Red Hat
Advanced Cluster Management
for Kubernetes

Red Hat Advanced Cluster Management for Kubernetes

Alfred Bach

Red Hat

Introducing!
Red Hat Advanced Cluster Management for Kubernetes

Robust, Proven, Award Winning

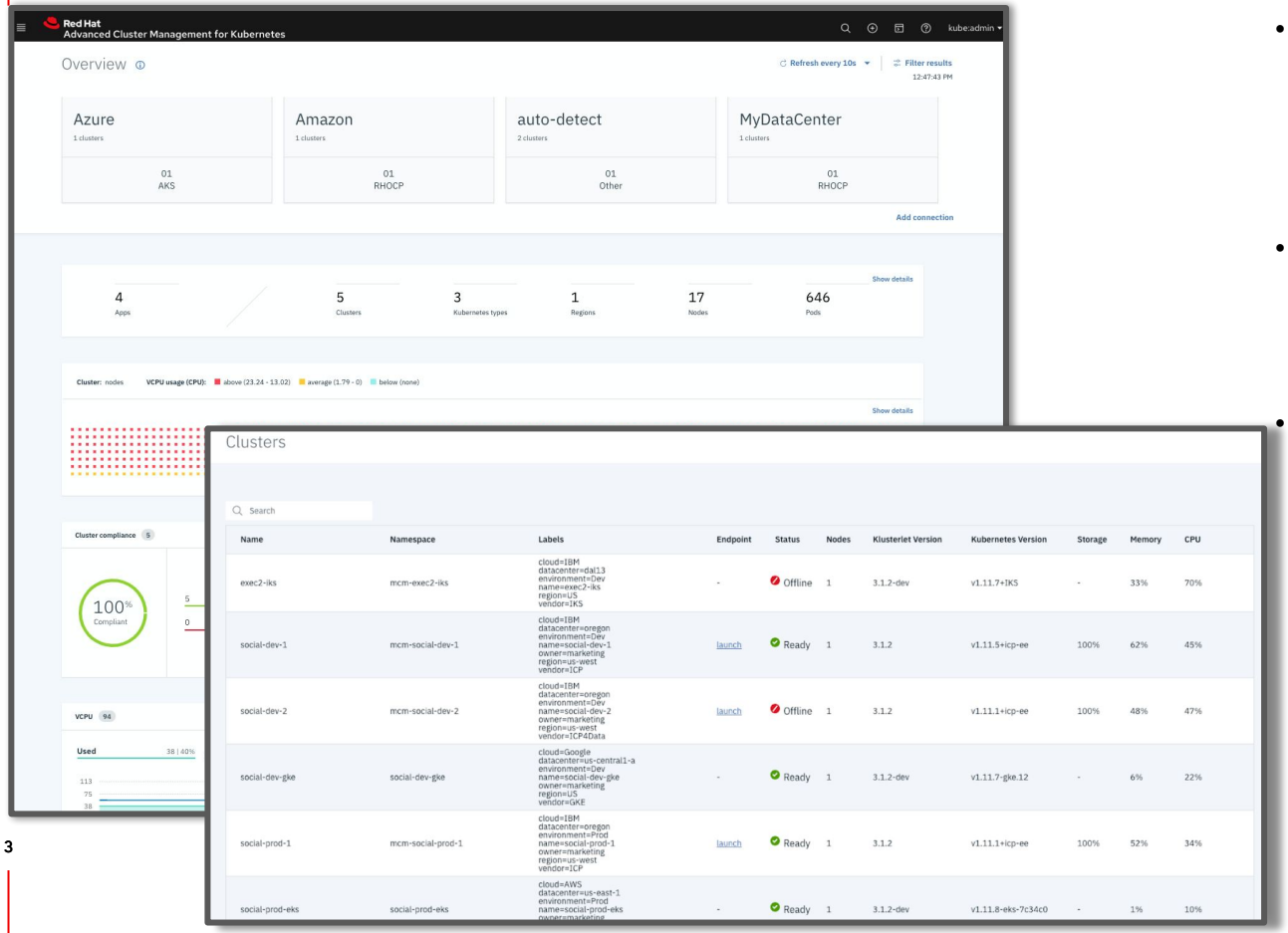
Multicluster Lifecycle Management

Policy Driven Governance, Risk and Compliance

Advanced Application Lifecycle Management

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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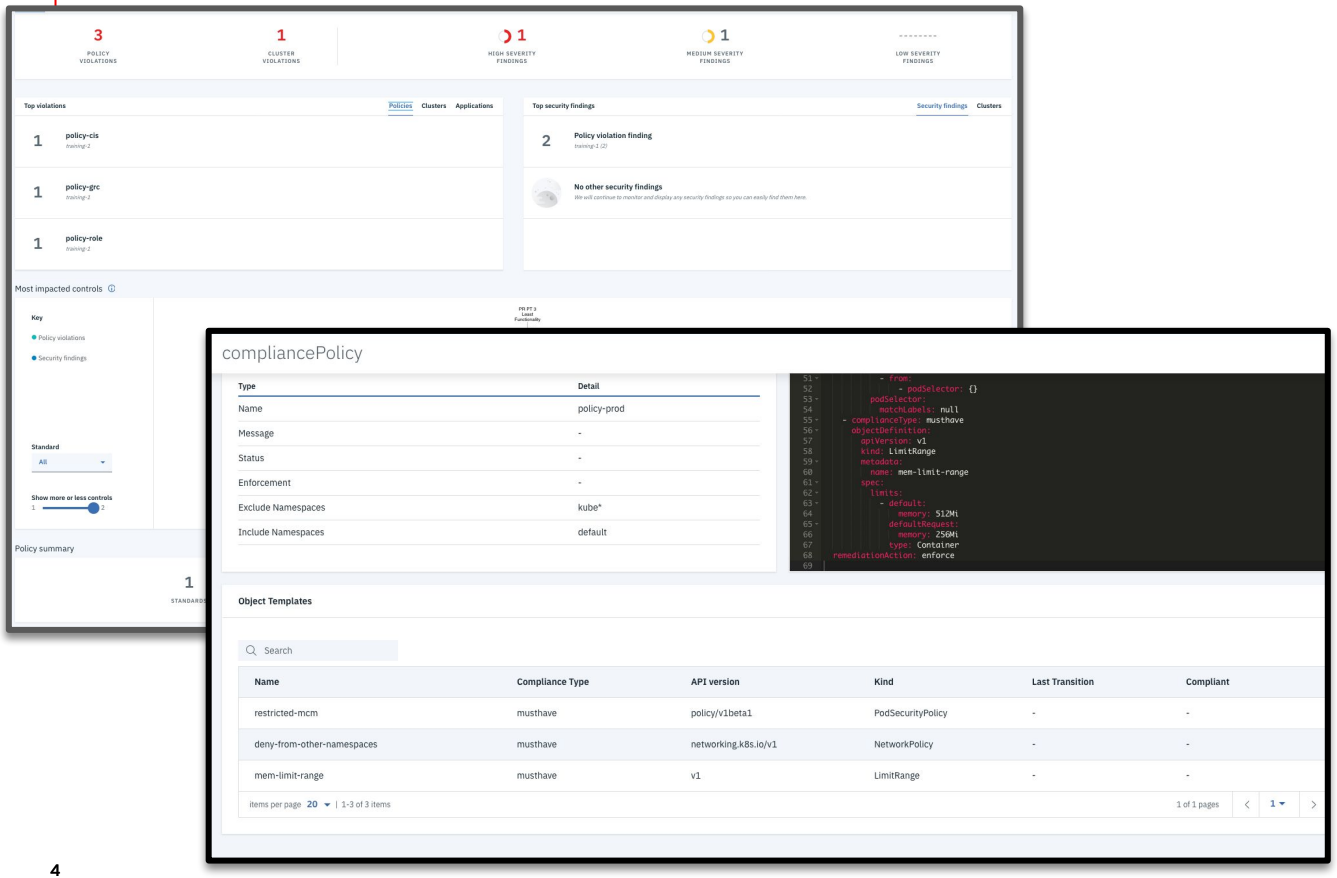
Policy based Governance, Risk and Compliance

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



- **Centrally** set & enforce policies for security, applications, & infrastructure
- 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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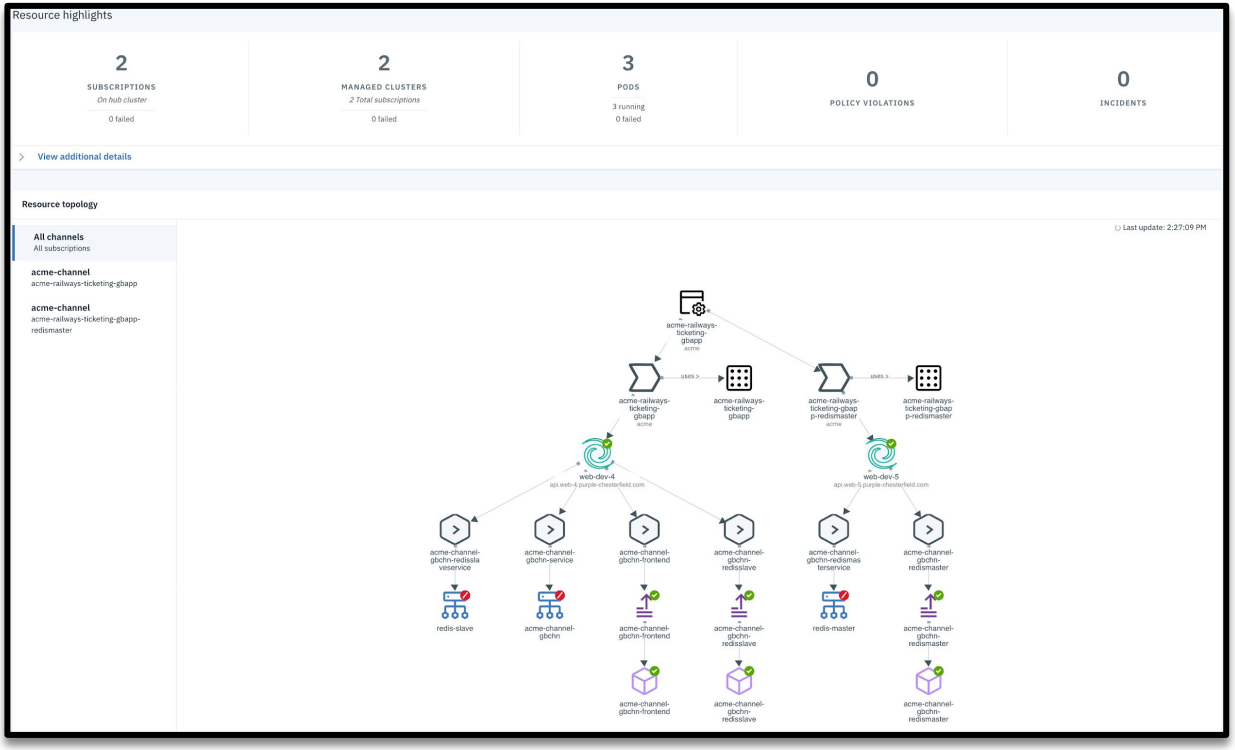
Advanced Application Lifecycle Management

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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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.

Ease Compliance

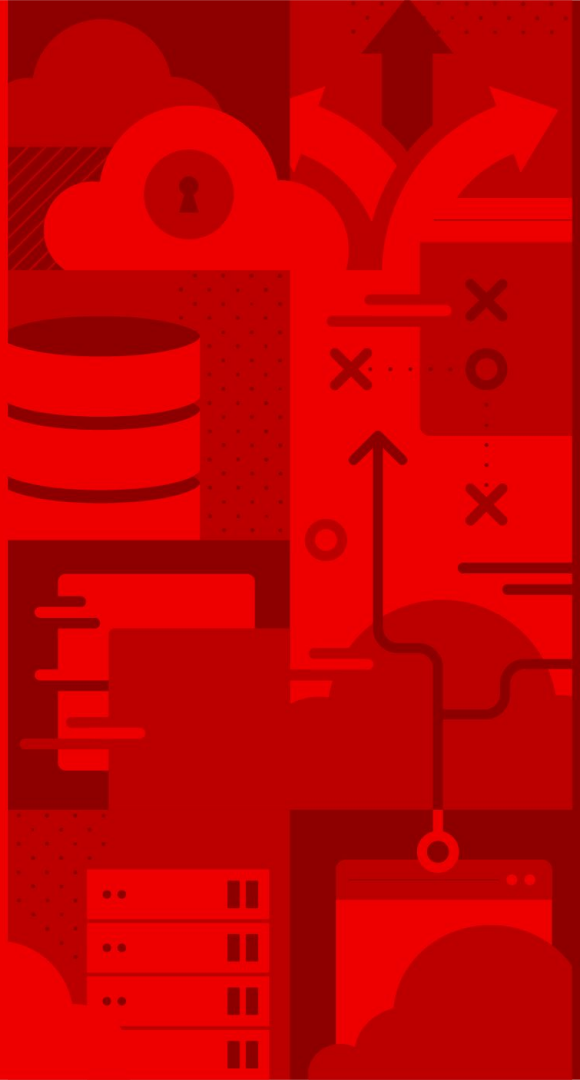
Policies can be written by the security team and enforced at each cluster, allowing environments to conform to your policy

Increase Application Availability

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

Reduced Costs

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



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?

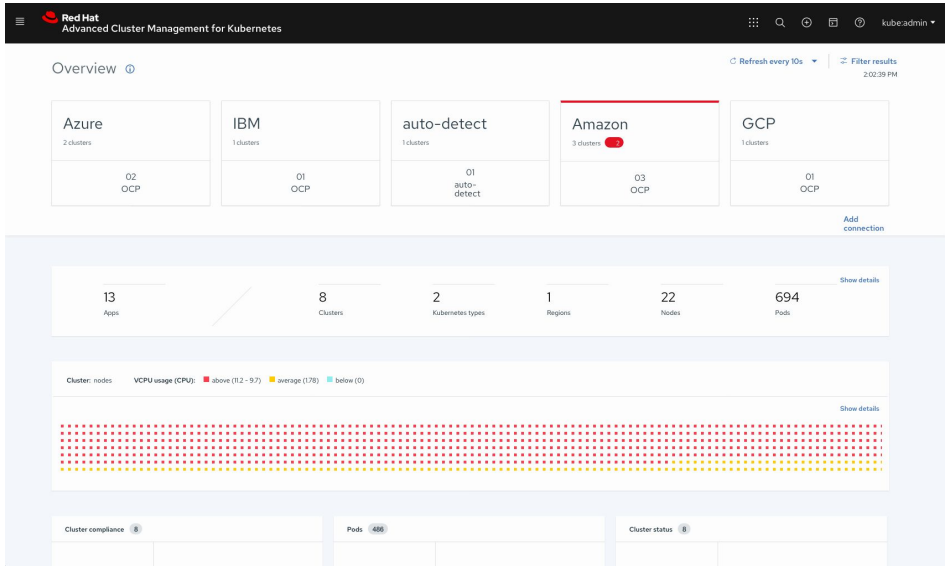
Multi-Cluster Lifecycle Management

Overview

IT Operations

DevOps/SRE

- Manage any Kubernetes compliant cluster
  - OpenShift 3.11, 4.1.x - 4.4.x
  - Public cloud hosted: OCP
  - Public cloud managed kubernetes: EKS, AKS, GKE, IKS
- Search, find and modify kubernetes resources across the management domain.
- IT Management as code with **YAML**
- 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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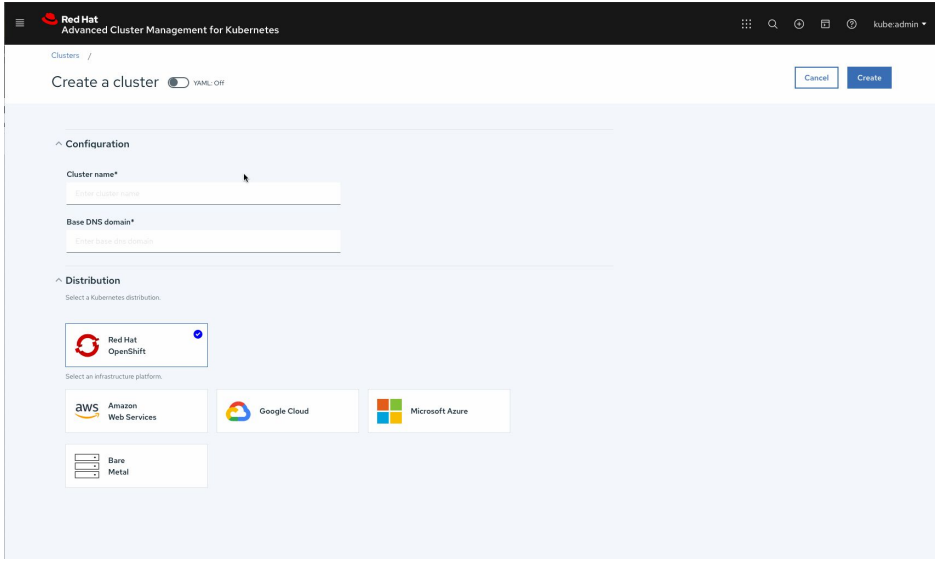
Multi-Cluster Lifecycle Management

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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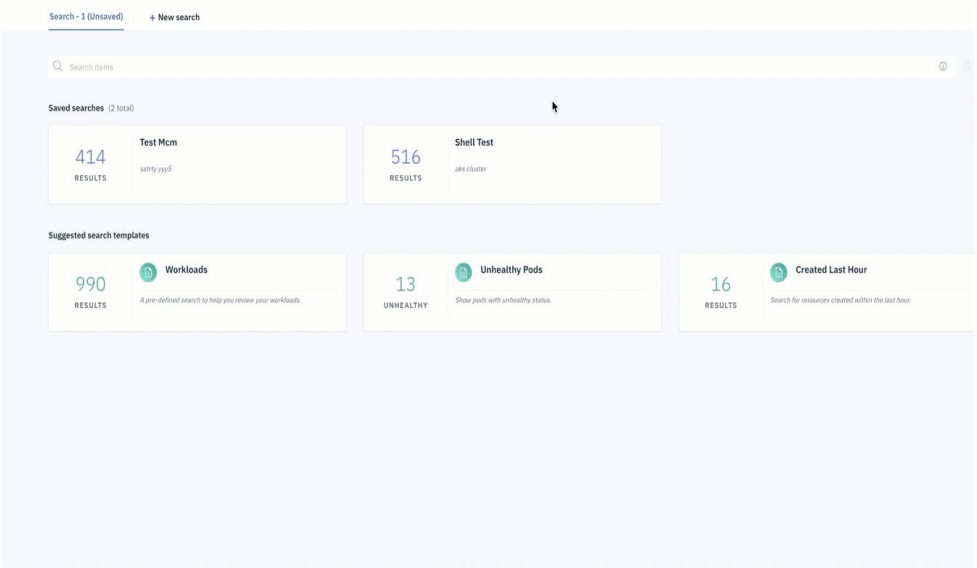
Multi-Cluster Lifecycle Management

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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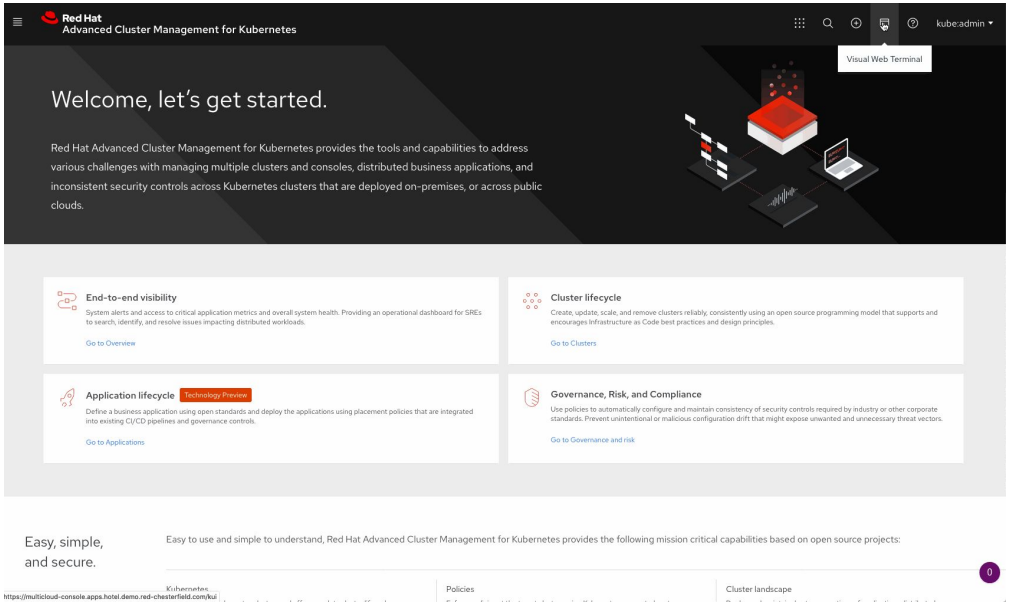
Multi-Cluster Lifecycle Management

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 Driven Governance Risk and Compliance

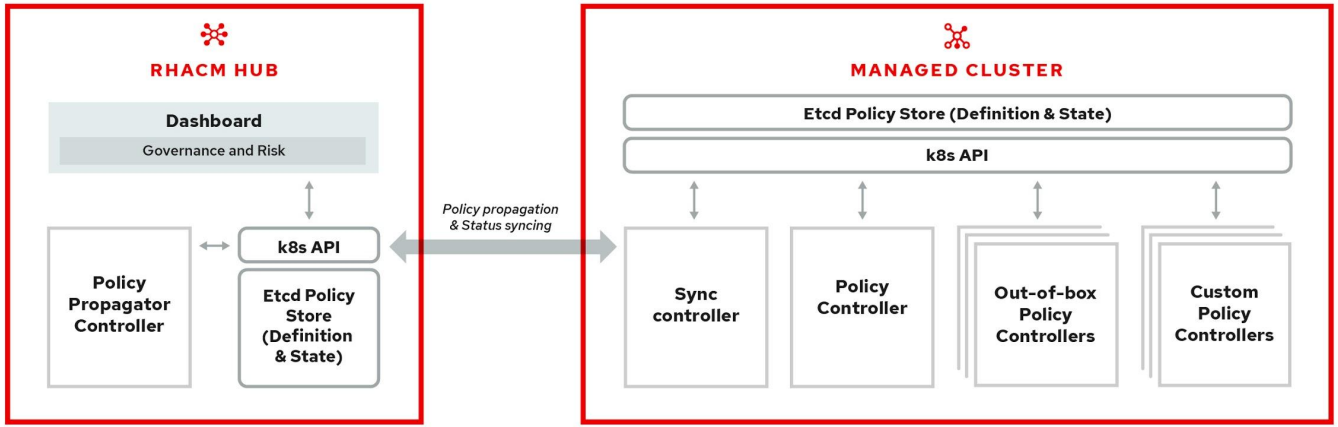
Architecture Overview

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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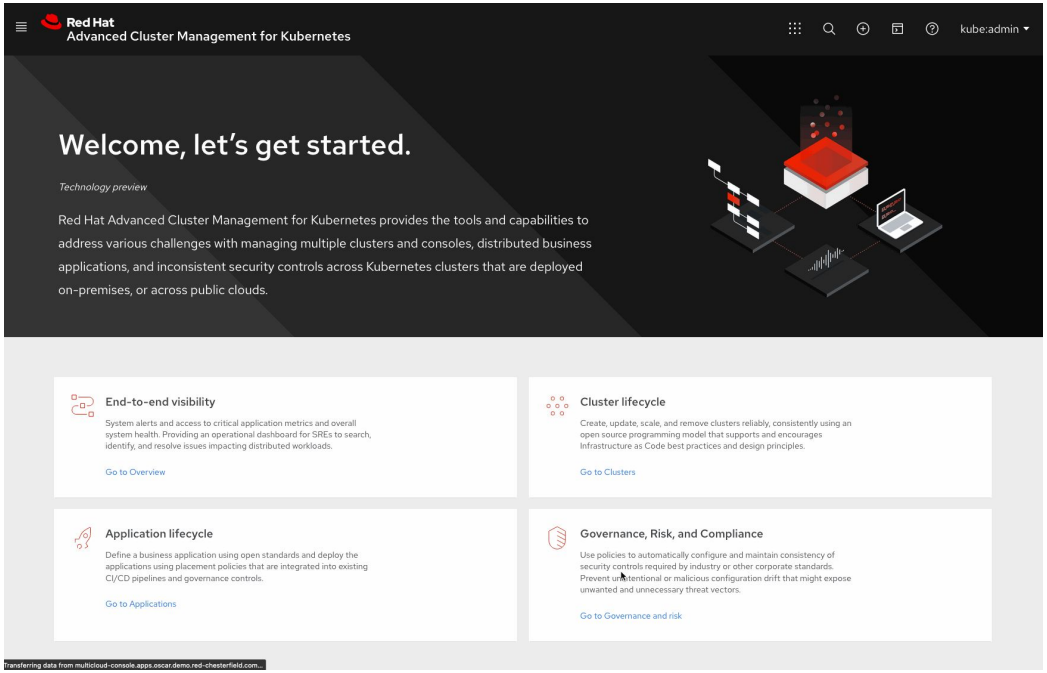
Policy based Governance, Risk and Compliance

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

Security Ops

IT Operations

- 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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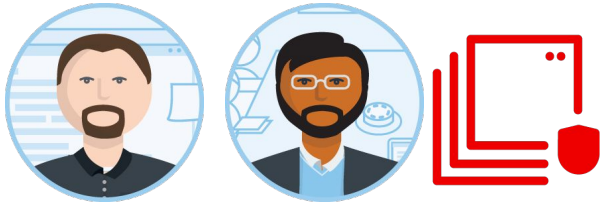
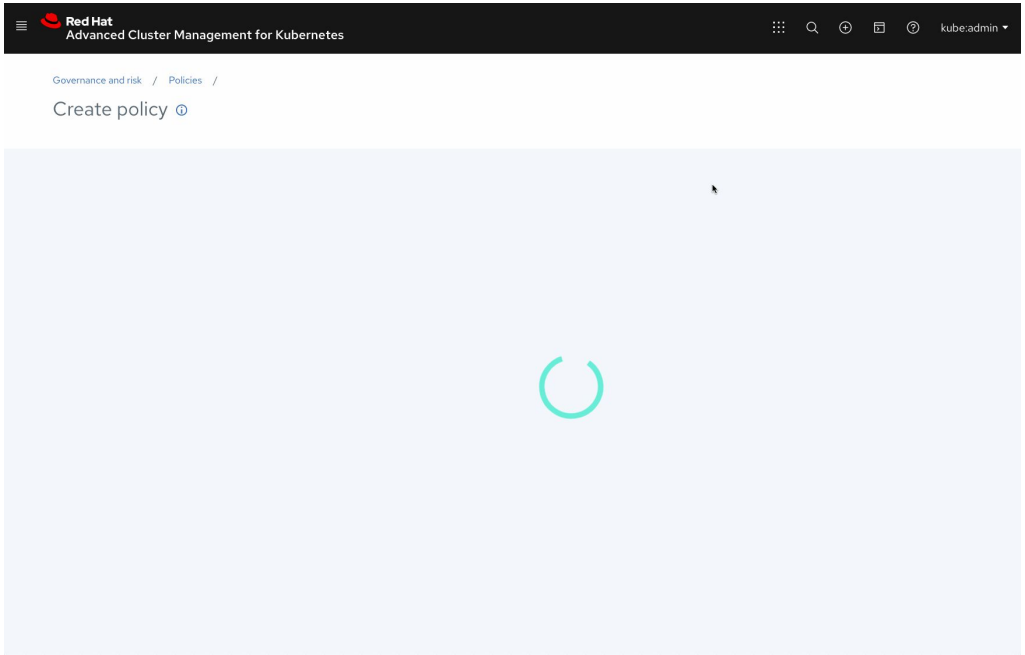


- Standard Policies out of the box
  - FISMA
  - HIPAA
  - NIST
  - PCI
- Leverage Different Categories to Represent more standards (if Needed)
- Use Labels to enforce policies against clusters
- Use **inform** to view policy violations
- Use **enforce** to view violations and automatically remediate



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Advanced Application Lifecycle Management

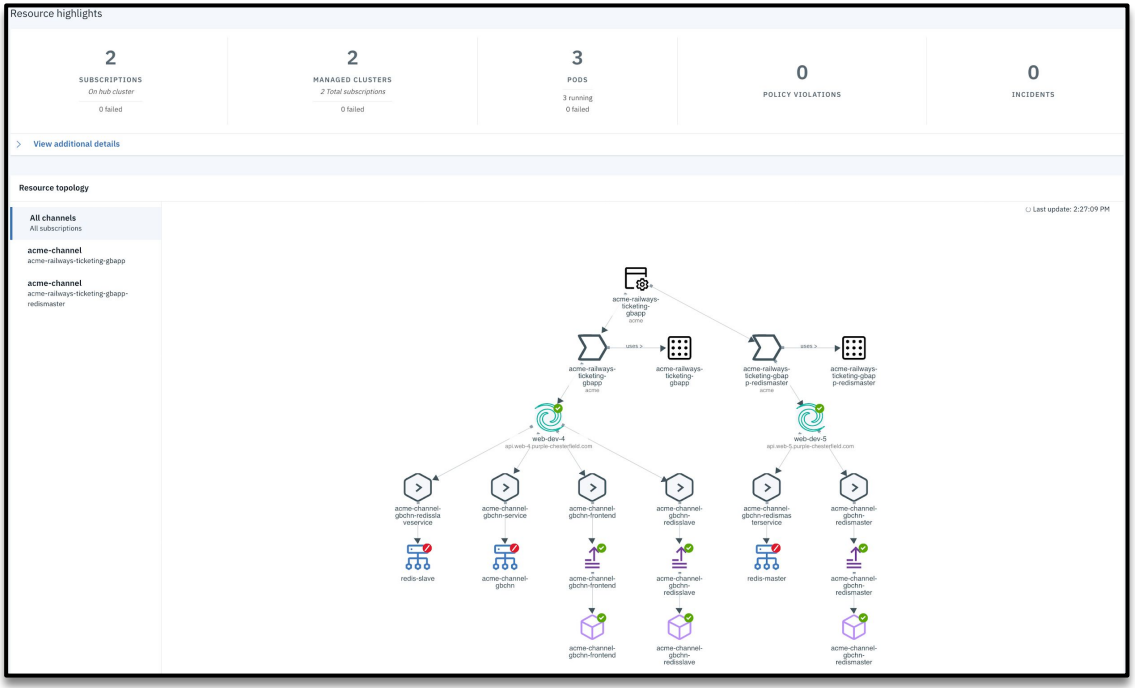
 DevOps/SRE	• I want to quickly investigate application relationships with real time status, so that I can see where problems are. • With the Application Topology view, I can visually inspect application status labels and pod logs to understand if a part of the application is running or not, without having 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

DevOps/SRE IT Operations

- 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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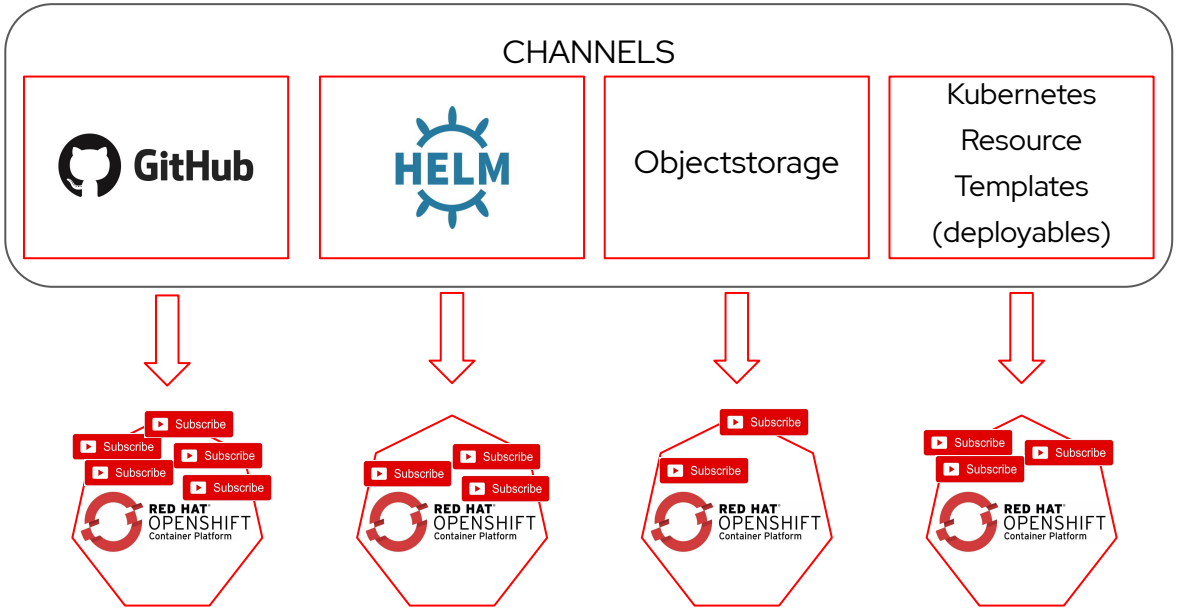
Advanced Application Lifecycle Management

Subscriptions Bring Enterprise to Kubernetes

DevOps/SRE

IT Operations

- 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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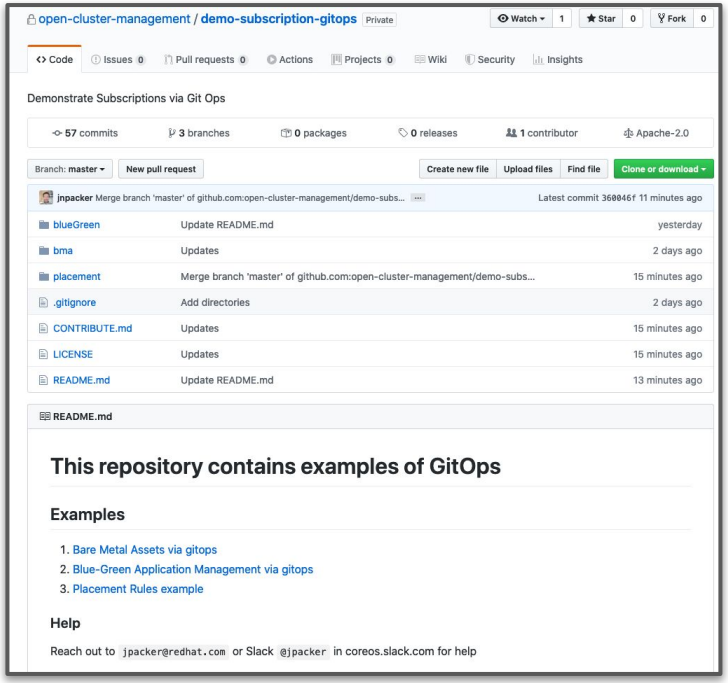
Advanced Application Lifecycle Management

GitOps as the source of truth

DevOps/SRE IT Operations

- 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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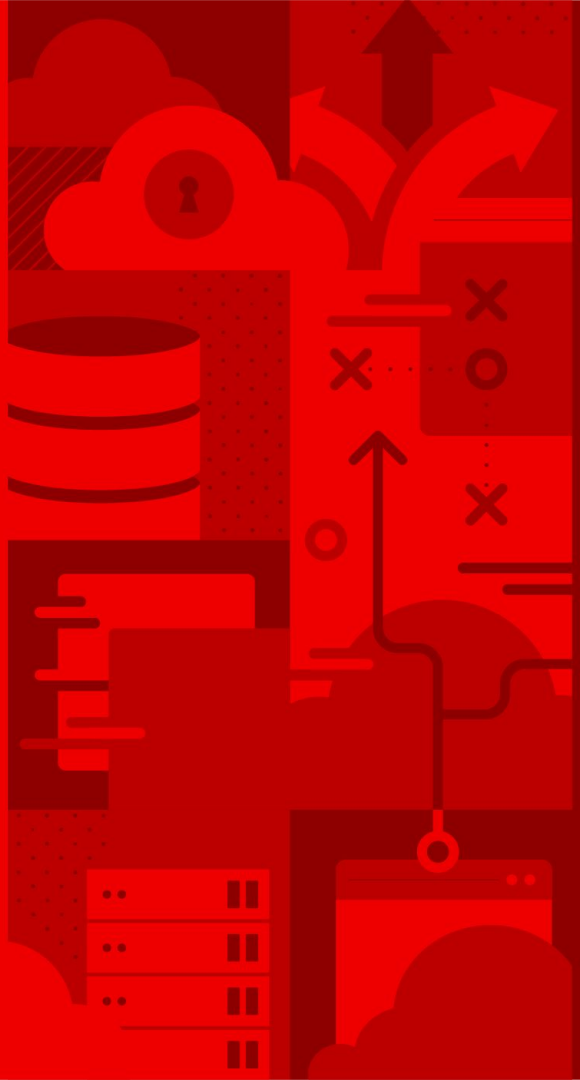


How it works with Openshift

Supporting Application Modernization

Red Hat OpenShift Container Platform

Red Hat Advanced Cluster Management for Kubernetes

Red Hat Ansible Automation Platform

cloud.redhat.com

RUN:

Cluster Services : Metrics, Chargeback, Registry, Logging

Advanced infrastructure functionality

Dev Services: Dev tools, Automated Builds, CI/CD, IDE

MANAGE:

Multicluster & Kubernetes lifecycle management

Policy-based governance, risk, & compliance

Application lifecycle management

AUTOMATE:

Config Management

Workflow orchestration

Network & security automation

Automation analytics

Certified content

Automation Services Catalog

OBSERVE:

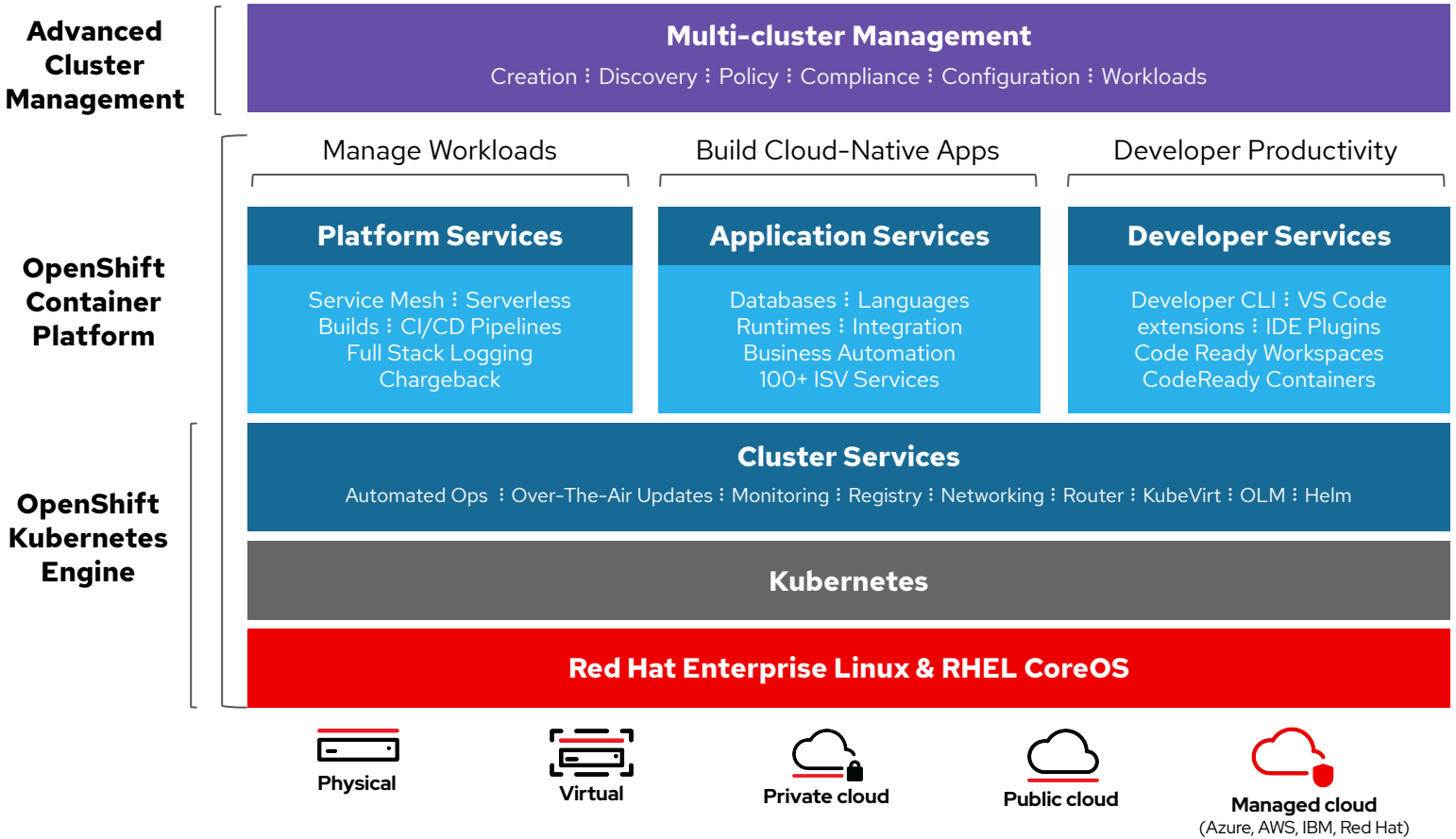
Red Hat Insights

Cost management

Connected Customer Experience

Subscription Watch

Draw Me a Picture!



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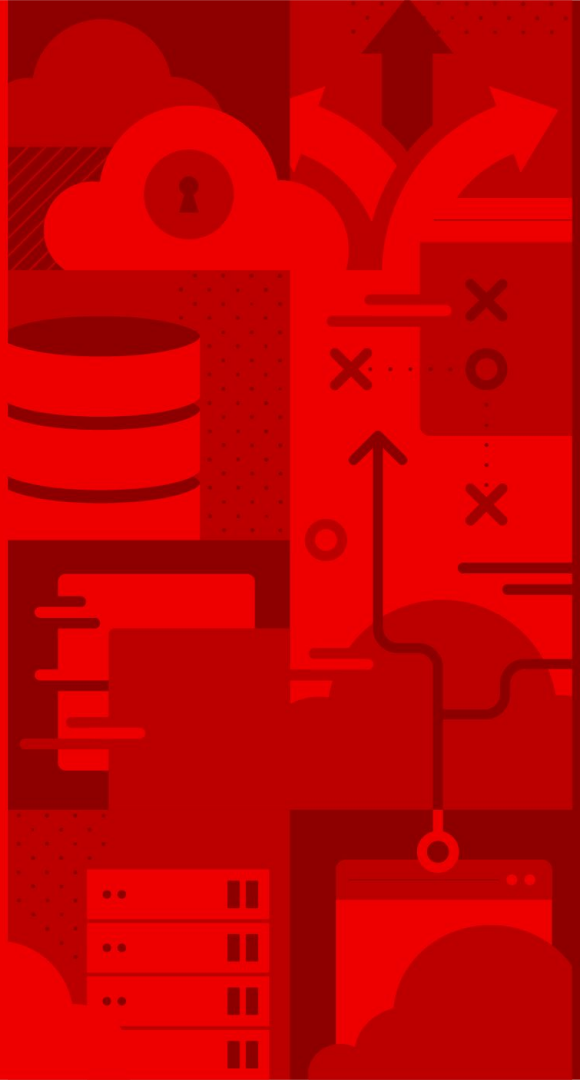

Architecture

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Architecture Overview

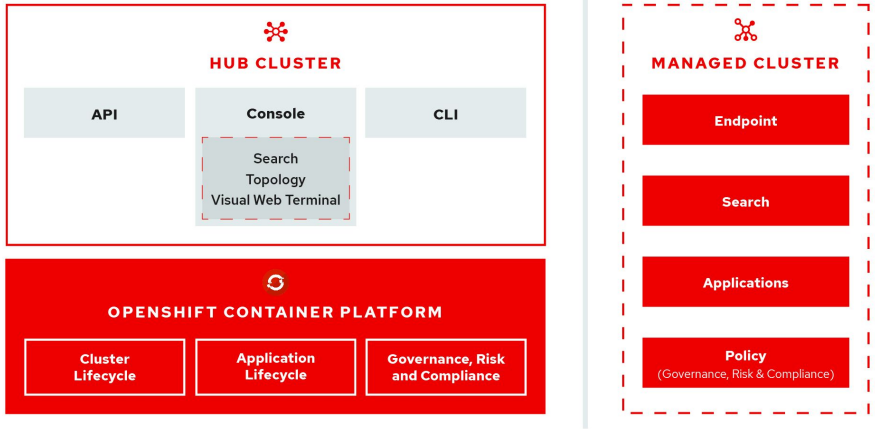
IT Operations

Hub Architecture and Components

- RHACM uses the multicluster-hub operator and runs in the open-cluster-management namespace

Managed Cluster Architecture and Components:

- RHACM managed clusters use the multi-cluster endpoint operator which runs in the multicluster-endpoint namespace



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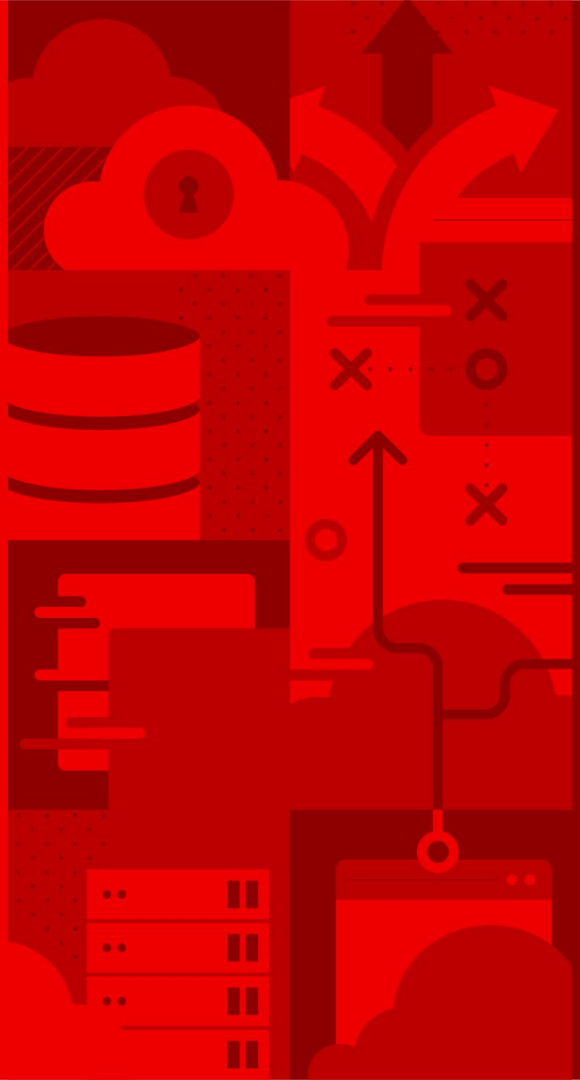

Installation

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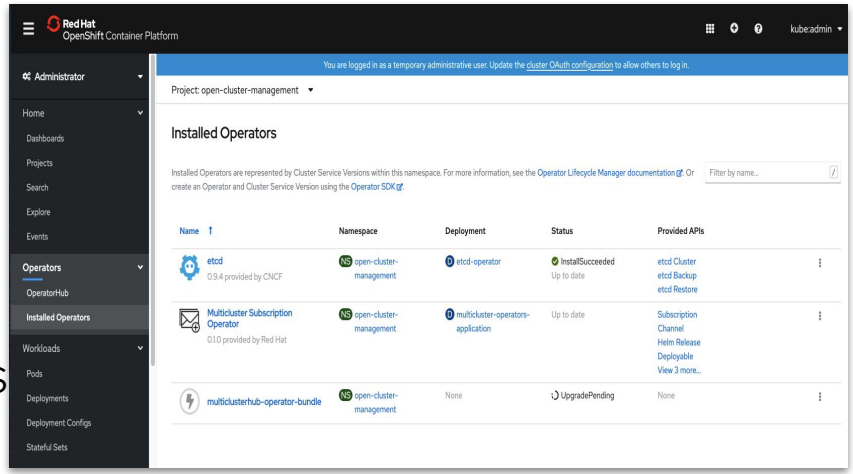
Installation and Foundation

Operator Install for Hub

Hub Cluster

- Operator based installation
- Available on OperatorHub.io
- Requires OCP 4.3.5 or OCP 4.4.x



Manage Kubernetes compliant clusters

- OpenShift 3.11, 4.1.x - 4.4.x
- Public cloud hosted: OCP
- Public cloud managed kubernetes: EKS, AKS, GKE, IKS

High Availability

- Supports OCP Availability Zone
- Limitation for Search component based on RedisGraph

Resource Requirements

- Test: 1 master, 2 workers, 4CPU and 16GB RAM
- Production: 3 masters, 16CPU and 128GB RAM
  - Production requirements vary based on number of clusters in the management domain and types of workloads being run

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Installation and Foundation

Operator Install for Managed Cluster

IT Operations

Managed Cluster

- The multicluster-endpoint operator controls the deployment of components on the managed cluster.
- List of included components:
  - Application Manager - agent for application management
  - Connection Manager - allows components to connect to the hub
  - Work Manager - executes remote actions from the hub
  - Policy Controller - agent for security GRC
  - Search Collector - agent for dynamic search
  - Service Registry - service discovery
  - IAM Policy controller - controller for IAM Policy
  - Certificate Policy Controller - controller for certificate expiration policy
  - CIS Policy Controller - controller for CIS policy

Thank you

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