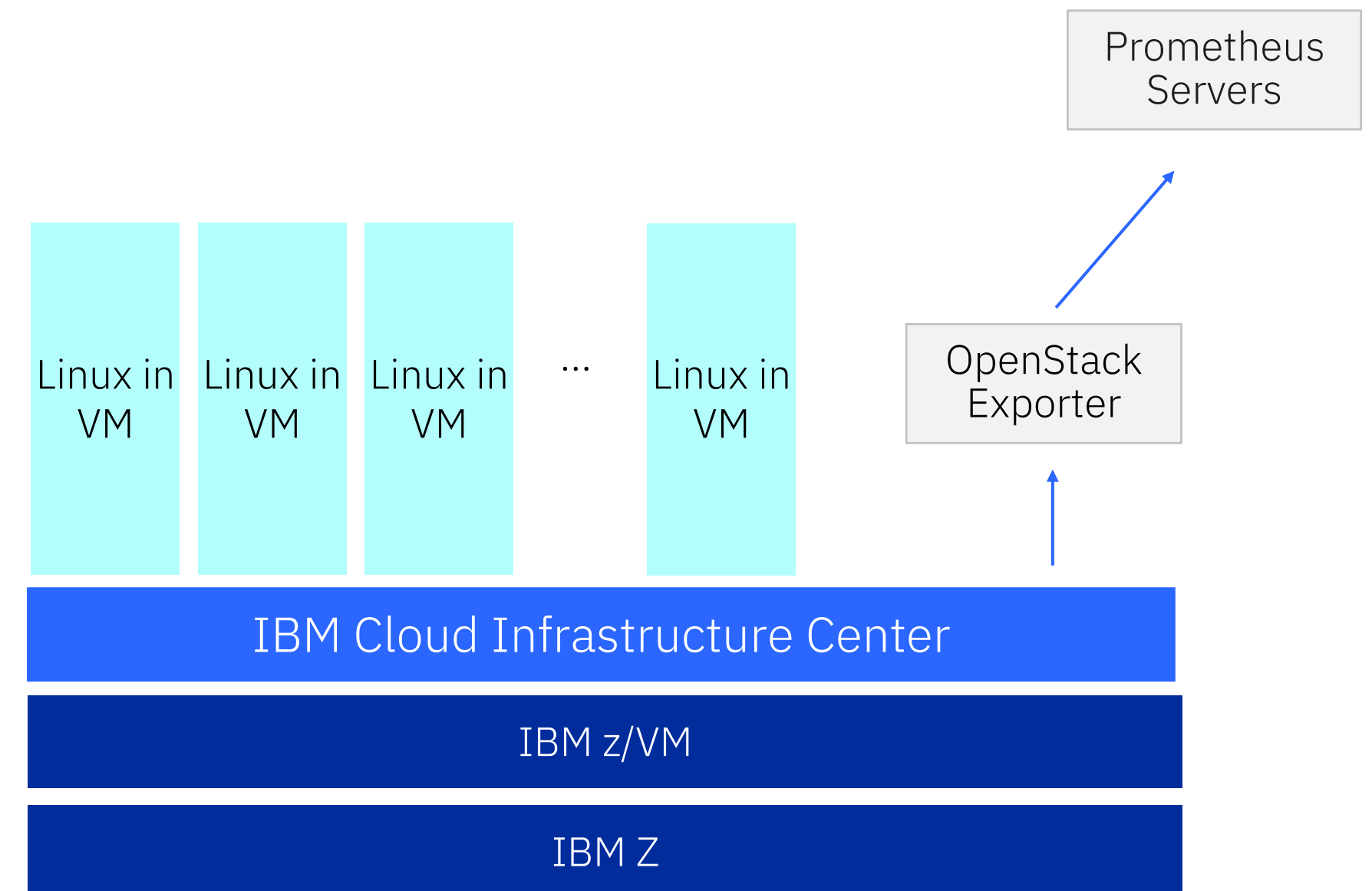
- simply the management of the existing environment, including the automation of services,
- benefit from Live Guest Relocation, and
- build monitoring of the services with telemetry services, and
- integrate advanced tooling.

Solution benefits

IBM Cloud Infrastructure Center is used to

- Web user interface simplifies daily operations greatly: instantiate, define, capture, and manage the lifecycle of VMs
- provide Live Guest Relocation (LGR) for z/VM virtual machines
- manage monitoring data via monitoring/telemetry APIs
- easily expose and integrate IBM Z resources with other tools via OpenStack-compatible API

Solution



Deployment of Red Hat OpenShift clusters

Cloud Infrastructure Center supports the simplification and automation of Red Hat OpenShift Container Platform cluster deployments

Challenges

- Lack of automation for large deployments
- Manual deployment of Red Hat OpenShift cluster

Solution

- OpenStack compatible API, can be consumed by tools such as Red Hat Ansible, Red Hat CloudForms, or Terraform
- Ansible scripts can be written to support the Red Hat OpenShift cluster creation steps
- Deployment support for Red Hat OpenShift clusters

Benefits

- Simplification and automation of Red Hat OpenShift cluster provisioning
- Flexible and easier life-cycle management of Red Hat OpenShift
- No requirement for DHCP, FTP services for simple cluster creation

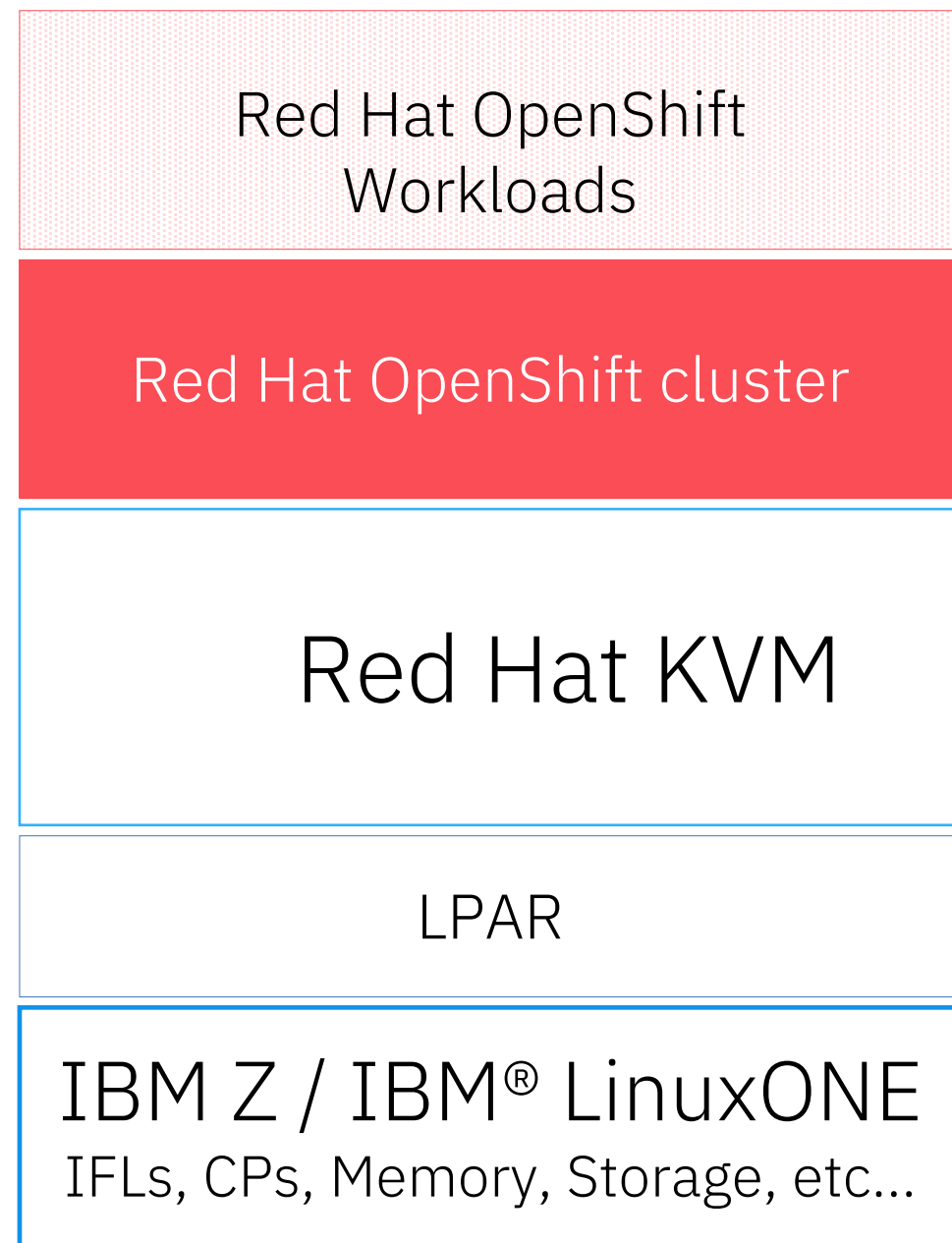
Blogs:

- [Installing Red Hat OpenShift Container Platform \(UPI\) via IBM Cloud Infrastructure Center](#)
- [Using the Ansible playbook to operate IBM Cloud Infrastructure Center](#)

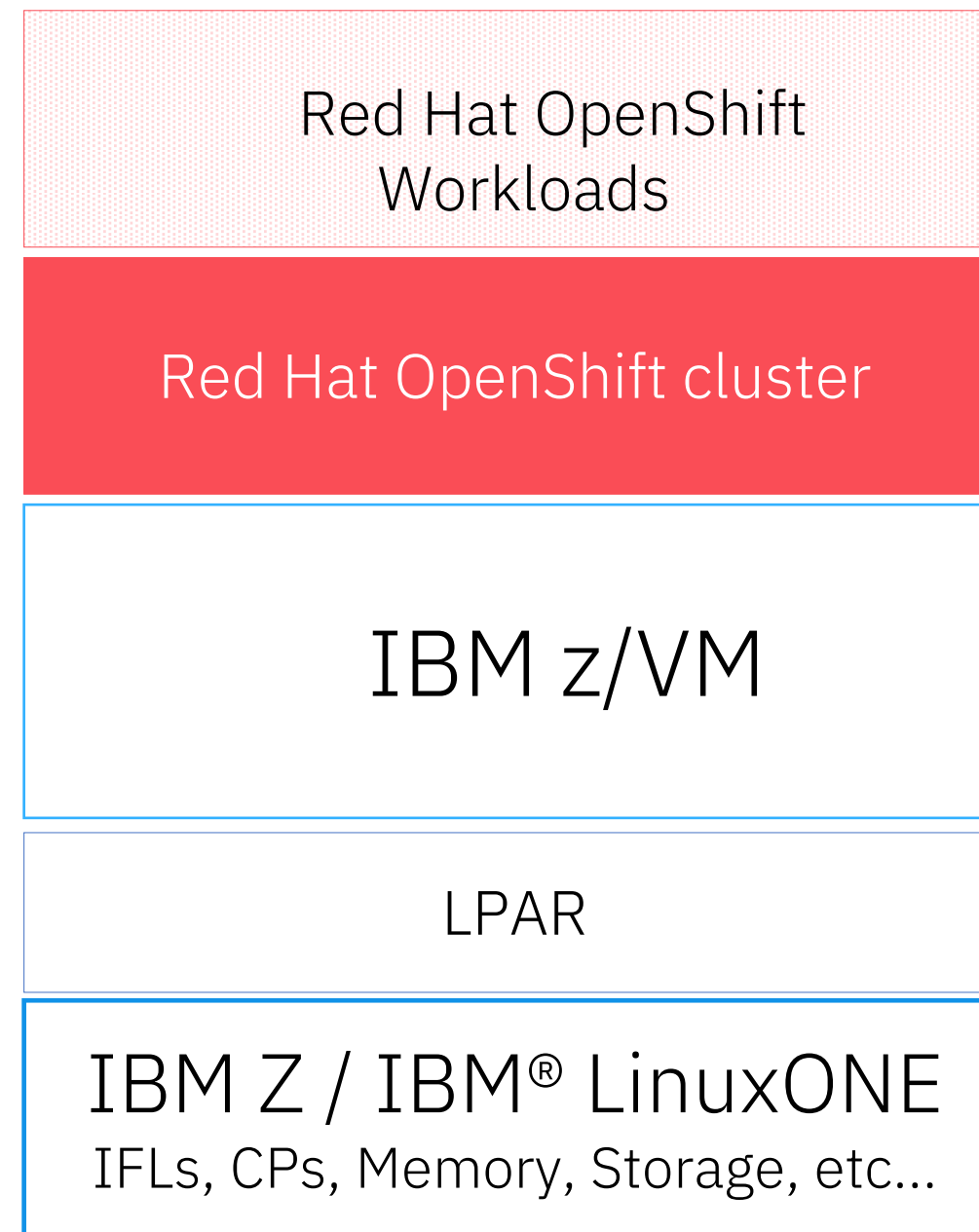
Download: Cloud Infrastructure Center OpenShift UPI Ansible Playbooks

- https://github.com/IBM/z_ansible_collections_samples/tree/master/z_infra_provisioning/cloud_infra_center/ocp_upi

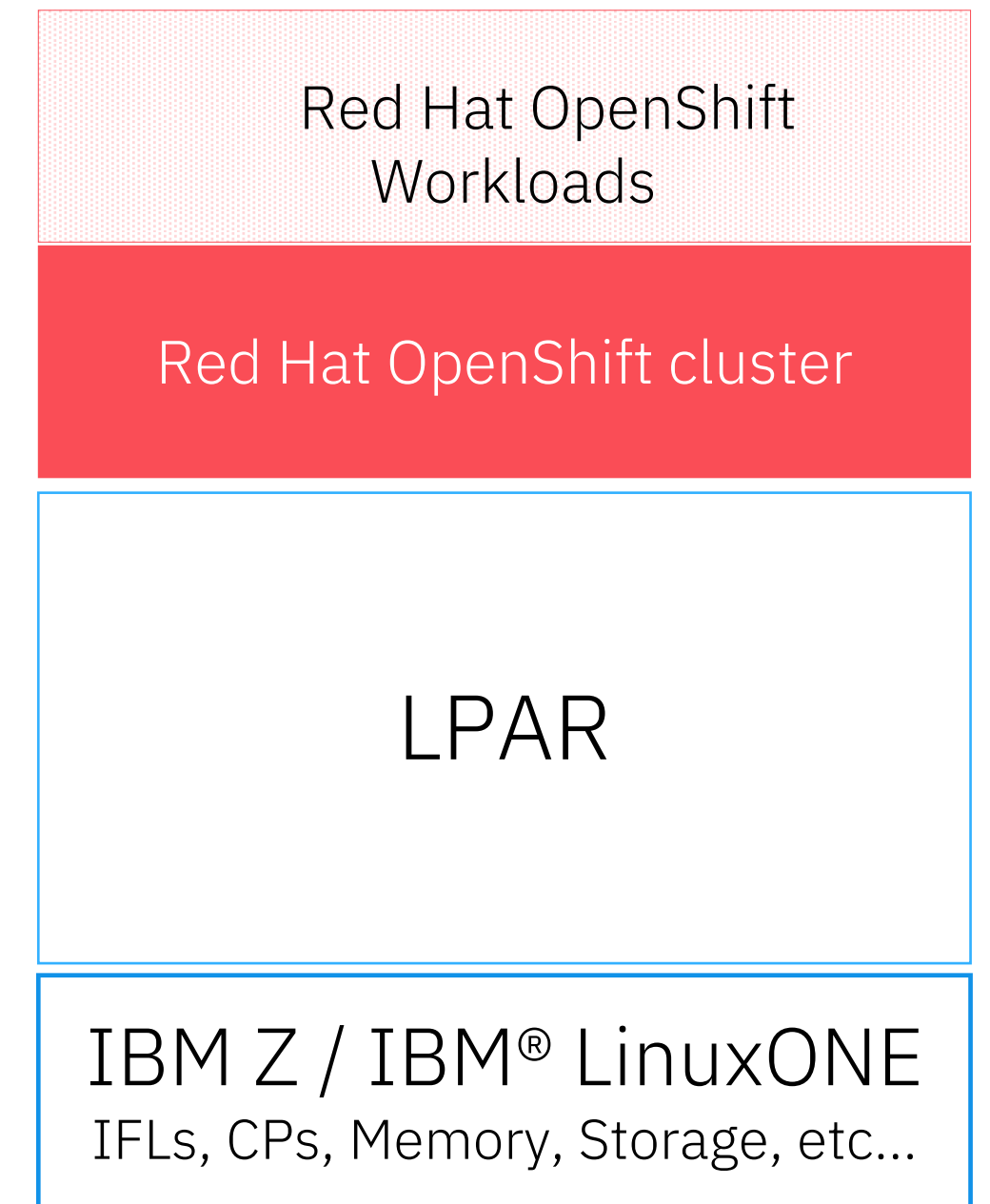
Red Hat OpenShift deployment options and configuration possibilities on IBM Z and IBM® LinuxONE



- Standard 6 node cluster
- High availability cluster
- 3 node cluster
- SNO



- Standard 6 node cluster
- High availability cluster
- 3 node cluster
- SNO



- Standard 6 node cluster
- High availability cluster
- 3 node cluster
- SNO

IBM Cloud Infrastructure Center 1.2.2 enhancements affecting Red Hat OpenShift

- RoCE card deployment on KVM
 - **Enhanced flexibility:** support of Red Hat OpenShift deployment through RoCE card on KVM offers a more efficient and flexible deployment option
 - **Automated DHCP server configuration:** including the port IP, MAC address, and DNS, reduces the manual setup time and minimizing errors
 - **Multi-cluster support:** the deployment of multiple Red Hat OpenShift clusters on a single RoCE card can optimize the resource utilization and simplifies the management
- **Support for single-node OpenShift (SNO) deployment:**
 - **Single-node deployment:** support of Red Hat OpenShift deployment on a single node, simplifying setups for small environments

Name	Host	IP	State	Health	Operating System	Online CPU	VM Type	Hypervisor Type	Instance id	Owner	Expiration Date
roce1-9k8f8-master-0	KVM-RoCE-Hypervisor	172.26.103.14	Active	OK	RHCOS4.15	4	deployed	KVM	hl100037		None
roce2-d2g6k-master-0	KVM-RoCE-Hypervisor	172.26.103.20	Active	OK	RHCOS4.15	4	deployed	KVM	hl100035		None

The image displays two side-by-side screenshots of the Red Hat OpenShift console. The left screenshot shows the 'Overview' page for a cluster, featuring a 'Getting started resources' section with links for 'Set up your cluster', 'Build with guided documentation', and 'Explore new admin features'. Below this is a 'Status' section with green checkmarks for 'Cluster', 'Control Plane', 'Operators', and 'Insights'. A warning for 'AlertmanagerReceiversNotConfigured' is visible. The 'Cluster utilization' section shows a CPU usage graph with 3.39 available of 4 nodes and a value of 612.9m. The right screenshot shows a similar 'Overview' page but with a different 'Cluster utilization' section, displaying a CPU usage graph with 3.15 available of 4 nodes and a value of 845.6m. Both screenshots show the same 'Status' and 'AlertmanagerReceiversNotConfigured' warning.

Key new functions with Cloud Infrastructure Center 1.2.2



- Storage related:
 - Advanced storage scheduler with IBM FlashSystem FC host awareness
 - Customized filter with physical connectivity detection
 - Customized filter for each compute node's storage providers
- New for KVM:
 - Enable KVM multi-attach capability
 - RoCE Express enablement in KVM compute node
- Security administrator and network administrator roles added.
- Attach/detach a NIC for a given VM
- Flexible resources customization for z/VM VMs:
 - Support to indicate the max memory during deployment for a z/VM virtual machine
 - Support to use a VDISK as swap disk for deployment of a z/VM virtual machine, optionally
- SMTP TLS client certificate enablement during the SMTP setup
- User experience improvements

Please see the IBM Cloud Infrastructure Center documentation to search and find detailed information about all capabilities : ibm.com/docs/en/cic

Advanced storage scheduler with IBM FlashSystem FC host awareness

- Advanced scheduler for volume creation with IBM FlashSystem FC host awareness.

Business value

- Monitor and select best fit storage provider to schedule the volume creation and avoid overloading the FC Hosts and FC Host Ports of IBM FlashSystem, instead of planning ahead and rescue after over-allocation.

Use case:

Today's problem: Overloading FC hosts and ports can lead to performance degradation, causing delays in data access and reducing overall system efficiency.

Solution: By intelligently scheduling volume creation and distributing the load, this feature prevents a wrong setup during the volume creation stage.

Storage Provider: FS9K

 Refresh |  Edit |  Remove

▼ Information	
Name:	FS9K
Hostname or IP address:	fl63.boeblingen.de.ibm.com
State:	● Running
Health:	● OK
Available capacity:	94,023 GB
Total capacity:	104,317 GB
Type:	IBM Storage FlashSystem
Agent Node:	zvm_224
Availability zone:	Default_Group
Fabric connection:	
Product Name:	IBM FlashSystem 9200
Version:	8.5.4.0
FC hosts count:	48 Used (512 Total)
FC host ports count:	67 Used (2048 Total)

Customized filter with physical connectivity detection

- Automatically detect the physical connectivity between storage providers and compute nodes and filter out the storage providers which don't have physical connectivity.

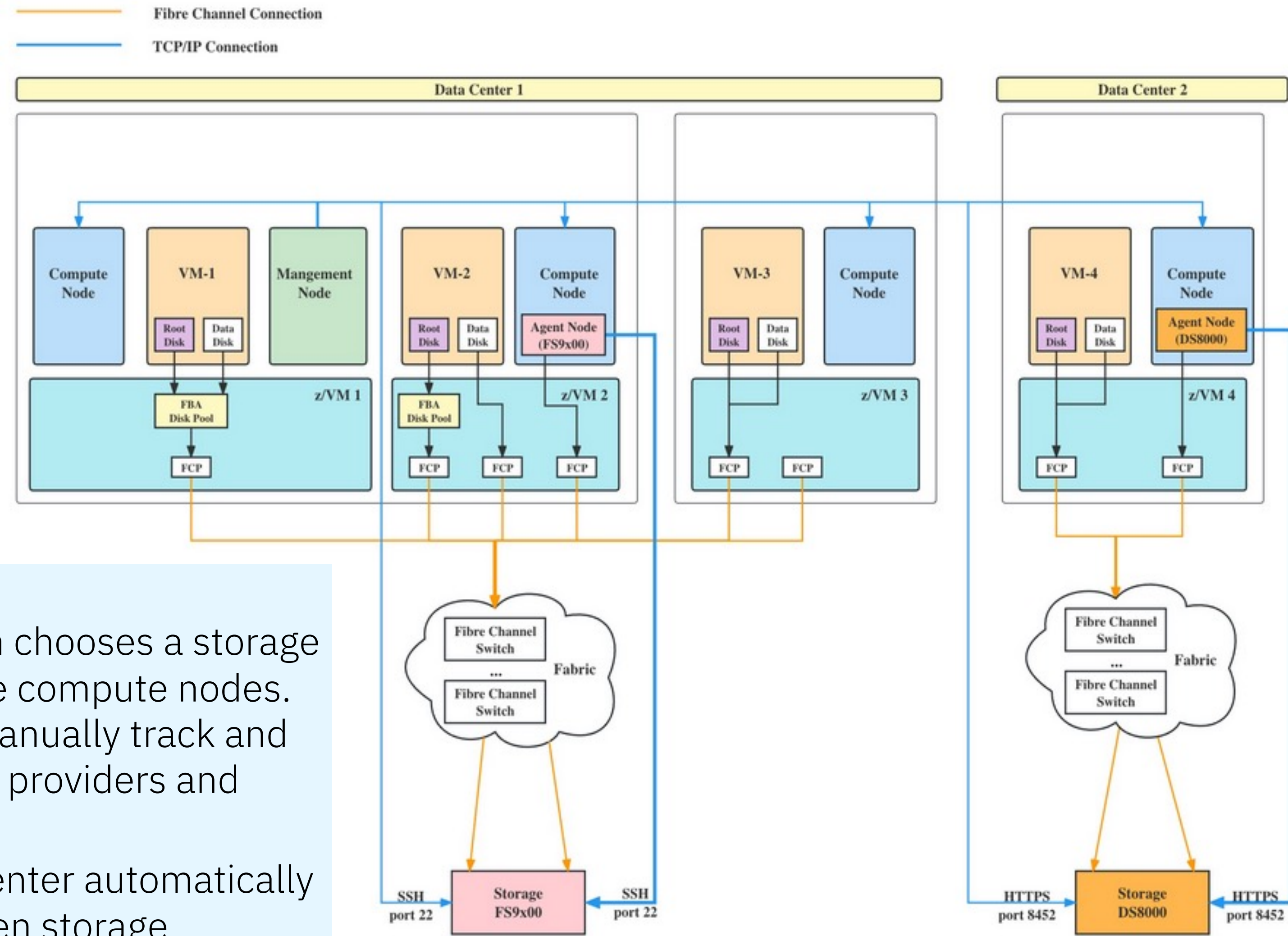
Business value

- Ensure the chosen storage provider has the physical connectivity with the compute node to prevent Boot from Volumes (BFV) failures stemming from FC connectivity issues. It saves effort and time by eliminating the need to manually pre-check connectivity before initiating a BFV operation.

Use case:

Today's problem: BFV failures can occur when an admin chooses a storage provider that lacks proper physical connectivity with the compute nodes. It is complex and impractical for the administrator to manually track and remember physical connectivity among various storage providers and compute nodes.

Solution: With this feature, IBM Cloud Infrastructure Center automatically detects and verifies the physical FC connectivity between storage providers and the specified compute node.



Customized filter for each compute node's storage providers

- Support the setting of blocked storage providers or allowed storage providers per compute node.
- It isolates storage providers and compute hosts when you boot virtual machines from volumes or attach volumes to virtual machines.

Business value

- Isolating storage providers per compute node simplifies the management of storage resources, reducing the complexity of storage configurations.

Use case:

Today's problem: Managing multiple storage configurations for different compute nodes can be highly complex and error-prone, especially in large-scale environments where diverse workloads require different storage characteristics.

Solution: Isolating storage providers per compute node standardizes and simplifies the storage setup for each node. This isolation means that administrators can manage storage configurations independently, reducing the risk of misconfiguration and making the system easier to maintain.

Host: zvm_155

Overview	
Machine Model:	M04
Hypervisor Type:	z/VM
Hypervisor OS Version:	7.1.0
Hypervisor hostname:	BOEM5401
IBM Cloud Infrastructure Center version:	1.2.2.0
Physical network mappings:	icicvlan1:VSICIC
Host in the SSI: ?	No
SSI Name: ?	
Allowed Storage Providers:	<u>ds8k63c1</u> , <u>fl63</u>
Blocked Storage Providers:	

Storage Provider: ds8k63c1

Refresh Edit Remove

Information	
Name:	ds8k63c1
Hostname or IP address:	ds8k63c1.boeblingen.de.ibm.com
State:	Running
Health:	OK
Available capacity:	22,442 GB
Total capacity:	38,132 GB

Storage Provider: fl63

Refresh Edit Remove

Information	
Name:	fl63
Hostname or IP address:	fl63.boeblingen.de.ibm.com
State:	Running
Health:	OK
Available capacity:	94,866 GB

Enable KVM multi-attach capability

- Enable to attach a volume with multi-attach capability to multiple KVM VMs.

Business value

- Multiple KVM VMs can access the same volume, allowing better load distribution. In case one VM fails, another can continue accessing the volume without interruption, improving system reliability.

```

root kvm_core2_ip_2_7 ~ virsh dumpxml RENP0006 | grep "type='block'" -A 8 | grep 5e49
    <source dev='/dev/disk/by-id/dm-uuid-mpath-3600507681080848f0800000000005e49' index='4' />
root kvm_core2_ip_2_8 ~ virsh dumpxml RENP0007 | grep "type='block'" -A 8 | grep 5e49
    <source dev='/dev/disk/by-id/dm-uuid-mpath-3600507681080848f0800000000005e49' index='4' />
    
```

Storage > Volume: demo_multiattach_vol

Volume: demo_multiattach_vol

Refresh | Edit | Delete | Unmanage | Deploy

Information

Name:	demo_multiattach_vol
ID:	86d14f03-eb6b-43e4-8b10-3b08ca778f22
Description:	
Size:	5 GB
State:	In-Use
Storage template:	demo_template
Volume type:	Generic
Storage pool:	ICIC_CORE2
Storage provider:	FS9K
Consistency Group:	
Availability zone:	Default_Group
Bootable:	No
Multi-attach enabled:	True

Details

Volume WWN:	600507681080848F08000000000005E49
Storage pool:	ICIC_CORE2

Attached Virtual Machines

No filter applied

Name	Host	IP
demo_kvm1	kvm2.7	172.26.93.25
demo_kvm2	kvm2.8	172.26.93.40

RoCE Express enablement in KVM compute node

RoCE Express connection on IBM Z and IBM LinuxONE

- Ability to use RoCE Express as uplink port to KVM VMs

Business value

- Gain better performance by connecting Linux VMs via RoCE Express.

Add Host
Specify the details for host registration.

Host management type:
 z/VM KVM

* Hostname or IP address: * User ID:

Display name: Enter a network interface on the host that is used as the virtual machines' layer-2 network connectivity uplink port, e.g. eth0.

* Network Interface name: * Password:

Advanced Input Options

Shared storage path: OVN Encapsulation IP:

Secure Execution Enabled

Reset Add Host Cancel

NICs

Name	Type	Device Number	Adapter Name	Adapter Port	Card Type	VLAN ID & Type	MAC Address	Description
RoCE	RoCE	0001	RoCE 02BC 201B-19	1	10 GbE RoCE Express2			

New roles supported in Cloud Infrastructure Center

Business value

- Provide more precise authority division for roles.
- Improve the security strategy for enterprise to manage the access control to Cloud Infrastructure Center.

Use case:

Today's problem:

Enterprise services providers need to provide finer granularity authority access control of Cloud Infrastructure Center. Cloud Infrastructure Center already provides abilities for RBAC (Role-Based Access Control). However, more authority divisions are needed for network resources and security resources management.

Solution:

Enhance existing RBAC (Role-Based Access Control) with new roles for network and security management of Cloud Infrastructure Center.

Edit Assigned Roles

Choose roles below to assign to the selected user and click Save.

i Only directly assigned roles are editable here. Additional roles may be inherited from a group.

Roles:

- None
- Administrator
- Network Administrator
- Security Administrator
- Project manager
- Self service user
- Other roles:
 - Deployer
 - Image manager
 - Storage manager
 - Viewer
 - Virtual machine manager
 - Virtual machine user

Network administrator role



Cloud network administrator

Network administrator of `ibm-default` project.

They are able to manage all projects' networks related resources in ibm-default` project.



Network administrator

Network administrator of other project.

They are able to manage networks related resources of his own project , public or shared to the project

Network administrator responsibilities

- Creating, editing, or removing networks
- Locking or unlocking IP addresses of a network
- Viewing network topologies
- Creating, editing, or removing routers
- Setting or clearing gateway of a router
- Adding or removing interfaces of a router
- Adding or removing static routes of a router
- Allocating or releasing IP to a project
- Associating or disassociating IP
- Viewing all resources except users and groups, projects, storage-related configurations, email-notification-related configurations.

Security administrator role



Cloud Security Administrator

Security administrator of `ibm-default` project.

They are able to manage all projects' security groups related resources in ibm-default` project.



Security Administrator

Security administrator of other project.

They are able to manage security groups related resources of his own project , public or shared to the project

Security administrator responsibilities

- Creating, editing, or removing security groups
- Managing security group rules of a security group
- Viewing all resources except users and groups, projects, storage-related configurations, email-notification-related configurations.

Attach/detach a NIC for a given VM

Enable to attach a new network interface card (NIC) to the given virtual machine on the fly or detach the NIC from the virtual machine dynamically.

Business value

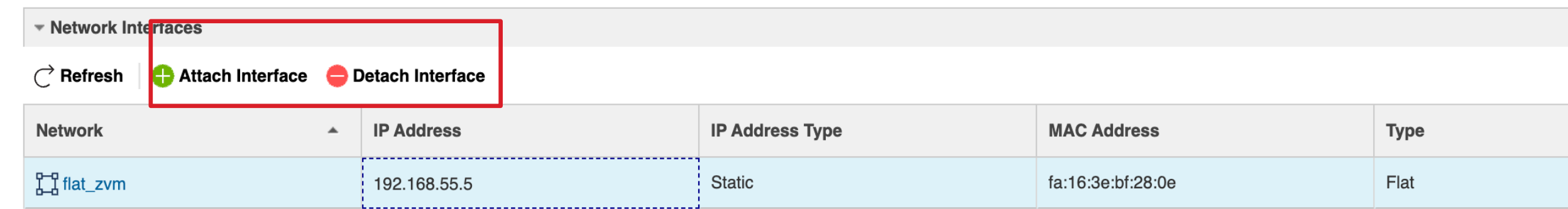
- The user can add the various NICs to the running virtual machines without breaking the current workload, so that they can use the new attached NIC to run the workload, and can remove the existing network NICs if not needed.

Use case:

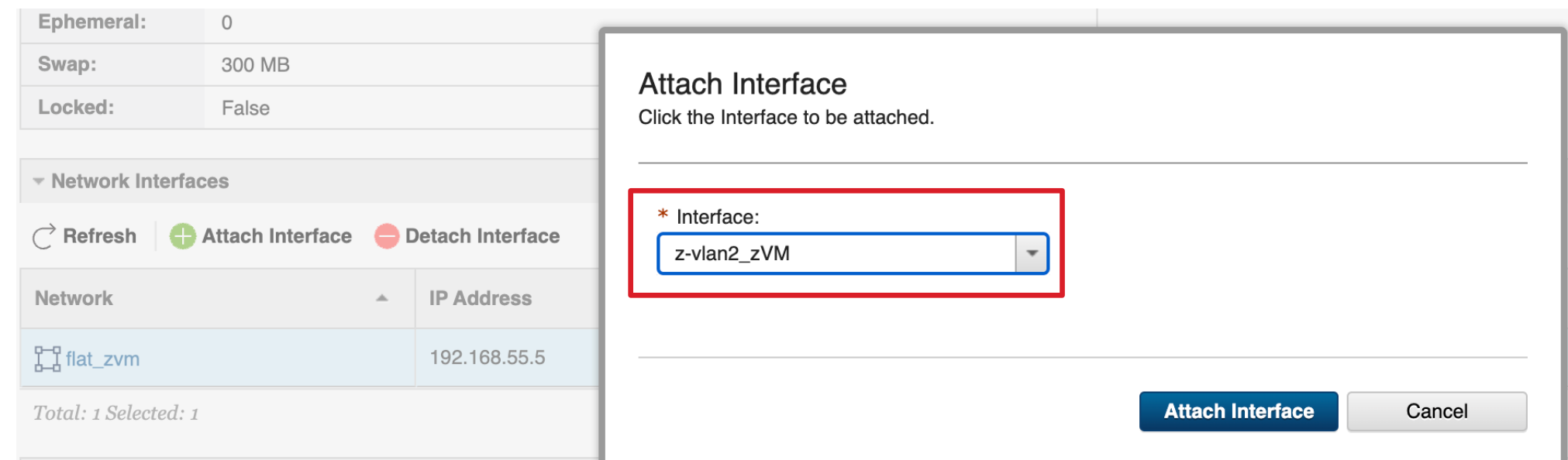
Today's problem: After the VM is deployed, its network interfaces are immutable, the user can not add or remove the network interfaces for it.

Solution: Using this feature, the administrator can dynamically add or remove the network interfaces for the VM.

Dynamical network interface management



Network	IP Address	IP Address Type	MAC Address	Type
flat_zvm	192.168.55.5	Static	fa:16:3e:bf:28:0e	Flat



Attach Interface
Click the Interface to be attached.

* Interface:
z-vlan2_zVM

Attach Interface Cancel



Network	IP Address	IP Address Type	MAC Address	Type
flat_zvm	192.168.55.5	Static	fa:16:3e:bf:28:0e	Flat
z-vlan2_zVM	172.26.55.160	Static	fa:16:3e:9f:2d:16	VLAN

```
[root@rhel88-zvm-swap-max ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue stat
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
   inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
   inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
7: enc1000: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdi
   link/ether 02:01:0c:5a:6b:45 brd ff:ff:ff:ff:ff:ff
   inet 192.168.55.5/17 brd 192.168.127.255 scope global
       valid_lft forever preferred_lft forever
8: enc1003: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdi
   link/ether 02:01:0c:00:00:c9 brd ff:ff:ff:ff:ff:ff
   inet 172.26.55.160/17 brd 172.26.127.255 scope global
       valid_lft forever preferred_lft forever
```


Flexible resources customization

Business value

- Enable to use V-DISK as swap disk for the deployments of the z/VM virtual machines
- Enable to customize the max memory of the deployed z/VM virtual machines

Deploy target: [?](#)
 rxf-cmp-364-investi

Collocation rule: [?](#) Key pair: [?](#)
 None None

Specifications

Compute template: [?](#)
 Tiny

* Processors	1
* Memory (MB)	4,096
* Disk size (GB)	10
Ephemeral size (GB)	0
Swap size (MB)	300
Instance Extra Specs	{"general:max_mem":"70G"}

```
[root@rhel88-zvm-swap-max ~]# lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
loop0       7:0      0   482K 0 loop
dasda       94:0     0    10G 0 disk
├─dasda1    94:1     0    10G 0 part /
└─dasdb     94:4     0   300M 0 disk
   └─dasdb1  94:5     0   300M 0 part [SWAP]
```

```
USER XY500030 LBYONLY 4G 70G G
INCLUDE ZCCDFLT
COMMAND SET VCONFIG MODE LINUX
COMMAND DEFINE CPU 00 TYPE IFL
COMMAND DEF STOR INITIAL STANDBY REMAINDER
IPL 0100
LOGONBY IAASADM
MACHINE ESA 32
SHARE RELATIVE 100
NICDEF 1000 TYPE QDIO DEVICES 3 MACID 5A6B45 LAN SYSTEM VSICIC
MDISK 0101 FB-512 V-DISK 614400 MWV
MDISK 0100 3390 262148 14564 T60103 MR
```

Integrating with Instana

Hypervisor Page:

- **Enhanced Data Accuracy:** Adjusted the display of used and available hypervisor data. Users can now access precise and reliable hypervisor information.

Compute Instances Page:

- **Project-Specific Display:** The VM page now exclusively shows VMs associated with the current project, ensuring a clear and focused view.

Compute Instances Detail Page:

- **Details CPU metrics:** Added the ability to display CPU utilization for each individual CPU core, providing deeper insights into performance.

The screenshot displays the Cloud Infrastructure Center monitoring interface, divided into three main sections:

Hypervisors: A table showing hypervisor details. A blue box highlights the 'Used CPU', 'Available CPU', 'Used Memory', and 'Available Memory' columns.

Name ↑	Host IP	Type	Used CPU	Available CPU	Used Memory	Available Memory	Used Storage (GB)	Available Storage (GB)	Instance Count
BOEM5404	172.26.3.36	zvm	3	768	12 GiB	2 TiB	30.00	1,356.00	2
os009	172.26.2.172	QEMU	11	160	44 GiB	124 GiB	100.00	627.00	4

Compute Instances: A table showing VMs associated with the current project. A blue box highlights the 'Project' column.

Name ↑	Project	Host Name	Host IP	Used CPU	Available CPU	Used Memory	Available Memory	User
rhel810_kvm_project1	project1	os009	172.26.103.119	1%	1	6%	4.00 GiB	root
rhel93_zvm_project1	project1	BOEM5404	172.26.104.20	0%	1	16%	4.00 GiB	root

Instance Usage: A table showing instance usage details.

Driver ↑	Hypervisor	Hypervisor OS	Name
libvirt	kvm	linux	roce2-d2g6k-master-0

vCPU Details: A table showing vCPU utilization for each core. A blue box highlights the 'CPU ID' and 'CPU Utilization' columns.

CPU ID ↑	CPU Utilization
0	32.86
1	32.66
2	39.20
3	28.93

Additional features visible include 'CPU Resources' and 'Memory Resources' graphs on the right side of the Compute Instances page.

1.2.2 - supported hypervisors, operation systems & servers

As a managed hypervisor:

- z/VM 7.3 or z/VM 7.2
- KVM as part of RHEL 8.8 or 8.10

As a host environment on z/VM or KVM:

- RHEL 8.8 or 8.10

As a deployable guest operating system instance on z/VM:

- RHEL 7.9, 8.2-8.9, 9.0-9.3
- Red Hat CoreOS 4.12, 4.13, 4.14 or 4.15 as part of Red Hat OpenShift Container Platform
- SUSE Linux Enterprise Server 15 SP2 – SP4
- Ubuntu 20.04 or 22.04

As a deployable guest operating system instance on KVM:

- RHEL 7.9, 8.2-8.9, 9.0-9.3
- Red Hat CoreOS 4.12, 4.13, 4.14 or 4.15 as part of Red Hat OpenShift Container Platform

Hardware platforms:

- IBM z16™ (all models)
- IBM z15™ (all models)
- IBM z14® (all models)
- IBM® LinuxONE 4 (all models)
- IBM® LinuxONE III (all models)
- IBM® LinuxONE II (all models)

Key new functions with Cloud Infrastructure Center 1.2.1



- FCP device limit management
- z/VM Multipath IPL (alternative path)
- Remote console access (KVM)
- HiperSockets enablement for KVM
- Export host into into csv
- Storage agent High available support
- Chargeback support through Cloud Pak for AIOps
- Deploy z/VM instance with specified USERID
- allow_lun_scan enablement by default
- User experience enhancement

PCHID awareness FCP device allocation on z/VM hosts and storage FC host awareness on FS9x family

- PCHID awareness FCP device placement to select best fit FCP device and honor the pre-defined limit of FCP allocations on PCHID
- Report used FC hosts counts and ports information on FS9x storage

Business value

- Provide data about the FCP device usage per CHPID including allocation, free, maximum capacity
- Monitor and select best fit PCHID to schedule the workload and avoid overload the FCP card, instead of planning ahead and rescue after over-allocation of the FCP devices on the same PCHID

Efficient & flexible FCP device management

Configuration > The Usage Data of All PCHIDs

The Usage Data of All PCHIDs

CPC Name	PCHID	Allocated Ratio	Maximum Capacity	Free Capacity	Allocated Capacity	Allocated to VMs	Allocated to Management Nodes	Allocated to Compute Nodes
M54	0198	0.78%	128	127	1	0	1	0
T46	0240	8.59%	128	117	11	11	0	0
T46	0244	0.78%	128	127	1	0	0	1
T46	0248	6.25%	128	120	8	4	0	4
T46	0260	0.78%	128	127	1	0	0	1
T46	0264	3.12%	128	124	4	4	0	0

Total: 7 Selected: 1

Allocation Details of PCHIDs

CPC Name	PCHID	Hypervisor hostname	Host Display Name	Allocated Capacity	Allocated to VMs	Allocated to Management Nodes	Allocated to Compute Nodes
M54	0198	BOEM5407		1	0	1	0
T46	0240	BOET4608	ZVM_125	11	11	0	0
T46	0244	BOET4608	ZVM_125	1	0	0	1
T46	0248	BOET4608	ZVM_125	4	4	0	0

Refresh Add Storage Edit Storage Remove Storage Manage Existing Volumes

Name	Agent Node	Available Capacity	Health	Type	Fabric connection	FC hosts count	FC host ports count
v7k60	ZVM_125	18,997 GB	OK	IBM Storage FlashSystem		145 Used (512 Total)	254 Used (2048 Total)

Multipath IPL enablement on z/VM VMs

High available for VM boot from FCP

Setup Multipath IPL on z/VM VM definition (USER DIRECT)

Business value

- Ensure for VMs (that boot from FCP devices) to automatically setup the multipath settings, avoiding a single point of failure that can be caused by FCP path issue at the boot phase of VMs
- Highly improved business continuity

```
USER HLP00006 LBYONLY 4G 64G G
INCLUDE ZCCDFLT
COMMAND SET VCONFIG MODE LINUX
COMMAND DEFINE CPU 00 TYPE IFL
COMMAND DEF STOR INITIAL STANDBY REMAINDER
IPL LOADDEV
LOADDEV DEVICE 1a0a <-- base IPL device
LOADDEV PORTname 50050768103391d8 <-- base IPL port
LOADDEV LUN 0000000000000000
LOADDEV SCSI ALTERNATE 1a0a PORT 50050768102491e1 <-- alternate path1
LOADDEV SCSI ALTERNATE 1b0a PORT 50050768102391e1<-- alternate path2
LOADDEV SCSI ALTERNATE 1b0a PORT 50050768102391d8<-- alternate path3
LOGONBY DEVCORE2
MACHINE ESA 32
SHARE RELATIVE 100
DEDICATE 1A0A 1A0A
DEDICATE 1B0A 1B0A
NICDEF 1000 TYPE QDIO DEVICES 3 MACID 8A1355 LAN SYSTEM VSICIC
```

HiperSockets enablement in KVM compute node

Ability to use HiperSockets as uplink port to KVM VMs

Business value

- Gain better performance by connecting Linux VMs and other OS such as IBM z/OS via HiperSockets on same IBM Z / IBM LinuxONE server

HiperSockets connection inside an IBM Z and IBM LinuxONE server

Add Host
Specify the details for host registration.

Host management type:
 z/VM KVM

* KVM hostname or IP address: * User ID:

Display name: Enter a network interface on the host that can be assigned to Open vSwitch bridge, e.g. eth0.

* Network Interface name: * Password:

Advanced Input Options

Shared storage path: OVN Encapsulation IP:

Secure Execution Enabled

Reset **Add Host** Cancel

Name	Device Number	Adapter Name	Adapter Port	Card Type	VLAN ID & Type	MAC Address	Description
hp1	0007	hhhhh	0	HiperSockets		02:de:33:00:d1:b8	

KVM VM remote console access

Access VM console through UI

Ability to access VMs through UI console (noVNC), even if there is no network

Business value

- Easier way to do daily operations on the VMs, admin/end user can access VMs via UI
- Rescue a VM through the UI, even the network of the VM is down (e.g., start network manager)

The screenshot displays a VM management interface. At the top, there is a toolbar with various actions: Refresh, Start, Stop, Suspend, Resume, Restart, Delete, Capture, Resize, Live Migrate, Cold Migrate, Edit Expiration Date, and Attach Volume. Below the toolbar, a 'Console Access' button is highlighted with a red box. A table below shows a list of VMs with columns for Name, Host, IP, State, Health, Operating System, Online CPU, VM Type, Hypervisor Type, Instance id, and Owner. The first VM in the table is 'rhel92_after_changevip_Nov3' on host 'kvmcore11' with IP '172.26.54.43', state 'Active', and health 'OK'. Below the table, a terminal window is shown, connected to QEMU (zsjh003c). The terminal output shows the VM's boot process, including the kernel version and the activation of the web console. The user 'root' logs in and runs 'ls', showing the directory structure of the VM.

Name	Host	IP	State	Health	Operating System	Online CPU	VM Type	Hypervisor Type	Instance id	Owner
rhel92_after_changevip_Nov3	kvmcore11	172.26.54.43	Active	OK	RHEL92	1	deployed	KVM	zsjh003c	

```
https://172.26.54.8:6080/vnc_lite.html?path=%3Ftoken%3D44b9250f-2a2e-42ab-ba13-0e279266aac9
Connected to QEMU (zsjh003c)
Red Hat Enterprise Linux 9.2 (Plow)
Kernel 5.14.0-284.11.1.el9_2.s390x on an s390x
Activate the web console with: systemctl enable --now cockpit.socket
rhel92-after-changevip-nov3 login: root
Password:
Last login: Wed May 24 05:30:27 from 192.168.122.1
[root@rhel92-after-changevip-nov3 ~]# ls
[root@rhel92-after-changevip-nov3 ~]# ls /
afs bin boot dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var
[root@rhel92-after-changevip-nov3 ~]#
```


Input USER ID during z/VM VM deployment

Enable to set alternative USER ID when deploying z/VM VM, instead of the default USER ID generated from the Cloud Infrastructure Center template

Business value

- Alignment of the VM naming convention with the company rules or existing best practice
- More flexibility for the naming of the USER ID

Flexible z/VM USER ID Management

Images ▶ Deploy rhel83_ext4_eckd

Deploy rhel83_ext4_eckd

General

* Virtual machine name:

rhel83_ext4_eckd

Virtual machine userid: ?

MYTEST

* Instances:

1

Description:

Tags: ?

```
USER MYTEST LBYONLY 4G 100G G
INCLUDE ZCCDFLT
COMMAND SET VCONFIG MODE LINUX
COMMAND DEFINE CPU 00 TYPE IFL
COMMAND DEF STOR INITIAL STANDBY REMAINDER
IPL 0100
LOGONBY IAASADM
MACHINE ESA 32
SHARE RELATIVE 100
NICDEF 1000 TYPE QDIO DEVICES 3 MACID 8980D8 LAN SYSTEM VSICIC
MDISK 0100 3390 556350 14564 CI2102 MR
*DVOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20231110 CRCXX
```


Storage agent high availability support

High availability of storage agent

Business value

- Automatic failover of storage agent to other nodes for business continuity

(storage agent handles the storage resources such as volume, snapshot, create, read, update, delete operations)

✓ Success	11/12/23, 12:38 AM	Storage provider gpfs-14573663776078067384-icic_gpfs failover to the host kvm4found3 complete.
i Information	11/12/23, 12:37 AM	Storage provider gpfs-14573663776078067384-icic_gpfs will failover to the host kvm4found3...
✗ Error	11/12/23, 12:37 AM	Cinder node kvm4found5 down, will failover the cinder volume/backup services for gpfs-1457366377...

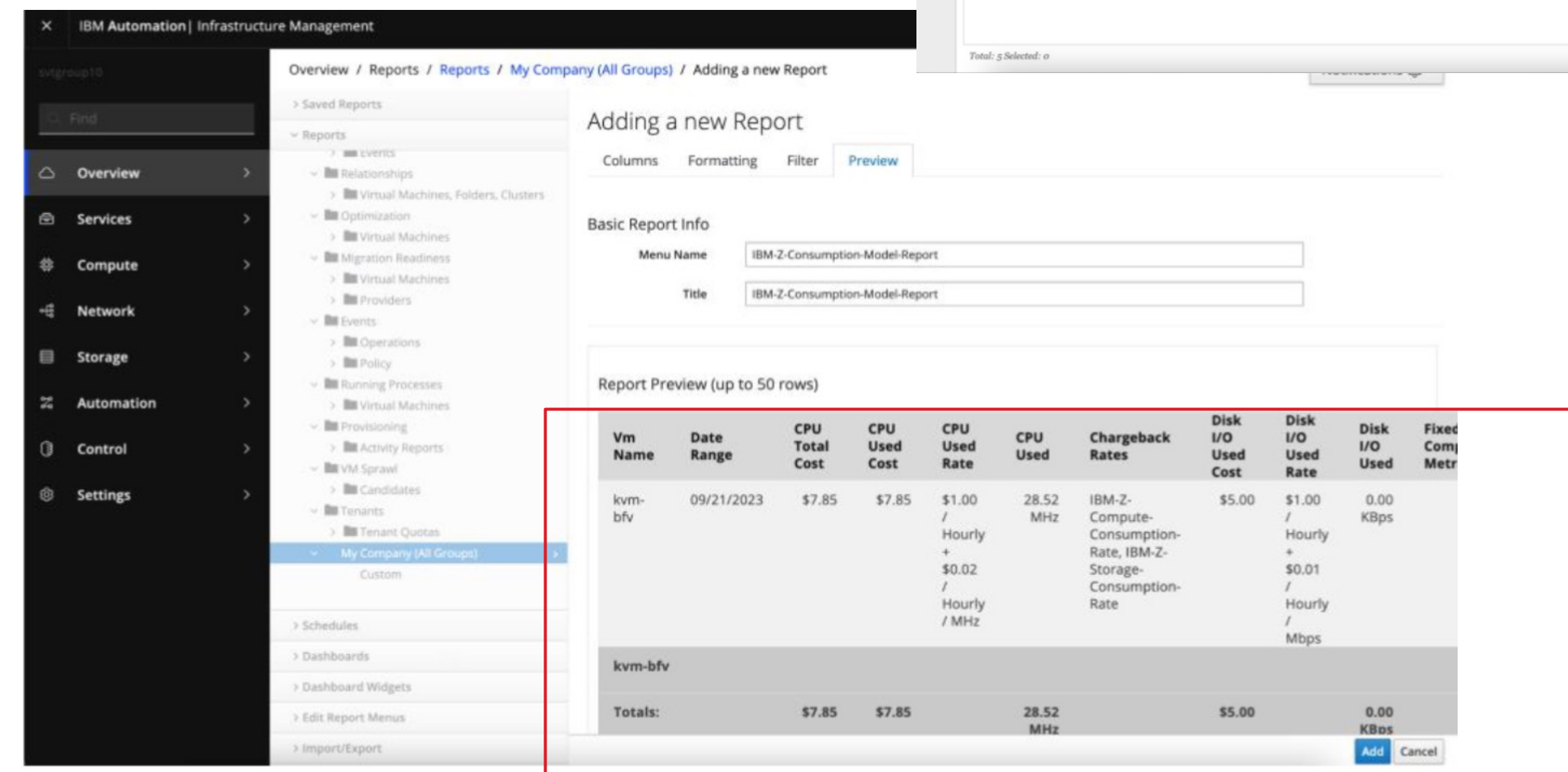
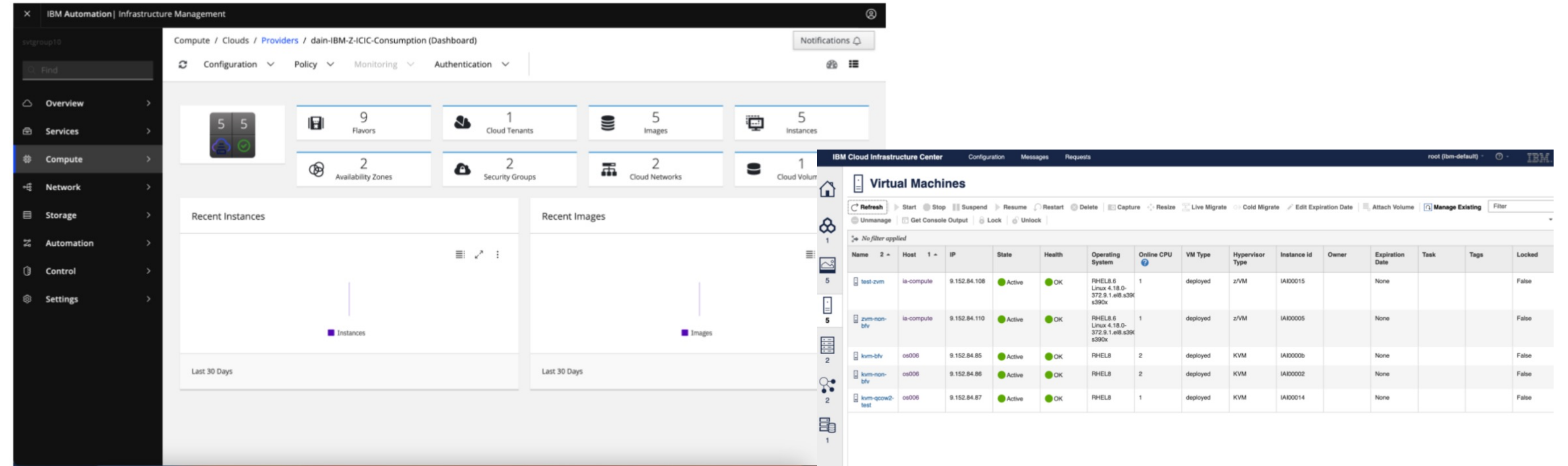
Chargeback support through IBM Cloud Pak for AIOps

Consumption based chargeback

Chargeback support through 'IBM Cloud Pak for AIOps' on RHEL KVM and z/VM hypervisor

Business value

- Consumption based chargeback of used resources for internal / external tracking and audits



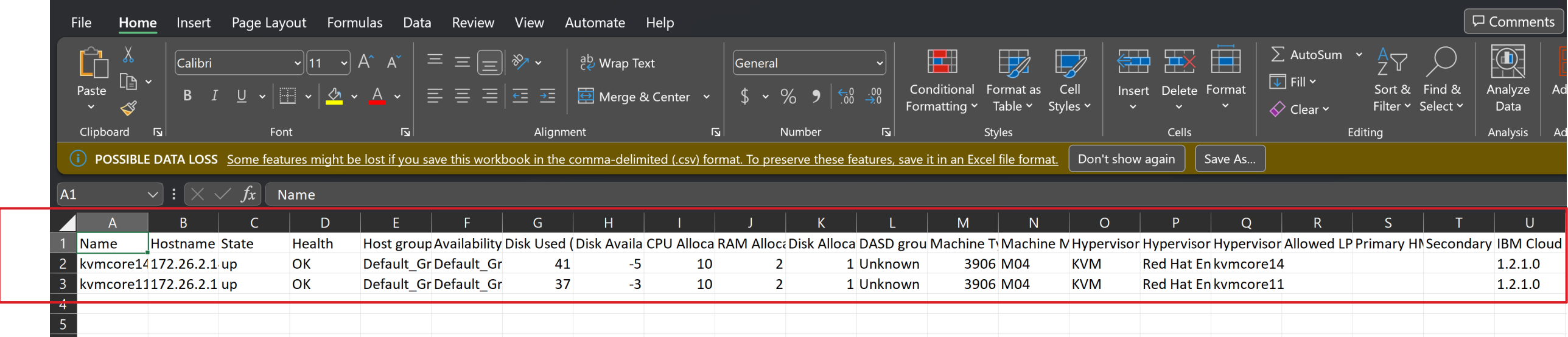
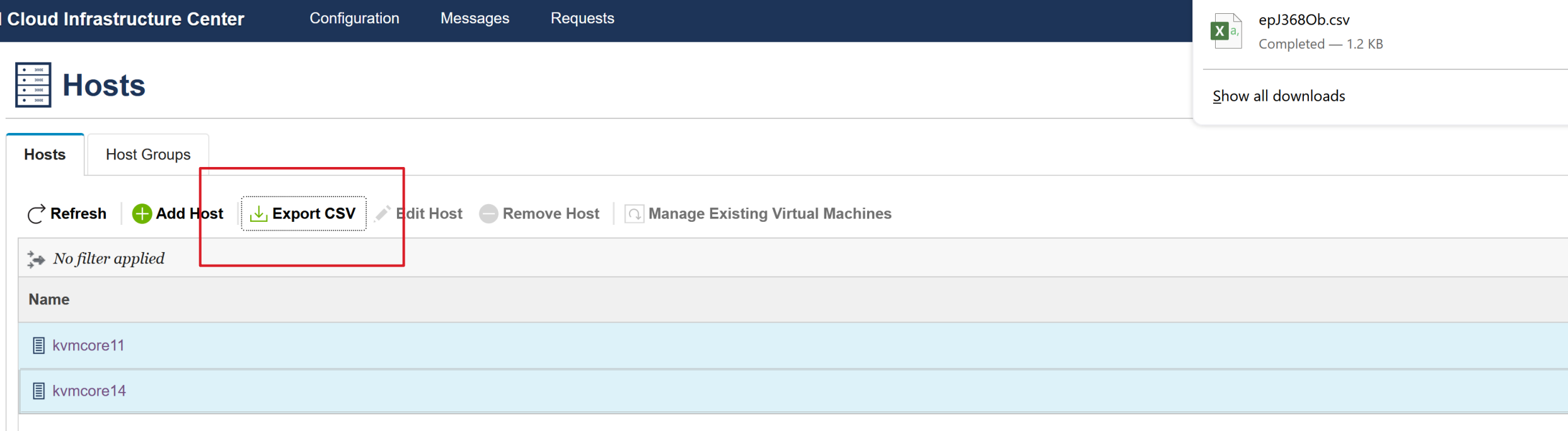
Export host info into csv file

Summary of compute node (hypervisor)

Ability to expose the compute node (hypervisor) information into csv file

Business value

- Expose the compute nodes' information into a csv file
- Explore the status of all Cloud Infrastructure Center managed hypervisors



Default enablement of allow_lun_scan on compute and management nodes

Easier and flexible mgmt. of LUN settings

Business value

- Easy configuration of management and compute nodes, avoiding manual setup
- Automatic management of LUN

```
# cat /sys/module/zfcp/parameters/allow_lun_scan  
Y
```

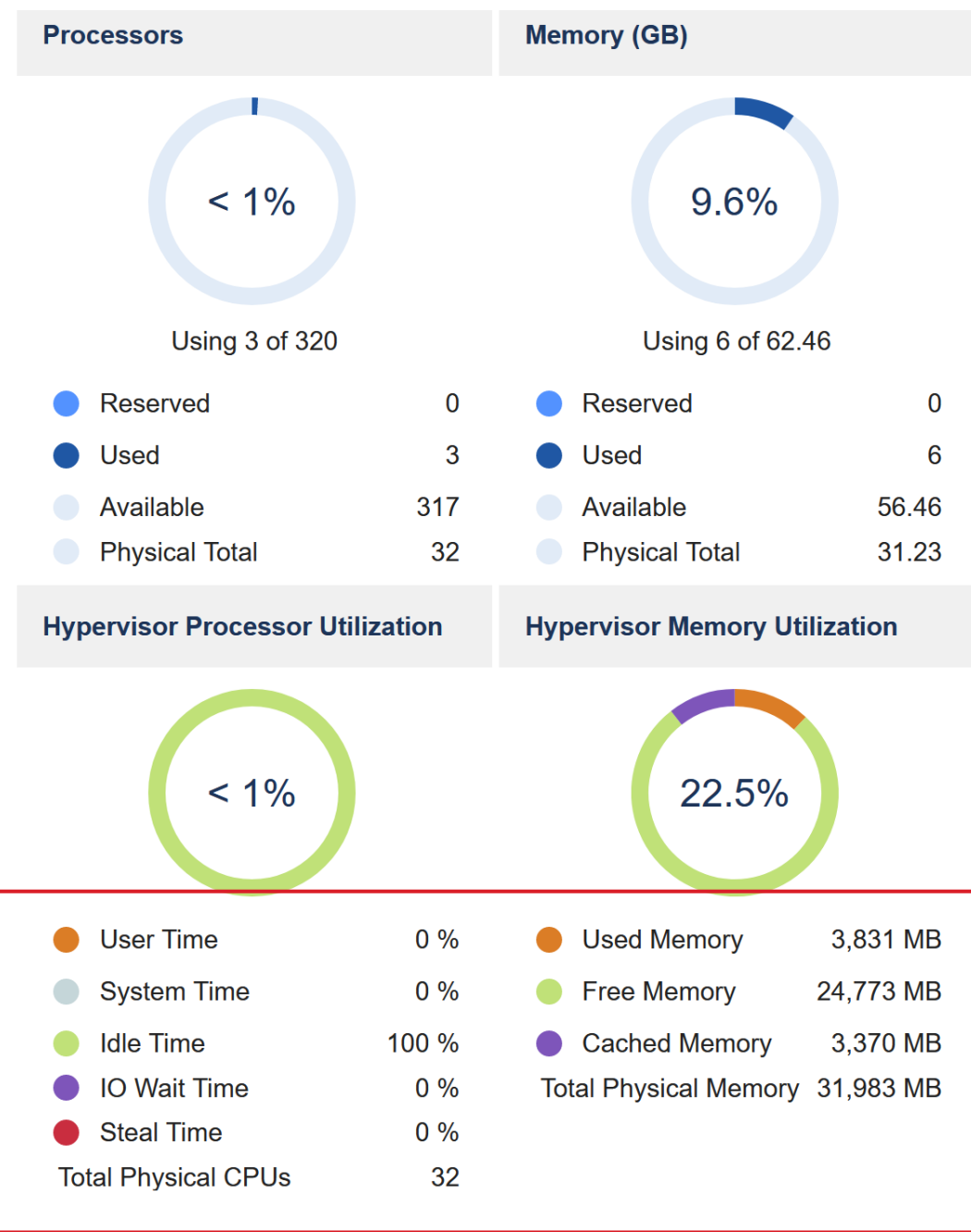
```
[root@kvmcore203 ~]# multipath -ll  
mpatha (36005076306ffd38800000000000000003) dm-0 IBM,2107900  
size=120G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw  
`-+- policy='service-time 0' prio=50 status=active  
  |- 0:0:1:1073954816 sdc 8:32 active ready running  
  `-- 0:0:2:1073954816 sdd 8:48 active ready running  
mpathh (36005076308ffd2cf00000000000000315) dm-6 IBM,2107900  
size=10G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw  
`-+- policy='service-time 0' prio=50 status=active  
  |- 0:0:10:1075134467 sdn 8:208 active ready running  
  |- 0:0:12:1075134467 sdr 65:16 active ready running  
  |- 0:0:8:1075134467 sdf 8:80 active ready running  
  `-- 0:0:9:1075134467 sdj 8:144 active ready running  
mpathj (36005076308ffd2cf00000000000000222) dm-8 IBM,2107900  
size=30G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw  
`-+- policy='service-time 0' prio=50 status=active  
  |- 0:0:10:1075986434 sdm 8:192 active ready running  
  |- 0:0:12:1075986434 sdq 65:0 active ready running  
  |- 0:0:8:1075986434 sde 8:64 active ready running  
  `-- 0:0:9:1075986434 sdi 8:128 active ready running  
mpathk (36005076308ffd2cf00000000000000a2a) dm-10 IBM,2107900  
size=30G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw  
`-+- policy='service-time 0' prio=50 status=active  
  |- 0:0:10:1076510730 sdo 8:224 active ready running  
  |- 0:0:12:1076510730 sds 65:32 active ready running  
  |- 0:0:8:1076510730 sdg 8:96 active ready running  
  `-- 0:0:9:1076510730 sdk 8:160 active ready running  
mpatho (36005076308ffd2cf00000000000002904) dm-5 IBM,2107900  
size=10G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw  
`-+- policy='service-time 0' prio=50 status=active  
  |- 0:0:10:1074020393 sdp 8:240 active ready running  
  |- 0:0:12:1074020393 sdt 65:48 active ready running  
  |- 0:0:8:1074020393 sdh 8:112 active ready running  
  `-- 0:0:9:1074020393 sdl 8:176 active ready running
```


User experience improvement

User experience improvement

Business value

- Compute node metrics include processor and memory utilization
- Lock and unlock of a VM, avoiding mis usage of critical VM
- Insights about what's configured and what's free, by showing z/VM DASD POOL in the UI



Dasd Group Details

Volume Name	Device Type	Start Cylinder	Free Disk Size (GB)	Dasd Group	Region Name
M40301	3390-A	262150	100	ICICPL	M40301
M40301	3390-A	87385	80	ICICPL	M40301
M40300	3390-A	146512	60	ICICPL	M40300
M40300	3390-A	574336	57	ICICPL	M40300
M40300	3390-A	466920	54	ICICPL	M40300
M40300	3390-A	759120	40	ICICPL	M40300

Total: 18 Selected: 1

Refresh Start Stop Suspend Resume Restart Delete Capture Resize Live Migrate Cold Migrate Edit Expirati

Console Access Lock Unlock

No filter applied

Name	Host	IP	State	Health	Operating System	Online CPU	VM Type	Hypervisor Type	Instance id
rhel92_after_	kvmcore11	172.26.54.43	Active	OK	RHEL92	1	deployed	KVM	zsjh003c
rhel92_genev	kvmcore11	192.168.54.15, 172.26.54.47	Active	OK	RHEL92	1	deployed	KVM	zsjh002f



Questions?



Thank you!

