Introduction to Red Hat Advanced Cluster Management

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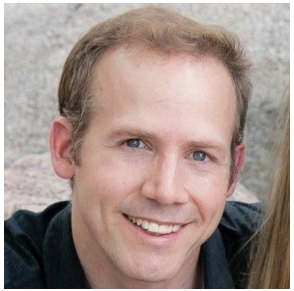

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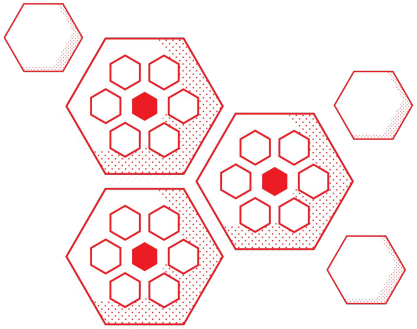
What we'll discuss and show today

- ★ Why Multicluster Kubernetes?
- ★ Introduction to Advanced Cluster Management
- ★ Demo
  - Cluster Management
  - Application Lifecycle Management
  - Governance, Risk, and Compliance (GRC)
  - Cluster Visibility

Kubernetes adoption leads to multicluster



"As Kubernetes gains adoption across the industry, scenarios are arising in which I&O teams are finding they must deploy and manage multiple clusters, either in a single region on-premises or in the cloud, or across multiple regions….for a number of reasons, including multi-tenancy, disaster recovery, and with hybrid, multicloud, or edge deployments."

Source:
Assessing Patterns for Deploying Distributed Kubernetes Clusters doc # G00465217, by Tony Iams

Where is the growth in cluster deployments?

Small Scale Dev teams

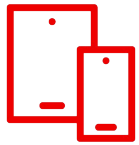
- Managing and syncing across Dev/QE/Pre-Prod/Prod clusters can be difficult

Medium Scale Organizations

- Retail with small clusters across 100s of locations
- Organizations with plan for growth 10-15 clusters moving to 100s

Large Scale

- Global organizations with 100s of clusters, hosting thousand of applications
- Large Retail with 1000s of stores



Edge Scale Telco

- 100s of zones, 1000s of clusters and nodes across complex topologies

Reasons for deploying clusters

Application availability

Reduced latency

Address industry standards

Geopolitical data residency guidelines

Disaster recovery

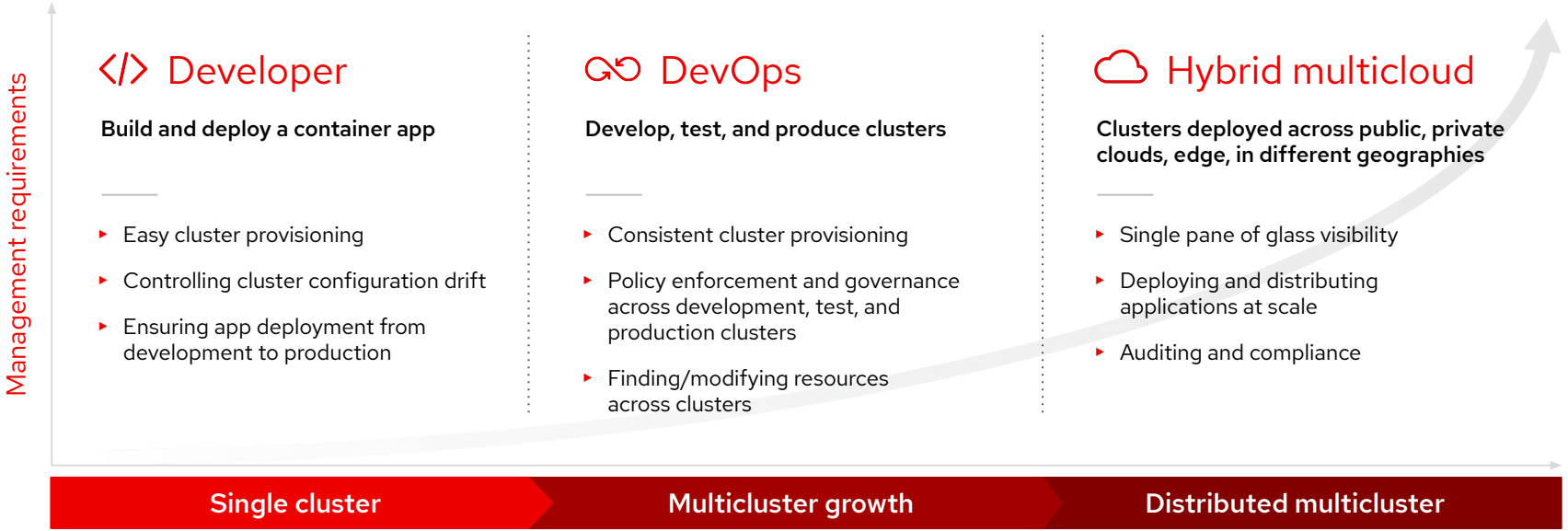
Edge deployments

CapEx cost reduction

Avoid vendor lock-in

Multicluster management challenges

How do I normalize and centralize key functions across environments?



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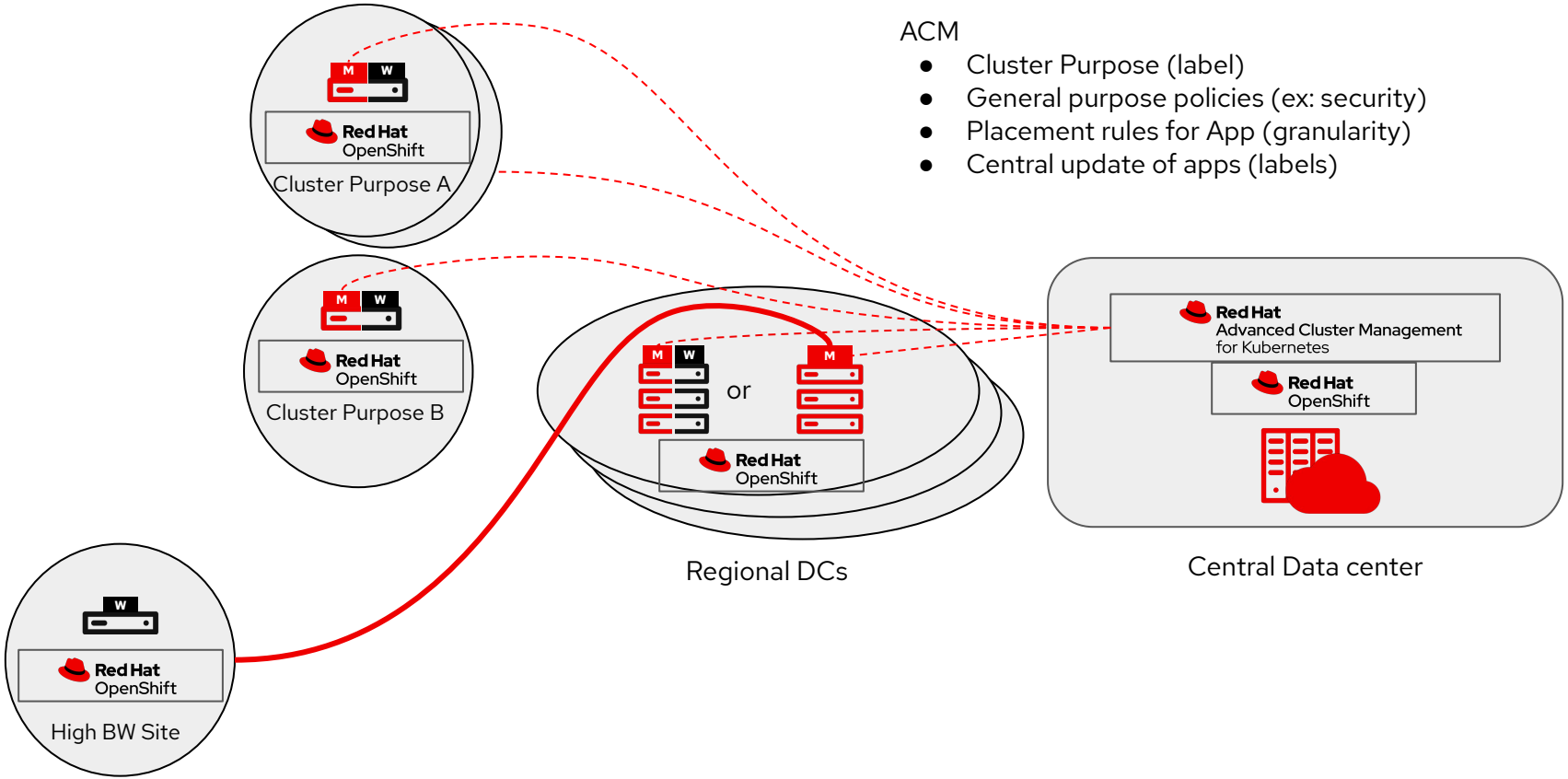
ACM and Edge deployment in a Nutshell



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Advanced Cluster Management for Kubernetes

Robust. Proven. Award winning.

Multicluster lifecycle management

Policy driven governance, risk, and compliance

Advanced application lifecycle management

Key personas

IT Operations

- How can I manage the lifecycle of multiple clusters regardless of where they reside using a single control plane?
- How can I quickly get to the root cause of failed components?
- How do I monitor usage across multiple clouds?

Key personas

SRE/DevOps

- How do I get a simplified understanding of my cluster health and the impact on my application availability?
- How do I automate: provisioning/deprovisioning of my clusters, the placement of workloads based on capacity and policy, and the pushing of application updates from dev to prod?

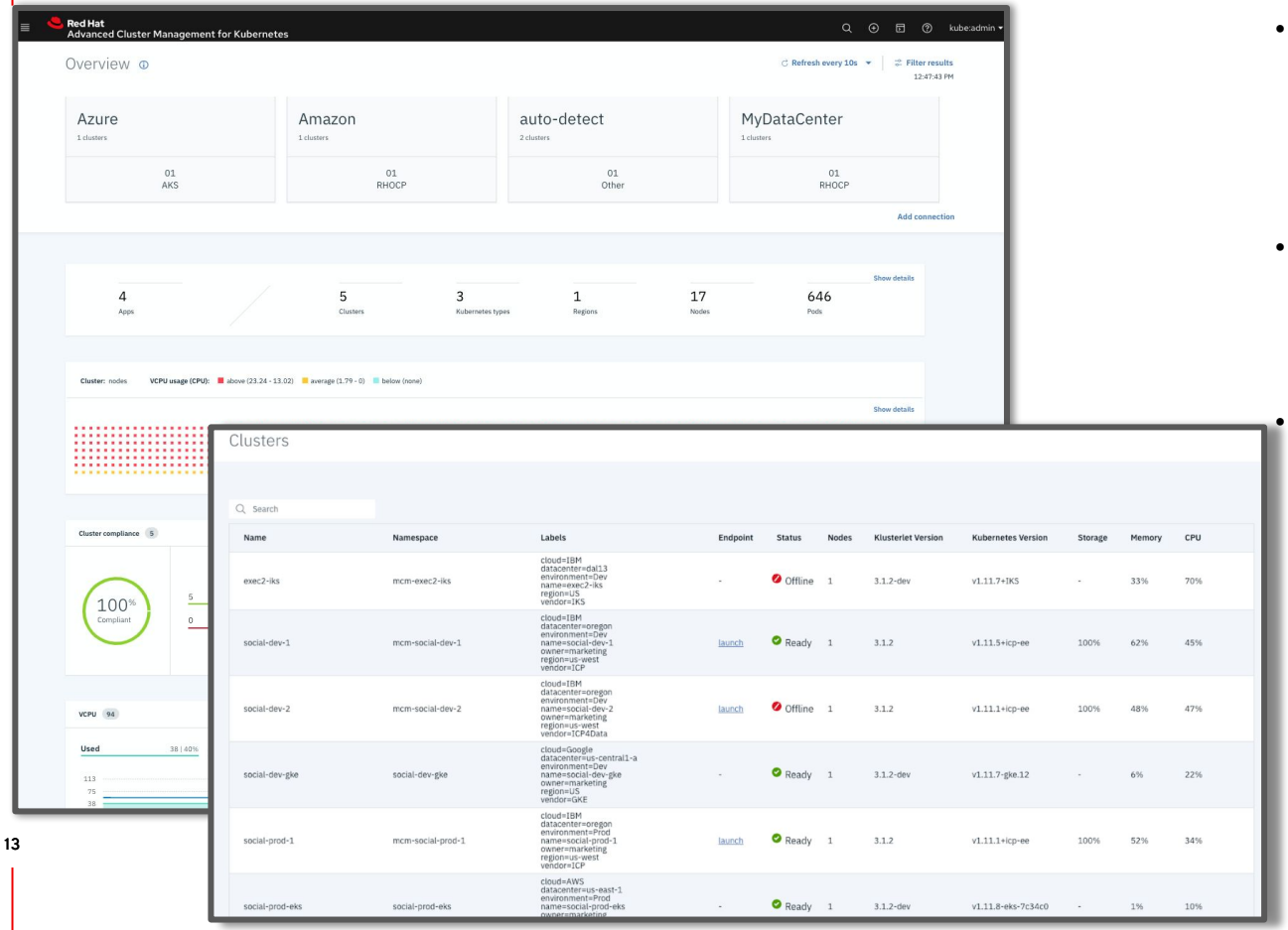
Key personas

SecOps

- How do I ensure all my clusters are compliant with my defined policies?
- How do I set consistent security policies across diverse environments and ensure enforcement?
- How do I get alerted on any configuration drift and remediate it?

Unified Multi-Cluster Management

Single Pane for all your Kubernetes Clusters



- **Centrally** create, update and delete Kubernetes clusters **across multiple** private and public clouds
- Search, find and modify **any** kubernetes resource across the **entire** domain.
- **Quickly** troubleshoot and resolve issues across your **federated** domain

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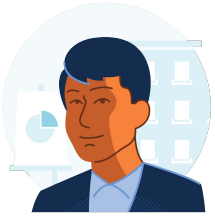
Multi-Cluster Lifecycle Management

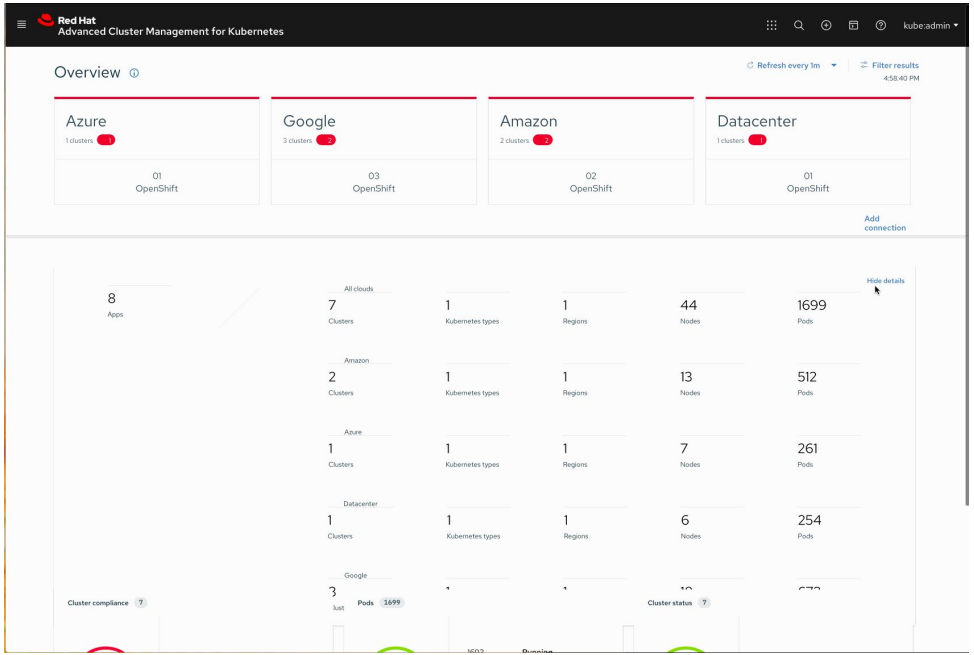
Overview



IT Operations

DevOps/SRE

- Full Management of OCP Kubernetes
  - OpenShift 3.11, 4.1.x - 4.5.x
  - Public cloud hosted: OCP
- Public cloud managed kubernetes: EKS, AKS, GKE, IKS
  - Search, find and modify kubernetes resources.
- See high level summaries across all clusters
  - Misconfiguration
  - Pod status
  - Resource capacity
- Troubleshoot and resolve issues across the federated domain
  - See in dashboard or via a list/table form
  - Table shows custom tagging
  - Regions
  - Business Purpose
  - Version



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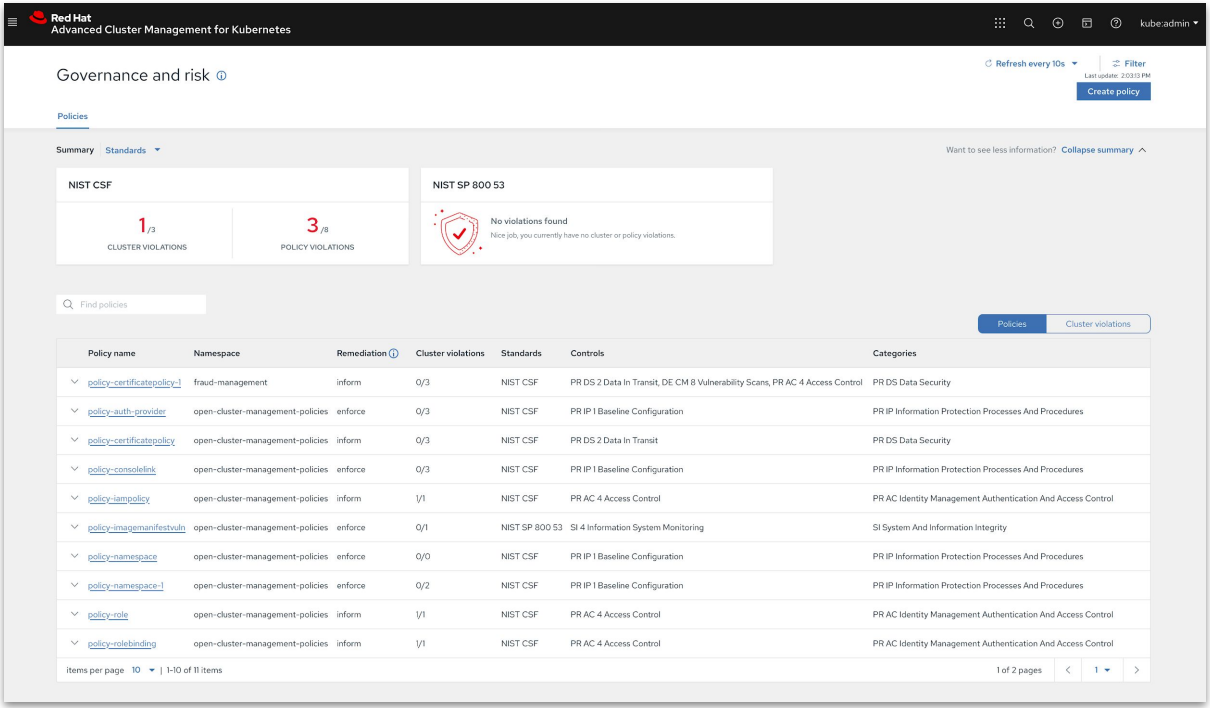
Policy based Governance, Risk and Compliance

Don't wait for your security team to tap you on the shoulder



- **Centrally** set & enforce policies for security, applications, & infrastructure
- https://github.com/open-cluster-management/policy-collection

- Quickly **visualize** detailed **auditing** on configuration of apps and clusters

- Built-in **CIS** compliance policies and audit checks

- **Immediate** visibility into your compliance posture based on **your** defined standards

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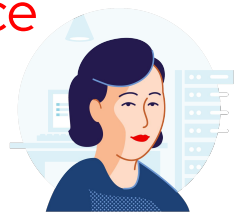
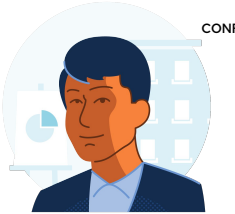
Policy Driven Governance Risk and Compliance

Architecture Overview



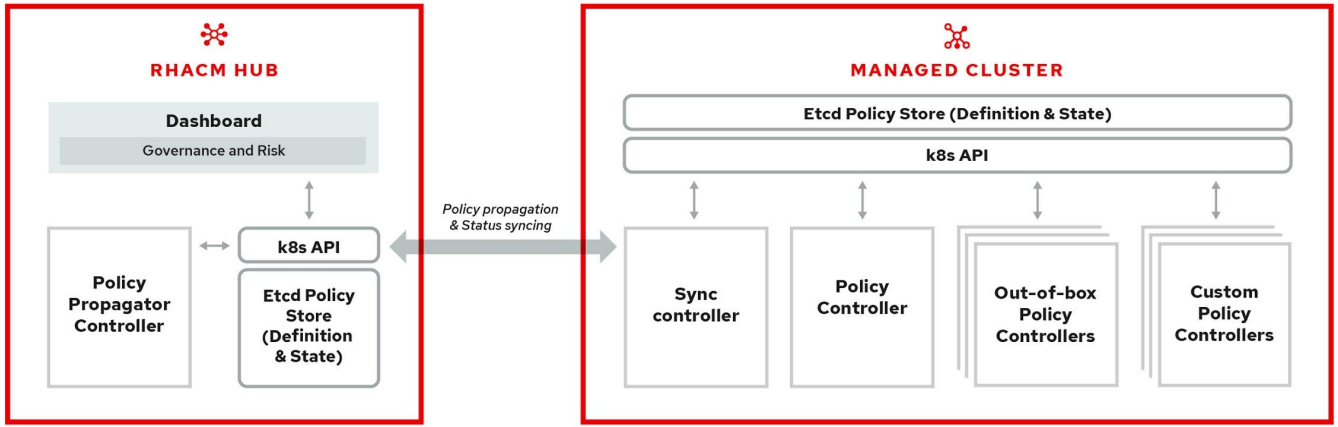
Security Ops



IT Operations

Managed Cluster and GRC Controllers

- Driven by Kubernetes CRDs and controllers
- Governance capability for managed clusters covering both security and configuration aspects.
- Out of box policies and an extensible policy framework



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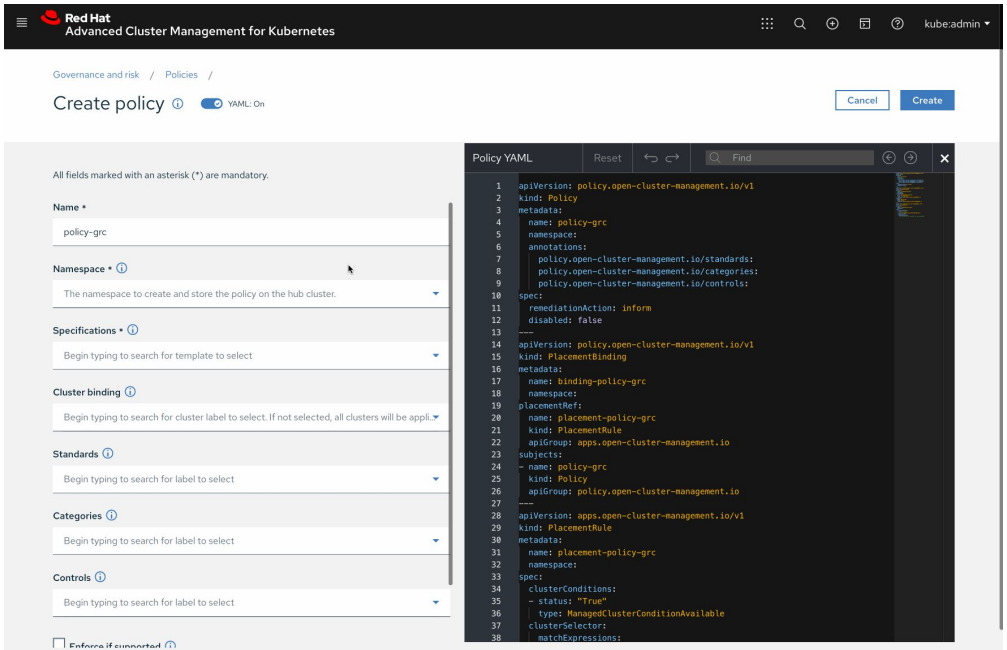
Policy based Governance, Risk and Compliance

Don’t wait for your security team to tap you on the shoulder

Security Ops

IT Operations

- Standard Policies out of the box
  - FISMA
  - HIPAA
  - NIST
  - PCI
- Leverage Different Categories to Represent more standards (if Needed)
- Use Labels to enforce policies against clusters
- Use **inform** to view policy violations
- Use **enforce** to view violations and automatically remediate



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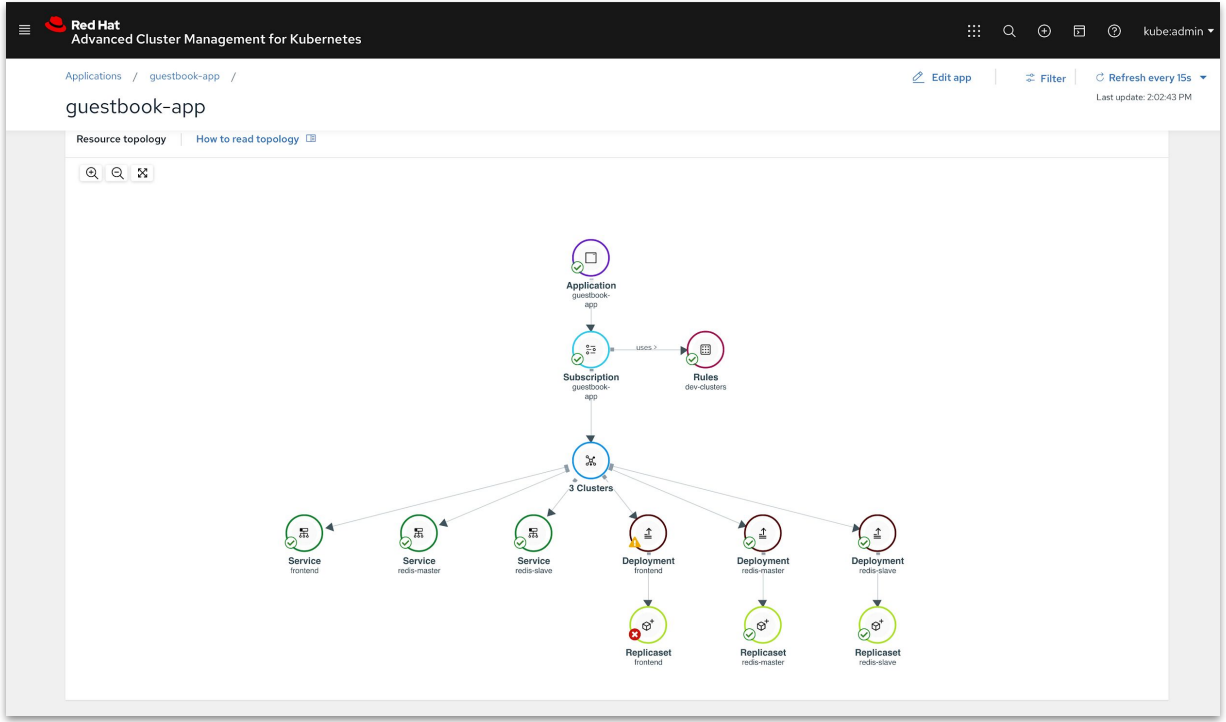
Advanced Application Lifecycle Management

Simplify your Application Lifecycle



- **Easily** Deploy Applications at **Scale**
- Deploy Applications from **Multiple** Sources
- Quickly **visualize** application relationships **across** clusters and those that **span** clusters

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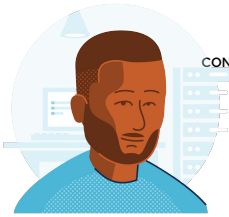
Advanced Application Lifecycle Management

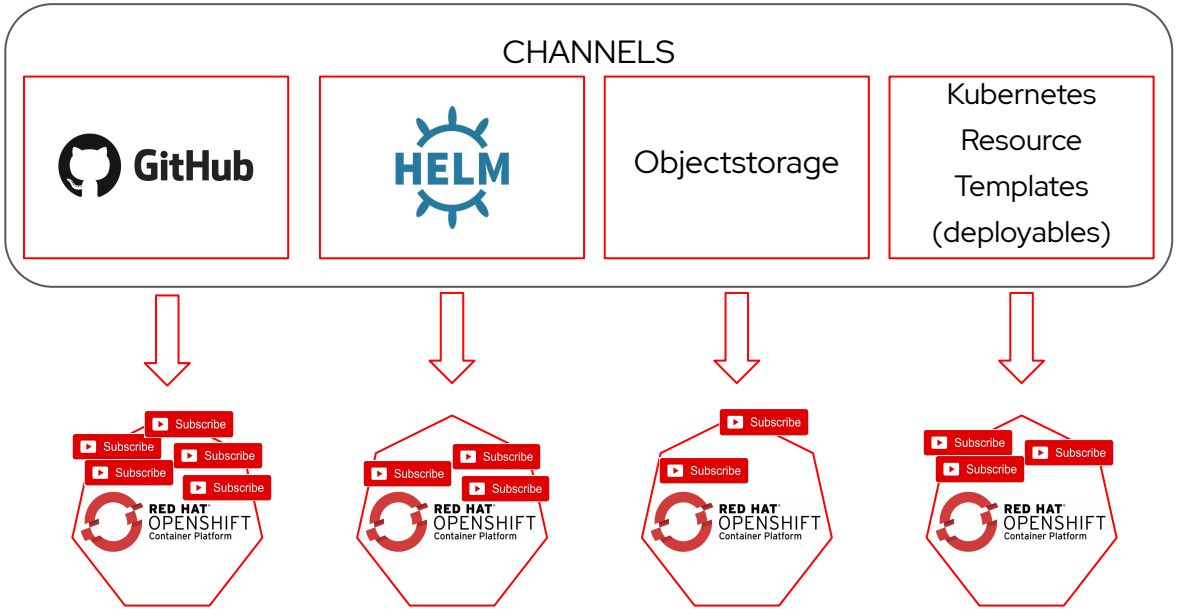
Subscriptions Bring Enterprise to Kubernetes

IT Operations



DevOps/SRE

- Extending the best of Enterprise into a desired state methodology
- Time Windows: New releases during your maintenance windows
- Rolling Updates: Control the rate and load on your growing infrastructure



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Benefits

Red Hat OpenShift and Red Hat Advanced Cluster Management for Kubernetes

Accelerate development to production

Self-service provisioning allows app dev teams to request clusters directly from a catalog removing central IT as a bottleneck.

Increase application availability

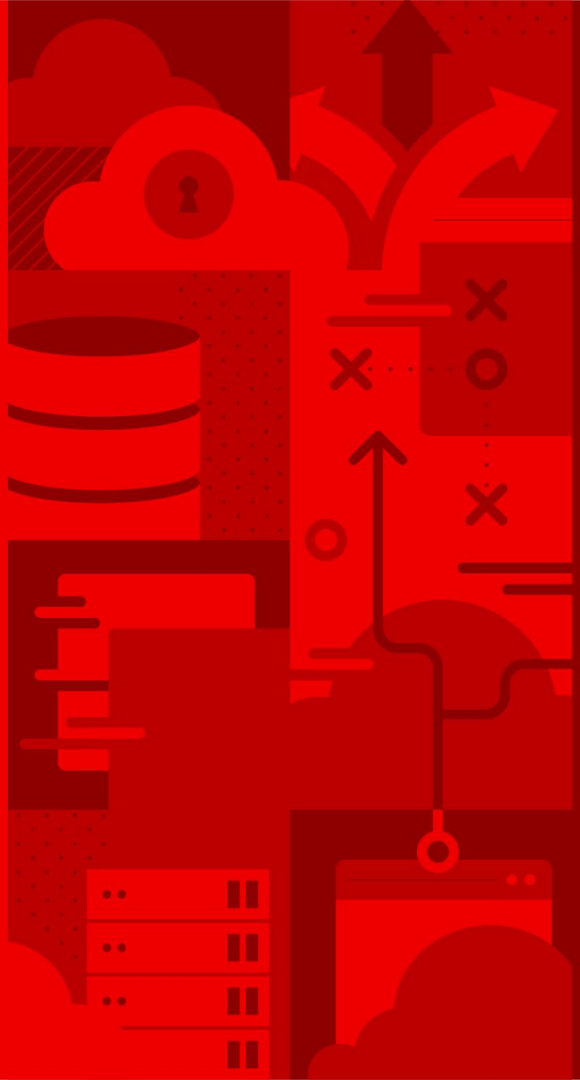
Placement rules can allow quick deployment of clusters across distributed locations for availability, capacity, and security reasons.

Reduce costs

Centralized management of clusters reduces operational cost, makes the environment consistent, and removes the need to manually manage individual clusters.

Ease compliance

Policies can be written by the security team and enforced at each cluster, allowing environments to conform to your policy.



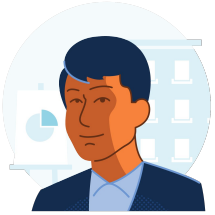
Detailed Use Cases

Multi-Cluster Lifecycle Management

 **IT Operations**	How do I get a simplified understanding of my cluster health and the impact it may have on my application availability ? How do I automate provisioning and deprovisioning of my clusters?
 **DevOps/SRE**	How can I manage the life cycle of multiple clusters regardless of where they reside (on-prem, across public clouds) using a single control plane?

Multi-Cluster Lifecycle Management

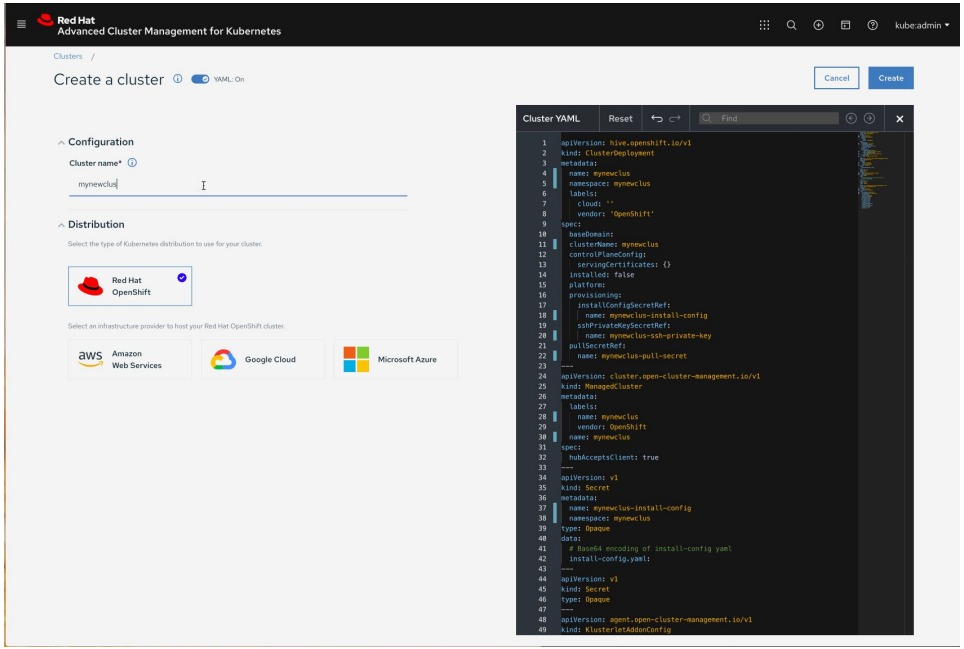
Creating & Importing Clusters



IT Operations

DevOps/SRE

- **Create**, **Upgrade** and **Destroy** OCP clusters running on **Bare-metal** as well as public cloud
- Leverage **Hive** API for OCP cluster deployment
- Wizard or YAML based create cluster flow
- Launch to an OCP Console from ACM
- Access cluster login credentials and download kubeadmin configuration



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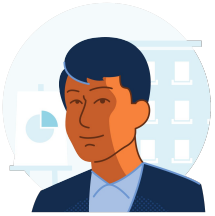
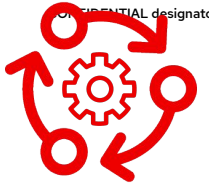
Multi-Cluster Lifecycle Management

Dynamic Search

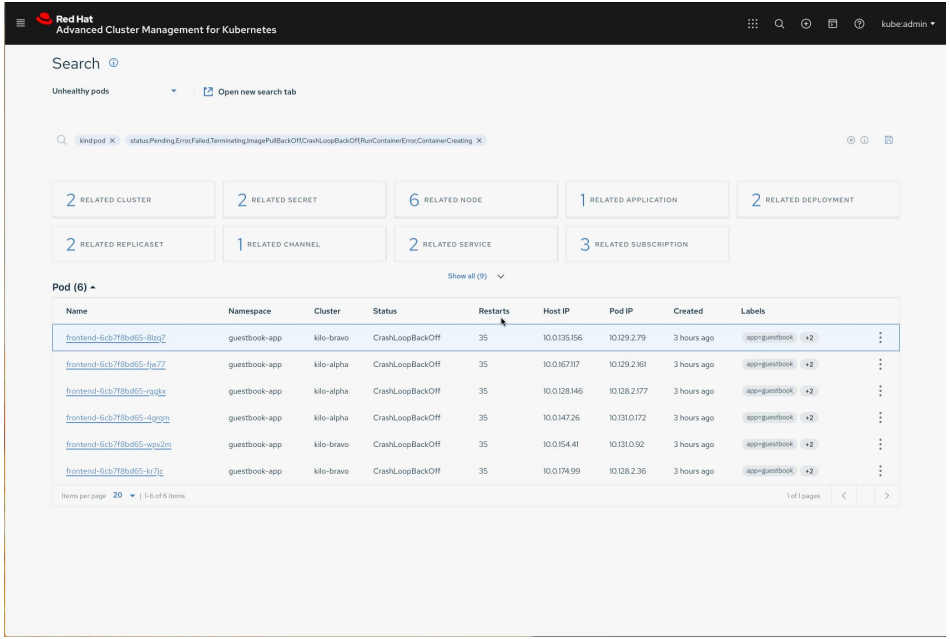


IT Operations

DevOps/SRE



- Troubleshooting across clusters via relationships
- See all **unhealthy** pods
- See related application models to those pods
- See related Persistent Volumes
- See related secrets
- See related ***any*** kube resource object category



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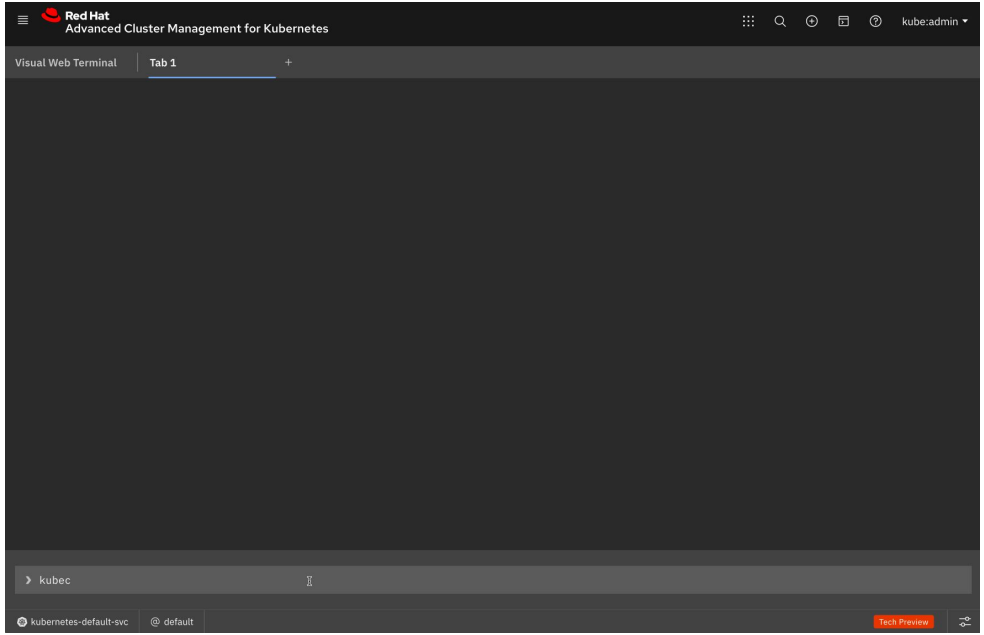
Multi-Cluster Lifecycle Management

Visual Web Terminal

IT Operations

DevOps/SRE

- Interactive terminal combines command input with visual output
- One **Terminal** for **all**
- Works with **helm**, **kubectl**, oc, **istioctl**
- Single interface for multi-cluster
- Drive ops directly from dashboards
- Bash commands allow for grep



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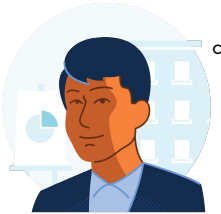
Policy Driven Governance Risk and Compliance

 Security OPS	• How do I ensure all my clusters are compliant with standard and custom policies? • How do I set consistent security policies across diverse environments and ensure enforcement? • How do I get alerted on any configuration drift and remediate it?
 IT Operations	• How do I ensure 99.9 % Uptime? • How do I drive more innovation at scale?

Policy based Governance, Risk and Compliance

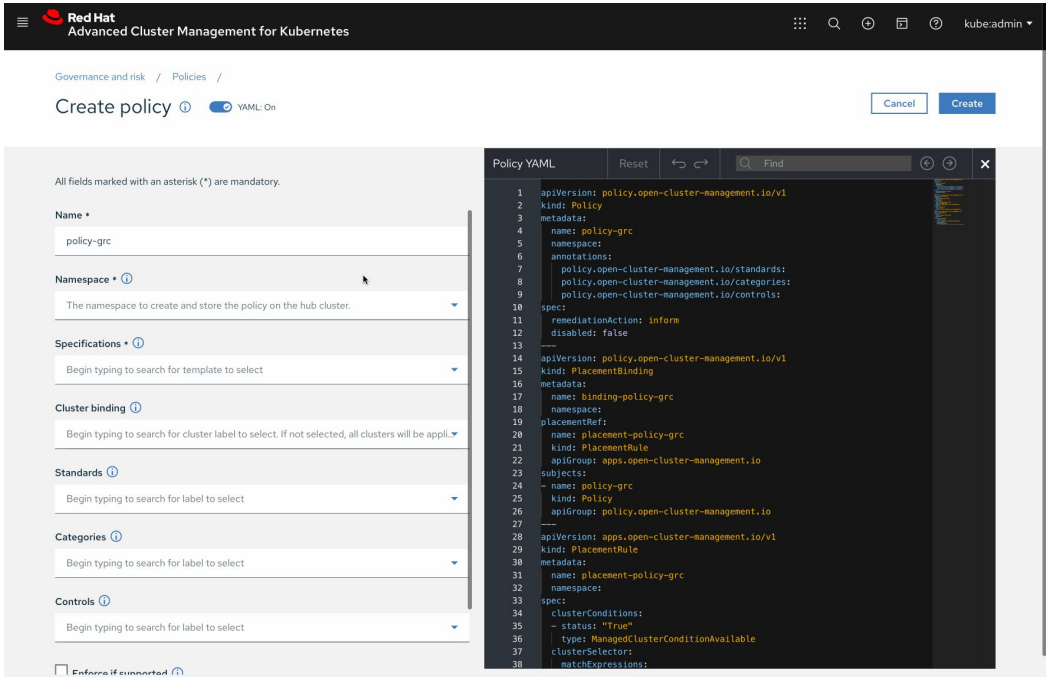
Don’t wait for your security team to tap you on the shoulder

Security Ops



IT Operations

- Set and enforce policies for security, applications, & infrastructure
- Deep visibility for auditing configuration of apps and clusters
- Unique policy capabilities around CIS compliance
- Categorize violations based on your standards for immediate visibility into your compliance posture



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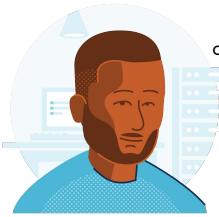
Advanced Application Lifecycle Management

 DevOps/SRE	• I want to quickly investigate application relationships with real time status, so that I can see where problems are. • With the Application Topology view, I can visually inspect application status labels and pod logs to understand if a part of the application is running or not, without having to connect to a cluster and gather any info.
 IT Operations	• I want new clusters to be deployed with a set of known configurations and required applications. • With the assignment of a label at cluster deploy time, the necessary configurations and applications will be automatically deployed and running without any additional manual effort.

Advanced Application Lifecycle Management

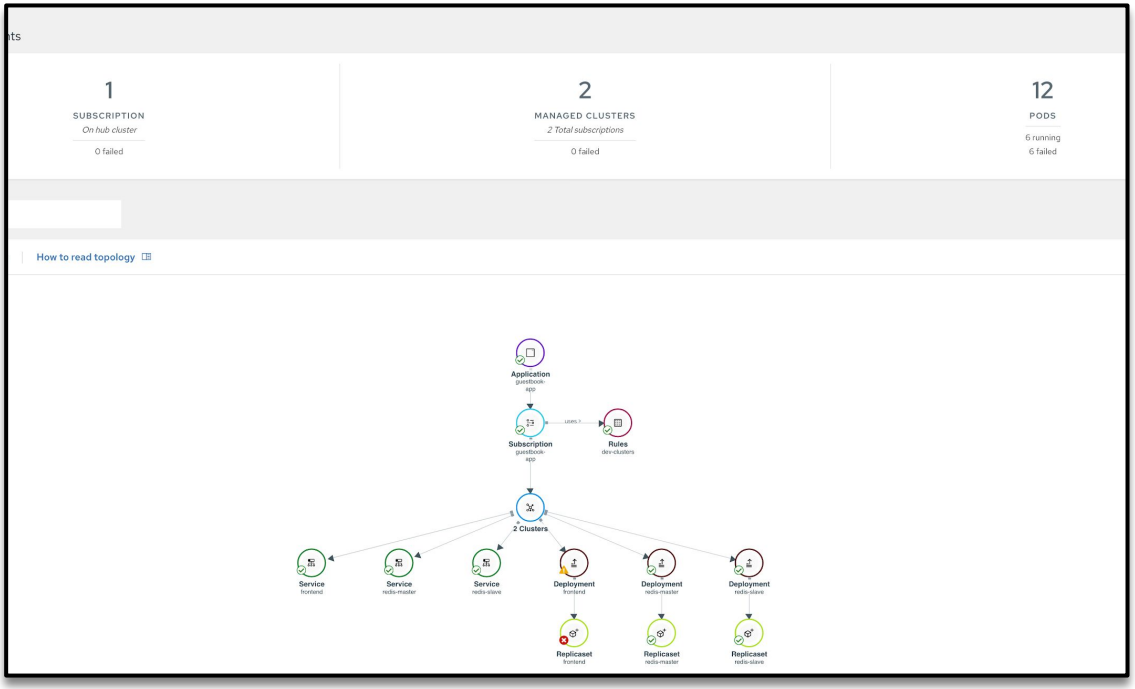
Simplify your Application Lifecycle

IT Operations



DevOps/SRE

- Deploy Applications at Scale
- Deploy Applications from Multiple Sources and Clusters
- Quickly Visualize Application Relationships
- Using the subscription & channel model, the latest application revisions are delivered to appropriate clusters, automatically.



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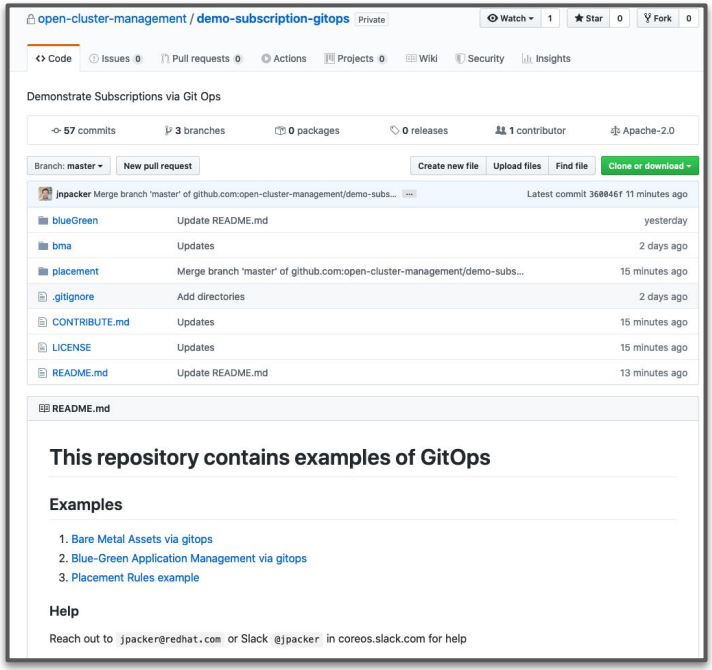
Advanced Application Lifecycle Management

GitOps as the source of truth

IT Operations

DevOps/SRE

- Create, modify & delete, just as you would any source code. Git becomes your source of truth controlling your data center.
- Have a record of who, what & when for every change precipitated in your environments
- Through code Reviews & Approvals, take full control of all changes to your data center(s)
- Restore your environment, via the Git commit history (system of record)



https://github.com/open-cluster-management/demo-subscription-gitops

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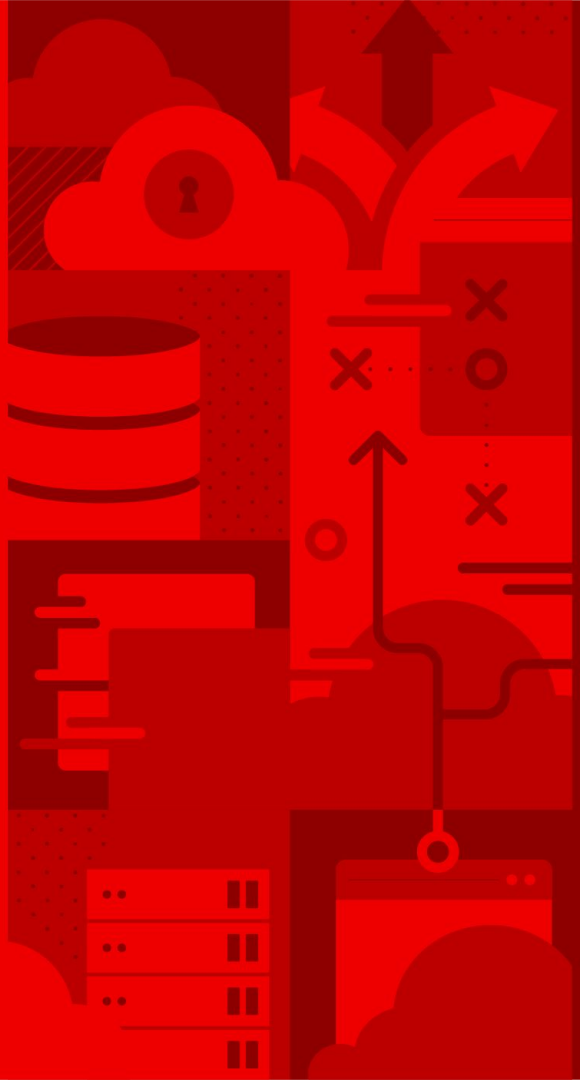

Architecture

Red Hat Advanced Cluster Management For Kubernetes

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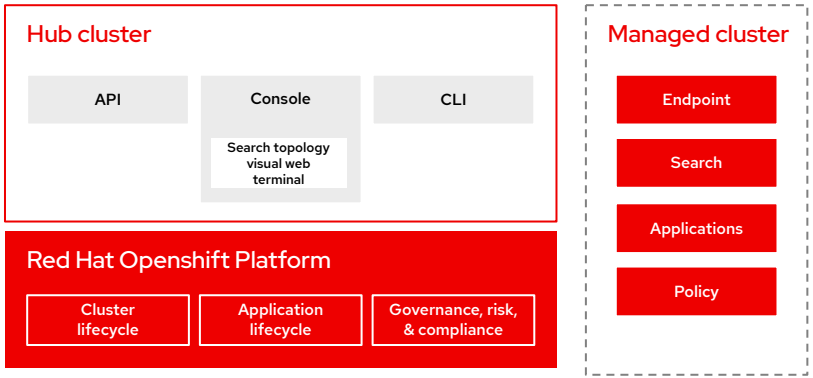
Architecture overview

IT Operations

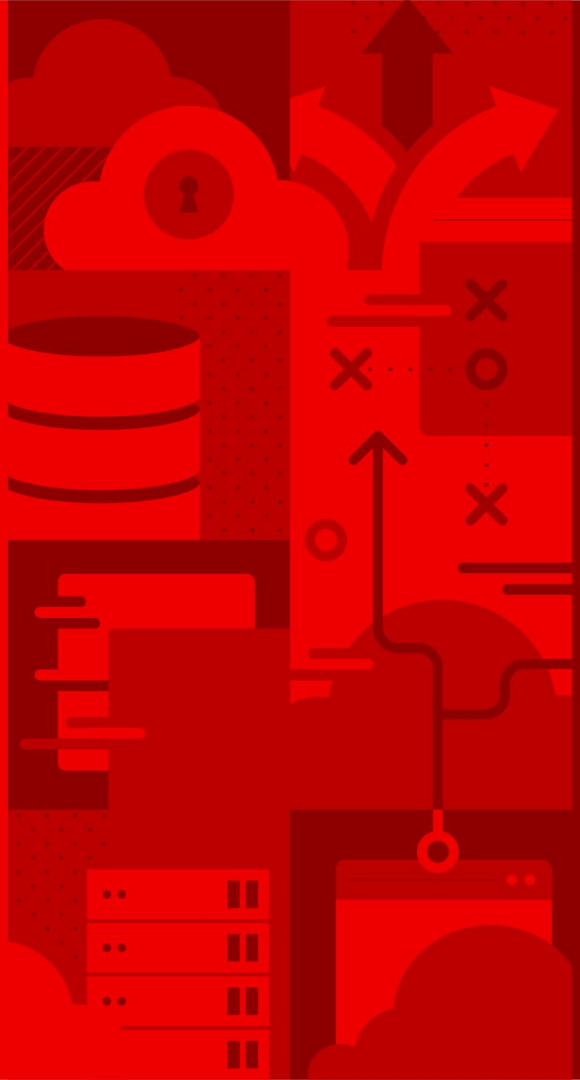


Hub architecture and components

Red Hat Advanced Cluster Management uses the multicluster-hub operator and runs in the open-cluster-management namespace

Managed cluster architecture and components

Red Hat Advanced Cluster Management managed clusters use the multicluster-endpoint operator which runs in the multicluster-endpoint namespace



Demo