



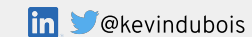
Red Hat Advanced Cluster Management for Kubernetes

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Agenda

- ▶ Why Hybrid Multi-Cloud
- ▶ Introducing Red Hat Advanced Cluster Management for Kubernetes
- ▶ Demo
- ▶ Installation
- ▶ Wrap up

Why Hybrid Multi-Cloud?

OpenShift Container Platform

Advanced Cluster Management

Multi-cluster management
Inventory : Policy : Compliance : Configuration : Workloads

OpenShift Container Platform

Manage workloads	Build cloud-native apps	Data driven insights	Developer productivity
Platform services	Application services	Data services	Developer services
Service Mesh Serverless : Builds CI/CD Pipelines Log Management : Cost Management	Languages & Runtimes API Mgmt : Integration: Messaging : Process Automation	Databases : Cache Data Ingestion & Preparation Data Analytics : AI/ML Data Mgmt & Resilience	Developer CLI : IDE Plugins & Extensions : Cloud-native IDE : Local developer sandbox

OpenShift Kubernetes Engine

Cluster services
Install : Operators : Over-the-air updates : Monitoring : Logging : Registry : Storage : Networking : Security | Ingress routing

Kubernetes

Red Hat Enterprise Linux CoreOS



Reasons for deploying clusters



Application availability



Disaster recovery



Reduced latency



Edge deployments



Address industry standards



CapEx cost reduction



Geopolitical data residency guidelines



Avoid vendor lock-in

Hybrid Multi-Cloud management is really hard

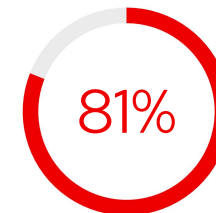
As organizations deploy more across multiple clouds, new challenges arise.

- ▶ **Difficult and error prone** to manage at scale
- ▶ **Inconsistent security controls** across environments
- ▶ **Overwhelming to verify** components, configurations, policies, and compliance

IDC Survey of 200 US-based \$1B companies actively using two or more “infrastructure clouds” for production applications



Using multiple infrastructure clouds*



Using multiple public clouds and one or more private/dedicated clouds*

Introducing Red Hat Advanced Cluster Management For Kubernetes

Key personas



IT Operations



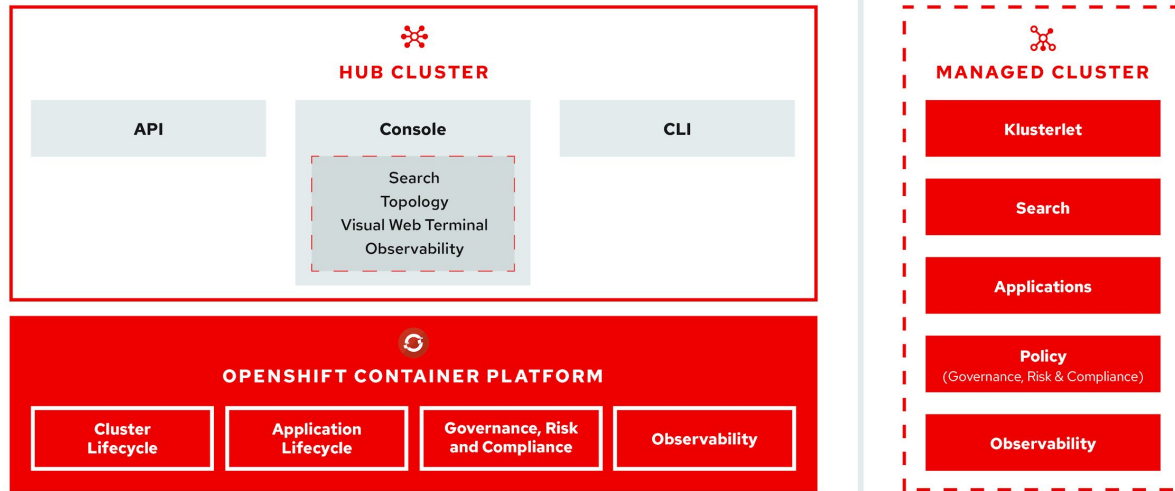
SRE/DevOps



SecOps



Architecture overview



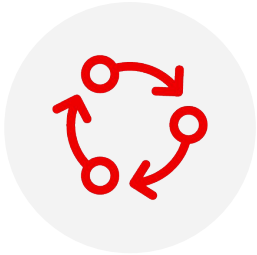
Hub architecture and components

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 open-cluster-management namespace

Robust. Proven. Award winning.



Multicluster lifecycle management



Policy driven governance, risk, and compliance



Advanced application lifecycle management



Multicluster observability for health and optimization

The screenshots illustrate the ACM interface's capabilities:

- Overview:** Displays cluster counts for different providers (Google, Amazon) and application status (e.g., 0/1 OpenShift).
- Control Plane Health:** Shows the health of the API Server and other control plane components.
- Governance and risk:** Provides a summary of policies (NIST CSF, NIST SP 800-53) and a table of violations. The table includes columns for Policy name, Namespace, Remediation, Cluster violations, Standards, Controls, and Categories.
- Applications:** Shows the lifecycle of an application like 'pacman-appl' across different clusters.
- Resource topology:** A dependency graph showing the flow from Ansiblejobs to Subscriptions, Placements, Clusters, Deployments, and Replicasets.

Unified Multi-Cluster Management

Single Pane for all your Kubernetes Clusters

Overview

Azure 4 clusters
03 OpenShift auto-detect 01

Google 1 clusters
01 GKE

OpenStack 2 clusters
02 OpenShift

Amazon 8 clusters
02 EKS 06 OpenShift

Clusters

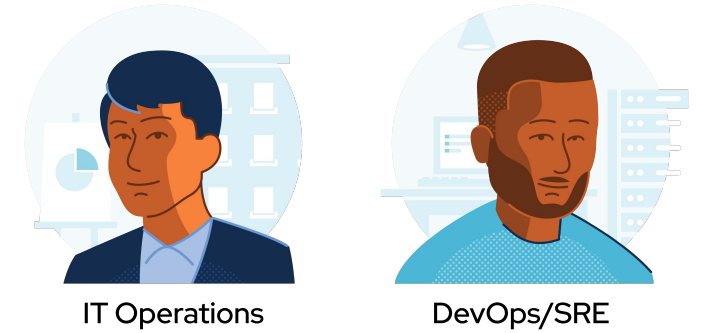
Name	Status	Distribution version	Labels	Nodes
acmcdan1	Ready	OpenShift 4.5.2(Upgrade available)	cloud=OpenStack +7	6
acmcdan2	Ready	OpenShift 4.5.2(Upgrade available)	cloud=OpenStack +5	6
estark-openshift46	Offline	OpenShift 4.6.0-rc.2	cloud=Amazon +4	6
installer-test	Ready	OpenShift 4.5.5(Upgrade available)	cloud=Amazon +5	6
local-cluster	Ready	OpenShift 4.5.1(Upgrade available)	cloud=Amazon +5	6
mynewcluster	Detaching	-	cloud=Amazon +3	-
oregon2	Ready	OpenShift 4.4.26(Upgrade available)	cloud=Amazon +4	6
sberens-azure	Offline	-	cloud=Azure +2	-
sberens-eks1	Ready	v1.15.11-eks-065dce	cloud=Amazon vendor=EKS +1	2
sberens-eks2	Ready	v1.15.11-eks-065dce	cloud=Amazon vendor=EKS +1	2
sberens-gke	Ready	v1.18.9-gke.801	cloud=Google vendor=GKE +1	3
singapore	Ready	OpenShift 4.4.17(Upgrade available)	cloud=Amazon +5	6
spoke50-azure1	Detaching	-	cloud=Azure +3	-
spoke50-azure2	Detaching	-	cloud=Azure +2	-
spoke50-azure4	Failed	-	cloud=Azure +2	-

Cluster compliance 22% Compliant

- **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

Multi-Cluster Lifecycle Management

Creating & Importing Clusters



- Full Management of OCP Kubernetes
 - Install OCP 4.4-4.6 on public cloud, bare metal or vsphere
 - Import any existing OCP 3.11 to 4.6.x
- Public cloud managed kubernetes: EKS, AKS, GKE, IKS,ROKS.
- 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 kubeadm configuration

```
1  apiVersion: hive.openshift.io/v1
2  kind: ClusterDeployment
3  metadata:
4    name: mynewclus
5    namespace: mynewclus
6  labels:
7    cloud: ''
8    vendor: 'OpenShift'
9  spec:
10   baseDomain:
11     clusterName: mynewclus
12   controlPlaneConfig:
13     servingCertificates: {}
14   installed: false
15   platform:
16     provisioning:
17       installConfigSecretRef:
18         name: mynewclus-install-config
19       sshPrivateKeySecretRef:
20         name: mynewclus-ssh-private-key
21       pullSecretRef:
22         name: mynewclus-pull-secret
23   ---
24   apiVersion: cluster.open-cluster-management.io/v1
25   kind: ManagedCluster
26   metadata:
27     labels:
28       name: mynewclus
29       vendor: OpenShift
30     name: mynewclus
31   spec:
32     hubAcceptsClient: true
33   ---
34   apiVersion: v1
35   kind: Secret
36   metadata:
37     name: mynewclus-install-config
38     namespace: mynewclus
39   type: Opaque
40   data:
41     # Base64 encoding of install-config.yaml
42     install-config.yaml:
43   ---
44   apiVersion: v1
45   kind: Secret
46   type: Opaque
47   ---
48   apiVersion: agent.open-cluster-management.io/v1
49   kind: KlusterletAddonConfig
```

Multi-Cluster Lifecycle Management

Dynamic Search

- 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



IT Operations



DevOps/SRE

Red Hat Advanced Cluster Management for Kubernetes

Search

Unhealthy pods

kind:pod X status:PendingErrorFailedTerminatingImagePullBackOffCrashLoopBackOffRunContainerErrorContainerCreating X

2 RELATED CLUSTER 2 RELATED SECRET 6 RELATED NODE 1 RELATED APPLICATION 2 RELATED DEPLOYMENT

2 RELATED REPLICASET 1 RELATED CHANNEL 2 RELATED SERVICE 3 RELATED SUBSCRIPTION

Pod (6)

Name	Namespace	Cluster	Status	Restarts	Host IP	Pod IP	Created	Labels
frontend-6cb7f8bd65-8lzq7	guestbook-app	kilo-bravo	CrashLoopBackOff	35	10.0.135.156	10.129.2.79	3 hours ago	app=guestbook +2
frontend-6cb7f8bd65-fw77	guestbook-app	kilo-alpha	CrashLoopBackOff	35	10.0.167.117	10.129.2.161	3 hours ago	app=guestbook +2
frontend-6cb7f8bd65-rqgkx	guestbook-app	kilo-alpha	CrashLoopBackOff	35	10.0.128.146	10.128.2.177	3 hours ago	app=guestbook +2
frontend-6cb7f8bd65-4grqm	guestbook-app	kilo-alpha	CrashLoopBackOff	35	10.0.147.26	10.131.0.172	3 hours ago	app=guestbook +2
frontend-6cb7f8bd65-wpv2m	guestbook-app	kilo-bravo	CrashLoopBackOff	35	10.0.154.41	10.131.0.92	3 hours ago	app=guestbook +2
frontend-6cb7f8bd65-kr7jc	guestbook-app	kilo-bravo	CrashLoopBackOff	35	10.0.174.99	10.128.2.36	3 hours ago	app=guestbook +2

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1 of 1 pages

Multi-Cluster Lifecycle Management

Visual Web Terminal

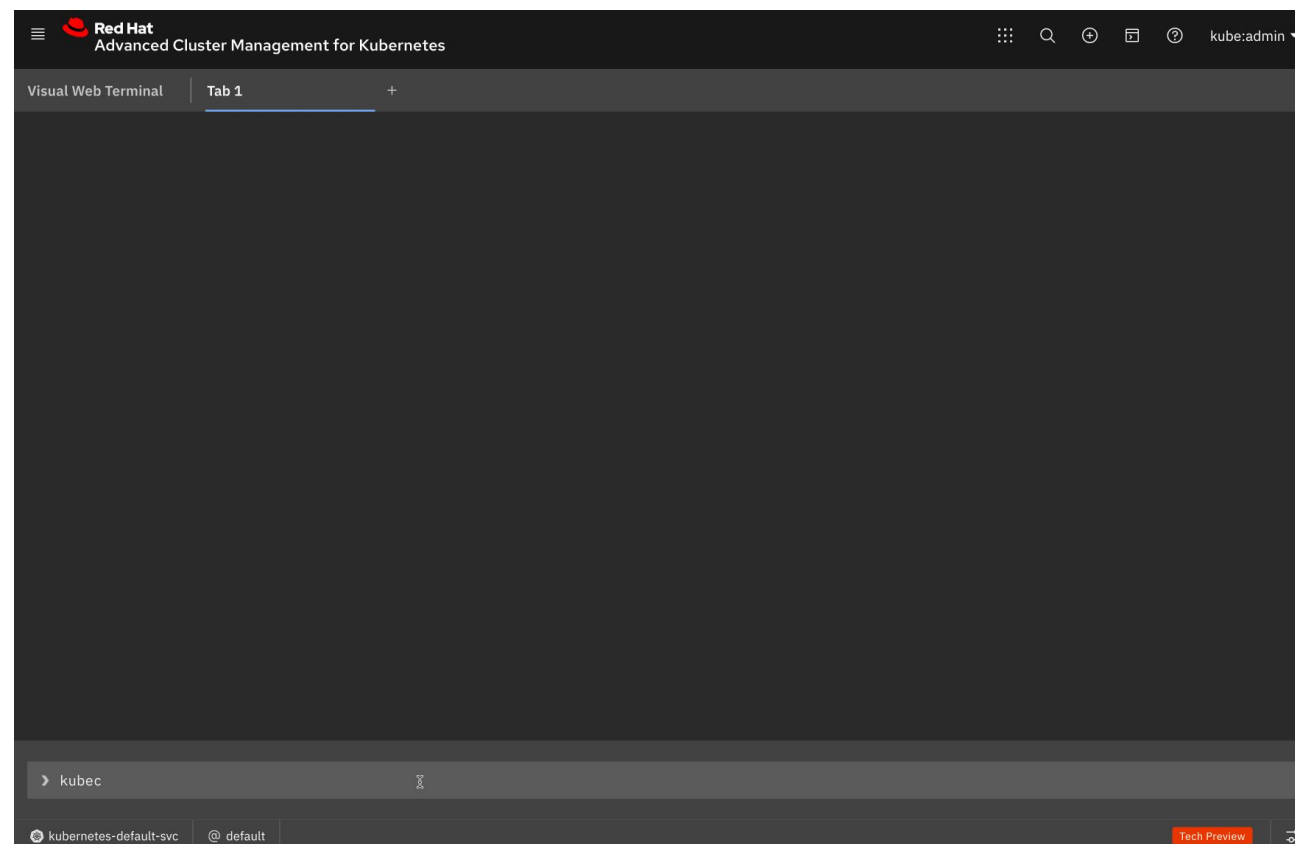
- Interactive terminal combines command input with visual output
- One **Terminal** for **all**
- Works with **helm, kubectl, oc, istioctl**
- Single interface for multi-cluster
- Drive ops directly from dashboards
- Bash commands allow for grep



IT Operations



DevOps/SRE



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 compliance
- Categorize violations based on your standards for immediate visibility into your compliance posture

The screenshot displays the Red Hat Advanced Cluster Management for Kubernetes console. The main view is the 'Create policy' form, which includes fields for Name, Namespace, Specifications, Cluster binding, Standards, Categories, and Controls. A 'Policy YAML' editor is open on the right, showing the following configuration:

```
1  apiVersion: policy.open-cluster-management.io/v1
2  kind: Policy
3  metadata:
4    name: policy-grc
5    namespace:
6    annotations:
7      policy.open-cluster-management.io/standards:
8      policy.open-cluster-management.io/categories:
9      policy.open-cluster-management.io/controls:
10 spec:
11   remediationAction: inform
12   disabled: false
13 ---
14 apiVersion: policy.open-cluster-management.io/v1
15 kind: PlacementBinding
16 metadata:
17   name: binding-policy-grc
18   namespace:
19 placementRef:
20   name: placement-policy-grc
21   kind: PlacementRule
22   apiGroup: apps.open-cluster-management.io
23 subjects:
24 - name: policy-grc
25   kind: Policy
26   apiGroup: policy.open-cluster-management.io
27 ---
28 apiVersion: apps.open-cluster-management.io/v1
29 kind: PlacementRule
30 metadata:
31   name: placement-policy-grc
32   namespace:
33 spec:
34   clusterConditions:
35   - status: "True"
36     type: ManagedClusterConditionAvailable
37   clusterSelector:
38     matchExpressions:
```


Policy based Governance, Risk and Compliance

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

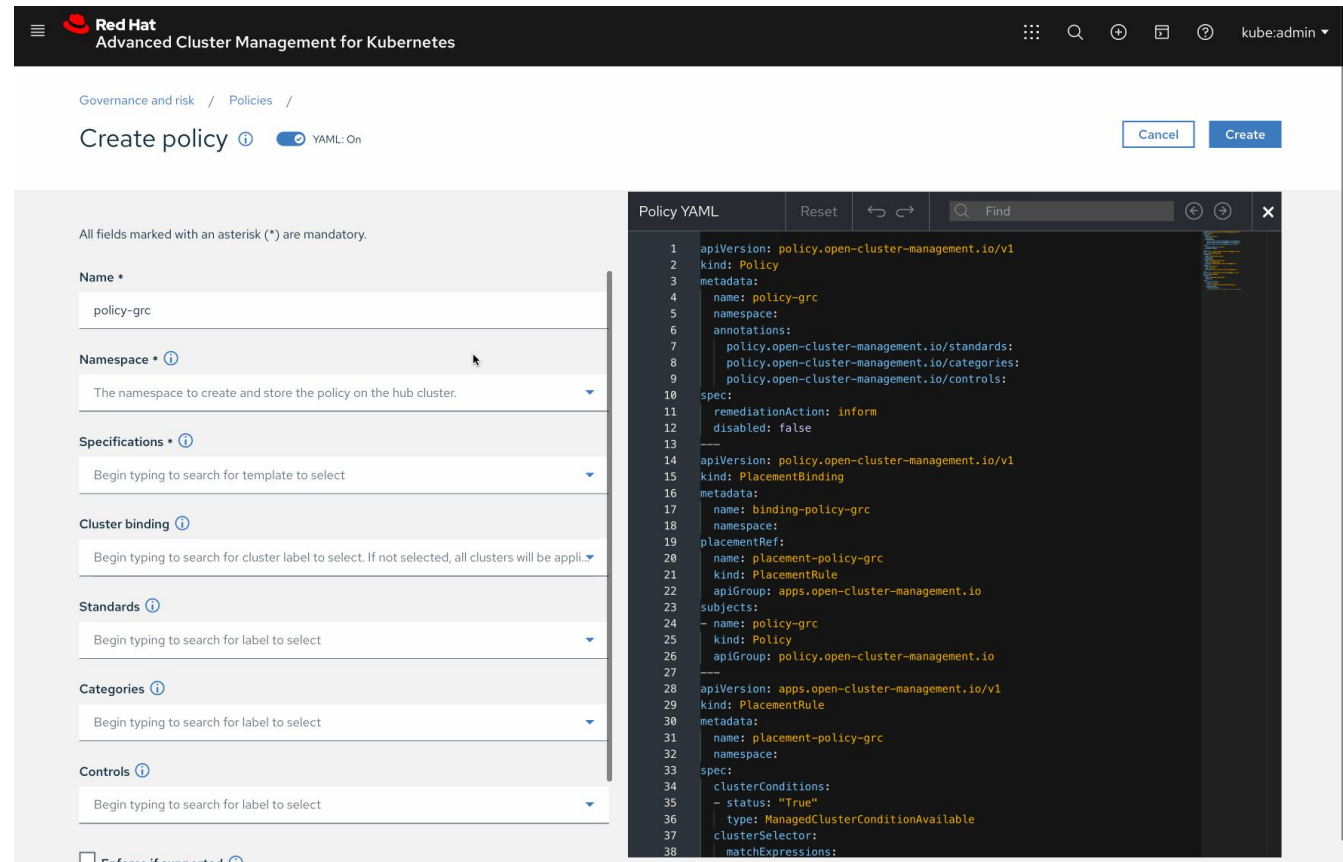


Security Ops



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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```
1 apiVersion: policy.open-cluster-management.io/v1
2 kind: Policy
3 metadata:
4   name: policy-grc
5   namespace:
6   annotations:
7     policy.open-cluster-management.io/standards:
8     policy.open-cluster-management.io/categories:
9     policy.open-cluster-management.io/controls:
10 spec:
11   remediationAction: inform
12   disabled: false
13 ---
14 apiVersion: policy.open-cluster-management.io/v1
15 kind: PlacementBinding
16 metadata:
17   name: binding-policy-grc
18   namespace:
19 placementRef:
20   name: placement-policy-grc
21   kind: PlacementRule
22 apiGroup: apps.open-cluster-management.io
23 subjects:
24 - name: policy-grc
25   kind: Policy
26   apiGroup: policy.open-cluster-management.io
27 ---
28 apiVersion: apps.open-cluster-management.io/v1
29 kind: PlacementRule
30 metadata:
31   name: placement-policy-grc
32   namespace:
33 spec:
34   clusterConditions:
35   - status: "True"
36     type: ManagedClusterConditionAvailable
37   clusterSelector:
38     matchExpressions:
```

Advanced Application Lifecycle Management

Simplify your Application Lifecycle

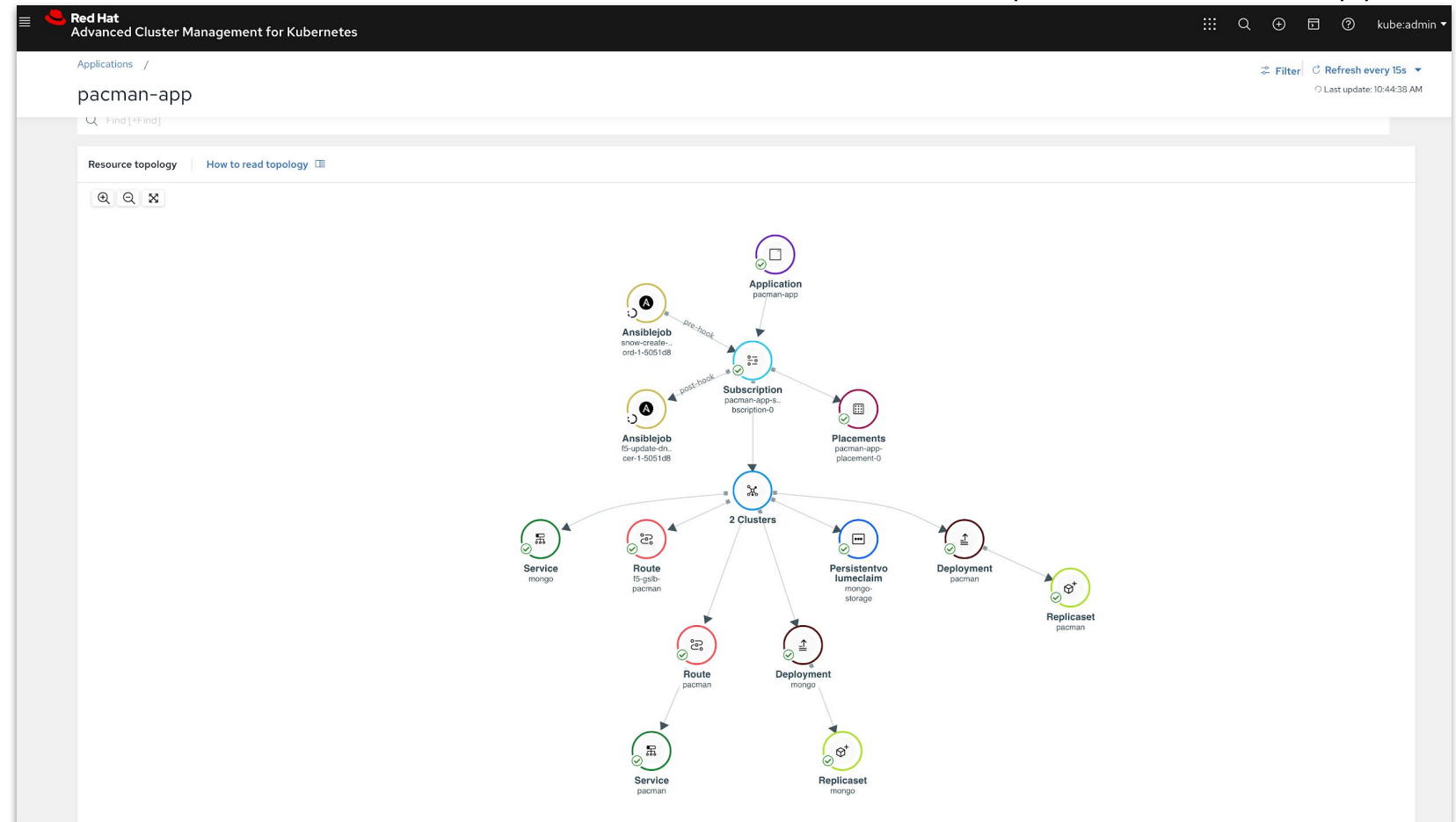
- Deploy Applications at Scale
- Deploy Applications from Multiple Sources and Clusters
- Quickly Visualize Application Relationships
- Integrate with the Red Hat Ansible Automation Platform



IT Operations



DevOps/SRE



Advanced Application Lifecycle Management

GitOps as the source of truth

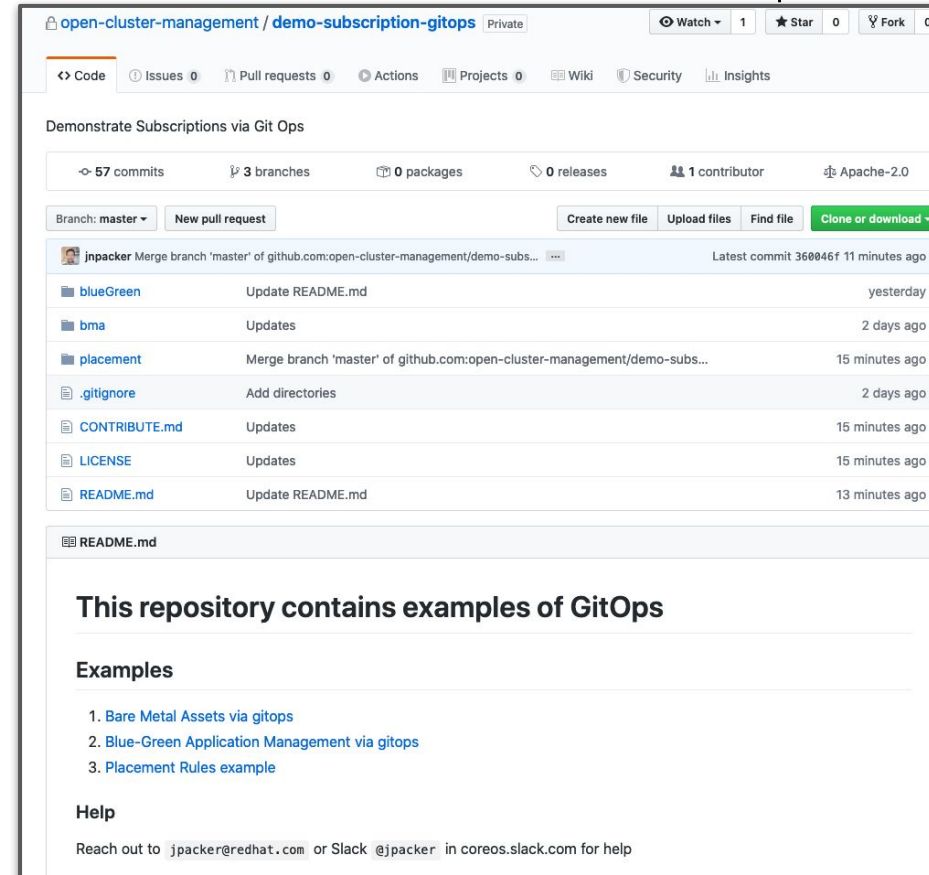
- Create, modify & delete, just as you would any source code. Git becomes your source of truth controlling your data center.
- Have a record of who, what & when for every change precipitated in your environments
- Through code Reviews & Approvals, take full control of all changes to your data center(s)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



IT Operations



DevOps/SRE



The screenshot shows a GitHub repository page for 'open-cluster-management / demo-subscription-gitops'. The repository is private and has 1 watch, 0 stars, and 0 forks. It contains 57 commits, 3 branches, 0 packages, 0 releases, and 1 contributor. The repository is Apache-2.0 licensed. The current branch is 'master'. A recent commit by 'jpacker' is highlighted, showing a merge of the 'master' branch. The commit history includes updates to README.md, bma, placement, .gitignore, CONTRIBUTING.md, LICENSE, and README.md. The README.md file is open, showing the title 'This repository contains examples of GitOps' and a list of examples: 'Bare Metal Assets via gitops', 'Blue-Green Application Management via gitops', and 'Placement Rules example'. A help section provides contact information for 'jpacker@redhat.com' or '@jpacker' on Slack.

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

Advanced Application Lifecycle Management

Subscriptions Bring Enterprise to Kubernetes

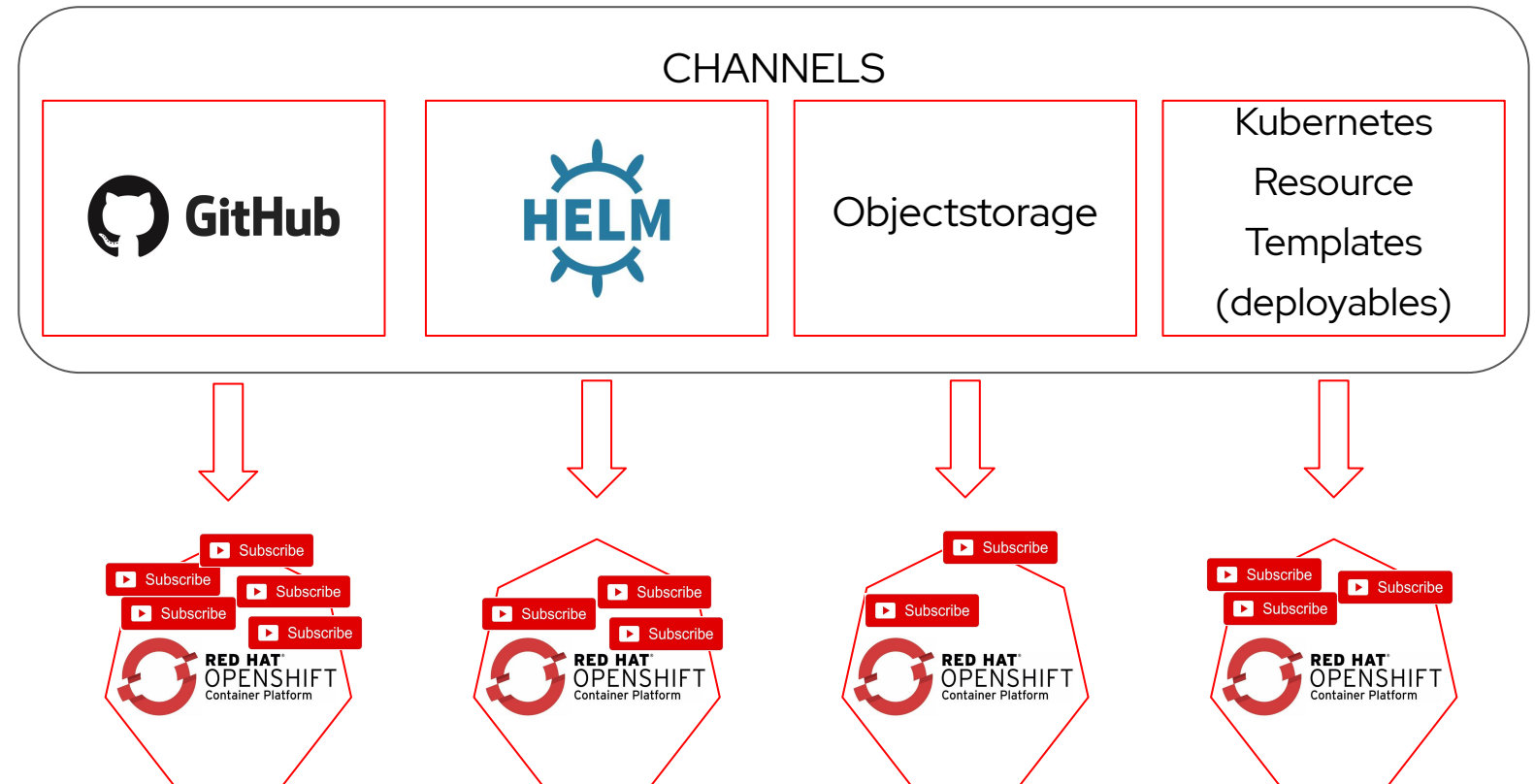


IT Operations



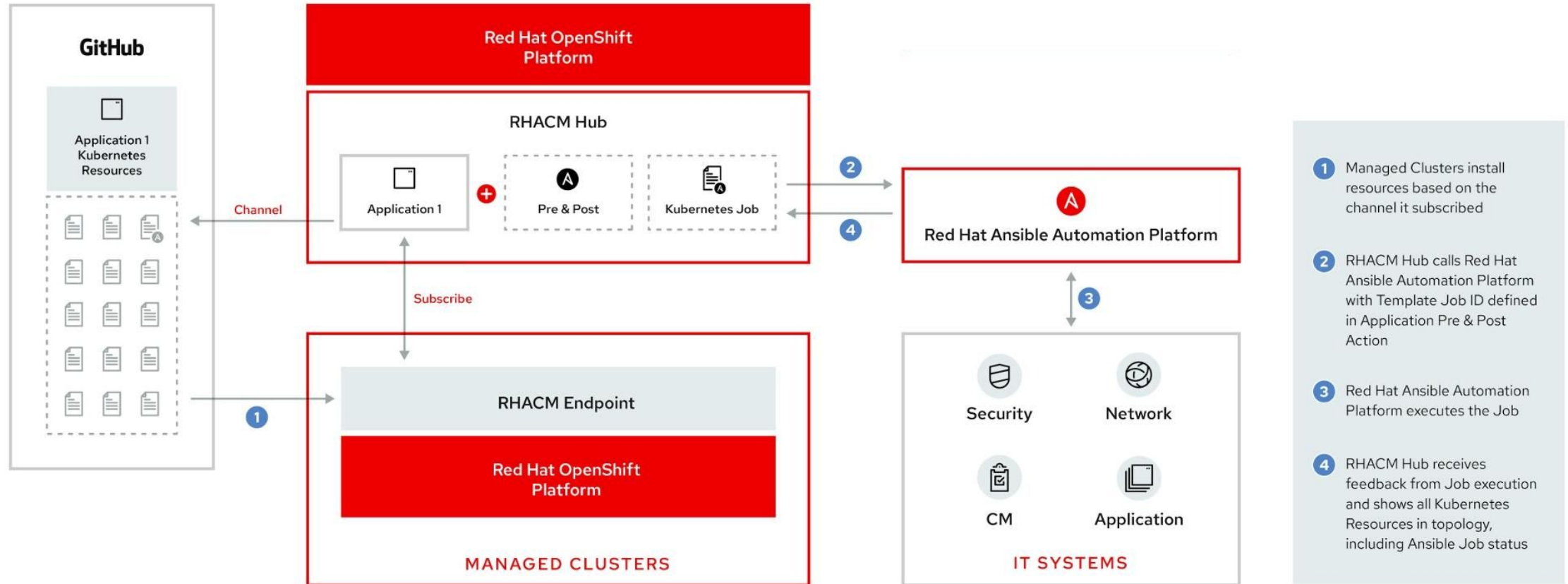
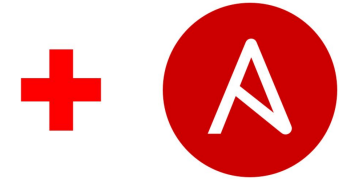
DevOps/SRE

- 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



Tech preview

Architecture Overview for Application Lifecycle



Multi-Cluster Observability

Overview

- Global Query view with **Grafana**
 - Out of the Box multi cluster health monitoring dashboards
 - PromQL compliant - Build your own queries
- Centralized **Database**
 - Optimized set of metrics collected from managed clusters
 - Focused on Cluster Management
- Unlimited **Data Retention**
 - Observe Metric trends
 - Set Alert Patterns
 - Supported Object Storage
 - AWS S3 (and compatible)
 - Ceph for on-premise
 - Google Cloud Storage
 - Azure Storage

Cluster	Status	Version	Provider	Nodes
stage1	Detached	-	-	-
cstark-openshift46	Offline	OpenShift 4.6.0-rc.2	cloud=Amazon +4	6
sberens-azure	Offline	-	cloud=Azure +2	-
spoke50-gke2	Offline	v1.16.13-gke.401	cloud=Google vendor=GKE +1	3
acmcdoan1	Ready	OpenShift 4.5.2(Upgrade available)	cloud=OpenStack +5	6
acmcdoan2	Ready	OpenShift 4.5.2(Upgrade available)	cloud=OpenStack +5	6
dhaiduce-01	Ready	OpenShift 4.3.38	cloud=Amazon +6	6
dhaiduce-02	Ready	OpenShift 4.3.33(Upgrade available)	cloud=Amazon +6	6
dhaiduce-03	Ready	OpenShift 4.5.11(Upgrade available)	cloud=Amazon +6	6
dhaiduce-04	Ready	OpenShift 4.4.23(Upgrade available)	cloud=Amazon +6	6
dhaiduce-eks-eu-central-1	Ready	v1.14.9-eks-658790	cloud=Amazon vendor=EKS +3	3
dhaiduce-eks-eu-north-1	Ready	v1.14.9-eks-658790	cloud=Amazon vendor=EKS +2	3
dhaiduce-eks-eu-west-1	Ready	v1.14.9-eks-658790	cloud=Amazon vendor=EKS +2	3
dhaiduce-eks-eu-west-2	Ready	v1.14.9-eks-658790	cloud=Amazon vendor=EKS +3	3
dhaiduce-eks-eu-west-3	Ready	v1.14.9-eks-658790	cloud=Amazon vendor=EKS +3	3
installer-test	Ready	OpenShift 4.5.5(Upgrade available)	cloud=Amazon +5	6
local-cluster	Ready	OpenShift 4.5.11(Upgrade available)	cloud=Amazon +5	6
lubbock	Ready	OpenShift 4.5.8(Upgrade available)	cloud=Amazon +4	6
oregon2	Ready	OpenShift 4.4.26(Upgrade available)	cloud=Amazon +4	6
sberens-eks1	Ready	v1.15.11-eks-065dce	cloud=Amazon vendor=EKS +1	2

Demo



Installation

Red Hat Advanced Cluster Management For
Kubernetes



IT Operations

Installation and foundation

Hub Cluster

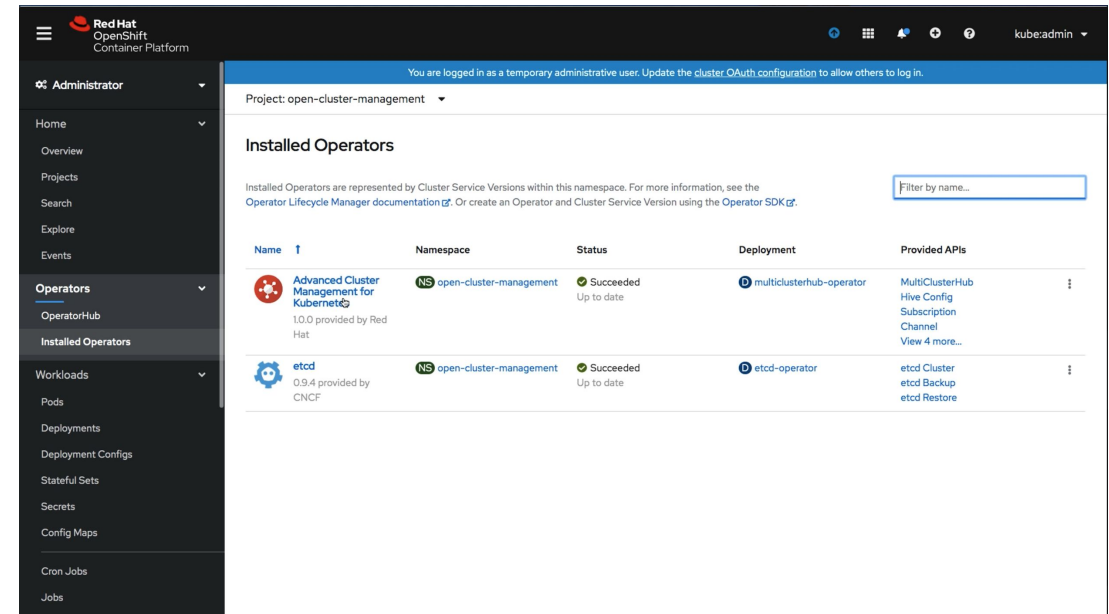
- Requires OCP 4.4.x - 4.6.x
 - (managed cluster can be 3.11)
- Operator based installation
- Available on OperatorHub

High Availability

- Supports OCP Availability Zone

Backup/Restore

- Backup/Restore etcd database of hub OpenShift cluster





IT Operations

Installation and foundation

Operator install for managed cluster

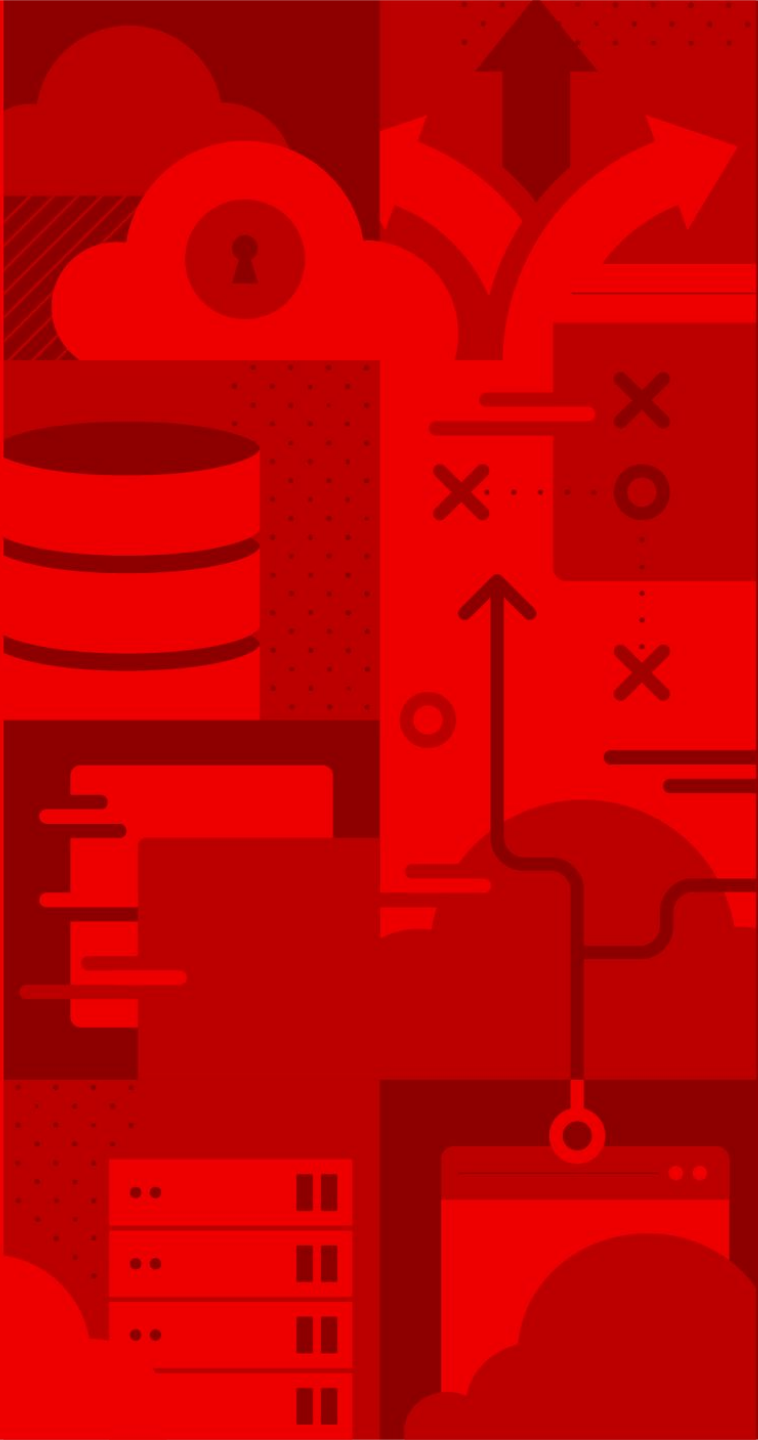


Managed cluster

The multicluster-endpoint operator controls the deployment of components on the managed cluster.

List of included components:

- ▶ Application manager
- ▶ Connection manager
- ▶ Work manager
- ▶ Policy controller
- ▶ Search collector
- ▶ Service registry
- ▶ IAM policy controller
- ▶ Certificate policy controller
- ▶ CIS policy controller



Wrap up

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.

COLLABORATIVE

A KUBERNETES MANAGEMENT TEAM

Our Red Hat-led Kubernetes management projects integrate you and our experts into a joint management team. With a constant feedback loop maintained through our agile development processes, we actively and collaboratively move development forward.

IDEATE

DESIGN

BUILD & ITERATE

LAUNCH



DISCOVERY SESSION
1 Day



NAVIGATE TO KUBERNETES MANAGEMENT



MINIMUM VIABLE PRODUCT
4 - 8 weeks



SCALED DELIVERY
Varies By Customer

RED HAT LEADS

YOU LEAD



Resources

[Product Overview](#)

[YouTube Playlist](#)

[Datasheet](#)

[Infographic](#)

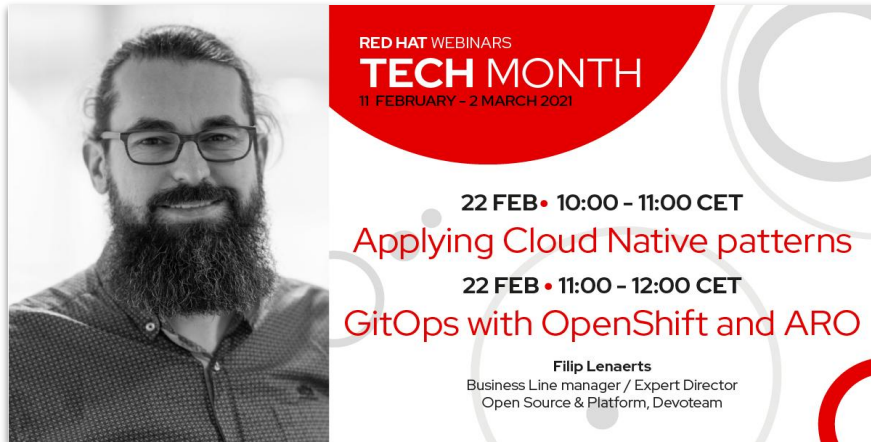
[Twitch Playlist](#)

[RHACM Blogs](#)

[FAQ](#)



Tech month agenda

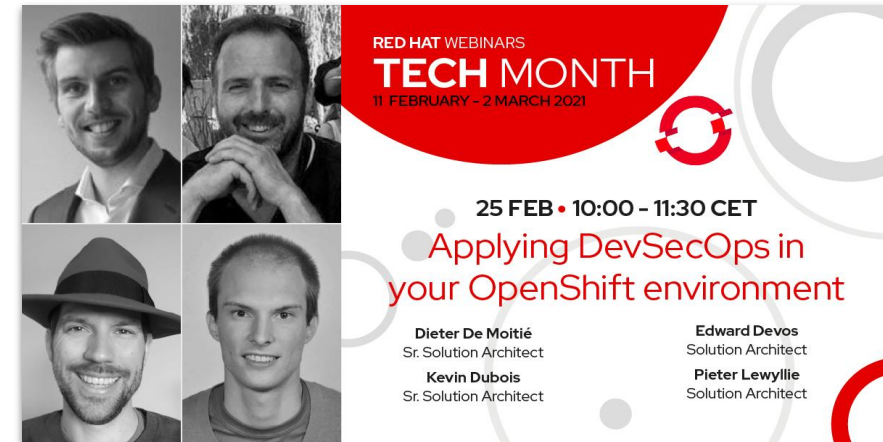


RED HAT WEBINARS
TECH MONTH
11 FEBRUARY - 2 MARCH 2021

22 FEB • 10:00 - 11:00 CET
Applying Cloud Native patterns

22 FEB • 11:00 - 12:00 CET
GitOps with OpenShift and ARO

Filip Lenaerts
Business Line manager / Expert Director
Open Source & Platform, Devoteam



RED HAT WEBINARS
TECH MONTH
11 FEBRUARY - 2 MARCH 2021

25 FEB • 10:00 - 11:30 CET
Applying DevSecOps in
your OpenShift environment

Dieter De Moitié
Sr. Solution Architect

Kevin Dubois
Sr. Solution Architect

Edward Devos
Solution Architect

Pieter Lewyllie
Solution Architect



RED HAT WEBINARS
TECH MONTH
11 FEBRUARY - 2 MARCH 2021

2 MARCH • 09:00 - 10:00 CET
Agile Integration update & demo

2 MARCH • 11:00 - 13:30 CET
Hands-On Lab

Didier Clabaut
Integration Architect, Integration Designers

Feb 25th Bonus session:
"We have been hacked!"
Romuald Vandepoel, Sr Cloud Architect at Red Hat

<https://red.ht/techmonth>

Thank you

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