

What's Next in OpenShift

Q4CY2023

OpenShift Product Management

Creating value depends
on the ability to develop and deliver
high-quality applications (*and AI models*) faster on
any cloud



Improve digital
customer experience



Gain competitive
advantage



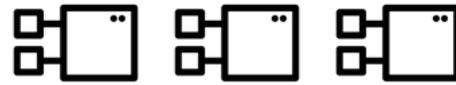
Mitigate risks

Delivering consistency, flexibility, security

Traditional apps



Cloud-native apps



AI/ML, Functions



Communities of Innovation | Ecosystems of Solutions



Secure & Automated Infrastructure and Operations



Physical



Virtual



Private cloud



Public cloud



Edge

OpenShift is available as a fully managed cloud service or self-managed platform

Managed Red Hat OpenShift Services - Fully managed, start quickly



Red Hat OpenShift
Service on AWS



Azure Red Hat
OpenShift



Red Hat OpenShift
on IBM Cloud

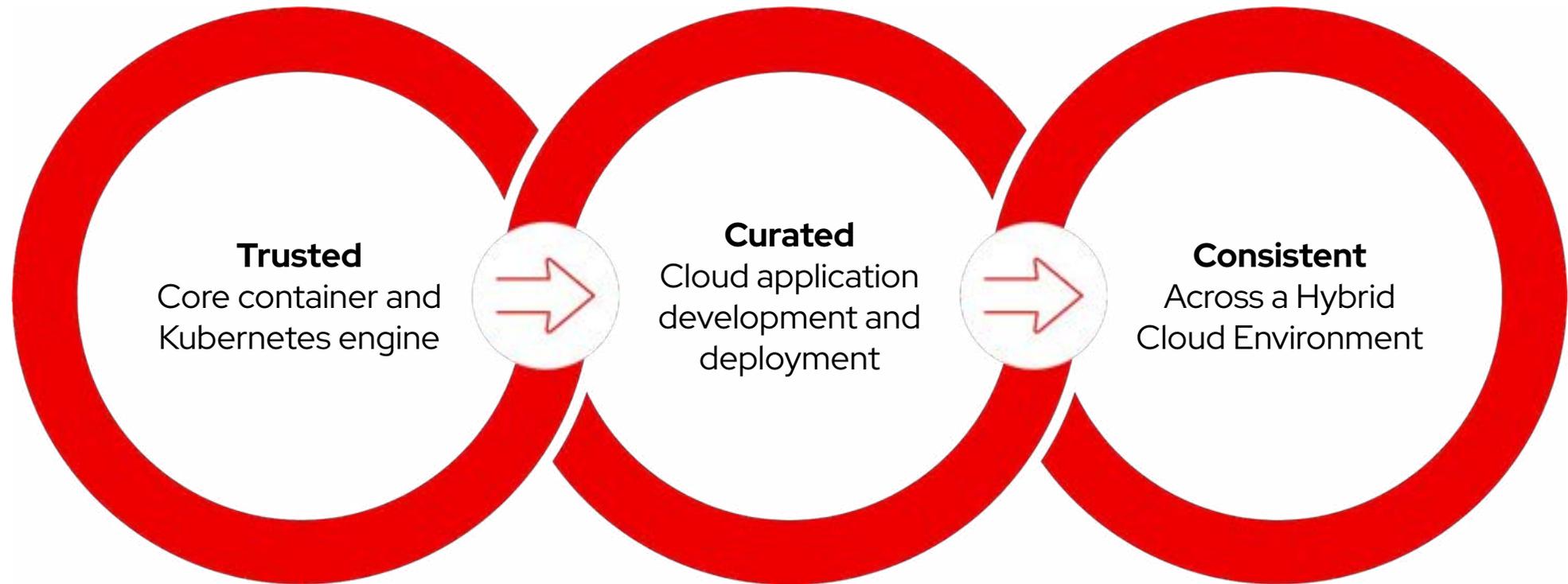


Red Hat OpenShift
Dedicated

Self-Managed Red Hat OpenShift - Customer managed, for control and flexibility

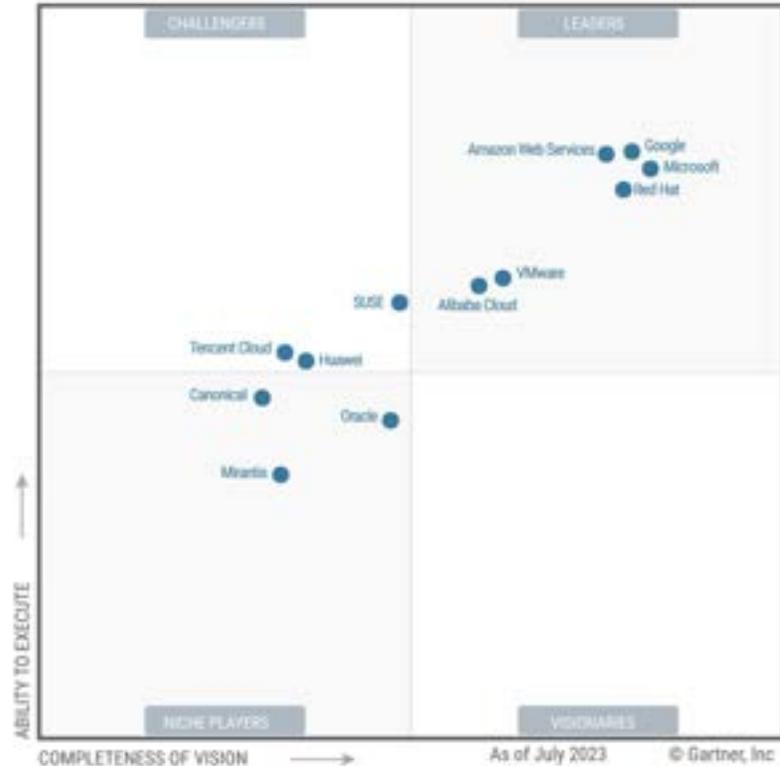
On **public cloud**, on-premises on **physical** or **virtual** infrastructure, or at the edge

OpenShift and themes that drive our roadmap



Red Hat is a Leader in the 2023 Gartner® Magic Quadrant™: Container Management

Figure 1. Magic Quadrant for Container Management



Source: Gartner

Source: Gartner, "Magic Quadrant for Container Management," September 2023

Red Hat is a Challenger in the 2023 Gartner® Magic Quadrant™: DevOps Platform

Figure 1: Magic Quadrant for DevOps Platforms



Source: Gartner

Source: Gartner, "Magic Quadrant for DevOps Platforms," June 2023



The Forrester Wave™: Multicloud Container Platforms, Q4 2023



“Red Hat sets the pace with enterprise IT capabilities and massive market presence. With OpenShift’s systematic innovation and development on multiple fronts, Red Hat has helped transform the MCP market segment.”

“The demand for OpenShift prompted AWS and Microsoft Azure to sell OpenShift as a managed service, despite having their own Kubernetes-based container services. Red Hat’s differentiated strategic vision is to up the ante on enterprise-grade open source computing.”

The Forrester Wave™: Multicloud Container Platforms, Q4 2023: The Eight Providers That Matter Most and How They Stack Up
Oct 2023

And so it begins...



Stocking the Shipyard: Empowering Developers & Platform engineers towards seamless experiences

Stocking the Shipyard: Complete Application Platform



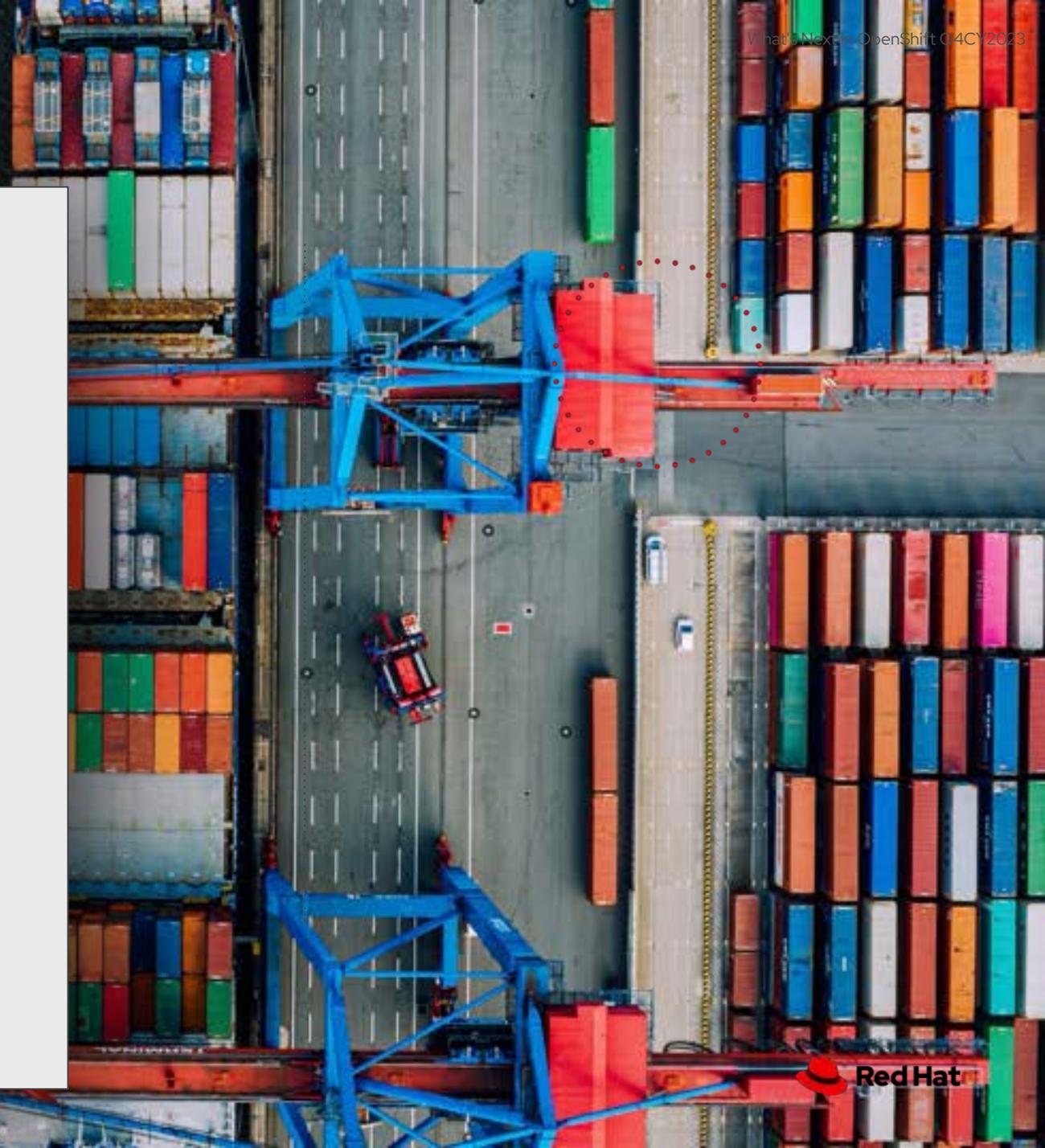
Build and Deliver



Self-Service Model



Developer Experience



Stocking the Shipyard: Building the Application Platform



**Build and
Deliver**



**Simplify and
increase Adoption**

- ▶ **Run Operators in Multi-Tenant Clusters** introduce a new lifecycle model that enables cluster tenants to have their own operator instance
- ▶ **Better Helm Workflow Support** in ArgoCD with enhancements including support for dynamic value lookup
- ▶ **Automate Updating GitOps Repos** with Image Updater and new push to image registries
- ▶ **Improved Canary Deployments** with Argo Rollouts support in OpenShift GitOps
- ▶ **Multi-arch and multi-cluster support** across the application platform including ARM64 support for Service Mesh and Serverless
- ▶ **Multi-tenant central registry** with better controls to manage growth, aging images, central authentication and ingesting external content
- ▶ **Performance Enhancements** with Tekton controller and components benchmarking and the introduction of concurrency
- ▶ **Networking Improvements** with Gateway API east-west enhancements and dev preview support for dual stack IPv4/IPv6 in Service Mesh



Stocking the Shipyard: Self-Service Delivery Model



**Developer
Self Service**



**Improve
Velocity**

- ▶ **Developer Hub 1.0 GA** based on Backstage enables self-service capabilities for end-to-end developer workflows, with golden paths and plugins
- ▶ **Developer Hub Platform Integration** across OpenShift initially with a Helm chart and then Operator for deployment
- ▶ **Additional Developer Hub Plugins** Authentication and Authorization with Keycloak, GitOps with Argo CD, Pipelines with Tekton, Container Image Registry for Quay, Multi Cluster View with Open Cluster Manager (OCM), JFrog Artifactory, Nexus Registry, Azure Container Registry
- ▶ **Hyperscaler Marketplace Support** for Developer Hub
- ▶ **OpenShift Local** to run the platform on their desktop and easily debug applications
- ▶ **Developer Sandbox** provides rapid access to a hosted private OpenShift environment, seeded with curated tools and services for developers
- ▶ **OpenShift Cluster Manager** allows AWS account holders to quickly spin up ROSA clusters



Stocking the Shipyard: Simplifying the Developer Experience



**Improve
Developer
Experience**



**Increase
Productivity**

- ▶ **Develop on Your Desktop** with Podman Desktop providing a user-friendly interface for containers developer workflows and enabling smooth transition to OpenShift from a local workstation.
- ▶ **Create, run, and manage applications** on an OpenShift cluster with its browser-based Dev console UI and broad catalog of samples and services.
- ▶ **Easily perform end-to-end developer workflows** with Red Hat Developer Hub and its Plugins and GPTs
- ▶ **Enrich Your Development Environment** with new extensions like OpenShift Toolkit for VS Code or IntelliJ
- ▶ **Create and Deploy Templated Functions** with additional Serverless Functions support for Wasm (DP) and Python



Adapting/Prepping the Vessel: Tailoring OpenShift Vessels for Diverse Environments and Consistent Navigation

Anchoring in New Ports: Expanding Horizons & Forging Alliances

Expanding Horizons: Hybrid Cloud

Expand to Additional Regions and Providers

Continue to expand support for any new AWS regions (e.g., AWS regions in the middle-east) and Azure Regions (e.g., Azure regions in China)

Deploy Compute Nodes on AWS Wavelength Zones & AWS Outposts

Closer to data-sources and end-users with Wavelength (Video streaming, Inference at the edge, IoT Streaming) AND into your own Datacenter with OCP & AWS Outposts to ensure consistency cross-cloud, as part of RH's Hybrid Cloud Strategy



Anchoring in New Ports: Expanding Horizons



Scan me for more details!

Expanding Horizons: On-Prem

Deploy & Distribute OpenShift Clusters across multiple vSphere Clusters

Improve the high availability by configuring multiple vCenter servers in one OpenShift cluster

Simplify adding nodes day 2 with the Agent-Installer

Applies to all clusters in bare metal, vSphere, Nutanix, OCI (external), None regardless of their installation method.

Anchoring in New Ports: Expanding Horizons & Forging Alliances

ORACLE
Cloud Infrastructure



**Anchoring in New Ports:
Forging Alliances**



Scan me for more details!

Expand to Oracle Cloud Infrastructure (OCI) with RHEL Certified BM "Shapes" and iSCSI Support for RHCOS Root Disk on Oracle Cloud Baremetal

Use BM shapes like you use the VM shapes clusters and enjoy RHCOS installations on your OCI AND future generic iSCSI usage capabilities for primary disks.

Run OpenShift Virtualization on Oracle Cloud Infrastructure (OCI)

Deploy OpenShift Virtualization on Oracle Cloud Infrastructure. And enjoy high-performance computing, high IOPS, and data-intensive brought to you by OCI.

Guarding the Vessel: Zero Trust & Multi-Cluster Readiness

Security-hardened Access Controls (Towards Zero Trust)

User Namespaces & Pod Security Admission (Enforcement Mode)

 Map "root" user in container to non-root on host and ensure compatibility Pod Security Admission Enforcement Mode.

Unlock advanced networking with OpenShift Virtualisation via ovn-kubernetes

 With ovn-kubernetes as native secondary network you more control over IPAM and can implement micro-segmentation for targeted workload isolation, all powered by OVN Kubernetes

Admin Network Policy & IPSec on N-S/E-W Traffic (ZTN):

 Define global cluster-admin only Network Policy rules to restrict egress, pod and namespace traffic across the cluster.

Encrypt North-South/East-West traffic, from your cloud cluster to external network endpoints. Encrypt East-West traffic. Both important for achieving Zero Trust Networking.



Guarding the Vessel (Zero Trust & Multi-Cluster Readiness)



Scan me for more details!

Prepping The Vessel For Multi-cluster Identity

Laying the Foundation with BYO OIDC Identity Integration

Configure and integrate with OIDC IDPs (e.g., Keycloak, Azure IDP) with direct access to OpenShift and K8s APIs.  

Unlock Cross-Cloud Identity with Unified SSO

Glide through your multi-cloud OCP deployment with seamless SSO powered by SPIRE. Example: workloads on ROSA clusters can securely communicate with another workload on ARO clusters 

Guarding the Vessel: Ease of Use & Additional Integrations

Simplifying User Experience with Cert-Manager



Auto renewal & Population of Certificates



Seamless Certificate Management for API-Server and Ingress Routes AND automated certificate renewals and injection into routes (less "insecure CA warnings" for default cluster routes).



Istio-csr Integration With Cert-Manager



Automate your Istio certificate management for mutual TLS, and future with OLM operators integrations with Cert-manager



Guarding the Vessel (Ease of Use & External Integrations)



Scan me for more details!

Additional Integrations for Improved Security

Leverage oc-mirror's enclave support to centralize your OCP content in a disconnected environments



For fully disconnected customers, oc-mirror enclave support will allow a single source (enterprise repository) access for OCP content (platform and operators) on the disconnected fabric.

Support Validation & Testing of Additional Issuers

In addition to ACME, Value, Venafi, we are looking to test and support NCM, RHCS, and more



ACME

Adventure in Diverse Seas: Navigating Different Waters

Evolving Windows Containers

Seamless Windows Integrations

WMCO's disconnected support AND Streamlined credentials management with Group Managed Service Accounts (gMSA) support.

Enhanced Monitoring & Cross-Platform Support

Unified monitoring experience for both Windows and Linux AND Broadened Windows containers support for ARO/ROSA platforms.



Adventure in Diverse Seas: Navigating The Arm, Windows & Multi-arch Waters



Scan me for more details!

Multi-Arch Innovations

Optimize scheduling Workloads on Multi-Arch Environments

For environments where workloads have specific architecture requirements, we are looking to optimise the scheduling process to make best use OpenShift's Multi-arch environments

Scalable & Diverse Architectural Support

For IBM Power/Z clusters, add x86 nodes day-2 with xtended agent-based support . Heterogeneous control planes and node pools w/ Hosted Control Planes.

Reinforcing the Vessel: Stability & Resilience

Stability

Simplified Update process with 'oc adm update'

Transition from 'oc adm upgrade' to 'oc adm update' and access verbs like 'update recommend', 'update pre-checks', 'update status' are designed to preemptively flag issues, provide detailed status, and allow for staged rollouts.



Enhanced OpenShift Virtualisation Experience

Experience less/no downtime with hot-plug (CPU/Memory) and dynamic addition of CPU and memory

Enjoy robust backup and recovery through Top-tier partnerships with Veeam, Kasten, and Trillio



Reinforcing the Vessel: Stability & Resilience



Scan me for more details!

Resilience

Etcd Improvements for with Hosted Control Planes

Experience improved Etcd performance and manageability with Hosted Control Planes via auto-defragmentation, resource usage optimisations, and more comprehensive back-up & recovery story.

Diagnose and Troubleshoot Etcd Issues Efficiently with Our Enhanced Metrics, Dashboard and Alerting.

Revamped dashboards to include targeted metrics and alerts for disk and network jitter, end-to-end latency, and problem categorisation.

Hardware RAID support with Metal3 for Dell, Supermicro, and HPE via Redfish to boost OpenShift's robustness.

Optimise OpenShift's robustness and reliability by integrating Hardware RAID support with Metal3 for top-tier platforms such as Dell, Supermicro, and HPE.

Customizing, Redesigning & Equipping the Vessel for Diverse Voyages

Customising the Vessel to Improve Flexibility of Deployment



Configure Custom MTU with OpenShift Installer

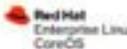


Tailor OpenShift cluster's network MTU during installation for enhanced flexibility and compatibility with specific network requirements, like those in public cloud environments. The Installer now accepts custom MTU parameters in the install-config manifest, with comprehensive documentation for guidance.



Configure External DNS for OpenShift on Cloud Providers

Deploy OpenShift on major cloud providers using your custom DNS service, instead of limited options like AWS Route53 or Google Cloud DNS. This improves flexibility and helps with compliance.



Configure Custom RHCOS boot images for tailored hardware driver integration.



Customizable boot images address OpenShift's limitations, allowing users to embed essential out-of-box drivers for seamless CoreOS installations on specialized hardware.



Unlock Dynamic and Non-Disruptive Pod Scaling in Your OpenShift Environment

Take your application scaling to the next level with OpenShift's upcoming autoscaling enhancements. Seamlessly update Pod resources and Vertical Pod Autoscaler (VPA) settings in real-time, without the need for Pod restarts. Plus, benefit from multi-dimensional autoscaling that unifies Horizontal Pod Autoscaler (HPA) and VPA for more precise scaling decisions



Customising & Redesigning the Vessel



Scan me for more details!

Redesigning the Vessel to Cater for More Use-cases

Configure Optional Ingress



Configure the Ingress Operator as needed within your OpenShift deployment. Disable it to reduce resource consumption, especially for Managed OpenShift on AWS (ROSA).

Seamlessly Run Layered Operators in Hosted Control Planes OpenShift Deployments



Embrace full OpenShift functionality even when you're using hosted control planes cost-efficient architecture.

Deploy Hosted control Planes On more Providers



Deploy HCP on additional infrastructure providers like vSphere and Nutanix. Take HCP's cost-efficiency and time-to-provision benefits to more environments.

Customizing, Redesigning & Equipping the Vessel for Diverse Voyages

Optimize Azure Outbound Traffic with SNAT Disabling and NAT Gateway Integration

 Disable SNAT for enhanced scalability and by making Azure NAT Gateway the default option for outbound traffic management. These changes alleviate SNAT Port Exhaustion issues, and aligns with best-practices.



Equipping the Vessel

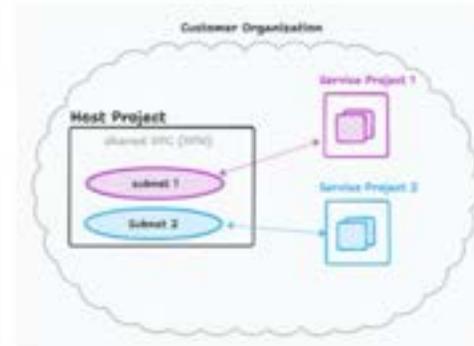


Scan me for more details!

Bring IPv6/IPv4 Dual-Stack to Public Cloud OpenShift Deployments



Extend IPv6/IPv4 dual-stack support to public cloud OpenShift deployments as the platforms/hyperscalers enable the capability across their stacks.



Access GCP Private & Restricted API Endpoints & Enable Shared VPC (XPN) between Service & Host Project

Leverage private service connect with OpenShift to stay compliant with your regulatory policies AND comply with GCP's best practices with XPN Host & Service Projects.



Keeping Watch and Surveilling the Ship: Observability



The Long Watch

Find Issues Fast

- Searching across namespaces in Loki log storage
- Fast troubleshooting sessions for Tracing in Tempo

Alerting on Issues

- Users can generate alerts through log storage.
- Alertmanager capabilities are expanding for metrics

Standardize your Signals

- Use eBPF to observe signals for Network Observability and Sustainability
- OpenTelemetry Collector
- Support for OpenTelemetry signals (Traces/Logs/Metrics)

Visualize Problem Areas

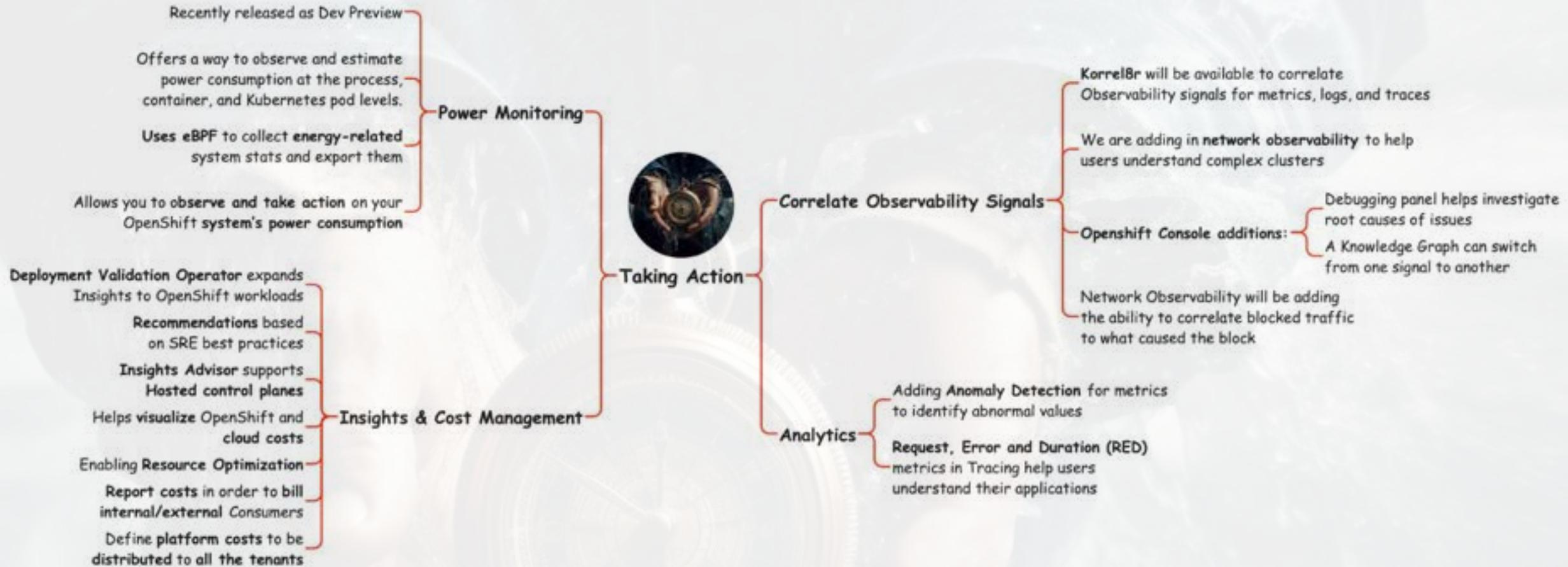
- Adding a UI for Tracing in the OpenShift Console
- Adding dashboards for Power Monitoring (Kepler)
- Evolving the Observability UI
 - grouping by tab and charts by topic
 - provide dashboard customization functionalities

Observe the Fleet with Multicluster Observability

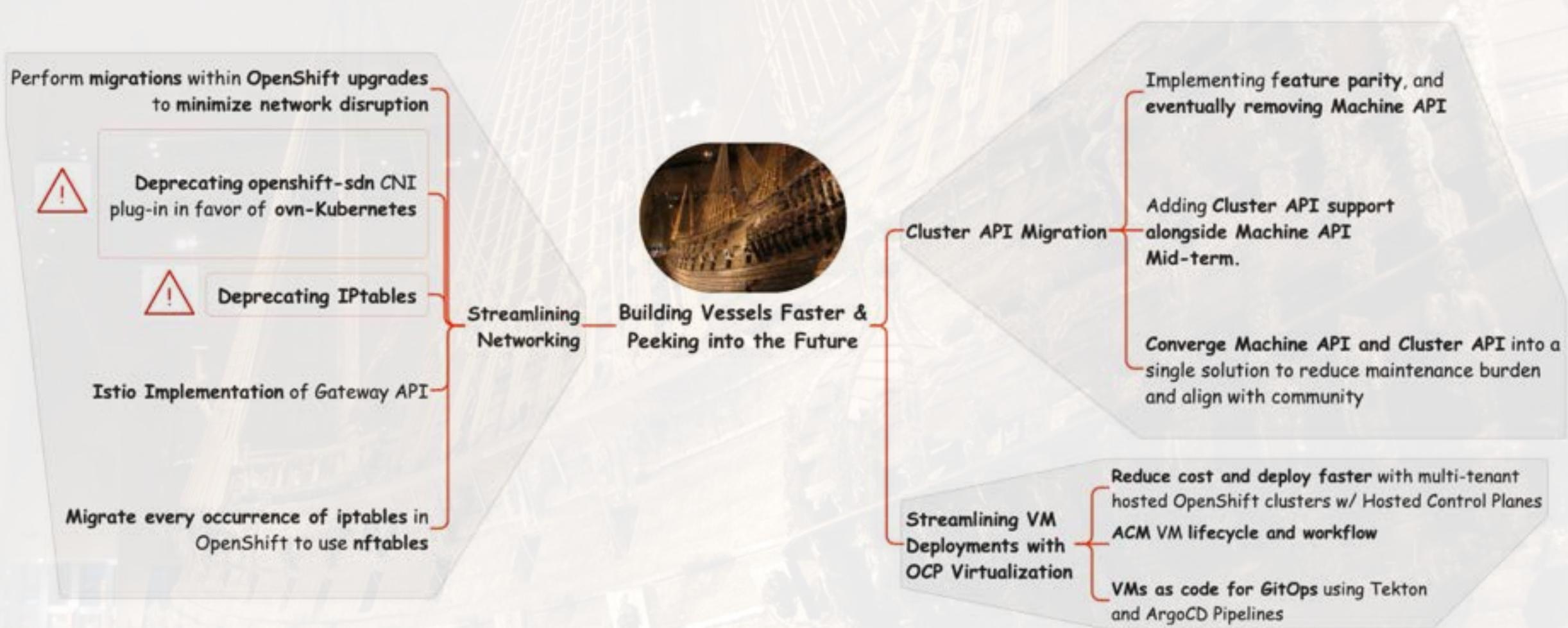
- Loki Multicluster Log Storage with ACM
- Multicluster tracing storage with ACM
- Thanos metrics storage



Keeping Watch and Surveilling the Ship: Observability



Charting Streamlined Waters: Building Vessels Faster & Peeking into the Future



Charting Streamlined Waters: Building Vessels Faster & Peeking into the Future



Building Vessels Faster & Peeking into the Future

Streamlining the OpenShift CLI

Deliver OpenShift CLI via OpenShift CLI Manager

As the number of projects in openshift is increasing, so is the number of CLI's associated with those projects.

Each CLI has its own download location and different ways of installing them on Linux and windows

OpenShift CLI Manager eases support burdens for both Cluster Admins and Developers

With a Krew plugin manifest file you can install the CLI using the 'oc krew install' command

Streamlining Workloads — WASM workload support in OCP

Commanding a Fleet: Navigate uncharted waters and provide routes to safe harbors

Multicloud, Multicloud, Scale, Security, Compliance



Red Hat Advanced Cluster Management for Kubernetes

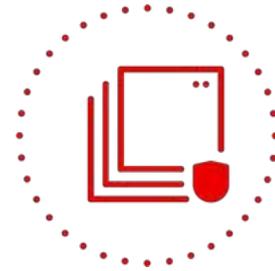


Observability

Provide fleet platform health metrics, logs and traces all in 1 place. Deliver Kubernetes right-sizing recommendations for platform engineers and developers.



Reduce cost



Governance

Enhanced policy compliance timeline, progressive policy rollouts, and advanced operator management provides configuration controls at the speed of your business.



Protect your investment



Scale

Manage your mixed fleet: MicroShift, HyperShift, single-node, compact, ... and whatever comes next. Global hub policy view and inventory search.



Embrace growth



Red Hat Advanced Cluster Management for Kubernetes

Fleet Observability



Noise



Clarity

- **Single interface for fleet RCA** collect and visualize platform metrics, logging, and traces to perform near-term (< 28 day) root cause analysis
- **Fleet overview** including cluster usage and optimization, alert management UI, and analysis delivered from Red Hat Insights
- **Custom dashboarding** build your own dashboards, deliver them via gitops, and view them directly within the OpenShift console
- **Centralized configuration** controls for fleet metrics, logging, traces, and service meshes



Red Hat Advanced Cluster Management for Kubernetes

Governance



Advanced Features

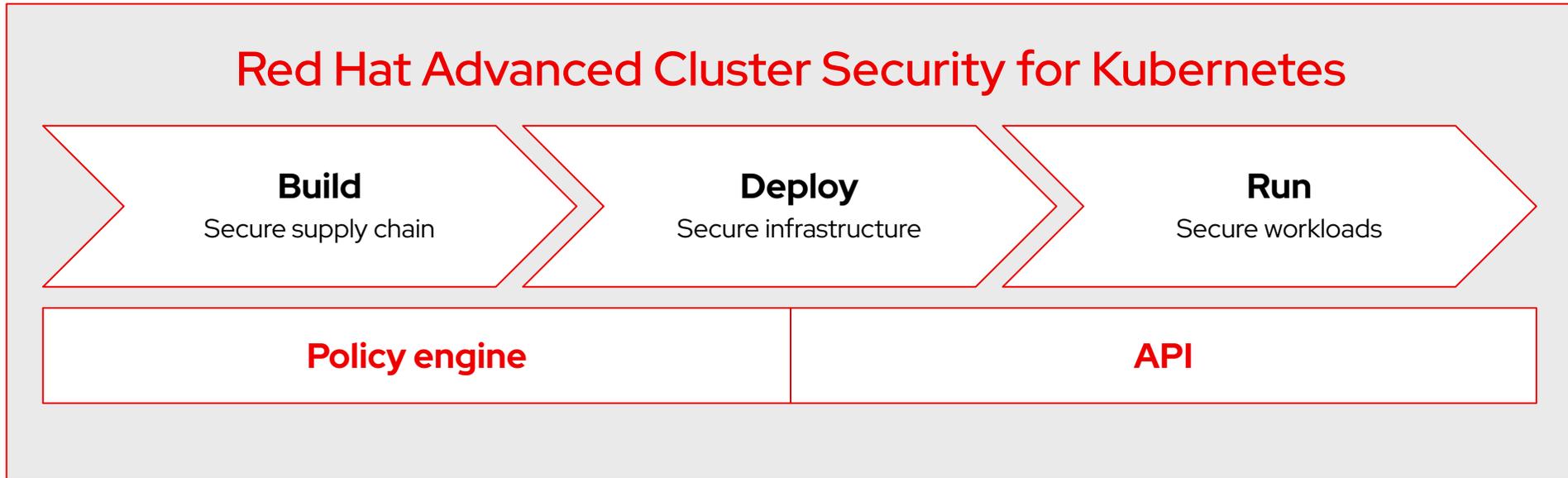


Simplify Operations

- ***Advanced Operator Management*** introduce a new policy type for easier configuration, upgrade and maintenance of operators at scale
- ***Compliance History*** provide the capability to store compliance events in a database for long term audit requirements
- ***Enforce resources using a progressive rollout strategy*** advanced rollout scenarios e.g. setting filters with UI support
- ***Enhanced Experience of Governance UI*** Provide custom fields to sort policies, for example based on teams or severity

Red Hat Advanced Cluster Security: Use Cases

Security across the entire application lifecycle



Vulnerability Management



Compliance



Automate Security Policies



Risk Profiling



Network Segmentation



Threat Detection and Response

Red Hat Advanced Cluster Security for Kubernetes Vulnerability Management and Supply Chain Security



**Faster time to
resolution**



Shift security left

- **One consolidated Clair v4 scanner across Red Hat products (ACS & Quay)** ensures accurate and consistent scan results with common language-level support
- **Adoption of Red Hat security data published in CSAF-VEX** (Common Security Advisory Framework using VEX profile) format
- **Export/Import SBOMs** and map known vulnerabilities to components
- **Developer scoped access for ACS results** with *namespace-admin workflows and integrations and ability to use collections in a variety of views and filters for grouping results.*

Red Hat Advanced Cluster Security for Kubernetes: Policy Management, Compliance and Network Security



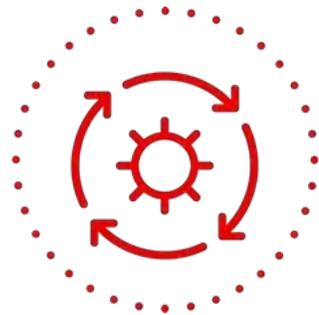
**Break
cross-functional
barriers**



Runtime security

- **GitOps approach** for managing ACS policies.
- Manage and schedule **Compliance Operator** scans with RHACS. Store trend data and export compliance reports for auditors.
- Focus attention on riskier deployments for remediation with **heat maps in network graph**.
- Ensure your workloads meet **networking guardrails** defined by your organization with **network system policies**.

Red Hat Advanced Cluster Security for Kubernetes: Expanding platform support



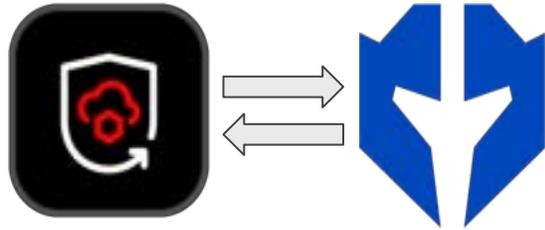
**Platform
Consistency**



Simplify Adoption

- **CO-RE BPF** as a new runtime collection allows ACS monitoring of a wider set of Linux OS kernels.
- **ACS** secures
 - **OpenShift / ROSA with Hosted Control Planes.**
 - **IBM ROKS/RHOIC**
 - **Red Hat Device Edge**
 - **OpenShift / *KS on Arm**

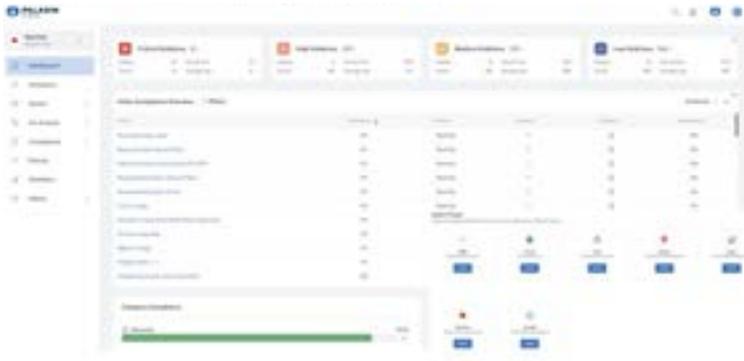
RHACS and the security ecosystem



Full Cloud Posture Management



Expand Security to Cloud Infrastructure



Integration with **Paladin Cloud** combines cloud infrastructure security (Paladin) with and Kubernetes security (RH ACS) for full-stack cloud native application protection.

Enhanced integration between RH ACS and **ServiceNow** Vulnerability Response and Alerts for streamlined vulnerability and Alert management.

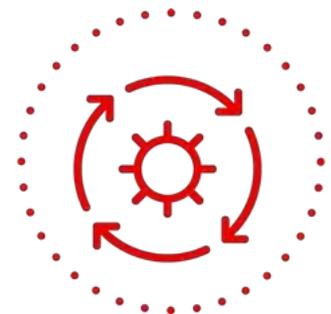


Vuln Scanning

Resolve

Notification

Remediation



Weather Forecast: Cloudy with a chance of ROSA/ARO/OSD...

Cloud Services

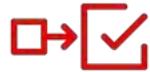
Red Hat OpenShift cloud services

A turnkey application platform with management and support from Red Hat and leading cloud providers



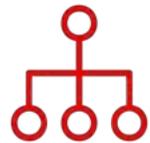
Accelerate time to value

Quickly build, deploy, and run applications that scale as needed.



Operational efficiency

Enhance operational consistency, efficiency and security with proactive management and support.



Focus on innovation

Simplify operations so your teams can refocus on innovation, not managing infrastructure.



Hybrid cloud flexibility

Deliver a consistent experience on premises and in the cloud.

Red Hat OpenShift cloud services

Azure Red Hat OpenShift (ARO)

- Short term credentials with managed identities
- Hosted Control Planes
- Bring your own NSGs
- Improving alerts with Azure Monitor Signals
- Enlarging cluster sizes
- Expanding regions and instance types
- Cluster wide proxy



Red Hat OpenShift Service on AWS (ROSA)

- Working on FedRAMP offering
- Terraform content
- Hosted Control Planes
- Region expansion
- Compute configuration QoL improvements
- Deprecate non-STS



Red Hat OpenShift cloud services



Google Cloud



OpenShift Dedicated

- Google Cloud:
 - Shared VPC (xPN)
 - Private Service Connect
 - Shielded VM policy
 - Workload Identity Federation
 - Domain restricted resource sharing
 - Standard GCP instances and new regions
- AWS
 - Allow newly created machine pool to be set as a default machine pool
 - Managed Ingress improvements
 - OCM Service Log notifications for platform events

Navigating the Telco/Edge Sea: Charting a Course with OpenShift for Telco/Edge

Product Managers: Franck Baudin, Daniel Fröhlich, Philippe Huet, Robert Love, Hari Rakotoranto, Michal Zasepa

OpenShift at Edge overview



Device Edge with MicroShift

Bring MicroShift to General Availability, then extend capabilities and compliance support



Enterprise Support for k8s at the smallest edge device



Edge Management

Add MicroShift related management capabilities to Ansible Automation Platform and Advanced Cluster Management



Consistent management



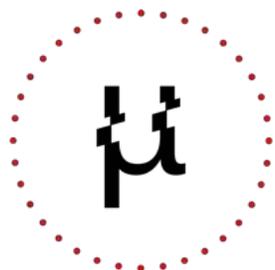
Simplify Edge

Further reduce SNO footprint
Reduce SNO installation and upgrade times
Support SNO quick rollbacks



Faster edge adoption

Red Hat Device Edge



MicroShift Compliance

- FIPS 140-3 (Pending RHEL)
- ISA 62443



Secure the edge

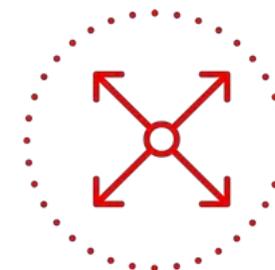


Edge Management

- Improved integration with AAP, ACM and ACS
- Observability with Open Telemetry
- Workload mmgt with gitops



Consistent management



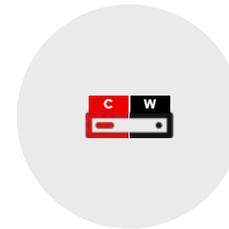
Extend Capabilities

- Operator Lifecycle Manager
- Machine Vision on arm
- Low latency workload
- GitOps



More edge use cases

Single Node OpenShift

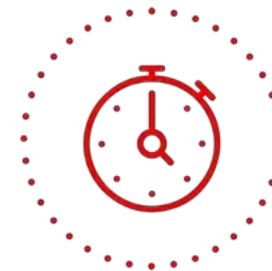


Continue footprint reduction

- Make more cluster capabilities optional
- Optimize resource usage
- Goal: 1 core control plane



**More resources available
for workload**



Minimize Deployment Time

- Make SNO relocatable using an image based approach
- Improve installation and upgrade time by using an A/B image based approach
- Support quick rollbacks



Faster edge rollouts

Accelerate RAN vDU Operations on Single Node OpenShift

Goals:

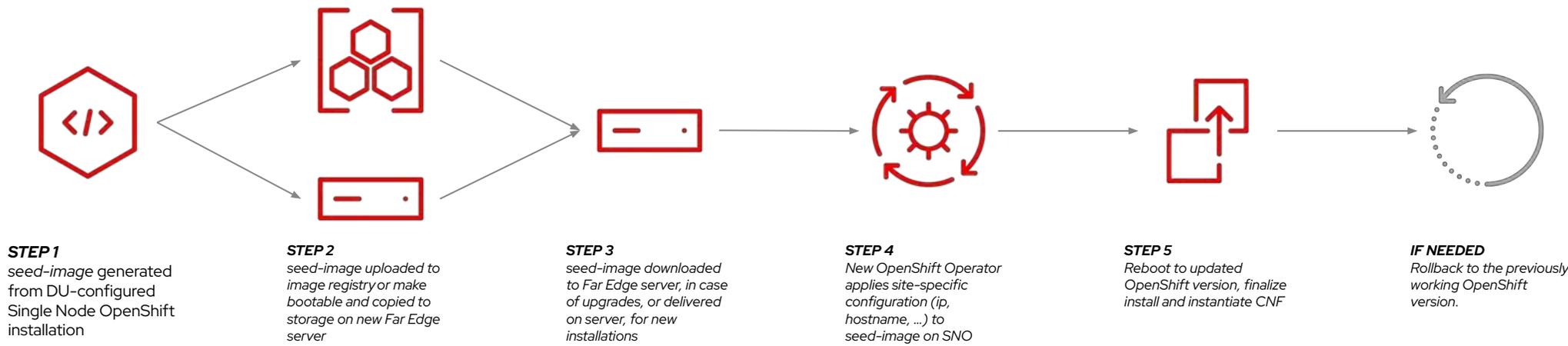
- Reduce time it takes to finish new deployments for DU-configured OpenShift deployments
- Reduce upgrade time and service downtime for DU-configured OpenShift deployments



What we plan to do:

- Replace existing installation/upgrade procedure with image-based installation/upgrade procedure

Steps to upgrade/install OCP on SNO





OpenShift as O-RAN O-Cloud Platform



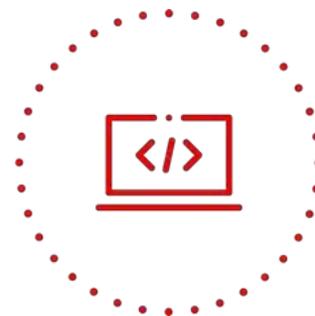
Continued Involvement in WG6

Influence O-RAN to implement an intent-based API for the O2 interface and follow the K8s declarative paradigm

Continue participation in PTP, Hardware Acceleration and O-Cloud areas



Introduce the Cloud Native practices into Telco



O2-IMS Interface Implementation

Analysis and implementation of API for O2 subinterfaces (*)



Standardised Telco Cloud for RAN



Hardware Management

Cooperation with Hardware vendors to deploy and provision the O-Cloud

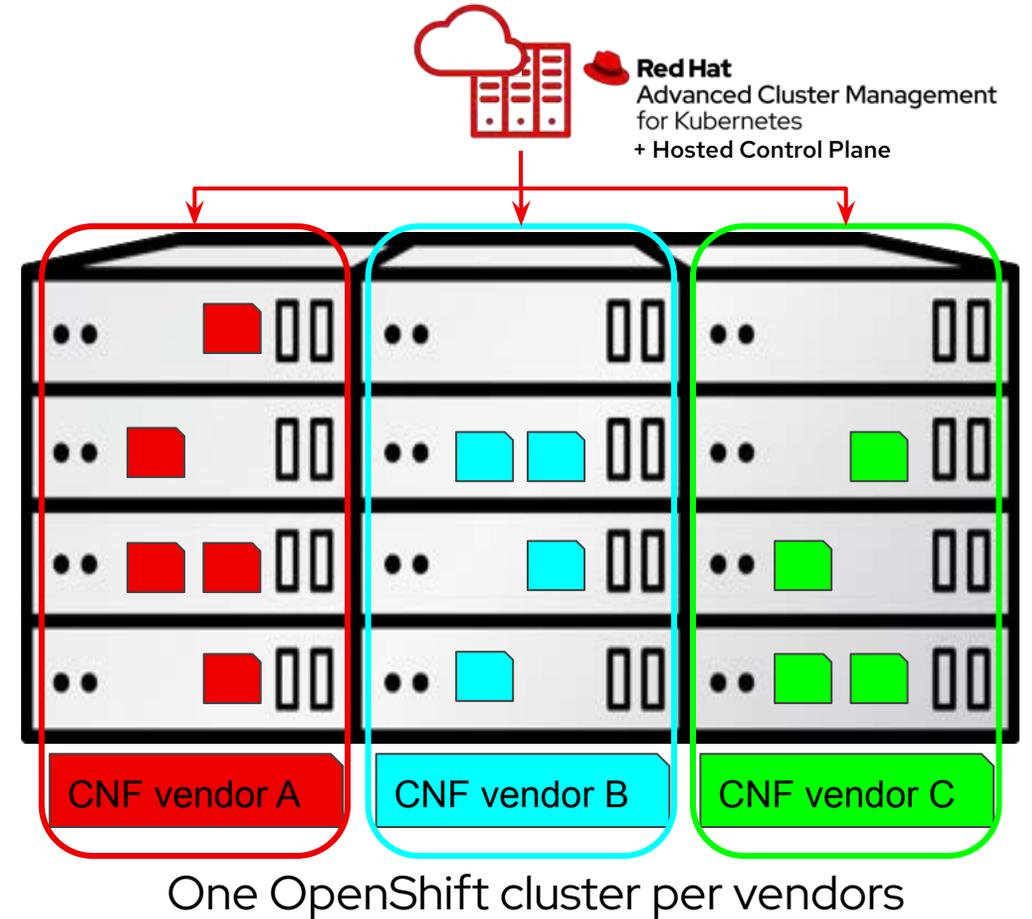
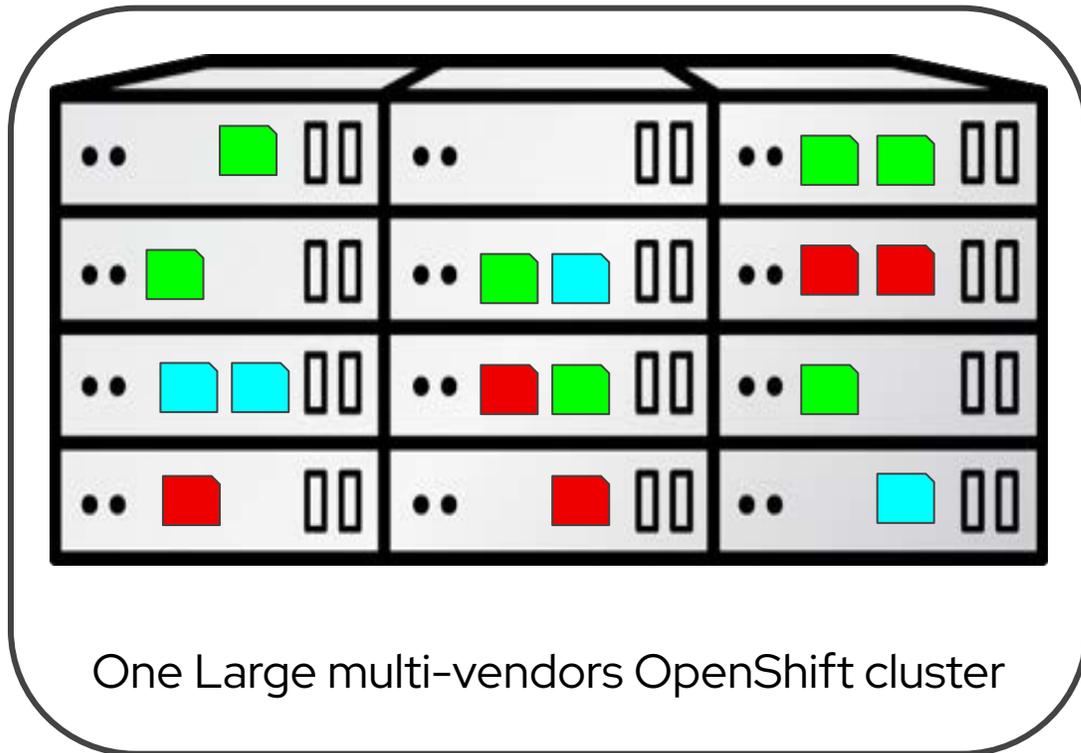
Driving the Hardware Acceleration alignment in O-RAN WG6



CaaS and bare metal orchestration  **Red Hat**

(*) - Depends on the O2-IMS API specifications readiness

New trend*: divide large clusters into smaller ones



Thank you for joining!

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