

What's Next OpenShift 4

- Please direct your Q&A into the Q&A forum within Primetime
- Any outstanding questions will be addressed at the end of the presentation or responses will be facilitated after the briefing
- The slide deck, recording, and Q&A will be added to the Google calendar event, [OpenShift video channel](#), and the PFE [Source page](#) after the call.
- Please take our poll + survey at the end of the session.
- For questions regarding field enablement for OpenShift, please contact Anna Swicegood at aswicego@redhat.com.

Please complete

[THIS 1-MINUTE SURVEY](#)

at the end of the presentation

Purpose of this presentation

- “OpenShift Roadmap Update: What’s Next”
 - **A look ahead over the next 6 - 12+ months**
 - **Focused on major OpenShift features / initiatives**
 - **Updated quarterly (goal) and subject to change**
 - **Useful for customers who want a general OpenShift Roadmap update**
- “OpenShift Roadmap Update: What’s New in OpenShift x.y”
 - A deep dive into the next OpenShift release
 - Delivered with each new OpenShift release
 - Useful for customers who want a deep dive on latest OpenShift release
- Both of these presentations are ok to use publicly
 - Decks will be available in PnT in multiple formats & via Google Slides
 - Feel free to use relevant slides, customize and make them your own
 - PM roadmap session recordings also available, but for internal use only
 - Slides and content are subject to change without notice

Table of Contents

- Introduction
- Hybrid Cloud Experience and OpenShift Plus
- Managed Cloud Services
- Telco and Edge
- Core, Platform and Developer Tools and Services



What's Next in OpenShift

Q4CY2021

OpenShift Product Management

Speakers



Scott Berens



Deepthi Dharwar



Jamie Scott



Karena Angell



Oren Kashi



Gaurav Singh



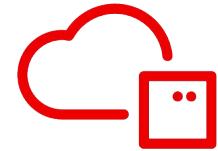
Tushar Katarki

Red Hat Open Hybrid Cloud

Enabling any application, on any infrastructure, in any location



Traditional
N-Tier Apps



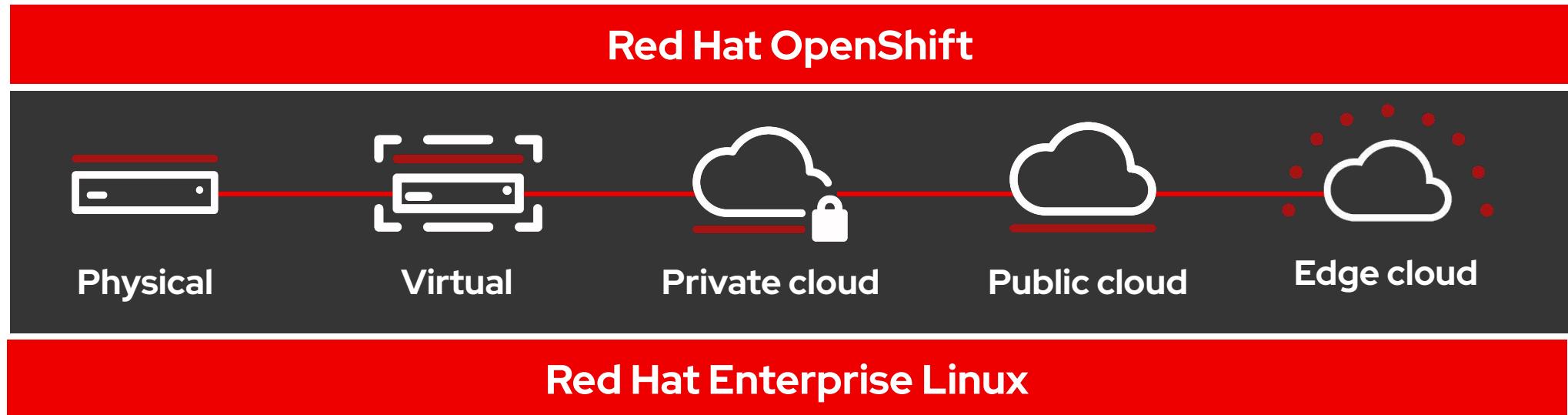
Cloud Native
Microservices



Data, Analytics
& AI/ML



ISV Packaged
Apps

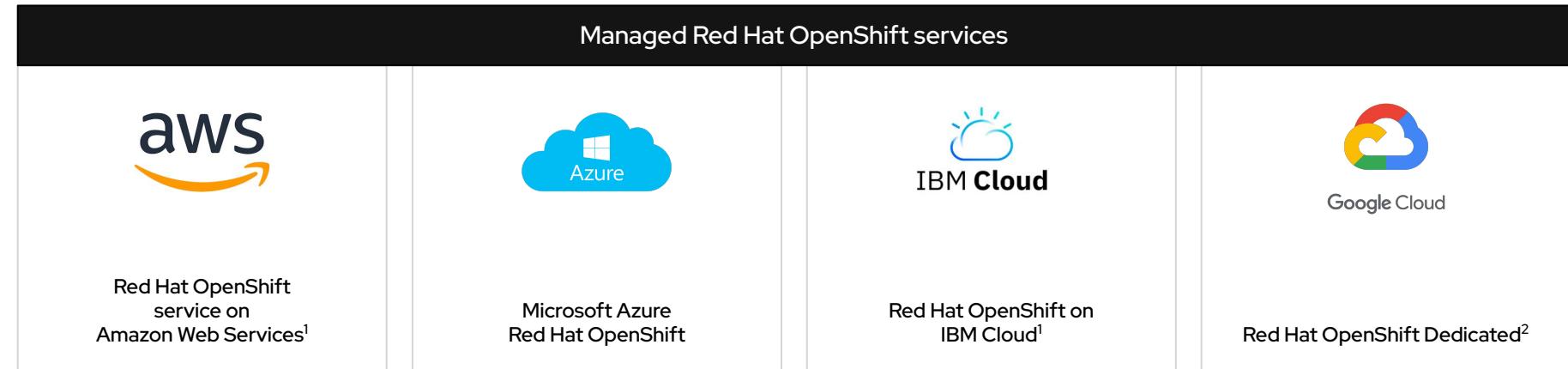


Red Hat OpenShift platform explained

Available as self-managed platform or fully managed cloud service

Start quickly, we manage it for you

Cloud managed

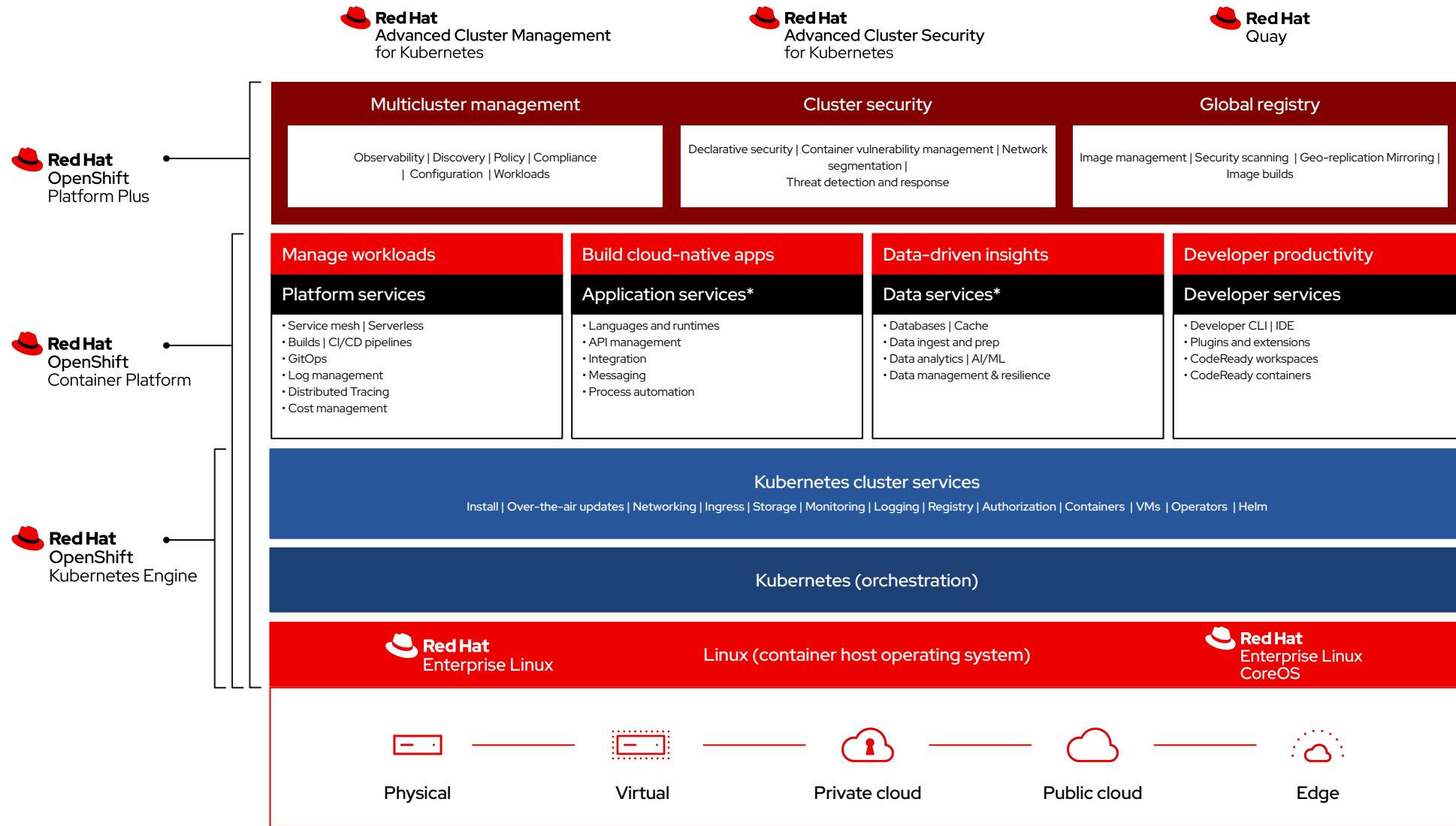


You manage it, for control and flexibility

Customer managed



Red Hat OpenShift





HYBRID CLOUD EXPERIENCE

Applications in hybrid clouds and clusters

CORE, PLATFORM & DEVELOPER TOOLS

TELCO & EDGE

MANAGED CLOUD SERVICES



Self-managed clusters and applications

Foundations for Managed Services and Telco and Edge



5G CORE and 5G RAN

Near edge and Far edge

From and to the edge



OpenShift as a (SRE) Managed Service

Managed (SRE) Application, Data and Management Services

Unified Experience

Security Everywhere

Platform Consistency

Changes to OpenShift Minor Release (4.y) Life Cycle

- Minor releases will have **18 months life**
- **Even releases** are designated as **EUS**
- A new **EUS to EUS upgrade** experience
- OpenShift 4 EUS be available to both standard and premium support
- **3 OCP releases per year** (same a Kubernetes)

BLOG

Time Is On Your Side: A Change to the OpenShift 4 Lifecycle

October 18, 2021 | by Mike Barrett



Red Hat is changing how long a minor number release (4.y) of OpenShift 4 will be supported. We are changing from our current version-based lifecycle policy to a timeline-based lifecycle of 18 months for all minor releases of OpenShift 4. This change will take effect with Red Hat OpenShift Container Platform version 4.7 and higher. Red Hat will also make all even numbers of OpenShift 4 an [extended update support \(EUS\) release](#) starting with OpenShift Container Platform 4.6 and higher. That means support periods will be extended for OpenShift releases 4.6, 4.8, 4.10, 4.12 and beyond.

A brief history on how we got to this topic. Starting in OpenShift 4, Red Hat moved away from a calendar driven lifecycle where we would declare a start date and end date for support when the software was released. At that time, we moved to a "rolling window," which many in the application platform or orchestration industry have made the norm.

Link to the Red Hat Blog -

<https://cloud.redhat.com/blog/time-is-on-your-side-a-change-to-the-openshift-4-lifecycle>

Red Hat OpenShift Container Platform Life Cycle Policy -

<https://access.redhat.com/support/policy/updates/openshift>

OpenShift Roadmap

1H CY2022

MANAGED	APP/DEV
<ul style="list-style-type: none"> • Helm + Go hybrid Operator SDK (Tech Preview) • File-based operator catalog management • OpenShift Serverless Functions • OpenShift Serverless - Kafka Broker (TP) • Dynamic Plugins for the OCP Console • Service Mesh on OpenShift Virtualization • Pipelines: concurrency control • Pipelines: in-cluster Tekton Hub • Pipelines: TaskRun and image signing • Shipwright (TP) with local build • Shared secret/configmaps across namespaces • GitOps: HashiCorp Vault integration • Azure Stack Hub (IPI) • Alibaba, & IBM Cloud (IPI) • OpenShift on ARM (AWS and Bare Metal) • VMWare HW version 15 and thin provisioning • Custom audit profiles by group • Cert-manager • Group membership information from an idp (OIDC) • MetalLB with BGP Support • External DNS management • Network Observability & Analysis Tooling • Primary Traffic on 2ndary Cluster Host Interface • Egress IP Multi-NIC Support • Disconnected mirroring simplification • Windows: containerd, health management, csi-proxy • ROSA: cluster manager UI for ROSA provisioning • ROSA/OSD: Cluster Hibernation • ARO: Azure Portal UI for ARO provisioning • Cost: Improved models for distribution of costs 	<ul style="list-style-type: none"> • Operator installed by default (Day0) • Java/Quarkus Operator SDK (TP) • Auto-scaling: Operator managed workload • mTLS natively in OpenShift Serverless/Knative • ServiceMesh for external services (VMs, BM) • ServiceMesh Support for IPv6 • Pipelines: unprivileged builds • Pipelines: extended history and log retention • Pipelines: manual approval • Argo CD multi-tenancy alignment with k8s • Argo CD Helm deployment enhancements • Shipwright: build triggers • Alibaba, & IBM Cloud (UPI) • Nutanix (UPI/IPI) • SRO manages third party special devices • GA of cert-manager, Pod Security Admission, Reconcile SCC, Kube KMS • Gateway API GA • eBPF Support • Support for ALB • OVN as a secondary network • Network tracing and Topology Views • Log Exploration Tool in the OpenShift Console • Windows: additional network plugins, HPA • DPU/SmatNIC support • ROSA/OSD: FedRAMP High on AWS GovCloud • ROSA/OSD: Terraform provider • ROSA/OSD/ARO: GPU Support • ARO: Upgrades through cluster manager • Cost management understands IBM Cloud IaaS

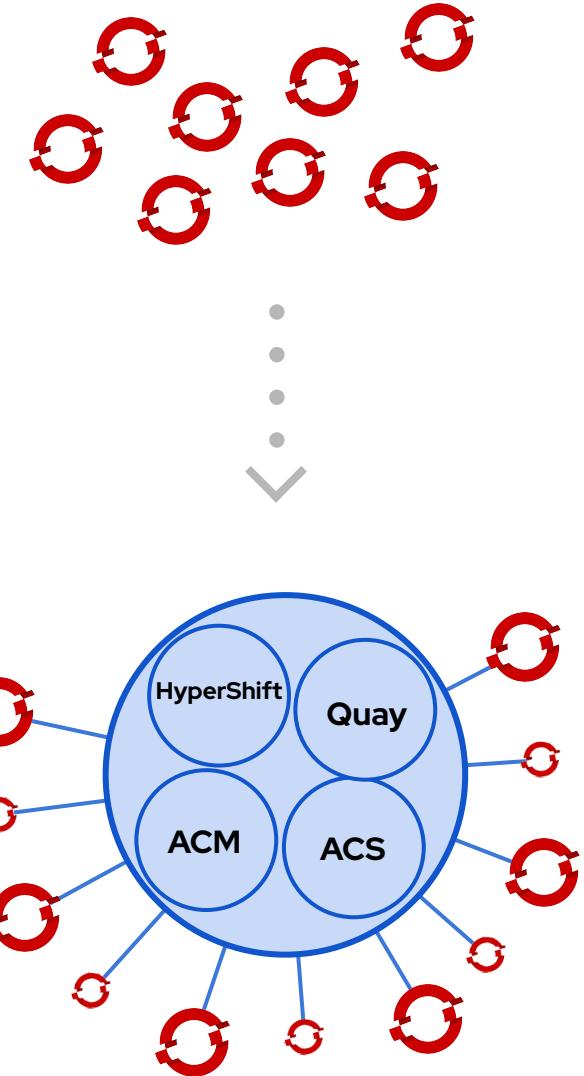
2H CY2022

MANAGED	APP/DEV
<ul style="list-style-type: none"> • Operator installed by default (Day0) • Java/Quarkus Operator SDK (TP) • Auto-scaling: Operator managed workload • mTLS natively in OpenShift Serverless/Knative • ServiceMesh for external services (VMs, BM) • ServiceMesh Support for IPv6 • Pipelines: unprivileged builds • Pipelines: extended history and log retention • Pipelines: manual approval • Argo CD multi-tenancy alignment with k8s • Argo CD Helm deployment enhancements • Shipwright: build triggers • Alibaba, & IBM Cloud (UPI) • Nutanix (UPI/IPI) • SRO manages third party special devices • GA of cert-manager, Pod Security Admission, Reconcile SCC, Kube KMS • Gateway API GA • eBPF Support • Support for ALB • OVN as a secondary network • Network tracing and Topology Views • Log Exploration Tool in the OpenShift Console • Windows: additional network plugins, HPA • DPU/SmatNIC support • ROSA/OSD: FedRAMP High on AWS GovCloud • ROSA/OSD: Terraform provider • ROSA/OSD/ARO: GPU Support • ARO: Upgrades through cluster manager • Cost management understands IBM Cloud IaaS 	<ul style="list-style-type: none"> • Operator- Android-Style Permission Approval • Operator - Helm Bundle Support • Operator - Python SDK prototype • Operator - Canary Rollouts / Fleet Management • Centrally managed multi-cluster service mesh • Serverless - Stateful functions • Make existing deployments Serverless • Shipwright custom tasks for Tekton • Argo CD application dependencies • Argo CD image updater and notifications • Pipelines: Tekton Bundle support • Pipeline reuse in pipelines • Utilize cgroups v2 • Expand cloud providers for OpenShift on ARM • Enable user namespaces • Hierarchical namespaces, Automate group sync, prevent brute force logins • ESNI Support • Network Policy v2 • Network Bandwidth-Aware Scheduler (QoS) • Ingress - Automatic Intelligent Sharding • SigStore style image signature verification • Allow OpenShift tenants to configure log forwarding • Cost mgmt integration to Subs Watch, ACM • Detailed Quota Usage in cluster manager • ROSA/OSD: AWS Dedicated instances

2022+

Hybrid Cloud and OpenShift Platform Plus

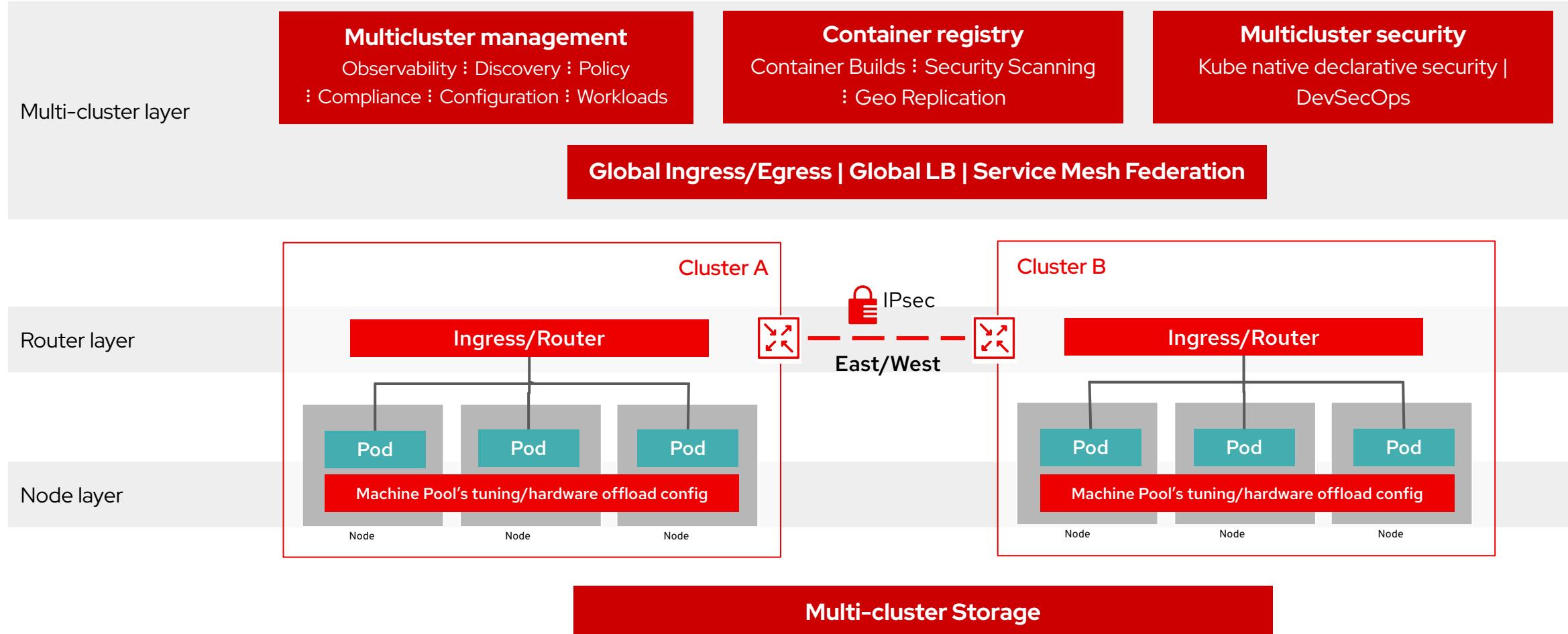
Successful fleet management requires central tools
Customers desire “regionality” for these tools



This is a big shift in thinking:

1. Embrace the Hub—an *infrastructure cluster*—as the unit of regionality to run OpenShift Plus.
2. Update deployment patterns to reflect Hub and spoke OpenShift clusters

Standardized tools for your 1st and 100th cluster





Red Hat Advanced Cluster Management for Kubernetes



Unified Experience

Leverage a single console experience from 1 cluster to thousands to deliver applications consistently across cloud services and on-premises environments.



Reduced Total Cost of Ownership

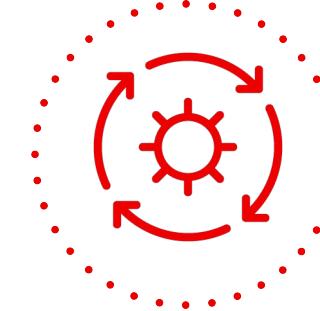


Security Everywhere

Cosigned manifests and secrets management enable faster application delivery with security throughout the supply chain.



Reduced Exposure and Risk



Platform Consistency

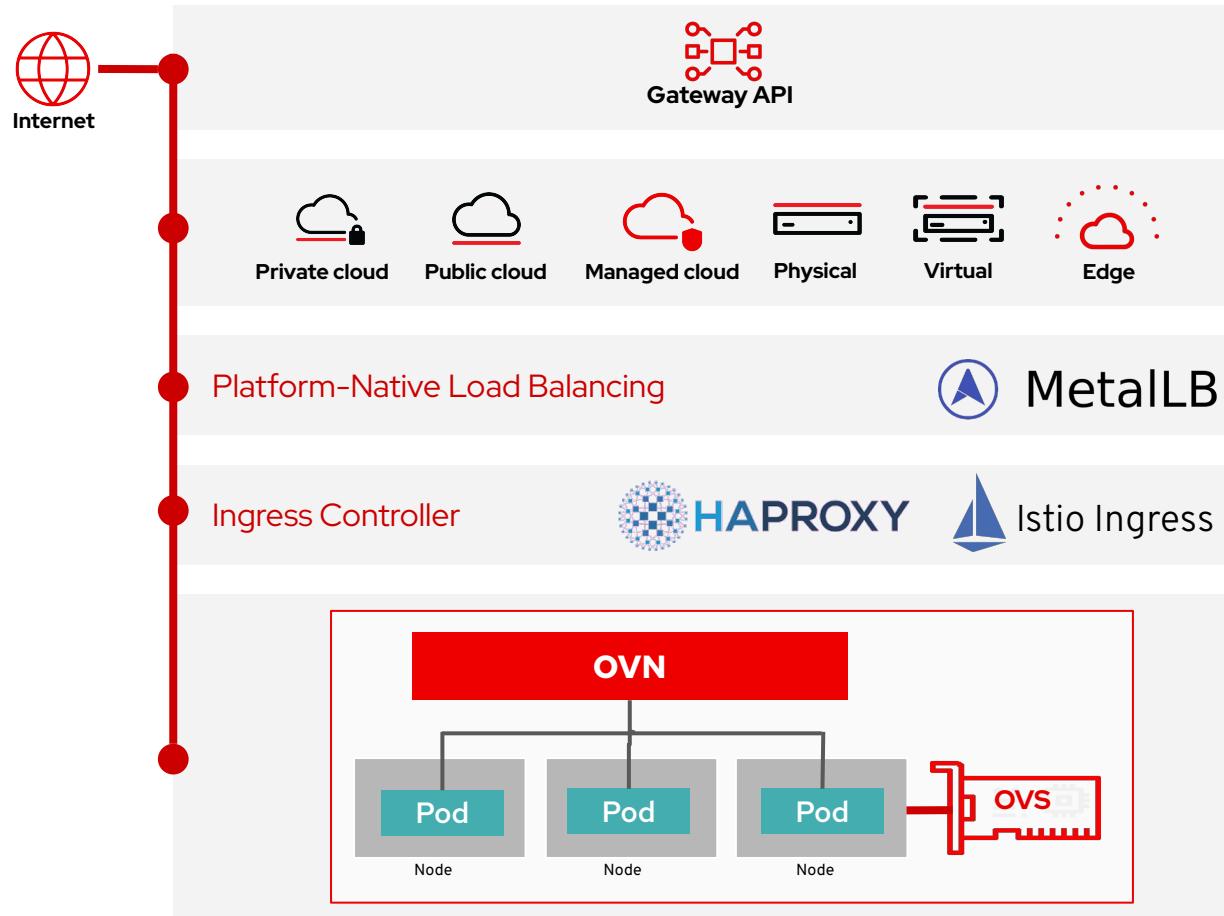
Deploy single, compact, multinode, remote worker nodes, cloud services, and HyperShifted clusters from hierarchical tiers of management hubs.



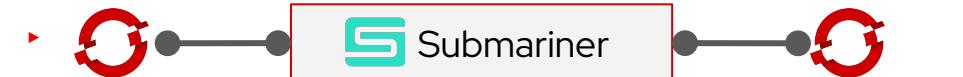
Increased Developer Productivity



Multi-cluster Gateway for Ingress and Egress



- ▶ 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 and filtering (e.g. WAF) for optimal performance
- ▶ Your traffic, your way: L4-L7, Envoy, by-pass
- ▶ OVN for advanced traffic workloads
- ▶ IPv6 single/dual for scale
- ▶ eBPF for policy, traffic control, tooling, debugging, observability
- ▶ BGP-advertised services (FRR)
- ▶ Observability for improved understanding
- ▶ Multi-NIC support to align host networking
- ▶ HW Offload (OVS, IPsec, ...) for performance





OpenShift Multi-Cluster Storage



OpenShift Storage

Cloud providers CSIs
CSI Migration from in-tree
 CSI Standardization

NFS Kerberos mounts
 Secret Store CSI

CSI Resize
 Transfer PVC/Snapshots
 between namespace
CSI Ephemeral volumes
 Expansion of stateful sets

OpenShift Data Foundation

OpenShift and ACM common console
 for all shared file (RWX), block (RWO),
 and object storage classes

Optional encryption on multiple levels
 Out-of-the-box async replication
 Easily add regional Disaster Recovery

Consistent data foundation
 capabilities and experience for users
 and workloads: on-premises, in the
 cloud, and at the edge

**Standardization &
 Reduced Total
 Cost of
 Ownership**

**Reduced Risk &
 Increased
 Business
 Continuity**

**Increased
 Developer &
 Admin
 Productivity**



Advanced Cluster Security for Kubernetes



Unified Experience

Accelerate operationalization with managed services.

Improve feedback loops, and create a shared language for security and development teams



Break cross functional barriers to reduce cost



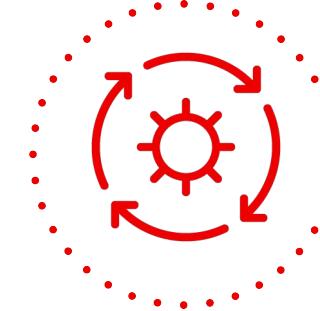
Security Everywhere

Enable teams to remediate issues more effectively

Identify risk indicators across expanded use cases



Innovate with confidence by bridging the skill gap



Platform Consistency

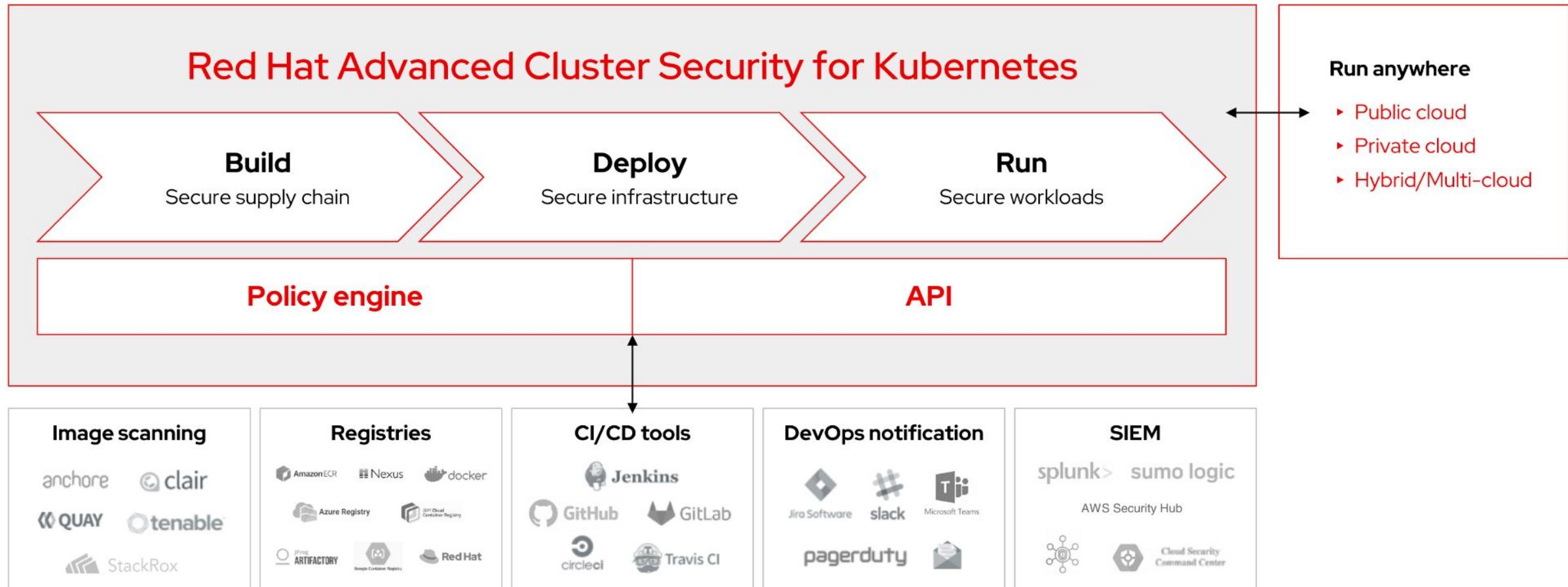
Provide consistent security data across the OpenShift and Kubernetes ecosystem

Enable teams to scale policy workflows in a repeatable way



Reduce complexity to focus resources

Evolving a Kubernetes Native Security Platform



Red Hat Quay



Unified Experience

Visual consistency with a completely new UI

Integration of quay.io into console.redhat.com



Consistent UX from self-managed to hosted



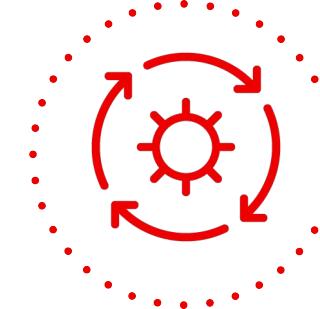
Security Everywhere

Scanning coverage beyond container base images (Java / Go packages)

Trust & verify with signatures



Remediate security risk before production



Platform Consistency

Geo-replication on all platforms via the Quay operator

Consistent consumption experience with pull-thru caching of external registries



Hybrid content distribution

Observability



Simplified Hybrid Observability

Enhancements to distinguish between Workload Monitoring & User Defined Projects to monitor flexible Hybrid Workloads and Applications



OpenShift Console Optimized for Hybrid Workload Monitoring

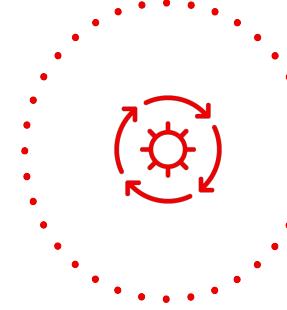


Correlation Consistency

Improved Thanos and Prometheus Support to extend using remote write for storage and platform monitoring for OpenShift Workloads



OpenShift Long & Short-Term Ingest Metrics Storage



Visualization Flexibility

Extensible visualization flexibility enabling Dashboards or OpenShift Console Visualization Across Cluster Workloads. Log Exploration Tools



Optimized API Experience in OpenShift Console

Network Observability



Unified Experience

Whether one cluster or one hundred, developers and cluster administrators require seamless connectivity across applications.



Network Traffic Metrics and Tracing

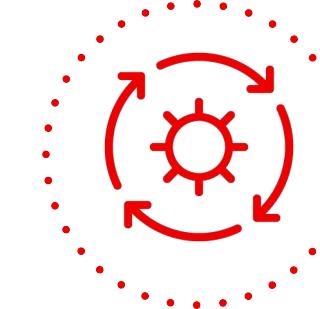


Security Everywhere

Security and regulatory compliance requires governance of traffic in, around, and out of networks.



Network Policy and Governance



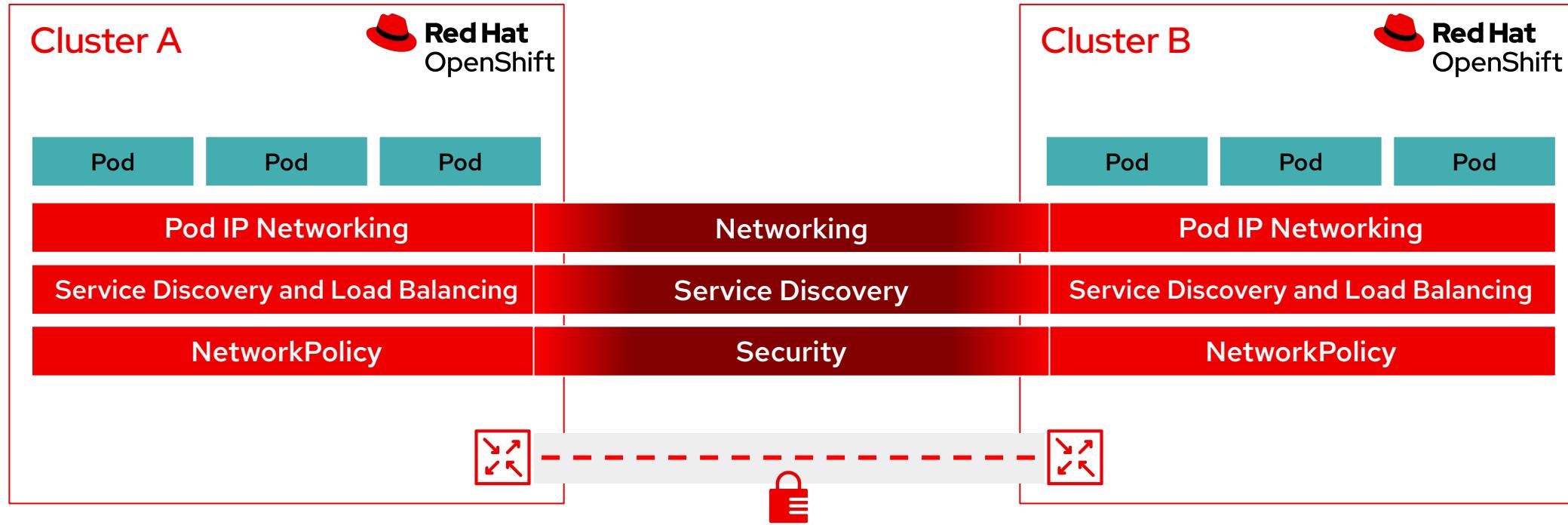
Platform Consistency

Developers and administrators require a common understanding of their traffic within and across cluster boundaries.



Network Traffic Flow and Topology

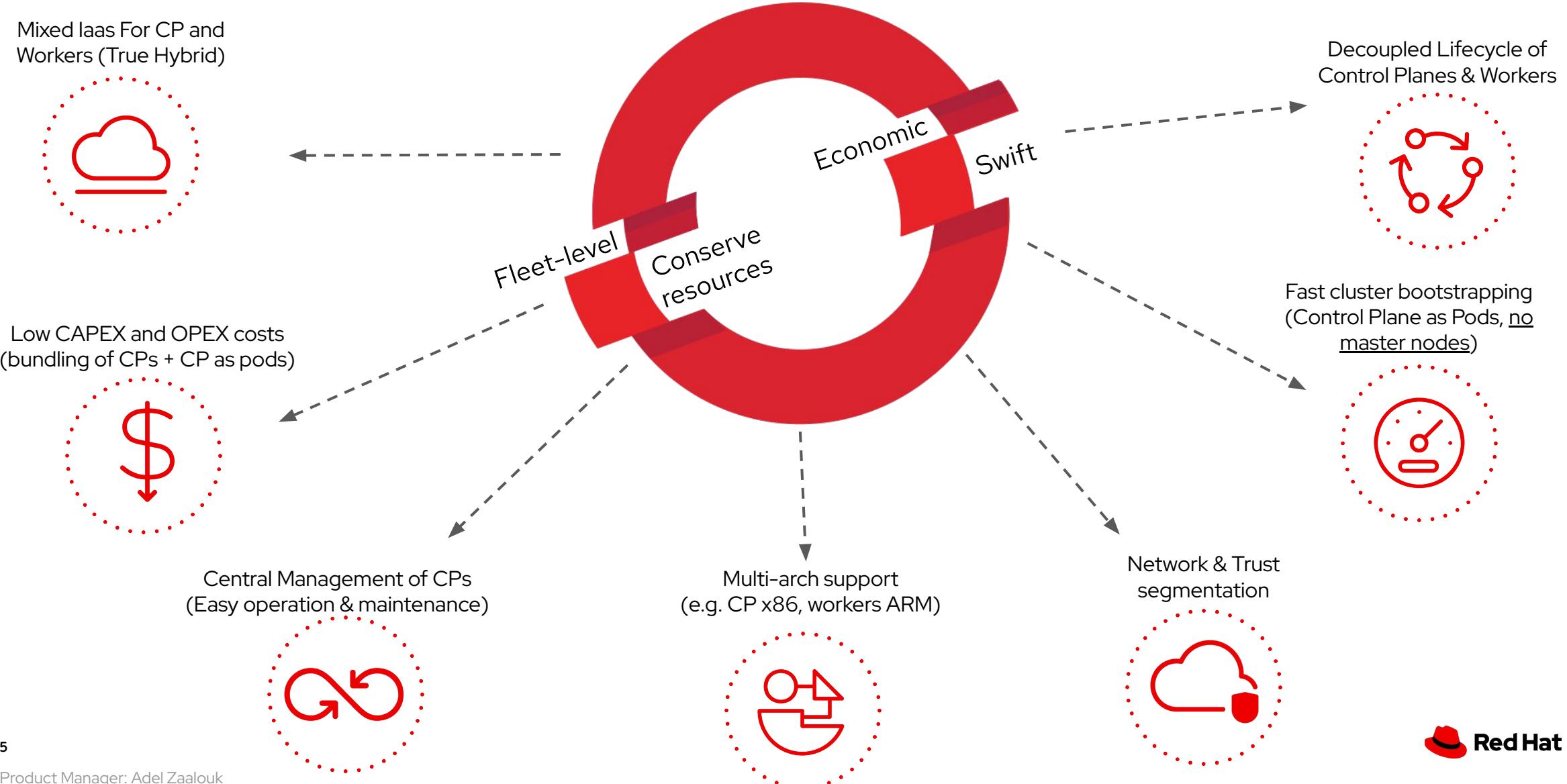
Kubernetes cluster networking with Submariner



Submariner provides cross-cluster network infrastructure for OpenShift by extending the well-known Kubernetes networking objects

HyperShift Brings Externally Managed Control-Planes

What's Next in OpenShift



Telco and Edge

The complexities of 5G CORE

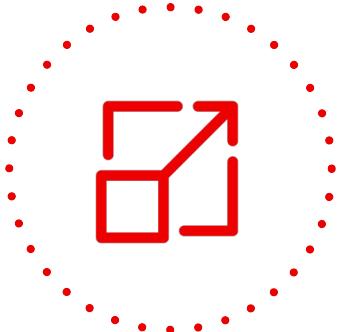


Legacy Integration

Integration or Migration with
4G Core
CNF certification



**Simplify mgmt
Convergence of workloads
on to a common platform**

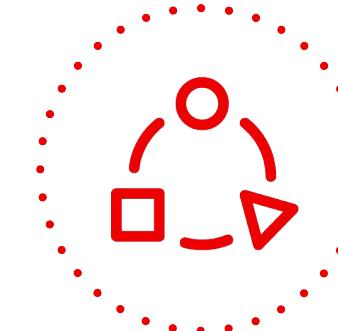


Advanced Scheduling for Enhanced Performance

PAO, NUMA Awareness,
Topology Scheduler



**Optimal resource utilization
with enhanced performance**



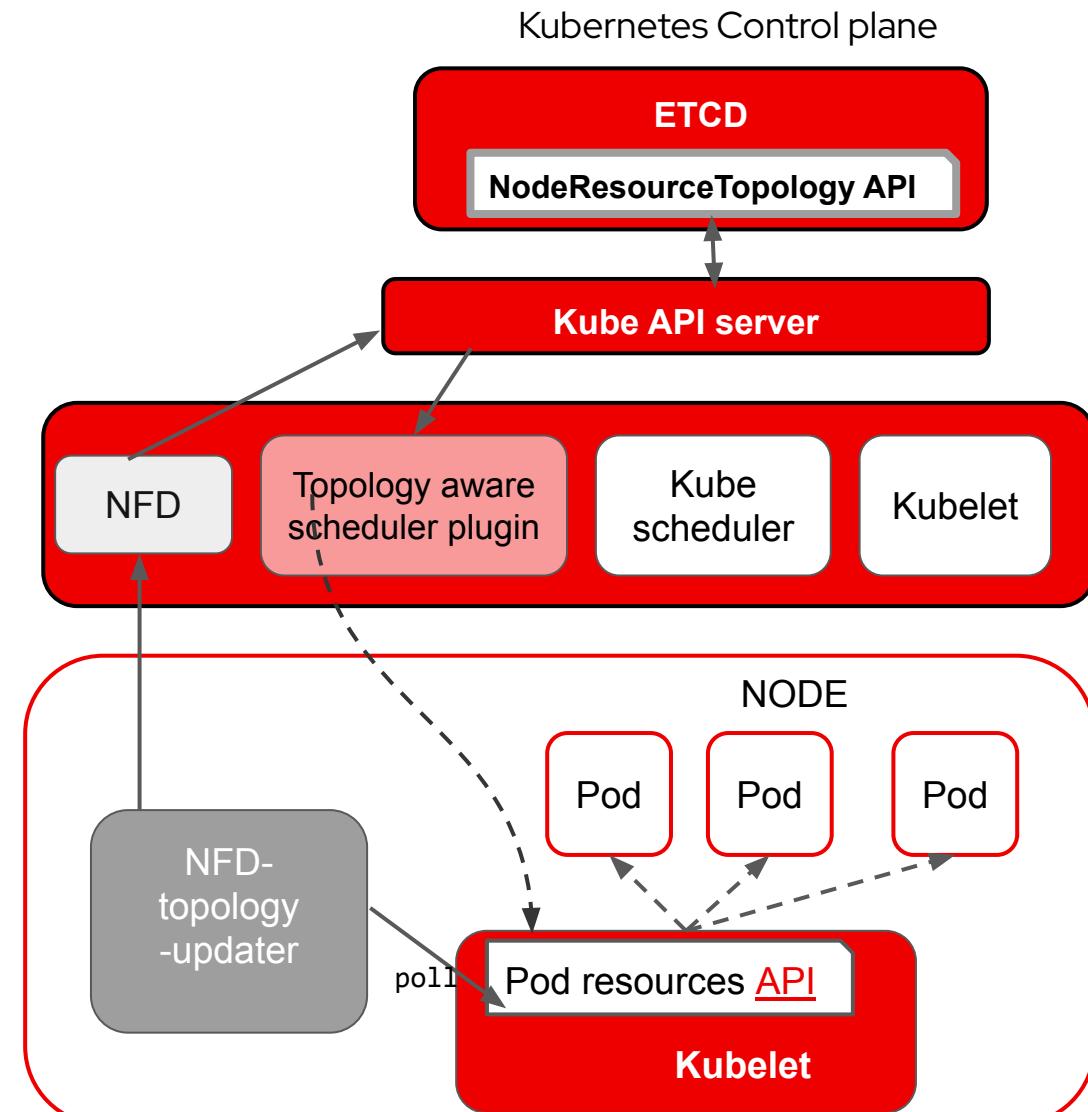
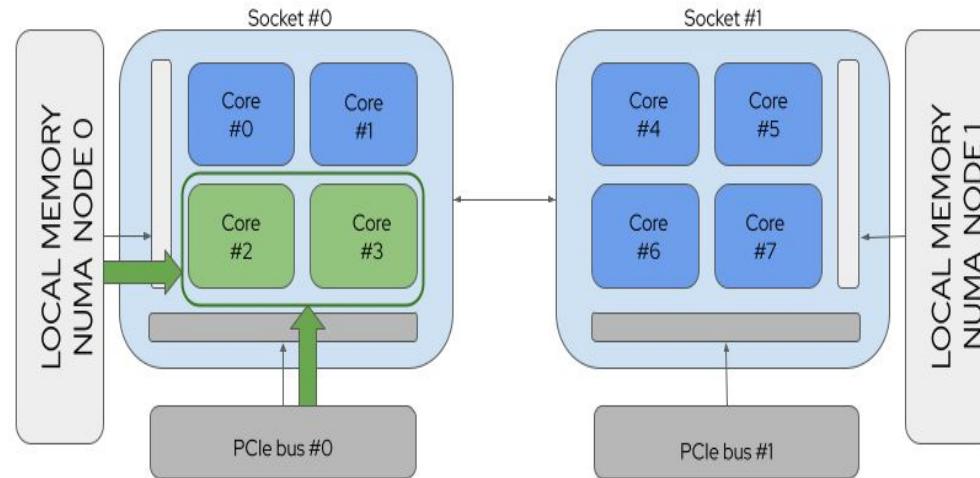
NextGen Hardware

New CPUs, NICs, SmartNICs,
GPUs, FPGA/ASIC, crypto
engines

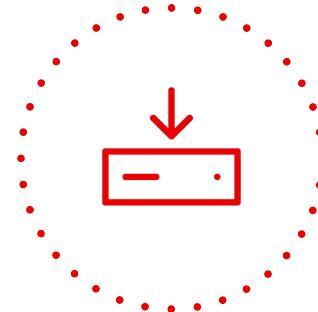


**Agile Infrastructure with the
latest Hardware [Efficient,
Scale, TCO]**

NUMA/Topology Aware Scheduling



Networking Hardware and Accelerators

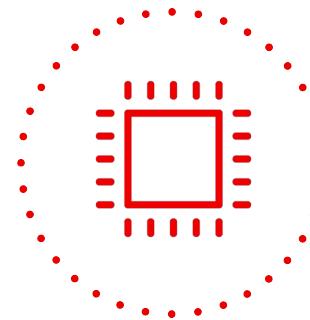


OVN Hardware Offload

OVN flow offload with
Programmable FPGAs or ASICs
Offload services: firewall, load
balancer, QoS and Egress



**High Performance
Networking w/ services**

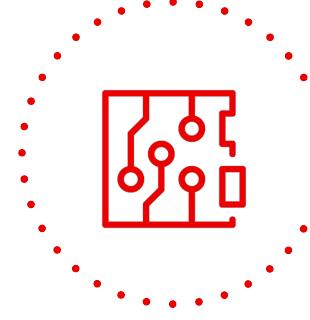


SmartNICs

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

Crypto engines support inline
IPsec and TLS offload
Programmable FPGAs and GPUs
with 5G Core and RAN
acceleration (GTP, FEC)
Operators to manage
Accelerators



**Accelerators to optimize
resource usage**

The complexities of edge computing/5G RAN

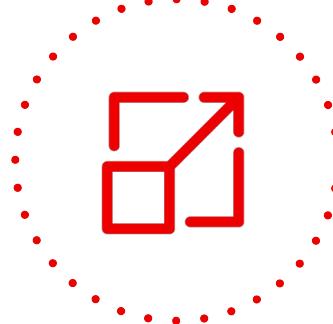


Variability

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



Small Footprint and Optimized infrastructure

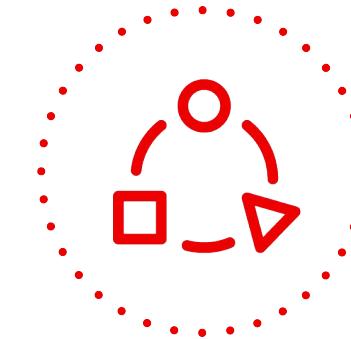


Scale

Need to deploy and manage hundreds to thousands sites and nodes



Ease of Management through ACM and ZTP



Appliance like Performance

Nodes are tuned so that RAN realtime workloads can leverage advanced timing and hardware accelerations.



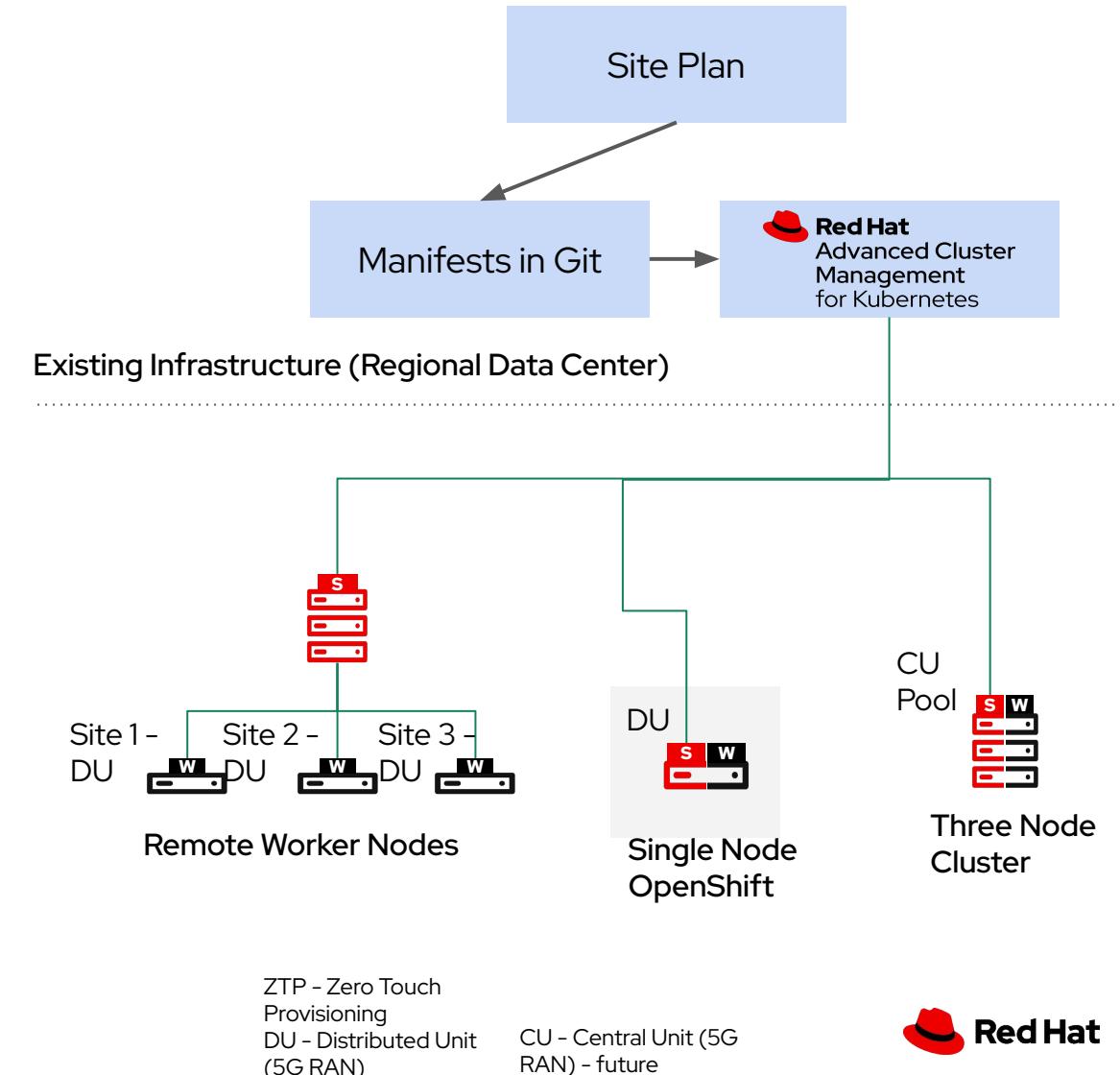
(RAN) Technology Evolution

Zero Touch Provisioning

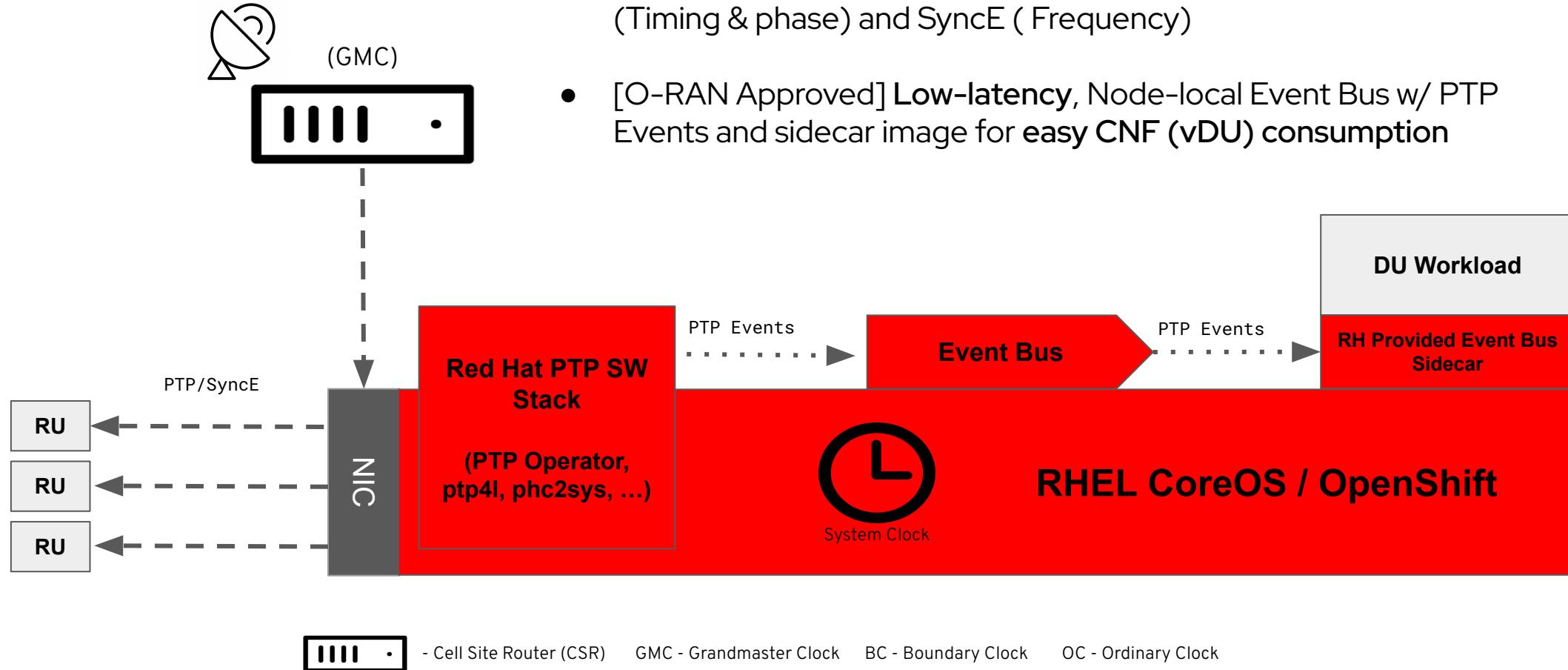
Aimed at **regional distributed on-prem disconnected deployment**.

Enabling customer's **automated** path from **uninstalled infrastructure to application running on an OpenShift cluster**.

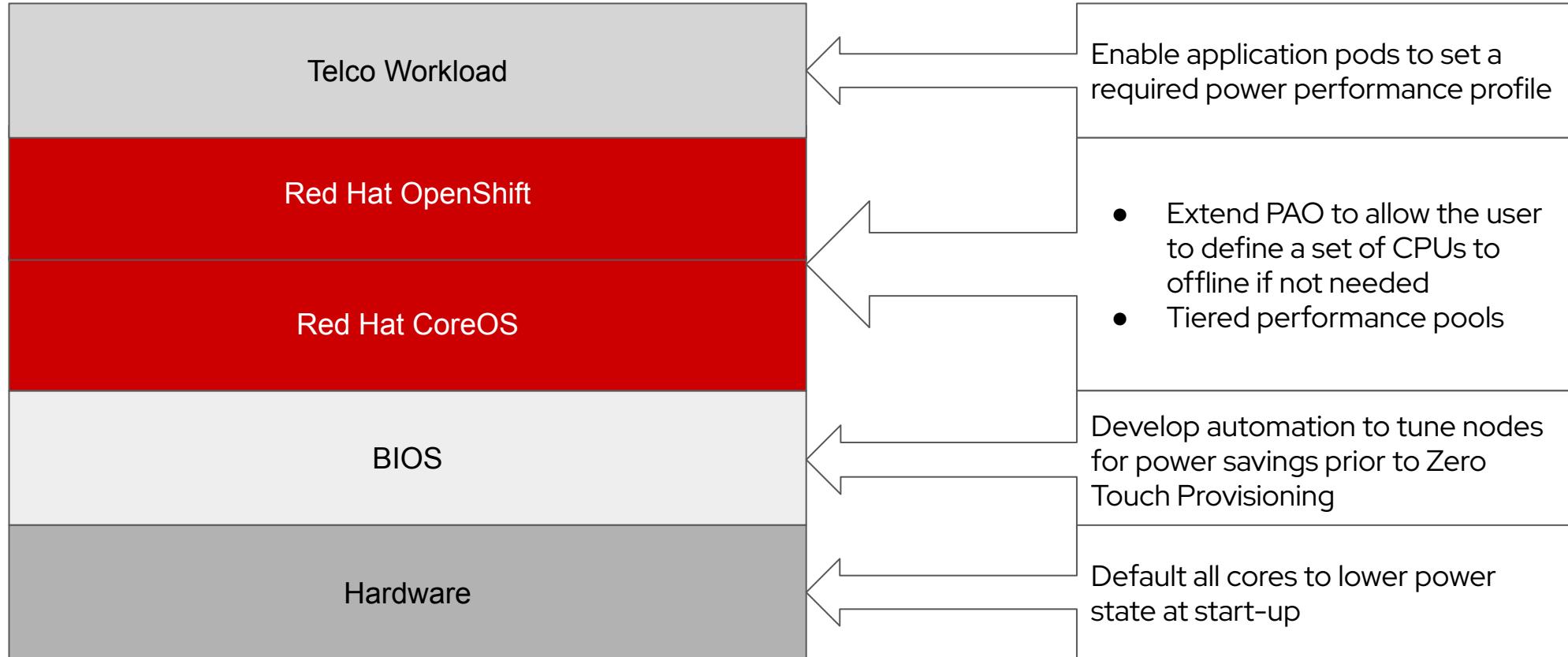
- **Increased Scale 2k** SNO nodes provisioned and managed by RHACM
- **Policy Driven Upgrades** Define groups of SNOs that can be upgraded independent of each other for more granular multi-cluster management
- **ZTP Everything** DU, C-RAN Hub, CU, Hub Cluster, additional infrastructure (image repository, NBDE Server, DHCP Server, etc...)



PTP and SyncE for RAN Workloads



Power Optimizations at the Telco Far Edge



Managed Cloud Services

Red Hat OpenShift Everywhere

A consistent platform no matter how or where you run

Red Hat OpenShift Cloud Services

Start quickly, we manage it for you



Red Hat OpenShift Service on AWS



Google Cloud

Red Hat OpenShift Dedicated



Azure Red Hat OpenShift



Red Hat OpenShift on IBM Cloud

Red Hat OpenShift Container Platform

You manage it, for control and flexibility



Red Hat
OpenShift
Container Platform

On public cloud, or
on-premises on
physical or virtual
infrastructure

High Level Managed OpenShift



Unified Experience

Allow users to create all Managed OpenShift clusters from one single location



Simplicity of operations

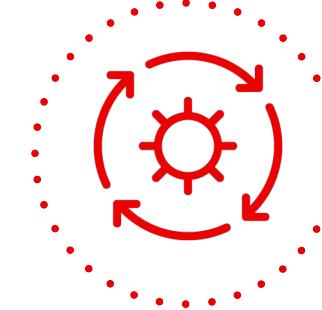


Security Everywhere

Achieve compliance with more industry certifications such as HIPAA and PCI as well and Gov certifications like FedRAMP HIGH



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



Platform Consistency

If it runs on OCP it should run on Managed OpenShift



Reducing the barriers to adopting Managed OpenShift



High Level Managed OpenShift



Expanded choice

Allow customers more options when choosing worker nodes to address many different workloads or budgets. Spot instances, GPU, Wavelength, AMD, dedicated



Meet the customer where they are

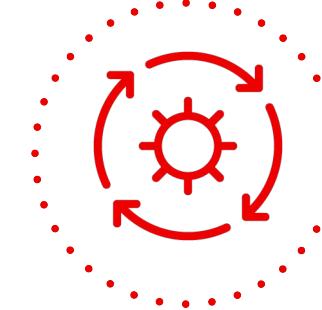


Security Everywhere

Support BYO Key for KMS and enable EBS encryption



Enable further security options for our sensitive customers



Platform Efficiency

Only run the platform when you need it. Pause it (and payments) when you don't.



Reduces the barriers to adopting Managed OpenShift



Managed Services

Public Roadmaps for OSD, ROSA and ARO

OSD: red.ht/osd-roadmap

ROSA: red.ht/roса-roadmap

ARO: red.ht/aro-roadmap

Red Hat OpenShift Service on AWS (ROSA) Roadmap

Updated 3 hours ago

Filter cards

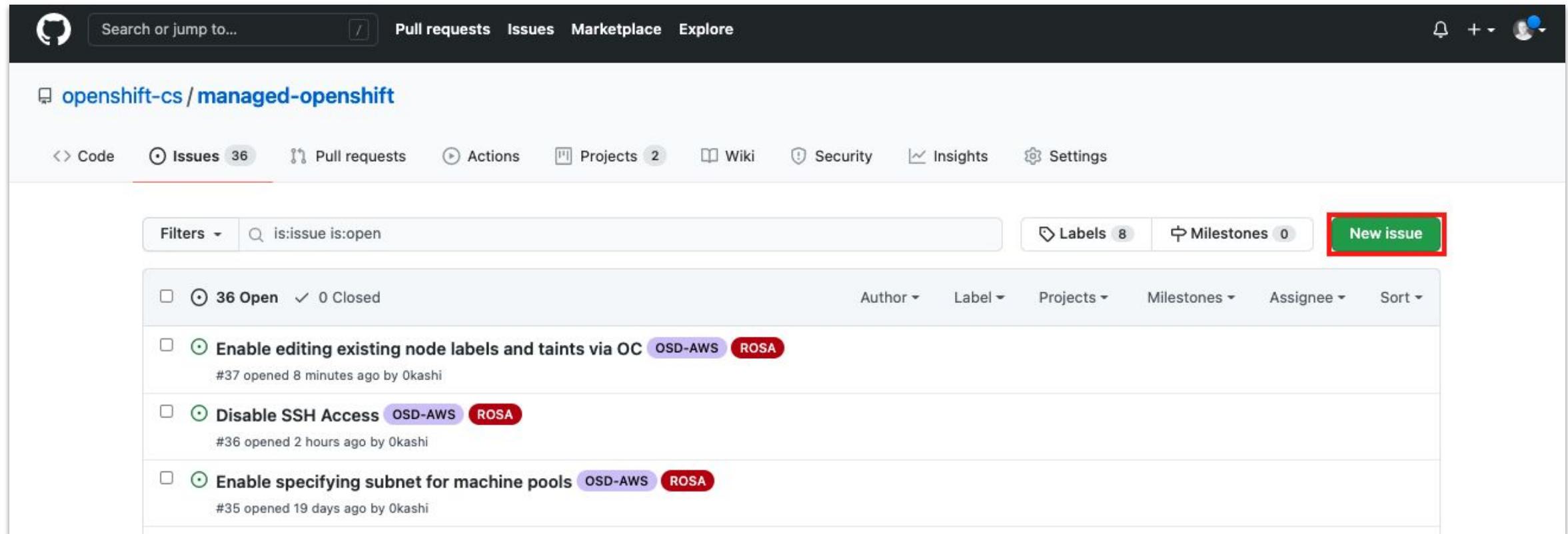
Add cards

Fullscreen

Menu

Column	Card Title	Details
Backlog (Committed)	Add support for OpenShift OVN CNI	#3 opened by acathrow OSD-AWS, OSD-GC, ROSA
Backlog (Committed)	AWS GovCloud Support	#12 opened by acathrow OSD-AWS, ROSA
Backlog (Committed)	Provision ROSA from OpenShift Cluster Manager UI	#11 opened by acathrow OSC, ROSA
In Progress	GPU Instance Type Support	#6 opened by Okashi OSD-AWS, OSD-GC, ROSA
In Progress	Enable Shutdown/Resume of Managed clusters	#21 opened by Okashi OSD-AWS, OSD-GC, ROSA
In Progress	Add AWS / AMD instance types to ROSA and OSD	#13 opened by acathrow OSD-AWS, ROSA
Coming Soon	Add htpasswd IdP management OCM	#15 opened by acathrow OCM, OSD-AWS, OSD-GC
Coming Soon	YAML output for ROSA	#8 opened by acathrow ROSA
Coming Soon	Enabling encrypted etcd	#23 opened by Okashi OSD-AWS, OSD-GC, ROSA
Coming Soon	Show username on cluster history log	#24 opened by Okashi OSD-AWS, ROSA
Completed (GA)	Enable User Workload Monitoring (UWM)	#7 opened by wgordon17 OSD-AWS, OSD-GC, ROSA
Completed (GA)	Log Forwarding to CloudWatch	#5 opened by Okashi OSD-AWS, ROSA
Completed (GA)	Enable "opt-in" AWS regions	#31 opened by Okashi OSD-AWS, ROSA

RFE Tracking



The screenshot shows the GitHub interface for the repository `openshift-cs/managed-openshift`. The 'Issues' tab is selected, showing 36 open issues. The search bar contains the filter `is:issue is:open`. The 'New issue' button is highlighted with a red box. The issues listed are:

- #37** Enable editing existing node labels and taints via OC OSD-AWS ROSA #37 opened 8 minutes ago by Okashi
- #36** Disable SSH Access OSD-AWS ROSA #36 opened 2 hours ago by Okashi
- #35** Enable specifying subnet for machine pools OSD-AWS ROSA #35 opened 19 days ago by Okashi

Core, Platform and Developer Tools

Installation, Updates and Provider Integration



- Add more platforms, more regions, more instances



Enable Hybrid Cloud

- Bootable installer image
- Factory installs of OpenShift
- Externally managed control planes (HyperShift)



Simplify onboarding

- Starting 4.10 (to 4.12), EUS upgrade requires single worker reboot
- Zone awareness during upgrades
- Targeted upgrade blocking



Mitigate risk

 **Alibaba Cloud**

 **Azure Stack Hub**

 **IBM Cloud**

 **NUTANIX™**

 **Red Hat**



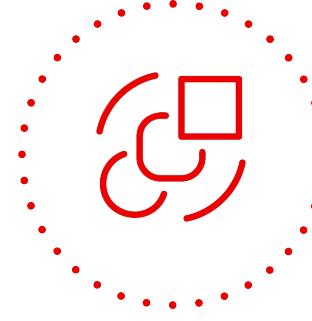
Platform

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



Enable new workloads and reduce TCO

Compute

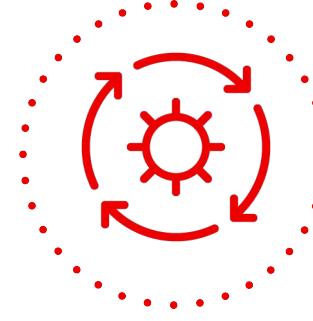


Consistency

- Enable pluggability with cloud native solutions: KMS, DNS, LB
- Cert-manager and improved lifecycle management of certificates



Enables Hybrid Cloud and accelerates projects



Experience

- A shift to self-driven control plane with automated scaling, backups and DR of the control plane
- Ability to customize RHCOS



More choice and flexibility to meet standards and compliance



Enabling Workloads on OpenShift



Clusters can install with optional operators at **day0**. Global operator model with granular permission management and **automatic failure recovery**. Expanded functionality for Operators: **reusable libraries**, custom scaffolding, additional languages (e.g. Java) and underlying libraries support. Scaffold build pipelines in a **git-friendly** way. Namespace-scoped Helm repositories. Tested and certified Helm Charts from partners. Helm CLI support in `oc` client.



More functionality out of the box



Specialized scheduler for **next generation workloads** on OpenShift. Secondary scheduler operator to onboard new schedulers. **Multicloud Application Dispatcher** operator to prioritize, queue and dispatch jobs to multiple clusters.



Deploy AI/ML or HPC workloads

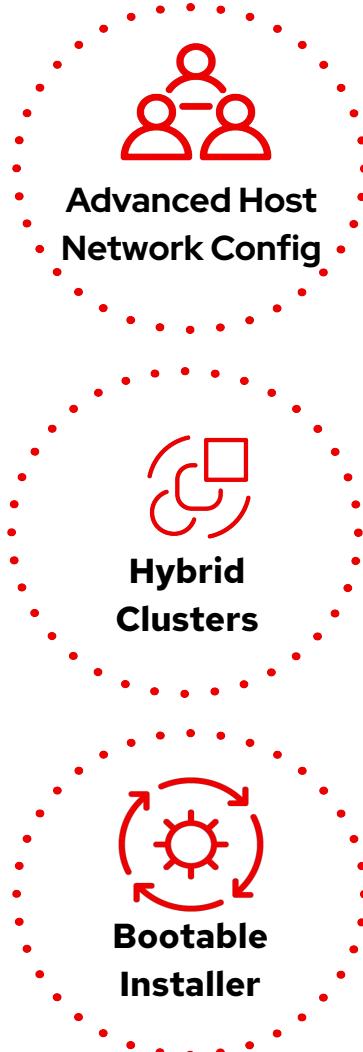


Improved experience for **custom and disconnected** operator catalogs. Streamlined disconnected registry mirror. Factory installs of OpenShift for reduced startup time.



Customers receive updates faster

OpenShift on Bare Metal



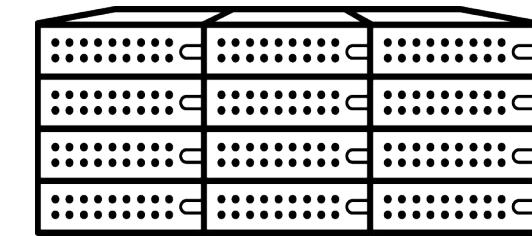
Bonds, VLANs and static IPs.
No DHCP required.
Advanced network config via IPI on day 1 and day 2.

Mix bare metal and VM nodes.
Virtualized control plane and physical workers.
Expand non-bare metal clusters with bare metal nodes.

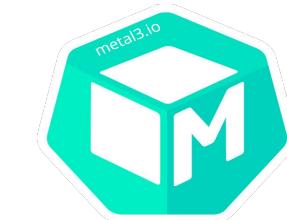
Bootable ephemeral installer.
Create cluster zero easily.
For on-prem or any cloud provider.



Infrastructure adapted to your network



Reduced footprint and optimized resources



Metal³

Faster onboarding of platforms



OpenShift Sandboxed Containers



Health Metrics

Provide console views for health-metrics and Insights on specific Kata Containers components.



Swift Root-Cause Analysis



Node Feature Discovery

Quickly Identify whether your cluster nodes/environment are eligible for the installation of the Kata runtime.



Low-friction Installs Lower Time To Kata (TTK)



Runtime Admission Control

Isolate your untrusted workloads during admission. Enforce or exempt workloads to/from running in sandboxed runtimes (e.g., Kata Containers).



Focus Less on HOW to Isolate, More on WHAT to Isolate



SR-IOV with DPDK

Enables running Cloud-Native Network Functions (CNFs) with sensitive network requirements.



Accelerate your Data-Plane with Tight Isolation

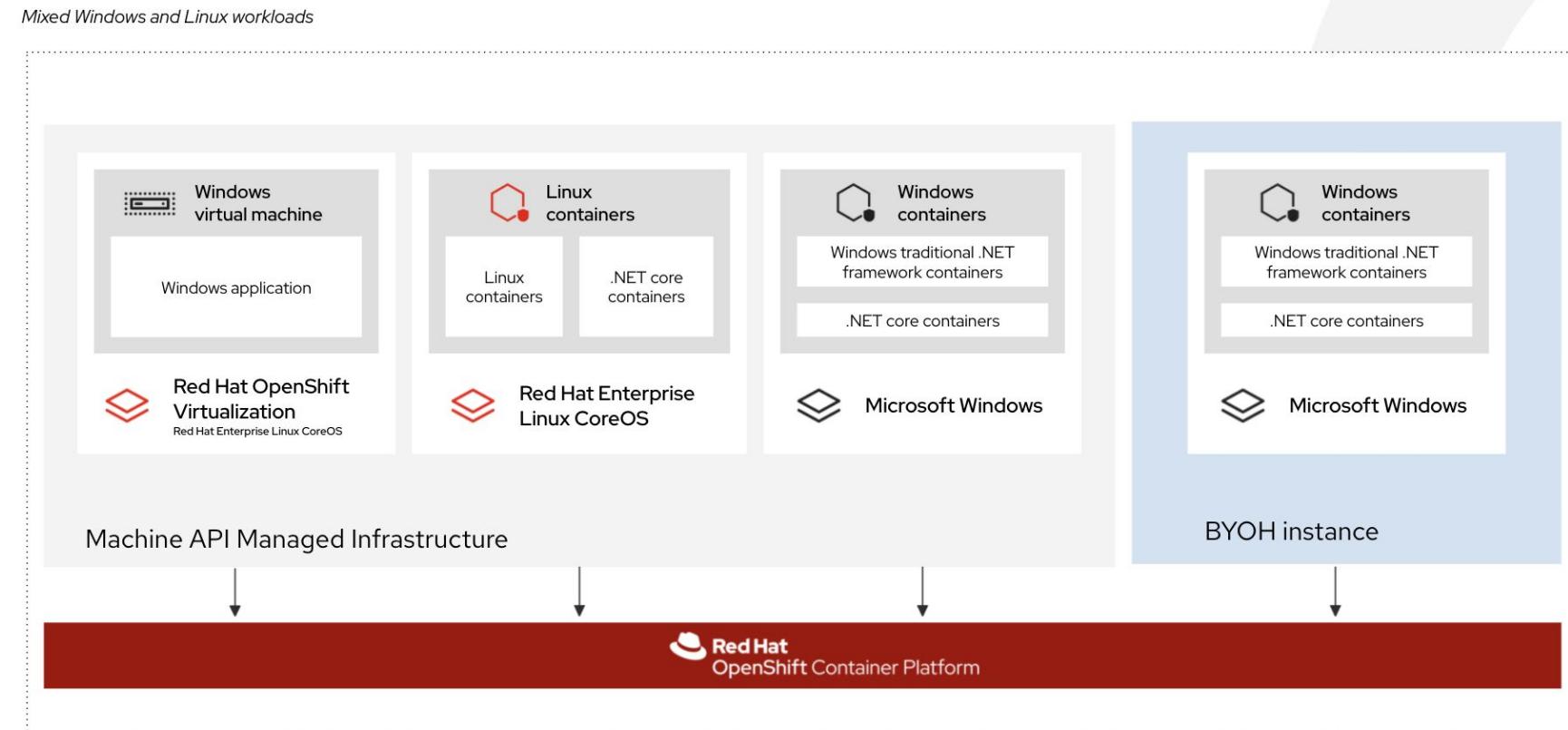
Platform Consistency

Windows nodes will move to Containerd as the runtime, and CSI for storage, thus future proofing consistency and application portability for Windows

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)

Windows updates



What's next for the OpenShift Console?



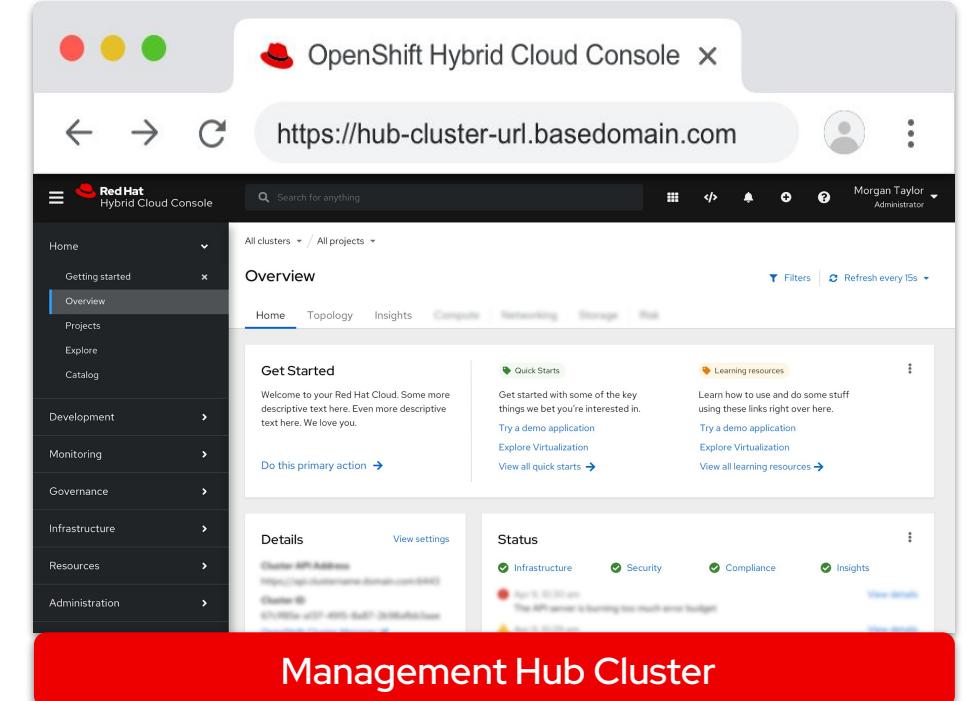
New Hub/Managed Cluster Intelligence

- OCP will update to a **fleet experience** when the management hub is enabled
- New lightweight **multi-cluster operator** enhances OCP screens via dynamic plugins
- **Fleet-wide auth** for managed clusters



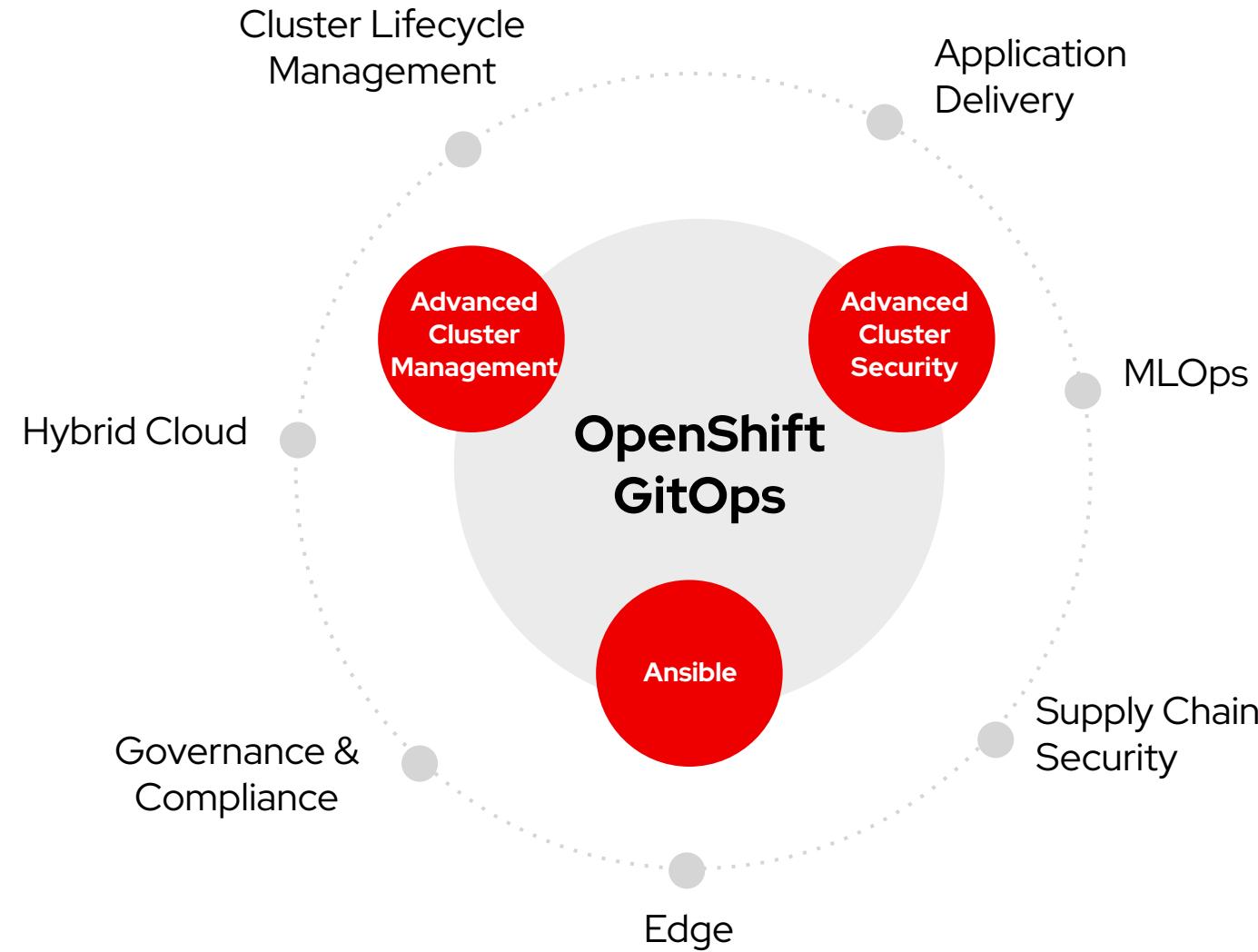
Unified OpenShift Platform Plus UX

- ACM is just the start. **ACS, Quay, Log Mgmt, and others** will integrate with the OCP Console via dynamic plugins in 2022
- **Dynamic plugins** will enable partners & customers to create their own native integrations



Management Hub Cluster







CI/CD & GitOps



OpenShift Pipelines

Enable GitOps workflows for managing CI, Approval workflows and concurrency control

Verifiable and signed pipelines for provenance
Image signing and verification

Tekton Hub on cluster for custom Task catalogs
Extended pipeline history and log retention

OpenShift GitOps

Declarative workflows for Helm, automated bootstrapping of Argo CD and GitOps workflows

Secret management guidance, HashiCorp Vault integration

Argo CD multi-tenancy alignment with Kubernetes, Improve cluster config management

Standardize GitOps workflows



Secure software supply chain



Improved operational experience





OpenShift Serverless



Unified Experience

Integration for platform services, Elevated Serverless Function experience. Event sources to cover the breadth of applicability



Enhance developer experience for Event Driven solutions

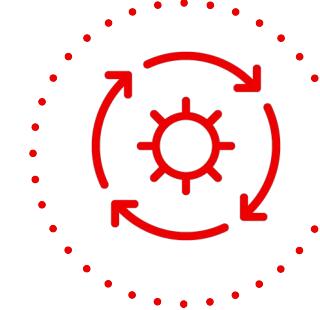


Security Everywhere

End to End encryption
Multi-Tenancy



Reduced exposure and risk



Platform Consistency

Serverless part of the OpenShift
Default deployment for stateless workload

Creation of apps in “cluster agnostic” environment



Increased productivity



OpenShift Service Mesh



Unified Experience

A platform integrated service mesh - including operator installation, observability and visualizations, networking, API management, and more.



Save time - solving integrations for you!

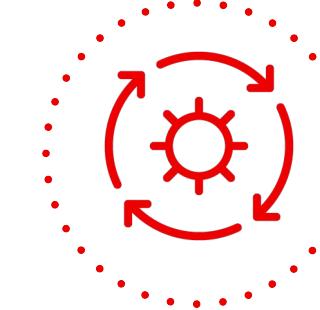


Security Everywhere

Secure traffic and manage service-level policies consistently across a zero-trust multi-tenant, environment.



Reduced exposure and risk across your network



Platform Consistency

A consistent platform with Istio service mesh across clusters, cloud providers, regions, and infrastructure types.



Reduce complexity with a consistent platform experience





OpenShift Virtualization



Unified Experience

Improved visualization of individual VMs

Overall resource utilization and intelligent diagnostics

Data protection (via OADP)
Disaster Recovery (via ACM)



Manage and protect VMs at Scale



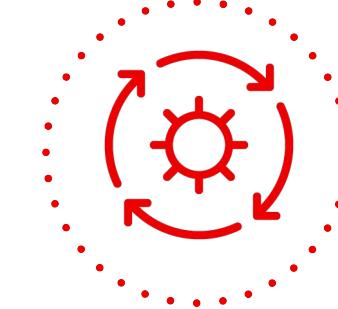
Security Everywhere

Improved integration with Compliance Operator and Advanced Cluster Security

Least privilege principles



Enhanced security compliance of VM



Platform Consistency

More Public Cloud & Bare Metal providers

vGPU support

SNO resource optimizations

Telco VNF validation program

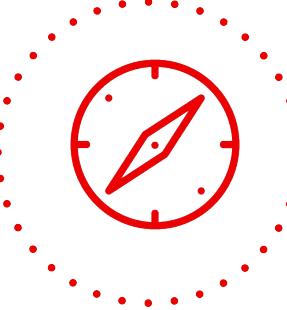
Warm migration (RHV) and basic migration (OSP)



OpenShift Everywhere Red Hat



Migration Toolkit for Applications

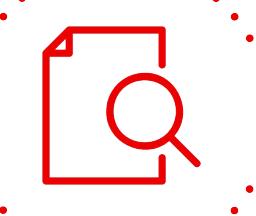


Migration Guidance

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



Ease OpenShift adoption

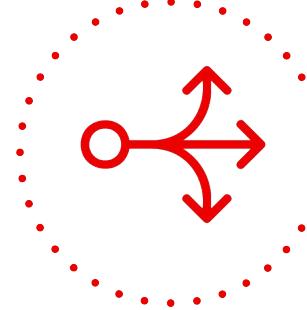


Gather Insight

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



Reduce risks



Extended Scope

Fully integrated toolkit leveraging multiple Open Source tools with a seamless user experience



Provide value on each stage of adoption

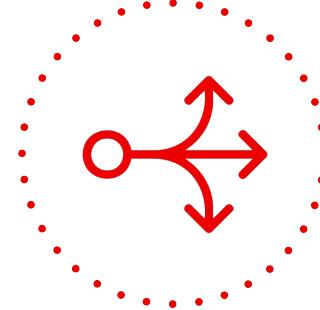


Migration Toolkit for Containers



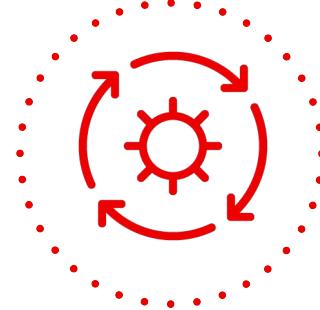
Migrating from OCP3 to OCP4

Always improving and reducing the effort of migrating your applications at scale to OpenShift 4.



Migrating from on-premise to cloud

Supporting migrations from on-premise to cloud solutions: ARO and ROSA

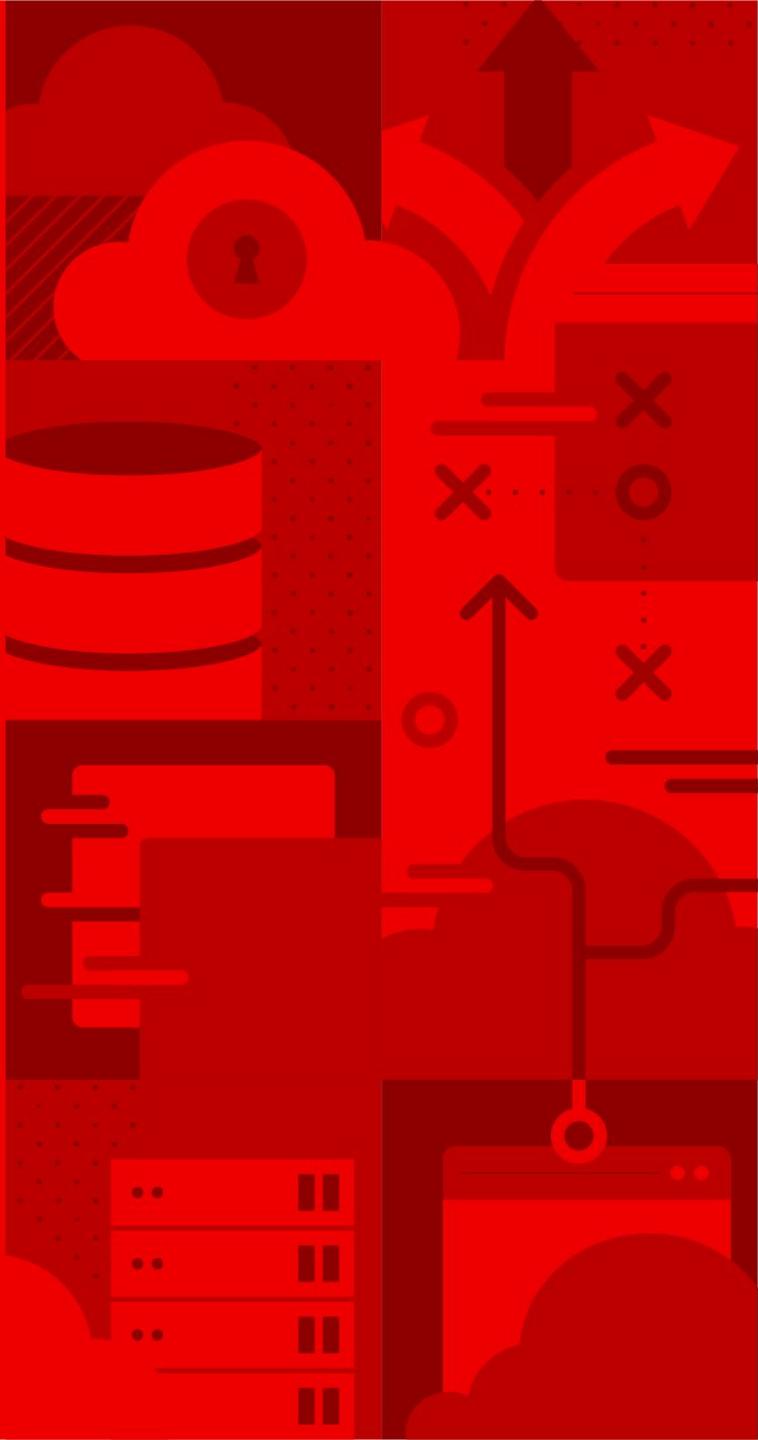


Storage migration

Supporting in-place migrations of your existing storage to OpenShift Data Foundation



Adopt with ease Red Hat's latest OpenShift technologies



[linkedin.com/company/red-hat](https://www.linkedin.com/company/red-hat)



[youtube.com/user/RedHatVideos](https://www.youtube.com/user/RedHatVideos)

Thank you

Red Hat is here to help

Responding to COVID-19 requires collaboration, transparency, and the free exchange of expertise.

[Ways to contact us](#)



Red Hat

Appendix - Roadmap Details (*not presented*)

Roadmap Table of Contents

Needs Update

Hybrid Cloud Experience and OpenShift Plus

- Red Hat Advanced Cluster Management
- Multi-Cluster Gateway for Ingress and Egress
- OpenShift Multi-Cluster Storage
- Red Hat Advanced Cluster Security
- Red Hat Quay
- Network Observability
- Observability
- HyperShift

Managed Services

Telco and Edge

Core, Platform and Developer Tools

- Installation Updates and Provider Integration
- Compute
- Enabling Workloads on OpenShift
- OpenShift on Bare Metal
- OpenShift Sandboxed Containers
- Windows
- OpenShift Console
- OpenShift CI/CD & GitOps
- OpenShift Serverless
- OpenShift Service Mesh
- OpenShift Virtualization
- Migration Toolkit for Applications
- Migration Toolkit for Containers

Hybrid Cloud and OpenShift Platform Plus *Roadmap Details*

OPENSHIFT STORAGE

OpenShift Storage

OpenShift Storage Roadmap		
CSI API	Near Term (3-6 months)	
	Mid Term (6-9 months)	
	Long Term (9+ months)	
CSI API <ul style="list-style-type: none"> CSI Migration <ul style="list-style-type: none"> Azure File (Tech Preview) vSphere (Tech Preview) AWS EBS (Tech Preview) 		CSI API <ul style="list-style-type: none"> CSI Migration <ul style="list-style-type: none"> GCE PD (GA) Cinder (GA) Azure Disk AWS EBS
CSI OPERATORS <ul style="list-style-type: none"> Alicloud Disk (GA) Azure Disk (GA) Azure File (Tech Preview) AWS EFS (GA) IBM Cloud (GA) vSphere (GA) 		CSI OPERATORS <ul style="list-style-type: none"> Azure File (GA) Nutanix (Full integration)
FEATURES <ul style="list-style-type: none"> Skip recursive permission changes on mount Flexvolumes deprecation 		FEATURES <ul style="list-style-type: none"> Multiple vCenter Zones Generic ephemeral CSI
CSI API <ul style="list-style-type: none"> CSI Resize (GA) Transfer PVC/Snapshots between namespaces CSI Ephemeral Inline CSI Migration <ul style="list-style-type: none"> vSphere (GA) Azure File (GA) 		CSI OPERATORS <ul style="list-style-type: none"> Secret Store CSI Google File
FEATURES <ul style="list-style-type: none"> Remove Flexvolumes CSI Metrics parity with in-tree NFS Mount in Kerberized environment Selinux context mount Expansion of stateful sets 		

OPENSHIFT CONTAINER STORAGE

OpenShift Data Foundation

Near Term

- Maintain CSI API

CSI API

- IBM ROKS (GAed)
- ARO self managed service (GAed)
- RHV (GAed)
- BM IPI (GA)

Platforms

- Disaster Recovery
 - Multi-Cluster Regional DR for block using ACM (TP)
- Data Federation - Object data replication
- KMS PV encryption with multi tenant authentication
- IPv6 single/dual stack (DP)

FEATURES

Mid Term

- Maintain CSI API

CSI API

- ROSA & OpenShift Dedicated

Platforms

- Disaster Recovery
 - Multi-Cluster Regional DR for block using ACM (GA)
 - Metro-DR Multi Cluster with ACM (TP)
- IPv6 and Multus (GA)
- Access filesystem via S3 API
- Single Node support (TP)
- Support for IBM HPCS KMS (DP)

FEATURES

Long Term

- Maintain CSI API

CSI API

- BM deployment on any platform
- Windows Nodes (TP)

Platforms

- Disaster Recovery
 - Multi-Cluster Regional DR for File using ACM (GA)
 - Metro-DR Multi Cluster with ACM (GA)
- Single Node (GA)
- Single Node HA (TP)
- Support for COSI - Object API for K8s
- Support KMS vendors via KMIP

FEATURES



OpenShift Networking

Near Term

(3-6 months)

- MetalLB with BGP Support
- IBM cloud support
- Alibaba Cloud Support
- ARM support
- IPv6 Dual stack support
- External DNS management
- OVS HW Offload with CX-5 (OVN)
- Cluster MTU Post-Install Modification
- HAProxy 2.4
- HAProxy Customization Enhancements:
 - ROUTER_MAX_CONNECTIONS
 - ROUTER_(ALLOWED|DENIED)_DOMAINS
 - Request URI Log Length
 - syslog Max Message Size
- Network Observability & Analysis Tooling
- Primary Traffic on 2ndary Cluster Host Interface
- Egress IP Multi-NIC Support
- Automatic EgressIP for Azure/GCP/AWS

...

Mid Term

(6-9 months)

- Gateway API GA
- BGP Routing Table (VRF) Separation
- MetalLB BGP traffic separation
- eBPF Support - Phase 1
- Nutanix AOS support
- SmartNIC Integrations
- Automatic EgressIP for Azure/GCP/AWS
- Support for ALB
- IPv6 Dual stack support
- Ingress traffic mirroring/splitting
- SR-IOV for three node deployments
- Cloud Infrastructure monitoring
- Network topology views
- OVN as a secondary network
- Network visibility for OCP traffic mirroring
- Allow Post-Installation Modification of Geneve and VXLAN Port
- Network tracing.
- ...

Long Term

(9 months +)

- Global Ingress API
- Multi-Cluster Networking
- Bandwidth-Aware Scheduler (QoS)
- No-overlay Option
- Network Policy v2
- Routable IPs for Pods
- eBPF Support - Phase 2
- SR-IOV Support for vSphere Platform
- Far Edge Cluster Footprint Support
- ESNI Support
- Ongoing SmartNIC Integrations
- Kubernetes Services for 2ndary Interfaces
- Host Networking Integration Enhancements
- Multi-NIC Support
- IPsec Offload
- Automatic Intelligent Sharding
- ...

Observability

Near Term

Logging v5.3

Logging

- Customer Preview for New Loki Logging to eventually replace Elasticsearch
- Customer Preview for New Vector Collector for Multi-Thread Scaling to replace Fluentd single threaded collectors
- CloudWatch and Loki support for Log Forwarding with support for authentication mechanisms for ROSA STS Authentication Tokens.
- Aggregate multi-line stack traces for non-JSON type logs.

OpenShift 4.9

Monitoring

- Forward metrics to a remote endpoint.
- Improve Monitoring component-relevant alerting rules to be more meaningful and actionable.
- Ability to restrict User Workload Monitoring to only watch defined namespaces.
- Ability to configure Monitoring to forward fired alerts to an external, user-owned Alertmanager.

Mid Term

Logging v5.4

Logging

- Tech Preview Loki Logs and Vector Collector for greater scale and reliability.
- Log Exploration Tool provided natively inside the OpenShift Console.
- Support for forwarding logs to GCP and AWS.
- Support for AWS Cloud Watch authentication mechanisms for ROSA Automated STS Authentication Tokens.
- Tech Preview Hybrid Logging Operators for OSD and ROSA

OpenShift 4.10

Monitoring

- Create new alerting rules based on platform-defined metrics.
- Introduce view into the OpenShift Console to show which services we scrape metrics from.
- Adopt cluster-wide TLS configuration.
- Allow tenants to create their own individual routing configuration independently from the cluster-wide Alertmanager config.
- Proxy support for Alertmanager.

Long Term

Logging v5.5+

Logging

- GA Loki Logging and Vector Collector as an alternative storage engine to Elasticsearch.
- Support higher throughput and resource-efficiency for Vector Multi-Thread collecting.
- Allow OpenShift tenants to configure log forwarding themselves.
- Improve OpenShift Logging Managed Service Experience and add-on logging workflows for managed tenants

OpenShift 4.11+

Monitoring

- Enable Prometheus Operator deployments per namespace to enable metrics to specific namespaces.
- Prometheus Operator for collecting application metrics
- Allow users to configure HTTP probes against an API.
- More flexibility on how admins will operate the Monitoring stack (start small, grow out).
- Simplified support for defining important SLOs for your application.

Distributed Tracing

Near Term

(3-6 months)

- Re-branding:
Red Hat OpenShift distributed tracing
(formerly known as Red Hat OpenShift Jaeger)
- Red Hat OpenShift distributed tracing platform: Jaeger 1.26
- Red Hat Openshift distributed tracing data collection: OpenTelemetry Collector 0.33 (Tech Preview)
- Runtimes Integration:
OpenTelemetry Client Libraries

Platform Data Collection OpenTelemetry

Platform Data Collection

Platform Data Collection

Mid Term

(6-9 months)

- OpenTelemetry Collector (GA)
- Multi-Cluster Capabilities
- Distributed Tracing (Umbrella Operator) for installing platform and data collection seamless

Platform Data Collection OpenTelemetry

Platform Data Collection

Platform Data Collection

Long Term

(9 months +)

- Visualization on OpenShift Console
- Auto-Instrumentation through Operator

Platform Data Collection OpenTelemetry

Platform Data Collection

Platform Data Collection

Red Hat Quay Roadmap

Red Hat Quay Roadmap		
QUAY	CLAIR	QUAY
<h2>Near Term</h2> <p>(3-6 months)</p> <ul style="list-style-type: none">• OCP mirror registry (all-in-one installer)• Quota Reporting & Management• Transparent Pull-through Cache <p>Quay on OpenShift</p> <ul style="list-style-type: none">• Operator Geo-replication support• Non-bare metal builds• Operator stability improvements• Operator Day 2 + GitOps Enhancements		<h2>Mid Term</h2> <p>(6-9 months)</p> <ul style="list-style-type: none">• Bulk Mirroring• Admin UX improvements• Restricted users• Vulnerability silencing• Native IPv6 support• First-class cosign support• Authenticated builds <p>Quay with OpenShift</p> <ul style="list-style-type: none">• Integration in OCP Logging• Integration in OCP Alerting
<p>CLAIR</p> <p>Clair v4</p> <ul style="list-style-type: none">• Streamlined Quay Operator integration• Support for scanning Java dependencies• CodeReady Dependency Analytics integration	<p>CLAIR</p> <p>Clair v4</p> <ul style="list-style-type: none">• Clair Kubernetes Operator• ACS Integration / Support• Support for scanning Golang binaries• Better CVE remediation guidance	<p>QUAY</p> <ul style="list-style-type: none">• New User Interface• First-class OLM content support• First-class Helm UX• Artifact Lifecycle Modeling• Automated Rebuilds• Splunk log-forwarding <p>Quay with OpenShift</p> <ul style="list-style-type: none">• Revamped Bridge Operator• OCP Developer UX improvement• Integration in OCP Authentication
		<p>CLAIR</p> <p>Clair v4</p> <ul style="list-style-type: none">• Support for Microsoft Windows• Multi-Arch Support• Additional language package manager scan coverage (NodeJS, Ruby, ...)

Roadmap is subject to change without notice. The depicted dates here represent provisional plans and rough estimates to the best of our knowledge today.



RHACM Roadmap

Near Term

(3 months)

- Scalability target: Approaching 2K Single Node OpenShift bare metal clusters (TP)
- Central Infrastructure Management with Assisted Installer (TP)
- RHACM hub on IBM Z and Power (GA)
- Cluster lifecycle: Microsoft Azure Gov
- Identity Configuration Management operator (TP)
- FIPS ready
- RHACM w/ RHACS (StackRox) integration (Phase 1 - Central and Sensors) (TP)
- Generation of Alerts for Policy Violations
- Console enhancements for policy management
- Support for ArgoCD & GitOps ApplicationSets
- Easily incorporate existing configuration (Kubernetes, Rego) as RHACM policies
- RHACM Hub DR backup and restore (TP)
- VolSync Integration for Business Critical applications (TP)
- Cluster health metrics for non-OpenShift (EKS, GKE, AKS, IKS) clusters
- Service Level Objectives (SLO) defined on the Grafana Observability dashboard (TP)

ACM

Mid Term

(6 months)

- Scalability target: 2K Single Node OpenShift bare metal clusters (GA)
- Central Infrastructure Management with Assisted Installer (GA)
- Cluster lifecycle support: RHV, AWS Gov
- Import and manage OpenShift on ARM (TP)
- Discover non-OCP clusters from hyperscale clouds
- Manage RHACM clusters from an Ansible Automation Platform
- Submariner multicloud networking (GA)
- ClusterPools, ClusterSets (GA)
- Application Enhancements (Pre/Post hooks, SyncWaves support)
- PolicySet definition for policy organization at scale
- RHACM w/ RHACS (StackRox) integration (Phase 2 - User Experience)
- OpenShift Data Foundation (aka OCS) with VolSync for Business Continuity (TP)
- RHACM Hub DR backup and restore (GA)
- Service Level Objectives (SLO) defined on the Grafana Observability dashboard (GA)

ACM

Long Term

(9+ months)

- Lifecycle HyperShift control plane and managed endpoints (TP)
- Cluster lifecycle support: IBM Cloud, AWS China
- Deploy/Destroy ROSA via CLI (TP)
- Deploy/Destroy EKS via CLI (TP)
- Multi-Hub architecture for edge management
- Key and secret management via RHACM
- Configuration Management Cloud Service launch
- Tighter developer lifecycle integrations
- Helm/Sigstore-Integration
- Unified Hybrid Console
- Support for PolicySets using PolicyGenerator
- Ready-to-use Policies for certain Standards (e.g. NIST/HIPPA)
- Integration with Integrity Shield (GA)
- Provide a Scheduling Feature for Policies
- Collaboration with Kyverno in Security Governance
- Fleet view for User Workload monitoring

ACM



Red Hat Advanced Cluster Management: What's Next



Multicloud lifecycle management

- Reduce infrastructure costs using externalized control planes with HyperShift.
- Deploy hybrid and infrastructure agnostic clusters at scale.
- Deploy SRE-managed and self-managed clusters from a single source of truth.



Advanced application lifecycle management

- Consolidated application deployment approach across various dev tools.
- Quickly observe application health and status from any deployment source.
- Include cross-cluster PV replication for business critical workloads.



Policy driven governance and compliance

- Creation of PolicySets and issue examples of PolicySets.
- Cluster governance cloud service.
- Tight integration of ACS and ACM within OpenShift Platform Plus.



Multicloud observability for health and optimization

- Provide the complete fleet view for cluster health metrics.
- Enable operations teams to analyze metrics using preferred tooling.

Red Hat Advanced Cluster Security Vision

Security across the entire application lifecycle



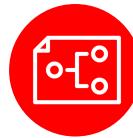
Reduce security program costs

Enable teams to shift security left with our continued focus on improving vulnerability management and compliance workflows



Enable effective prioritization workflows

Provide teams with the information to prioritize the issues that matter most in their environment



Best in class OpenShift support

First class support for the OpenShift platform across clouds and managed services and security use cases



Our commitment to open source

Creating an open source community focused on enabling Kubernetes security will enable us to tap into innovation pools not previously available



Advanced security workflows

Enable advanced incident response and hardening capabilities to enable the most mature risk management programs



Program Management

Improve cybersecurity programs by making recommendations that would have an outsized impact on an organization's security posture and exposing program metrics to showcase ROI

RHACS Roadmap

Near Term

OpenShift Integrations

- Rebranding RHACS
- License removal from RHACS
- Publish RHACS images in registry.redhat.io
- Scoped access control
- Red Hat scanning certification
- OpenShift security benchmark
- Risk, policy, and network graph adjustments

ACS

Security Features

- Kubernetes (OpenShift API Server) audit log detection

Open Source

- Initial evaluation and community launch

Platform

- Upgrade process enhancements
- Health check improvements

Mid Term

OpenShift Integrations

- Availability in OperatorHub
- Compliance workflows for OpenShift
- ACM Profile for RHACS

Security Features

- CI/CLI improvements (Jenkins and CLI)
- IDE integration for KubeLinter
- Active vulnerability management*
- MITRE ATT&CK framework alignment
- Exploitability data

Open Source

- KubeLinter project improvements
- Upstream contributions

Platform

- ROSA, ARO, OSD on AWS, OSD on GCP
- Network flow scale
- Database migration*
- Database modeling for vuln mgmt*

ACS

Long Term

OpenShift Integrations

- OpenShift Service Mesh (Istio)
- OpenShift Serverless (knative)

Security Features

- Security metrics trending and reporting
- Local/offline scanning
- Recommendation framework
- Role binding recommendations
- Risk profiling enhancements
- Replica uniformity
- Network & runtime enhancements
- Consolidated UX across use cases

ACS

Open Source

- StackRox project fully open-sourced

Platform

- RHACS managed add-on availability
- Local cluster scanner support
- Database migration*
- Database modeling for vuln mgmt*

Compliance Operator Roadmap

Compliance Operator Roadmap		
Compliance Operator Roadmap		
Compliance Operator Roadmap		
Near Term (Q4 2021)	Mid Term (1H CY 2022)	Long Term (2H CY 2022)
Portfolio Integration <ul style="list-style-type: none">Compliance Operator integration available now with ACS and ACM	Portfolio Integration <ul style="list-style-type: none">RH ACS provides workflows for Compliance	Portfolio Integration <ul style="list-style-type: none">Integrated OpenShift Platform Plus UX for Compliance
Profiles <ul style="list-style-type: none">FedRAMP Moderate (NIST 800-53)PCI-DSSNERC-CIP	Profiles <ul style="list-style-type: none">FedRAMP HighDISA-STIGHIPAA	Profiles <ul style="list-style-type: none">NIST 800-171ISO 27001ANSSI
Operators <ul style="list-style-type: none">Custom ProfilesMetrics + AlertingParameterized remediation	Operators <ul style="list-style-type: none">Enforcement remediations	Operators <ul style="list-style-type: none">Install-time complianceMulti-cluster complianceGitOps integrationSecurity Profiles operator
 Red Hat		
Product Manager: Doron Caspin		

HyperShift

Near Term

(3-6 month)

- HyperShift Etcd Operator
- OLM In the Control Plane
- Console support for HyperShift
- HA / Single Replica Modes
- Independent CP & NodePool Upgrades
- Multiple versions of the CP on mgmt cluster
- Reverse tunneling with api-server proxy (konnnectivity)
- Dedicated STS Roles for CP components
- Private Link to support Private Clusters on AWS
- AWS as infra provider
- ACM Hosted Cluster life cycle (AWS)
- Cluster Auto-scaling
- Multiple service publishing strategies
- FIPS Compliance for Hosted Clusters
- HyperShift Operator Tracing
- Metrics for Cluster Creation + Resource Consumption

HyperShift

Mid Term

(6-9 months)

- OVN support
- Azure Infra provider
- Platform None Infra Provider
- KubeVirt as Infra provider
- Bare Metal infra provider
- In-place upgrades
- Compliance Operator support
- HyperShift for ROSA
- HyperShift integrations with OCM
- HyperShift Multi-Arch NodePools
- ACM hub of hubs backed by HyperShift

HyperShift

Long Term

(9+ months)

- HyperShift for OSD
- HyperShift for ARO
- HyperShift on OpenShift Appliance
- Cost operator support
- Integration with Cert-manager operator
- HyperShift Multi-Arch control-planes
- Management Clusters Auto-scaling
- Cross management clusters scheduling.

HyperShift

Telco and Edge *Roadmap Details*

Telco 5G Roadmap

Near Term

(3-6 months)

Timing	<ul style="list-style-type: none"> PTP Robustness Improvements (process failure recovery, thread scheduling/prio via PTP Operator)
Ops	<ul style="list-style-type: none"> 1,500 SNO Provisioned / Managed by RHACM Zero Touch Provisioning (GA) Policy-driven multi-cluster update/upgrade Logging Optimizations (vector.dev)
Misc	<ul style="list-style-type: none"> Zero Touch Provisioning of NBDE secured Single-Node OpenShift
Core	<ul style="list-style-type: none"> Load Balancer for bare-metal (metalLB): L3/BGP NUMA aware scheduler (TP) Dynamic Storage Provisioning (TP)

PMs: Robert Love (RAN), Franck Baudin (Core)

Mid Term

(6-9 months)

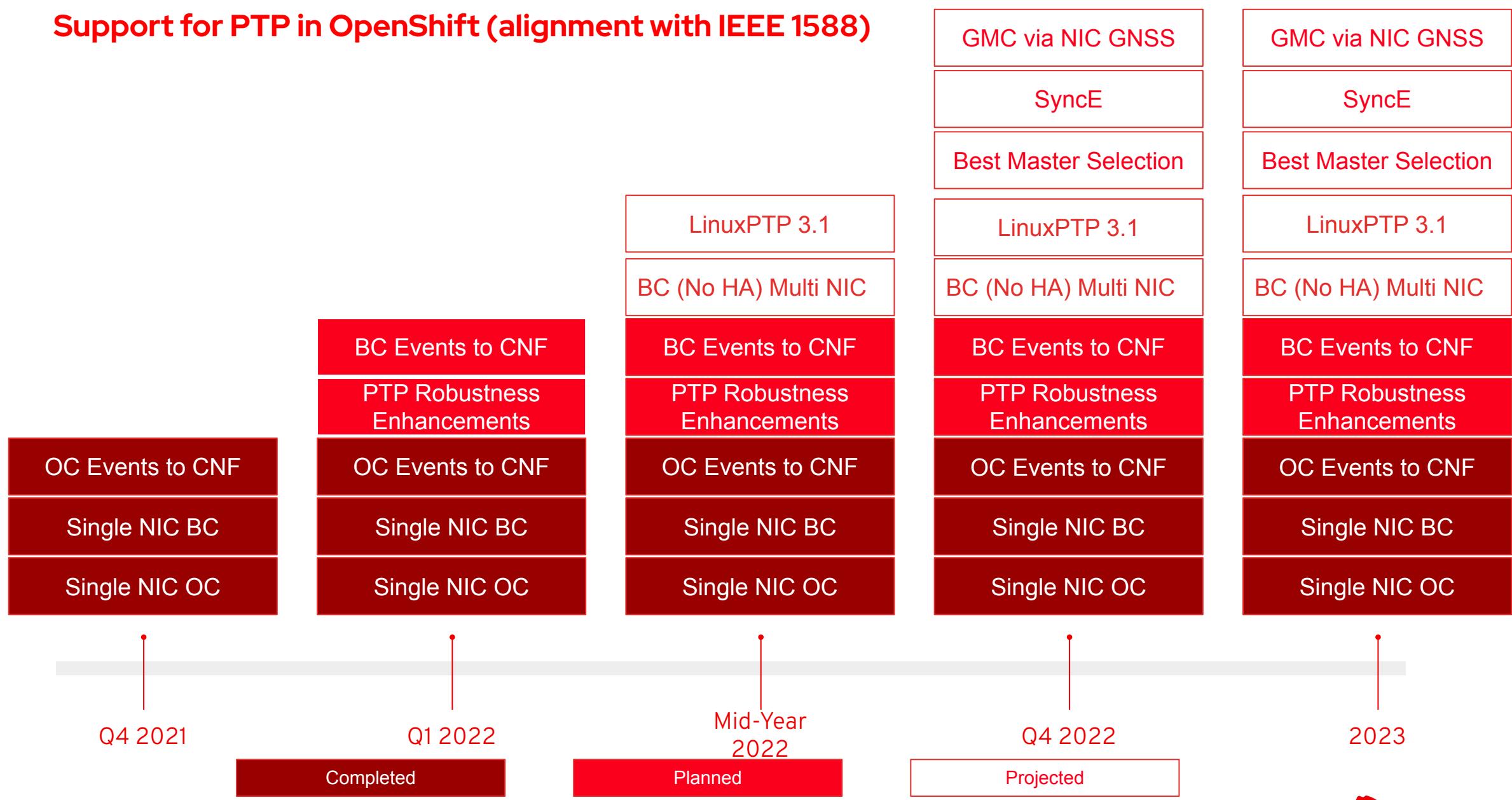
Timing	<ul style="list-style-type: none"> LinuxPTP 3.1 Multiple NIC PTP Boundary Clock (w/o HA) Multiple Time Sources - Best Master Selection
Ops	<ul style="list-style-type: none"> 2,000 SNO Provisioned / Managed by RHACM BIOS Configuration for OCP deployment via GitOp (Power Optimization Focus) Policy-driven node staging prior to OCP upgrade
Misc	<ul style="list-style-type: none"> NBDE Tang Server Operator 802.1x Authentication CoreDNS forwarding DNS requests over TLS Intel SPR Readiness Generic Special Resource Operator (SRO) (GA)
Core	<ul style="list-style-type: none"> NUMA aware scheduler (GA) Dynamic Storage Provisioning (GA)

Long Term

(9 months +)

Timing	<ul style="list-style-type: none"> SyncE OCP Node as a Grand Master Clock
Ops	<ul style="list-style-type: none"> ZTP of Hub Cluster (RHACM, Tang Server, etc...) ZTP of CU
Misc	<ul style="list-style-type: none"> NBDE Operator (Manage Client/Server E2E NBDE, Re-Keying Policies) IMA-base File Attestation (RHEL9) Optimization for Power Savings
Core	<ul style="list-style-type: none"> CPU Manager: mix of exclusive and shared CPU for a container Gatekeeper: labels and annotations update SmartNIC enablement: Bluefield2

Support for PTP in OpenShift (alignment with IEEE 1588)



OpenShift for Edge

Near Term

- RHACM integration/disconnected installs
- RHACM manage 1000 clusters
- Zero touch provisioning (ZTP) DP
- Single Node Openshift deployment over L3 without external LB
- Single Node Openshift provisioning scale improvements (Bootstrap pivot on single node)

Fleet Management

- Single Node Openshift (TP)
- Single-Stack IPv6 and Dual-Stack IPv4/IPv6
- Minimal core usage by platform
- Mt Bryce (eASIC) FEC - via 3rd-Party
- Upgrades via backup/restore

Edge offerings

Mid Term

- Central infrastructure management
- Zero Touch Provisioning
- Lifecycle management/ upgrade service

Fleet Management

- Single Node Openshift (GA)
- Single Node Openshift upgrade support
- Single Node Openshift OLM operator compliance

Edge offerings

Long Term

- Edge devices - kubernetes native device management (CRD)

Fleet Management

- Full-stack attestation
- Additional SmartNICs and accelerators
- OCP as a boundary clock

Edge offerings

Managed Services

Roadmap Details

Managed OpenShift Roadmap

Compliance

OSD / ROSA

- PCI DSS Certification
- FedRamp Certification (CY22-Q2)
- HIPAA Ready Certification (scoping)
- ISO27017 and ISO27018 (2Q2022)

ARO

- FIPS mode install option
- HIPAA certification

Security

OSD / ROSA

- AWS: STS / Role based access
- AWS: Reduced permissions requirements
- AWS: New management network ingress (Private Link)
- BYOK for EBS volumes
- Added layer of etcd encryption
- Configure availability of SSH on the cluster

ARO

- BYOK Disk Encryption
- Egress lockdown
- Storage Lockdown

Managed OpenShift Roadmap

Compute

OSD / ROSA	<ul style="list-style-type: none">• AWS and GCP Region parity with OCP• GPU support• Spot instances• AMD instances• Support dedicated cloud instances	ARO	<ul style="list-style-type: none">• Azure Government region support (Preview)• Expanded instance type support• Spot Instance support• Azure Norway West• GPU Support
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Infrastructure

OSD / ROSA	<ul style="list-style-type: none">• Cluster hibernation• CloudFormation support for ROSA• Terraform provider support• Ansible support• Cluster-wide HTTP(S) proxy during creation for existing VPC• Use OVN as default• Support for NLB in addition to CLB• Use preexisting Route53 when installing in existing VPC• Edit existing node labels and taints	ARO	<ul style="list-style-type: none">• Azure Portal Cluster Creation GUI• Installation Configurability (version, etc)• Azure AppLens Integration
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Managed OpenShift Roadmap

Platform

OSD / ROSA	ARO
<ul style="list-style-type: none">• Expanded region support• Log forwarding• User Workload Monitoring including Alerting• ROSA: Output YAML from CL• ROSA: Annual agreements in AWS Console• Scheduled upgrades for AddOns• ROSA: AWS console integration• Support selecting AZ's• ROSA: STS OCM Provisioning• Ensure that editing the node label or taint applies to all existing nodes.• ROSA: CLI commands to delete / list IAM resources• Allow customer to customize web console branding	<ul style="list-style-type: none">• OCM: "Adopt" ARO clusters into OCM• OCM: Cluster AddOns• OCM: Provision ARO clusters through OCM• OCM: Manage Upgrades

Core, Platform and Developer Tools

Roadmap Details

Install / Upgrades Roadmap

Near Term (3-6 months)		Mid Term (6-9 months)		Long Term (9+ months)	
GENERAL	GENERAL	GENERAL	GENERAL	GENERAL	GENERAL
PROVIDERS	PROVIDERS	PROVIDERS	PROVIDERS	PROVIDERS	PROVIDERS
<p>IBM Cloud:</p> <ul style="list-style-type: none"> • Installer-provisioned infrastructure support <p>Alibaba Cloud</p> <ul style="list-style-type: none"> • Installer-provisioned infrastructure support <p>Azure Stack Hub (on-premise):</p> <ul style="list-style-type: none"> • Installer-provisioned infrastructure support <p>Azure:</p> <ul style="list-style-type: none"> • Document restricted network installation <p>GCP:</p> <ul style="list-style-type: none"> • Deploy OCP to a shared VPC <p>VMware vSphere:</p> <ul style="list-style-type: none"> • Thin provisioning for OS Disk • Use HW version 15 for the VMs <p>Red Hat OpenStack:</p> <ul style="list-style-type: none"> • Allow strict anti-affinity for servers at install time • Tech-Preview - Support OCP workloads on OSP DCN for Enterprise use-cases • OVS Hardware offload - UPI 	<p>Alibaba Cloud</p> <ul style="list-style-type: none"> • User-provisioned infrastructure support <p>Azure:</p> <ul style="list-style-type: none"> • Better documenting of credential permissions • User-managed keys Azure Disk Encryption Sets • UltraDisks support <p>GCP:</p> <ul style="list-style-type: none"> • Better documenting of credential permissions <p>IBM Cloud:</p> <ul style="list-style-type: none"> • User-provisioned infrastructure support <p>VMware vSphere:</p> <ul style="list-style-type: none"> • Multi-cluster deployment support (single vCenter) <p>Red Hat OpenStack:</p> <ul style="list-style-type: none"> • Support MetalLB with BGP • DCN improvements for Telco/NFV • Better scaling using Kuryr OVN 	<p>Install:</p> <ul style="list-style-type: none"> • Improved Disconnected Workflow <p>Upgrade:</p> <ul style="list-style-type: none"> • Release upgrade graph data as a container • 'oc' enhancement to display upgrade paths 	<p>Install:</p> <ul style="list-style-type: none"> • Customer managed external DNS for Cloud Providers <p>Upgrade:</p> <ul style="list-style-type: none"> • EUS to EUS upgrades 	<p>Azure:</p> <ul style="list-style-type: none"> • Support for Azure China cloud instance • User-defined infrastructure tags <p>GCP:</p> <ul style="list-style-type: none"> • User-defined infrastructure tags <p>VMware vSphere:</p> <ul style="list-style-type: none"> • CPU & Memory reservations 	<p>Install:</p> <ul style="list-style-type: none"> • MachineSet-managed control plane • Additional disk for ETCD • Include/exclude capabilities based on user selection

Installation, Updates, and Provider Integration

More platforms

Alibaba Cloud

Azure Stack Hub

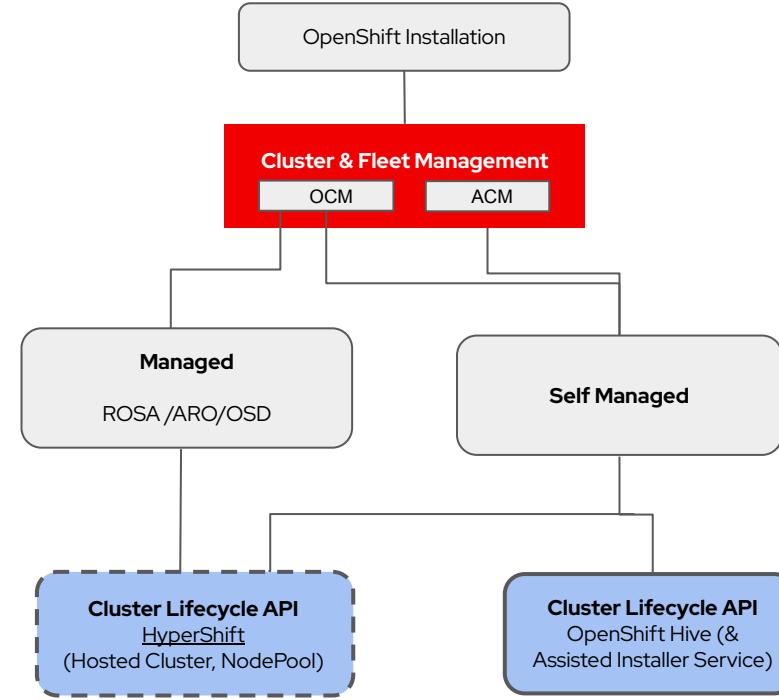
IBM Cloud

NUTANIX



Enable Hybrid Cloud

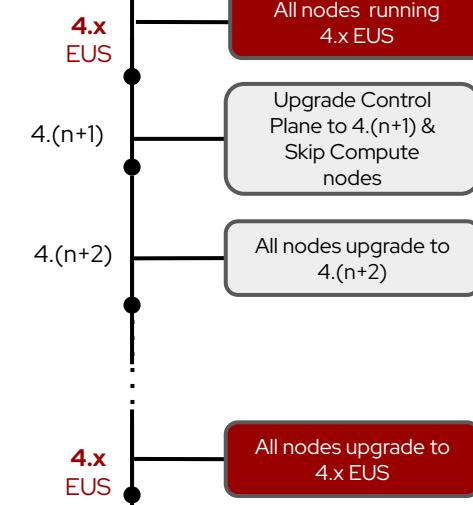
Installation



Simplify onboarding

Upgrades

EUS to EUS Upgrades

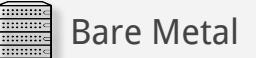
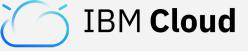


Contingent on Testing & Validation

- Alerts when node/pod fails to drain
- Zone awareness during upgrades
- Targeted upgrade blocking



Mitigate risk

Provider	Full Stack Automation (installer-provisioned infrastructure)	Pre-existing Infrastructure (user-provisioned infrastructure)
 Alibaba Cloud	4.10*	4.11*
 aws	4.1	4.1
 NUTANIX	4.11*	4.11*
 Microsoft Azure	4.2	4.3+ (z-stream)
 Azure Stack Hub	4.10*	4.9
 Bare Metal	4.6	4.1
 EQUINIX METAL	TBD	TBD
 Google Cloud Platform	4.2	4.2
 Microsoft Hyper-V	-	TBD
 IBM Cloud	4.10*	4.11*
IBM Power Systems 	-	4.3+ (z-stream)
 IBM Z	-	4.2+ (z-stream)
 RED HAT OPENSTACK PLATFORM	4.2	4.4
 RED HAT VIRTUALIZATION	4.4	4.6
 VMware vSphere	4.5	4.1
 vmware aws **	4.6	4.6

** via VMware Validated Design (VVD)

* Tentatively planned & subject to change

PMs: Marcos Entenza (AWS, Azure, GCP, IBM Cloud), Gaurav Singh (Alibaba), Maria Bracho (VMware vSphere), Peter Lauterbach (RHV), Ramon Acedo Rodriguez (BM), Anita Tragler (OSP), & Duncan Hardie (IBM Z & Power)

OpenShift Bare Metal

Near Term

(3-6 months)

- Support for day-1 configuration of bonds, static IPs and VLANs on nodes
- Kubernetes NMState GA for bare metal clusters
- Get and set node BIOS attributes
- Monitor Node Health from Workloads: powered by Metal3 and Redfish, API to subscribe to hardware events
- TLS for virtual media

Mid Term

(6-9 months)

- Hybrid Clusters: deploy Bare Metal Worker Nodes from OpenShift on non-bare metal platforms
- Central Infrastructure Management (power management) from RHACM for Single Node OpenShift nodes
- Document adding custom Redfish-based controllers for telco partners with specialized hardware
- Network logging improvements

Long Term

(9 months +)

- Central Infrastructure Management (power management) from RHACM for bare metal nodes in managed clusters
- High Availability for SNO pairs
- Node Health Check (non-Machine API-based health checks)
- Bootable Installer: ephemeral installer for on-prem, agnostic and long tail of platforms (bare metal focused)

OpenShift on OpenStack

Short Term (OCP 4.10)		Mid Term (OCP 4.11)		Long Term (4.12+)	
Installer & Infrastructure	Kuryr CNI	Installer & Infrastructure	Kuryr CNI	Installer & Infrastructure	Kuryr CNI
<ul style="list-style-type: none">Octavia Load Balancer service - router shardingTelco/NFV Fast datapath OVS-DPDK with host-device pluginOpenStack external cloud provider [TP]Anti-affinity for workloadsOCP control-plane (Master) cold migrationOSP DCN Edge - OCP cluster in Edge site (AZ awareness) [TP]		<ul style="list-style-type: none">Installer flexibility with external Cloud Provider (no Terraform)IPI dual-stack on OSP IPv6 provisioningOctavia External Load balancer - UDP supportEgress IP supportTelco/NFV Fast Datapath IPI with OVS HW offloadOSP DCN Edge: Stretched OCP cluster across DCN edge sites (AZ awareness)MetallLB with BGP (L3 mode)	<ul style="list-style-type: none">Kuryr dual stack support	<ul style="list-style-type: none">Disconnected (Air Gapped) all-in-one Quay, installerMetallLB with BGP LBaaSOpenStack DNSaaS DesignateOSP DCN Edge with Remote worker nodesIPI with dual-stack and IPv6Windows Container with BYOHHPC GPU/vGPU supportMonitoring with Telemetry data	<ul style="list-style-type: none">Kuryr and OVN Improved ScaleKuryr at DCN edge
	<ul style="list-style-type: none">Kuryr Improved debugging with Metrics				

OpenShift on OpenStack

Deployment User Experience

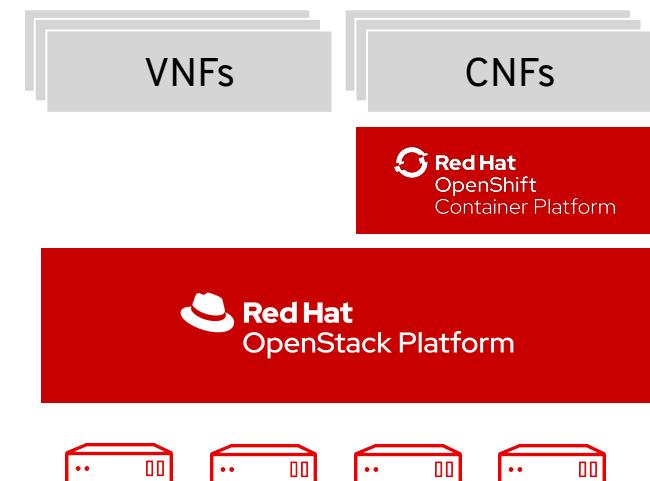
- Continue to improve the installation experience of OpenShift 4 on OpenStack in the User-Provisioned Infrastructure (UPI) and Installer-Provisioned Infrastructure (IPI) installation workflows
- Improvements involve addressing new use cases and simplifying the installation workflows

OpenStack Bare Metal Integration

- Mixed environments of virtual and bare metal instances to address use cases such as direct hardware access (NVMe, SR-IOV, GPU, FPGA) or performance-sensitive apps

Telco & Edge Focus

- OpenStack is one of the most popular platforms in Telco. OpenShift on OpenStack is strategic for many of such customers, running VNFs and CNFs together, Distributed Compute Nodes or SR-IOV for containers

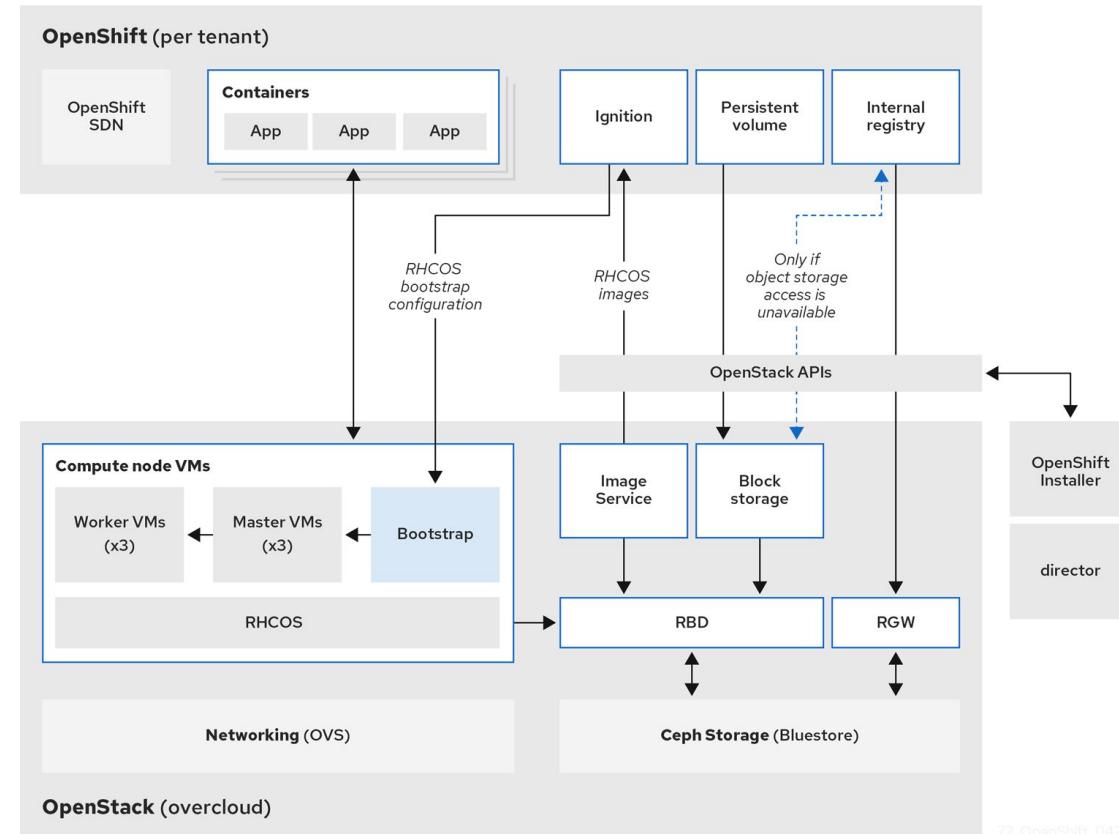


Standard hardware



Current OpenShift 4 on Red Hat OpenStack Platform Reference Architecture

OCP 4.4 & OSP 13/16



72_OpenShift_0420

<https://www.openshift.com/blog/ocp-4-on-osp-ra-blog-post>

OpenShift Virtualization

Near Term 1H CY2022

- vGPU support
- Velero Backup/Restore Tech Preview
- Service Mesh
- IPv6 single-stack
- Virtualization resource usage visualization

Core Platform

- Single Node Openshift (TP)
- Tech Preview Bare Metal IBM Public Cloud
- MTV support for Warm Migration from RHV

Deployment Options

Mid Term 2H CY2022

- Single VM deeper statistics visualization
- OADP (Velero) Backup/Restore GA with Ecosystem Partners
- Import / Export virtual machine
- Online snapshots
- Real time virtual machine
- App High Availability (Pacemaker and fencing)

Core Platform

- Single Node Openshift (GA)
- Tech Preview Bare Metal additional Cloud vendors
- VNF Certification
- MTV support for migration from OSP
- OCP Virtualization as control plane for OSP

Deployment Options

Long Term 2023+

- AI/ML and Remote Visualization
- Compliance operator
- Improve disconnected experience
- ACS integrations
- Non-privileged containers

Core Platform

- Public Cloud Bare Metal GA/Tech Preview contd.
- ARM support

Deployment Options

OpenShift Sandboxed Containers (Kata)

Near Term

(~4 months = 4.10)

- Metrics for Kata stack.
- Additional dashboards in OpenShift console for health metrics.
- Node Feature discovery for new installs.
- Additional Logging from QEMU, the operator, and the kata runtime.
- Integrations of the sandboxed operator in CPaaS

Sandboxed Containers

Mid Term

(~7 months = 4.11)

- Smart admission control for kata runtime (with / without ACS)
- Kata 3.0 compatibility - Part I
- Update to QEMU 6.2
- Update to RHEL 8.6 with extensions
- SR-IOV with DPDK support
- Qualify sandboxed containers on SNO
- Dev Flows Integration

Sandboxed Containers

Long Term

(9+ months = 4.11+)

- Use CRI-O stats (instead of cAdvisor) for metrics
- Support External Control Plane (HyperShift) topology with sandboxed containers.
- Integrate sandboxed containers in the logging stack
- Kata 3.0 compatibility part II

Sandboxed Containers

Compute

Near Term

Kubernetes

- Secondary Scheduler Operator
- Technology preview of autoscaling based on custom metrics with KEDA
- Ability to deploy alternative recommender in VPA
- GPU Fabric Manager enablement for NVIDIA DGX A100 (8 x GPUs per physical node)

Container Host

RHEL CoreOS and Machine Config Operator

- Kdump for diagnosing kernel crashes to GA
- AWS GovCloud image publishing
- coreos-installer live ISO customization UX
- Improved node drain documentation and alerting
- Improved CA certificate handling
- Support of kubelet tlsSecurityProfile cryptographic policy flag

Windows

- Support for Bring your own Host that should enable Windows Containers support in UPI for platforms such as vSphere, Bare metal etc

Mid Term

Kubernetes

- In-Place upgrade of VPA
- Krew
- Cgroup V2
- Special Resource Operator GA
- GPU Dashboard
- GPUDirect RDMA enablement for multi-node training

Container Host

RHEL CoreOS and Machine Config Operator

- rpm-ostree RHCOS images in OCI container
- Password-protecting grub menu via Ignition
- Automated hotfix distribution

Windows

- Support for ContainerD runtime
- Improved Logging/Monitoring & Storage
- Support for more network plugins such as NSX 3.0

Long Term

Kubernetes

- Multi dimensional POD autoscaler
- Swap Support for containers
- Behavior detection driven recommenders in VPA
- Enabling AI/ML and HPC workload
- NVIDIA GPU on ARM systems
- Checkpoint/Restore In Userspace
- Cache container images

Container Host

RHEL CoreOS and Machine Config Operator

- Simpler customization
- Custom content
- RHEL 9 based RHCOS
- Reboot policies

Windows

- Support for Hosted Platforms (ARO, AMRO, OSD)
- Knative Automations, Service Mesh support
- Policy enforcement using OPA
- Deeper UI changes

OPENSHIFT ON ARM

OpenShift on Arm

Near Term

(3-6 months)

- SBSA/SBBR compliant servers
 - Pre existing infrastructure (Tech Preview)
- Bluefield 2 (Dev Preview)

BARE METAL

- AWS
 - Full stack automation (GA)

CLOUD

- OpenShift Monitoring (already in OpenShift)
- Advanced Cluster Management (client only)
- OpenShift Logging

ADDONS

Mid Term

(6-9 months)

- SBSA/SBBR compliant servers
 - Pre existing infrastructure (GA)
- Bluefield 2 (Tech Preview)

BARE METAL

CLOUD

ADDONS

- Phase 2 - implementation of subset TBD

Long Term

(9+ months)

- SBSA/SBBR compliant servers
 - Full stack automation (GA)
- Bluefield 2 (GA)

BARE METAL

CLOUD

ADDONS

- Other cloud providers

OPENSPLIT MULTI-ARCHITECTURE

OpenShift Multi-Architecture

Near Term

(3-6 months)

- Compliance Operator
- Multiple NICs
- OVNKube IPSec Support
- Kubernetes nmstate operator
- Multus Plugins (IPVAN, Bridge with VLAN, Static IPAM, Host Device)
- Vertical pod autoscaler
- *Horizontal pod autoscaling - Memory **Tech Preview***

IBM POWER

Mid Term

(6-9 months)

- PowerVS Automated Installer (IPI)
- HyperShift

IBM POWER

Long Term

(9+ months)

- PowerVS Pre Existing Infrastructure (UPI)
- Migration toolkit
- FIPS compliance

IBM POWER

- Future platform support (Z Next)
- Compliance Operator
- Multiple NICs
- CryptoExpress (CEX) Adaptors
- OVNKube IPSec Support
- Kubernetes nmstate operator
- Multus Plugins (IPVAN, Bridge with VLAN, Static IPAM, Host Device)
- Vertical pod autoscaler
- *Horizontal pod autoscaling - Memory **Tech Preview***

IBM Z

IBM Z

- Enhance KVM UPI with Secure Execution
- HyperShift

IBM Z

- Migration toolkit
- zVPC Automated Installer (IPI)
- FIPS compliance



Control Plane

Q1 CY2022

API and Auth

- Update Control Plane to 1.23
- Tech Preview of Cert-manager
- Consume Group membership information from an idp (OIDC)

etcd

- Master Node Scaling and Recovery Behavior Matches That of Worker Nodes

Q2-Q4 2022

API and Auth

- Update Control Plane Kubernetes Version to 1.24
- GA of cert-manager
- Pod Security Admission
- Improved audit logging (login/login failure details)
- Reconcile SCC
- Kube KMS R&D

etcd

- Disaster recovery & Automated backups
- Etcd bump

2022+

API and Auth

- Hierarchical namespaces,
- Automated Group sync
- Prevent brute force logins

etcd

- Etcd Auto tune
- Separate PIOPS volume for etcd supported as a Day 1 operation
- Etcd certs signed by Custom CA

OPENSHIFT CLUSTER INFRASTRUCTURE

Cluster Infrastructure

Near Term

(3-6 months)

- **Azure:** enable accelerated networking
- **Azure:** worker node ephemeral disks
- **Azure:** availability set support
- **Azure:** UltraSSD support
- **GCP:** GPU support
- Cloud Controller Manager Operator

API

- **GCP:** Out of tree cloud provider (TP)
- **IBM:** Out of tree cloud provider (GA)
- **Alibaba:** Out of tree cloud provider (GA)
- **vSphere:** Out of tree cloud provider (TP)

PROVIDERS

Mid Term

(6-9 months)

- **AWS:** support for other network types (EFA)
- **AWS:** mixed spot instance machine sets
- **GCP:** support for pd-balanced disk type
- Set subnet for “service type” load balancer
- Migration from MachineAPI to CAPI
- Managed Compute for Control Plane
 - Compute autoscaling
 - Vertical rolling updates
- Cluster API Phase 1 (TP)

API

- **vSphere:** Out of tree cloud provider (GA)
- **GCP:** Out of tree cloud provider (GA)
- **Azure:** Out of tree cloud providers (GA)
- **OpenStack:** Out of tree cloud provider (GA)
- **AWS:** Out of tree cloud provider (GA)
- **Nutanix:** Cloud provider (GA)

PROVIDERS

Long Term

(9+ months)

- CAPI completion
- Native scaling groups
- Improved Metrics
- Automatically spread across Availability Zones

API

- Equinix Metal: cloud provider

PROVIDERS

Unified Console Experience (ACM, ACS, OCP, ODF, Quay)

Near Term

Application	<ul style="list-style-type: none">Guide users to add webhooks when adding pipelinesEnable devs to share their Helm Charts in the catalogImprove Dev Exp for front end devsSupport quick search from AddUsability enhancements for Topology
Cluster	<ul style="list-style-type: none">Upgrade control plane onlyAppliedClusterResourceQuota supportRun pod in debug modeVisualize Cluster Support Level
Fleet	<ul style="list-style-type: none">OCP & ACM native integration: Tech PreviewMulti-Cluster SSO enabledMulti-Cluster networking serviceability enhancementsRHV & AWS GovCloud cluster provisioning supportManaged Cluster Creation via OCM IntegrationGovernance & config management with policy setsACM & ODF integration...
Extend	<ul style="list-style-type: none">Dynamic Plugin: Dev Preview - Alpha APIsDynamic Plugin: Sample AppsDynamic Plugin: Github Template Repository

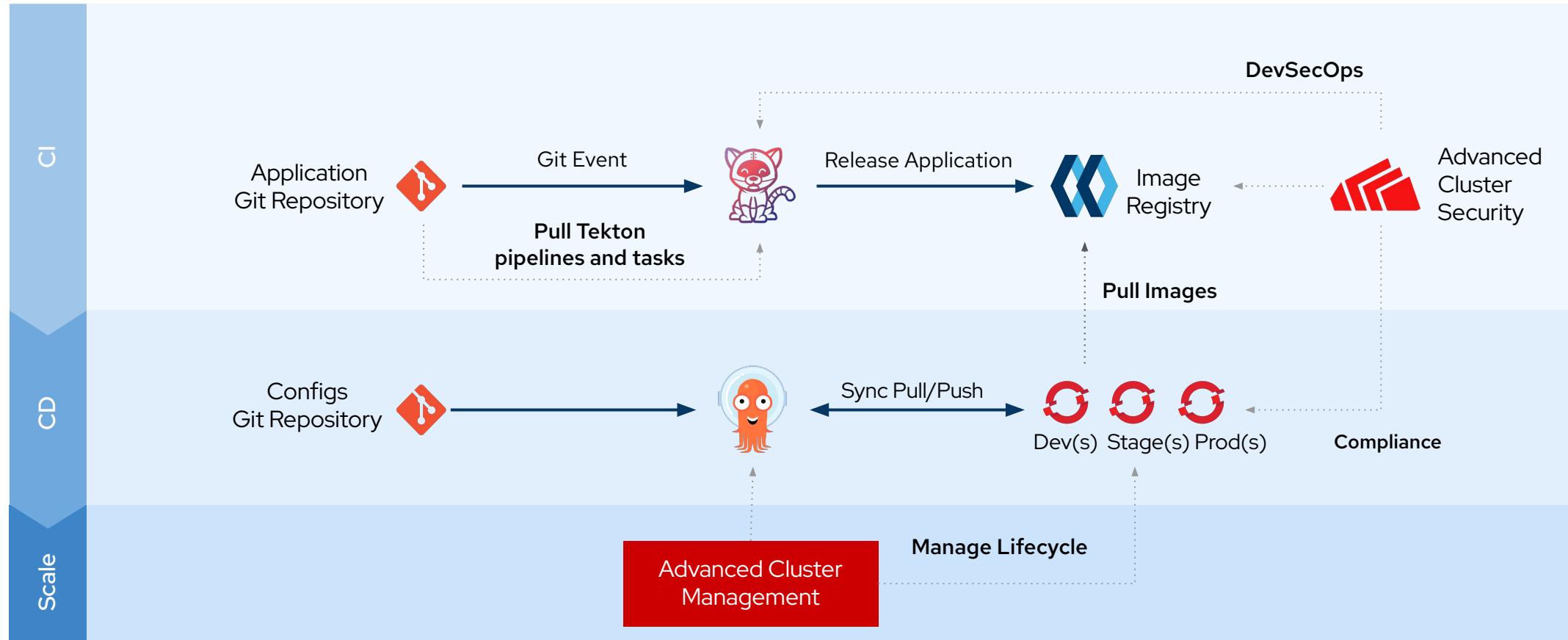
Mid Term

Application	<ul style="list-style-type: none">Dark ModePod Log Viewer: Color ContextExposure of Java performance data
Cluster	<ul style="list-style-type: none">Pod Disruption BudgetUser preference: Dark ModeHPA - Custom metricsImproved upgrade details
Fleet	<ul style="list-style-type: none">OCP & ACM native integration: GAACM & ServiceMesh integration - FederatedACM & OpenShift GitOps integrationNative Managed Cluster Creation: ROSA, ARO, OSD, *ksEasy provisioning with Cluster Profiles/Templates
Extend	<ul style="list-style-type: none">Dynamic Plugins: Tech Preview - Beta APIsDynamic Plugins: Plugin CatalogDynamic Plugins: Operator Helpers

Long Term

Application	<ul style="list-style-type: none">Migrate app from another clusterExposure of tracingBuilds v2 in ConsolePush changes to Git
Cluster	<ul style="list-style-type: none">User preference: Set time/date formatVertical Pod Autoscaler supportSecurity Context Constraints support
Fleet	<ul style="list-style-type: none">ACS & ACM & Quay Native Integration - Image vulnerabilityACS & ACM Native Integration - ComplianceACM & ServiceMesh integration - Multi-ClusterCluster Profiles/Templates with Operator add-on supportACM enable partner integrations - Dynamic Plugins
Extend	<ul style="list-style-type: none">Dynamic Plugins: GA - v1 APIsDynamic Plugins: Certification Process for partnersDynamic Plugins: Stand-alone mode

Declarative CI & App Delivery with GitOps



DevOps & GitOps

Short Term

Builds	<ul style="list-style-type: none">Shipwright Tech PreviewBuildpacks build strategyShared secret/configmaps across namespaces (Shared Resource CSI Driver)
Pipelines	<ul style="list-style-type: none">Pipeline as code concurrency controlIn-cluster Tekton HubPipeline resource quota guidanceTekton Chains and task signing
GitOps	<ul style="list-style-type: none">ApplicationSets GAkubeadmin and OCP group support with RH SSOGuidance on OpenShift configurationsGuidance on secret management

Mid Term

Builds	<ul style="list-style-type: none">Auto-pruning buildsShipwright in Dev ConsoleVolumes support in Shipwright buildsBuild triggers
Pipelines	<ul style="list-style-type: none">Pipeline concurrency controlImprove workspace user-experienceUnprivileged builds in pipelinesExtended pipeline history and log retentionManual approval in pipelinesTekton Bundle supportGitLab support in pipeline as code
GitOps	<ul style="list-style-type: none">HashiCorp Vault integrationArgo CD multi-tenancy alignment with k8sApplication CRs in any namespaceApplication CRs service account impersonationArgo CD Helm deployment enhancementsImprove support for custom plugins in Argo CD

Long Term

Builds	<ul style="list-style-type: none">Shipwright Builds GAShipwright custom tasks for TektonBuildConfig to Shipwright migration guideBuild dependency caching
Pipelines	<ul style="list-style-type: none">Tekton Task bundlesPipeline templates in pipeline builderPipeline reuse in pipelinesWorkspace templatesScheduled pipelinesRepository metrics in Dev Console
GitOps	<ul style="list-style-type: none">Application dependenciesImage updaterNotificationsCluster-wide Argo CD control plane

Near Term (OCP 4.10)

Operator Management

- [Support hosted control planes](#) (Hypershift)
- [Data-loss prevention with versioned CRDs](#)

Operator Packaging

- [File-based catalog creation](#)
- [Complex dependency expressions](#)

Stability/Performance

- Hotfix delivery process (internal)
- [Reduce downloads for mirroring catalogs](#)
- Optimizations for large clusters

OLM Integration

- Digest-based bundle (for disconnected env)

Enable more Operators/Mature Operators

- [Java/Quarkus Operator SDK](#) (upstream beta)
- [Helm + Go hybrid Operator SDK](#) (Tech Preview)
- Auto-pruning for Operator created objects
- Enable Ansible Operator insight (capability level IV)

Operator Testing

- Pluggable/external bundle validation engine
- Enable local storage for scorecard test results

Mid Term (4.11/4.12)

Operator Management

- [Cluster-scoped Operator API & Bundle API](#)
- Discrete [Operator RBAC](#) and [visibility control](#)
- Auto-recover failed installs/updates
- Operator installed by default (Day0)

Operator Packaging

- [Content Deprecation / Upstream templates](#)
- [File-based catalog refinements](#)

Lifecycle Model

- [Operand versioning & dependencies](#)
- [Cross-Channel Update Indication](#)
- [Z-stream only automatic updates](#)

OLM Integration

- Testing run/upgrade with file-based catalog
- Support cluster-scoped Operator API

Enable more Operators/Mature Operators

- [Java/Quarkus Operator SDK](#) (Tech Preview)
- [Helm + Go hybrid Operator SDK](#) (GA)
- **Auto-scaling:** Operator managed workload
- Easy opt-in to **reusable advanced capabilities**

Operator Releasing UX

- Support git-friendly build pipeline scaffolding
- External validation/test suites for best practices

Long Term (OCP 4.12+)

New Global Operator Model

- [CLI tool for OLM](#)
- Android-Style Permission Approval
- Helm Bundle Support
- User Request-based Operator deployments
- Version-locked multi-operator products
- [Introspect Dependencies and Update Graph](#)

Operator Packaging

- [CSV-less bundles / k8s manifest support](#)

Managed Services Support

- [Canary Rollouts / Fleet Management](#)

OLM Integration

- Support CSV-less bundle validation/test
- Support Canary Rollouts / Fleet Management
- Support discover all versions of an Operators

Enable more Operators/Mature Operators

- Java/Quarkus SDK GA
- Python SDK prototype
- Idiomatic Operator development

Helm Enablement Roadmap

Near Term

(4.10)

HELM

- Helm CLI updates
- Enabled namespace scope Helm chart repositories
- Best practices guides for Helm on OpenShift
- Multi-Cluster Support

HELM

Mid Term

(4.10/4.11)

- GitHub action for Chart Verifier tool
- ArtifactHub integration in Developer Console
- Kubelinter integration with Chart Verifier

HELM

Long Term

(4.11+)

- IDE Tooling
- Security and Signature
- Migration from Templates and Samples Operator to Helm Charts

Service Mesh & Serverless

Short Term

(3-6 months)

Service Mesh

- Internal improvements to increase release cadence - keeping closer to upstream Istio.
- Kiali enhancements for large meshes and federation
- More flexible integration with Network Policies
- Service Mesh support on OpenShift Virtualization

Serverless

- Functions General Availability
 - Node and TypeScript
 - Local developer experience using podman/docker
 - On cluster build
- Functions Tech Preview
 - Quarkus, Python, Go, Rust, Spring Boot
- Knative Kafka Broker - Tech Preview
- Red Hat Event Sink
 - Camel-K sinks
 - Kafka sinks
- OpenShift Dedicated Support , ROSA
 - Unmanaged Add-On
- Managed Kafka support

Service Mesh

Mid Term

(6-9 months)

- Support for external services (VMs, bare metal)
- Support for IPv6
- Service Mesh Command Line Support

Serverless

- Functions General Availability
 - Additional runtimes
- Functions Tech Preview
 - IDE Experience
 - Customizable language packs
- Security Enhancements
 - mTLS natively in Knative
- Knative Kafka Broker - GA
- Cold start improvements
- Serverless workflow orchestration
- Red Hat Event Sources
 - Ceph
 - Kogito
 - Data Grid
- Additional monitoring alerts and dashboard

Service Mesh

Long Term

(9 months+)

Service Mesh

- Centrally managed multi-cluster service mesh
- Service Mesh integration with Advanced Cluster Manager (ACM)

Serverless

- Serverless Cost Model
- Serverless on SNO
- Default deployment for stateless workload
- Security Enhancements
 - End to end encryption
 - Broker and channel authentication/authorization
- Make existing deployments Serverless
- Integrations
 - Keda with Eventing
 - 3scale API Gateway
- Stateful functions
- Event Streaming support



Migration Toolkit for Applications

Near Term

(Q4'21 - MTA 5.2.1)

- UX
- User experience driven by the Windup Web console

- FEATURES
- First JBoss EAP 8 rules: replace javax imports with jakarta equivalents
 - First OpenJDK 8 to OpenJDK 11 rules contributed, more to follow
 - Updated set of rules for Quarkus extensions
 - Updated targets in all IDE plugin flavors

Mid Term

Mid Term

(Q2'22 - MTA 6.0)

- UX
- Application Inventory as the driver for user experience
 - Seamless integration between tools
 - Windup web console UX merged into the Application Inventory
 - Enhanced RBAC

- FEATURES
- Application portfolio management
 - Integration with Git, SVN and Maven
 - Application assessment
 - Custom questionnaire management
 - Applications analysis
 - Centralized database and API

Long Term

(Q3'22 - MTA 6.1)

- UX
- Seamless integration of Move2kube and Tackle Test as part of the Migration waves flow

- FEATURES
- Automate the creation of migration assets on application repositories
 - Deployment manifests (Tech Preview)
 - Automatically generated tests (Tech Preview)
 - Introduce migration waves

- Move2kube (Tech preview)
- Tackle Test (Tech preview)

Dev Sandbox Roadmap

Near Term (4Q'21)

- EXPERIENCE**
- Deploy apps in Serverless mode
 - Create data science models with RHODS
 - Easily add RHOAM to apps
 - Interact with Red Hat team via public Slack channel
 - Generate activation codes for Red Hat events and customers for faster signup and co-location

101
CORE

- Provide org-type tenancy
- Enhance subscription emails to include feedback surveys

101

Mid Term (1Q'22)

- EXPERIENCE**
- Access web terminal in cluster
 - Access Dev Sandbox from console.redhat.com
 - Build and run apps that deliver data science experimentation models
 - Send records from SQL databases to Kafka streams

101
CORE

- Unify Sandbox clusters with RHODS, RHOAM, and all pre-configured operators
- Enable Sandbox styled clusters for App Studio services and subscriber workloads
- Enhance telemetry from Sandbox console to capture catalog items and subscriber email domain

- EXPERIENCE**

Long Term (2Q'22+)

- View vulnerability advisories about images deployed from Quay
- One-click signup and deployment of source code from Github

101
CORE

- Enable proxy-based accessibility to data from Sandbox
- Run and manage Dev Sandbox on ROSA and ARO clusters, along with AWS and Microsoft

Developer Tools

Near Term

- Pipeline / GitOps enable
- Helm support
- Transition to outer loop

odo

- Plug-in recommendations for better OOTB experience
- Initial support of devfile v2 for interoperability
- Improved support for Bitbucket and Gitlab
- New dashboard and improved management of credentials and secrets

CR Workspaces

- Updates to include 4.8 z-streams
- Profile work for app consumption
- Single node profile installer work
- Integration with podman
- Better telemetry/metrics around downloads and usage

CR Containers

Mid Term

- Builds v2
- Knative Serving
- Functions
- Additional runtime support via devfiles
- Local dev support with podman

odo

CR Workspaces

- Easier discoverability in OpenShift Developer Console
- More easily able to share workspace definitions with teams
- Improved support of IntelliJ IDE
- Simpler user management

CR Containers

- Updates to include 4.8/9 GA bits
- Improved consumption for podman/RHEL minimal guest image
- Apply single node installer support to additional operators

Long Term

- Import/export app
- Create helm chart
- Knative Eventing

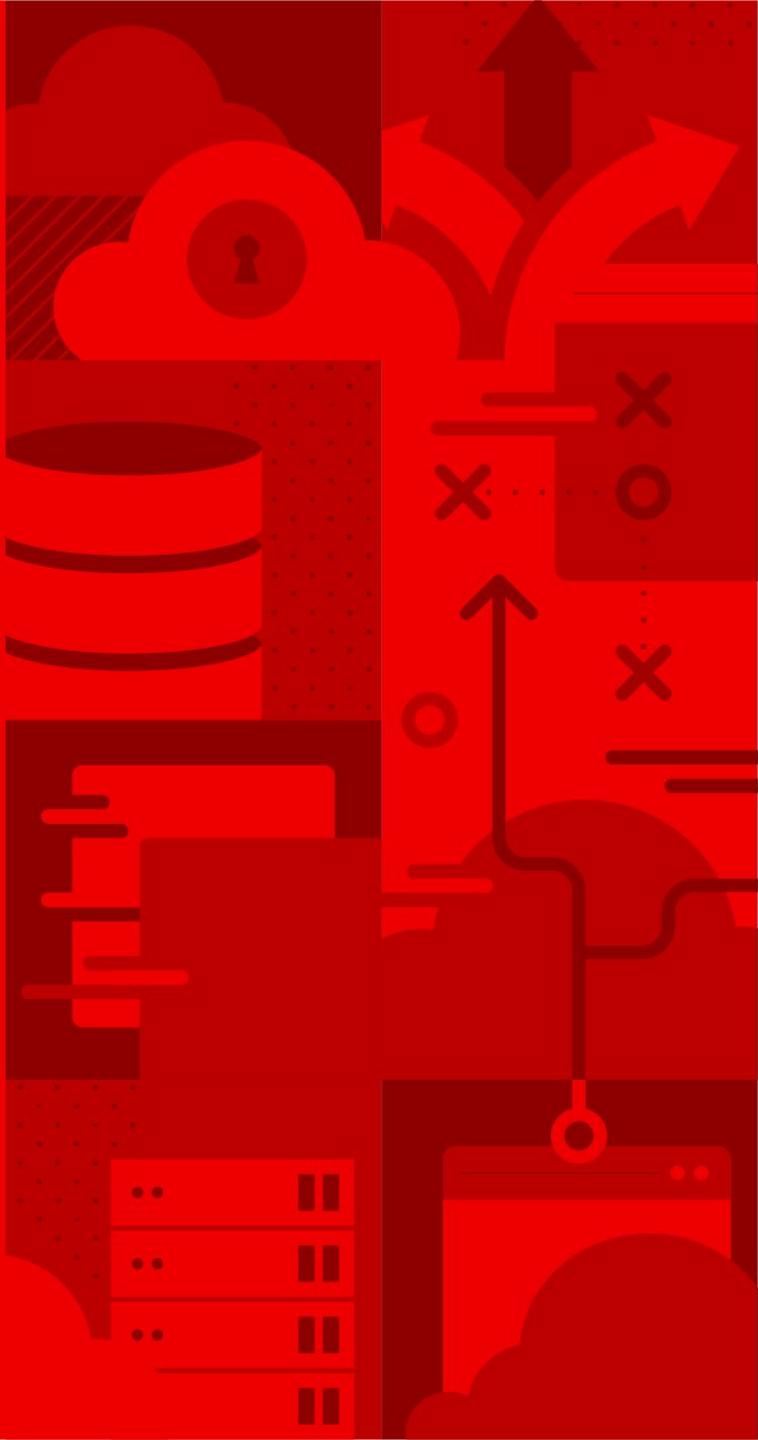
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CR Workspaces

- Co-editing and team collaboration
- Better integration and support for outer-loop
- Multi-cluster support
- Pipelines and Serverless integration

CR Containers

- Update mechanism for crc binary
- Update mechanism for embedded image
- Further operator enablement of single node case, further resource consumption improvements



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