

# IBM Z & IBM LinuxONE as THE Hub for the enterprise

Management and Automation

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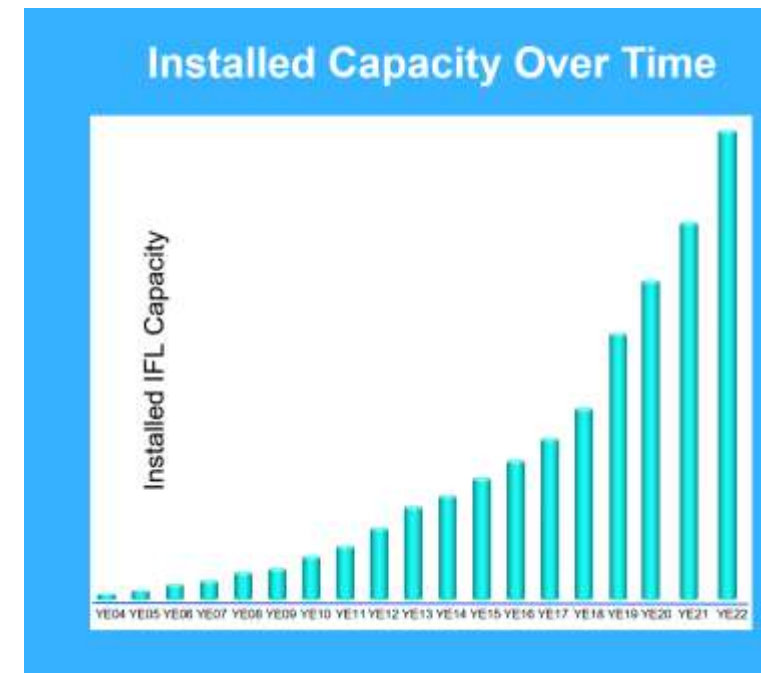


# The future is here... & new business areas



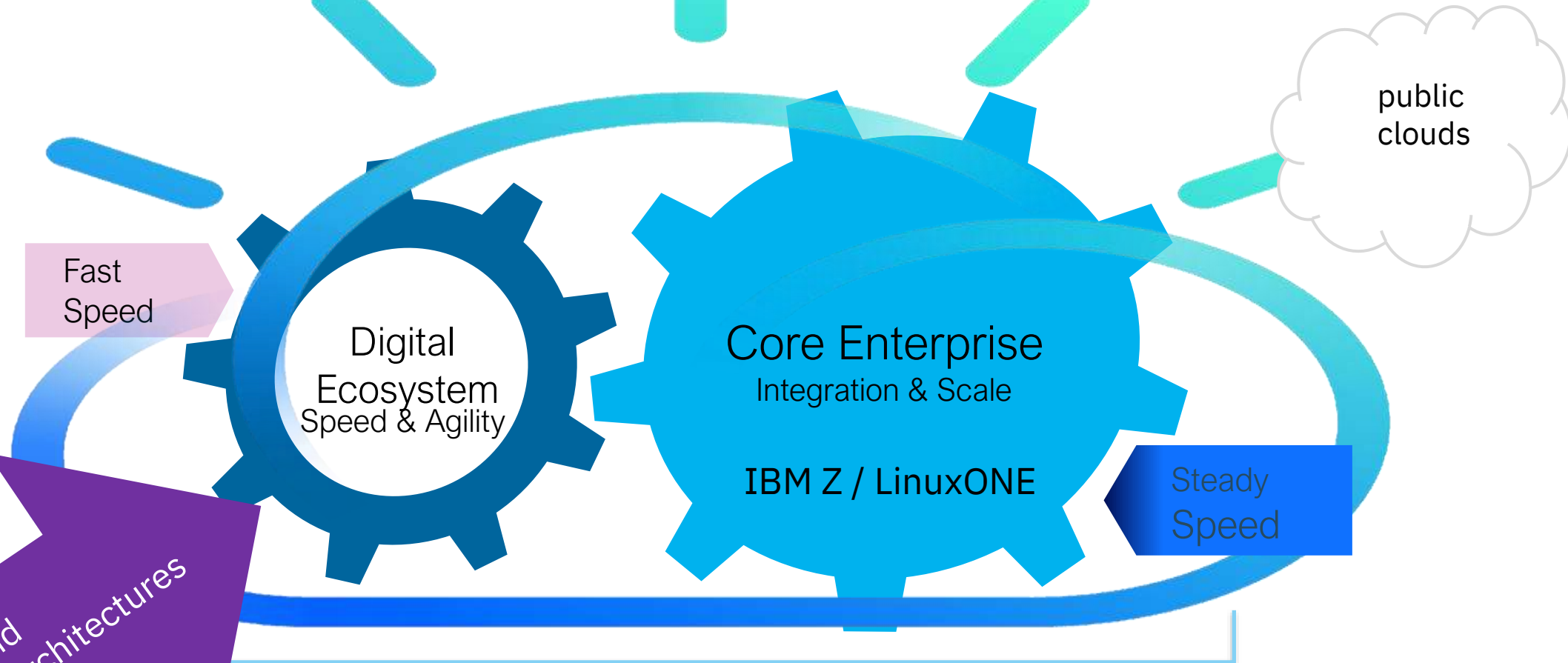
## A growing Market

Installed Linux capacity increased by 22% YTY from 4Q22 to 4Q23



...and a new 'Era of hybrid cloud computing' with IBM Z & IBM LinuxONE

# Today's hybrid IT services, hybrid Cloud and self service



Hybrid service orchestration and traditional transactional & data services orchestrator

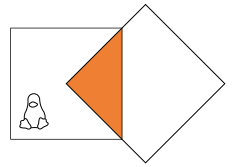
**The cloud service model with end-to-end orchestration capabilities**

How to manage and automate across Architectures

# IBM® z16 & LinuxONE 4 product Portfolio

Building your sustainable infrastructure

IBM® LinuxONE Emperor 4 won the Sustainable Product Award at the [SEAL 2022 Business Sustainability Awards](#)



## IBM® Z & LinuxONE Emperor 4

Designed to support the growth in IT requirements for multi-frame clients  
With superior scalability & efficiency  
With up to 200 cores



## IBM® Z & LinuxONE Rockhopper 4

Designed for roll-in, roll-out single-frame clients, providing enriched capabilities and improved performance per core  
With up to 68 cores



## IBM® Z & LinuxONE Rockhopper 4 Rack Mount

Components designed for colocation with other technology  
Ideal for edge computing  
IBM-installed in customer-supplied rack  
With up to 68 cores



## IBM® LinuxONE 4 Express

Rack mount entry model with easy preconfigured options and simplified support  
With up to 16 cores

# Sell IBM Z & LinuxONE as a secure Hub for the entire enterprise

➤ Why: Most Secure, Role based, Zero Trust environment

## IBM LinuxONE



Hyper Protect  
& Secure Execution

➤ Enterprise Management & Operation Hub

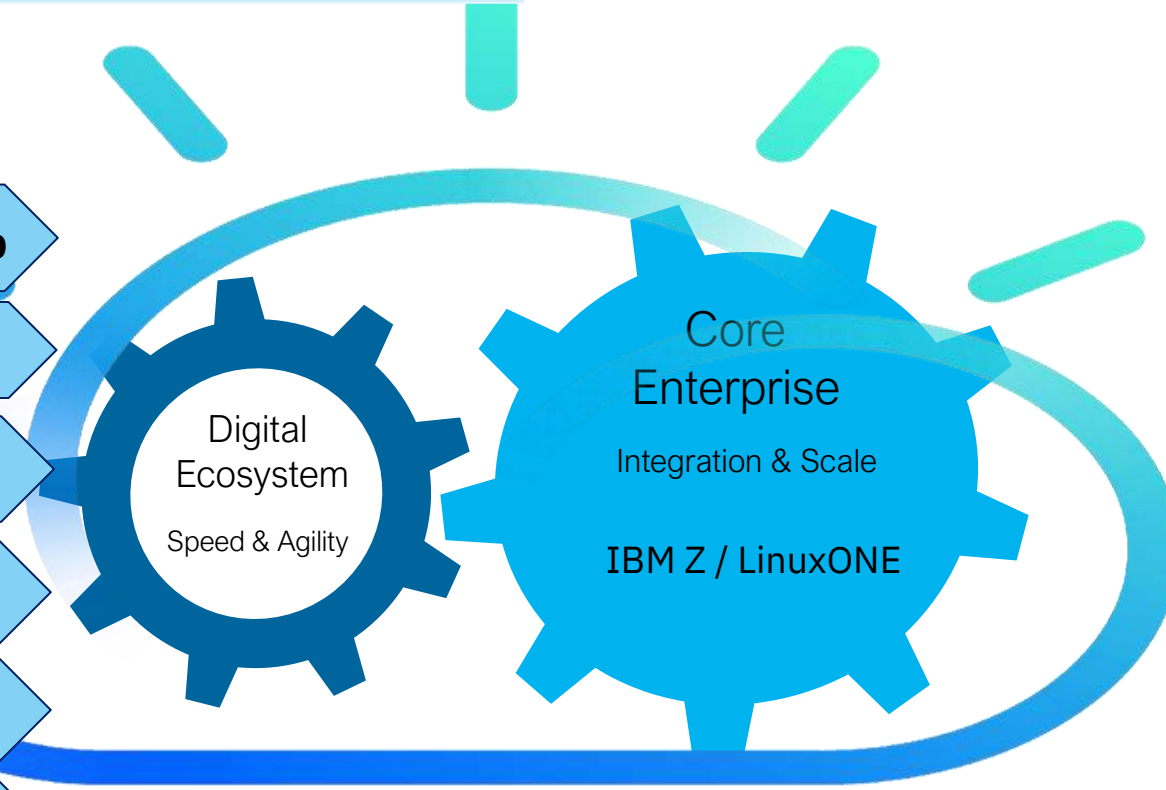
➤ Automation Hub

➤ Data Resiliency Hub, Backup, HA/DR

➤ Integration Hub

➤ Security Hub

➤ Observability Hub, Open Telemetry



**This Management Hub – is a secured centralized service model with end-to-end orchestration capabilities !**

# LinuxONE as the enterprise Hub for your Hybrid Multi-Cloud

Bundles IBM Z & LinuxONE and Software to build the **Hub Options** – start today:



**1. Enterprise Management & Operation Hub**

( **SW:** ACM, ICIC)



**2. Enterprise Automation Hub**

( **SW:** RH Ansible Automation Platform, ICIC)

**3. Data Resiliency Hub, Backup, HA/DR**

( **SW:** Storage Protect+, GDPS Appliance, ACM)

**4. Enterprise Security Hub**

( **SW:** ACS, Security Gateway, Confid. Computing & Secure Execution (SE) enabled SW, Hyper Protect Encrypt Serv)

**5. Enterprise Integration Hub for Hybrid Cloud**

(**SW:** CP4I, ACE, AMQ, CP4BA, Data Gate, Nooba GW)

**6. Observability Hub**

( **SW:** Instana, Turbonomics, Open Telemetry)

IBM z16 / LinuxONE  
or Rack Mount



# (1) LinuxONE as Management Hub



High benefit with inheritance of LinuxONE characteristics:

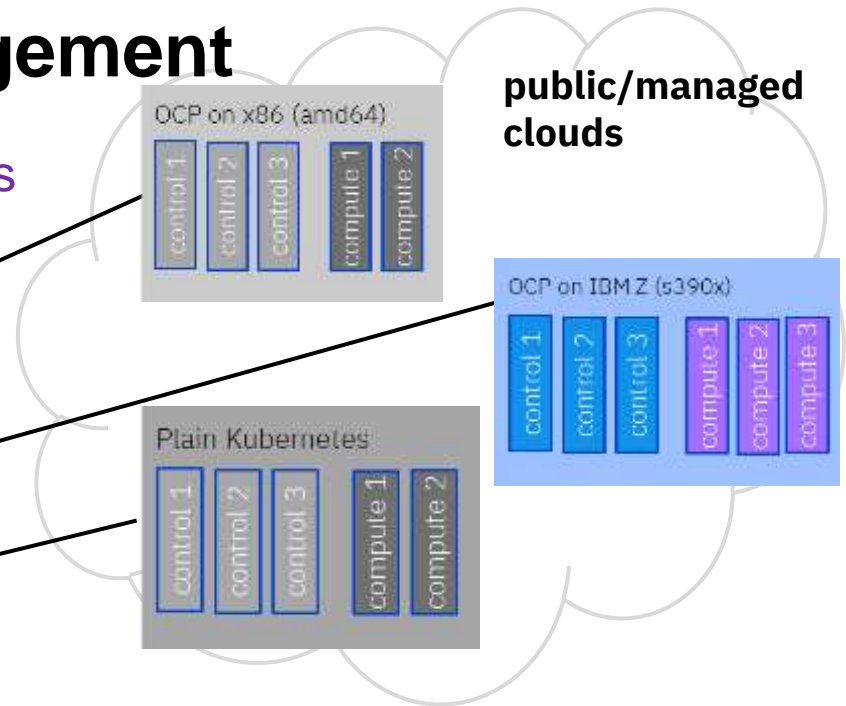
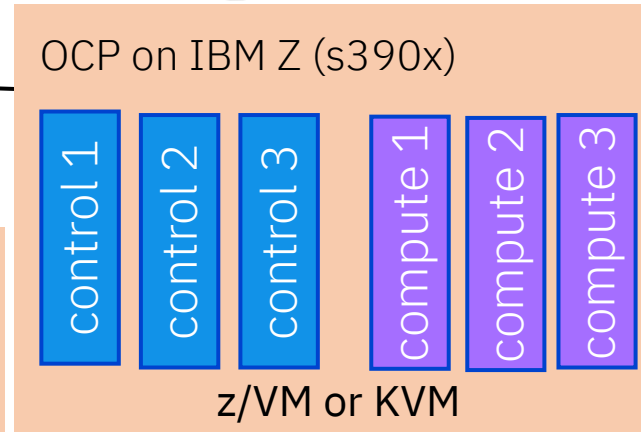
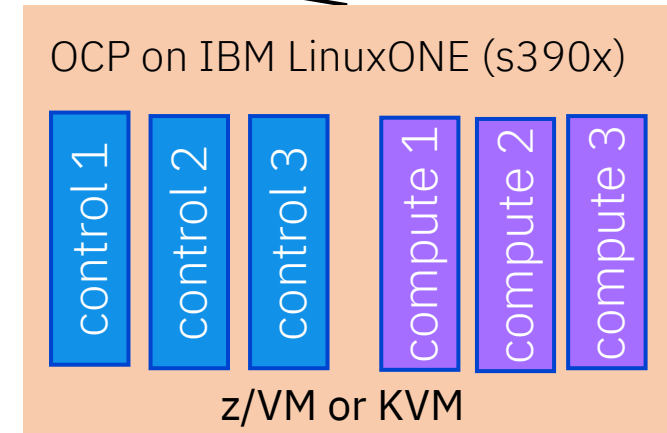
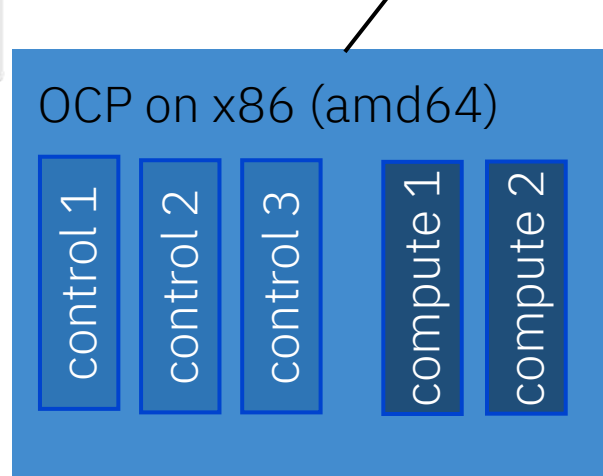
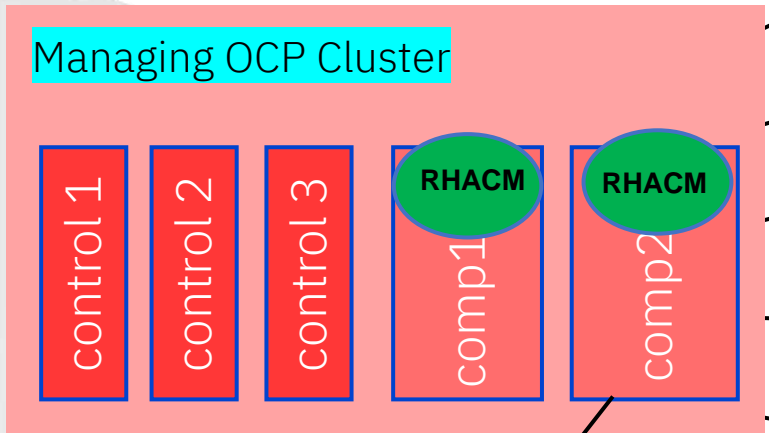
- Security
- Scalability
- Resiliency

## Goal: Centralized Common toolset

- **Hybrid Multi-Architecture Multi Cloud management**
  - using RH Advanced Cluster Management for Kubernetes
  - single Pane of Glas
  - on-premise
  - heterogeneous Kubernetes Container environments
  - Multi Cloud & Multi-Architecture
  - including Kubernetes in public clouds
- **Infrastructure management with IBM Cloud Infrastructure Center (ICIC)**
  - Virtual environment management (VMs)
  - Infrastructure management
  - External tools enablement for LinuxONE management

# ➤ Hybrid Multi-Architecture Multi Cloud management

- traditional RH OpenShift landscape managed from a single pane of glass using [Red Hat Advanced Cluster Management for Kubernetes](#) (RHACM)





# Red Hat Advance Cluster manager (RHACM) pillars



# Red Hat Advanced Cluster Management Overview (RHACM)



Multicluster lifecycle management



Policy driven governance, risk, and compliance



Advanced application lifecycle management



Multicluster observability for health and optimization

Red Hat Advanced Cluster Management for Kubernetes

Overview

Google 2 Cluster  
Amazon 6 Cluster  
Microsoft 1 Cluster  
IBM 1 Cluster

Summary

4 Applications 10 Clusters 1 Subnet/Type 5 Region 60 Nodes 2513 Pods

Cluster compliance 66%  
100% Compliant  
34% Non-compliant

Pods 100%  
24% Pending  
47% Running  
29% Failed

Cluster status 100%  
100% Ready  
0% NotReady

Governance and risk

Summary

NIST-CSF 10 / 10 Cluster violations  
NIST SP 800-53 8 / 11 Policy violations  
NIST SP 800-53 2 / 2 Cluster violations  
NIST 1 / 1 Policy violations

ISO

Policy name	Namespace	Remediation	Cluster violation	Standard	Category	Context	Created
policy-gpu-limits	open-cluster-management-policies	warn	0 / 1	NIST	HS-23 Data Privacy	FR-20-2 Data In Transit	23 hours ago
policy-gpu-usage	open-cluster-management-policies	warn	0 / 1	ISO	ISO-27001 Security	FR-25-2 Data In Transit	23 hours ago
policy-gpu-memory-limit	open-cluster-management-policies	warn	2 / 10	NIST-CSF	HS-18 Access Control Processes and Procedures	FR-18 Resource Configuration	2 days ago
policy-gpu-memory-usage	open-cluster-management-policies	warn	0 / 1	NIST-CSF	HS-18 Access Control Processes and Procedures	FR-18 Resource Configuration	2 days ago
policy-gpu-memory-usage	open-cluster-management-policies	warn	0 / 1	NIST-CSF	HS-18 Access Control Processes and Procedures	FR-18 Resource Configuration	2 days ago
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policy-gpu-memory-usage	open-cluster-management-policies	warn	0 / 1	NIST-CSF	HS-18 Access Control Processes and Procedures	FR-18 Resource Configuration	2 days ago

Top 10 Most Violated Clusters (% CPU usage)

Cluster Name | Most Violated | Requested | Utilized

cluster-1	27.4%	41.3%	25.1%
cluster-2	30.2%	30.3%	17.6%
cluster-3	30.9%	40.8%	17.1%
cluster-4	1.4%	21.4%	30.8%
cluster-5	32.2%	49.9%	16.4%
cluster-6	41.6%	67.4%	11.7%
cluster-7	33.4%	31.7%	10.4%

Red Hat

# ➤ IBM Cloud Infrastructure Center for Infrastructure-as-a-Service for IBM Z and IBM<sup>®</sup> LinuxONE



Guest provisioning  
for traditional  
workloads



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

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



# Capabilities

Modernize for hybrid cloud and traditional workloads – 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 IBM® LinuxONE.



## Service automation

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



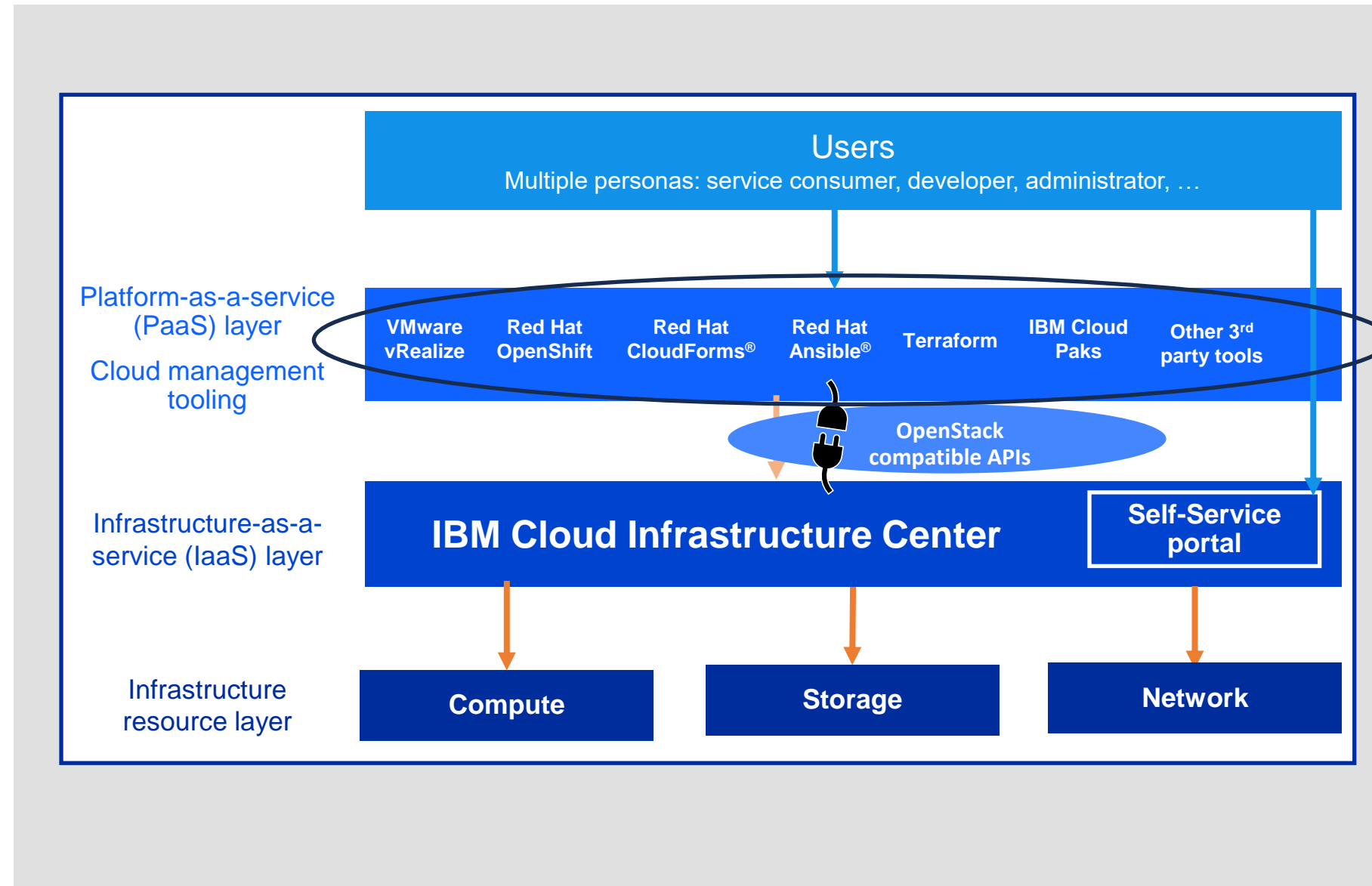
## Cloud integration

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

# IBM's hybrid cloud management approach

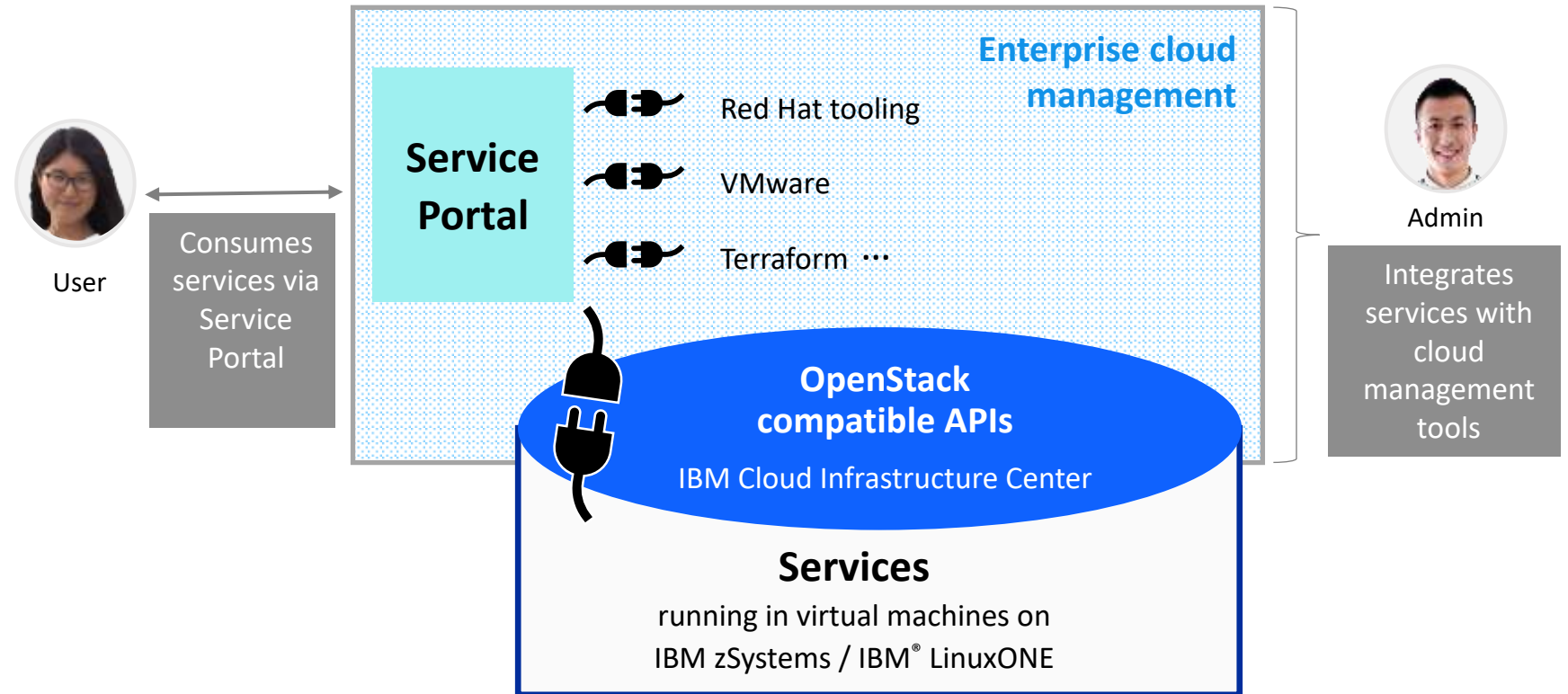
## IBM Cloud integration via cloud tools

- Connecting the layers enables to integrate the IBM Z / IBM® LinuxONE infrastructure across the enterprise.



# Enterprise cloud management

- Via OpenStack compatible APIs, Cloud Infrastructure Center allows for easy integration with cloud management tools to provide an out-of-the-box experience
- to users

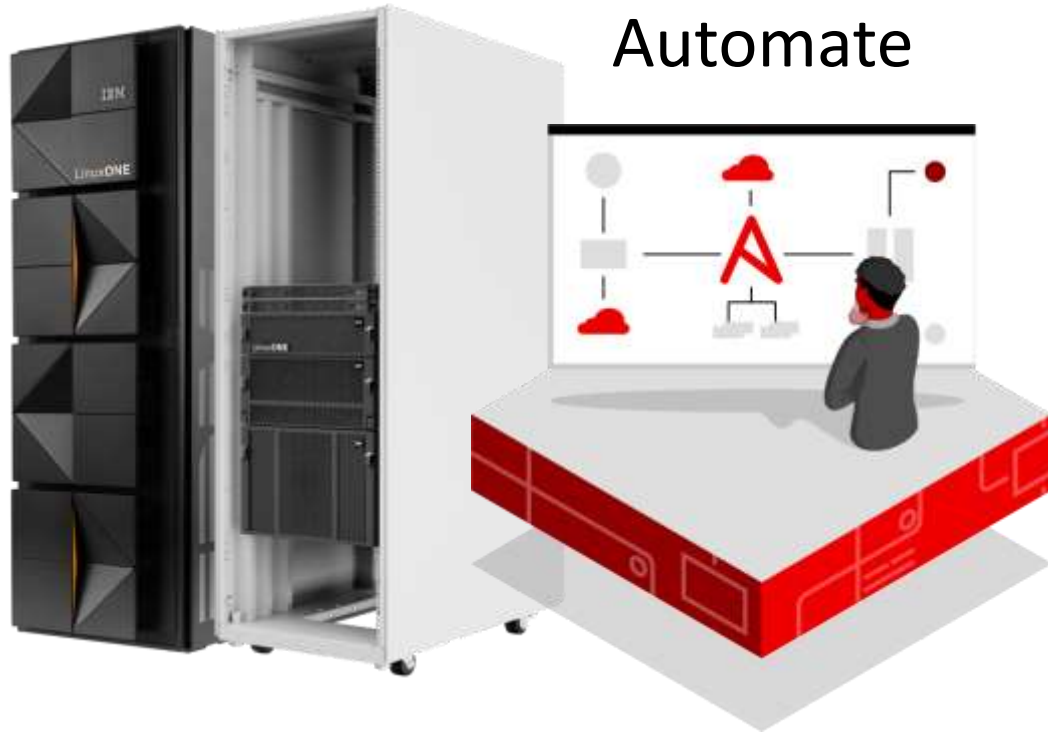




# Use cases

- **Simplified experience with virtualization**
- *“Simplify”*
- Industry standard based and vendor-agnostic technology for simplified IaaS management
- **Deployment support 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.

## (2) LinuxONE as Automation Hub



High benefit with inheritance of LinuxONE capabilities:

- Security
- Scalability
- Resiliency

### Goal: Common enterprise toolset

➤ **Centralized Enterprise Automation management using RH Ansible Automation Platform**

- on IBM LinuxONE

- Integrate RH Ansible with Infrastructure tooling
- Integrate RH Ansible with Linux on Z
- Make use of Content Collections for IBM Z & z/OS
- Automate heterogeneous CI/CD and Container environments
- single Pane of Glas for Automation control
- on-premise
- multi-Architecture
- including public clouds

➤ **Centralized integrated RH OpenShift Automation**

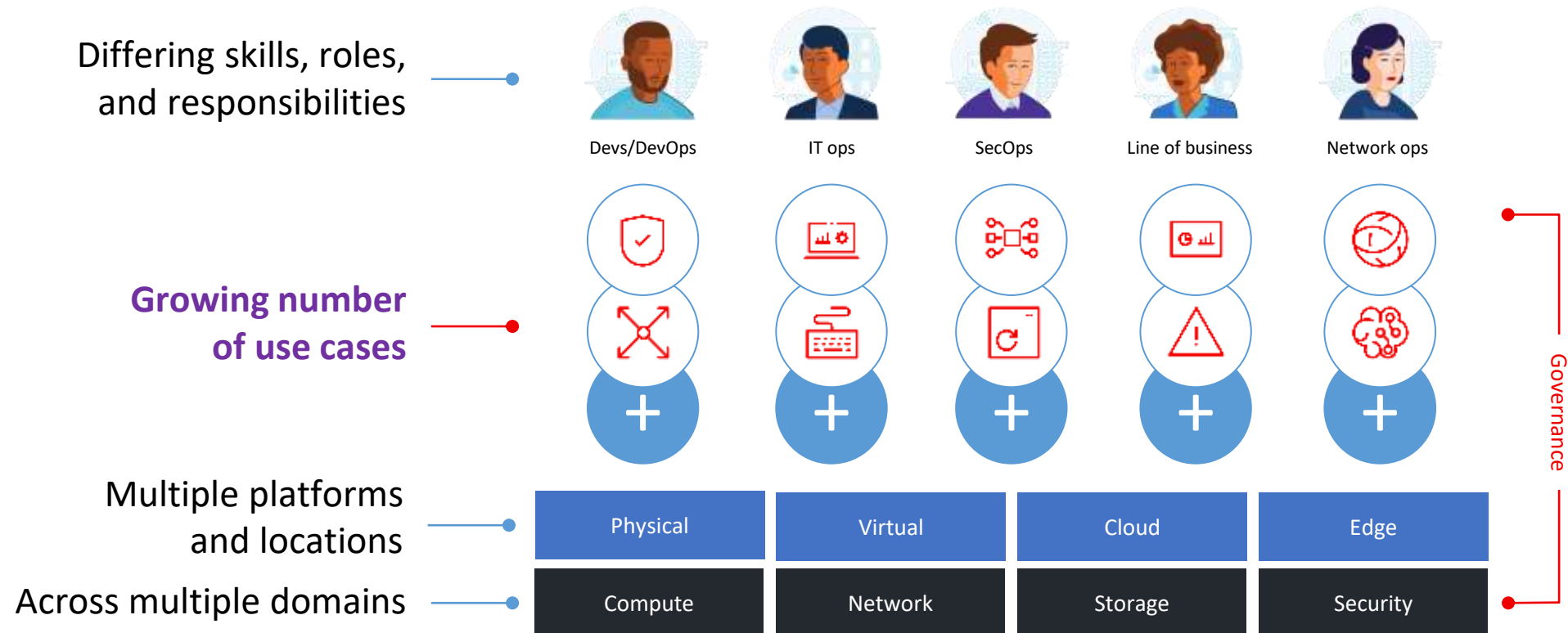
- using OpenShift Pipelines

- across RH OpenShift environments



# Challenges that require Automation

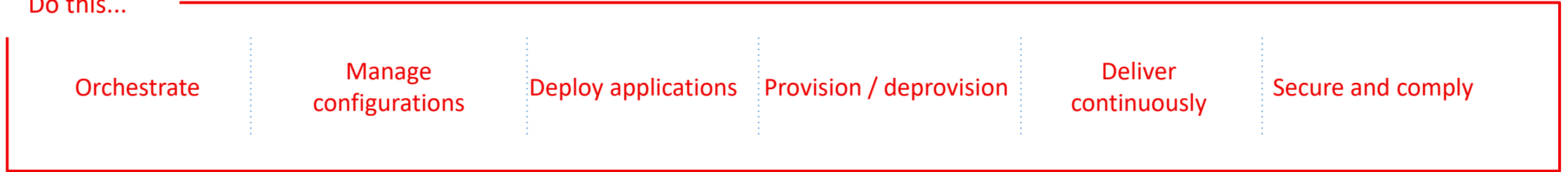
Many organizations share the same challenge



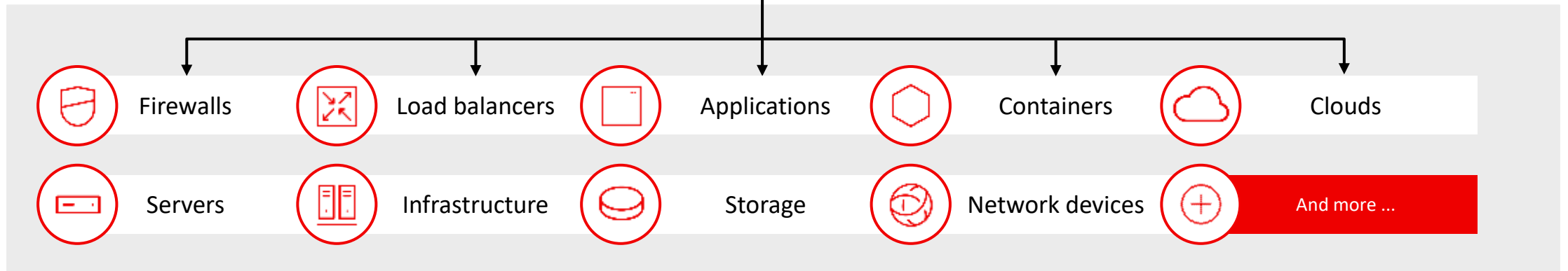
# Red Hat Ansible Automation Platform

## All your IT environments

Do this...



On these...



# Red Hat Ansible usage with IBM Z and IBM LinuxONE

Ansible can be helpful to work with/automate the following IBM Z / IBM LinuxONE environments as well:

- Linux on IBM Z / IBM LinuxONE
- IBM z/VM
- KVM on IBM Z / IBM LinuxONE
- Red Hat OpenShift
- IBM Cloud Infrastructure Center

Developers, administrators, and operators can benefit from **pre-existing certified content** to build from, for both building and testing.

## Ansible Content Collections

Ansible content can be created and managed internally for your organizations to use. However, curated content is also available from Red Hat through Ansible Content Collections. These collections provide developers with the option of building on curated automation content, which includes more than 100 certified collections and more than 40,000 modules.

- [Ansible Content Collections](#)
- [Getting Started With Ansible Content Collections](#)

## Ansible automation hub

This hosted service is the place for users to find and use supported Ansible Content Collections, which contains modules, roles, and plug-ins, along with the documentation needed to get started.

- [Ansible automation hub](#)

# Red Hat Ansible Certified Content for IBM z/OS environment

## [IBM CICS® TS Operator](#)

collection provides automation for provisioning CICS TS on one or more z/OS endpoints and managing its lifecycle in a hybrid cloud environment.

## [IBM z/OS IMS collection](#)

supports tasks such as generating IMS Database Descriptors (DBD), Program Specification Blocks (PSB), Application Control Blocks (ACB), and running IMS type-1 & type-2 commands.

## [IBM Operator Collection](#)

[SDK](#) provides the automation to deploy an operator in your namespace that contains your latest Ansible collection modifications, quickly redeploy your local modifications in seconds, and delete the operator once development is complete.

## [IBM Z Open Automation Utilities Operator collection](#)

provides automation for installing the ZOAU language on one or more z/OS endpoints and managing its lifecycle in a hybrid cloud environment. It uses the z/OS Package Manager to install the software on to z/OS and manage its lifecycle.

## [IBM z/OS core collection](#)

supports automation tasks submitting / querying jobs, creating / fetching / copying data sets, executing operator / TSO commands, ping, querying operator actions, backing up and restoring data sets / volumes, APF authorizing libraries, mounting file systems, running z/OS programs without JCL, initializing volumes, archiving / unarchiving / templating with Jinja, etc.

## [IBM Z System Automation](#)

collection supports operational tasks using the IBM Z System Automation Operations API such as creating and deleting dynamic resources from a template defined in the current active policy of an IBM Z System Automation environment. It interacts with IBM Z System Automation using the SA Operations API provided by the SA Operations REST Server.

## [IBM z/OS Package Manager](#)

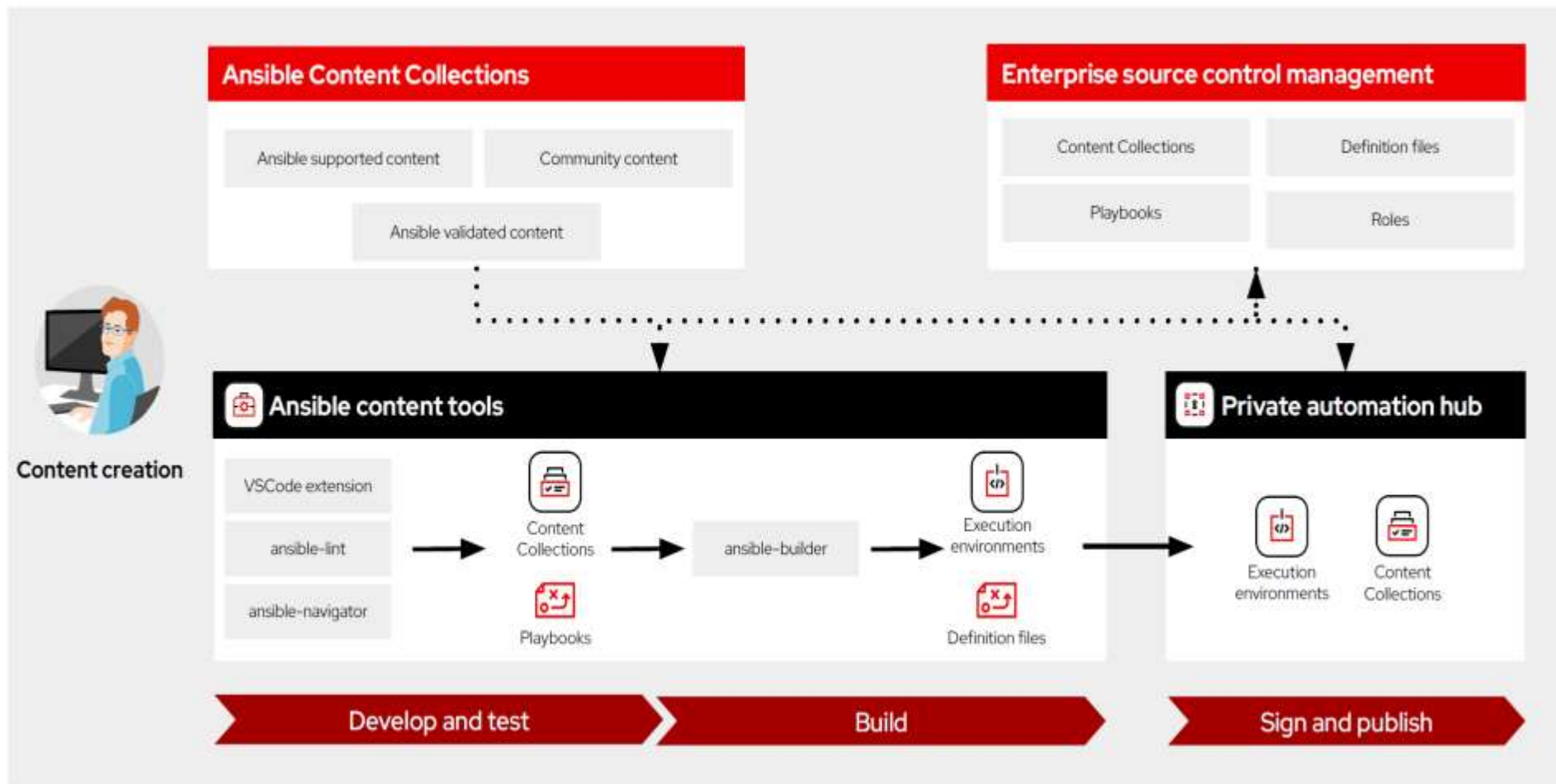
collection provides automation for installing z/OS Package Manager and the z/OS products on one or more z/OS endpoints and managing their lifecycle in a hybrid cloud environment. IBM z/OS Package Manager is a utility that can install any z/OS software that is packaged as an OCI artifact on z/OS.

## [IBM z/OSMF collection](#)

supports automation tasks such as operating z/OS workflows, provisioning and managing z/OS middleware / software, via z/OSMF RESTful services.

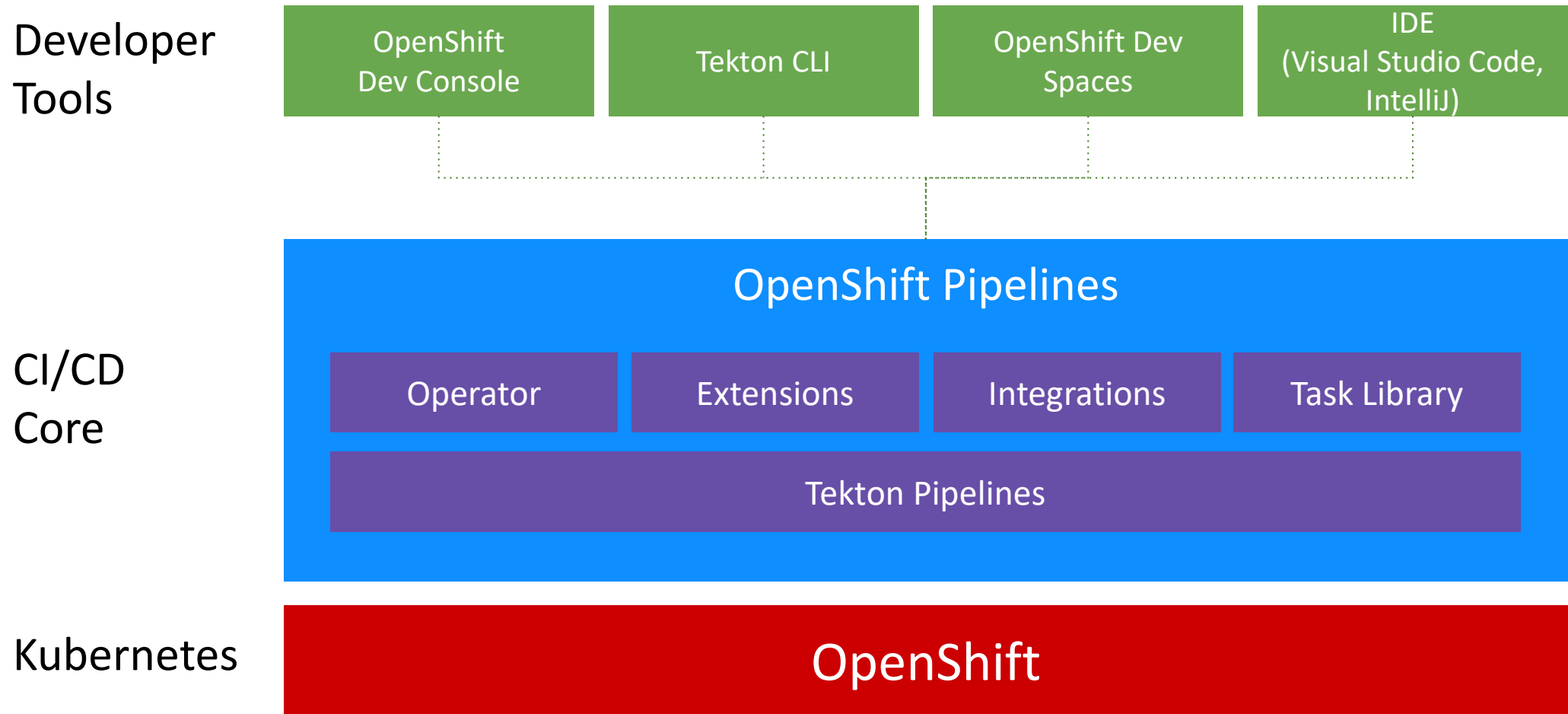
# Red Hat Ansible Automation Platform

## The automation content life cycle.



# Centralized integrated RH OpenShift Automation

- using **OpenShift Pipelines (Tekton)**



# Main Concepts of OpenShift Pipeline Triggers



## Trigger

Start pipelines based on events: GitHub Webhooks  
Gitlab events, Cron jobs  
Custom event

## Event Listener

A listener for events, which transforms them into some actions

## Interceptor

An event processor for filtering, verification and transformation

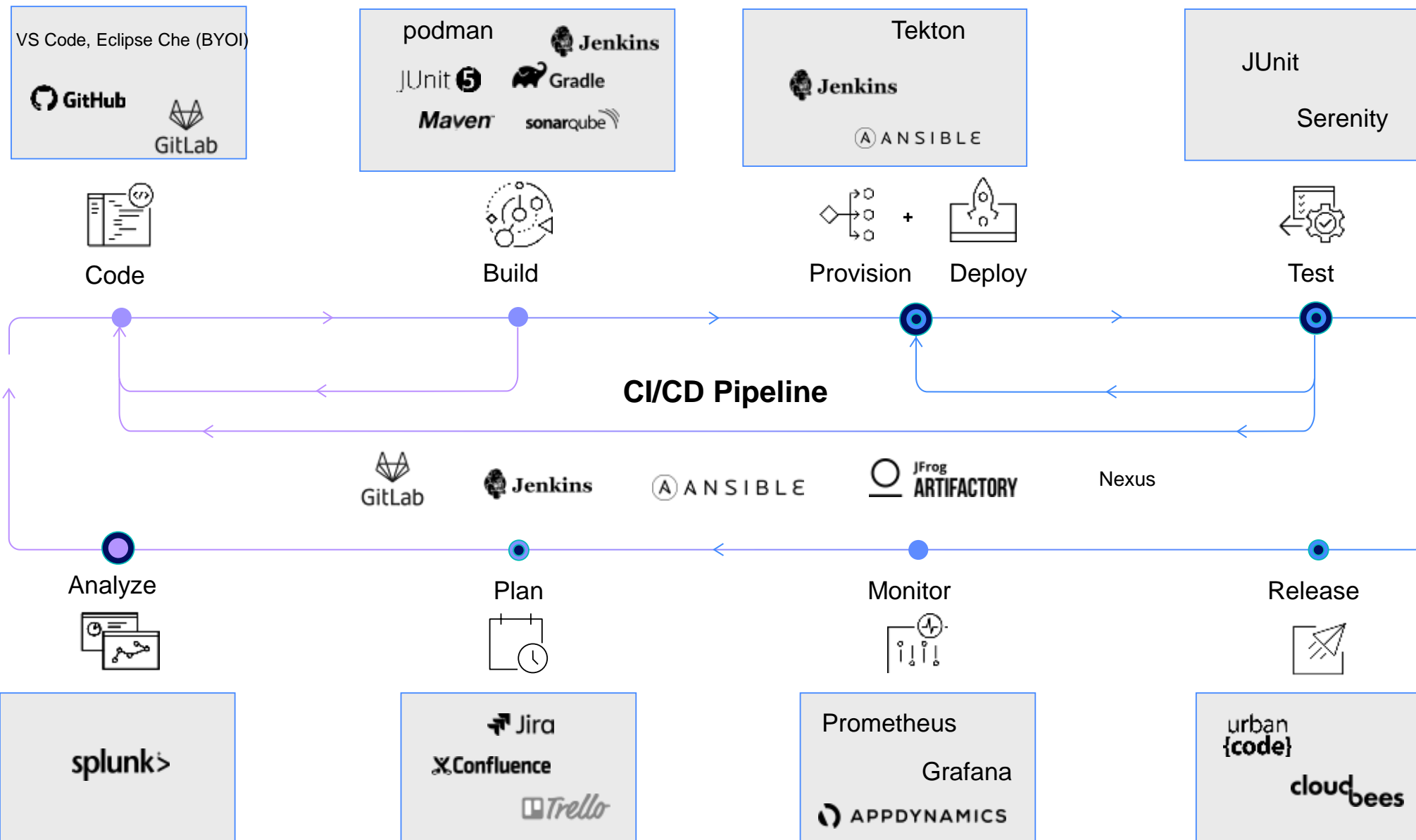
## Trigger Binding

A mapping between event payload and Trigger Template parameters

## Trigger Template

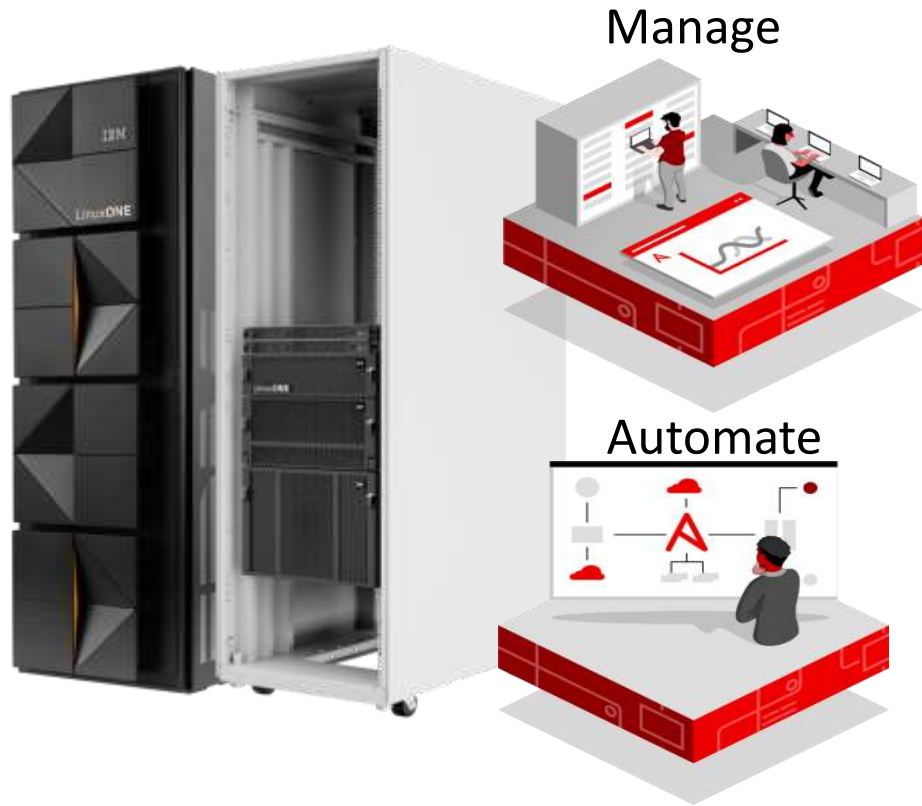
A template for resource to create based on event info

# DevOps and CI/CD integrate well with Ansible





# Conclusion: Exploit IBM Z & LinuxONE as Management and Automation Hub



High benefit with inheritance of LinuxONE characteristics:

- Security
- Scalability
- Resiliency

## Goal: Centralized Common toolset

- Infrastructure management for IBM Z & LinuxONE with **IBM Cloud Infrastructure Center (ICIC)**
- Hybrid Multi-Architecture Multi Cloud management using **RH Advanced Cluster Management for Kubernetes**
- Centralized Enterprise Automation management using **RH Ansible Automation Platform on IBM Z & LinuxONE**
- Centralized integrated RH OpenShift Automation using **OpenShift Pipelines**

# Why IBM Z Architecture best fits for hybrid containerized workloads

- **Perfect fit for dynamic workloads**, due to vertical scalability
  - Can support unpredicted Microservices/Container growth and spin
- **Fine granular capacity allocation & sharing** through virtualization
  - Useful for individual Microservice/Container scalability
- **Massive number of secured Microservices/ Containers**
  - millions container on a single server
  - advantage of scale up vs. scale out on x86
- **Most securable server** and high-speed encryption
  - Highest certified multi-tenant security & crypto, Quantum safe
- **Easy failover** in case of errors or service crash
  - Containers are designed for failure and profit from HW with HA / DR

# Questions?



**Wilhelm Mild**

*IBM Executive IT Architect*



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