



What's Next in OpenShift

Q4CY2022

OpenShift Product Management

Hybrid Cloud and the Red Hat OpenShift Roadmap

Red Hat Hybrid Cloud Experience

Red Hat OpenShift Platform Plus

Yesterday-Today-Tomorrow

Private Datacenter to
Public Cloud



DATACENTER-CENTRIC IT



Today-Tomorrow

Public Cloud to
Hybrid Cloud & Multi Cloud



SERVICE-CENTRIC SOLUTIONS



Future

Hybrid Cloud extends to
Enterprise Edge Infrastructure



**SERVICES ON DISTRIBUTED
EDGE**

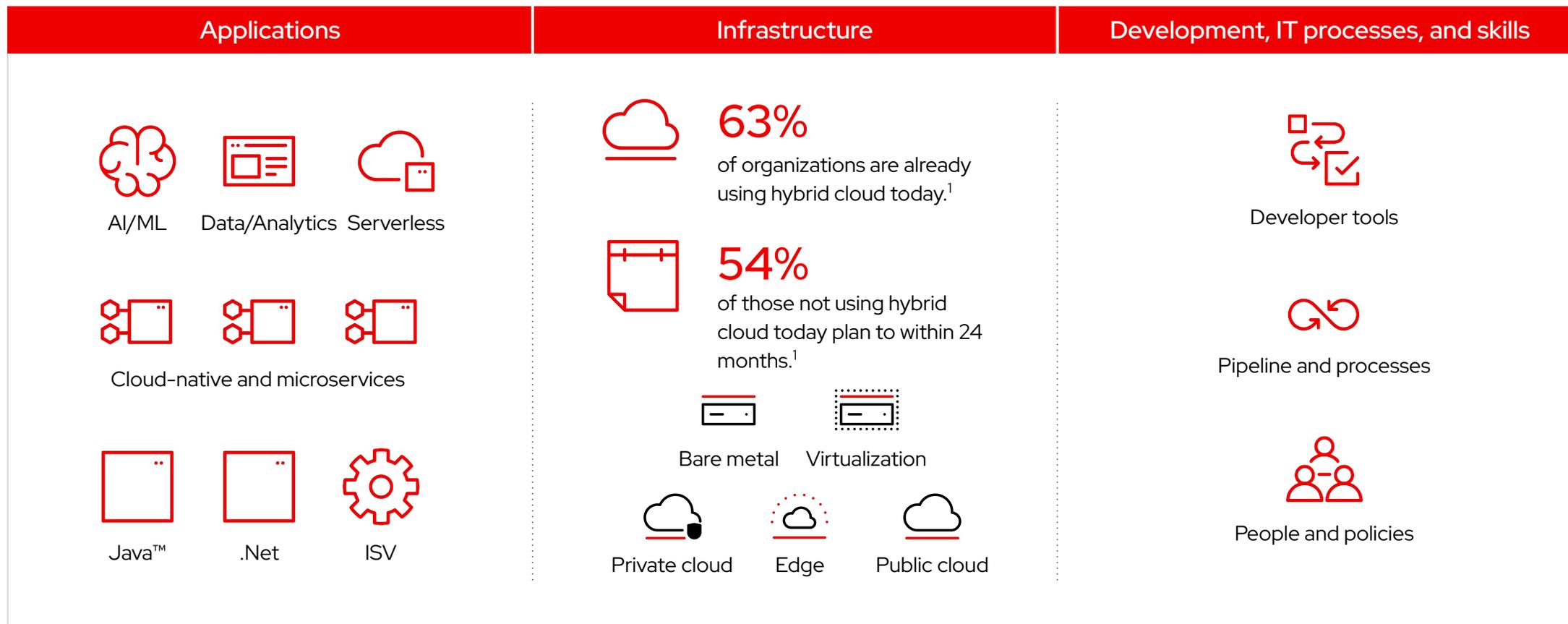
Red Hat OpenShift Cloud Services

Red Hat OpenShift as a managed service

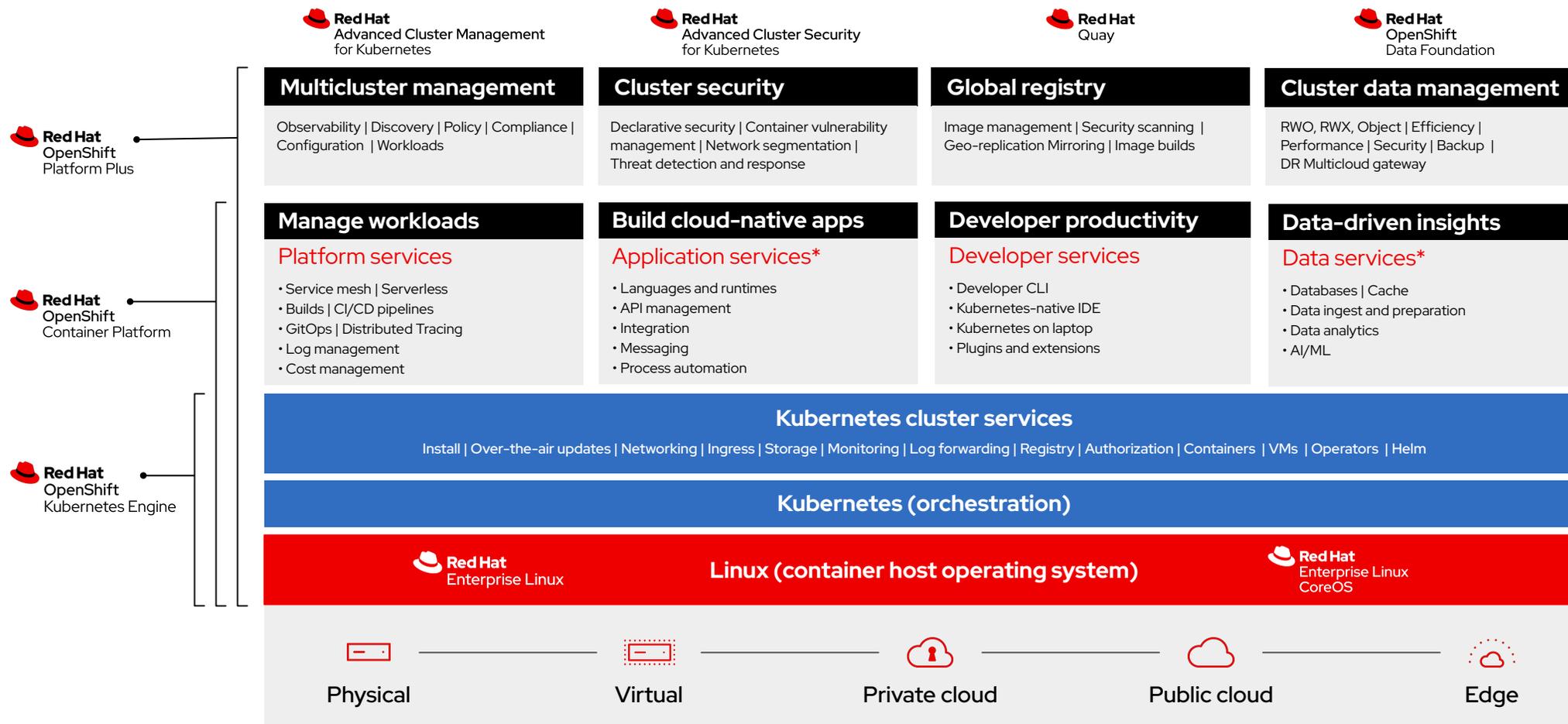
Red Hat OpenShift Platform

Hybrid Cloud is about more than Infrastructure

Hybrid app portfolios, infrastructure environments and mix of tools & processes



Red Hat Hybrid Cloud Platform



* Red Hat OpenShift® includes supported runtimes for popular languages/frameworks/databases. Additional capabilities listed are from the Red Hat Application Services and Red Hat Data Services portfolios.

** Disaster recovery, volume and multicloud encryption, key management service, and support for multiple clusters and off-cluster workloads requires OpenShift Data Foundation Advanced

Available as self-managed platform or fully managed cloud service

Start quickly, we manage it for you

Cloud managed

Managed Red Hat OpenShift services			
 <p>Red Hat OpenShift service on Amazon Web Services¹</p>	 <p>Microsoft Azure Red Hat OpenShift</p>	 <p>Red Hat OpenShift on IBM Cloud¹</p>	 <p>Red Hat OpenShift Dedicated²</p>

You manage it, for control and flexibility

Customer managed

Self-managed Red Hat OpenShift			
 <p>Red Hat OpenShift Platform Plus</p>	 <p>Red Hat OpenShift Container Platform</p>	 <p>Red Hat OpenShift Kubernetes Engine</p>	<p>On public cloud, or on-premises on physical or virtual infrastructure³</p>

Source:
 2 Red Hat managed service running on user-supplied GCP infrastructure
 3 See docs.openshift.com for supported infrastructure options and configurations

Software supply chain security

Executive Order on Improving The Nation's Cybersecurity

May 12, 2021



(vii) providing a purchaser a Software Bill of Materials (SBOM) for each product directly or by publishing it on a public website;

Sec. 2. Removing Barriers to Sharing Threat Information.



(f) Within 60 days of the date of this order, the Secretary of Commerce, in coordination with the Assistant Secretary for Communications and Information and the Administrator of the National Telecommunications and Information Administration, shall publish minimum elements for an SBOM.

Sec. 2. Removing Barriers to Sharing Threat Information.

Supply-Chain Levels for Software Artifacts (SLSA)

Contributing to the development of SLSA

- ▶ Red Hat mapped SLSA to corresponding standards, frameworks, and the 2021 cybersecurity executive order, and made it publicly available
 - SSDF v1.1
 - NIST 800-53r5
 - EO 14028
 - NIST SP800-161r1
- ▶ SLSA is about the end user's ability to verify the security of the software they purchase
- ▶ Red Hat is actively contributing upstream to SLSA automation





CI/CD & GitOps

OpenShift Pipelines

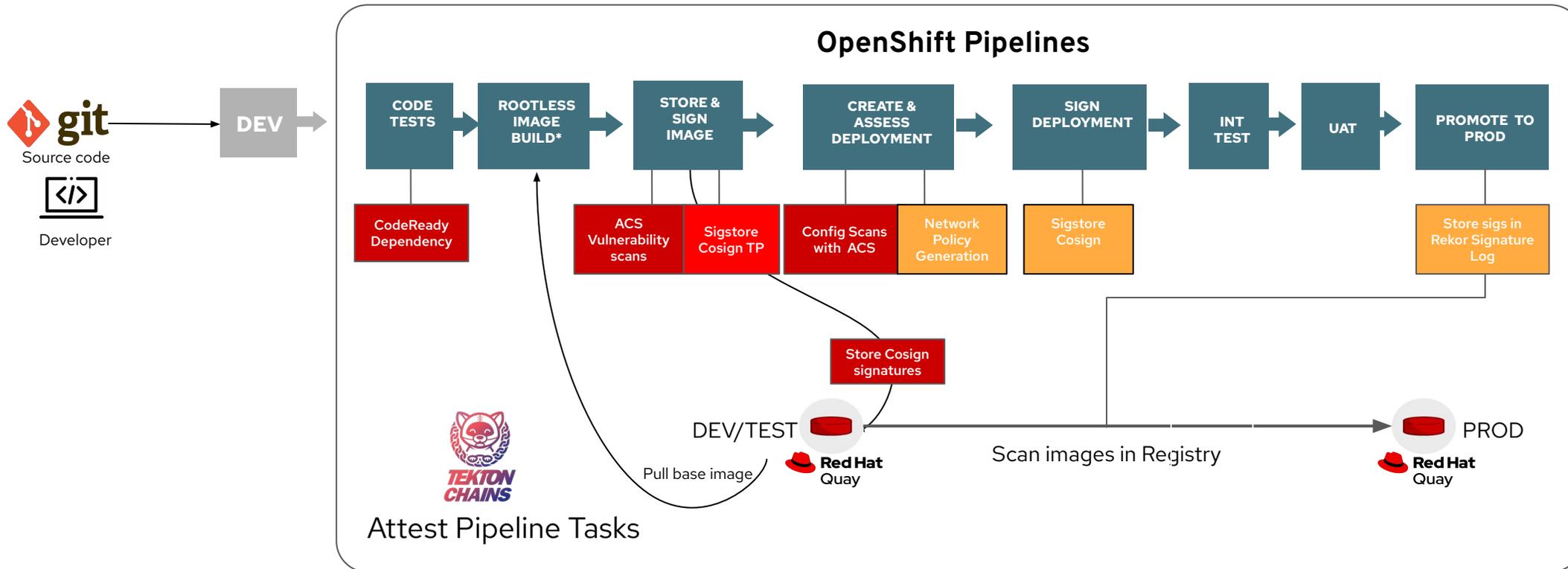
- ▶ **Security** - Tekton Chains GA, Security configuration levels for image builds, Secure-by-default image builds
- ▶ **Observability** : Openshift Pipelines Long-term history and log retention
- ▶ **Customization**: New CLI , Red Hat Tekton Catalog, Manual Approval, Resource Quota for pipelineruns

OpenShift GitOps

- ▶ **Security**: Supply chain signing, Multi-tenancy improvements, secrets manager integration
- ▶ **Observability**: Monitoring dashboards
- ▶ **Automation**: Argo Rollouts, Image updater
- ▶ **Platform**: ARM support

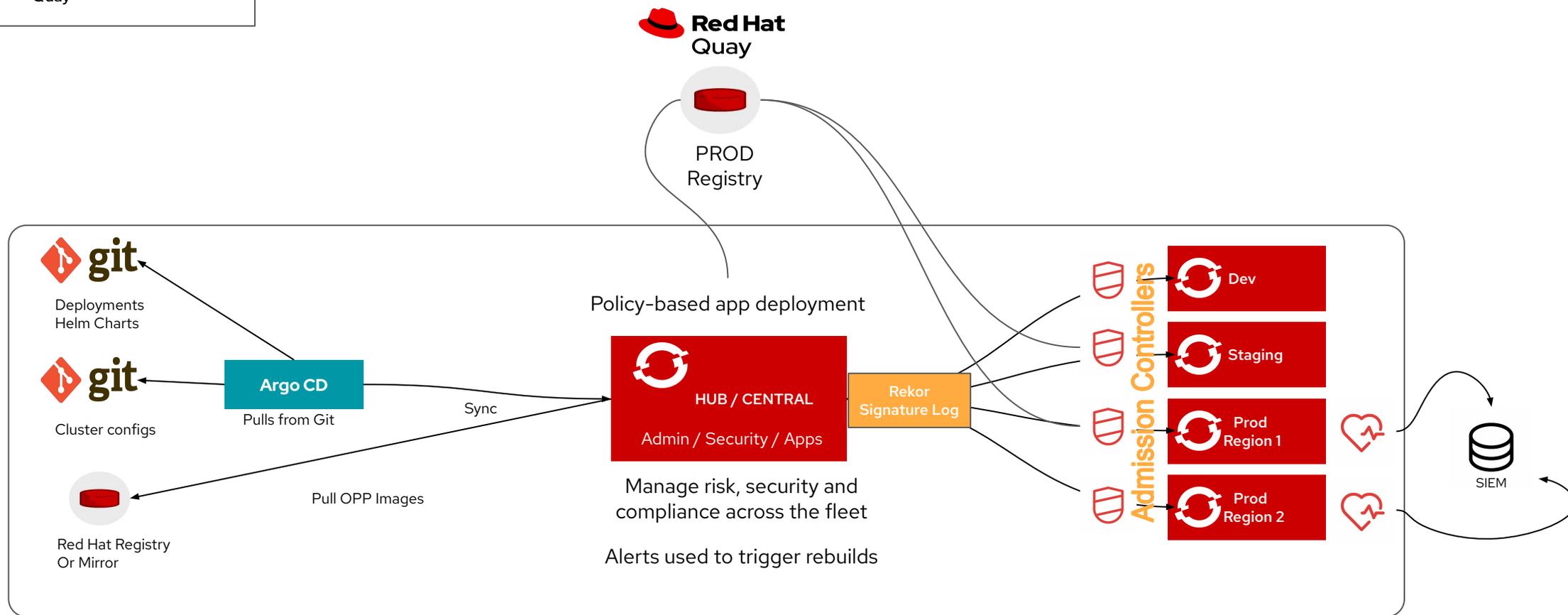
-  **Red Hat**
OpenShift
Container Platform
-  **Red Hat**
Advanced Cluster Management
for Kubernetes
-  **Red Hat**
Advanced Cluster Security
-  **Red Hat**
Quay

Validated Pattern for multi-cluster DevSecOps Application Build and CI



-  **Red Hat**
OpenShift
Container Platform
-  **Red Hat**
Advanced Cluster Management
for Kubernetes
-  **Red Hat**
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-  **Red Hat**
Quay

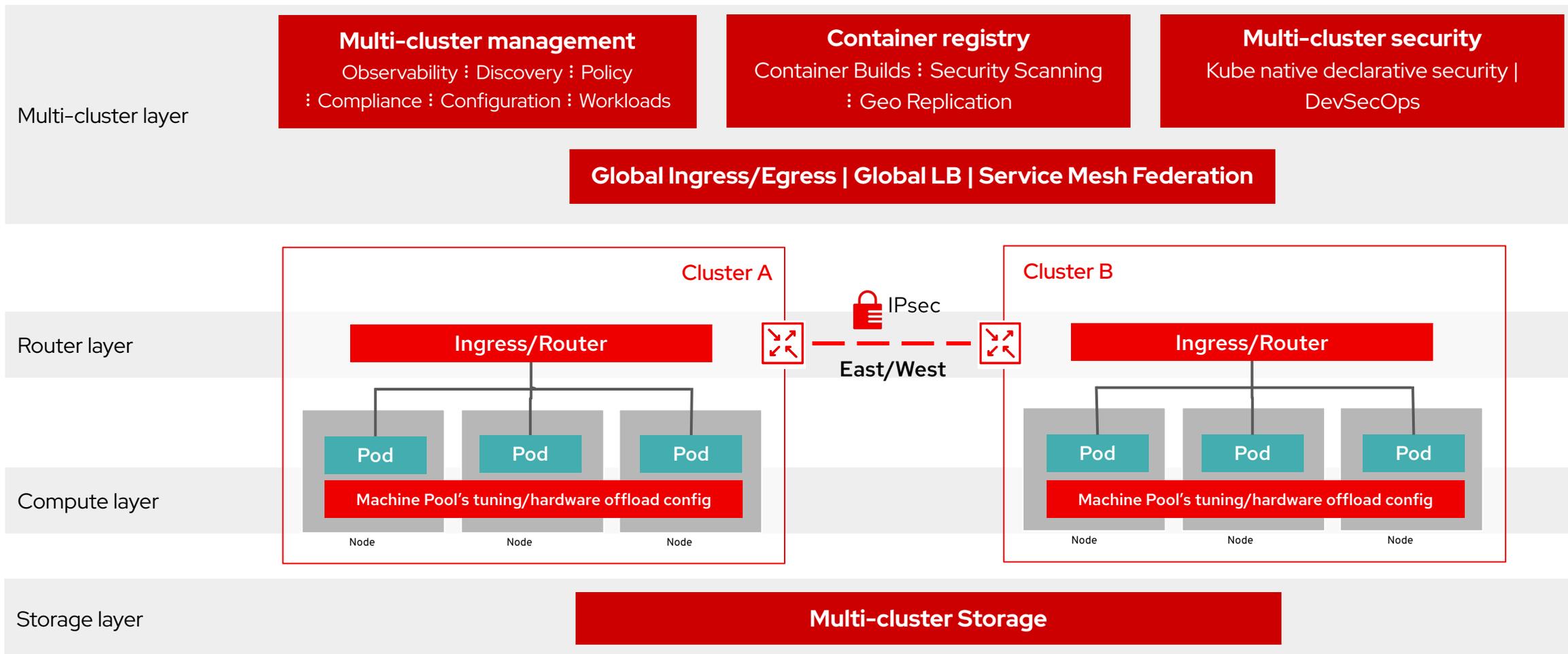
Validated Pattern for multi-cluster DevSecOps Application CD



Multicluster management, governance and security

Standardized Tools for Your 1st and 100th Cluster

A single hybrid cloud platform for enterprises to build, deploy, run, manage, automate, and secure intelligent applications at scale





Red Hat Advanced Cluster Management for Kubernetes



Unified Experience

Unified cluster inventory across RH cloud and on premises.
Improved visibility of operator health.
User workload monitoring of fleet application and workloads.



Increase Return on Investment

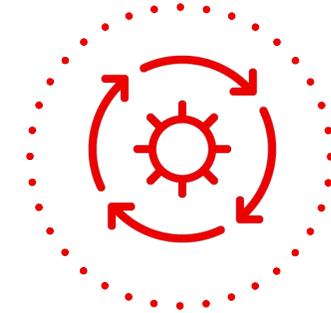


Security Everywhere

Improvements in manifest signing within secure software supply chain across the fleet.
Enhanced compliance history for audit purposes.



Reduce Security Risk



Platform Consistency

Deploy OCP across any cloud and on-premise infrastructure using Hosted Control Planes.
Cluster Lifecycle for Managed OpenShift/Kubernetes.



Reduce Complexity

Red Hat Advanced Cluster Security for Kubernetes



Unified Experience

Streamlined **vulnerability management** workflows enable drill down from consolidated views to detailed views in just few clicks.

ACS dashboard presents **security metrics with trends** to assess effectiveness of policies and risk management.



Increase Return on Investment



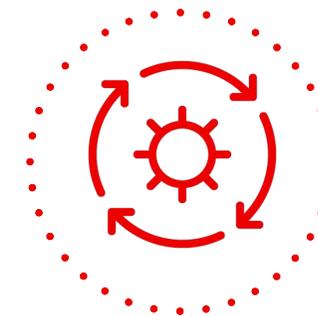
Security Everywhere

Extend **vulnerability scanning** to host OS to provide a consolidated view of known vulnerabilities for your fleet of clusters, including nodes.

Developers will be able to scan images on local filesystems to **shift security further left**.



Reduce Security Risk



Platform Consistency

Manage and schedule **Compliance Operator** scans with RHACS. Store historical compliance data. Easily product compliance reports for auditors.

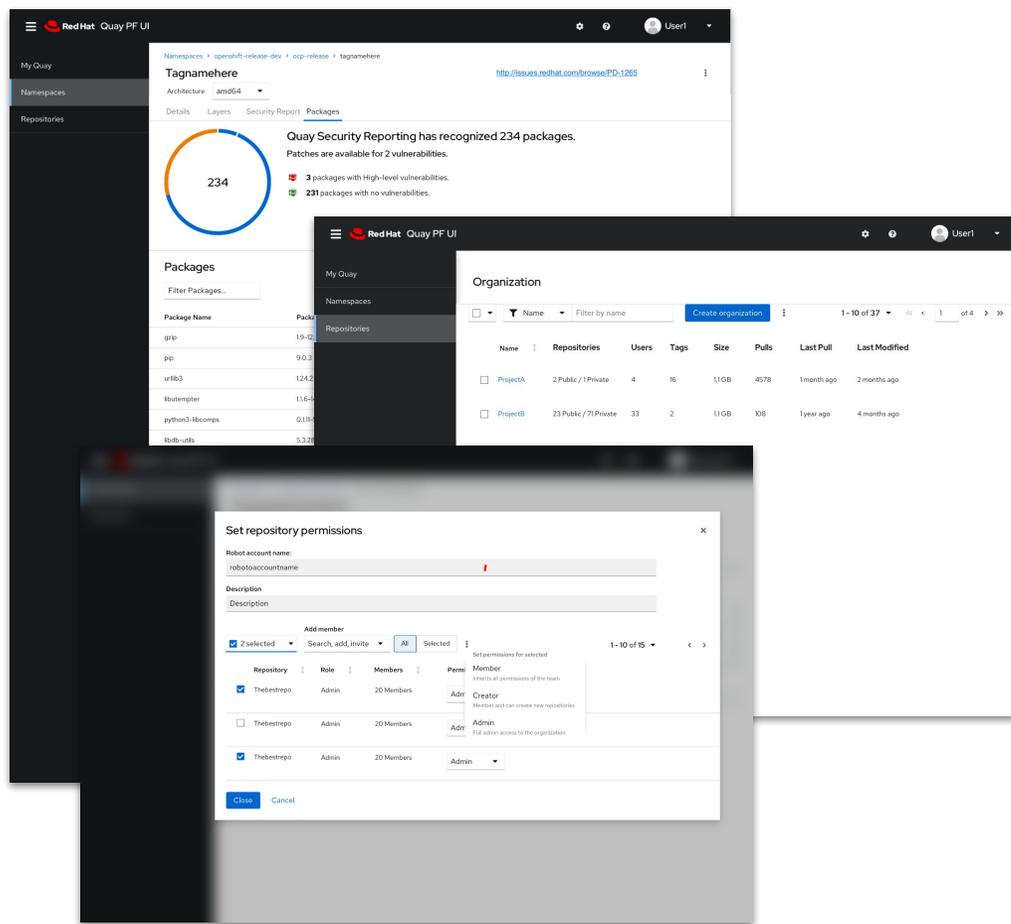
ACS on **IBM/Z and IBM Power**.
First phase: secure OpenShift on **IBM/Z and IBM Power**.



Reduce Complexity



Red Hat Quay & Quay.io



Revitalized user interface

Effectively manage your central source of truth for all containerized content in an effective, yet familiar way.



Supply Chain Security

Extending image scanning coverage to more artifacts (Golang, NPM) & link SBOMs to artifacts directly with OCI referencers



Automated content management

Lifecycle artifacts with configurable retention policies to cap storage usage and efficiently ingest content from other registries via mass replication

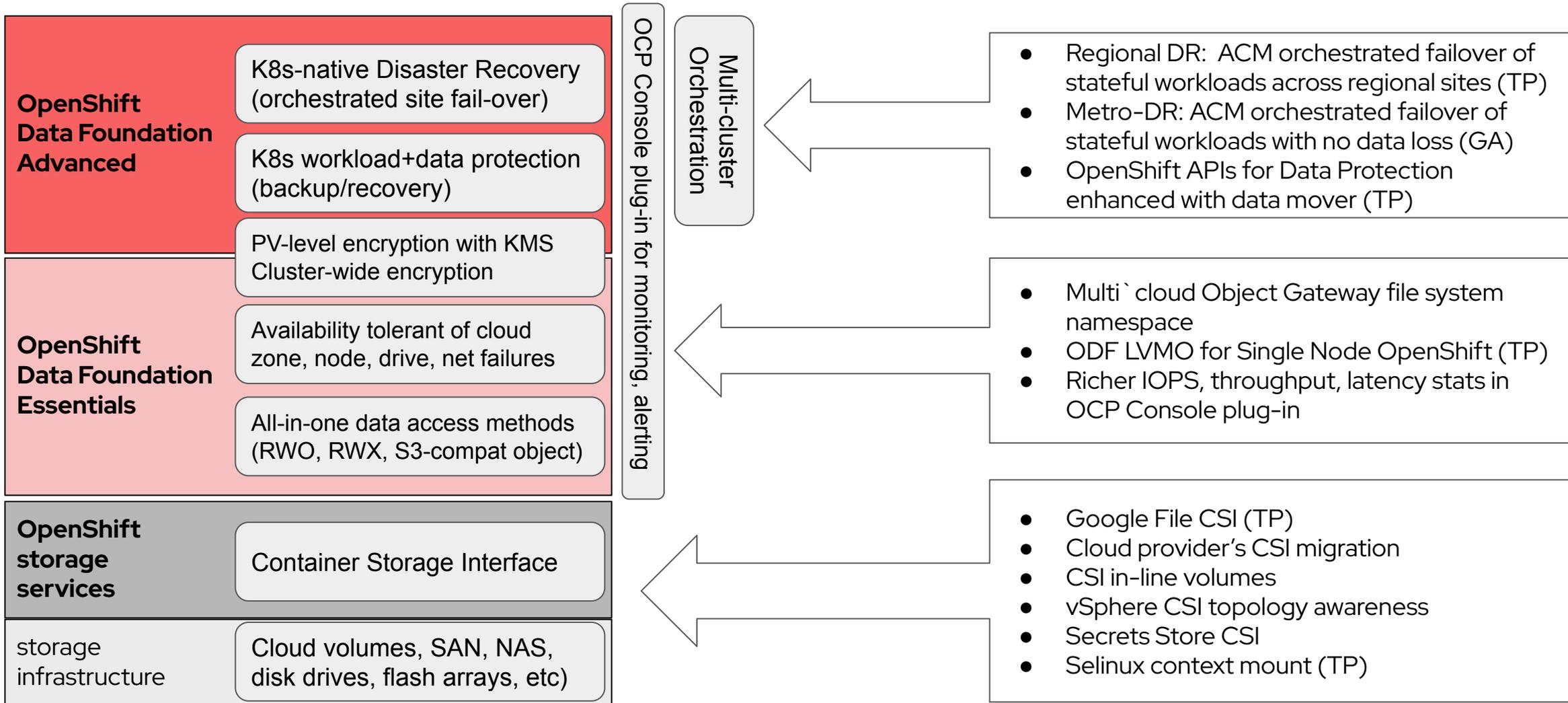


Enterprise-friendly SaaS

Quay.io experience at console.redhat.com with ISO27001 and SOC 2 Type 2 certifications, upfront billing and payment via cloud provider marketplaces and custom identity provider



OpenShift Multi-Cluster Storage



Red Hat Cloud Services

Red Hat Cloud Services



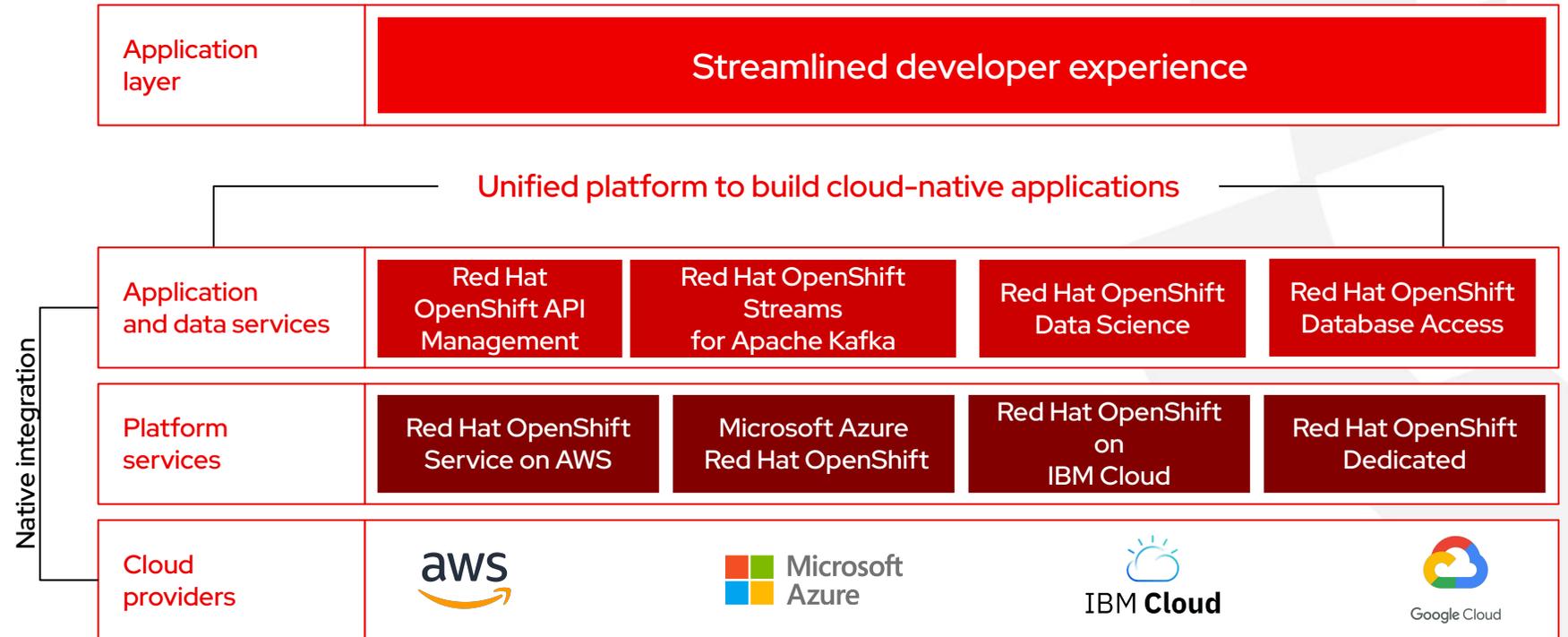
Full stack management and unified experience



Maximize full value of Red Hat® OpenShift®



Hybrid cloud flexibility



New Cloud Service areas

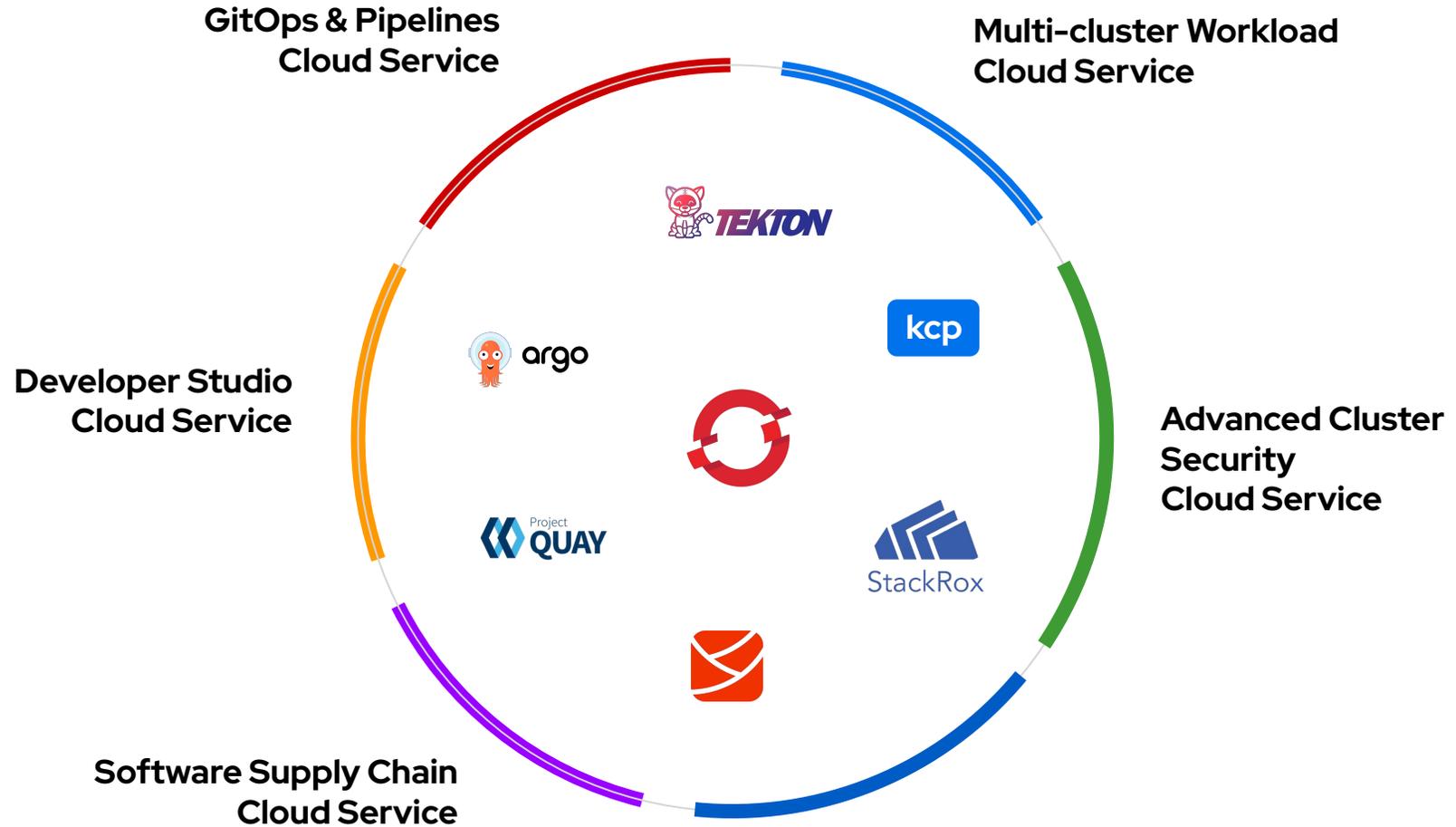
Platform Consistency

Complement our "cluster" Cloud Services with new "app" services.

Cloud services that share the same technology investments in use within OpenShift for seamless integration

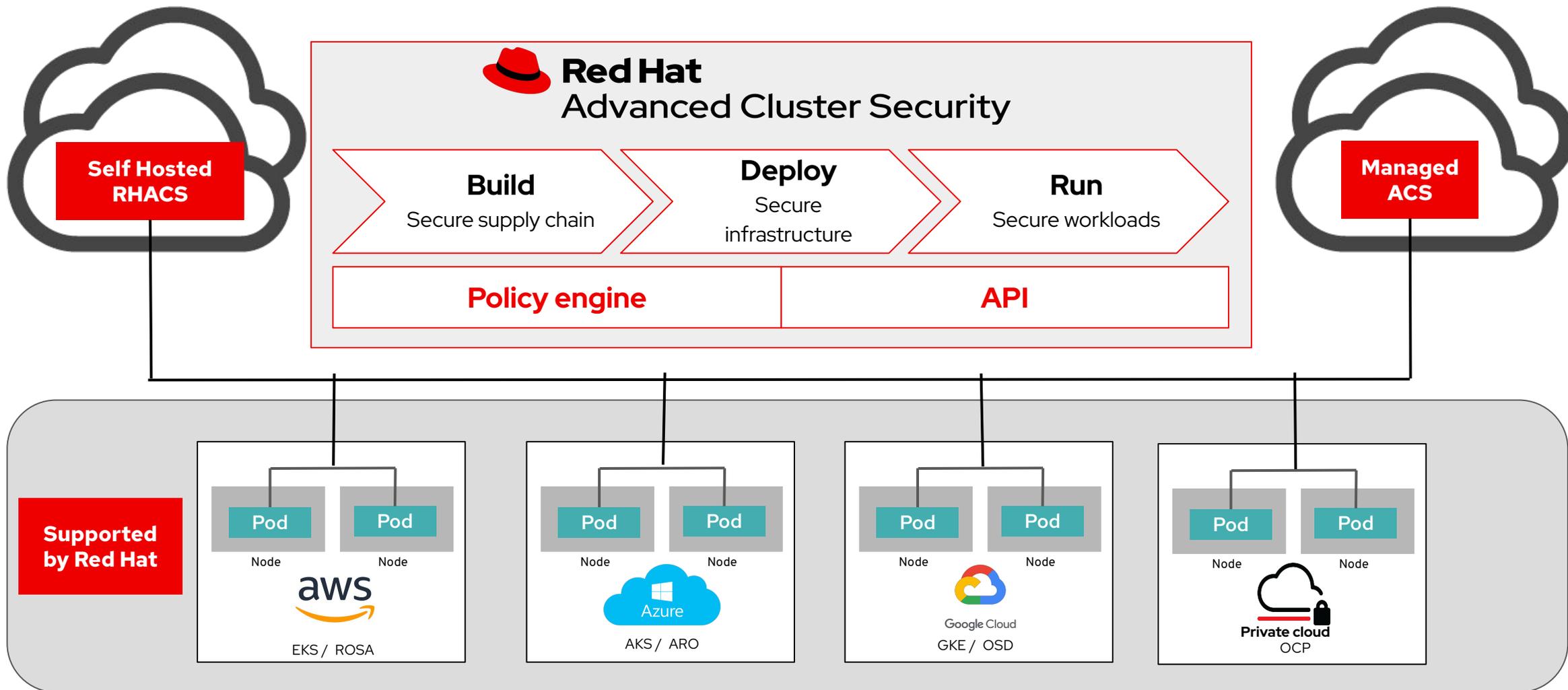


Developer access to multi-cluster aware tools without toil

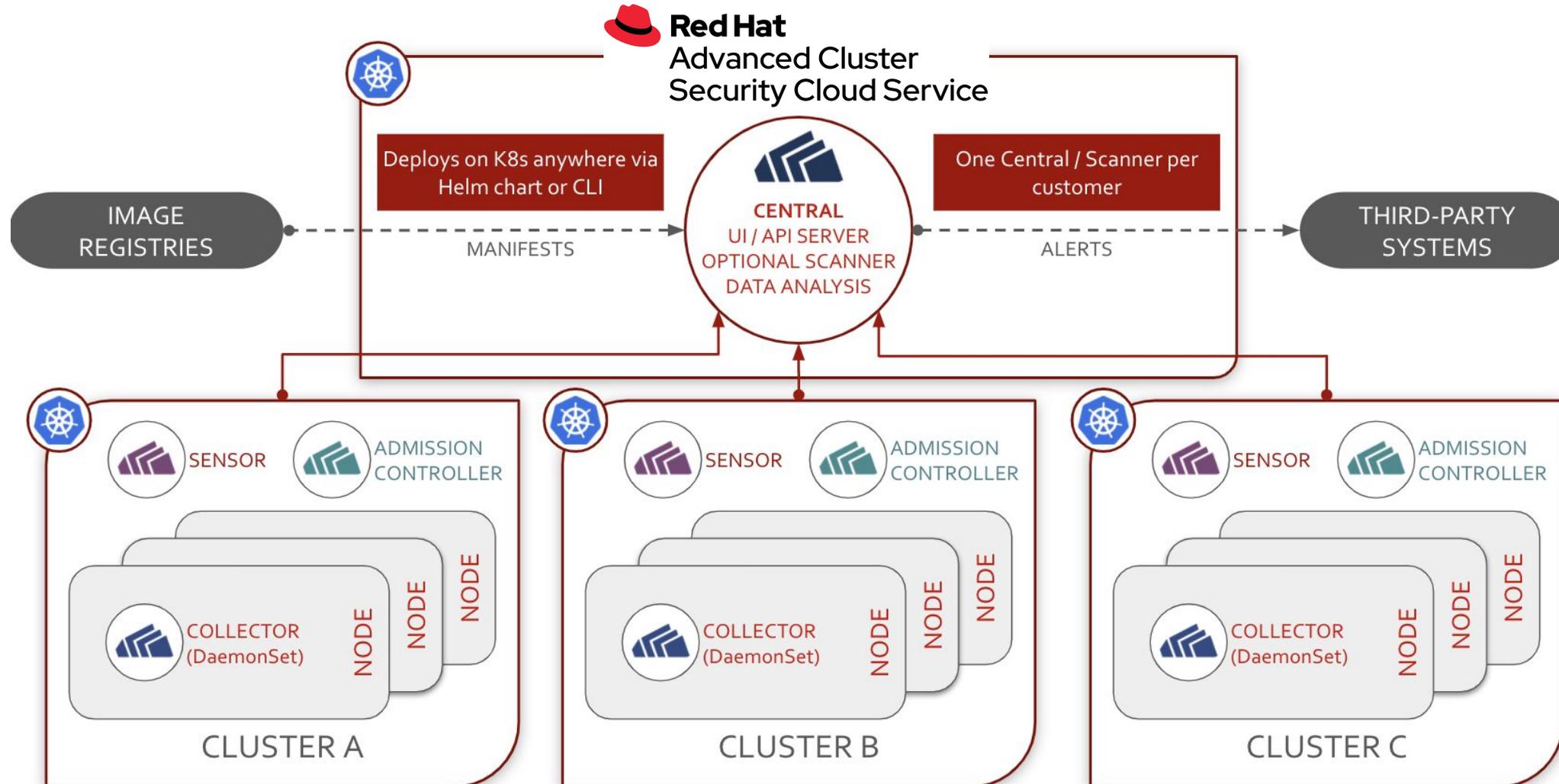


Red Hat Advanced Cluster Security Cloud Service

Field Trial



Architecture



Red Hat OpenShift cloud services



Unified Experience

Allow users to create all managed OpenShift clusters from one single location as well as version configurability



Simplicity of operations

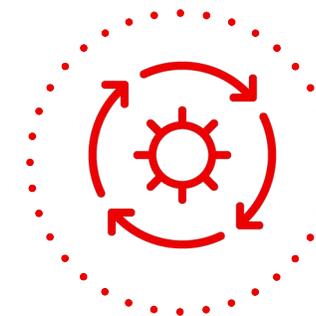


Security Everywhere

Achieve compliance with more industry certifications and governmental compliances



Offer more flexibility in the kinds of workloads that can be run



Platform Consistency

If it runs on OpenShift it will run on managed OpenShift.



Reducing the barriers to adopting managed OpenShift



Red Hat OpenShift cloud services



Expanded choice

Allow customers more options when choosing worker nodes to address many different workloads or budgets.



Meet customer where they are



Security Everywhere

Short term token based credentials across supported clouds. Azure Lockbox, Keyvault and enabling UDR for private clusters.



Enable additional security options for our sensitive customers

Core platform, workloads and developer experience

Installation, Updates, and Provider Integration



- Add new platforms
- Add new regions to existing platforms
- Add more instances types and capabilities



Enable Hybrid Cloud



- Agent-based installer
- Hosted Control Planes (HyperShift)
- Composable installation



Simplify onboarding



- Improve update behavior and conditional updates
- Enhance update documentation
- Improve update user experience



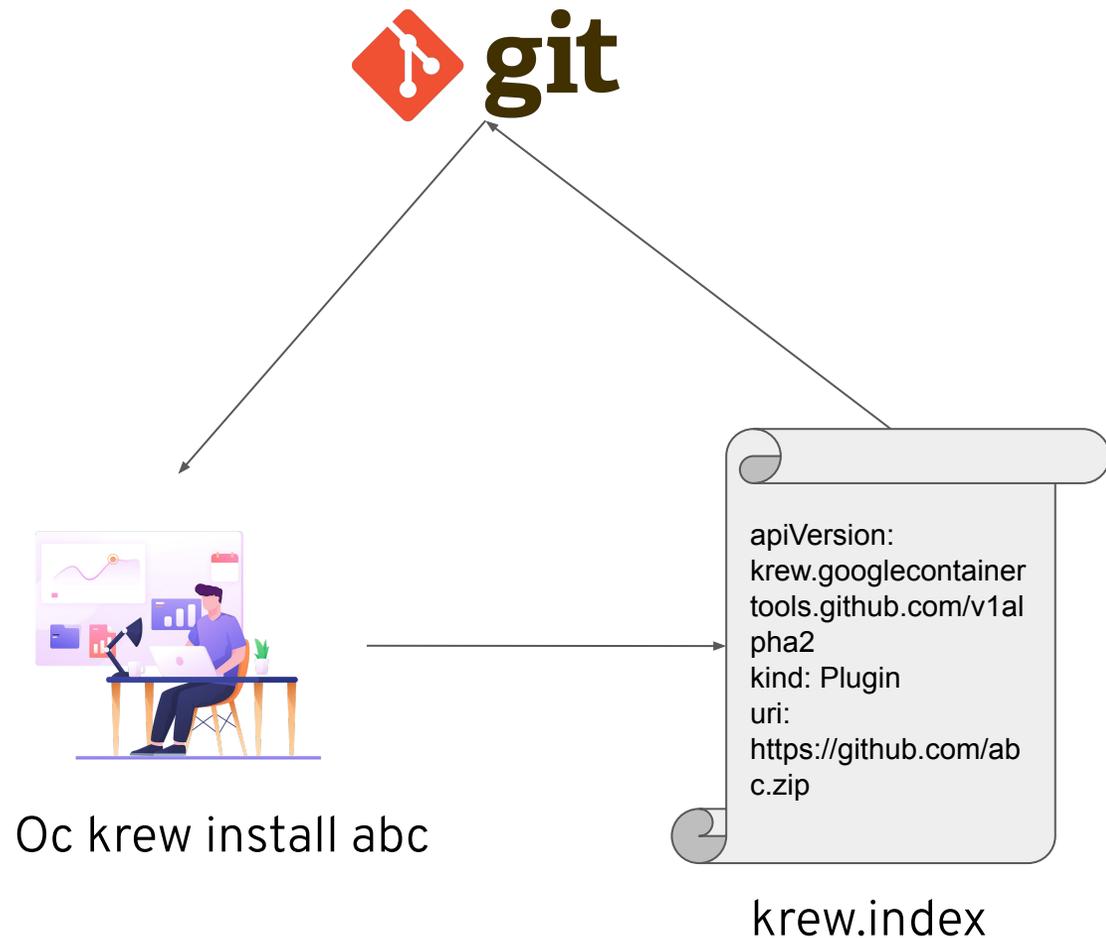
Mitigate risk



Google Cloud



CLI Manager – Krew (Tech Preview)



CLI Manager - Krew

- Discover OC plugins
- Install them on openshift clients
- Keep the installed plugins up-to-date

OpenShift on Bare Metal



Agent-based installer (Local)

Interactive UI installation.
Install OpenShift anywhere from a bootable image.



Easy and flexible OpenShift installs

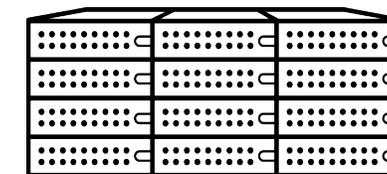



Assisted Installer (SaaS)

Heterogeneous clusters (multi-arch), Multicluster Engine (MCE) and Hypershift integration



Deploy OpenShift ready for Hypershift from the SaaS



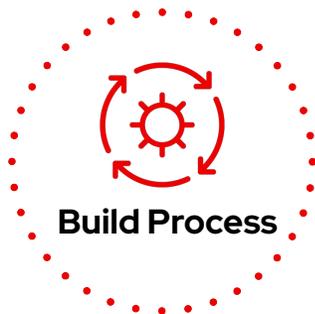

Metal Platform (The engine)

Manage and deploy bare metal clusters with ACM from ROSA



ZTP of bare metal from the cloud

OpenShift CoreOS Layering Roadmap



- On-cluster build enhancements for the batteries-included experience
- Custom installation images that can include 3rd party kernel drivers pre-installed



More install & build flexibility



- Simpler node configuration workflows
- 3rd party RPMs
- RHEL packages not shipped in RHCOS
- RHEL hotfix packages (**GA in 4.12!**)



GA Support coming soon!

Cluster-level operator management

Ensuring cluster integrity and avoid dependency dead-locks

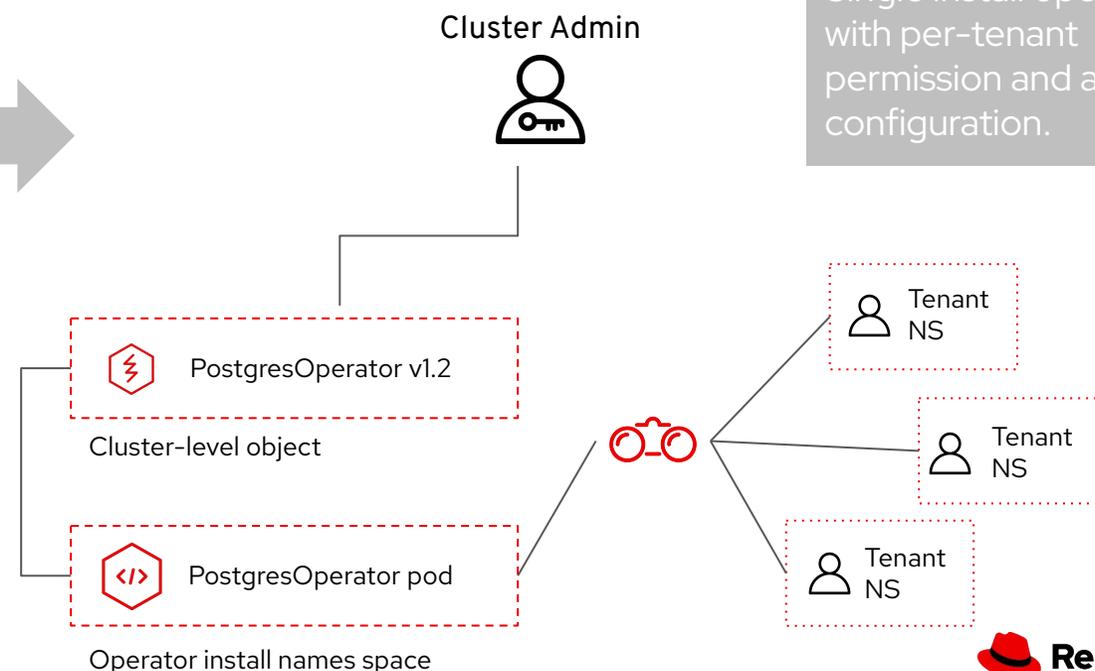
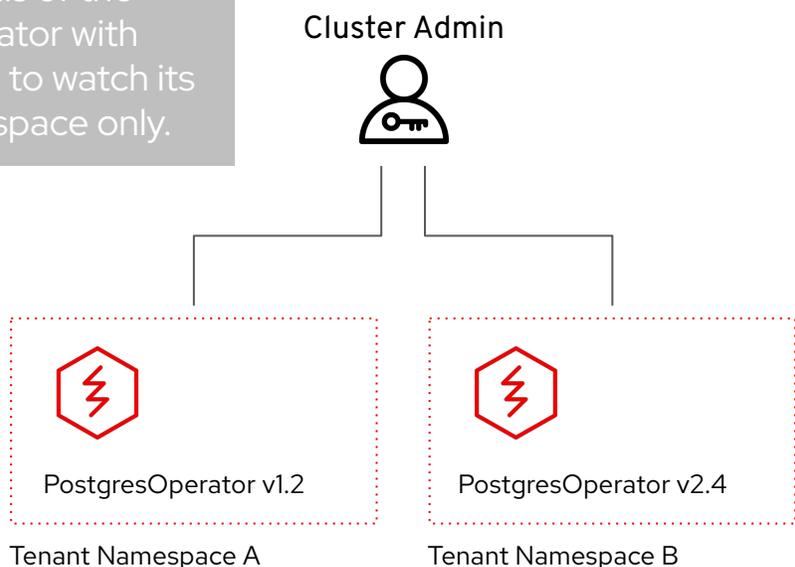
- ✓ Fully declarative/GitOps-friendly installs
- ✓ Resource-friendly in large clusters
- ✓ Granular update control to non-latest versions
- ✓ Selective permission grants
- ✓ Platform operators

Namespace'd operators (OLM 0.x)

Cluster-level operators (OLM 1.x)

Many installs of the same operator with permission to watch its own namespace only.

Single install operator with per-tenant permission and access configuration.



Compute

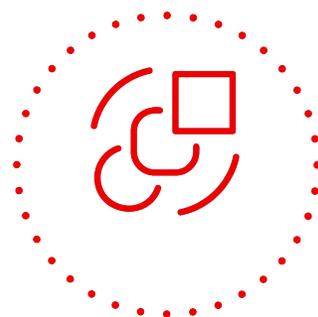


Platform

- Enable Arm on more cloud providers
- More IBM P/Z innovations
- Mixed CPU chip architecture
- DPU/IPU integration with unique architectural approach



Enable new workloads and reduce TCO

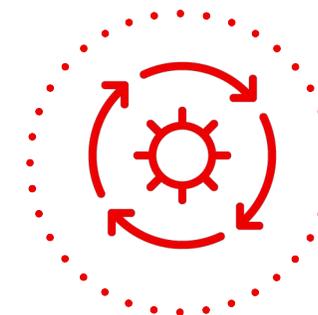


Consistency & Security

- Enable pluggability with cloud native solutions: KMS, DNS, LB
- GA Cert-manager
- Enable Pod Security Admission by default
- Alert when the etcd container memory consumption exceeds threshold



Enable Hybrid Cloud and accelerate projects



Experience

- Self-driven control plane with automated scaling, backups and DR of the control plane
- Customizable RHCOS
- Simpler to configure RHCOS
- Improved Audit Logging
- Improved API Server Alerting



More choice and flexibility to meet standards and compliance



OpenShift Support for Windows Containers



Platform Consistency

Windows nodes will move to using the cluster wide proxy, and CSI for storage, thus future proofing consistency and application portability for Windows



Consistent experience with upstream

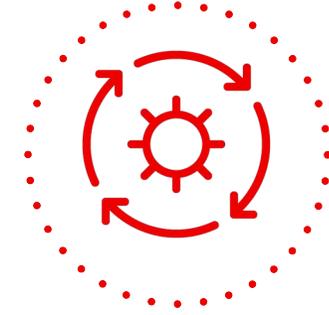


Unified Experience

Health Management of Windows Nodes with self healing will allow for better resiliency of the Windows nodes (e.g. recovering from a Kubelet crash). Horizontal Pod Autoscaling of Windows pods to will enable workloads to be scaled to match demand



Easy Management of Windows apps



Expanding Ecosystem

Support for more cloud platforms, like GCP and IB cloud means that you can run your windows container instances where you need them to run.

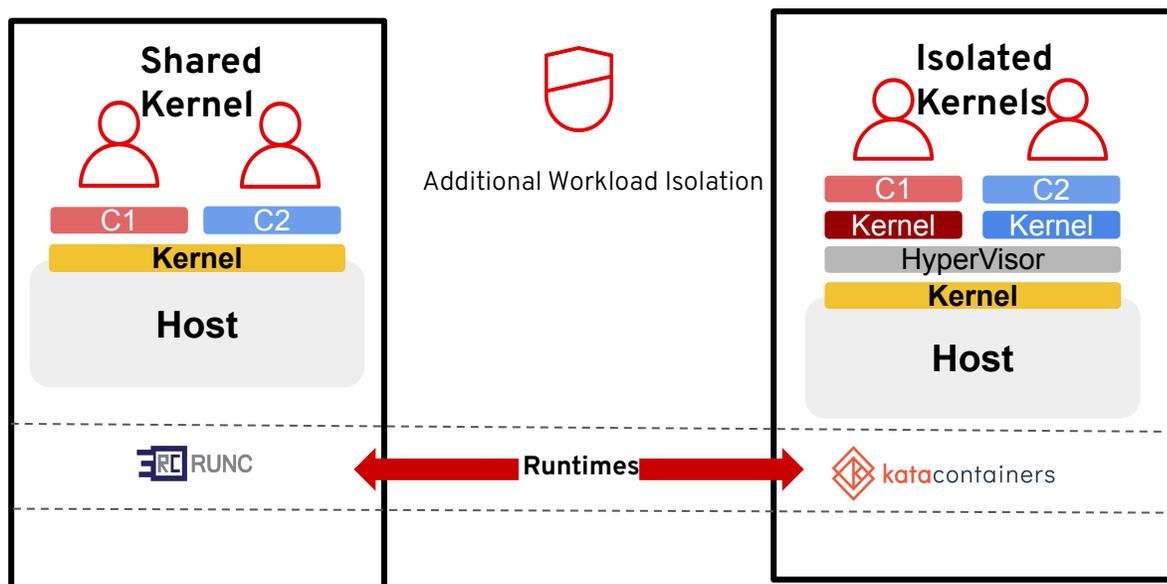


Broader compatibility



OpenShift sandboxed containers

Isolation with native Kubernetes user experience

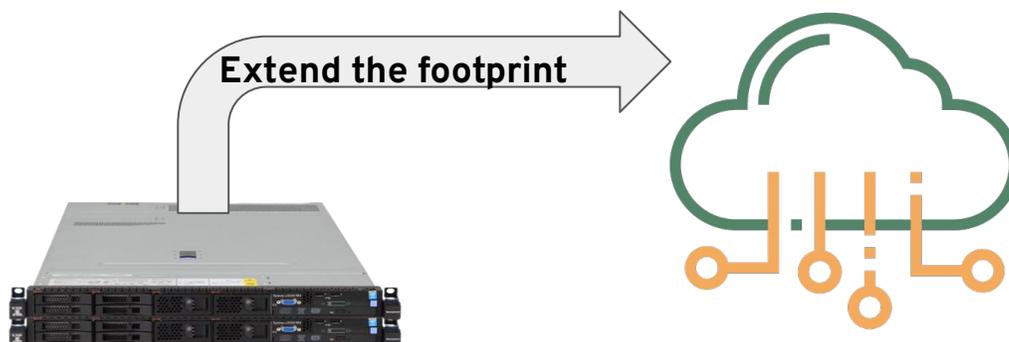


Today's Features & benefits

- Supported on bare metal workers
- Container workloads requiring elevated privileges at run time
- Example workloads
 - a. CI/CD jobs that may require root privilege
 - b. 3rd party untrusted applications

What's Next

- Support for virtualized workers on-premise and in public cloud



OpenShift Virtualization



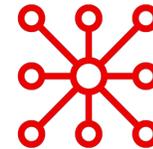
Enterprise Virtualization Capabilities

- **Enhanced Ecosystem of Data Protection partners**
- **Micro-segmentation on secondary network using OVN-K**
- Dynamic configuration with Network and CPU hotplug
- Improved density with Memory Overcommit
- Windows 11 and VBS support



Enterprise Scale

- **Scale to 10K VMs in a single cluster**
- Auto vNUMA
- Enhanced resource balance with workload aware scheduler



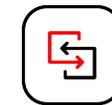
Multi-Cluster Scaling

- **ACM VM lifecycle and workflow**
- **Metro-DR (sync) with OpenShift Data Foundation**
- OpenStack as source for MTV
- Reduce cost and deploy faster with multi-tenant virtual clusters

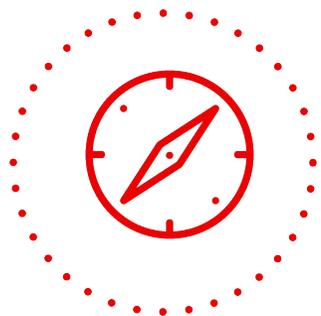


Developer Services

- **VMs as code for GitOps using Tekton and ArgoCD Pipelines**
- Automate with Ansible integration
- Gateway API for load balancing



Migration Toolkit for Applications

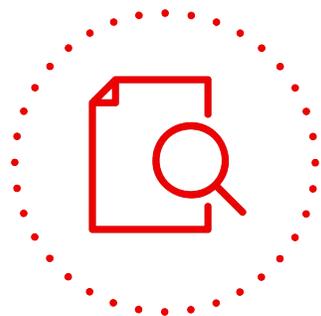


Migration Guidance

Help organizations safely migrate and modernize their application portfolio to leverage OpenShift



Ease OpenShift adoption

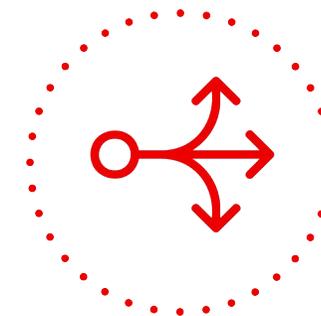


Gather Insight

Enable adoption leads to make informed decisions and keep the migration and modernization process measurable and predictable



Reduce risks



Extended Scope

Fully integrated toolkit leveraging tools from the CNCF project Konveyor with a seamless user experience



Provide value on each stage of adoption

OpenShift Serverless



- Elevated Developer Experience for apps creation with Serverless functions
- Orchestration of microservices and functions
- Discovery and Subscription of Events for functions and microservices
- Central catalog of events from heterogeneous sources across hybrid and multi-cloud.



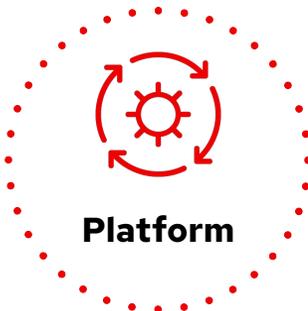
Increase the ease of use



- Security Guard for securing serverless containers
- End to End encryption for internal and external services
- Multi-Tenancy for services and events
- Broker and Channel authentication and authorization



Reduce exposure and risk



- OpenShift Serverless everywhere
- Default deployment for stateless workload
- Integration with other platform features, Custom Auto Metrics scaler, GitOps for deployment rollout



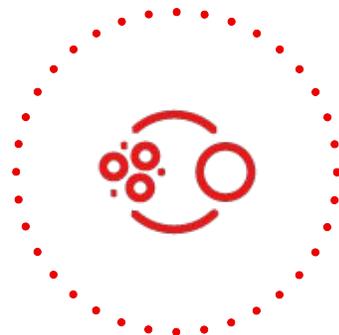
Increased productivity

Developer Experience



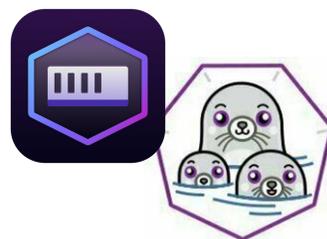
Onboarding

- Accelerate onboarding of Red Hat platforms via IDPs in customer environments.
- Gain recognition in Backstage.io, the leading open source IDP project



Local Development

- Improve developer productivity of building and testing containerized applications in local environments
- Increase adoption of existing local development tools to drive growth of Red Hat platforms



Cloud-hosted Services

- Grow overall trial/evaluation impact with Dev Sandbox for Red Hat platforms and services
- Launch a managed service offering to import, build, and deploy applications for enterprise-grade applications
- Define a competitive free to fee journey for advanced capabilities and Red Hat platforms/services

Learn more about What's next for developers!

Check out a deeper dive for developers on Red Hat Media Space with the "[What's Next: OpenShift Roadmap Update - Developer Edition](#)"



Edge and Telco

Introducing Red Hat Device Edge

Adding kubernetes to small form factor, field deployed edge devices



What's the news?

We are productizing MicroShift, bundled with Red Hat Enterprise Linux for Edge



What will be available?

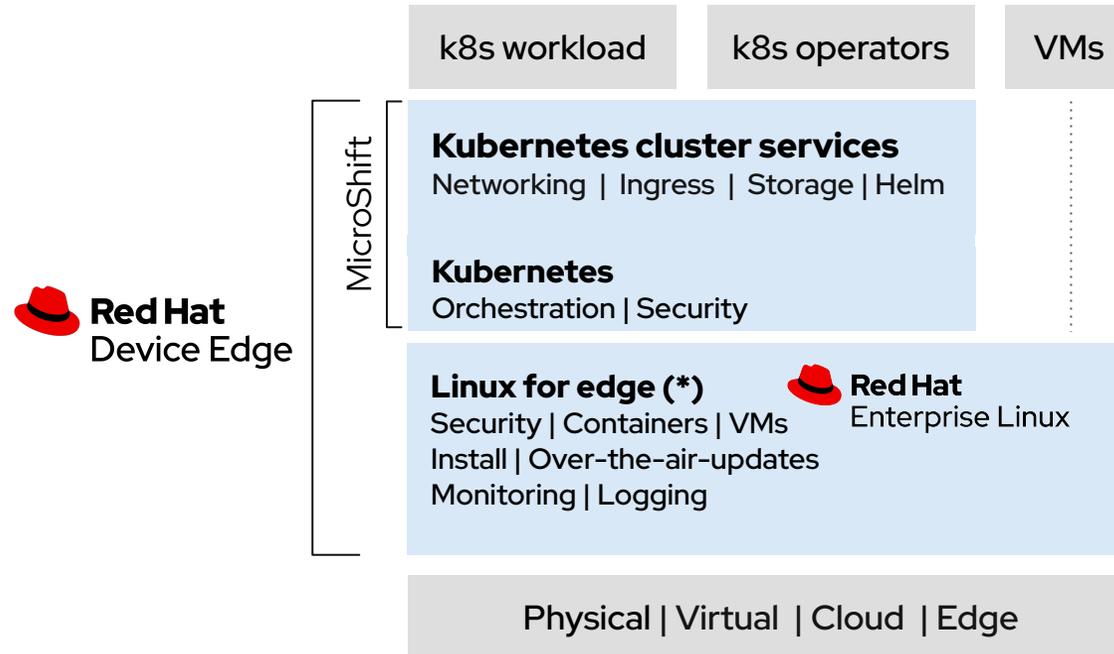
A new product **Red Hat Device Edge** that contains support for MicroShift, a low footprint k8s distribution derived from OpenShift



Why are we doing this?

To address the market demand for a consistent platform even on the smallest devices

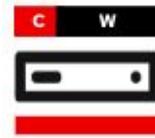
Red Hat Device Edge Technical Overview



See the [announcement](#) for more details

* recommended for edge deployments: [Red Hat Enterprise Linux for Edge Images](#), rpm-ostree, immutable, atomic upgrade, over the air flavour of Red Hat Enterprise Linux.

Red Hat Device Edge / MicroShift



Kubernetes distribution for small form factor, field deployed far edge devices, derived from OpenShift.

- Dev Preview early 2023, Tech preview for customers on Early Access Program
- CNCF certification
- General Availability expected for Summer 2023
- Focusing on Industrial Edge Computing use cases first
- Then extending to Machine Vision Use Cases on ARM
- Long term: low latency workload

Single Node OpenShift

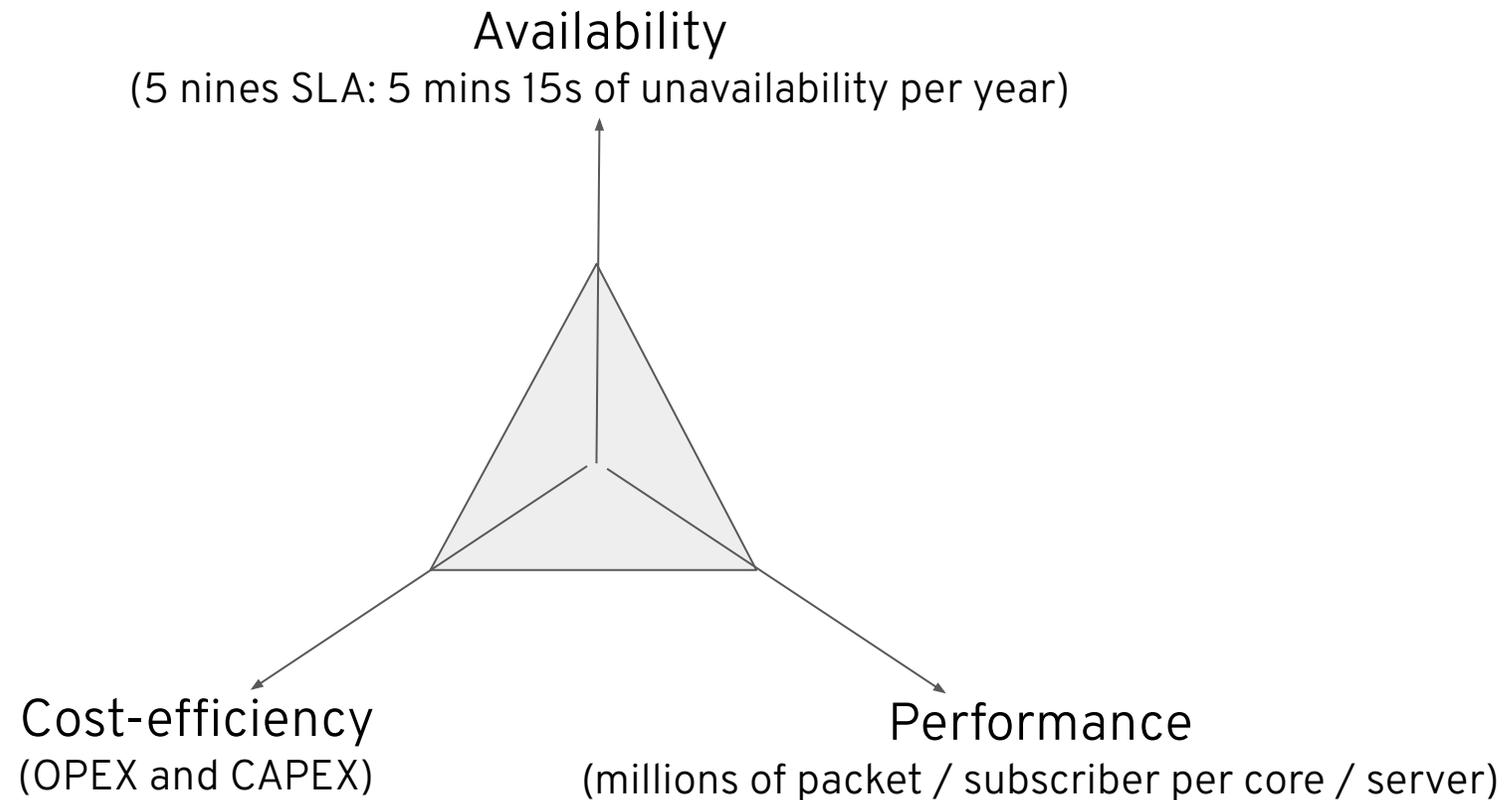


Combined control plane and worker on a single server for edge use cases that require resilient in case of no or intermittent connectivity to a central site

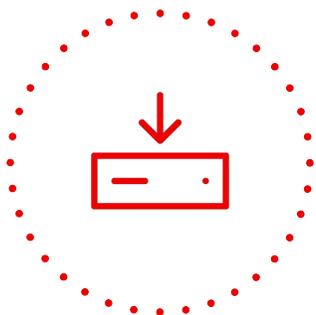
- Continue adding supported footprints:
 - AWS IPI
 - ARM bare-metal
- Continuing trajectory to reduce footprint, by leveraging composable OpenShift

Telco orthogonal requirements... all mandatory!

Optimization on two axis, conceptually straightforward, is **not** an option



Hardware and Accelerators

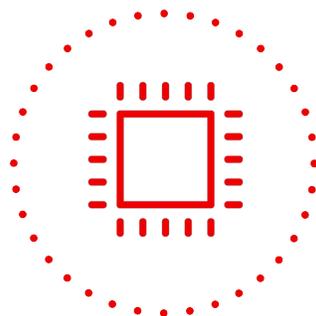


NextGen Hardware

Address Telco use cases with Optimal Platform Tuning and leverage Specialized Hardware: latest CPUs, NICs, PCIe



Agile Infrastructure with the latest Hardware [Efficient, Scale, TCO]

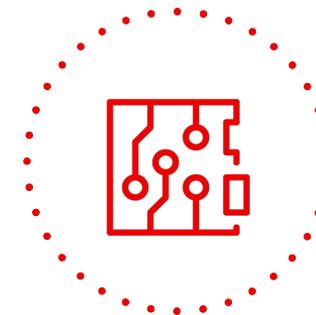


SmartNICs & DPUs

Infrastructure services including Networking, Storage, AI/ML in a separate cluster on ARM cores in the NIC. Tenant workloads in x86 cluster



Isolation of Tenant and Infrastructure cluster



Accelerators

RAN accelerators (FEC), GPUs with 5G Core, Crypto accelerators (TLS, IPsec)



High Performance Network/Services and resource optimization

The challenges of 5G RAN

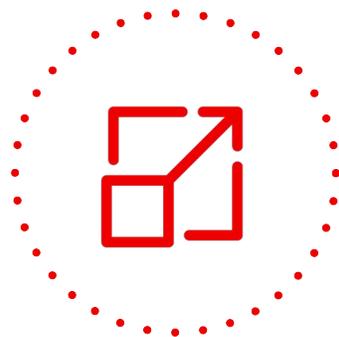


Variability

Different edge sites can vary in network connectivity, space, and power/cooling/performance



Versatile footprints and infrastructure cost saving

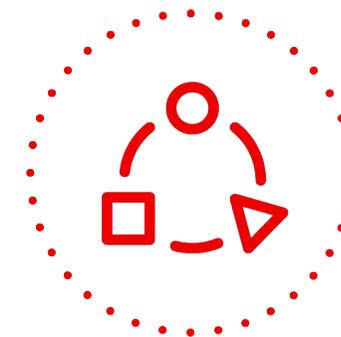


Operation at Scale

Zero Touch Provisioning (ZTP) and LCM management (ACM, TALM) of decentralized high numbers of small sites (scale-out)



Determinism at scale Through Automation



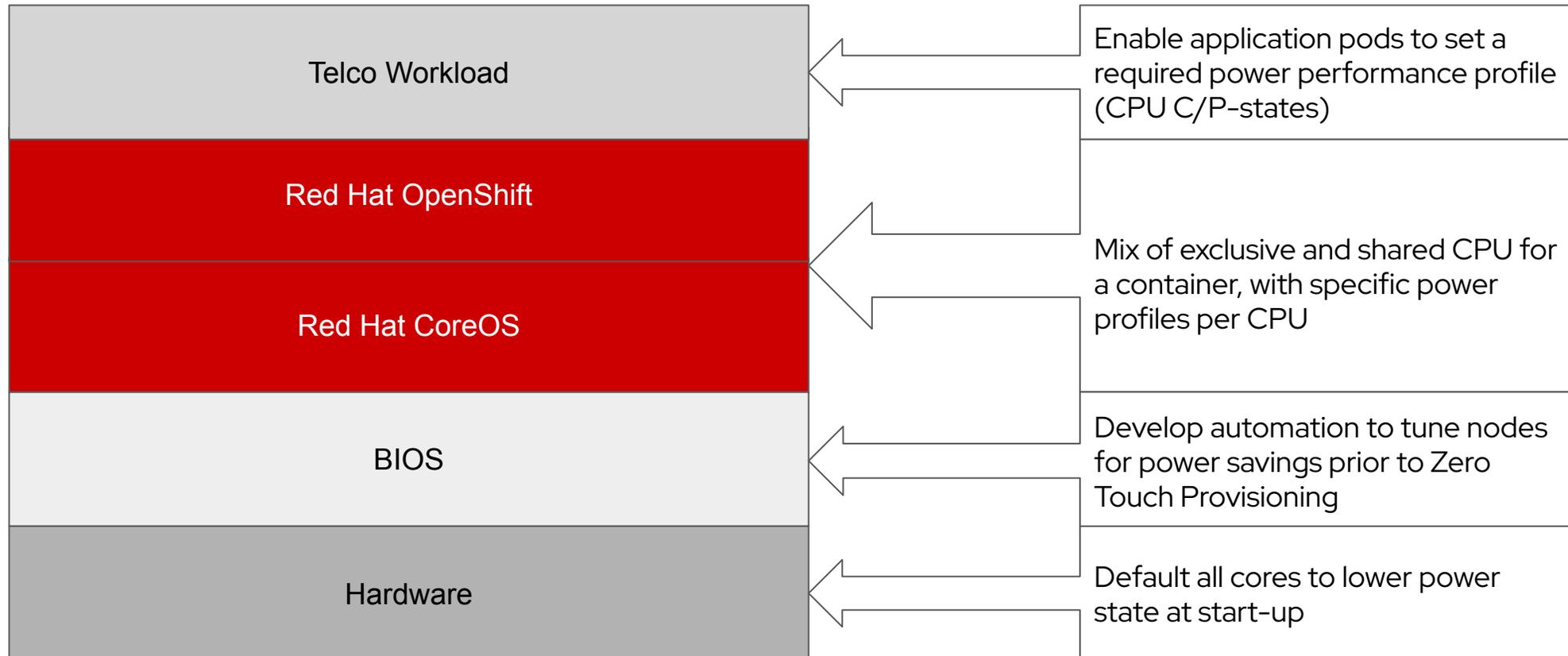
Innovation with appliance-like performance

Reduced footprint with cutting edge hardware acceleration and intelligent power management to satisfy the stringent requirements from RAN realtime workload.



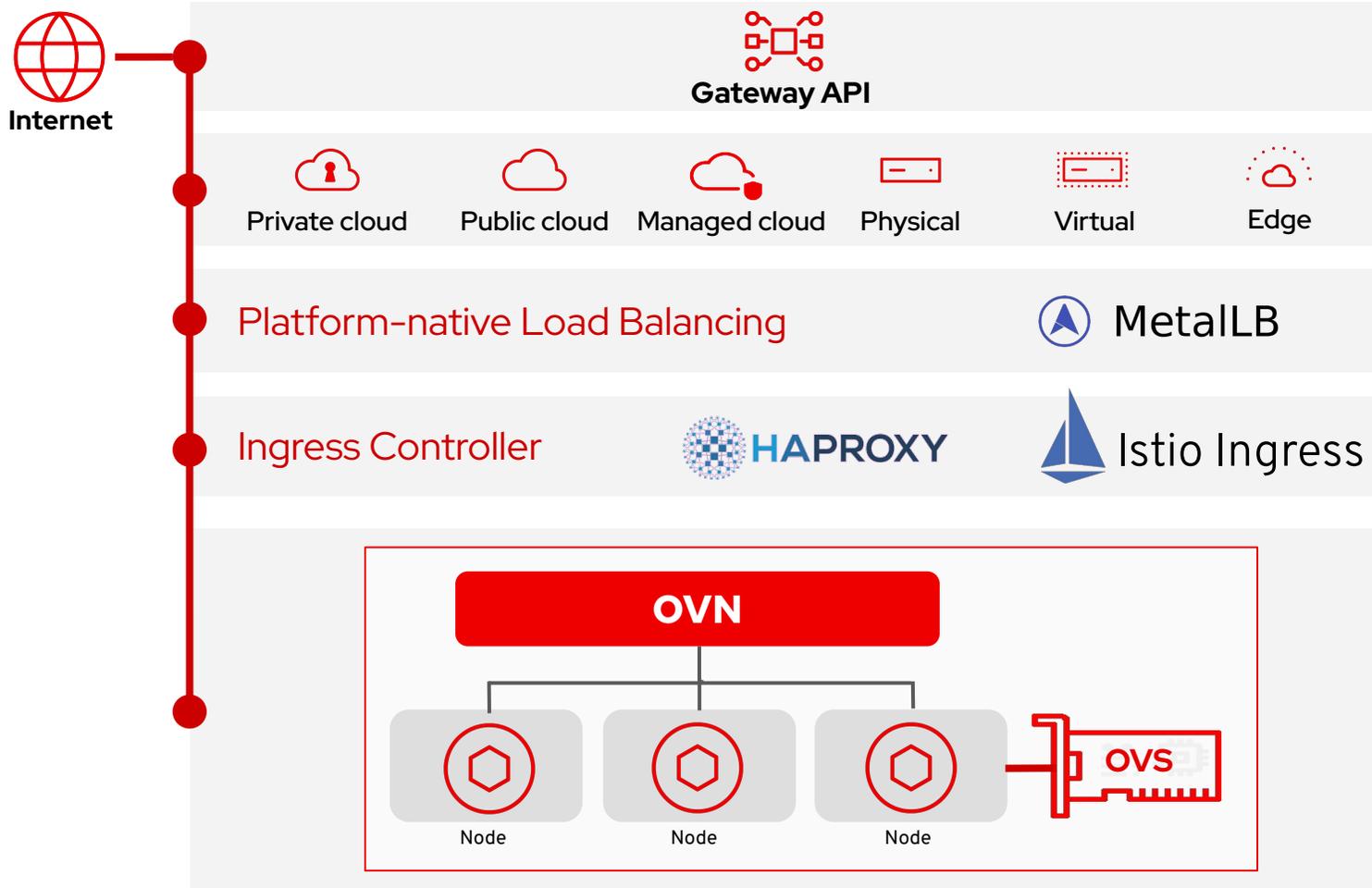
(RAN) Technology Evolution through openness

Power Optimizations for Telco

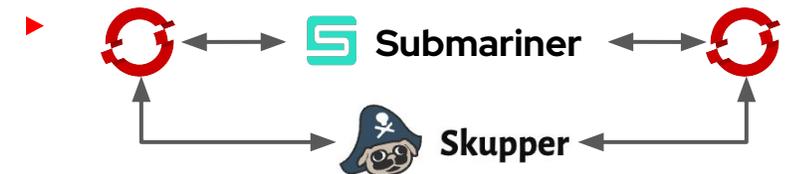


Networking and Observability

Multicluster End-to-End Networking



- ▶ Unified traffic handling so you configure all your traffic the same way
- ▶ Any supported platform – add or swap easily, hybrid scenarios
- ▶ Flexibility to use native traffic distribution for optimal performance





OpenShift Service Mesh

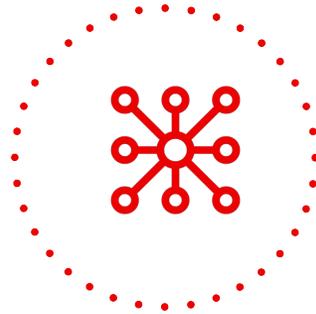


Istio Community Convergence

Converge Service Mesh with Istio to enable customers on the latest from the Istio and Kubernetes communities.



The latest application networking innovation

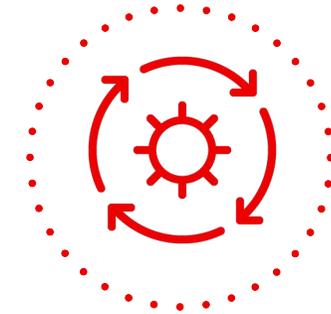


Service Mesh at Scale

Support scaled mesh use cases: Large meshes, multi-cluster, services outside of clusters and IPv6.



Secure, observe & manage traffic at scale



Better Together

Cohesive with the OpenShift including console, networking, certificate management, monitoring, GitOps and more.



Reduce complexity with a consistent experience





Network Observability Operator

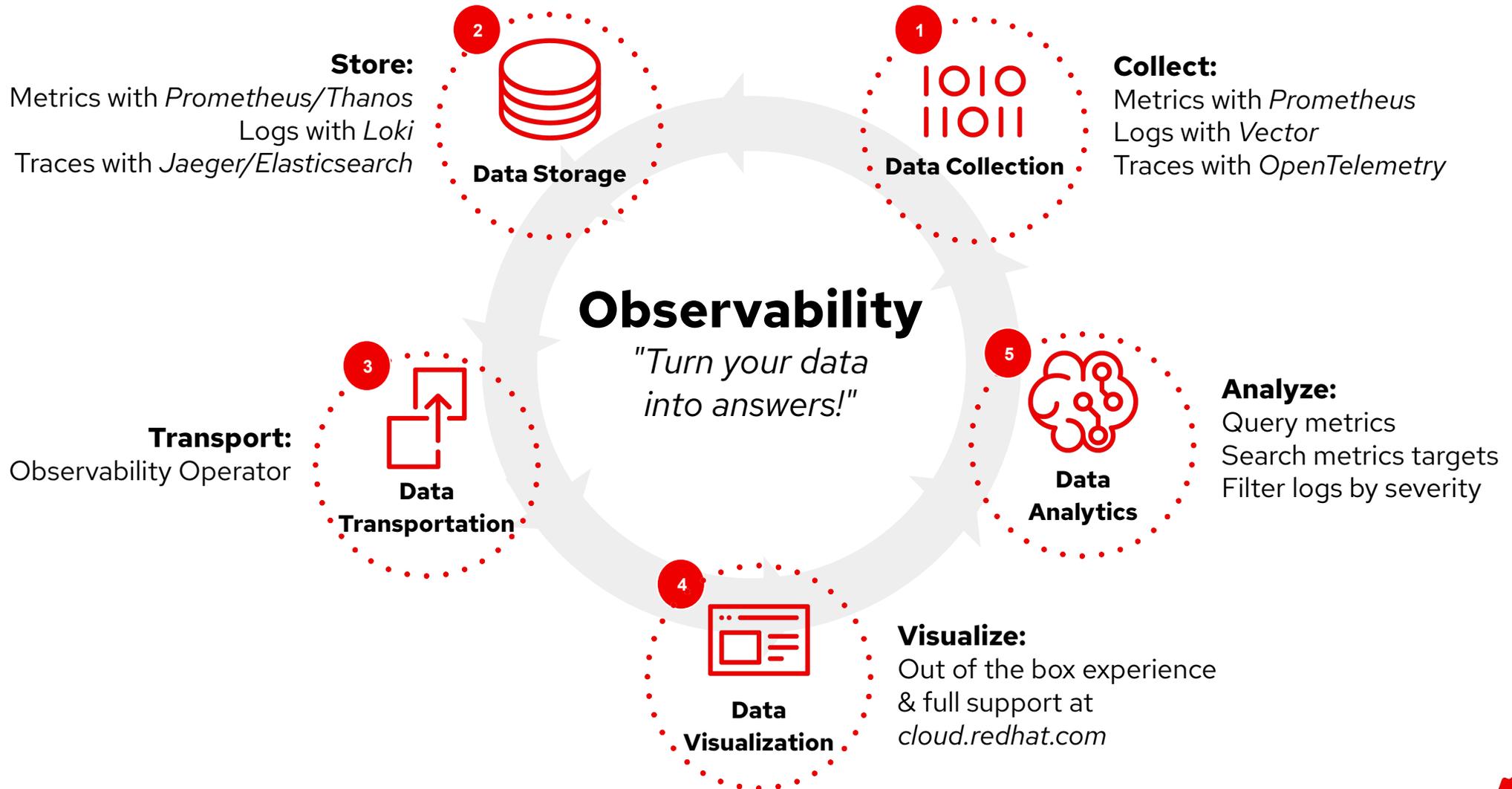
Network Flows Collector and Monitoring Solution

- Based upon an **eBPF**-based agent to collect metrics
- Observable network traffic metrics and tracing
- Enhanced observability of Kubernetes Network Policy
- Observable network traffic flows and topology across multiple hybrid clusters



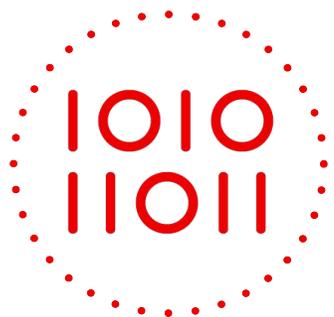


Observability





Observability



Collect & Aggregate

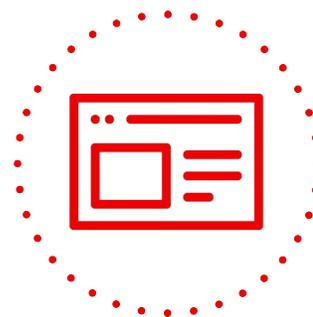
Vector as Log Collector and *Loki* as Log Store;

OpenTelemetry as Traces Collector

Cluster Monitoring Prometheus with Observability Operator



Out of the Box Operator for Observability



Visualize

More emphasis on the OpenShift Console - with better support and improved navigation for users



Out of the Box Visualization Experience



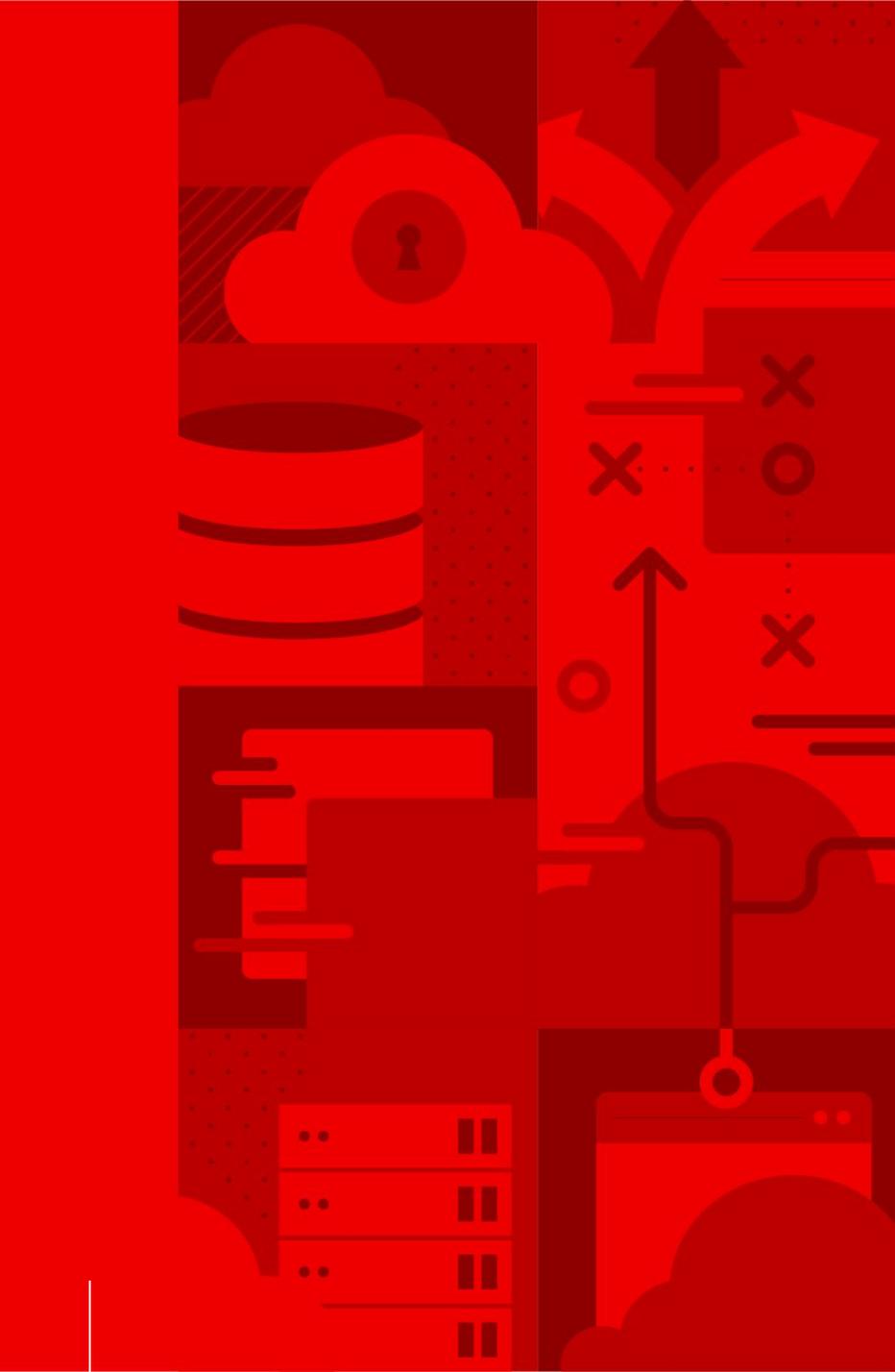
Analyze

Easily search, query, filter, and visualize metrics, metrics targets and logs via the Observe section of *cloud.redhat.com*

Start exploring runbooks URLs for alerts



Turn your data into answers!



Thank you

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