What’s new in IBM Cloud Infrastructure Center

Stev Glodowski & Ingo Adlung

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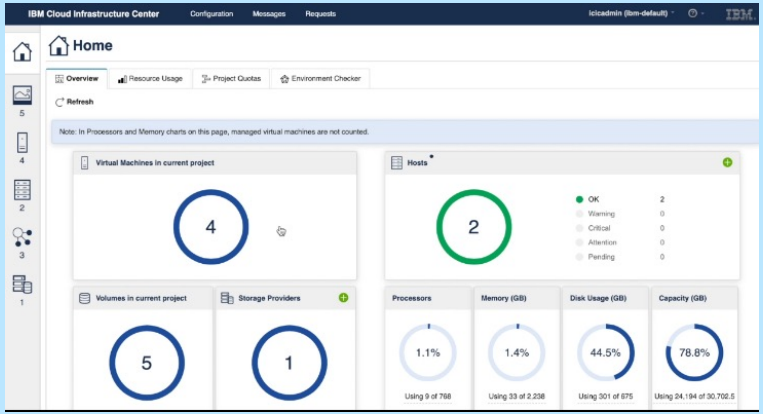
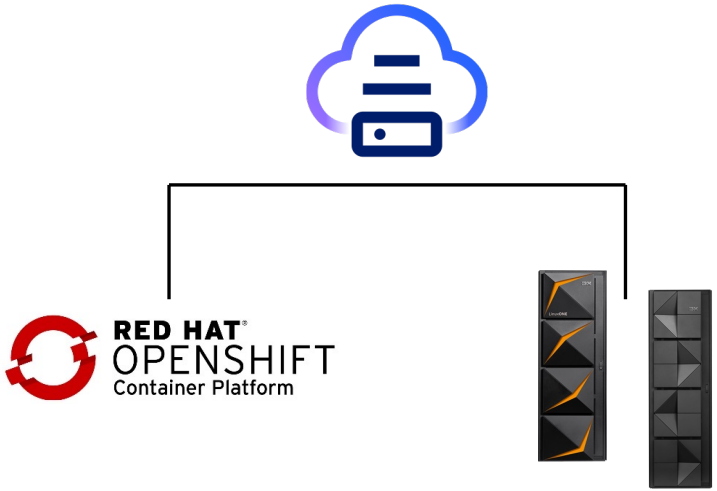
Infrastructure-as-a-Service for IBM Z and LinuxONE

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



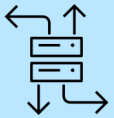


IaaS layer for Red Hat OpenShift deployments (hybrid cloud stack)

Guest provisioning for noncontainerized workloads

Use cases

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 and LinuxONE.

Service automation

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

Cloud integration

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

ICIC Solution Scenarios

On-premises DB as-a-Service

“Data Gravity”

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

Deployment of Red Hat OpenShift clusters

“UPI”

Provisioning of Red Hat OpenShift Container Platform clusters via the deployment of Red Hat CoreOS

IaaS for service providers

“Tenant-safe services”

Service providers can offer **tenant-safe Infrastructure as a Service,** in a virtual environment

Facilitate LinuxONE introduction with new clients

“Simplify”

As the **platform’s infrastructure solution**, Cloud Infrastructure Center **simplifies client experience and hides the complexity** of virtual infrastructure running on IBM LinuxONE and IBM zSystems.

sense and response

On-premises DB as-a-Service

Select a database and deploy it in an **as-a-service model** with **simple Infrastructure-as-a-Service (IaaS) management** via Cloud Infrastructure Center, on a highly scalable and secure platform.

Example: MongoDB, used as caching database for read-only queries of the backend database, used in production today.

Business problem

- Modernization of apps and data to improve scalability, response time, and security.
- Capability to scale up and down a large amount of DB instances
- x86 cloud infrastructure fails to support the required quality of service (QoS)
- x86 systems cannot scale, are not resilient, and are not as secure

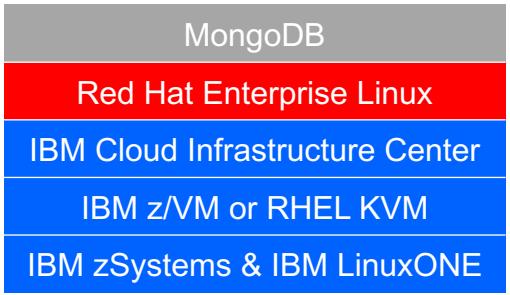
Solution

Cloud Infrastructure Center

- manages the infrastructure, consisting of on-premises deployments of z/VM- and RH KVM-based Linux virtual machines
- deploy of Red Hat Enterprise Linux images with DB

IBM LinuxONE and IBM Storage used for their scalability and qualities of service

Solution stack:



Benefits

- Workload managed in an as-a-service environment that adheres to industry regulation and sustainability business objectives
- Fastest DB-Recovery in the company history
- Agility to support large scale DB instances
- Superior performance, scalability, reliability and security
- Automated deployment of DB instances at scale using Cloud Infrastructure Center based on pre-defined playbooks delivering a turn-key solution

Deployment of Red Hat OpenShift clusters

Cloud Infrastructure Center supports the **provisioning of Red Hat OpenShift Container Platform clusters** as part of Red Hat Enterprise Linux CoreOS.

Business problem

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

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 orchestrate the whole Red Hat OpenShift cluster creation steps
- Deployment of Red Hat OpenShift clusters with the deployment of Red Hat CoreOS (as part of Red Hat OpenShift)

Benefits

- Automated Red Hat CoreOS 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

IaaS 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.

Business problem

- Traditional IT ops-model is complex to manage infrastructure across multiple platforms
- Individual management for infrastructure pillars
- Existing management requires manual admin activities

Solution

- Manage the infrastructure as-a-service
  - Hybrid cloud / containerized ,and
  - non-containerized traditional workloads
- Lifecycle management: define, instantiate, and manage the z/VM and Red Hat KVM-based virtual infrastructure
- Deployment of Linux images including workloads

Benefits

- Act as a service bureau for infrastructure-as- a-service (IaaS) services to a multiplicity of tenants
- Consistent, industry-standard user experience
- Quickly deploy a virtual machines from an image library
- Built-in OpenStack compatible APIs enable easy integration
- Tenant-safe service management via a self-service portal

Sample deployments:

- IBM LinuxONE Community Cloud
- Read the full IBM CIO Office story

"IBM Cloud Infrastructure Center allows us to substantially improve our infrastructure management and reduce cost & complexity to manage from simple to complex environments."

- Eric Everson Mendes Marins, PCS_ZVM squad at IBM CIO Office

Facilitate LinuxONE & zSystems introduction with new clients

As the **platform's infrastructure solution**, Cloud Infrastructure Center **simplifies client experience** with LinuxONE and zSystems.

Business problem

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

Solution

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

Benefits

- Simplify client experience with LinuxONE and zSystems virtualization
- Vendor-agnostic IaaS management
- Provide 'Private Cloud' infrastructure as a service via OpenStack for z/VM, KVM
- IaaS automation via Terraform, VMWare vRealize Automation, etc… using the API/CLI layer
- Integration with z/VM Express System Install (z/VM ESI)

IBM Cloud Infrastructure Center is orderable via **Shopz** and is offered as part of '**IBM Infrastructure Suite for z/VM and Linux v2.2**' and '**LinuxONE III Express bundles**.

Large bank in NA

MongoDB-as-a-Service

Cloud-native as-a-Service environment that adheres to industry regulation and sustainability business objectives

Solution Benefits

50% more efficient in terms of Data Center Space, Power, Cooling

Support for backup and restore via FS

Automate deployments of MongoDB instances at scale using IBM Cloud Infrastructure Center

In Production

33:1 core consolidation vs X86

Cyber-resilient

High Performance

Highly Available

Business requirements

FFIEC Appendix J compliant technology solution for Franchise Critical applications running MongoDB (cyber resilient)

Sub-second recovery speed for multi-TB instances to meet strict RTO requirements

Solution elements

Function	On IBM zSystems
Deployment Catalog	Integrated with existing tools
Automation	Provision via IBM Cloud Infrastructure Center
Mongo Instance	Mongo Enterprise on zSystems
OS	RHEL 8
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

MongoDB Bundles with Express

	Small – 4 IFLs	Medium – 6 IFLs	Large – 12 IFLs
LinuxONE III Express	**$135K*** 4 IFLs (384 GB)	6 IFLs (512 GB)	12 IFLs (768 GB)
3-Yr HW Maint + RHEL	1 year warranty, 2 years maintenance	1 year warranty, 2 years maintenance	1 year warranty, 2 years maintenance
ICIC + 2 x OSA Cards	3 Years S&S + 2 x OSA Cards	3 Years S&S + 2 x OSA Cards	3 Years S&S + 2 x OSA Cards
OSDB (MongoDB)	3 Licenses, 3 Years S&S	4 Licenses, 3 Years S&S	6 Licenses, 3 Years S&S
z/VM	**optional** Price for 3 years z/VM [2]	**optional** Price for 3 years z/VM [2]	**optional** Price for 3 years z/VM [2]
Implementation Package	**optional** 1 week of Jump Start	**optional** 1 week of Jump Start	**optional** 1 week of Jump Start

2= z/VM* 7.2 + RACF Security Server Feature + DirMaint Feature + Performance toolkit for VM feature (PIDs: OTC: 5741-A09 ; S&S: 5741-SNS)

**Price is NA direct end-user price. GEO prices may vary.*

Infrastructure Suite

Optional priced feature

Infrastructure Suite for z/VM and Linux V2.2

+

IBM Cloud Infrastructure Center 

Core Components

OMEGAMON XE on z/VM and Linux

Performance monitoring of z/VM and Linux guests

Integration with ITM on distributed platforms and other OMEGAMONs on z/OS

Operations Manager for z/VM

Operational monitoring (consoles, current state of service machines, network connections, etc.)

Automated operations

Take actions based on events or messages

Backup and Restore Manager for z/VM

Image and file level backup and recovery of z/VM

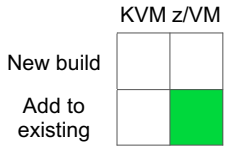
Image level backup and recovery of Linux

Spectrum Protect

File level backup and recovery for Linux Virtual Machines

No limit on number of clients or servers: price is based on number of IFLs or general purpose processors

Red Hat OpenShift soft bundle for IBM zSystems and LinuxONE



Red Hat OpenShift (for 6 IFLs)	No charge for Red Hat OpenShift control plane nodes. Bastion node included with Red Hat OpenShift Stock Keeping Unit (SKU) for use with Red Hat OpenShift only. Minimum of 3 Red Hat OpenShift compute nodes at **$2K / IFL / year.** [1]
z/VM + Ops Mgr + Cloud Infrastructure Center[3] (for 6 IFLs)	Can be added at approved IBM zSystems or LinuxONE prices.
1-year Hardware Warranty	**Included** for the first year. Maintenance for years 2-3 is incremental cost at approved IBM zSystems or LinuxONE prices.
6 IFLs	**Buy 6 IFLs, Pay for 3** [2] This special price is only available when adding 6 IFLs (microcode only) to an existing z14*, z14 ZR1*, z15 T01, z15 T02, IBM z16, LinuxONE Emperor II*, LinuxONE Rockhopper II*, LinuxONE III LT1 or LinuxONE III LT2 when purchased with Red Hat OpenShift. Memory required to run these IFLs may be purchased at approved IBM zSystems or LinuxONE prices.

Optional features include:
- IBM WebSphere® Hybrid Edition
- Red Hat Enterprise Linux
- Red Hat Runtimes (including JBoss® App Server, Quarkus)

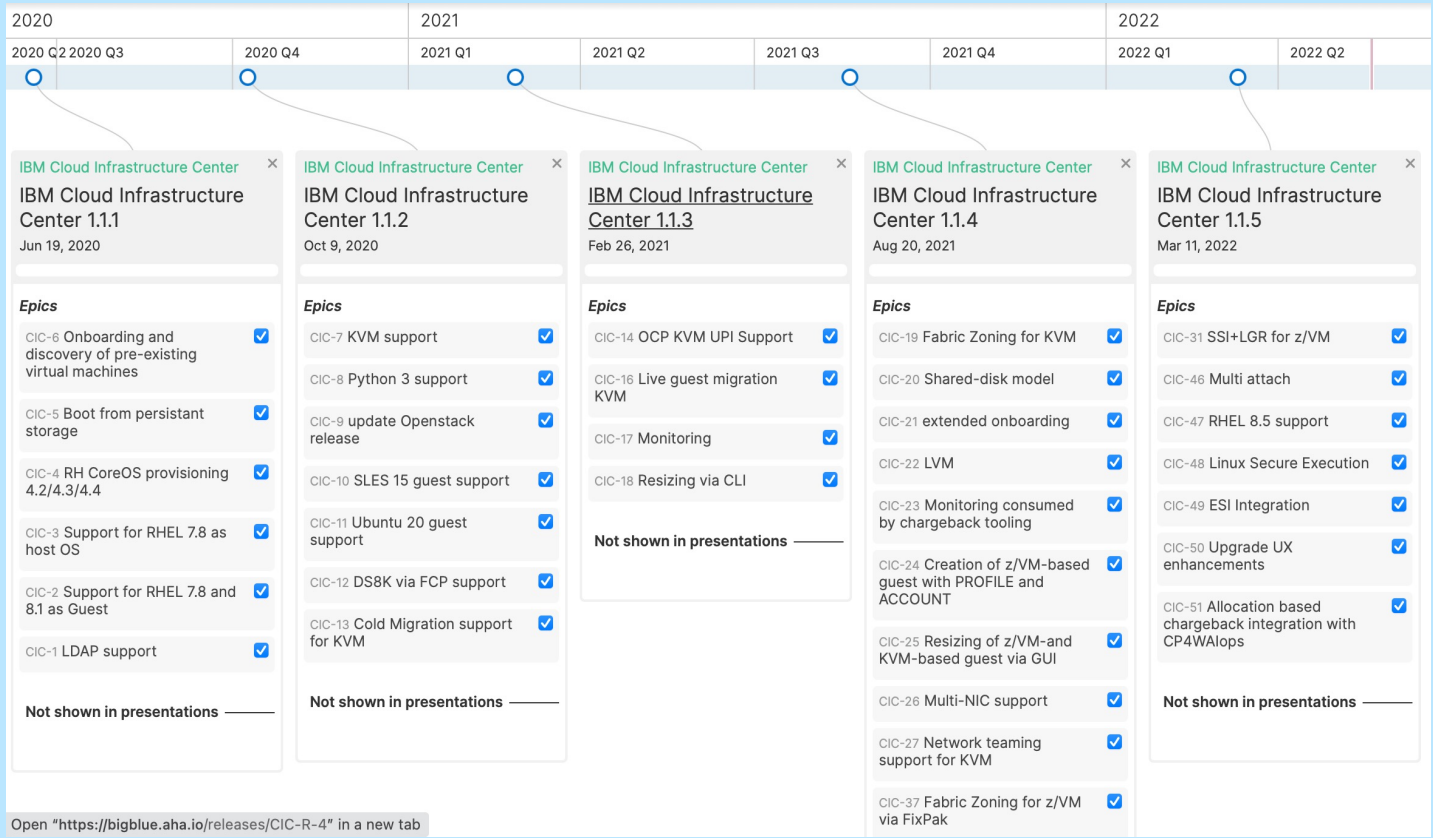
[1] Red Hat OpenShift may be ordered directly from Red Hat (use this Red Hat seller lookup tool or contact your geo Synergy office) or via ESW / CFSW / ShopZ which does not require engaging Red Hat sellers

[2] The 3 IFLs running the control plane nodes are free of charge.

[3] Price includes z/VM 7.2 + RACF Security Server feature + DirMaint feature + Performance Toolkit for VM feature + Cloud Infrastructure Center + Ops Mgr (OTC and 1 year S&S must be prepaid). Features can be bought together or separately.

Roadmap

You Platform IaaS solution for IBM zSystems and LinuxONE



Key new functions with Cloud Infrastructure Center 1.1.4 & 1.1.5

New with IBM Cloud Infrastructure Center 1.1.4*

Fabric zoning support for IBM z/VM and Red Hat KVM-based virtual machines (VMs)

Monitoring to be consumed by chargeback tools

Resizing of VMs using the user interface

Extended onboarding capabilities of z/VM-based VMs running Red Hat Enterprise Linux CoreOS

Network teaming support for Red Hat KVM-based VMs

Provisioning of z/VM-based VMs from a network with multiple subnets using the user interface

Creation of z/VM-based VMs with PROFILE and ACCOUNT statements via the user interface

Provisioning of z/VM-based VMs using persistent storage-based boot volumes building on LVM volume groups, leveraging FCP storage

Support of the shared-disk model

Support of IBM Spectrum® Scale as persistent storage on Red Hat KVM-based virtual machines.

Enhancement of the healthy report status feature

Support for Red Hat Enterprise Linux 8.4 and Red Hat Enterprise Linux CoreOS 4.8

* Including Fix Pack 1

Key new functions with Cloud Infrastructure Center 1.1.5

- Red Hat related update
- Live guest relocation (LGR) enablement
- Multiple attach of persistent storage
- Secure execution enablement
- Upgrade validation tool
- Enhancement of health detection and report of virtual machine and storage
- Allocation based chargeback integration with IBM Cloud Pak for Watson AIOps

Supported hypervisors, operation systems, and hardware with 1.1.5

- As a managed hypervisor:
  - IBM z/VM 7.2 or 7.1
  - KVM as part of Red Hat Enterprise Linux 8.4
- As a host environment on z/VM and Red Hat KVM:
  - Red Hat Enterprise Linux 8.2 or 8.4
- As guest operating system instance on z/VM:
  - Canonical Ubuntu 20.04
  - Red Hat Enterprise Linux 7.9, 8.2, 8.4, or 8.5
  - Red Hat Enterprise Linux CoreOS 4.6, 4.7, 4.8, 4.9, or 4.10 as part of Red Hat Linux OpenShift
  - SUSE Linux Enterprise Server 15 SP2
- As guest operating system instance on Red Hat KVM:
  - Red Hat Enterprise Linux 7.9, 8.2, 8.4, or 8.5
  - Red Hat Enterprise Linux CoreOS 4.6, 4.7, 4.8, 4.9, or 4.10 as part of Red Hat OpenShift

Hardware platforms:

- IBM z16™ (all models)
- IBM z15™ (all models)
- IBM z14® (all models)
- IBM z13®
- IBM z13s®
- IBM LinuxONE III (all models, incl LinuxONE III Express)
- IBM LinuxONE Emperor II
- IBM LinuxONE Rockhopper II
- IBM LinuxONE Emperor I
- IBM LinuxONE Rockhopper I

Refer to the individual IBM hardware announcements for the certified Linux distributions and Red Hat OpenShift versions.

Red Hat related updates

New with 1.1.5

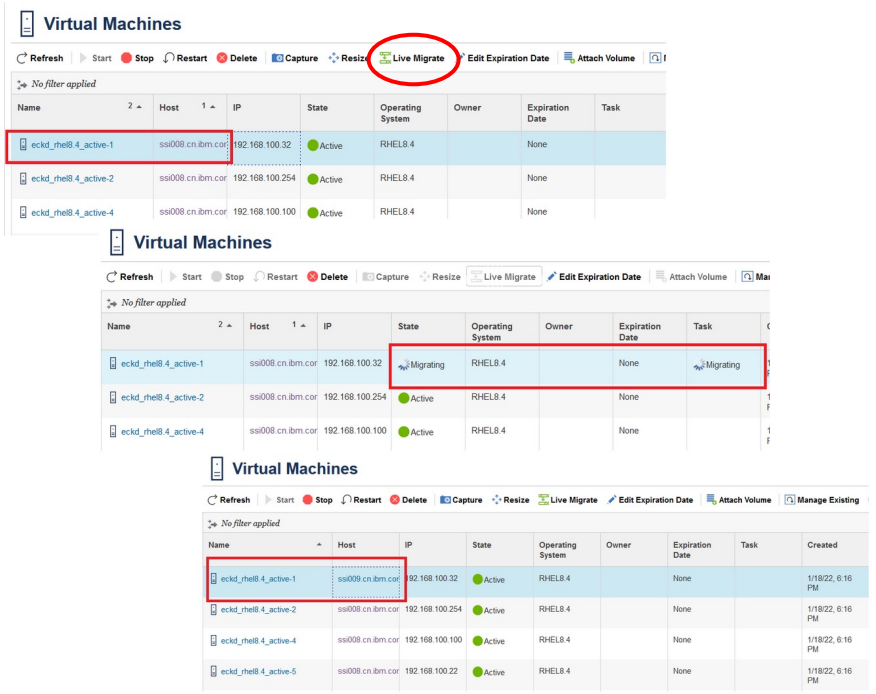
New supported guest OS

- Red Hat Enterprise Linux CoreOS 4.10 and 4.9 as part of Red Hat OpenShift Container Platform 4.10 (GA Mar 2022) and 4.9 (GA Oct 2021)
- Red Hat Enterprise Linux 8.5 (GA Nov 2021)

Live guest relocation (LGR) enablement

New with 1.1.5

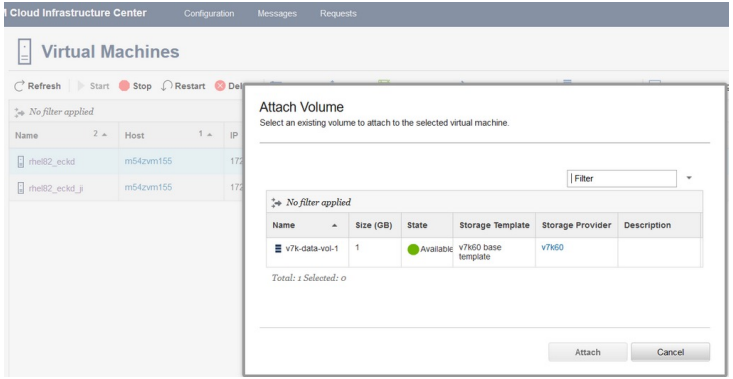
- Administrators can move virtual machines through the Cloud Infrastructure Center UI/API from one z/VM to another z/VM with the LGR enablement to achieve business continuity
- Cloud Infrastructure Center utilize z/VM command - VMRELOCATE to perform the LGR
- z/VM Single System Image (SSI), pre-requirement for doing LGR, was enabled at Cloud Infrastructure Center 1.1.4
- LGR virtual machine that need EQID management inside one SSI (e.g., virtual machine with FCP device) is not supported yet, and will be enabled at upcoming release(s)

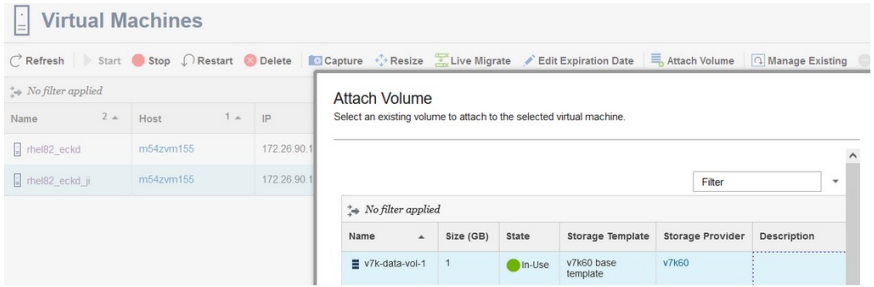


Multiple attach of persistent storage

New with 1.1.5

- A volume (persistent storage) can be attached to multiple z/VM virtual machines
- This is beneficial for solutions like a clustered database that need shared block storage across its nodes that run in multiple virtual machines
  - E.g., Oracle RAC is using shared block storage, so that the data can be shared among the RAC cluster

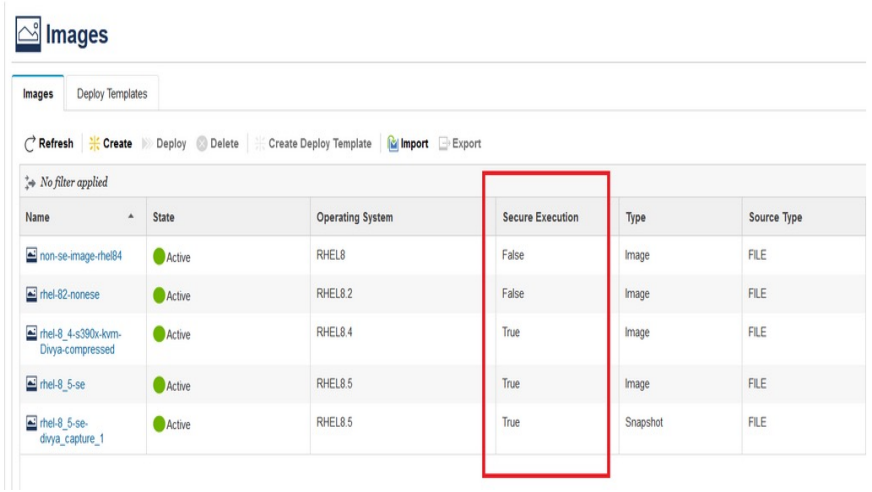




Secure execution enablement

New with 1.1.5

- Cloud Infrastructure Center can do lifecycle management: create, delete, start, stop, cold migrate, etc.
- If the host is for secure execution, it can be marked when the add host action is performed
- The ‘Secure Image’ need to be pre-generated then uploaded to the Cloud Infrastructure Center



IBM Secure Execution for Linux is a z/Architecture® security technology that protects data of workloads that run in a KVM guest from being inspected or modified by the server environment

Upgrade validation tool

New with 1.1.5

The upgrade validation tool, providing pre-upgrade & post-upgrade validation, helps the administrator to validate whether there are potential issues before/after the upgrade.

– Pre-upgrade validation tool collects necessary information for us to decide whether the current status is safe to upgrade or not
  - Check cache file /var/opt/ibm/icic/backups/etc/nova/nova.conf
  - Check management node disk space
  - Check selinux/umask/firewall settings on management and compute nodes
  - Whether /opt/ibm/icic/policy policy json files have been changed since last installation
  - Whether there are z/VM SSI compute nodes

– Post-upgrade validation tool checks whether there are errors in the installation and Cloud Infrastructure Center-restore logs on both management and compute nodes during upgrade

```
[root@m5404019 icic-1.1.5.0]# ./lib/validate-upgrade
################################################################################
####### Welcome to the IBM Cloud Infrastructure Center Upgrade Validator! #######
################################################################################

Validator is in pre-upgrade mode, it will run validation checks to ensure readiness for upgrades.
Running check clean_cache
```

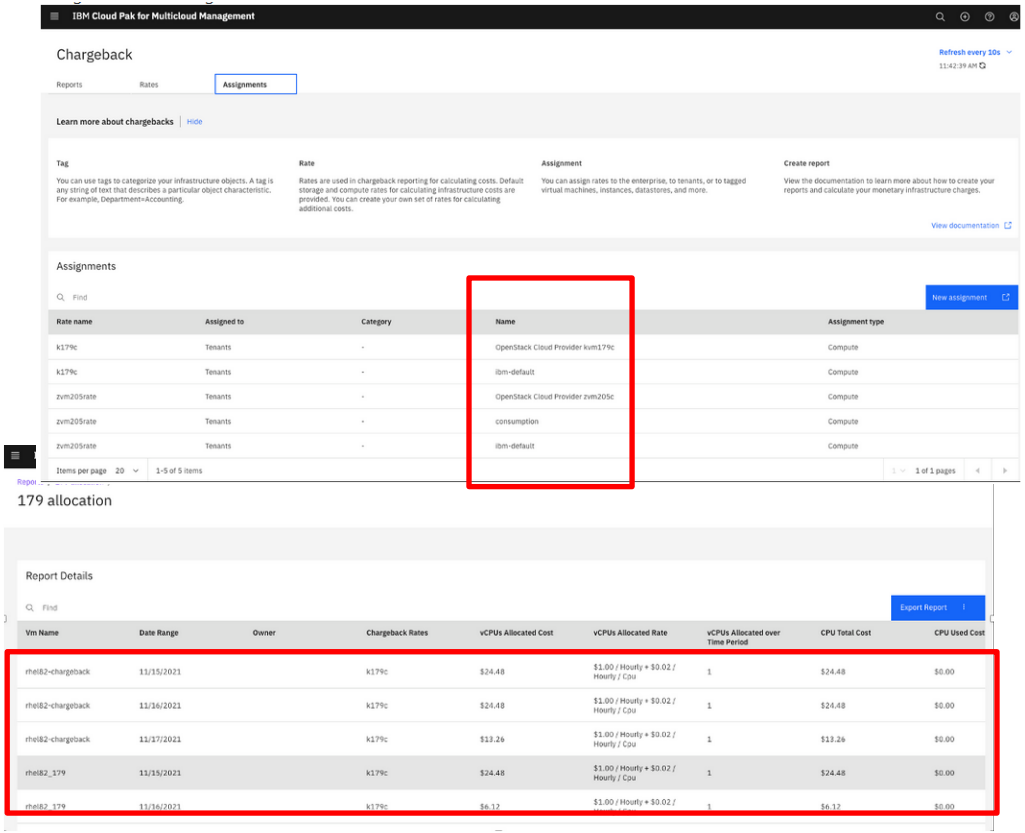
```
Success! Results logged to /opt/ibm/icic/log//icic-validate-2022-01-19-013539.log
[root@m5404019 icic-1.1.5.0]#
```

Allocation based chargeback integration with IBM Cloud Pak for Watson AIOps

New with 1.1.5

- Allocation based chargeback integration
  - Administrators/users can monitor and consume the resource allocations of the resources, which are managed by Cloud Infrastructure Center, through IBM Cloud Pak for Watson AIOps

- Cloud Pak for Watson AIOps integration with Cloud Infrastructure Center through OpenStack cloud provider (OpenStack API)

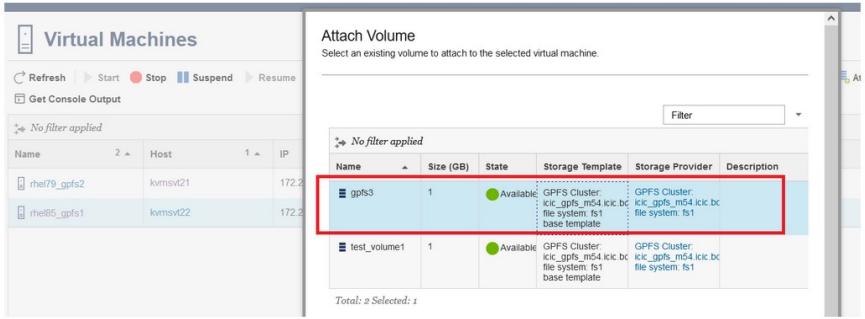


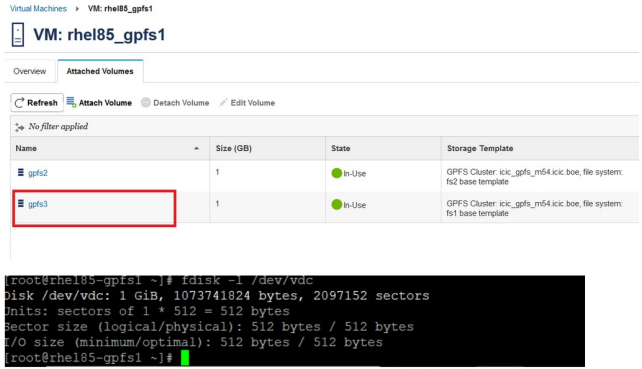
IBM Spectrum® Scale as persistent storage

Available for KVM since Cloud Infrastructure Center 1.1.4 FP1

New with 1.1.5

- Lifecycle management of persistent storage including allocate / deallocate / attach / detach through IBM Spectrum Scale
  - Administrators can use IBM Spectrum Scale as storage backend, so that virtual machines can consume the persistent storage as data volume



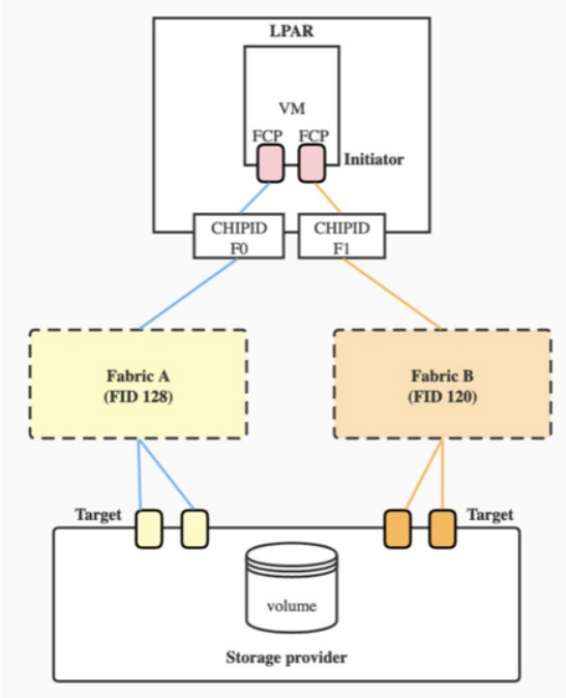


Fabric zoning support on z/VM

Available for KVM since Cloud Infrastructure Center 1.1.4,
available for z/VM since Cloud Infrastructure Center 1.1.4 FP1

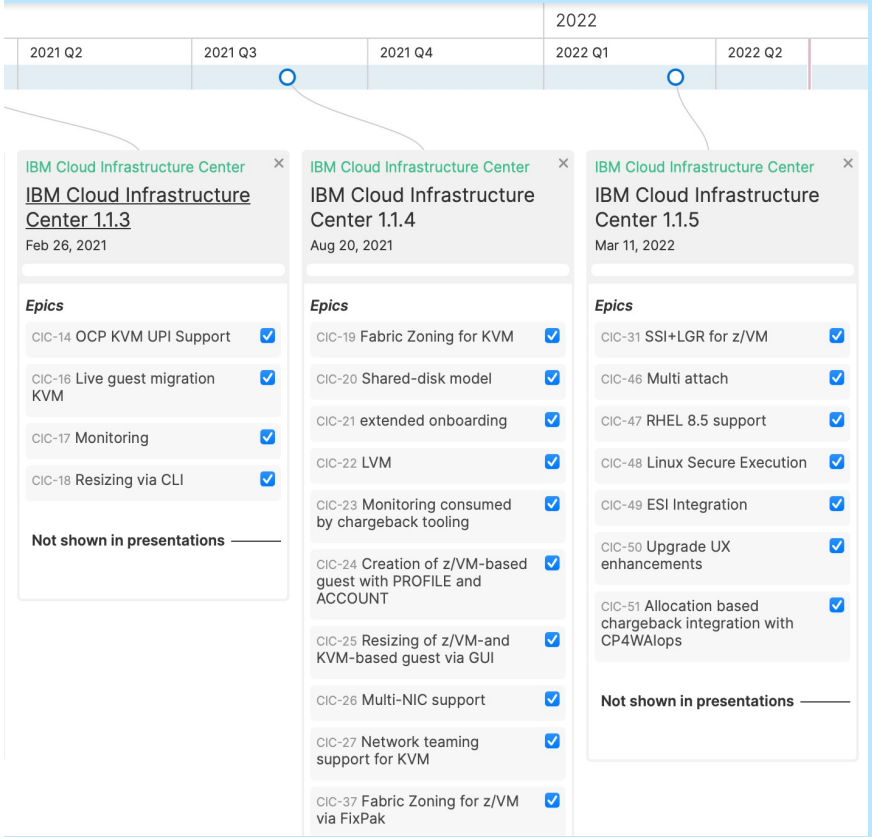
New with 1.1.5

- Fabric zoning support makes the provisioning of virtual machine fully automatically including compute, storage and fabric management
  - Helps administrators to auto manage zones when attaching or detaching persistent storage volumes for VMs, reducing most of the required manual actions.
- Zoning provides an isolation where host or initiators and storage targets can communicate with each other only if they are members of the same zone.
- For detailed information refer to ibm.com/support/pages/node/6515050



Future

You Platform IaaS solution for IBM zSystems and LinuxONE

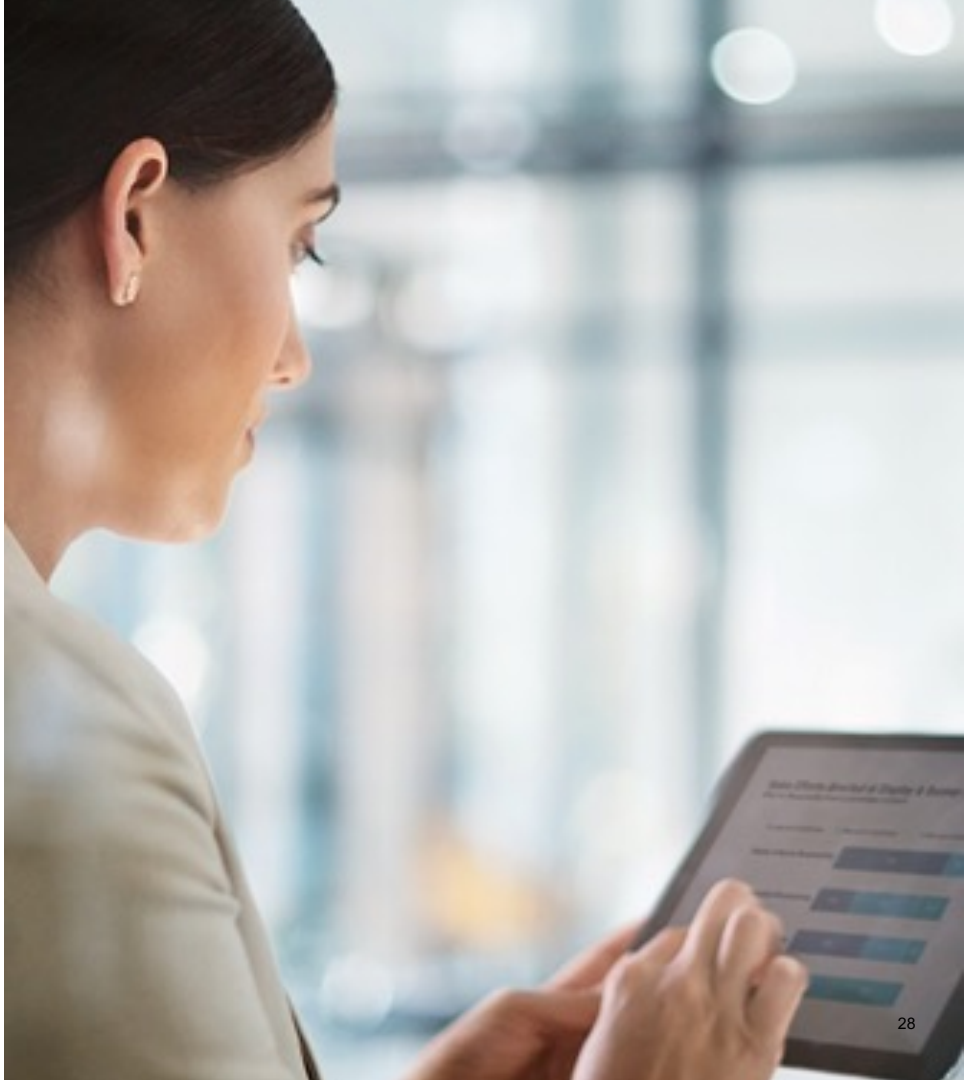


Your Requirements

- HA Cluster
- Network Security Groups
- LPAR support
- SDN
- Operational enhancements
- ….

Get started today!

- Watch IBM Cloud Infrastructure Center webpage
- Read the technical blogs and announcements
- Check out the technical details at the IBM Documentation
- Get started using the Content solution
- Watch IBM z16 webpage
- *Request a demo* from your IBM or business partner representative



Thank you

Stev Glodowski, Product Management Lead, Private Cloud Foundation
stev.glodowski@de.ibm.com

Ingo Adlung, IBM Distinguished Engineer, Chief Architect, and CTO
IBM Z and LinuxONE Virtualization & Linux
adlung@de.ibm.com

Janet Wu, Product Manager, Cloud Infrastructure Center
wujia@cn.ibm.com