Red Hat
Advanced Cluster Management
for Kubernetes

Red Hat Advanced Cluster Management for Kubernetes

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About today

This session is a 2 hours beginners' workshop on Red Hat Advanced Cluster Management for Kubernetes (RHACM or ACM in short).

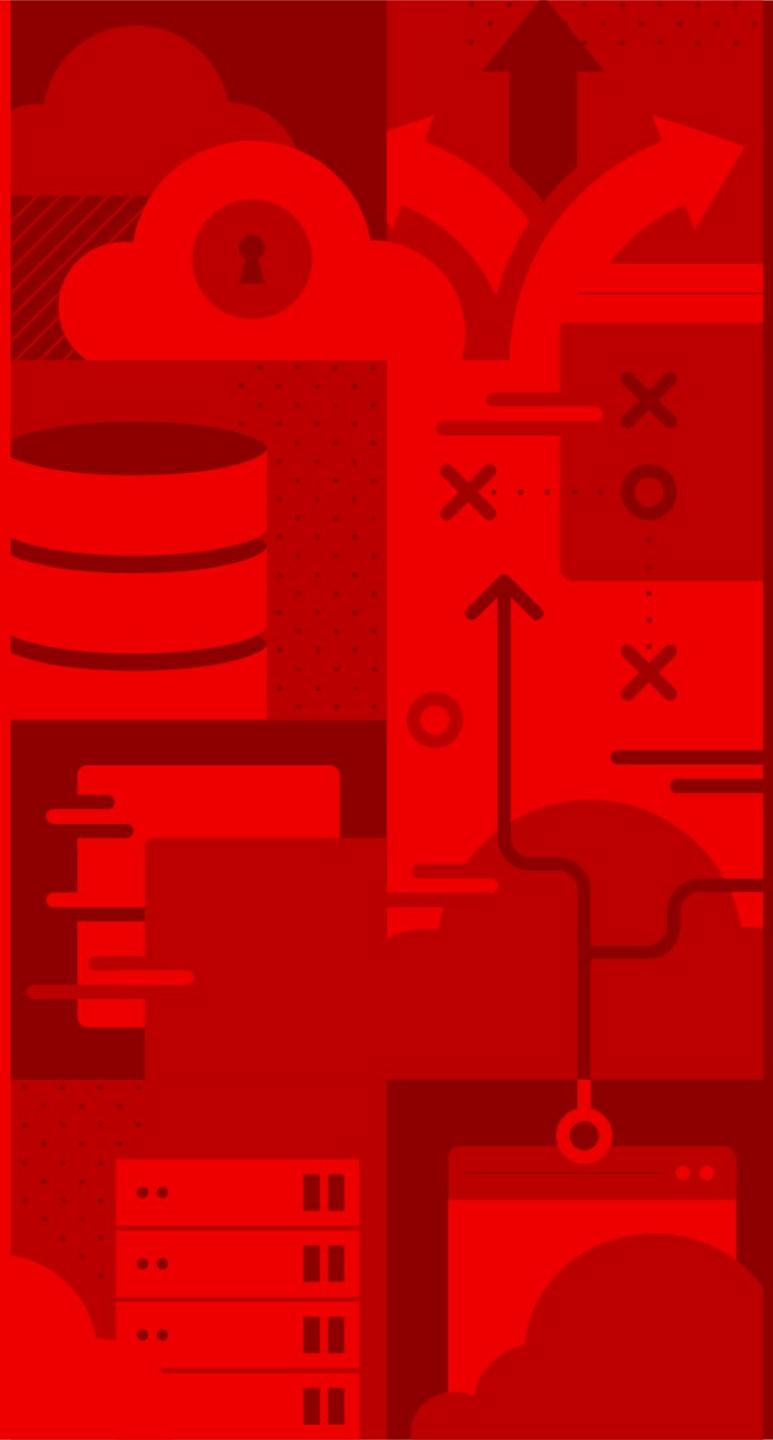
It has the following format:

- 30 - 45 minutes of Context, Architecture, Use-cases Overview

- 30 minutes of hands-on Lab covering the 3 base use cases
  - Cluster management
  - Application deployment (GitOps style)
  - Policy driven governance

- Extra advanced use cases (instructors/videos) & extra resources about ACM if time permits

Red Hat Insights



Current Trends and Challenges with Kubernetes

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Some of the key players when it comes to Kubernetes platforms?

Meet the Developers

Meet Security

Meet IT Ops

Meet Management & Business

Kubernetes, what can happen? Addressing the considerations

Considerations:

- Allow developers to spin up clusters as and when required to experiment and build
- Standard developer tools & capabilities to allow easy portability of workloads between clusters
- Choice of on-premise and cloud clusters, containers & VMs to modernise existing applications

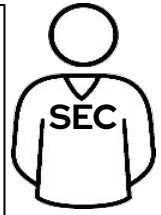
Considerations:

- Integration with the many, varied kubernetes platforms, with enterprise tooling and application e.g monitoring, logging, integration & service management
- Providing a consistent, flexible and secure platform experience to end users

Kubernetes

Considerations:

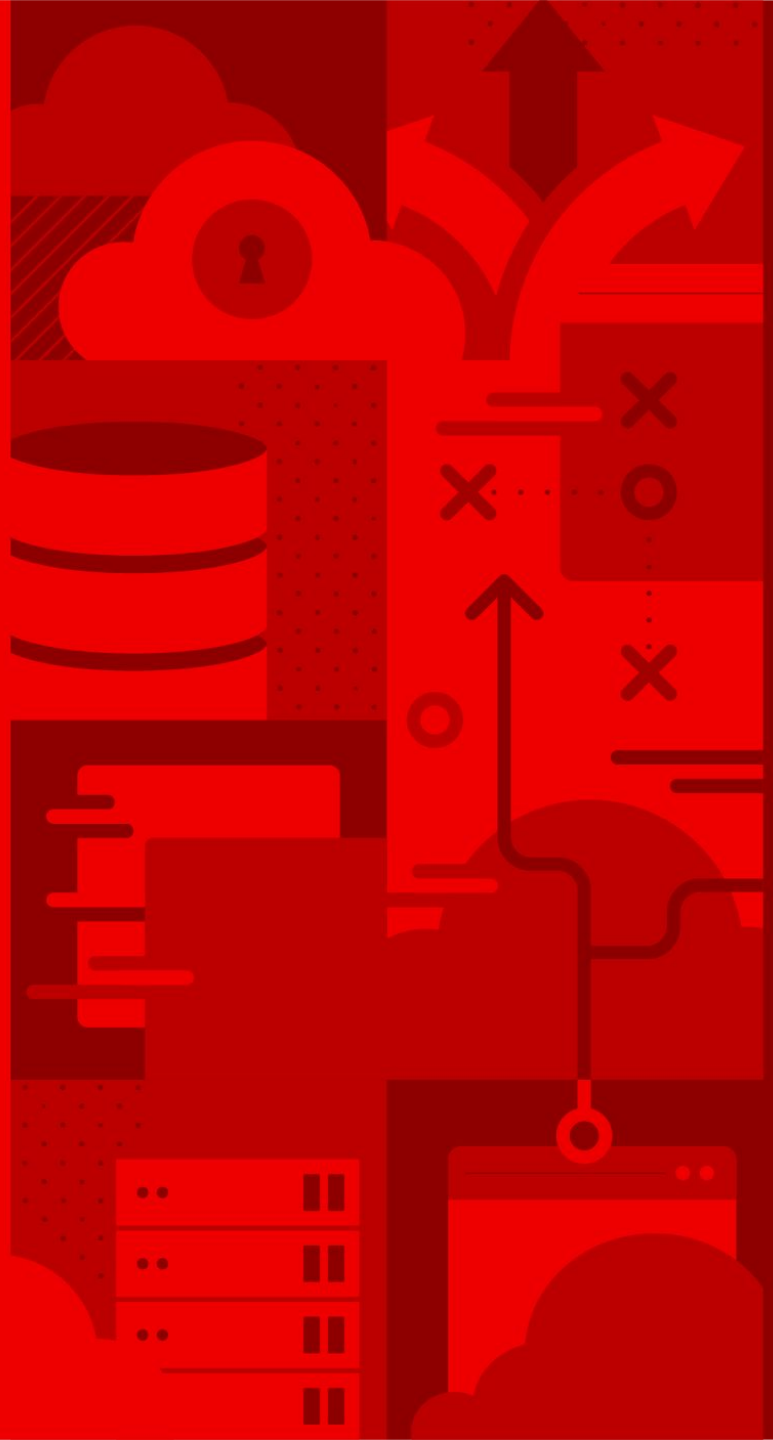
- Preventing risk of compliance and security breaches
- Centrally managing security policy across a diverse set of platforms



Considerations:

- Getting an accurate view of the actual cost of running platforms
- Avoiding lock-in, to get the best value for the business

Red Hat Insights



Introducing Red Hat Advanced Cluster Management For Kubernetes

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What is ACM?

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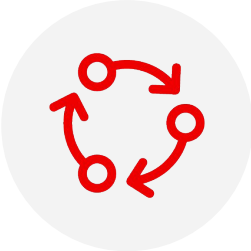
Advanced Cluster Management
for Kubernetes



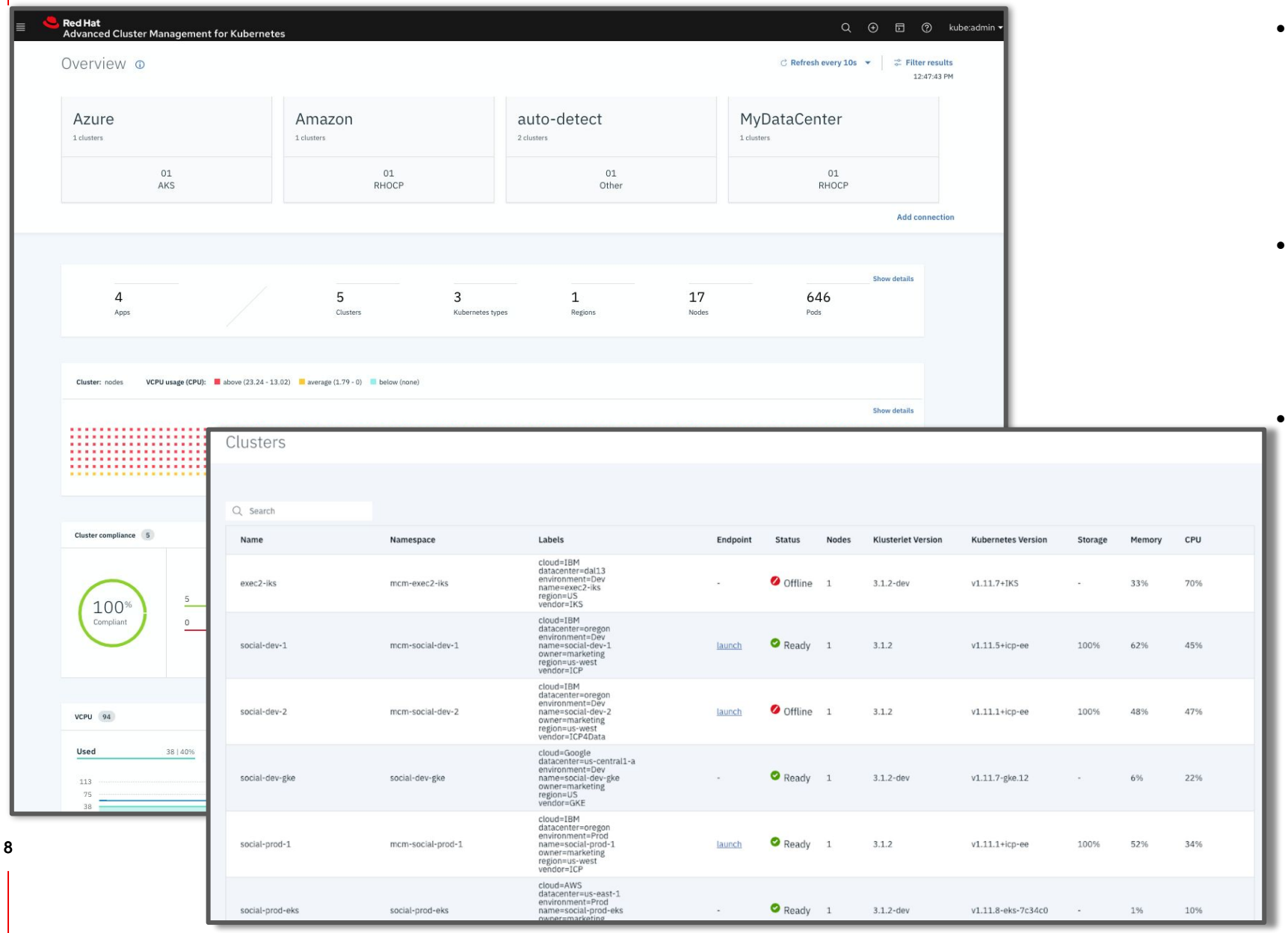
Multicluster lifecycle management

Policy driven governance, risk, and compliance

Advanced application lifecycle management

Unified Multi-Cluster Management

Red Hat Advanced Cluster Management for Kubernetes



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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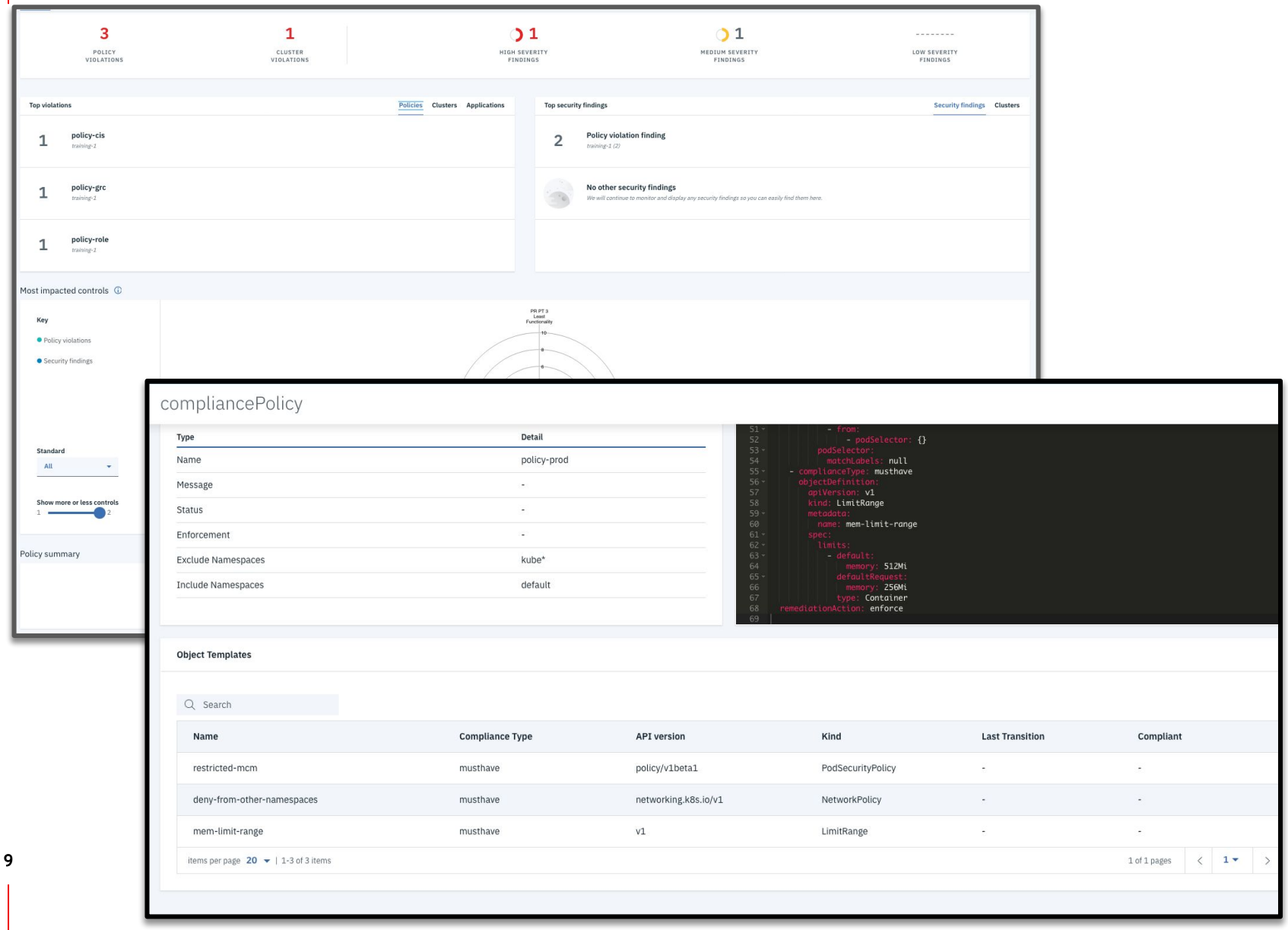
Policy based Governance, Risk and Compliance

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

Red Hat Advanced Cluster Management for Kubernetes



- **Centrally** set & enforce policies for security, applications, & infrastructure
- Quickly **visualize** detailed **auditing** on configuration of apps and clusters
- Built-in compliance policies and audit checks
- **Immediate** visibility into your compliance posture based on **your** defined standards

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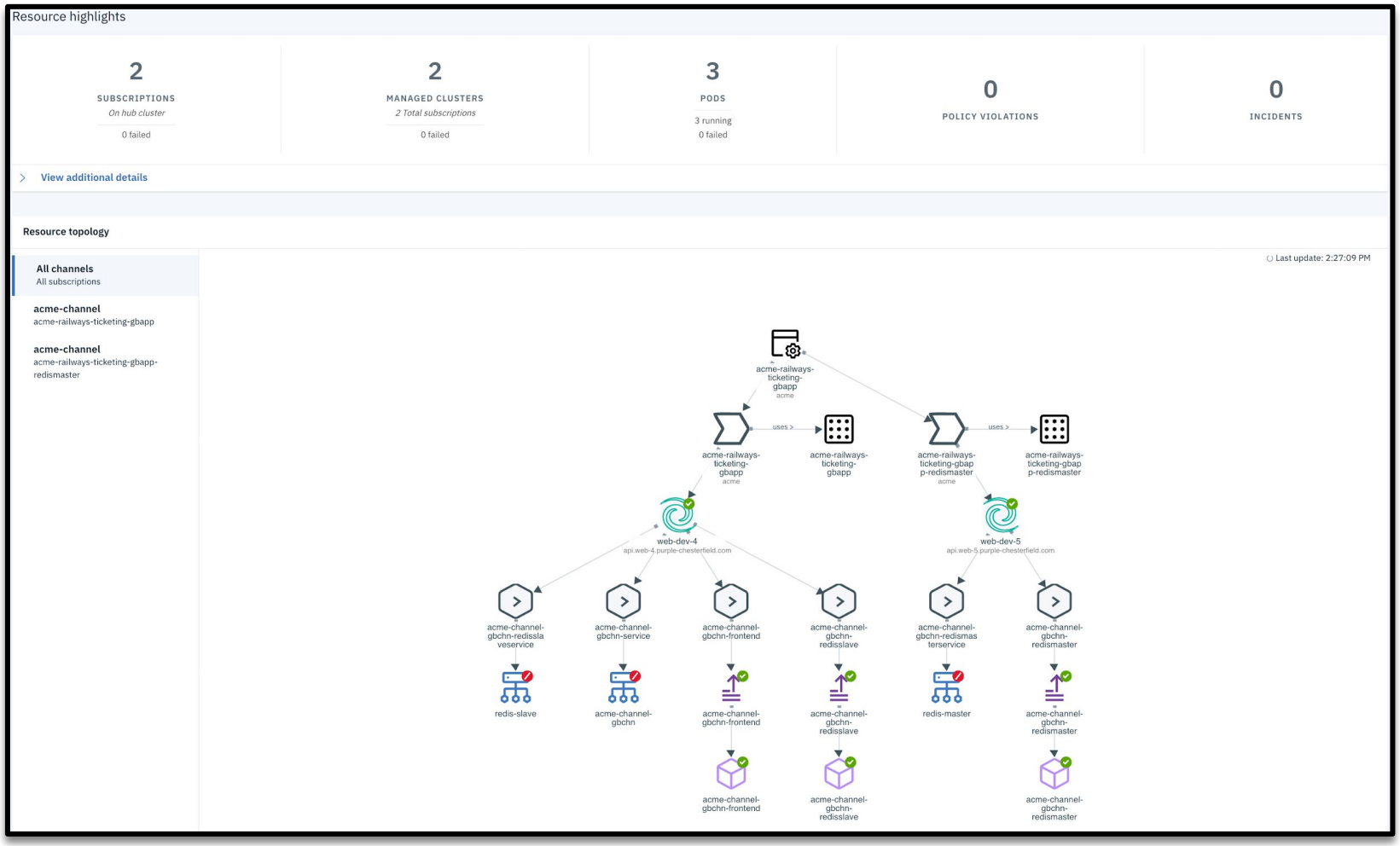
Advanced Application Lifecycle Management

Red Hat Advanced Cluster Management for Kubernetes

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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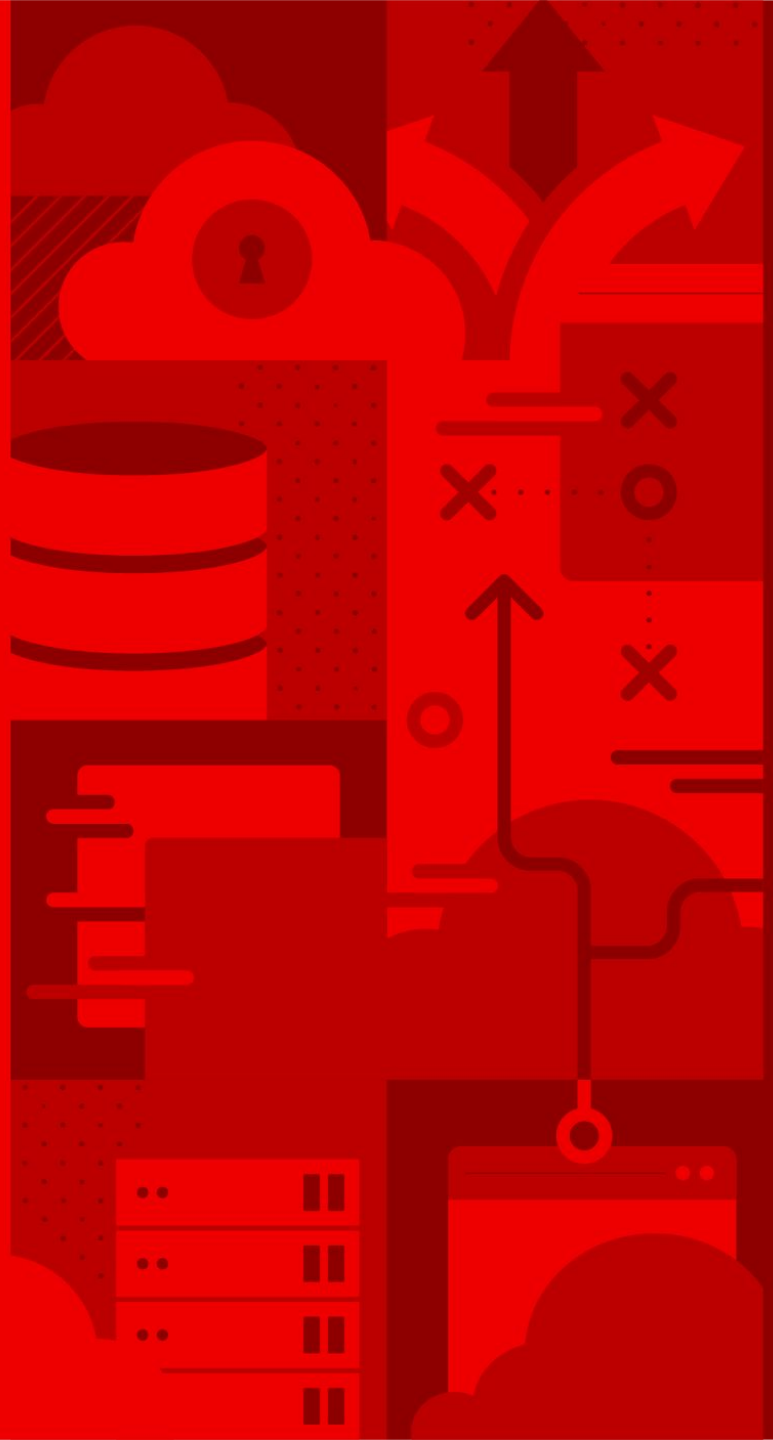

ACM Use Cases Overview

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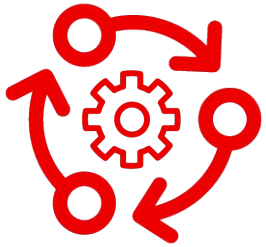
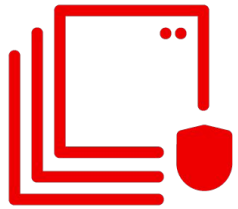
ACM Use Cases Overview

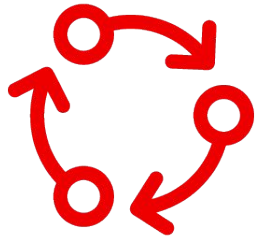
Red Hat Advanced Cluster Management for Kubernetes



- Full Management of OCP Kubernetes
- Public cloud managed kubernetes: EKS, AKS, GKE, IKS *
- See high level summaries across all clusters
    - Misconfiguration
    - Pod status
    - Resource capacity
- Troubleshoot and resolve issues across the federated domain (via dashboard and/or CLI)



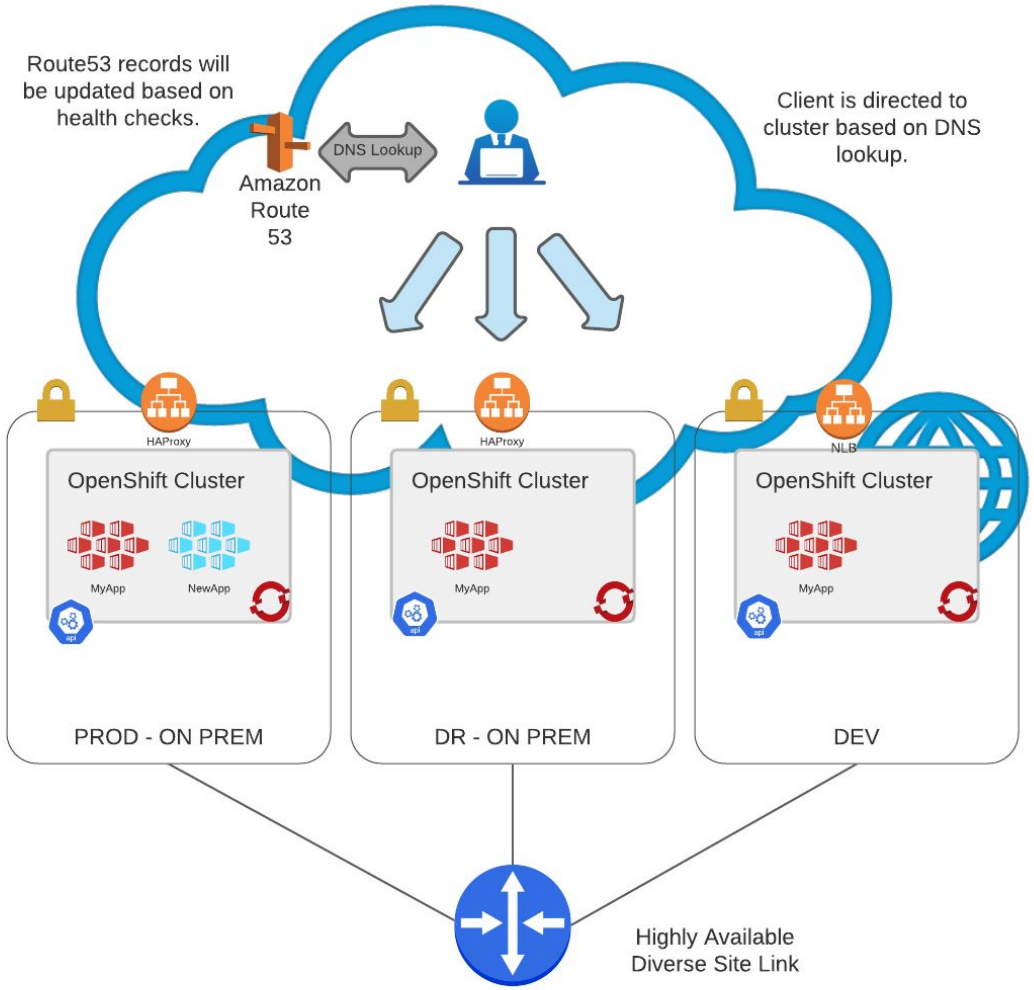
- Set and enforce policies for security, applications, & infrastructure
- Deep visibility for auditing configuration of apps and clusters
- Policies built based on standards compliance
- Categorize violations based on your standards for immediate visibility into your compliance posture



- 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.

* see Support Matrix in the Appendix

A real life Multi-K8 cluster Scenario in APAC



APAC customer:

- 3 clusters (2 on-premises and 1 in AWS)

Use Cases:

- Manage the various OCP clusters (on-prem & cloud)
- Provide application placement rules (Dev, Prod, DR) and failover
- Manage & apply policies centrally on all clusters
- Have an automated CI/CD pipeline between the various environments (dev, prod)

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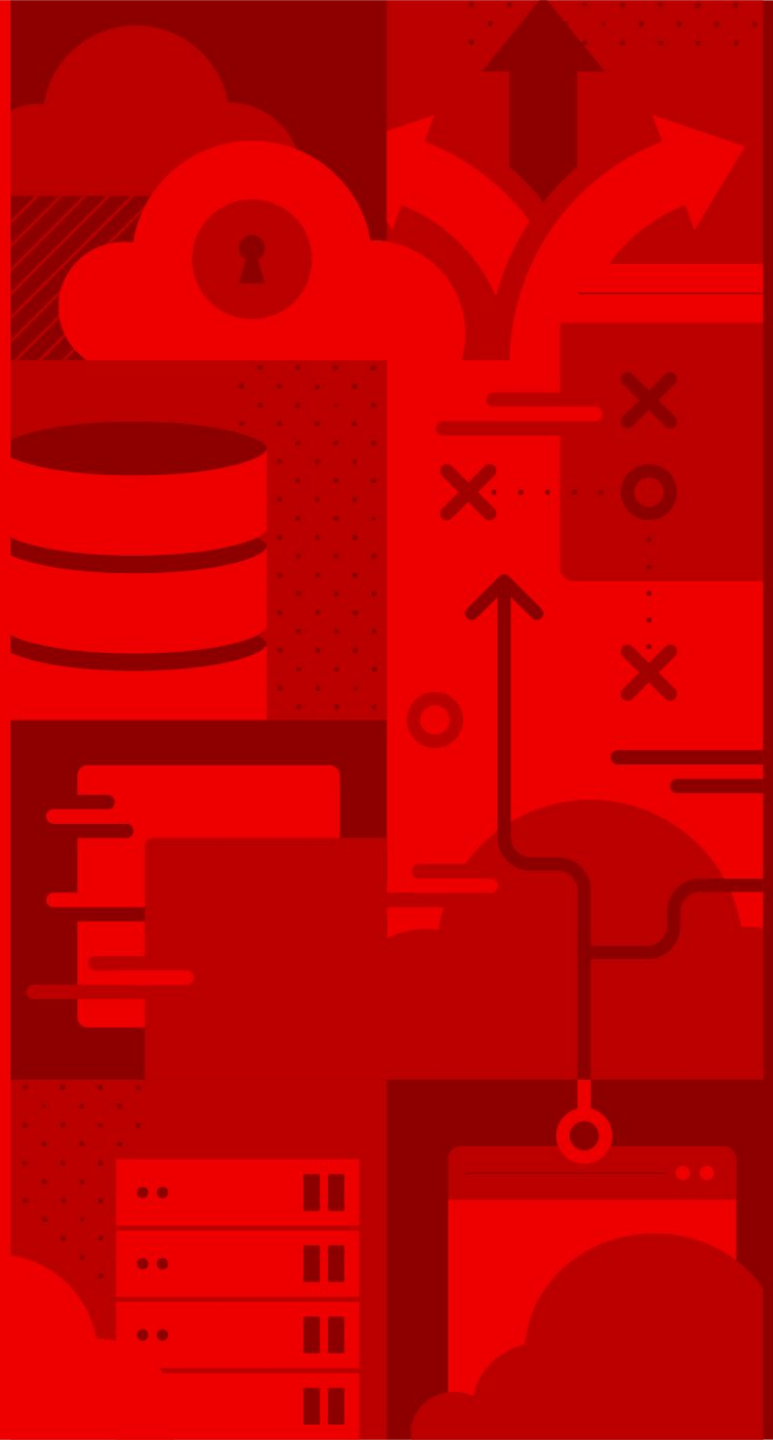

Architecture

Red Hat Advanced Cluster Management For Kubernetes

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Advanced Cluster Management for Kubernetes

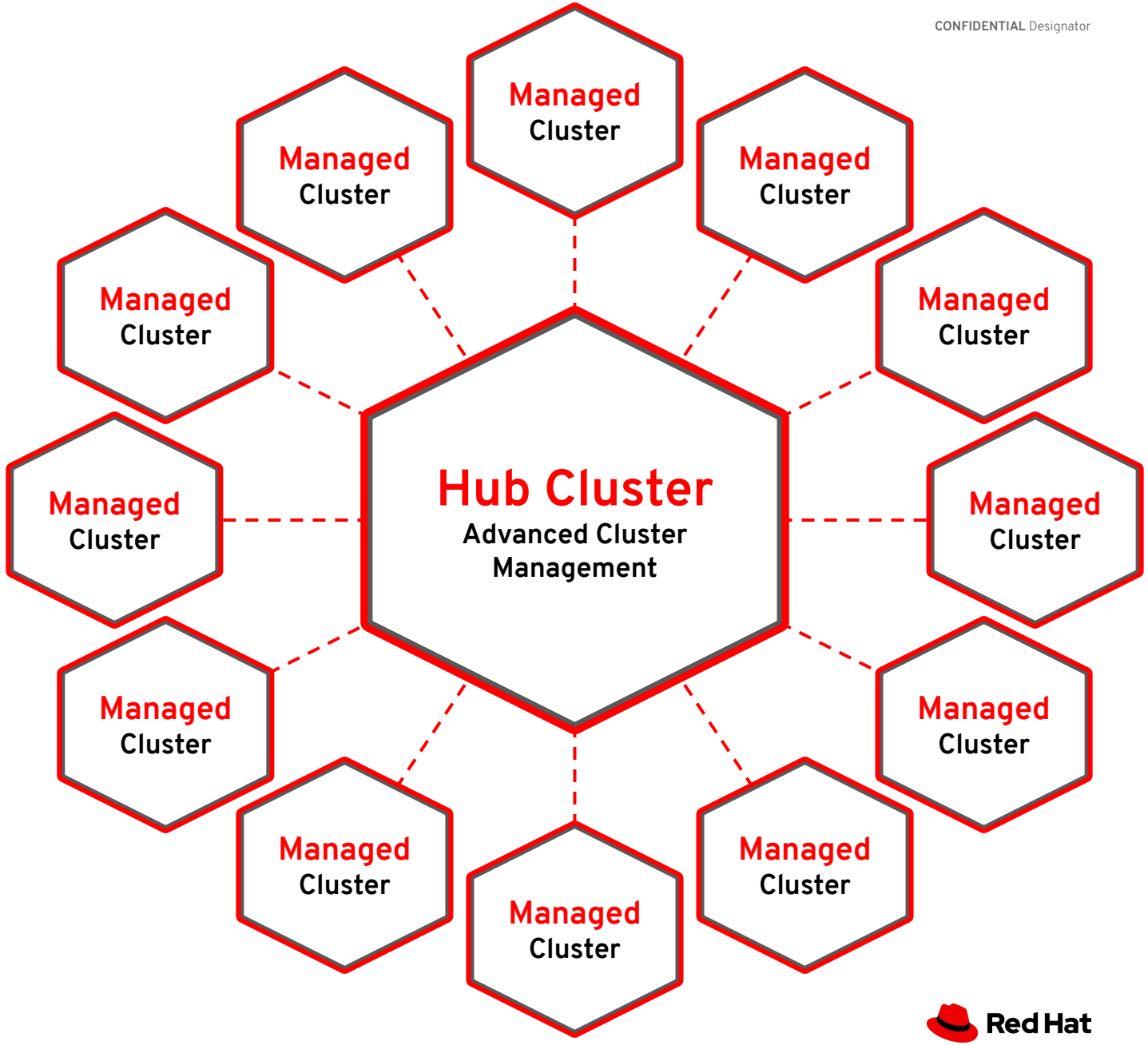
Advanced Cluster Management runs on Red Hat OpenShift.

Hub Cluster

The OpenShift cluster where Advanced Cluster Management is installed is called the hub cluster. It is the central hub for creating, managing, and monitoring Kubernetes clusters.

Managed Cluster

A Kubernetes cluster managed by Advanced Cluster Management is called a managed cluster.



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Hub Cluster Components

Console
Cluster management web user interface.

Hive Controller
Handles provisioning clusters on cloud providers.

Managed Cluster Import Controller
Handles the deployment of the klusterlet operator to managed clusters.

Klusterlet Addon Controller
Handles the deployment of the klusterlet addon operator to managed clusters.

Managed Cluster Components

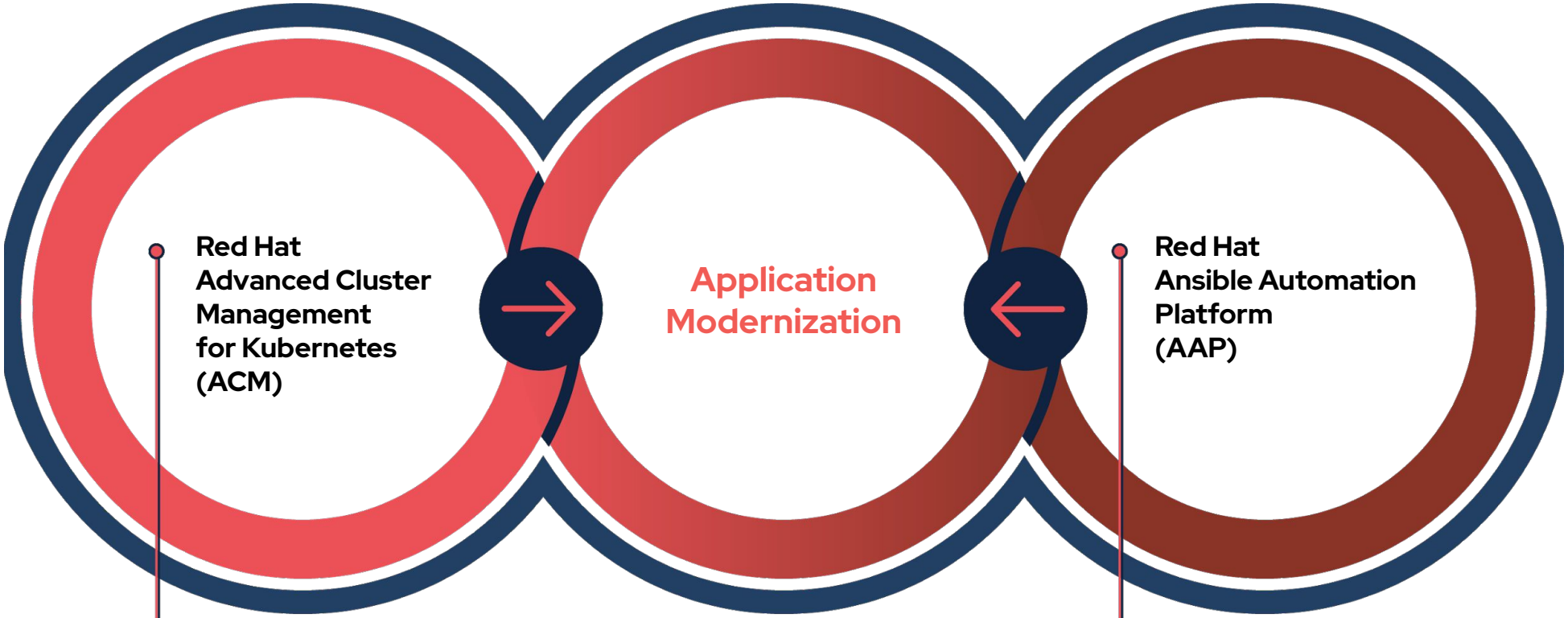
Klusterlet Operator
Handles the deployment of the registration and work controllers on the managed cluster.

Registration Controller
Handles the registration of the managed cluster with the hub cluster.

Work Controller
Handles applying manifest work to the managed cluster.

Klusterlet Addon Operator
Handles the deployment of addon components.

Application modernization driven by Automation of Kubernetes and beyond....



Automate the deployment and management of OpenShift cluster, applications, control policy compliance, and enforcement

Automating everything outside of Kubernetes: Configuration of networking, databases, load balancers, firewall, etc.

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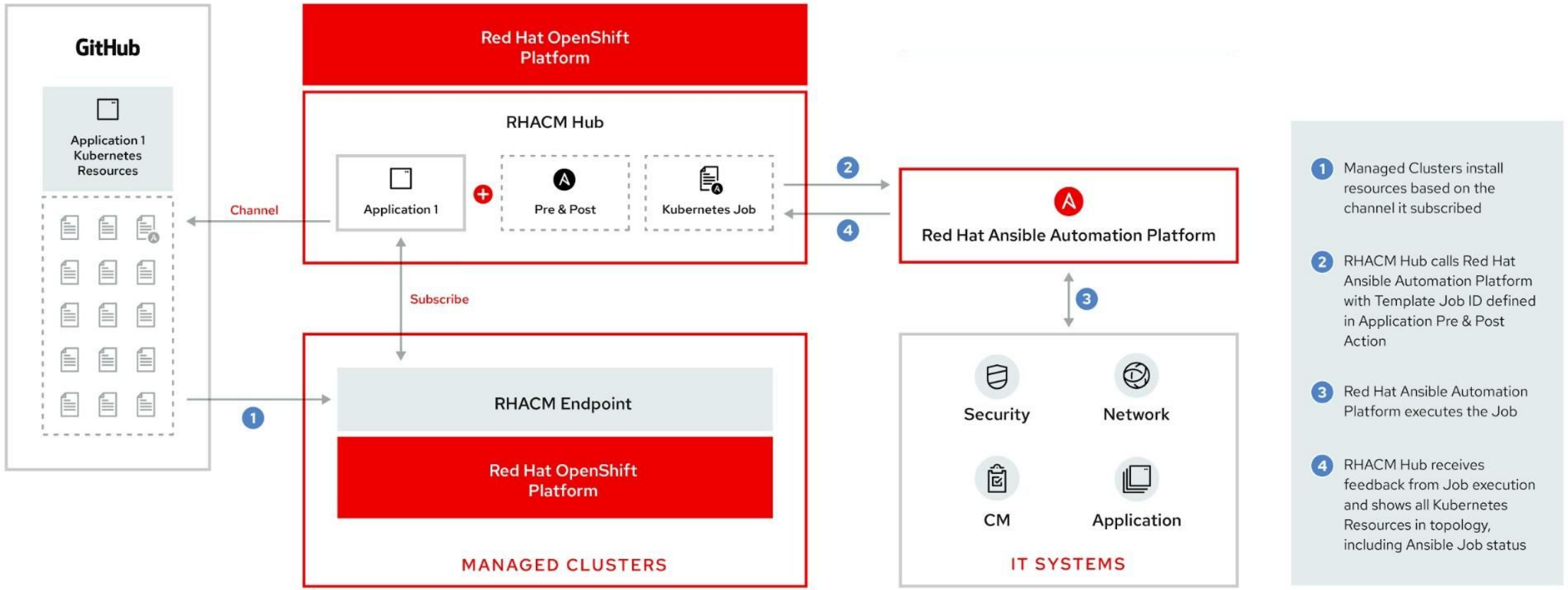
Tech preview

Architecture Overview

for Application Lifecycle

Red Hat Advanced Cluster Management for Kubernetes



1. Managed Clusters install resources based on the channel it subscribed
2. RHACM Hub calls Red Hat Ansible Automation Platform with Template Job ID defined in Application Pre & Post Action
3. Red Hat Ansible Automation Platform executes the Job
4. RHACM Hub receives feedback from Job execution and shows all Kubernetes Resources in topology, including Ansible Job status

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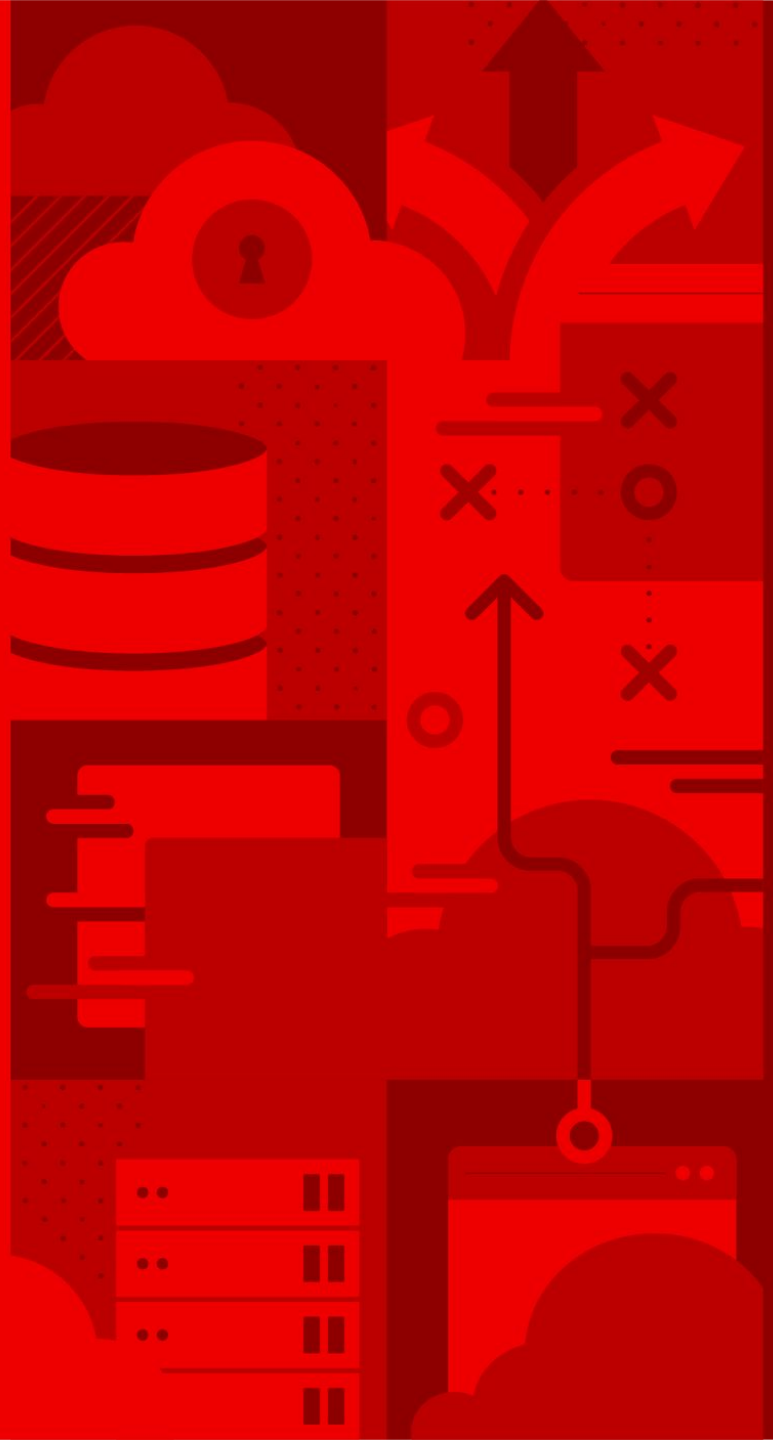

The Lab!

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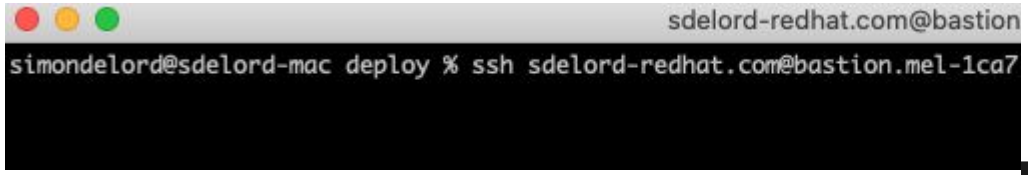
ACM - The lab

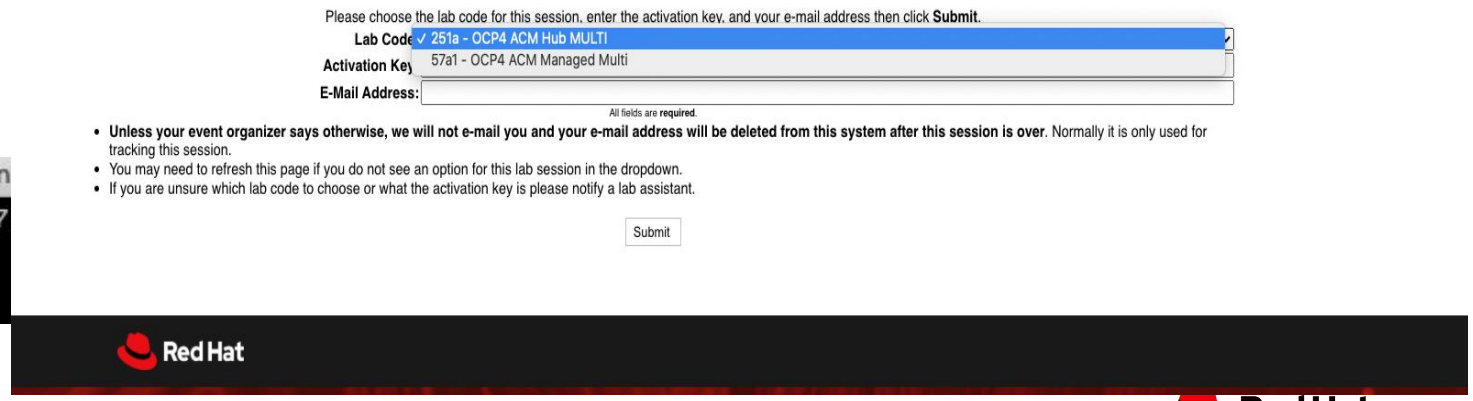
Red Hat Advanced Cluster Management for Kubernetes

- Step1: Log into the URL https://www.opentlc.com/gg/gg.cgi?profile=klewis-redhat.com
  - **Select Lab Code (OCP ACM Hub Multi)**
  - **Enter activation key:** 60c34
  - **Email Address: your email**

- Step2: Log into the URL https://www.opentlc.com/gg/gg.cgi?profile=klewis-redhat.com
  - **Select Lab Code (OCP ACM Managed Multi)**
  - **Enter activation key:** 1c23b
  - **Email Address: your email**

- Step3: have An SSH client
  on your machine





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ACM - The lab

Red Hat Advanced Cluster Management for Kubernetes

Welcome to: OCP4 ACM Hub MULTI

Your assigned lab GUID is **anz-0792**

Let's get started! Please read these instructions carefully before starting to have the best lab experience:

- Save the above **GUID** as you will need it to access your lab's systems from your workstation.
- Consult the lab instructions *before* attempting to connect to the lab environment.
- Please note the following information about your lab environment:
  - Openshift Master Console: https://console-openshift-console.apps.cluster-anz-0792.anz-0792.sandbox929.opentlc.com
  - Openshift API for command line 'oc' client: https://api.cluster-anz-0792.anz-0792.sandbox929.opentlc.com:6443
  - Download oc client from http://d3s3zqyaz8cp2d.cloudfront.net/pub/openshift-v4/clients/ocp/4.6.12/openshift-client-linux-4.6.12.tar.gz
  - HTPasswd Authentication is enabled on this cluster.
  - Users user1 .. user5 are created with password `openshift`
  - User `admin` with password `FQZFDIf2IHN0gBS8` is cluster admin.
  - Your ACM console is available at:
  - https://multicloud-console.apps.cluster-anz-0792.anz-0792.sandbox929.opentlc.com
  - You can access your bastion via SSH:
  - ssh klewis-redhat.com@bastion.anz-0792.sandbox929.opentlc.com
  - Make sure you use the username 'klewis-redhat.com' and the password 'YPirYi3R07qA' when prompted.

WARNING: You should only click FORGET SESSION if **requested** to do so by a lab attendant.

FORGET SESSION

OpenShift Console

ACM Console & Login

Jumphost & Login

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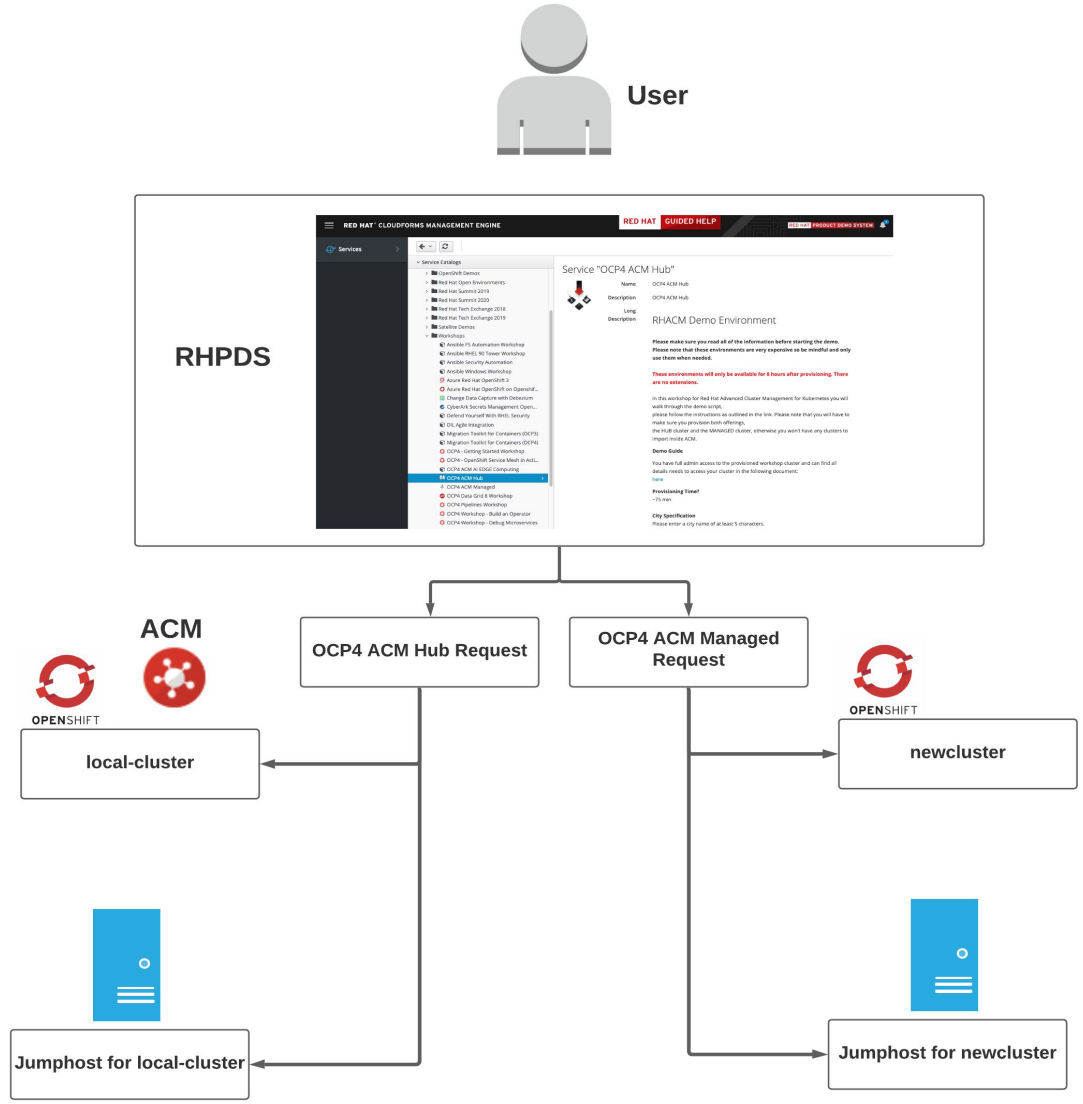
ACM - The lab

Red Hat Advanced Cluster Management for Kubernetes



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ACM - The lab

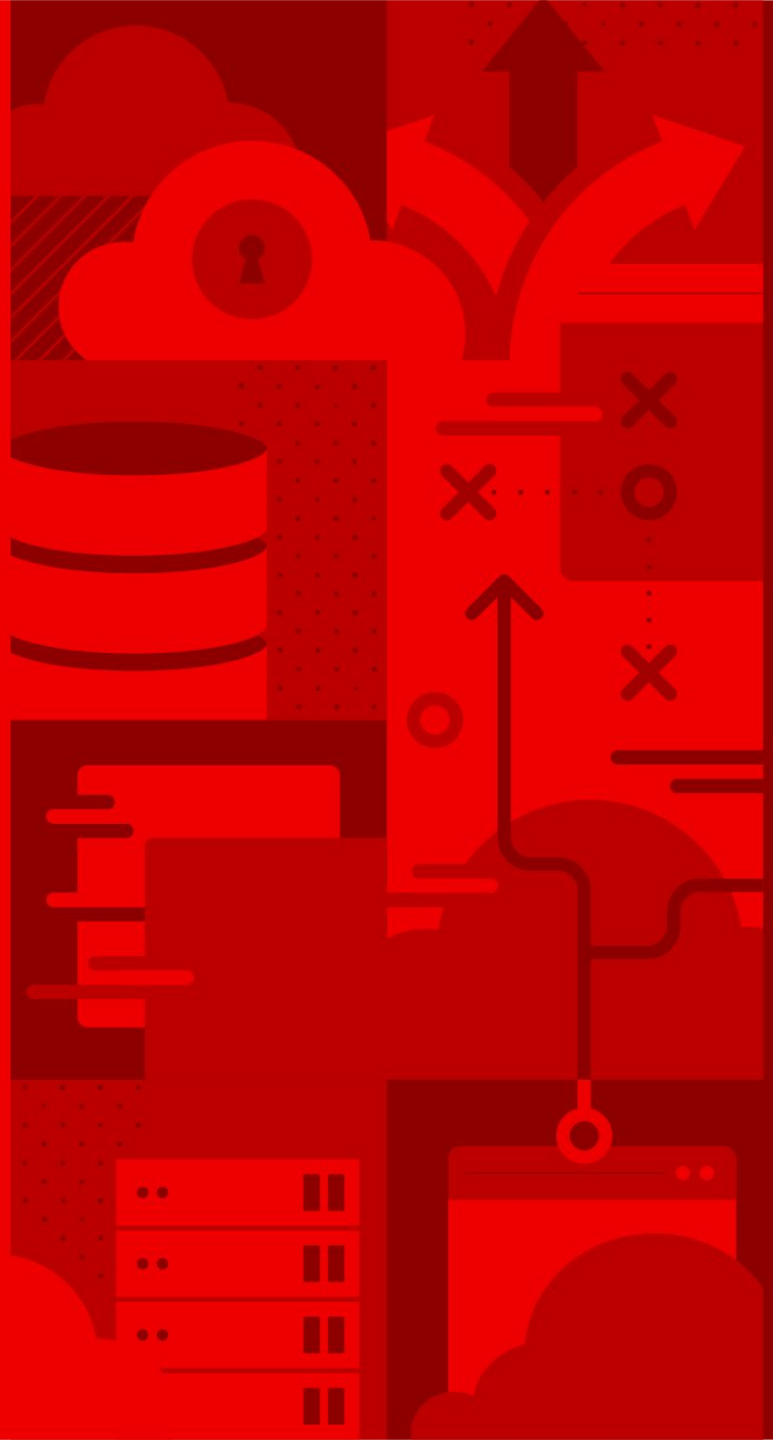
The Workshop walkthrough is available here.

4 exercises* (with extra activities):

- Exercise 1: log onto ACM and discover the console (extra activities at the end of the section)
- Exercise 2: import a second OCP cluster (extra activities at the end of the section)
- Exercise 3: deploy an application to the managed cluster (extra activities at the end of the section)
- Exercise 4: apply a policy

All activities should take around 30 minutes
Take your time, play with the console, ask questions!

* this is the first iteration of the Workshop. More exercises will be added down the track.
Check the following for extra use cases (to be done at your pace, time)



Resources & Extra Use-cases

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ACM useful documentation

List of useful resources:

- ACM operator install in ACM Install Guide (CLI or GUI)
- Sizing for ACM in ACM Sizing guide
- Subscription list is in the appendix section.
- Troubleshooting most common issues on ACM - Troubleshooting
- List of GitPolicies

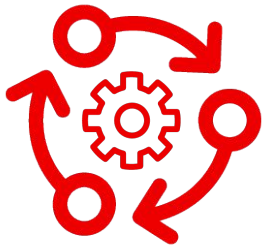
In practice to try ACM:

- Use RHPDS catalog options (today's lab)
- Otherwise, any OCP cluster will do* (IPI, UPI, whatever).

* 4.4.3 or later, 4.5.2 or later (bare metal features only supported on 4.5 or later), 4.6.1 or later

ACM - Simple Use Cases (1/2)

Red Hat Advanced Cluster Management for Kubernetes

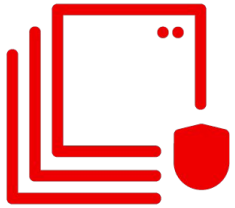


Import an OCP cluster
(5 minutes video)

Visibility across all clusters
(2 minutes video)

Import an EKS cluster via RHACM
(3 minutes video)

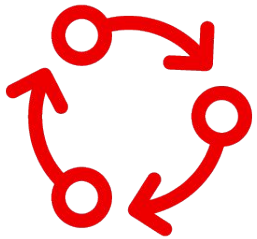
Create an OCP cluster via RHACM
(2 minutes video)



RHACM Policy Compliance View
(2 minutes video)

RHACM Rogue Actor Handling
(2 minutes video)

RHACM Role Policy Enforcement
(2 minutes video)



Application Deployment via RHACM
(3 minutes video)

Migrate an application from xKS to OCP via RHACM
(3 minutes video)

Hybrid Application Deployment via RHACM (2 minutes video)

Operator Deployment via RHACM
(2 minutes video)

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ACM - Advanced Use Cases (2/2)

Extra videos that are not part of the standard ACM guide

- Service-mesh operators, configuration and application deployment with ACM (5 minutes)
- Edge use case, VNF Service chaining with ACM (10 minutes)
- Tekton, OCP and ACM for CICD (10 minutes)

All the associated files / scripts are available in

- https://github.com/SimonDelord/ACM-Templates
- https://github.com/SimonDelord/tekton

Thank you

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Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.


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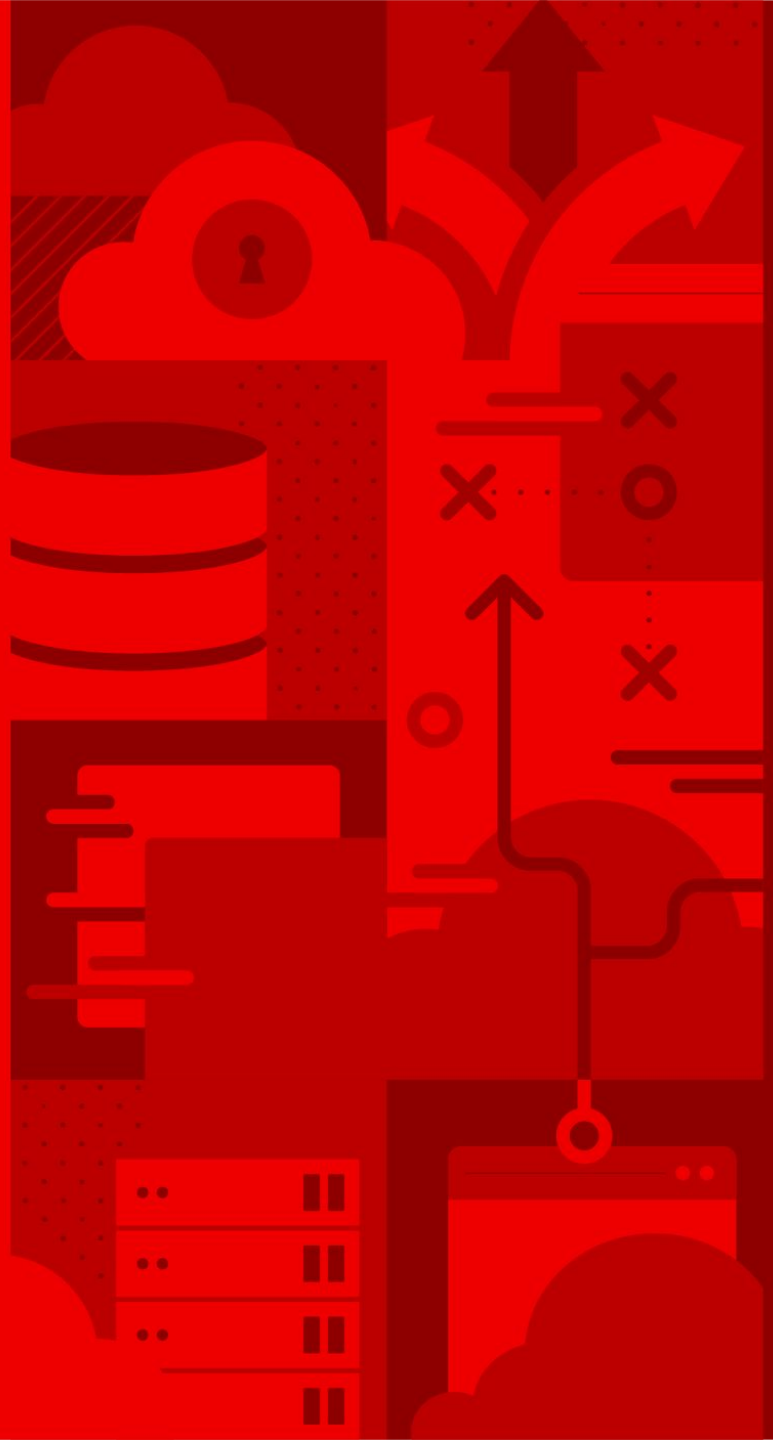
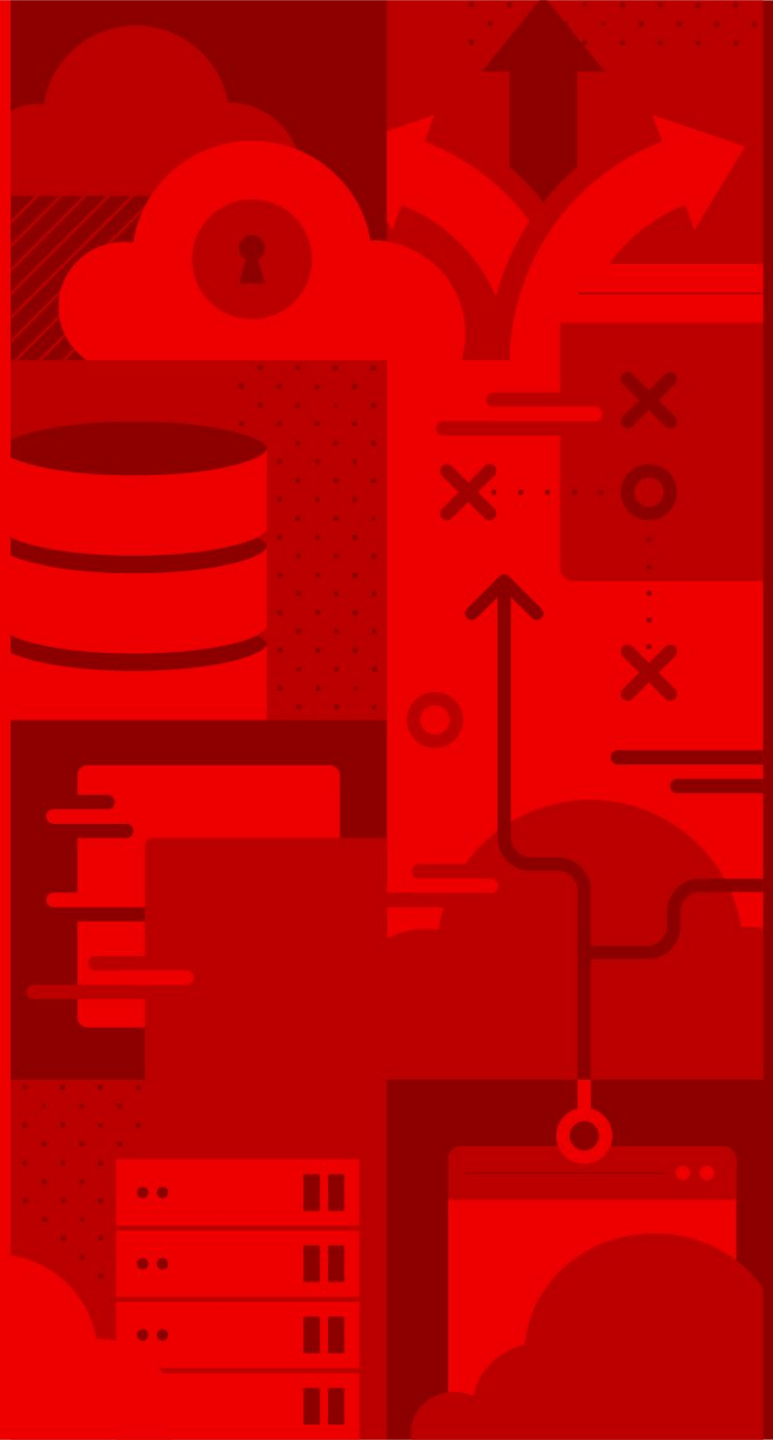


Appendix

Red Hat Insights



Current Trends & Challenges - Appendix

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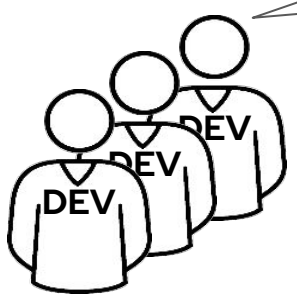
Kubernetes, what can happen?

I don't need to wait, I'll just deploy and will build my own or pick one in the cloud

I need a container platform that can deal with VMs and containers and can run on-premise and cloud to help me modernise my existing applications in stages

I need a K8 platform to run my applications but IT is too slow & inflexible



Kubernetes

On-premise

Microsoft Azure

amazon web services

Google Cloud

Considerations:

- Allow developers to spin up clusters as and when required to experiment and build
- Standard developer tools & capabilities to allow easy portability of workloads between clusters
- Choice of on-premise and cloud clusters, containers & VMs to modernise existing applications

OPENSHIFT

V1.18

Kubernetes

V1.16

Azure Kubernetes Service

V1.17

Amazon EKS

V1.17

Google Kubernetes Engine

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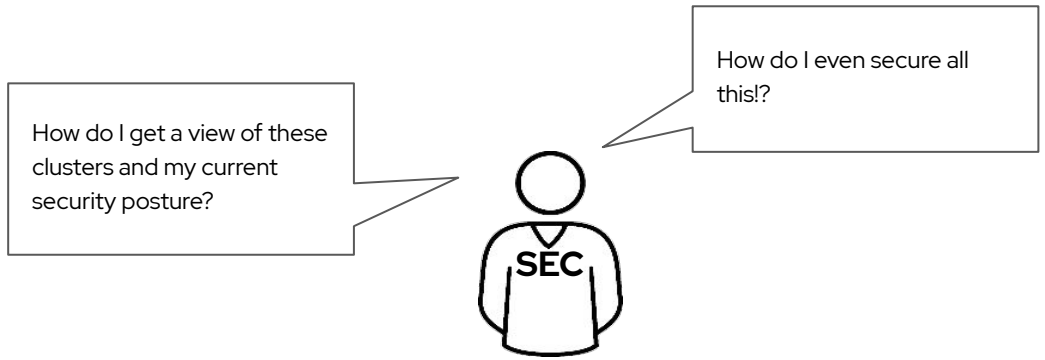
Kubernetes, what can happen?



On-premise

Microsoft Azure

amazon web services

Google Cloud

Considerations:

- Preventing risk of compliance and security breaches
- Centrally managing security policy across a diverse set of platforms

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V1.18

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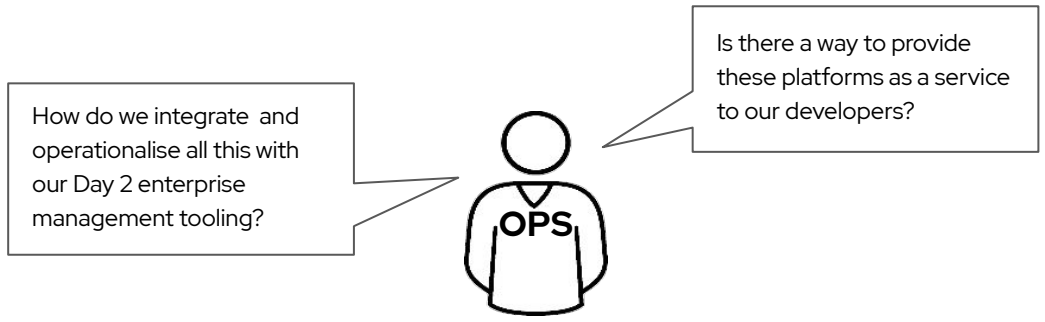

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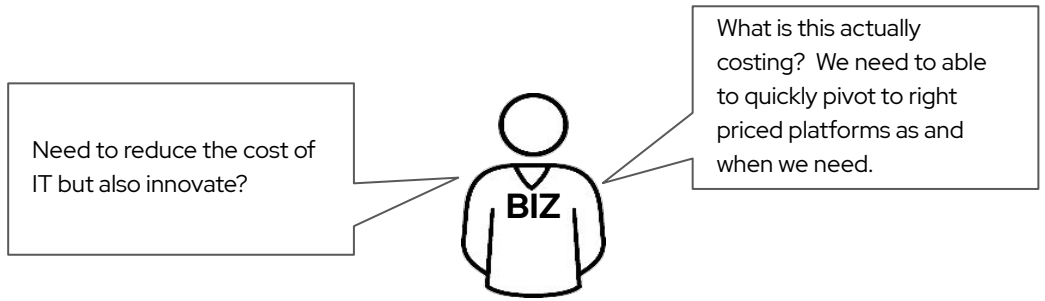
Kubernetes, what can happen?



On-premise

Microsoft Azure

amazon web services

Google Cloud

Considerations:

- Getting an accurate view of the actual cost of running platforms
- Avoiding lock-in, to get the best value for the business

OPENSHIFT

V1.18

Kubernetes

V1.16

Azure Kubernetes Service

V1.17

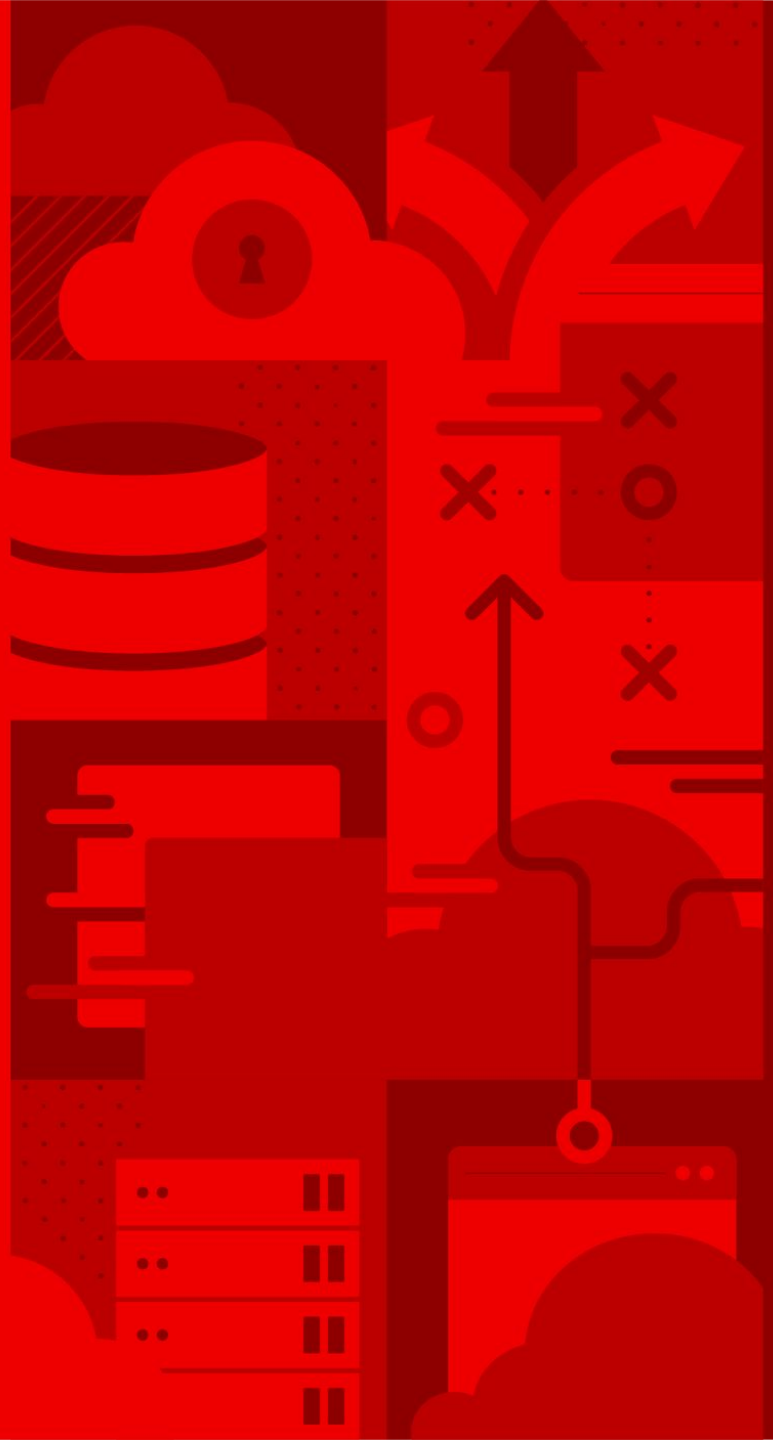
Amazon EKS

V1.17

Google Kubernetes Engine

Red Hat

Red Hat Insights



Architecture - Appendix

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Role-Based Access Control

Red Hat Advanced Cluster Management for Kubernetes

Security OPS

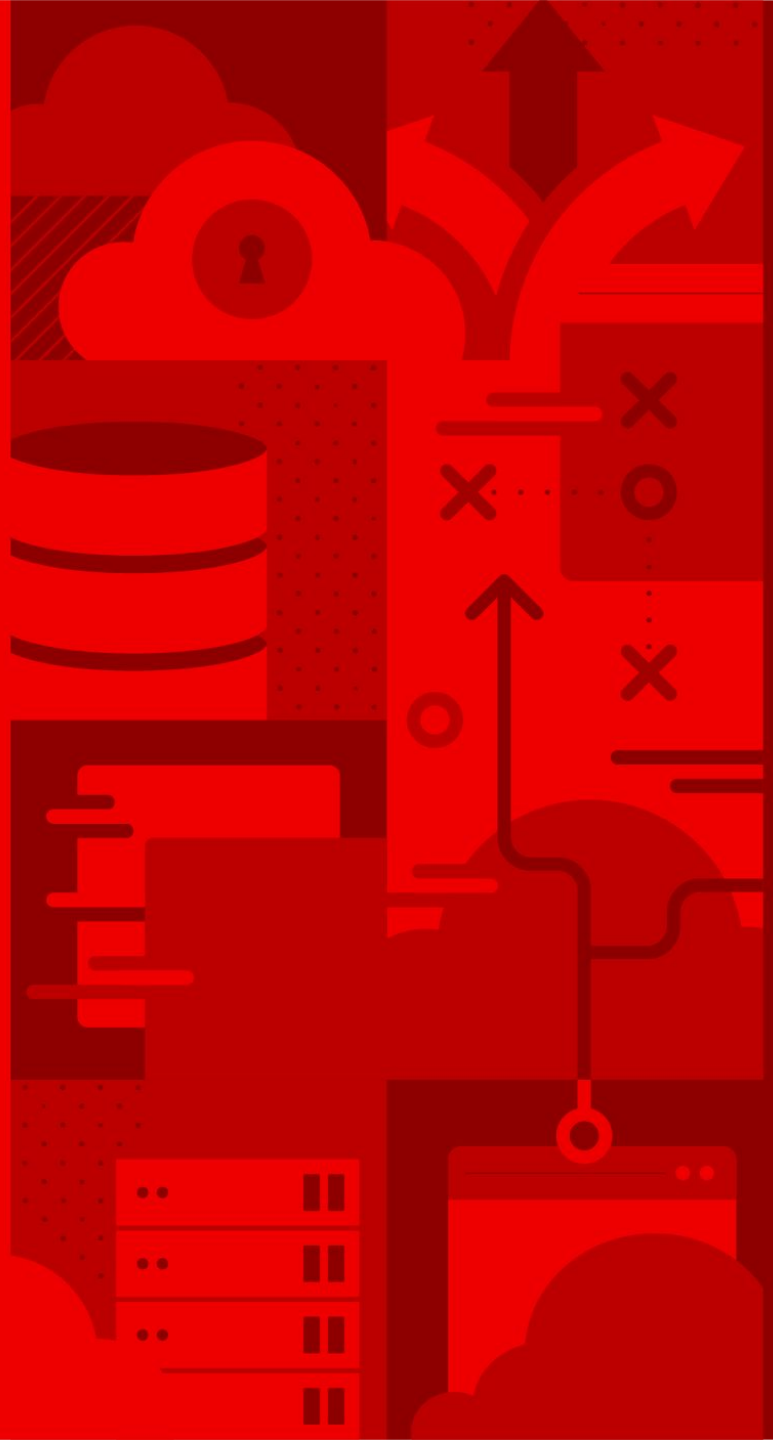
How to control User access

- There are no RHACM specific Roles or Personas, we rely on the default roles included in OCP
  - **Cluster Admin** - Super User can perform all actions
  - **Admin** - Can perform some actions
  - **Edit** - Read access
  - **View-** Read access
- Default User after installation is Kube Admin

UI Panel	Cluster Admin	Admin	Edit	View
Home Page	Read	Read	Read	Read
Overview Page	Read	Read	Read	Read
Topology View	Read	Read	Read	Read
Cluster View	CRUD*	Read	Read	Read
Manage Applications	CRUD*	CRUD*	Read	Read
Manage Policies	CRUD*	CRUD*	No Access	No Access

*Create / Read / Update /Delete

Red Hat Insights



RHACM Support Matrix

Red Hat

RHACM Support Matrix

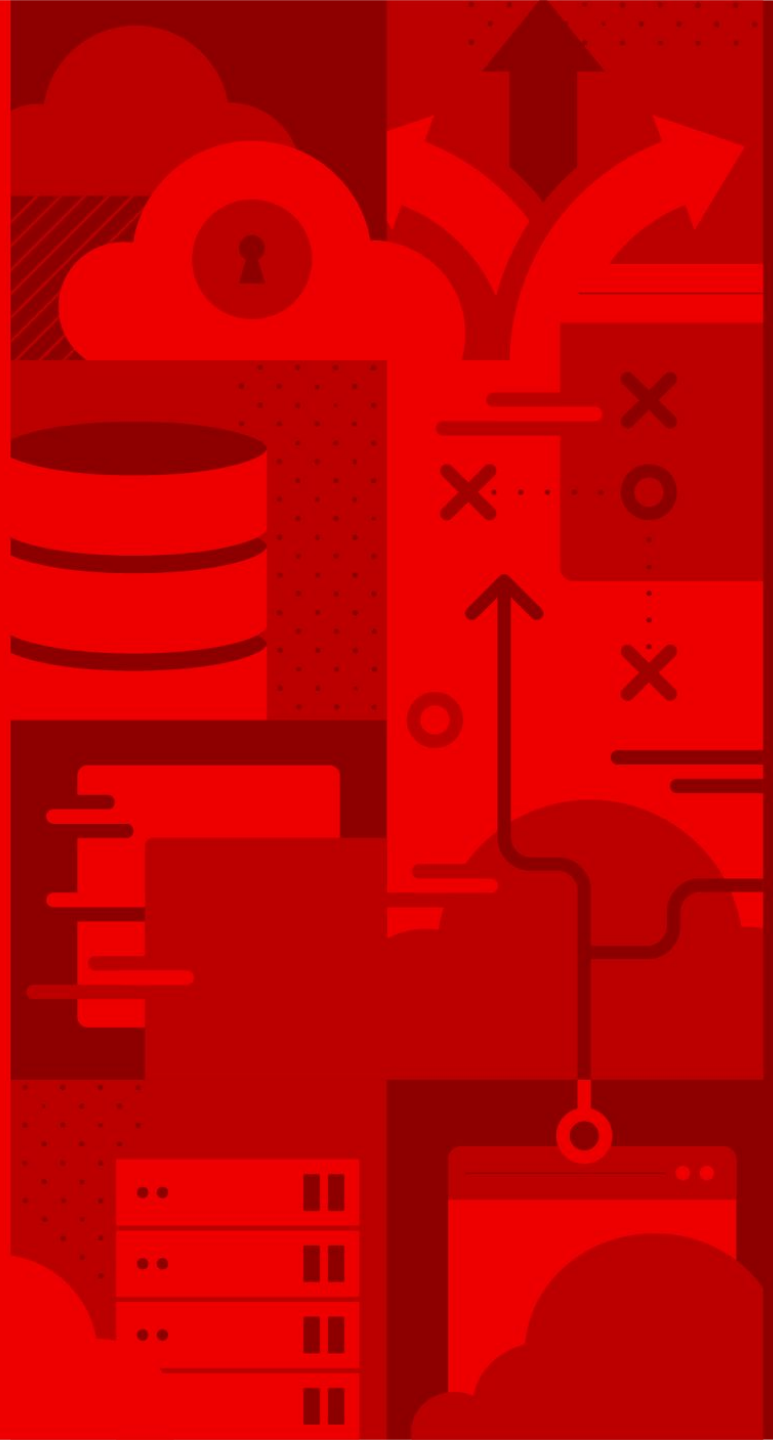
Taken from Support Matrix (many other tables covering Applications, Policies, etc...)

Cluster Lifecycle Management

Features	Red Hat OpenShift Container Platform	Red Hat OpenShift Kubernetes Engine	IBM Red Hat OpenShift Kubernetes Services	Amazon EKS	Google GKE	IBM Cloud Kubernetes Service	Microsoft AKS
Cluster list view	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Import existing cluster	Yes (OpenShift Container Platform 3.11, and later)	Yes	Yes	Yes	Yes	Yes	Yes
Create a cluster	Yes (OpenShift Container Platform 4.4, and later)	Yes	No	No	No	No	No
Upgrade a cluster	Yes (OpenShift Container Platform 4.3, and later)	Yes	No	No	No	No	No
Destroy a cluster	Yes (OpenShift Container Platform 4.3 and later)	Yes	No	No	No	No	No

Red Hat

Red Hat Insights



RHACM Production SKUs

Red Hat

Production SKUs

New SKU#	Existing SKUs Description
MCT3945	Red Hat Advanced Cluster Management for Kubernetes, Premium (2 Core or 4 vCPU)
MCT3946	Red Hat Advanced Cluster Management for Kubernetes, Standard (2 Core or 4 vCPU)
SER0599	60 Day Evaluation of Red Hat Advanced Cluster Management for Kubernetes, Self-Support (2 Cores or 4vCPU)
SER0600	60 Day Evaluation of Red Hat Advanced Cluster Management for Kubernetes, Standard (2 Cores or 4vCPU)
SER0601	Red Hat Advanced Cluster Management for Kubernetes, Self-Support (2 Cores or 4vCPUs, NFR, Partner Only)
SER0602	Red Hat Advanced Cluster Management for Kubernetes, Standard (2 Cores or 4vCPUs, NFR, Partner Only)