Red Hat Industrial Edge

Roadmap for Industry 4.0

Scott ‘SES’ England-Sullivan
Chief Architect, Central NAComm

Red Hat

Agenda

- What is Industry 4.0
- How can Red Hat help?
- Open Data Hub
- Wrap Up / Q&A

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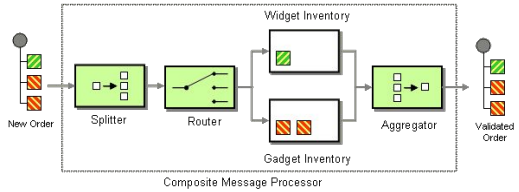
Scott “SES” England-Sullivan

Chief Architect

- API & Integration Specialist
- Committer with Apache Camel
- I Like Things that Go Fast
- I miss my Loons!




Fender TELECASTER

What is Industry 4.0

The bridging of physical industrial assets and digital technologies through cyber-physical systems.

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The 4 Industrial Revolutions

From Steam to Automation

1760 to 1840

Mechanization

Steam Engines

Mining

Iron Production

Machine Tools

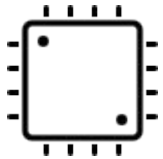
1870 to 1914

Mass Production

Production Line

Engines/Turbines

Electrical Systems



1969 to 2008

Computerization

Digital Manufacturing

Introduction of OT & IT

Internet

PLC & Robotics

2010 to Today

Automation

Smart Factories

Convergence of OT & IT

The Cloud

IoT & Cyber-Physical

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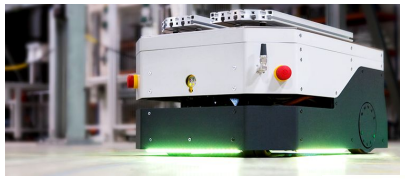
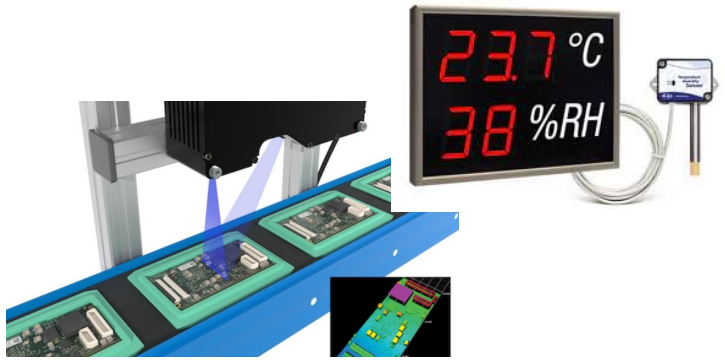
What is Operational Technology?

Computation

Control





Communications

5G

CBRS

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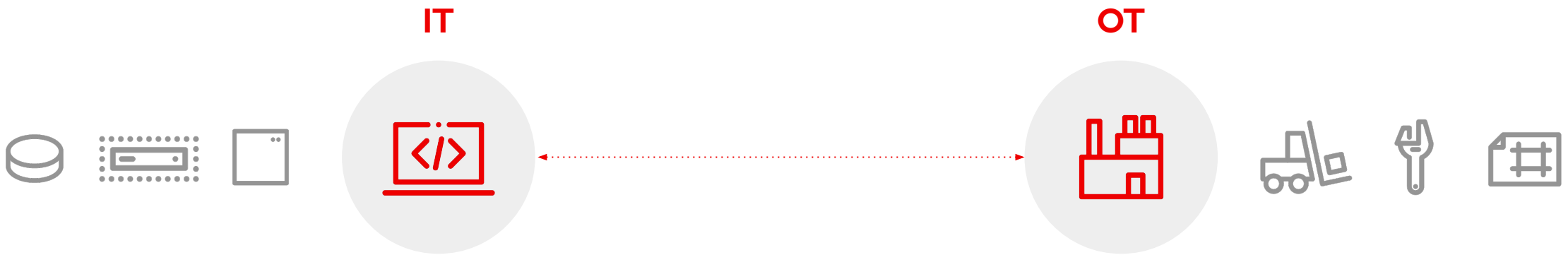
Edge is bringing transformation to operational technology



Software-defined platforms

- Standard, scalable hardware
- Cloud-native applications
- Flexibility and agility
- Convergence of data platforms

Software-defined **everything**

- Real-world, real-time interaction
- Convergence of planning & execution
- Implementation of data-driven insights
- Integration of formerly closed systems

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IT/OT Convergence

The Challenges

How can Red Hat help?

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Edge Tiers

Centralize where you can, distribute where you must.

Partners

Red Hat's focus

SCALE

FOOTPRINT

Device or Sensor

Device Edge

Edge Server/Gateway

End-User Premises Edge

Infrastructure Edge

Provider Edge

Provider Far Edge

Provider Access Edge

Provider Aggregation Edge

Provider/Enterprise Core

Regional Data Center

Core Data Center

"last mile"

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Internal use only

Factory Edge

Any workload, any footprint, **any location**

SCALE

FOOTPRINT

Device or Sensor

Network Modernization
Private Wireless
MES Integration
Predictive Maintenance
Quality Assurance

End-user premises edge

Edge server/gateway

Infrastructure edge

Different Stakeholders (OT vs. IT)
Special technology requirements
Long Depreciation Cycles
Firewalls

"last mile"

Provider edge

Provider far edge

Provider access edge

Provider aggregation edge

Provider or enterprise core

Regional data center

Core data center

A consistent edge platform from the datacenter to the edge

Develop once, deploy anywhere

Meet diverse use cases

Consistent operations

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Edge gateway/ edge server

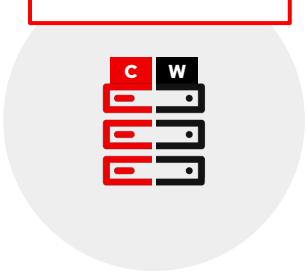
Small bare metal footprint

Infrastructure virtualization

Public/private cloud

Red Hat is focused on four edge architectures

TODAY

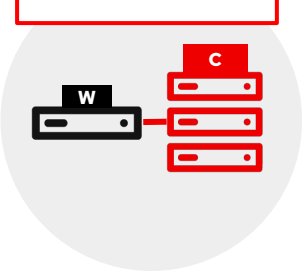


Edge clusters (3+ node HA)

Red Hat OpenShift masters and workers reside on the same node. High availability (HA) setup with 3 servers.

Red Hat OpenShift Container Platform

4.6

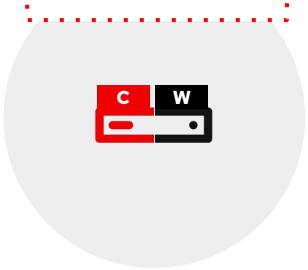


Remote worker nodes

Red Hat OpenShift masters reside in a central location, with reliably-connected workers distributed at edge sites sharing a control plane.

Red Hat OpenShift Container Platform

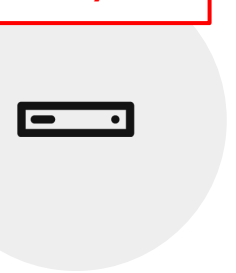
2021



Coming soon

Red Hat OpenShift Container Platform

NEW w/ 8.3



Small footprint device edge

A small footprint deployment with long-lived release support. Key building blocks are Red Hat Enterprise Linux and a container runtime.

Red Hat Enterprise Linux

Cluster management and application deployment

Kubernetes node control

C Control node

W Worker node

Evolving Red Hat Enterprise Linux for the Edge

Stability and deployment flexibility

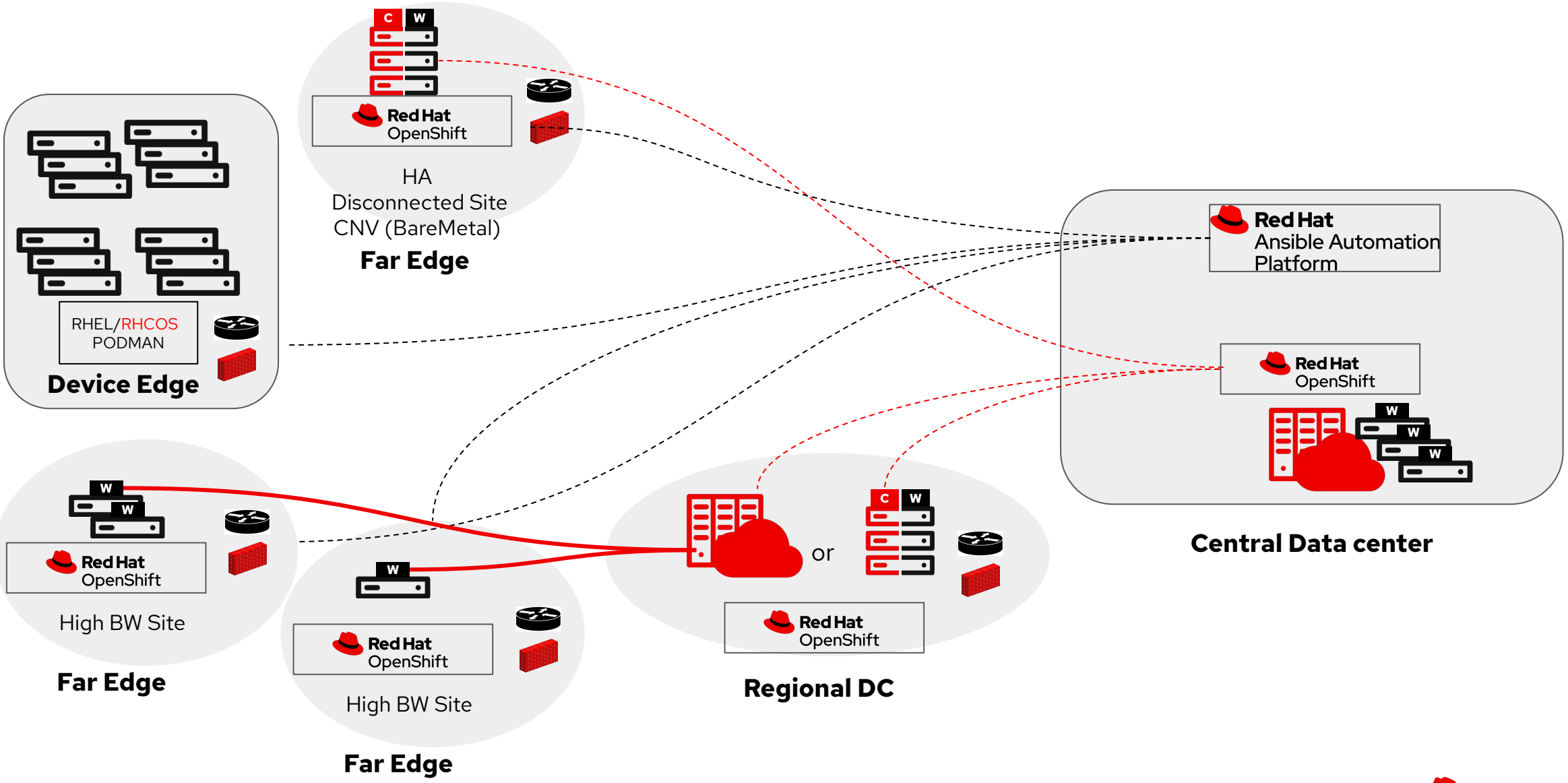
New Edge deployment option
Included with RHEL 8.3

Create edge-optimized RHEL system images with ImageBuilder using the included **RHEL for Edge Commit** image type

Leverage core RHEL technologies, like language and application frameworks, and now:

- An application immutable, small footprint deployment
- Intended for, but not limited to, containerized applications
- Transactional OS updates
- Intelligent OS rollbacks function as a failsafe to add additional resilience.

Edge deployments with OpenShift



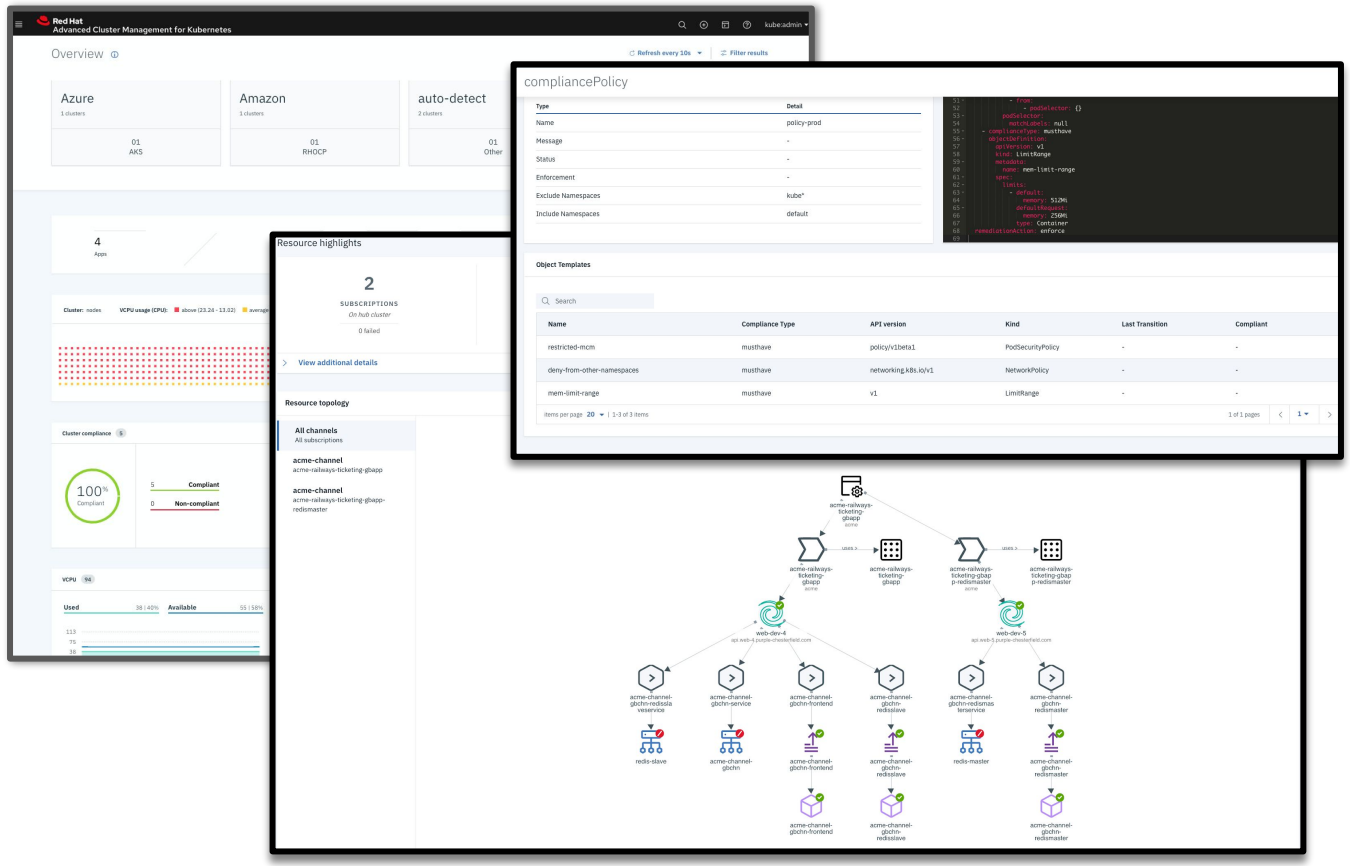
Managing the edge, just like the core

Red Hat Advanced Cluster Management for Kubernetes

Multicluster lifecycle management

Policy driven governance, risk, and compliance

Advanced application lifecycle management



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Small footprint edge OS

Memory-constrained edge servers/Internet of Things (IoT) Gateways

- Nov. 2020

Single-node edge servers

Low bandwidth or disconnected sites

- 2021

Remote worker nodes

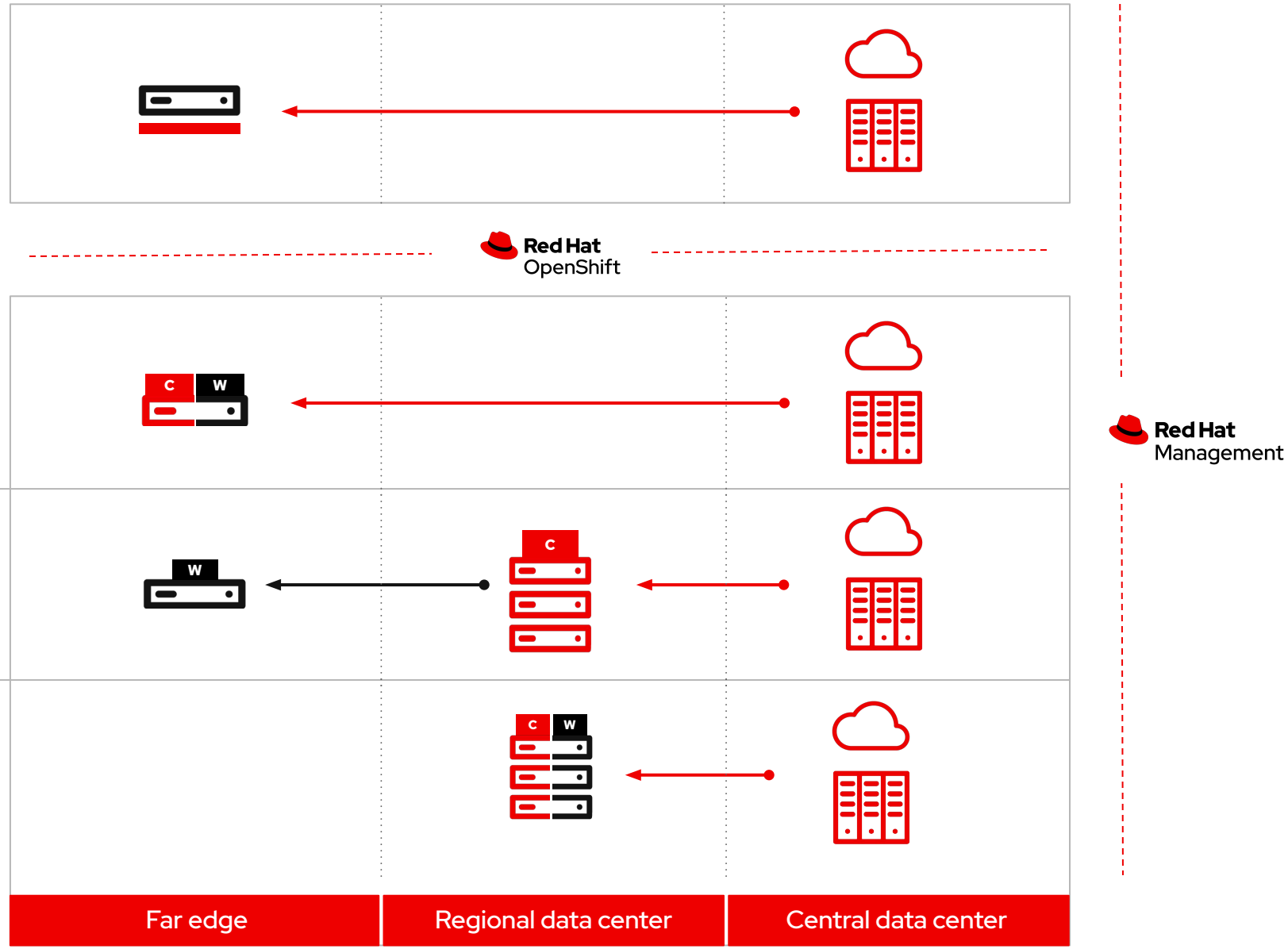
Space-constrained environments

- Nov. 2020

3 node Clusters

Small footprint with high availability

- Today



Cluster management and application deployment

Kubernetes node control

C Control node

W Worker node

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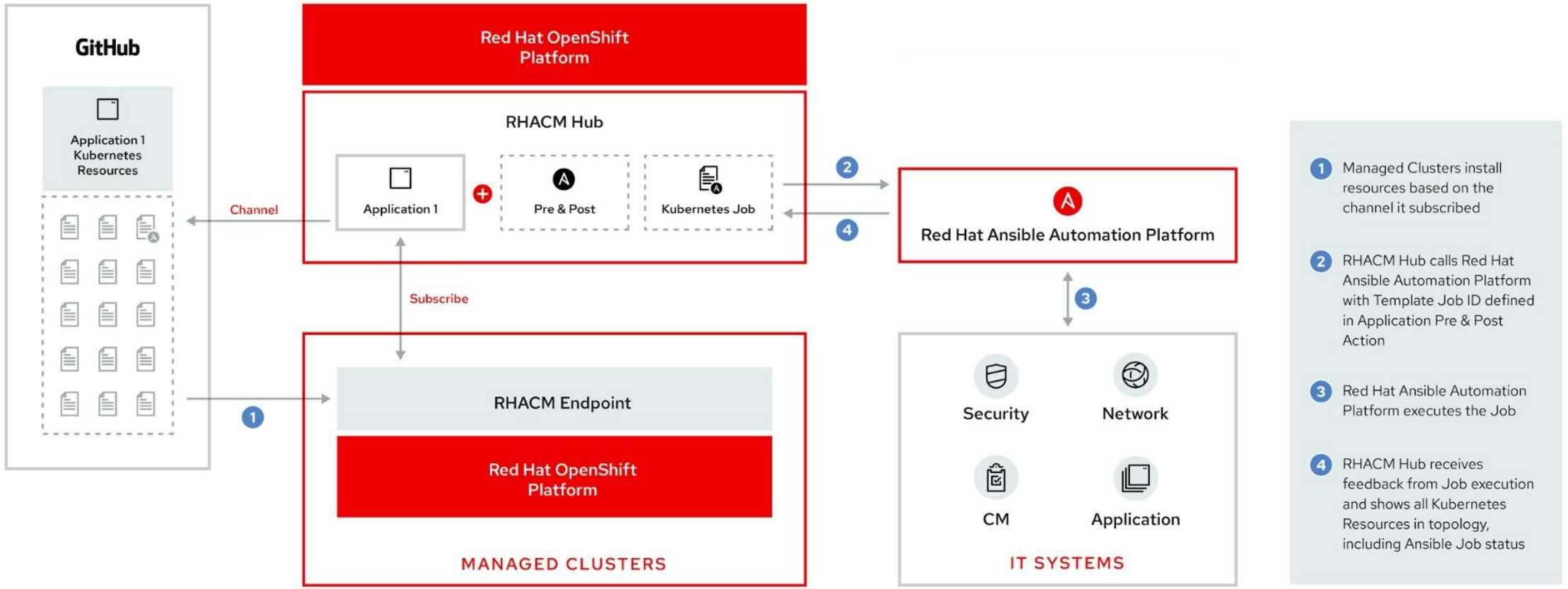
Tech preview

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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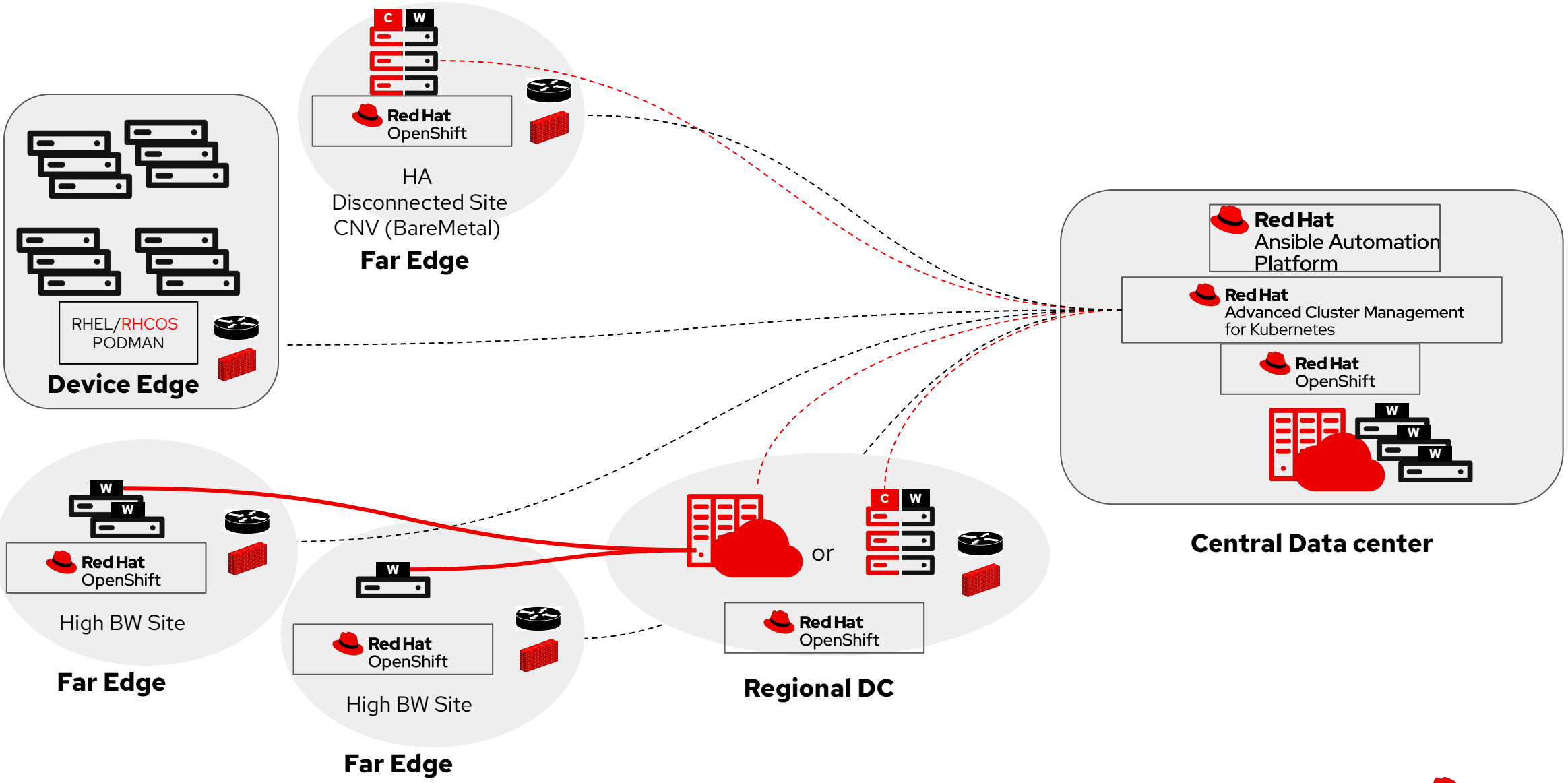
Edge deployments with OpenShift



Open Data Hub

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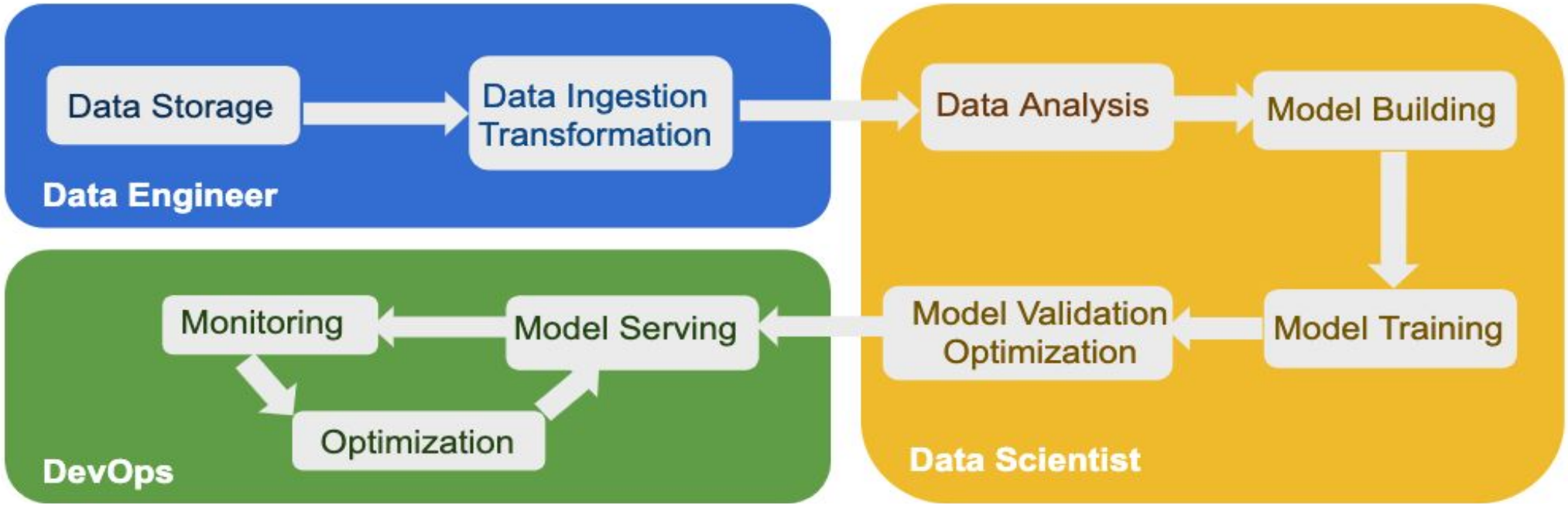
Open Data Hub is an open source community AI/ML platform on Openshift



Open Data Hub integrates open source projects into an **end-to-end AI/ML platform** on OpenShift

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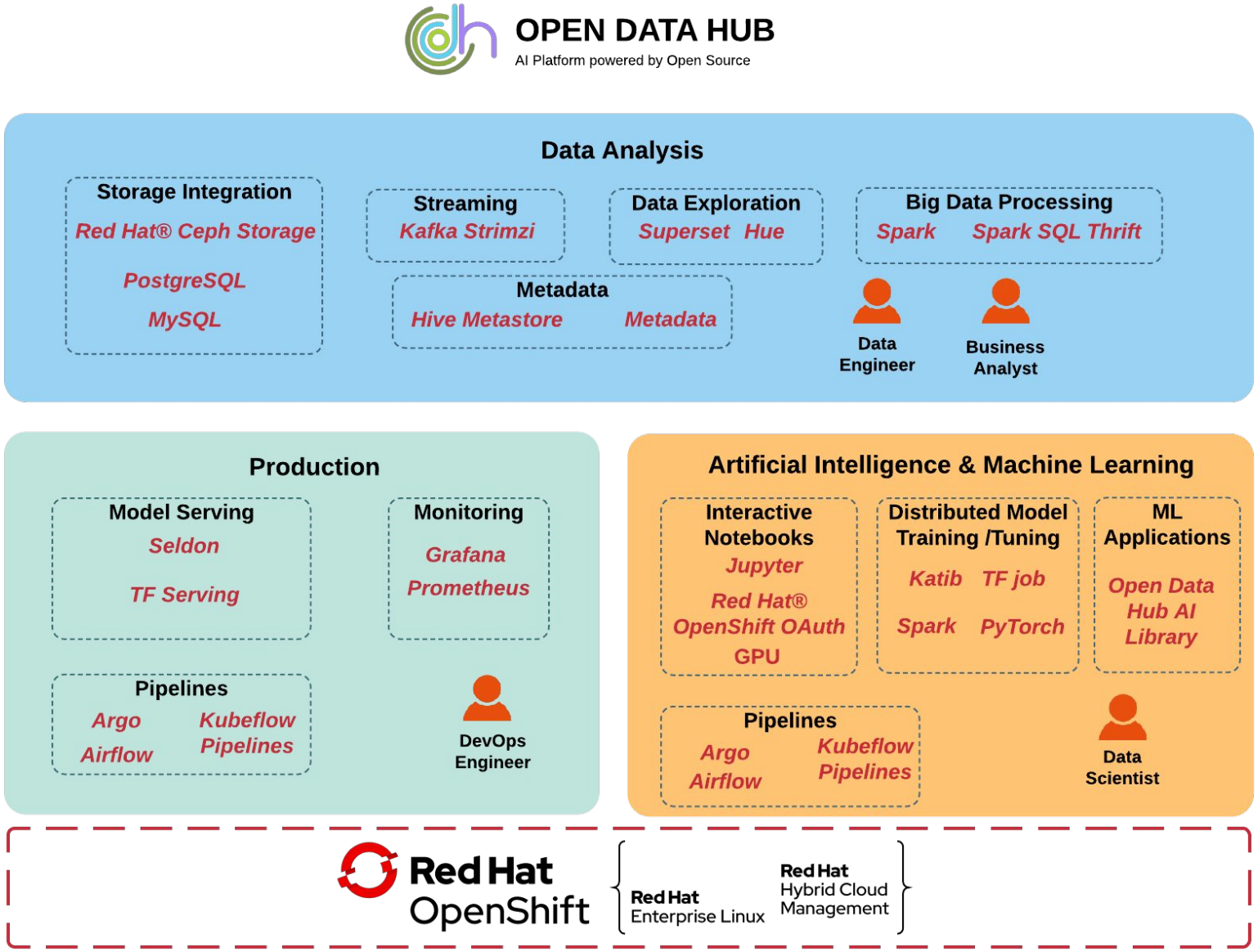

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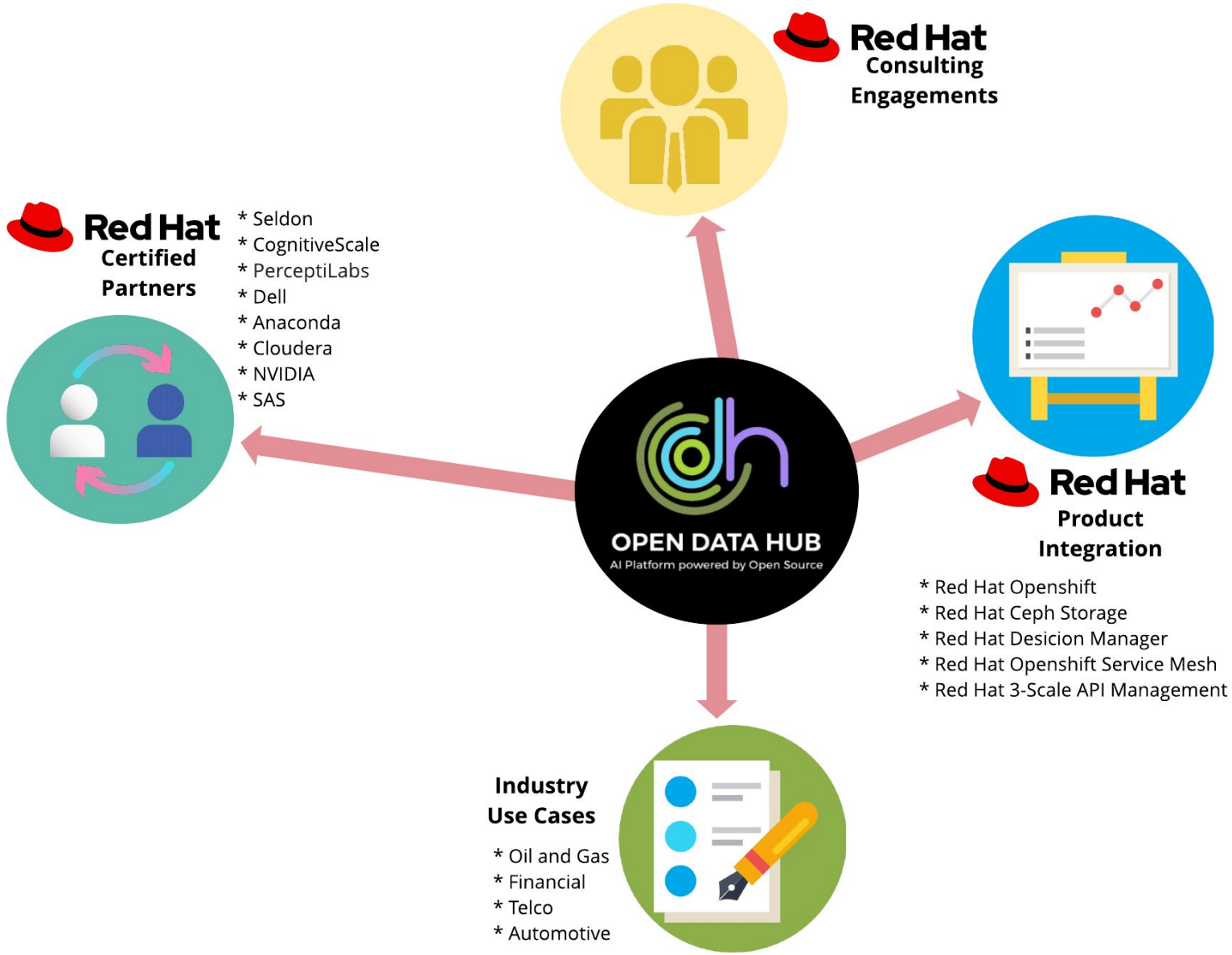
Open Data Hub comes with an ecosystem provided by **Red Hat** and **Certified Partners**



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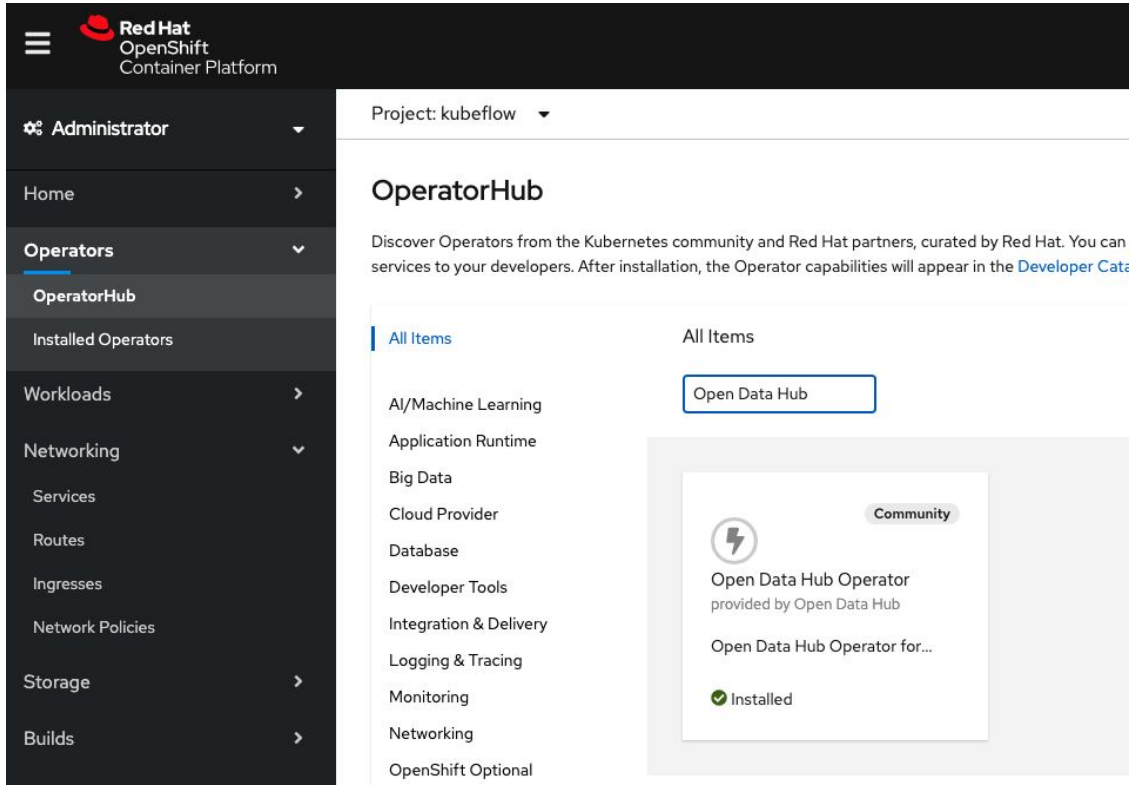
Open Data Hub is an **Operator** installed from OpenShift **OperatorHub**

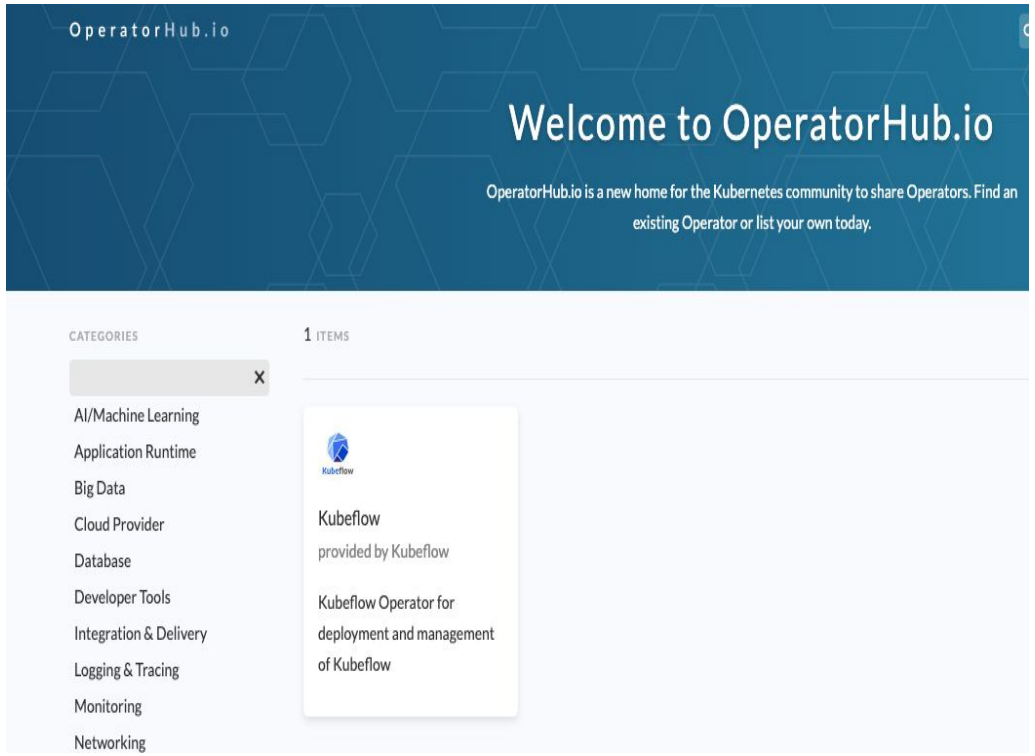
✓ Yes

OPENSHIFT



✗ No

kubernetes



Production Workflow - AI/ML Model Training /Serving in Edge

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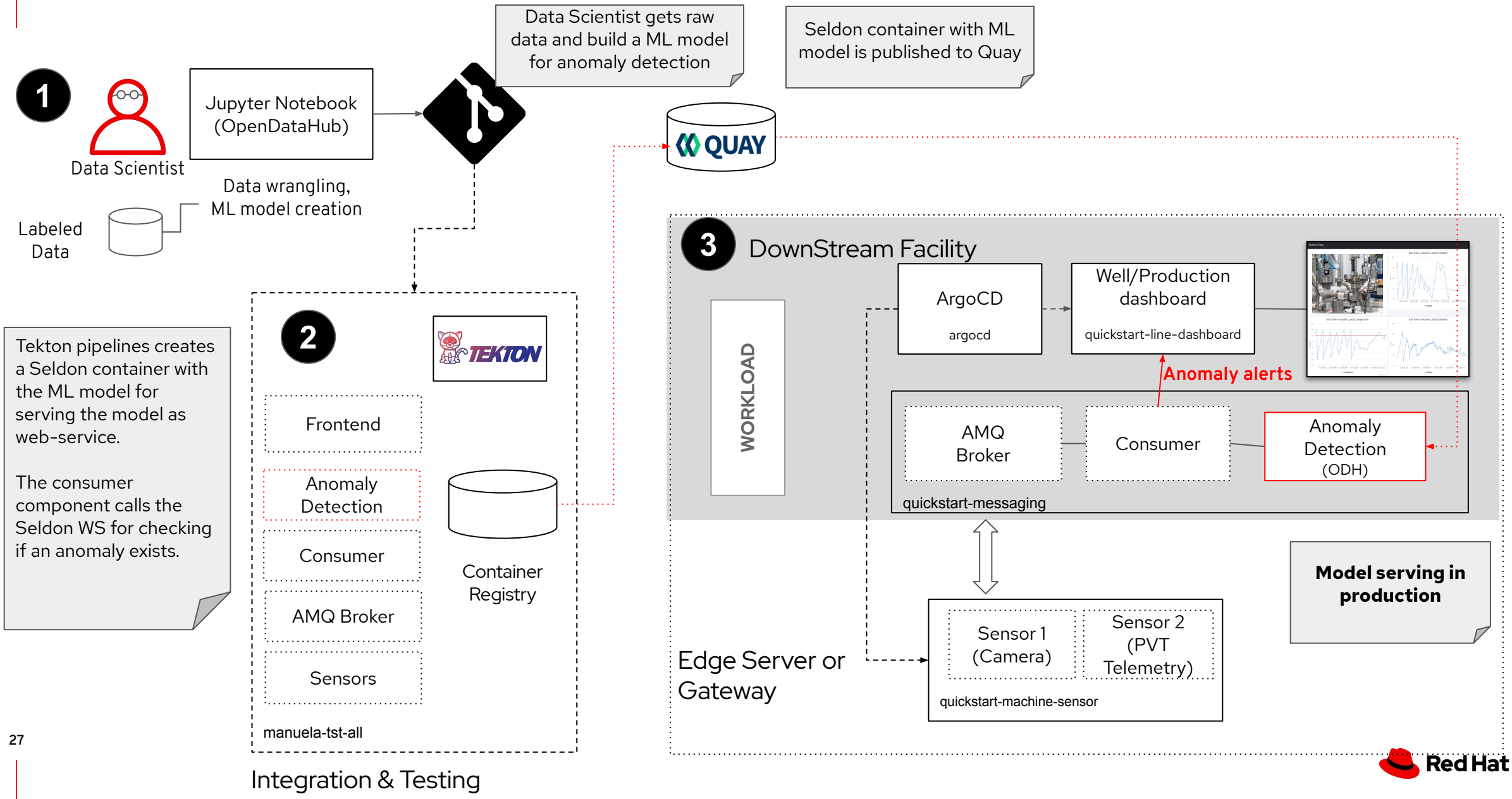

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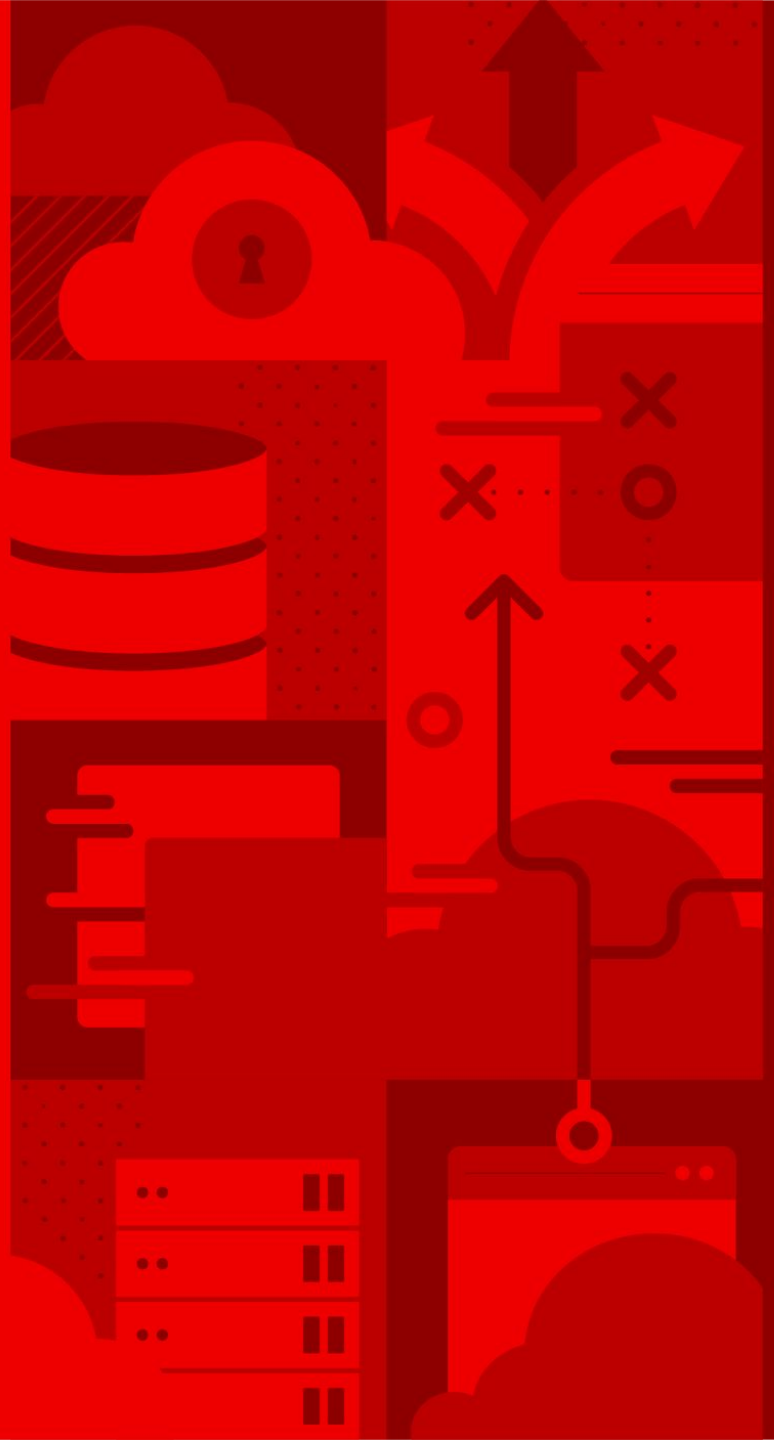

Wrap Up & Questions

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ses@redhat.com

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