Hallo. Servus. Grüezi. 15. OpenShift Anwendertreffen!

🇩🇪 🇨🇭 🇦🇹 DACH Event

30.06.2021

Red Hat

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Senior Solution Architect

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○ https://github.com/stefantrimborn

in https://www.linkedin.com/in/stefan-trimborn/
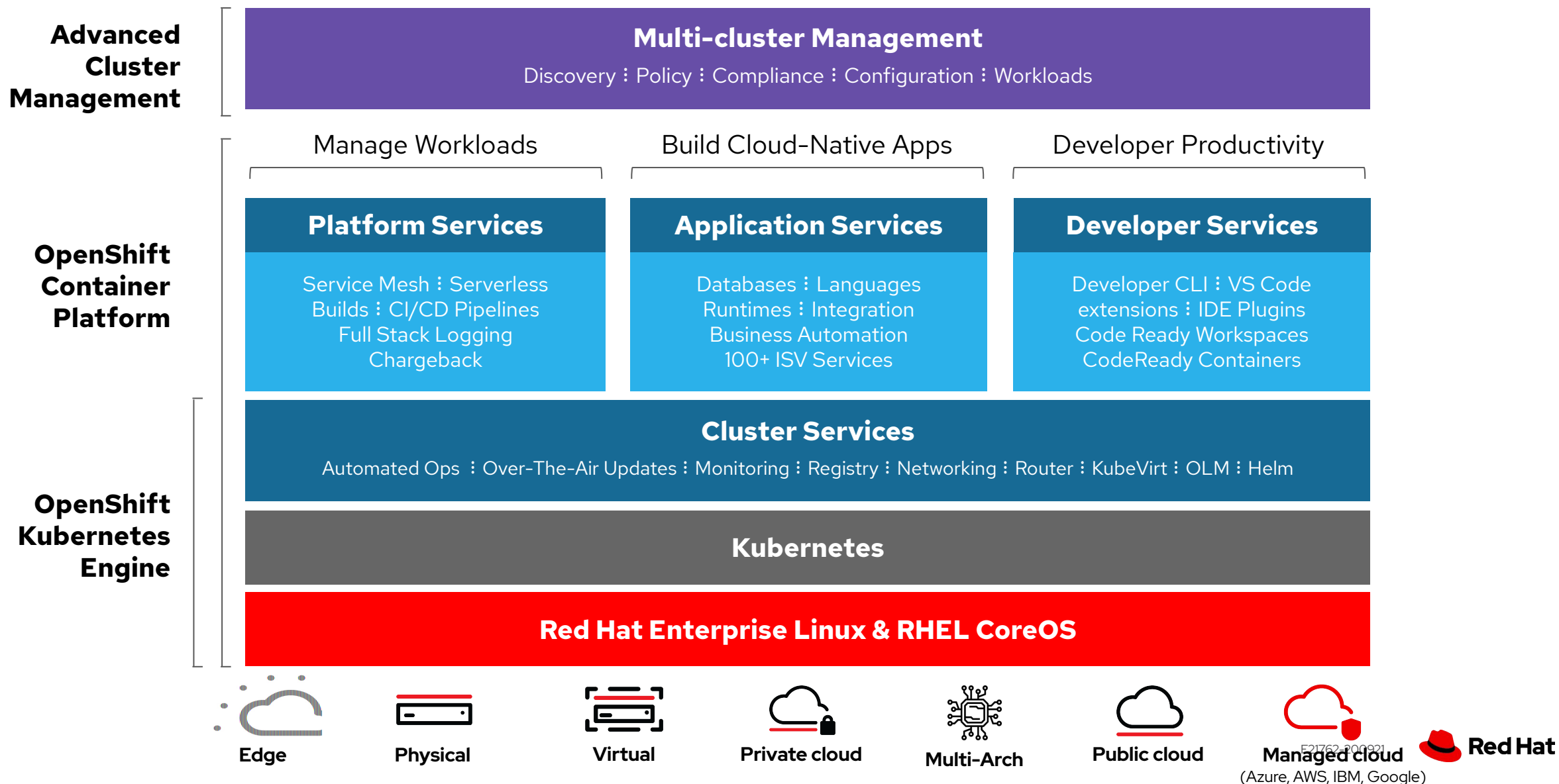
🐦 @stefan_tr1mb0rn

Red Hat

Agenda

- ▶ From Traditional to VM's to Containers
- ▶ Architectural Overview
- ▶ VM's and Windows Containers
- ▶ Ecosystem
- ▶ Platform Services
- ▶ Platform Plus
- ▶ Red Hat Training
- ▶ Q & A

Red Hat

# OpenShift Container Platform

Advanced Cluster Management

Multi-cluster Management

Discovery ⋮ Policy ⋮ Compliance ⋮ Configuration ⋮ Workloads

OpenShift Container Platform

Manage Workloads | Build Cloud-Native Apps | Developer Productivity

Platform Services

Service Mesh ⋮ Serverless
Builds ⋮ CI/CD Pipelines
Full Stack Logging
Chargeback

Application Services

Databases ⋮ Languages
Runtimes ⋮ Integration
Business Automation
100+ ISV Services

Developer Services

Developer CLI ⋮ VS Code
extensions ⋮ IDE Plugins
Code Ready Workspaces
CodeReady Containers

OpenShift Kubernetes Engine

Cluster Services

Automated Ops ⋮ Over-The-Air Updates ⋮ Monitoring ⋮ Registry ⋮ Networking ⋮ Router ⋮ KubeVirt ⋮ OLM ⋮ Helm

Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS

Edge **Physical** **Virtual** **Private cloud** **Multi-Arch** **Public cloud** **Managed cloud**
(Azure, AWS, IBM, Google)

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Red Hat

OpenShift Container Platform

OpenShift Ecosystem

Advanced Cluster Management

Multi-cluster Management

Discovery ⋮ Policy ⋮ Compliance ⋮ Configuration ⋮ Workloads

Advanced Cluster Security

Advanced security

Declarative security ⋮ Vulnerability management ⋮ Network segmentation ⋮ Threat detection & response

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Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS

Containers

Red Hat

From Hosts to VM's to Containers

Traditional

| App1 | App2 | App3 |

Bins/Libs

OS

Infrastructure

Virtual Machines

VM Management

App1	App2	App3
Bins/Libs	Bins/Libs	Bins/Libs
Guest OS	Guest OS	Guest OS

Hypervisor

(Host Operating System)

Infrastructure

Containers

Kubernetes

| App1 | App2 | App3 |
| Bins/Libs | Bins/Libs | Bins/Libs |

?

Host Operating System

Infrastructure

Red Hat

From Hosts to VM's to Containers

Traditional

App1	App2	App3
Bins/Libs		
OS		
Infrastructure		

Virtual Machines

VM Management

App1	App2	App3
Bins/Libs	Bins/Libs	Bins/Libs
Guest OS	Guest OS	Guest OS

Hypervisor

(Host Operating System)

Infrastructure

Containers

Kubernetes

App1	App2	App3
Bins/Libs	Bins/Libs	Bins/Libs
App4	App5	App6
Bins/Libs	Bins/Libs	Bins/Libs
App7	App8	App9
Bins/Libs	Bins/Libs	Bins/Libs

Host Operating System

Infrastructure

Red Hat

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Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS

Edge

Physical

Virtual

Private cloud

Multi-Arch

Public cloud

Managed cloud
(Azure, AWS, IBM, Google)

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Container-Basics

- a container is the smallest compute unit

CONTAINER

Red Hat
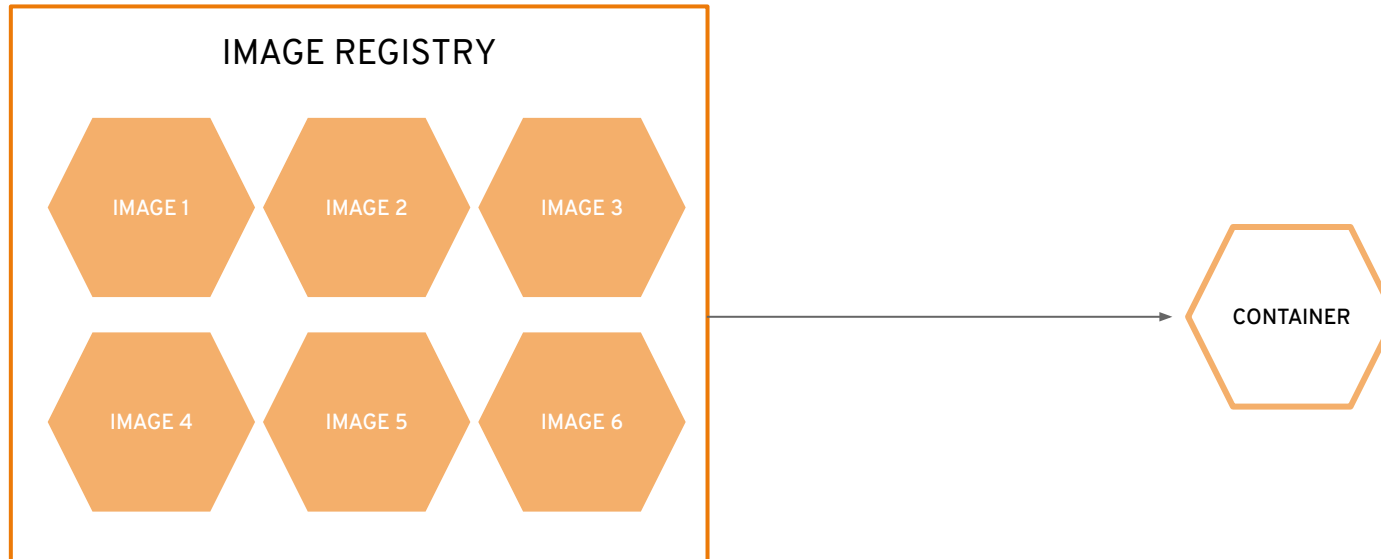
Container-Basics - Registry

containers are created from container images

IMAGE

CONTAINER

BINARY

RUNTIME (running process)
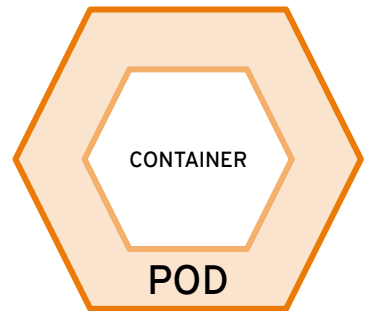
Container-Basics - Registry

container images are stored in an image registry
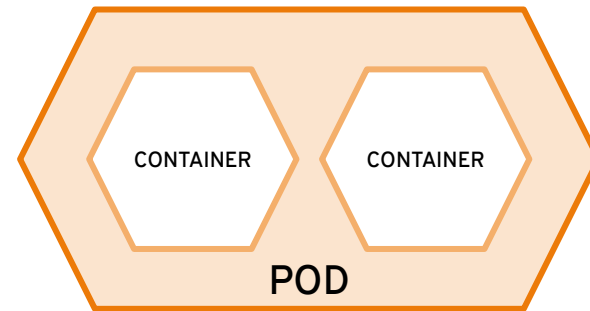
Container-Basics - POD's

- containers are wrapped in pods which are units of deployment and management

CONTAINER

POD

10.140.4.44

CONTAINER   CONTAINER

POD
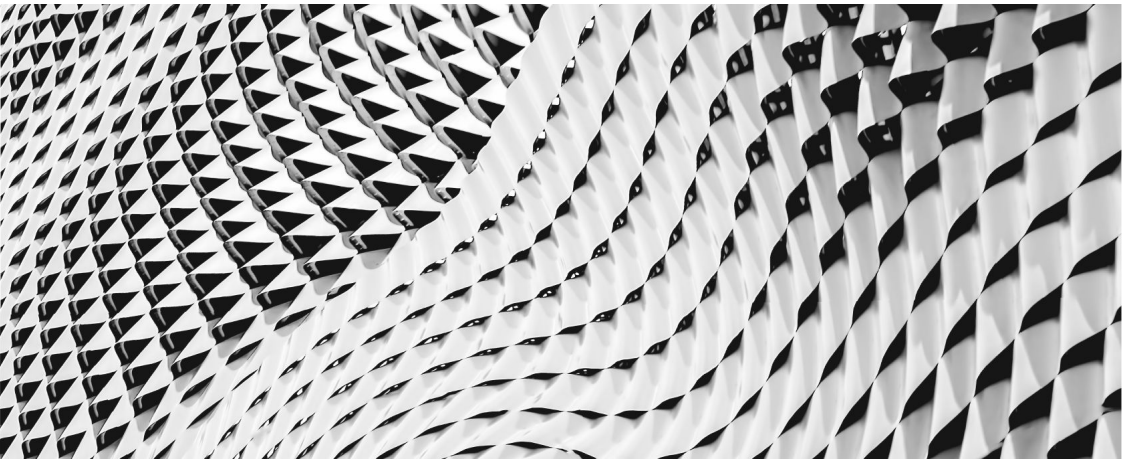
10.15.6.55
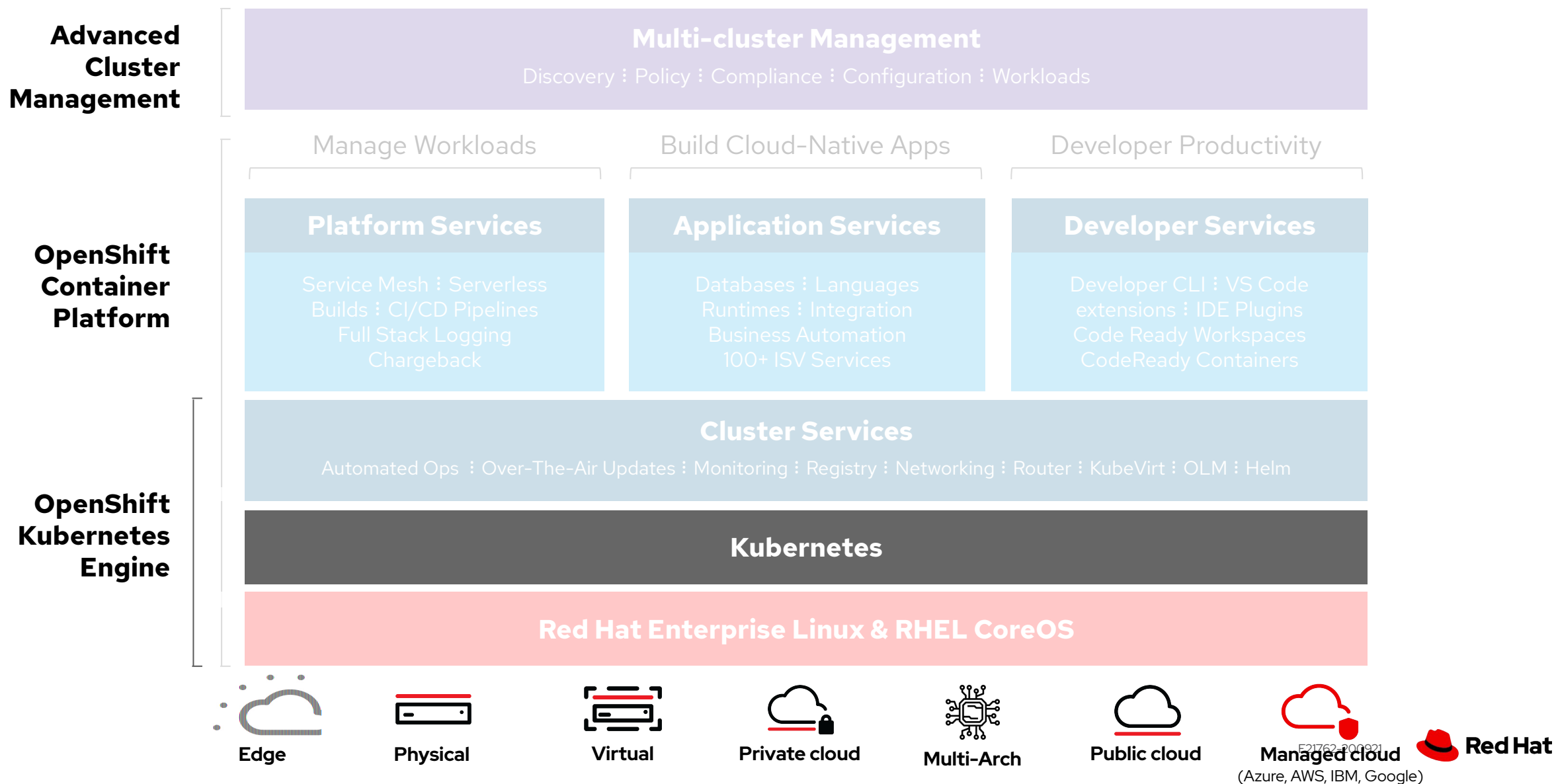
How to handle all these Containers?

V0000000

Kubernetes

Red Hat

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F21762-000921

🎩 **Red Hat**

Kubernetes and what it can do for you

Service discovery and load balancing - Kubernetes can expose a container using the DNS name or using their own IP address. If traffic to a container is high, Kubernetes is able to load balance and distribute the network traffic so that the deployment is stable.

Automatic bin packing - You provide Kubernetes with a cluster of nodes that it can use to run containerized tasks. You tell Kubernetes how much CPU and memory (RAM) each container needs. Kubernetes can fit containers onto your nodes to make the best use of your resources.

Self-healing - Kubernetes restarts containers that fail, replaces containers, kills containers that don't respond to your user-defined health check, and doesn't advertise them to clients until they are ready to serve.

Red Hat

Kubernetes and what it can do for you

Storage orchestration – Kubernetes allows you to automatically mount a storage system of your choice, such as local storages, public cloud providers, and more.

Secret and configuration management - Kubernetes lets you store and manage sensitive information, such as passwords, OAuth tokens, and SSH keys. You can deploy and update secrets and application configuration without rebuilding your container images, and without exposing secrets in your stack configuration.

Automated rollouts and rollbacks – You can describe the desired state for your deployed containers using Kubernetes, and it can change the actual state to the desired state at a controlled rate. For example, you can automate Kubernetes to create new containers for your deployment, remove existing containers and adopt all their resources to the new container.

Red Hat

Kubernetes and what it can't do for you

Does not deploy source code and does not build your application. Continuous Integration, Delivery, and Deployment (CI/CD) workflows are determined by organization cultures and preferences as well as technical requirements.
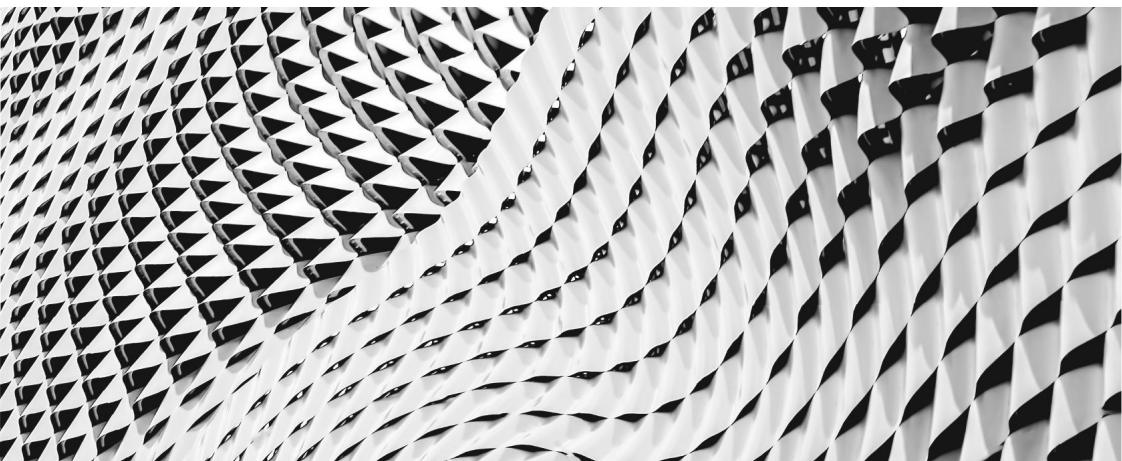
Does not provide application-level services, such as middleware (for example, message buses), data-processing frameworks (for example, Spark), databases (for example, PostgreSQL), caches, nor cluster storage systems (for example, Ceph) as built-in services.
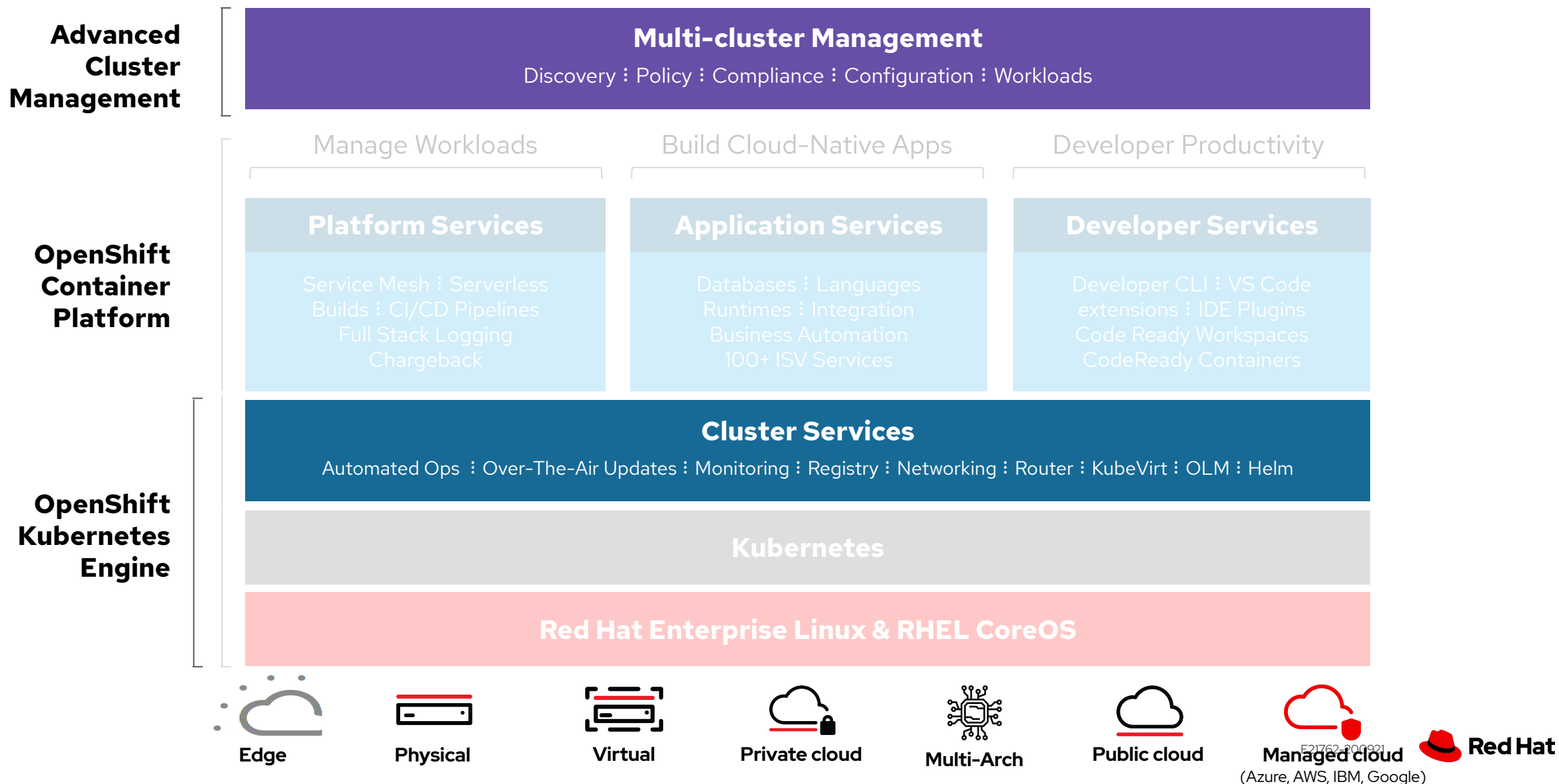
Does not dictate logging, monitoring, or alerting solutions. It provides some integrations as proof of concept, and mechanisms to collect and export metrics.

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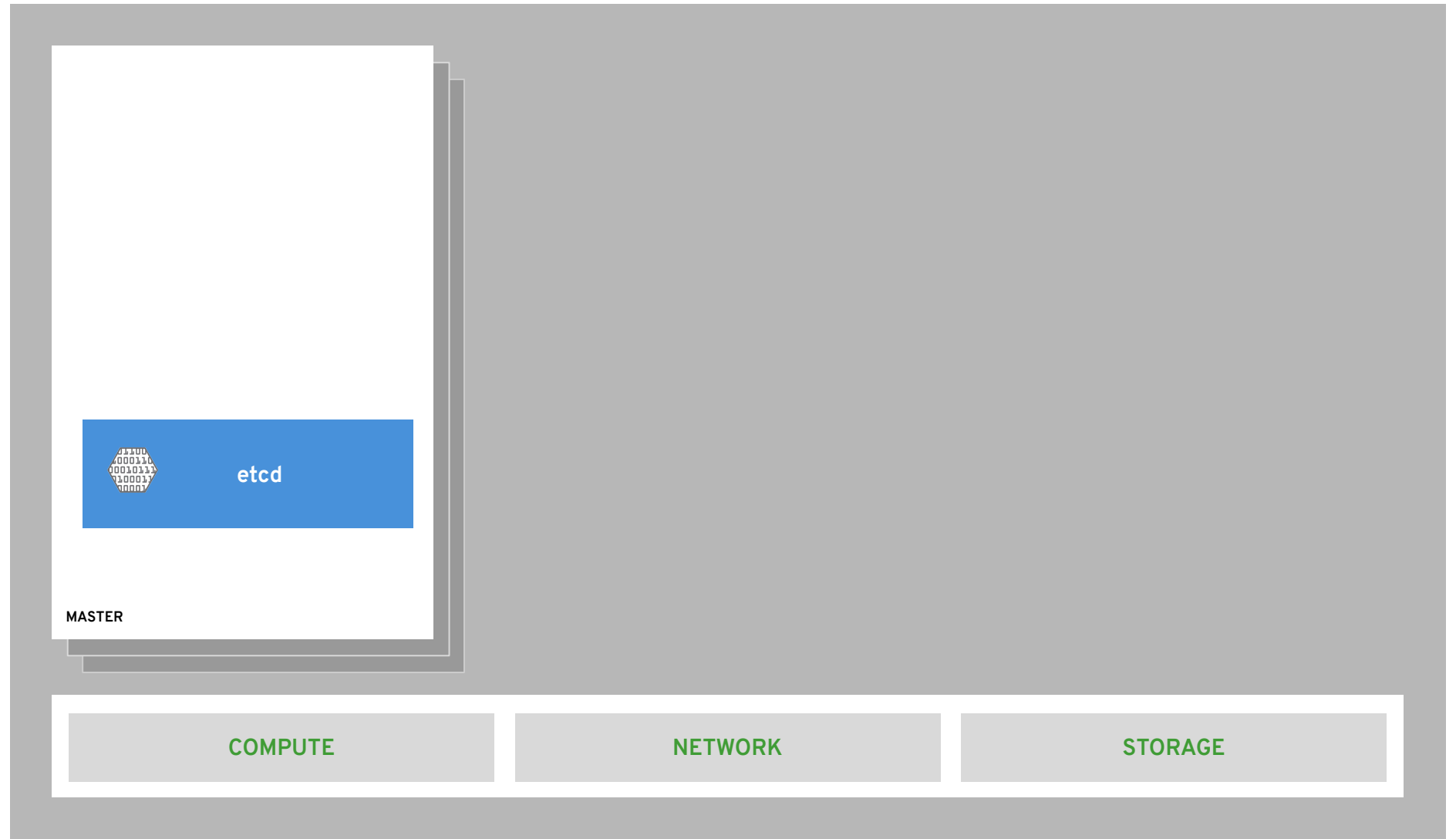
OpenShift

Your applications - on a platform
that accelerates developer
productivity and excels in
operational readiness and
security

Red Hat

OpenShift Container Platform

Advanced Cluster Management

Multi-cluster Management

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Full Stack Logging
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Red Hat Enterprise Linux & RHEL CoreOS

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state of everything

etcd

MASTER

COMPUTE

NETWORK

STORAGE

core kubernetes components

V0000000
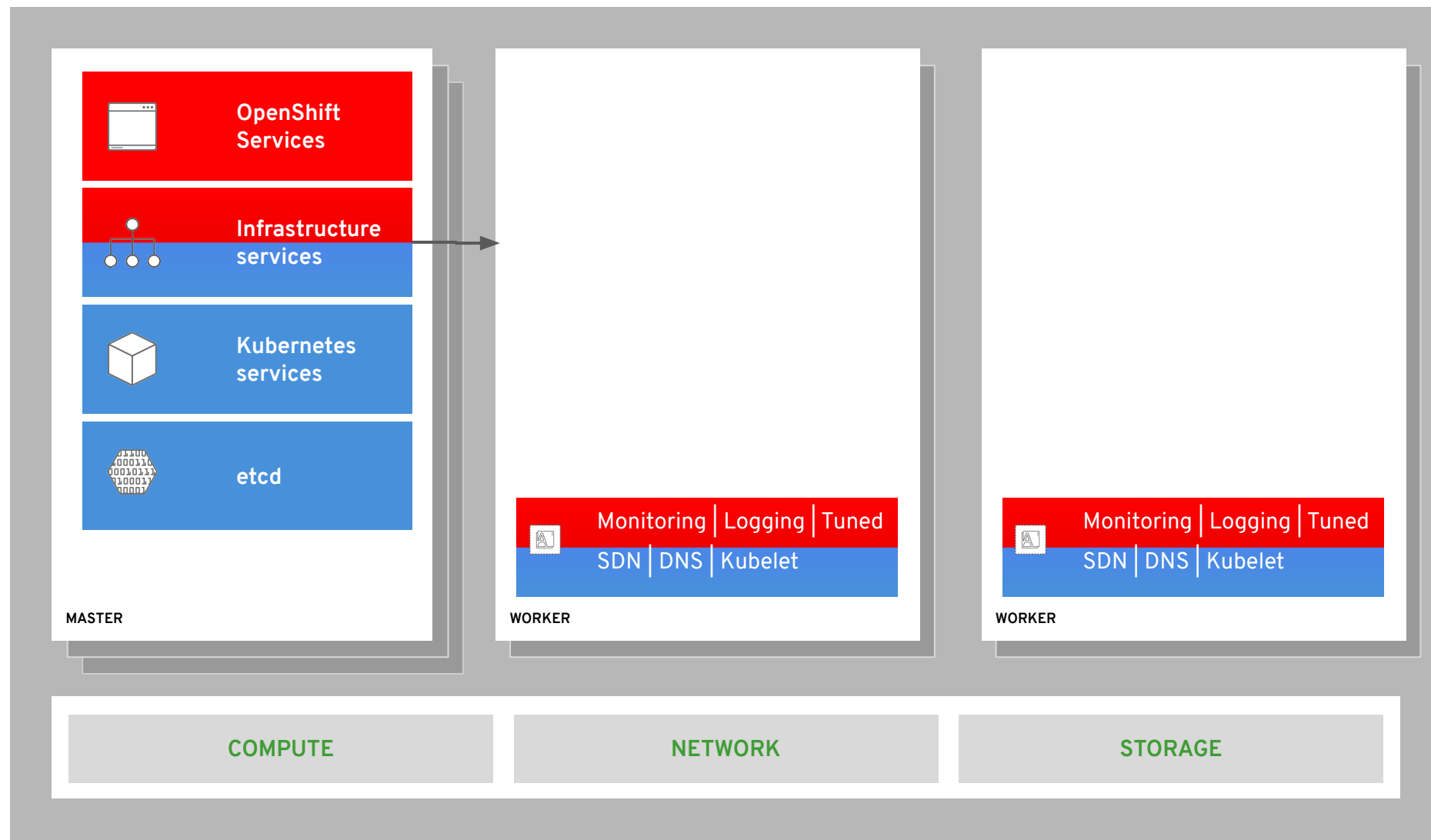
core OpenShift components

OpenShift services

Kubernetes services

etcd

MASTER

OpenShift API

Operator Lifecycle Management

Web Console

COMPUTE

NETWORK

STORAGE
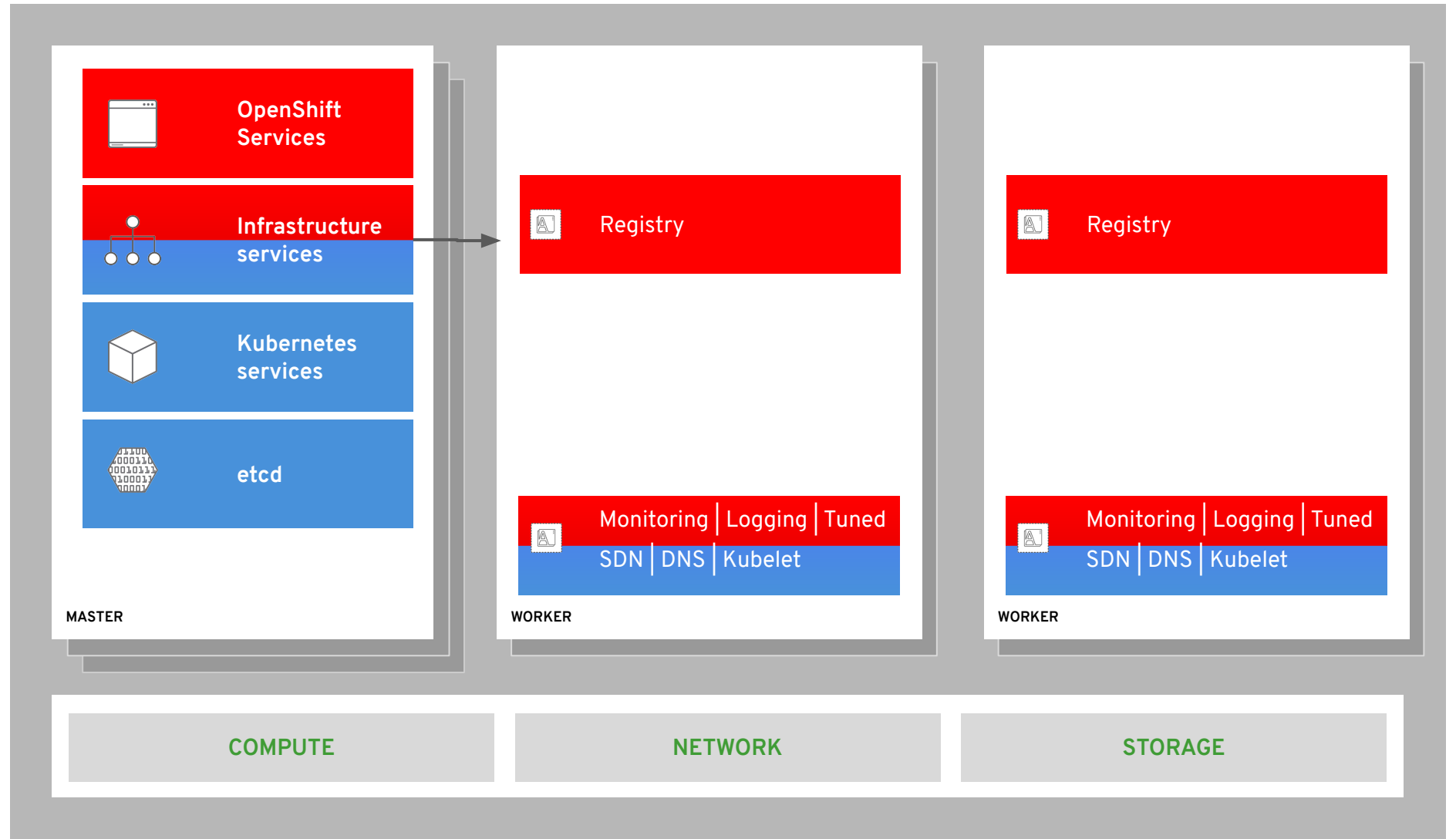
internal and support infrastructure services

OpenShift Services

Infrastructure services

Kubernetes services

etcd

MASTER

Monitoring | Logging | Tuned | SDN | DNS | Kubelet

COMPUTE

NETWORK

STORAGE

run on all hosts

OpenShift Services

Infrastructure services

Kubernetes services

etcd

MASTER

Monitoring | Logging | Tuned
SDN | DNS | Kubelet

WORKER

Monitoring | Logging | Tuned
SDN | DNS | Kubelet

WORKER

COMPUTE

NETWORK

STORAGE

V0000000

Red Hat
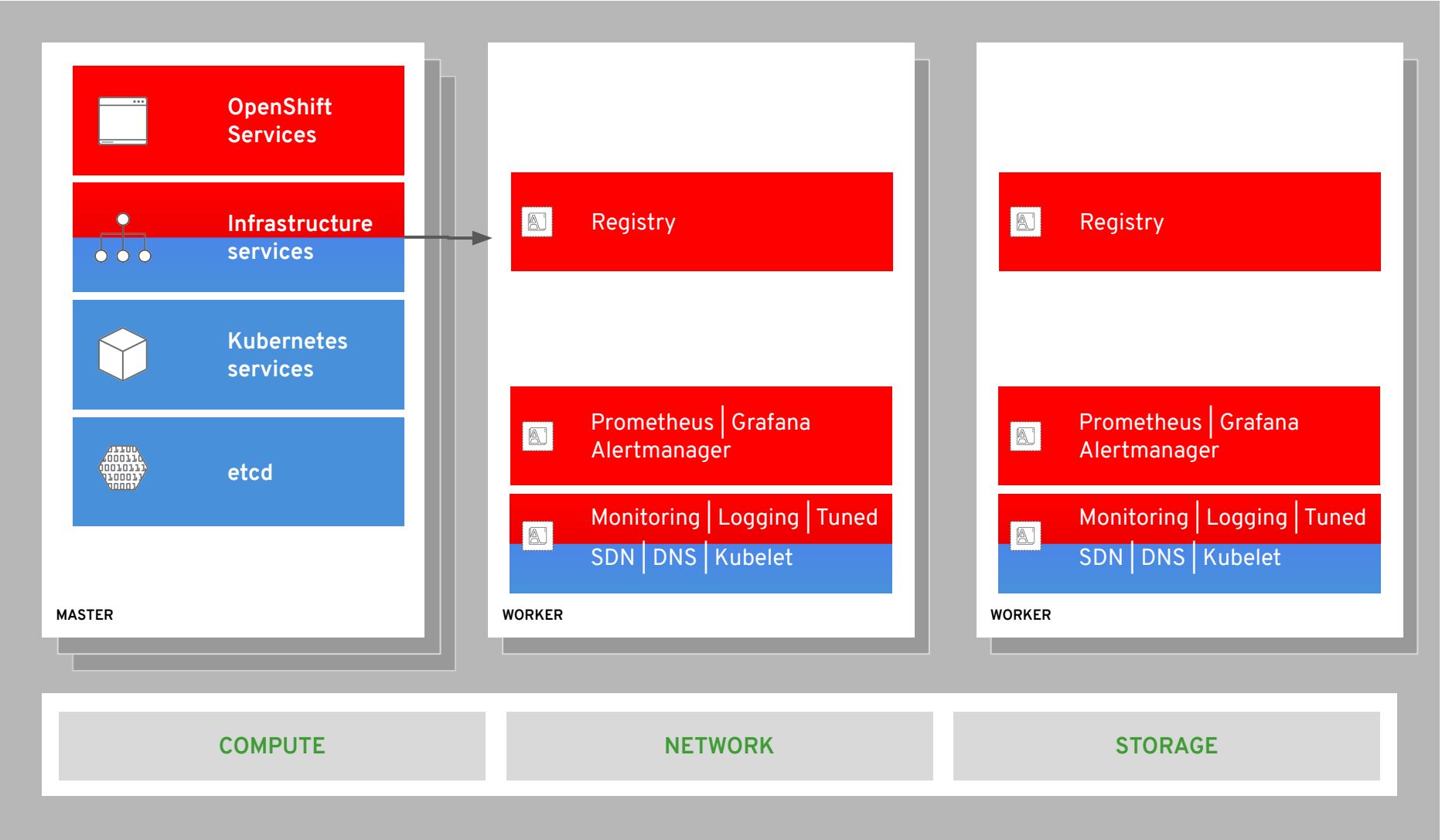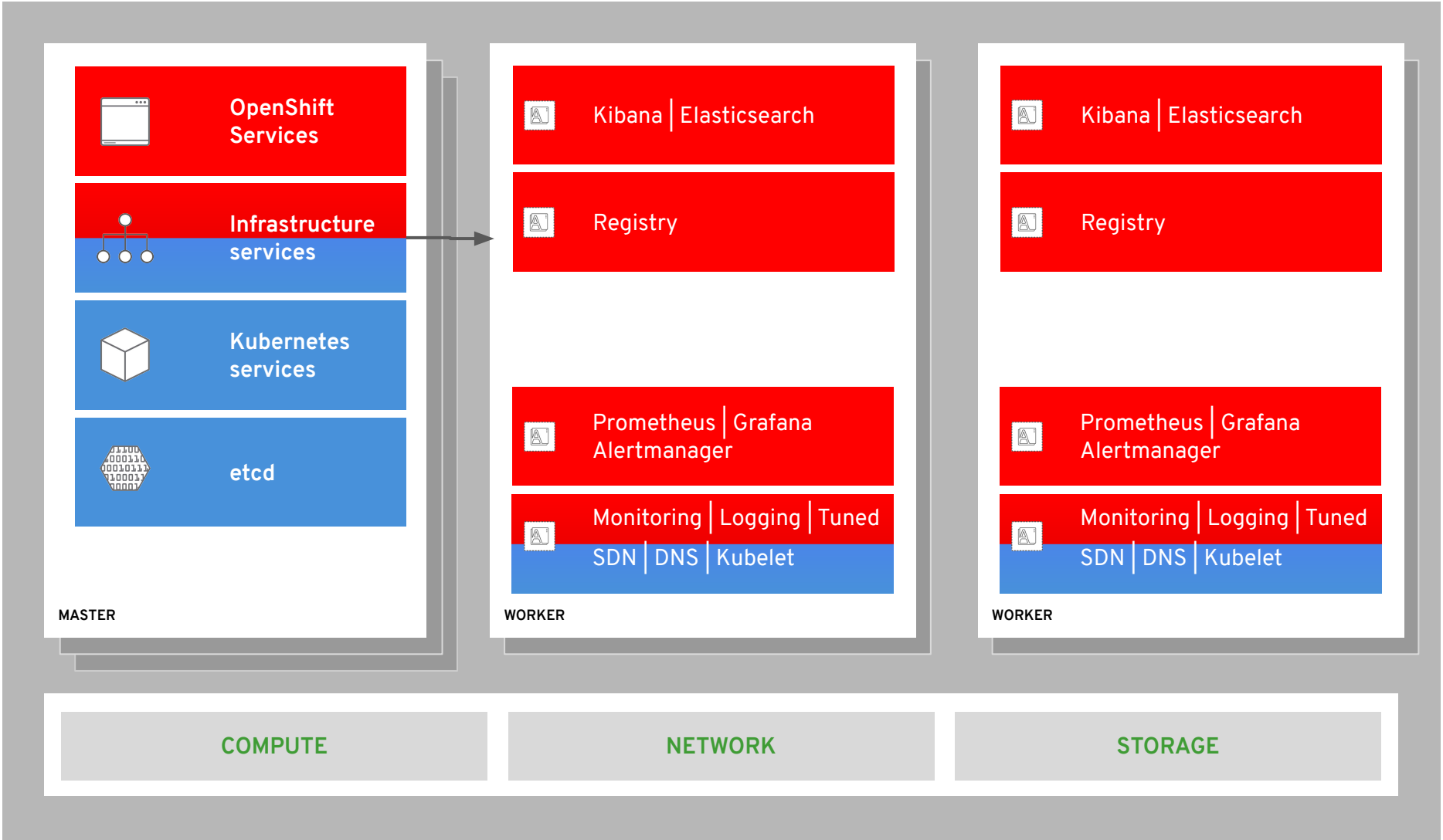
integrated image registry

cluster monitoring

V0000000

log aggregation

V0000000
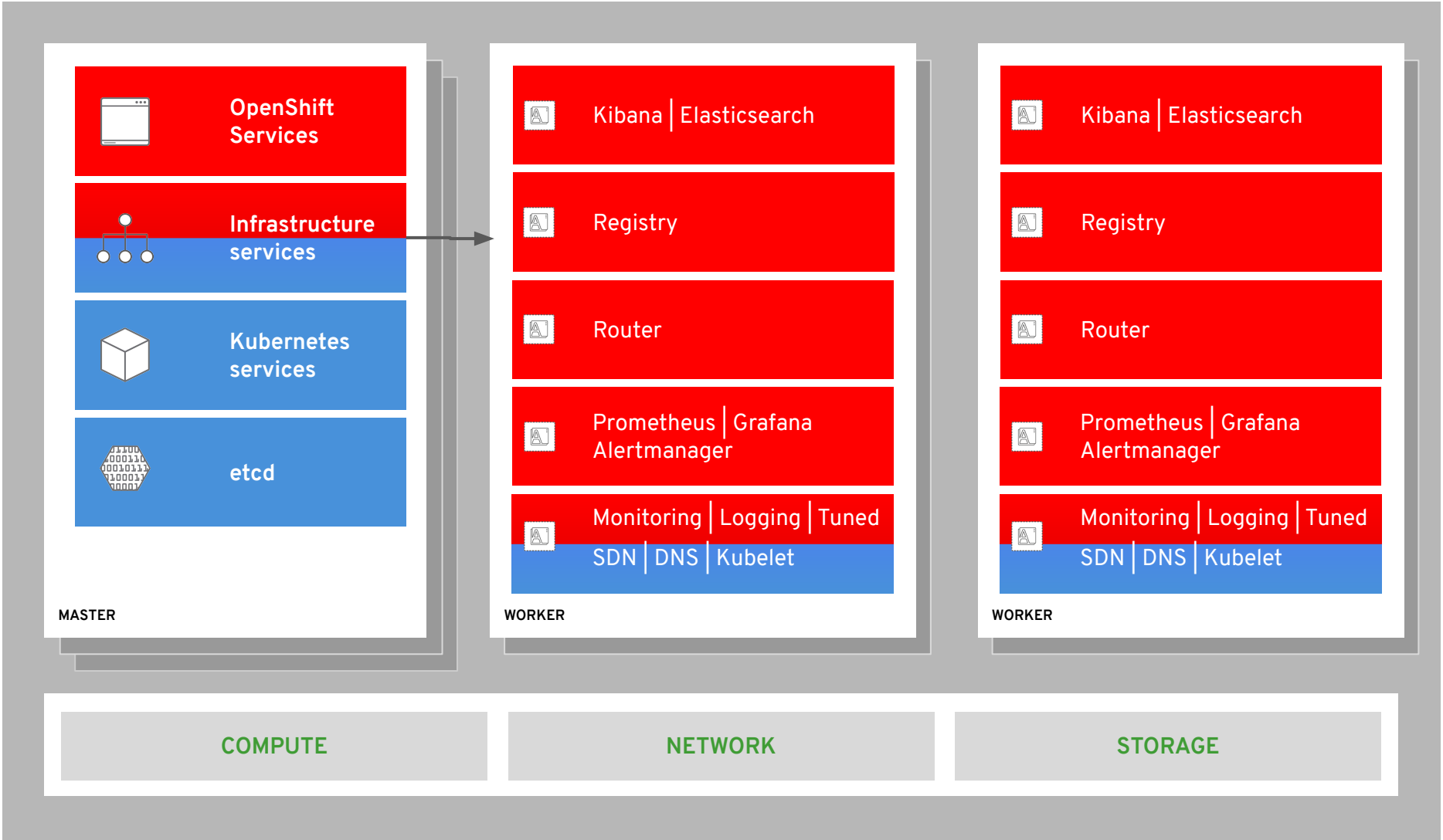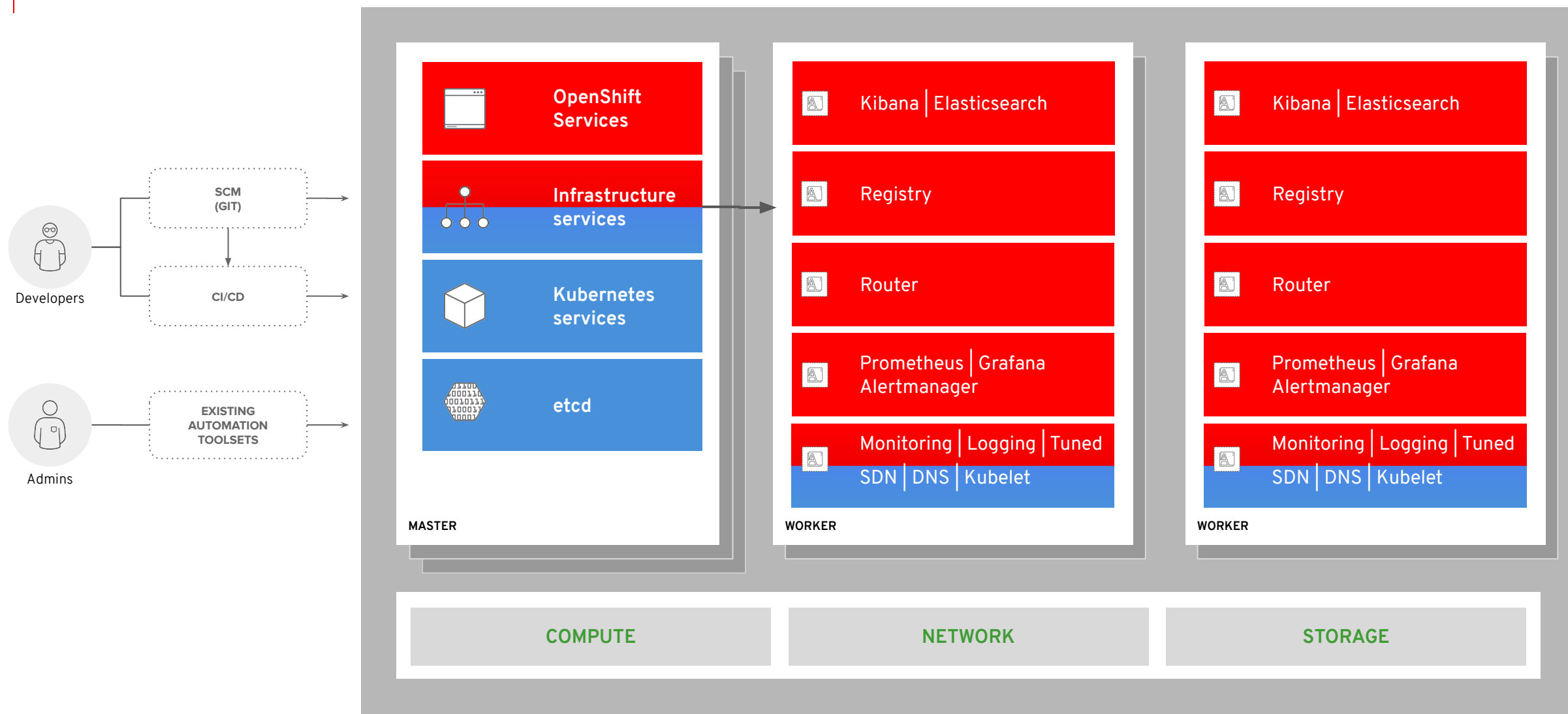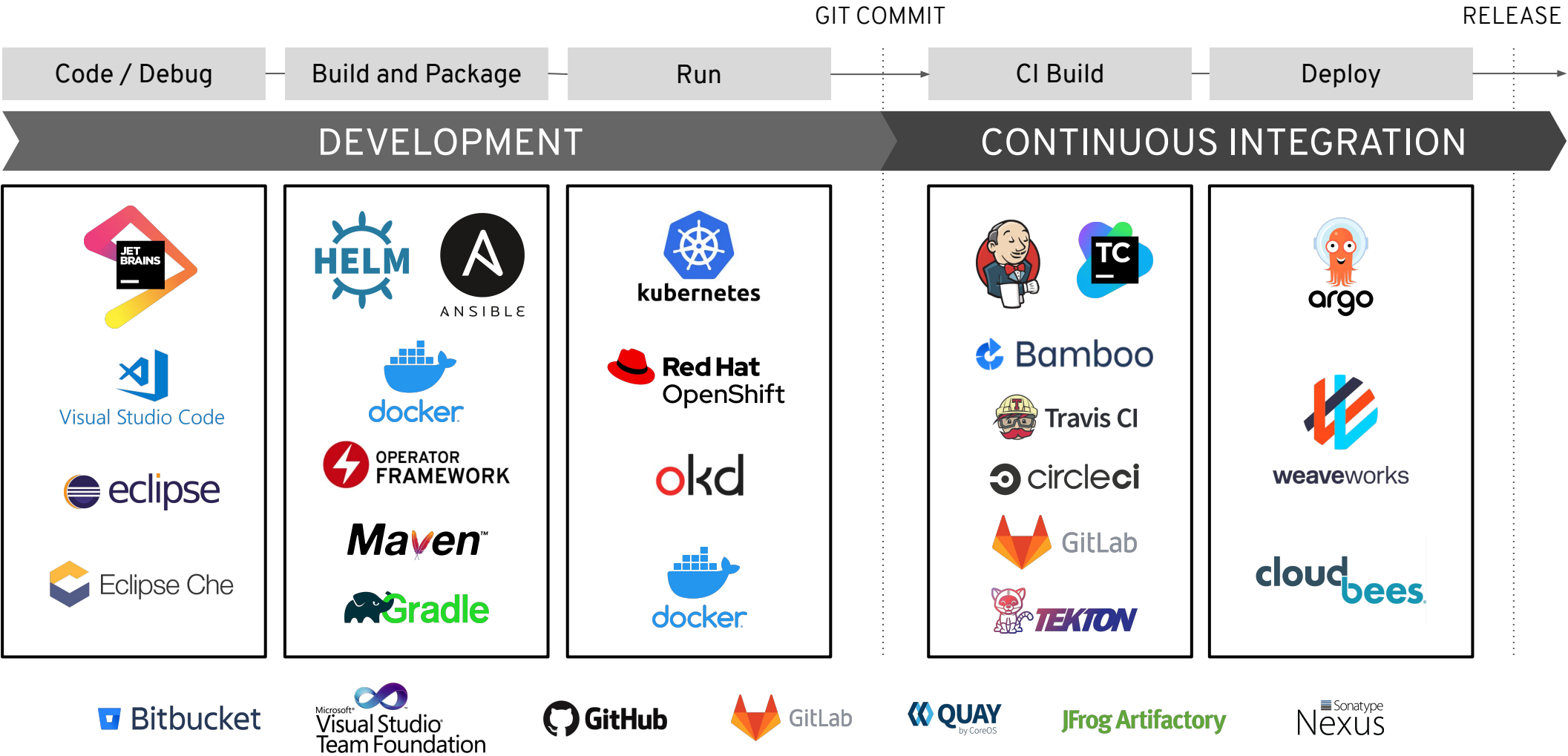
integrated routing

V0000000
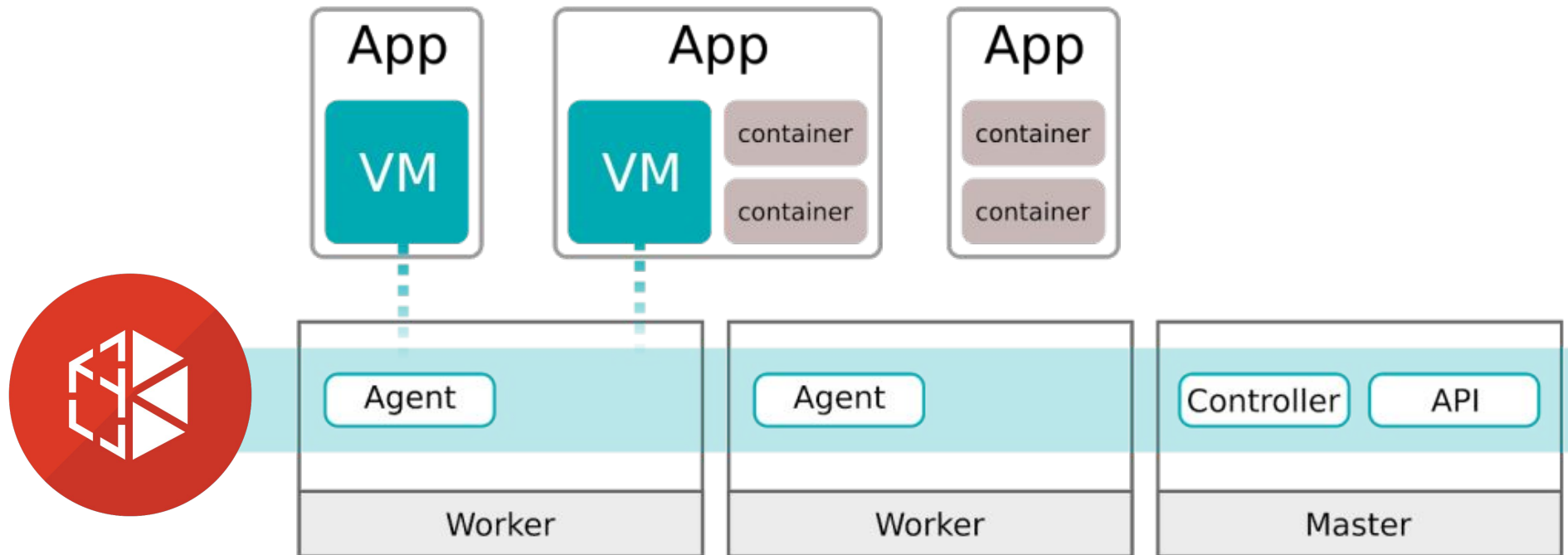
dev and ops via web, cli, API, and IDE

OpenShift integrates into your organization
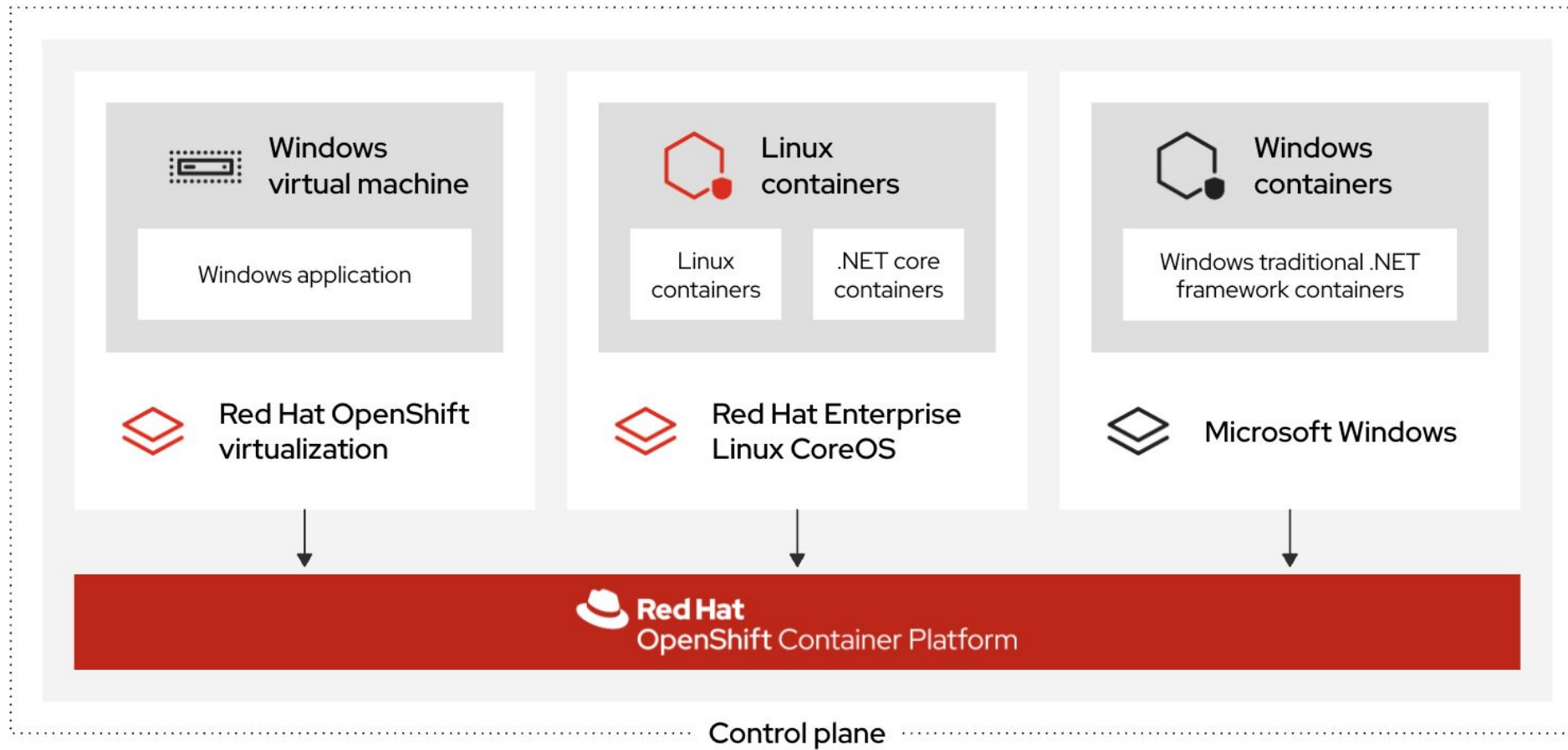
KubeVirt – Virtualization in Containers

Windows containers

Mixed Windows and Linux workloads

Windows virtual machine

Windows application

Red Hat OpenShift virtualization

Linux containers

Linux containers | .NET core containers

Red Hat Enterprise Linux CoreOS

Windows containers

Windows traditional .NET framework containers

Microsoft Windows

Red Hat OpenShift Container Platform

Control plane

Kubernetes done right is hard

INSTALL	DEPLOY	HARDEN	OPERATE
• Templating	• Identity & security access	• Platform monitoring & alerts	• OS upgrade & patch
• Validation	• App monitoring & alerts	• Metering & chargeback	• Platform upgrade & patch
• OS setup	• Storage & persistence	• Platform security hardening	• Image upgrade & patch
	• Egress, ingress, & integration	• Image hardening	• App upgrade & patch
	• Host container images	• Security certifications	• Security patches
	• Build/Deploy methodology	• Network policy	• Continuous security scanning
	• Choice of footprint size	• Disaster recovery	• Multi-environment rollout
		• Resource segmentation	• Enterprise container registry
			• Cluster & app elasticity
			• Monitor, alert, remediate
			• Log aggregation

⚠ **75%**
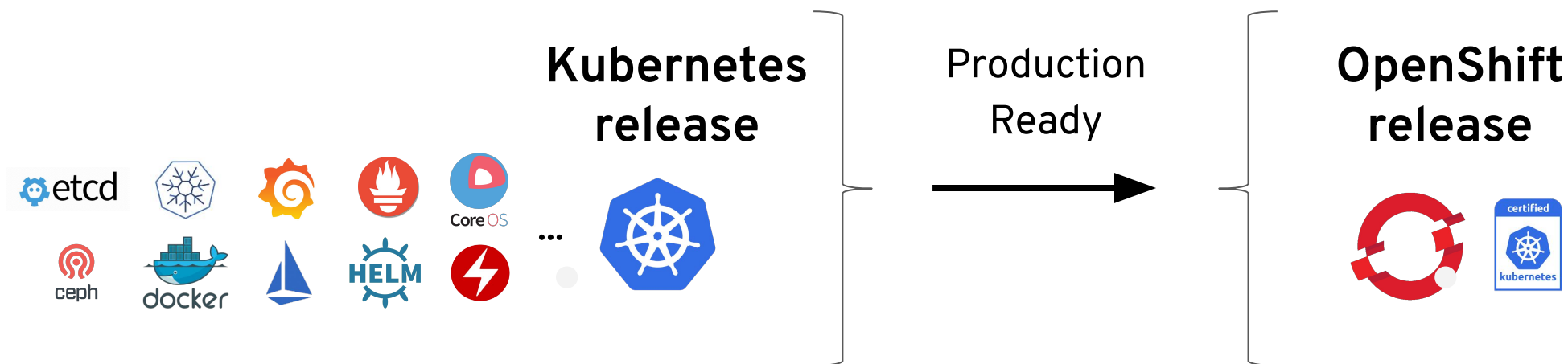
of enterprise users identify

complexity of implementation and

operations as the top blocker to adoption

Source: The New Stack. *The State of the Kubernetes Ecosystem*, August 2017.

V0000000

Red Hat

OpenShift is trusted enterprise Kubernetes

Kubernetes release

Production Ready

OpenShift release

- Hundreds of defect and performance fixes
- 200+ validated integrations
- Certified container ecosystem
- 9-year enterprise life-cycle management
- Red Hat is a leading Kubernetes contributor since day 1

OpenShift Ecosystem
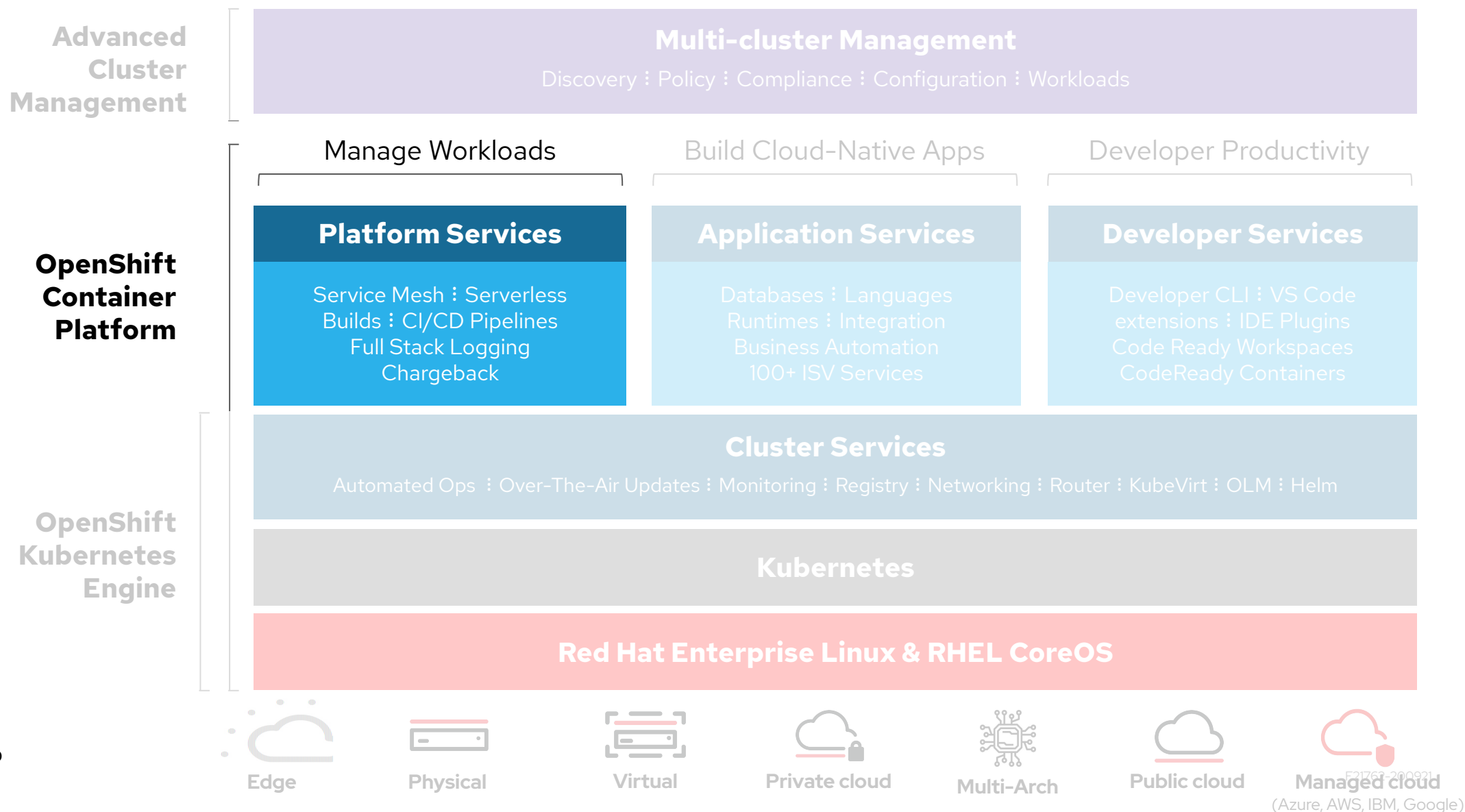
60+ Certified ISV Operators

OpenShift Platform Services for Cloud Native Development

Red Hat

OpenShift Platform Services for Cloud Native Development

▶ OpenShift Platform Services

▶ OpenShift ServiceMesh

▶ OpenShift Serverless

▶ OpenShift Pipelines

Red Hat

OpenShift Container Platform

Advanced Cluster Management

Multi-cluster Management

Discovery : Policy : Compliance : Configuration : Workloads

OpenShift Container Platform

Manage Workloads

Build Cloud-Native Apps

Developer Productivity

Platform Services

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Full Stack Logging
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Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS

OpenShift Kubernetes Engine

Edge

Physical

Virtual

Private cloud

Multi-Arch

Public cloud

Managed cloud
(Azure, AWS, IBM, Google)

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OpenShift Platform Services for Cloud Native Development

▶ OpenShift Platform Services

▶ OpenShift ServiceMesh

▶ OpenShift Serverless

▶ OpenShift Pipelines

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What are Microservices?

an architectural style that structures an application as a collection of services
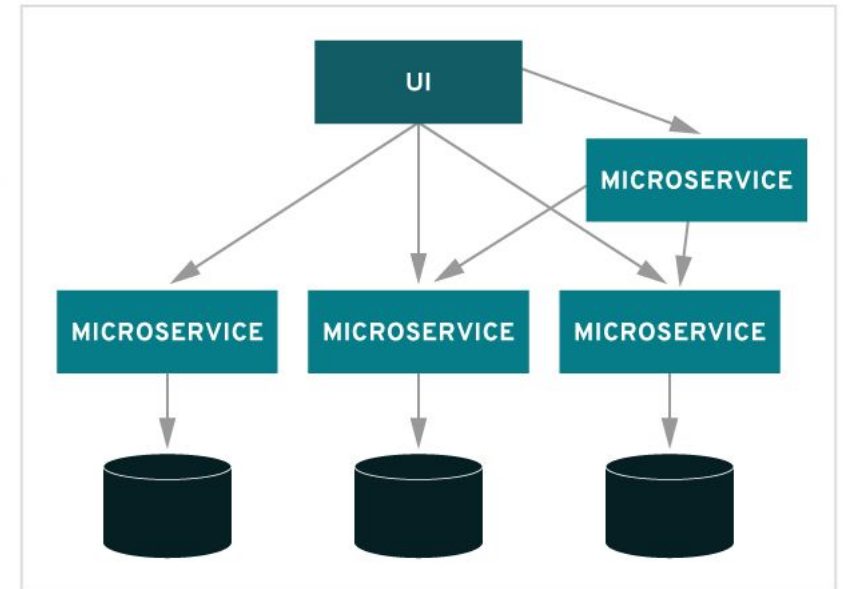
- ▸ Single purpose
- ▸ Independently deployable
- ▸ Have their context bound to a biz domain
- ▸ Owned by a small team
- ▸ Often stateless

Benefits of Microservices

Agility
Deliver updates faster and react faster to new business demands

Highly scalable
Scale independently to meet temporary traffic increases, complete batch processing, or other business needs

Can be purpose-built
Use the languages and frameworks best suited for the service's domain

Resilience
Improved fault isolation restricts service issues, such as memory leaks or open database connections, to only affect that specific service

Many orgs have had success with Microservices – Netflix, Amazon, eBay, The Guardian

There is inherent complexity in adopting microservices

Some common areas where organizations stumble when adopting microservices

Tolerance to Faults

Cascading failure, partial outages, traffic spikes

DevOps and Deployments

More failure surface, version incompatibility, untracked svcs

Services Communication Needs

Latency, concurrence, distributed transactions

Inability to Monitor & Understand Performance

More to monitor & different types of monitoring required

Securing Services

Malicious requests, DoS, id & access control

Highly Distributed Logs
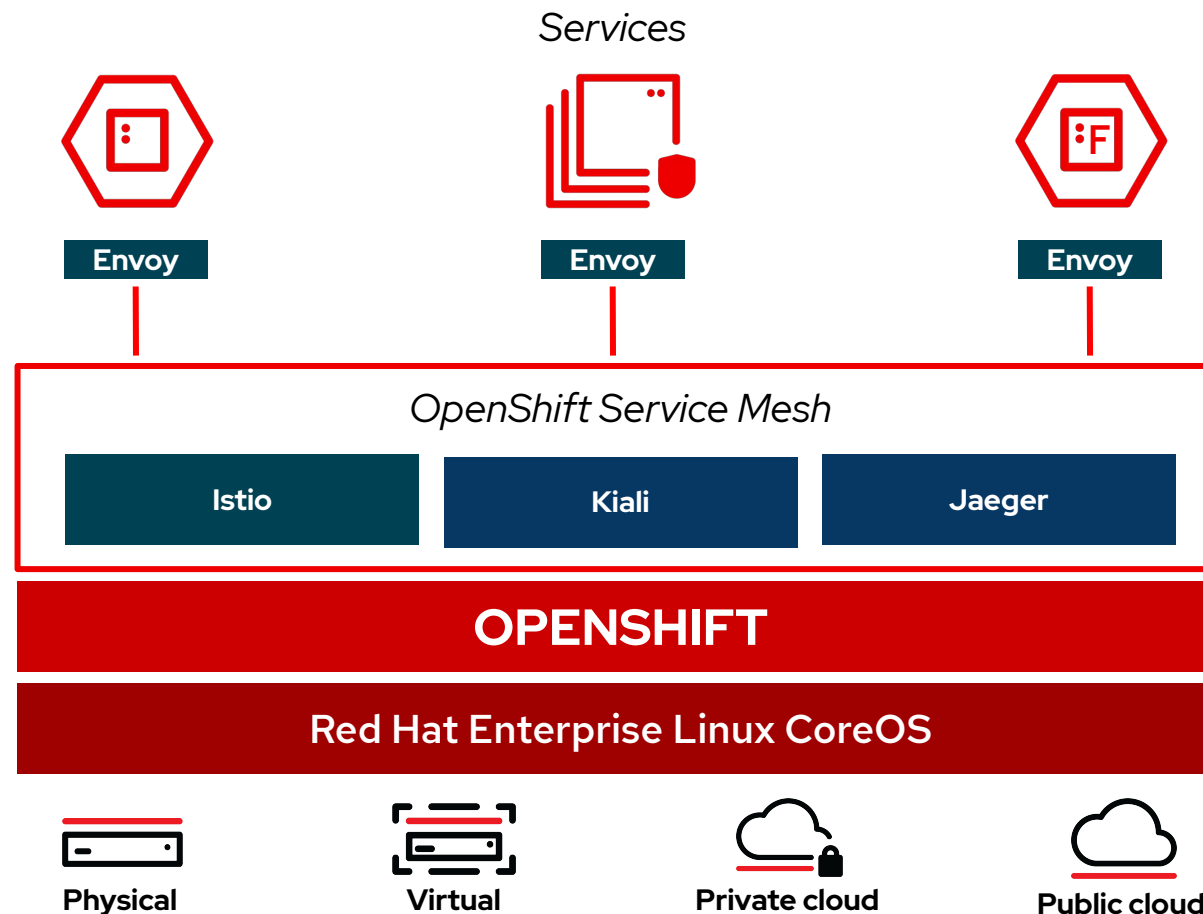
Scattered logs, lots more logs to manage, access control

Red Hat

OpenShift Service Mesh

Connect, Secure, Control and Observe Services on OpenShift

➤ Connect services securely with zero-trust network policies.

➤ Automatically secure your services with managed authentication, authorization and encryption.

➤ Control traffic to safely manage deployments, A/B testing, chaos engineering and more.

➤ See what's happening with out of the box distributed tracing, metrics and logging.

➤ Manage OpenShift Service Mesh with the **Kiali** web console.

Services

Envoy

Envoy

Envoy

OpenShift Service Mesh

| Istio | Kiali | Jaeger |

OPENSHIFT

Red Hat Enterprise Linux CoreOS

Physical

Virtual

Private cloud

Public cloud

Red Hat

OpenShift Platform Services for Cloud Native Development

▶ OpenShift Platform Services

▶ OpenShift ServiceMesh

▶ OpenShift Serverless

▶ OpenShift Pipelines

Red Hat

Serverless Market Trends

"Use Serverless To optimize The Benefits of The cloud" [2]

40%

of enterprises adopted Serverless technologies or practices with expected growth coming in the next 12 to 18 months.[1]
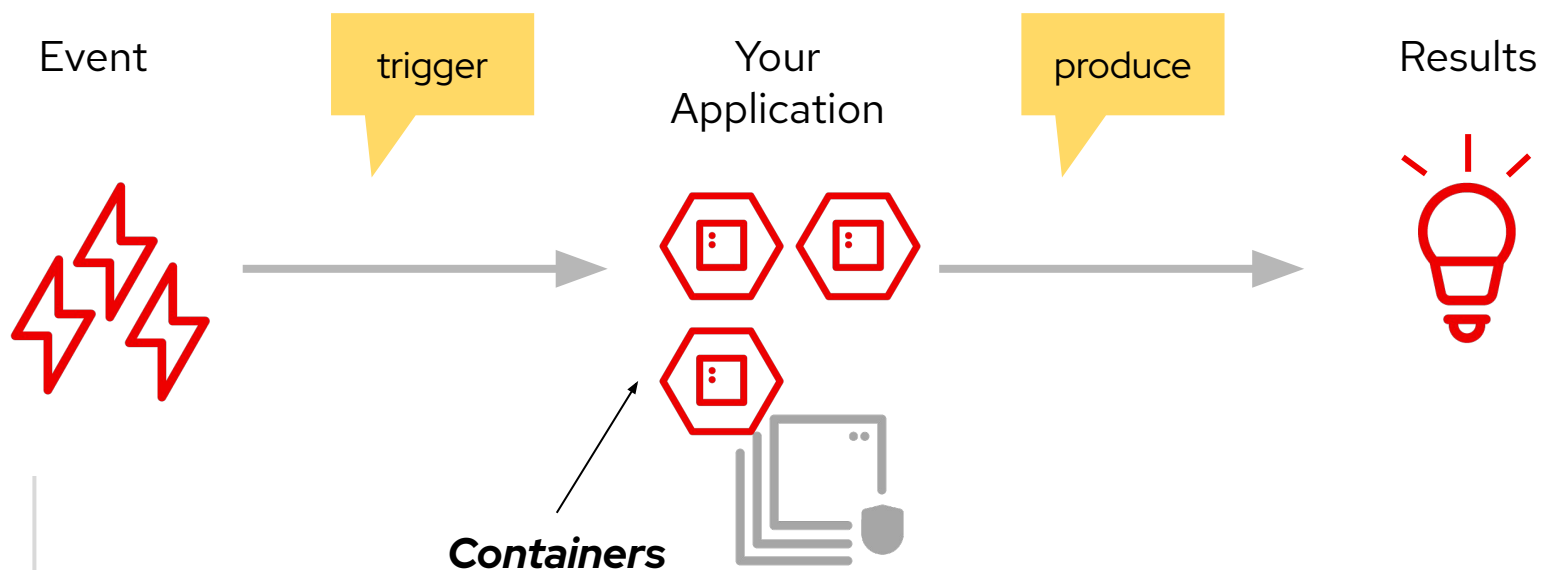
Vendor lock-in is the second biggest concern when adopting Serverless technologies.[1]

60%

of the serverless practitioners reported *"reduction of operational costs"* with the second biggest benefit being *"scale with demand automatically"*

Red Hat
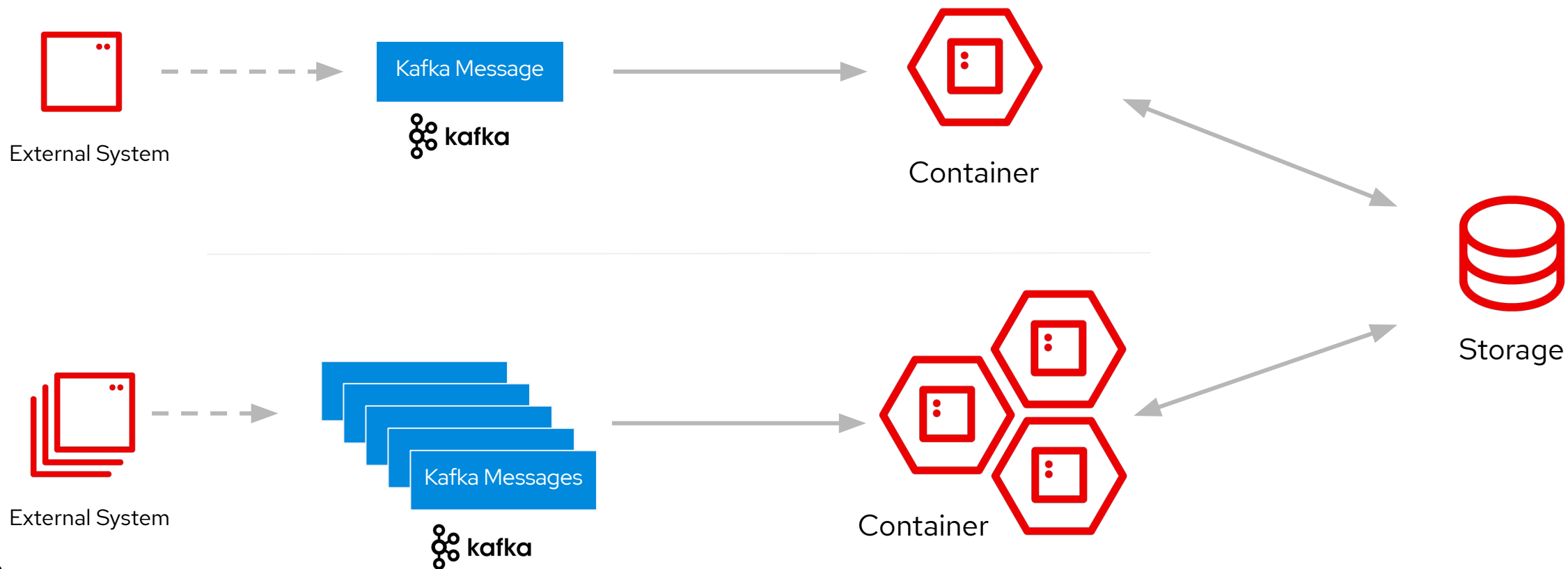
The "Serverless Pattern" in k8s world

Event

trigger

Your
Application

produce

Results

HTTP Requests

Kafka Messages

Image Uploaded

New Order

Login from user

Containers

The "Serverless Pattern"

Processing a Kafka message
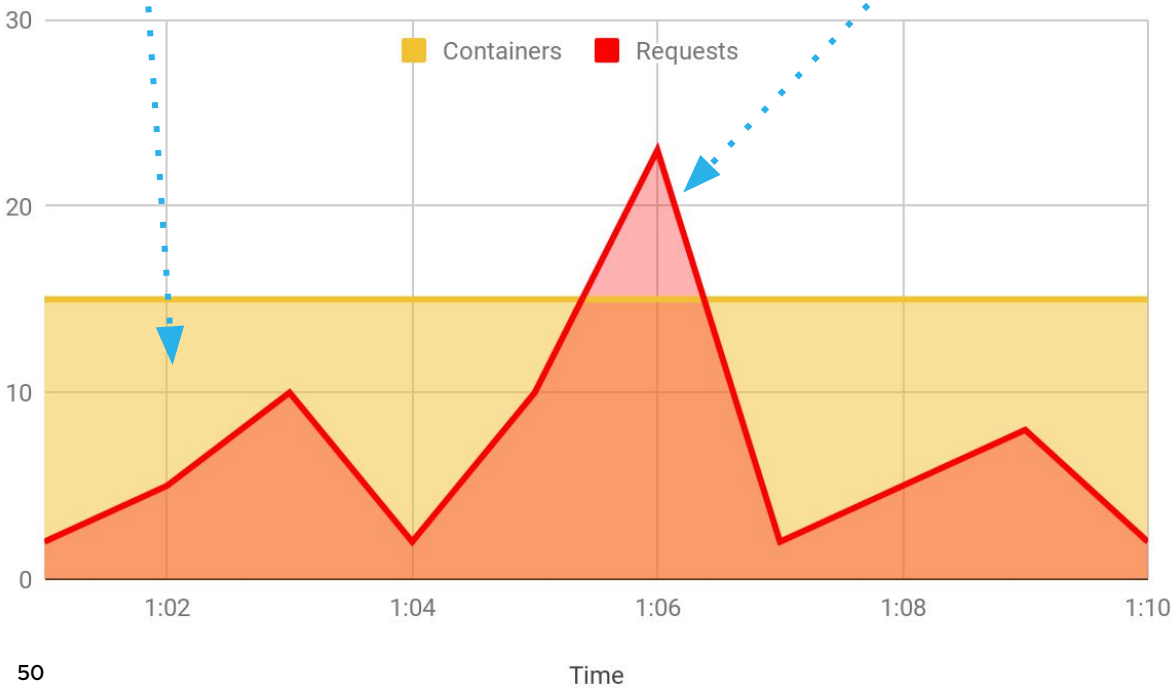
Serverless Operational Benefits

Over provisioning
Time in capacity planning
IT cost of idle resources

Under provisioning
Lost business revenue
Poor quality of service
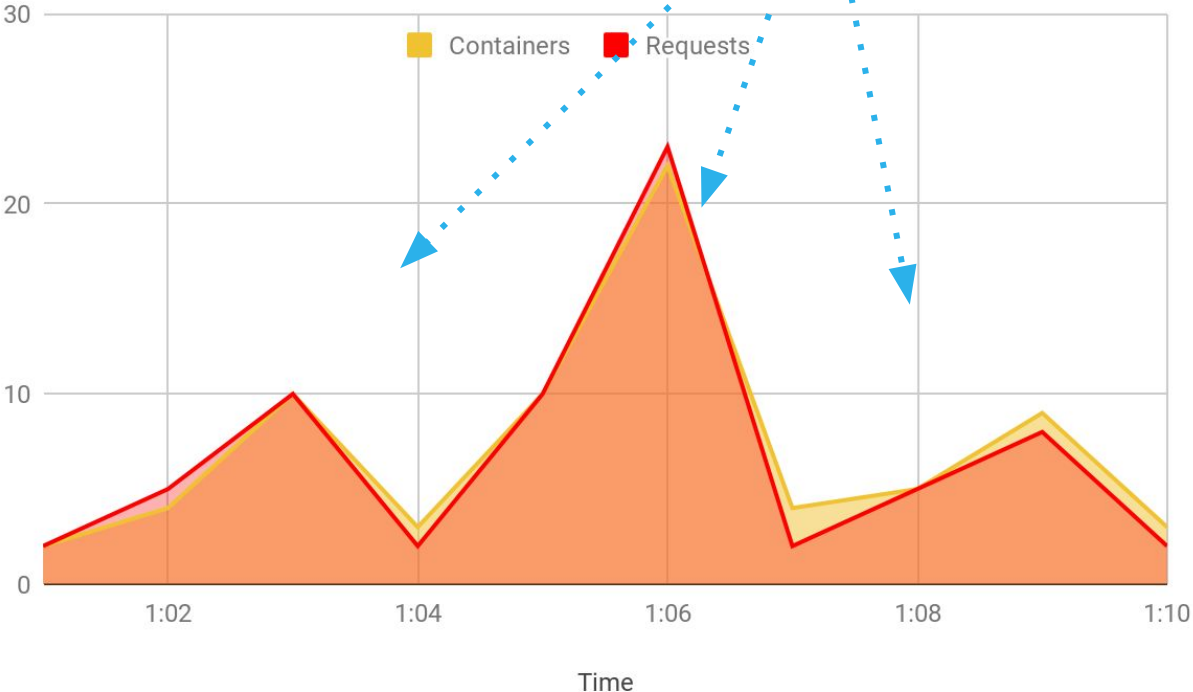
More applications
Direct line between IT
costs & business revenue

NOT Serverless

with Serverless

OpenShift Serverless
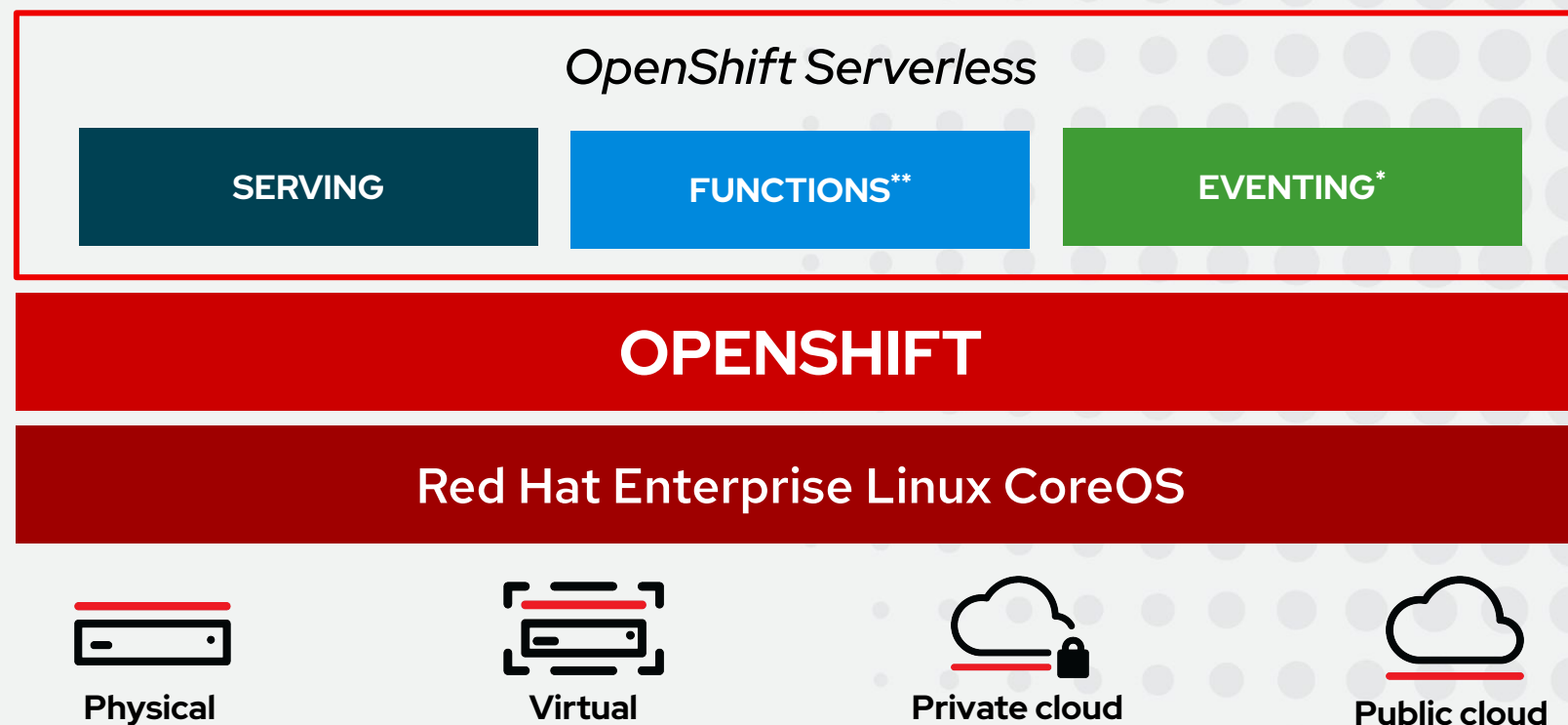
*Packages and Extends Knative with **Functions** and is installed and managed by an **Operator***

Applications

Events

OpenShift Serverless

| SERVING | FUNCTIONS** | EVENTING* |

OPENSHIFT

Red Hat Enterprise Linux CoreOS

Physical

Virtual

Private cloud

Public cloud

* Eventing is currently in Technology Preview

** Functions are currently in Developer Preview

OpenShift Platform Services for Cloud Native Development

▶ OpenShift Platform Services

▶ OpenShift ServiceMesh

▶ OpenShift Serverless

▶ OpenShift Pipelines

Red Hat

OpenShift Pipelines
a Cloud-Native CI/CD Experience on OpenShift

Standard Kubernetes-style pipelines
Declarative pipelines with standard Kubernetes custom resources (CRDs) based on Tekton[*]

Run pipelines in containers
Scale pipeline executions on-demand with containers on Kubernetes

Powerful command-line tool
Run and manage pipelines with an interactive command-line tool
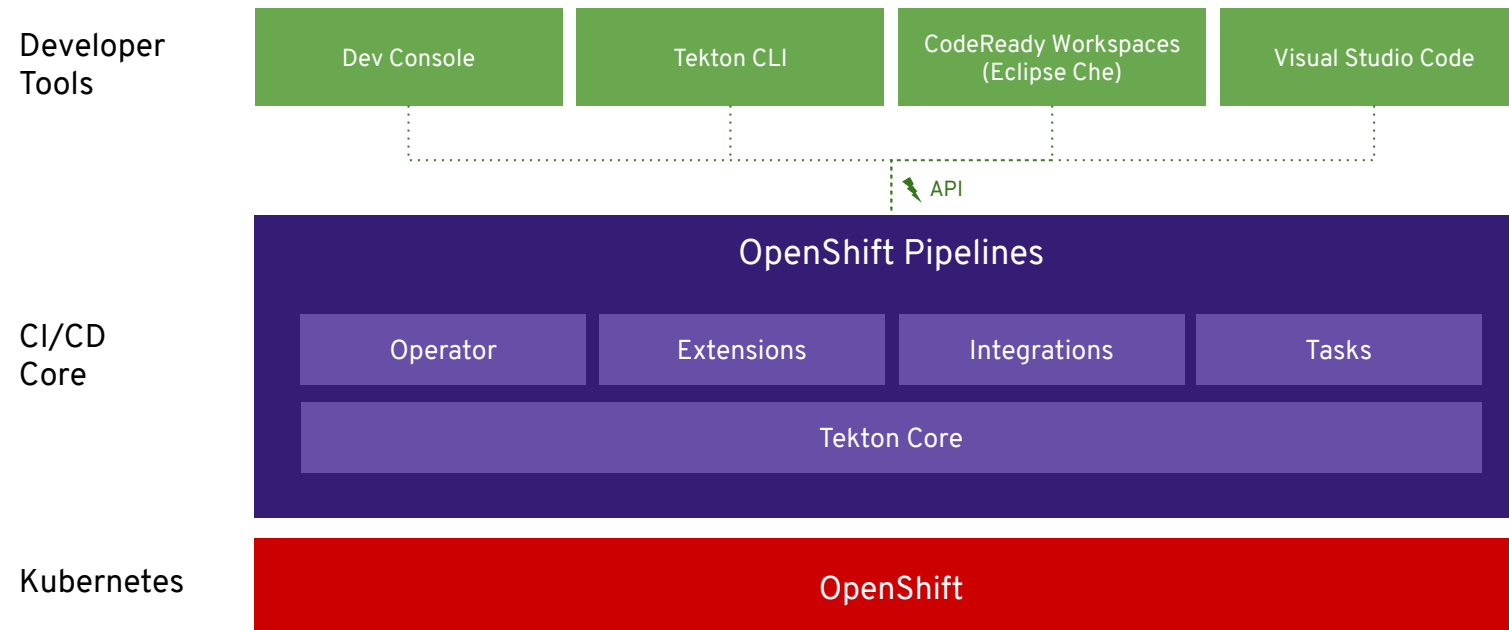
Build images with Kubernetes tools
Use tools of your choice (source-to-image, buildah, kaniko, jib, etc) for building container images

Deploy to multiple platforms
Deploy applications to multiple platforms like serverless, virtual machines and Kubernetes

Integration with OpenShift and Tooling
A CI/CD experience integrated with OpenShift, developer tools and IDE extensions
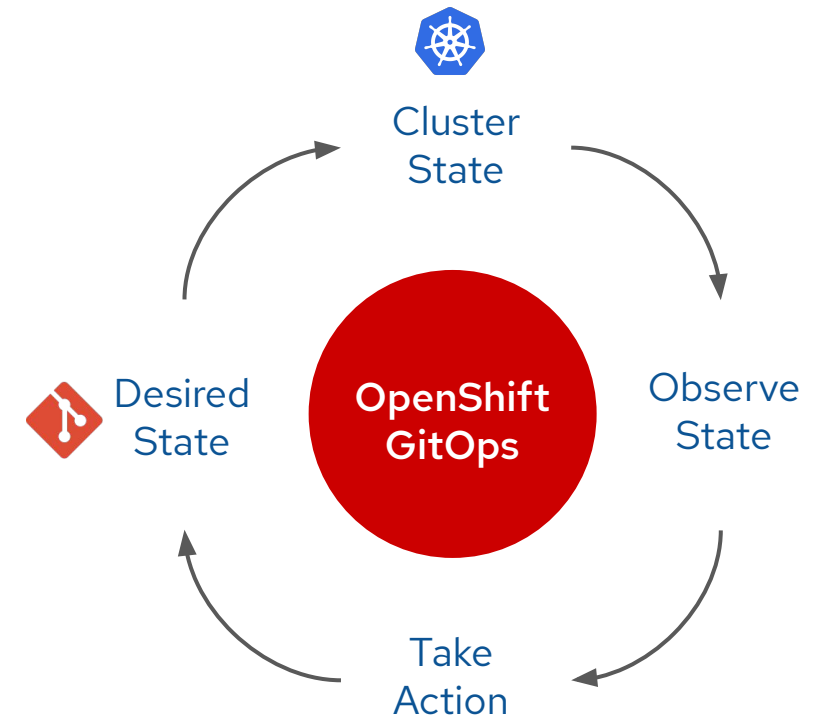
Red Hat

OpenShift Pipelines Architecture

| Developer Tools | Dev Console | Tekton CLI | CodeReady Workspaces (Eclipse Che) | Visual Studio Code |

⚡ API

CI/CD Core	OpenShift Pipelines
	Operator · Extensions · Integrations · Tasks
	Tekton Core

| Kubernetes | OpenShift |

Red Hat

OpenShift GitOps

- Enable teams to adopt a declarative GitOps approach to multi-cluster configuration and continuous delivery

- OpenShift GitOps is complementary to OpenShift Pipelines and includes

  - Argo CD
  - GitOps Application Manager CLI
  - Integrated into Dev Console (App Stages)

- Included in OpenShift SKUs

Cluster State

Observe State

OpenShift GitOps

Desired State

Take Action

OpenShift Platform Plus
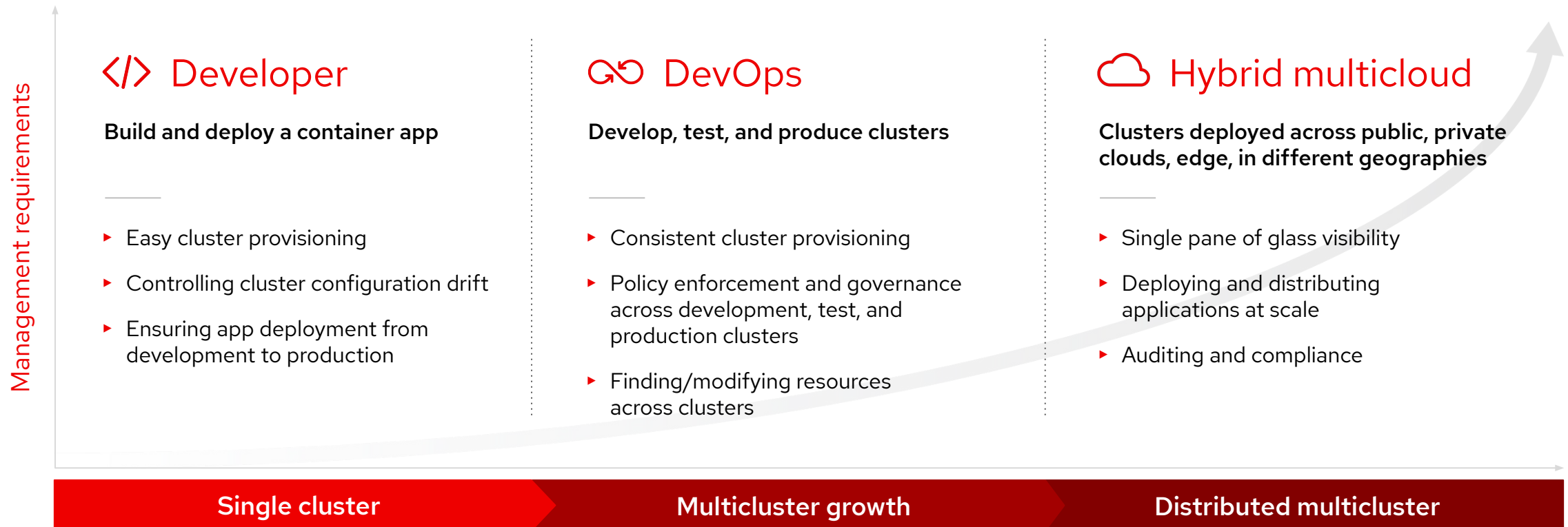
OpenShift Platform Services

OpenShift Platform Plus

▶ OpenShift Advanced Cluster Management

▶ OpenShift Advanced Cluster Security

▶ OpenShift Quay

57

Multicluster management challenges

How do I normalize and centralize key functions across environments?

Management requirements

</> Developer

Build and deploy a container app

▸ Easy cluster provisioning

▸ Controlling cluster configuration drift

▸ Ensuring app deployment from development to production

⚲ DevOps

Develop, test, and produce clusters

▸ Consistent cluster provisioning

▸ Policy enforcement and governance across development, test, and production clusters

▸ Finding/modifying resources across clusters

☁ Hybrid multicloud

Clusters deployed across public, private clouds, edge, in different geographies

---

▸ Single pane of glass visibility

▸ Deploying and distributing applications at scale

▸ Auditing and compliance

Single cluster	Multicluster growth	Distributed multicluster

Red Hat

Robust. Proven. Award winning.

Multicluster lifecycle management
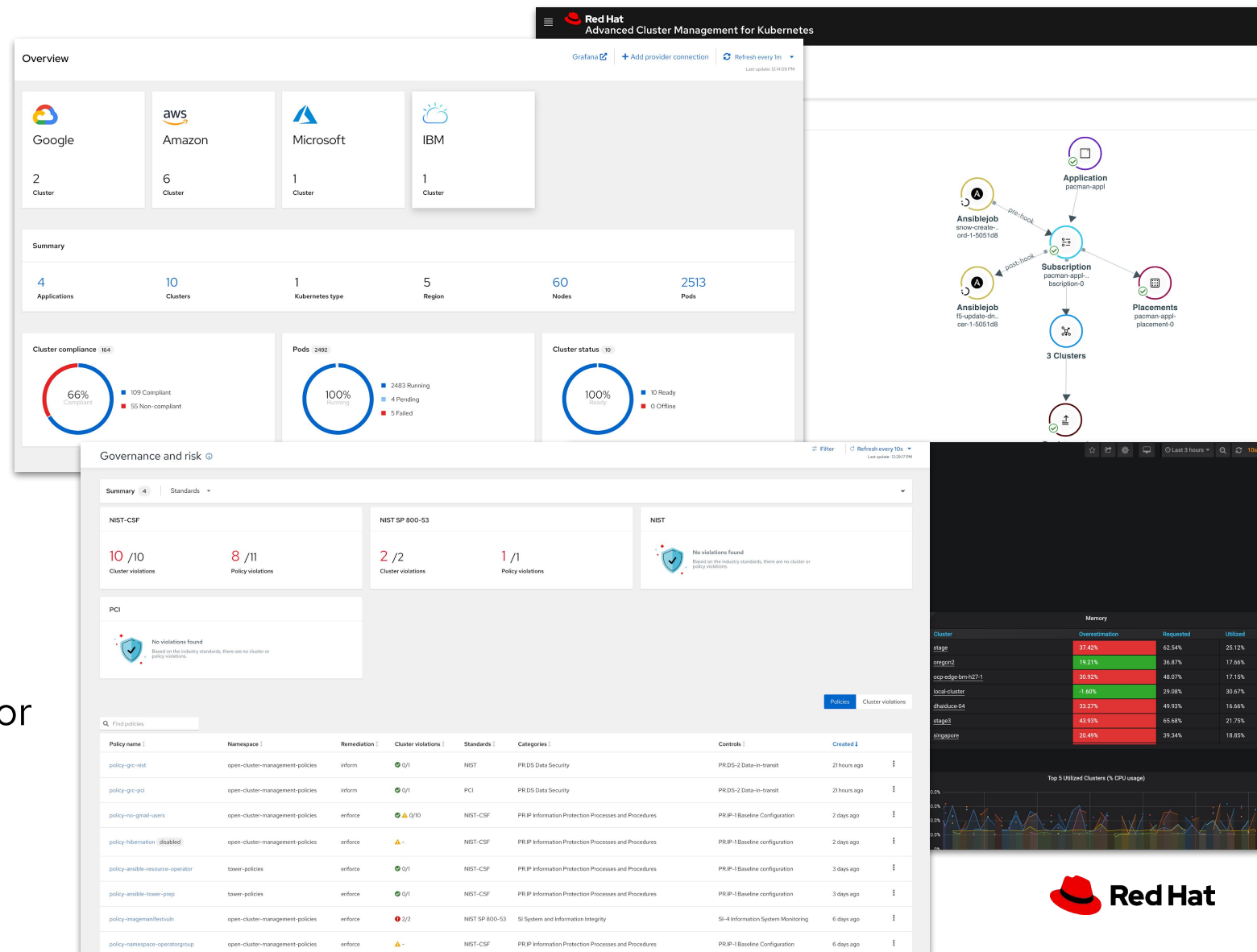
Policy driven governance, risk, and compliance

Advanced application lifecycle management

Multicluster observability for health and optimization

OpenShift Platform Services for Cloud Native Development

▶ OpenShift Advanced Cluster Management

▶ OpenShift Advanced Cluster Security

▶ OpenShift Quay

Red Hat

Reasons for security issues in cloud native applications

Reality vs perception
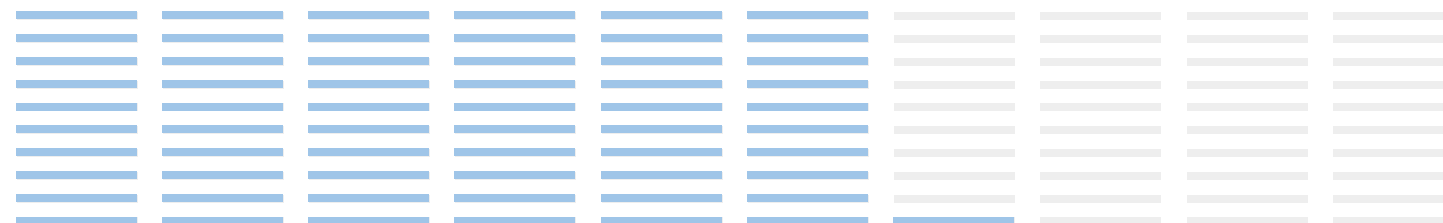
12%
Attack

27%
Container image vulnerabilities

61%
Misconfiguration / information exposure

Red Hat

Red Hat Advanced Cluster Security for Kubernetes

A cloud workload protection platform and cloud security posture management solution to enable you to "shift left"

Shift left	Cloud security posture management (CSPM)	Cloud workload protection (CWPP)
Secure supply chain	Secure infrastructure	Secure workloads
Extend scanning and compliance into development (DevSecOps)	Promote the existing highly secure nature of the OpenShift platform	Analyse and improve the platform workloads

🔍 Control

| Trusted content |
| Container registry |
| Build management |
| CI/CD pipeline |
| Vulnerability analysis |
| App config analysis |
| APIs for CI/CD integrations |

🛡 Protect

| Kubernetes platform lifecycle |
| Identity and access management |
| Platform data |
| Deployment policies |
| Image assurance and policy admission controller |
| Compliance assessments |
| Risk profiling |

💬 Detect & Respond

| Container isolation |
| Network isolation |
| Application access and data |
| Observability |
| Runtime behavioral analysis |
| Auto-suggest network policies |
| Threat detection / incident response |
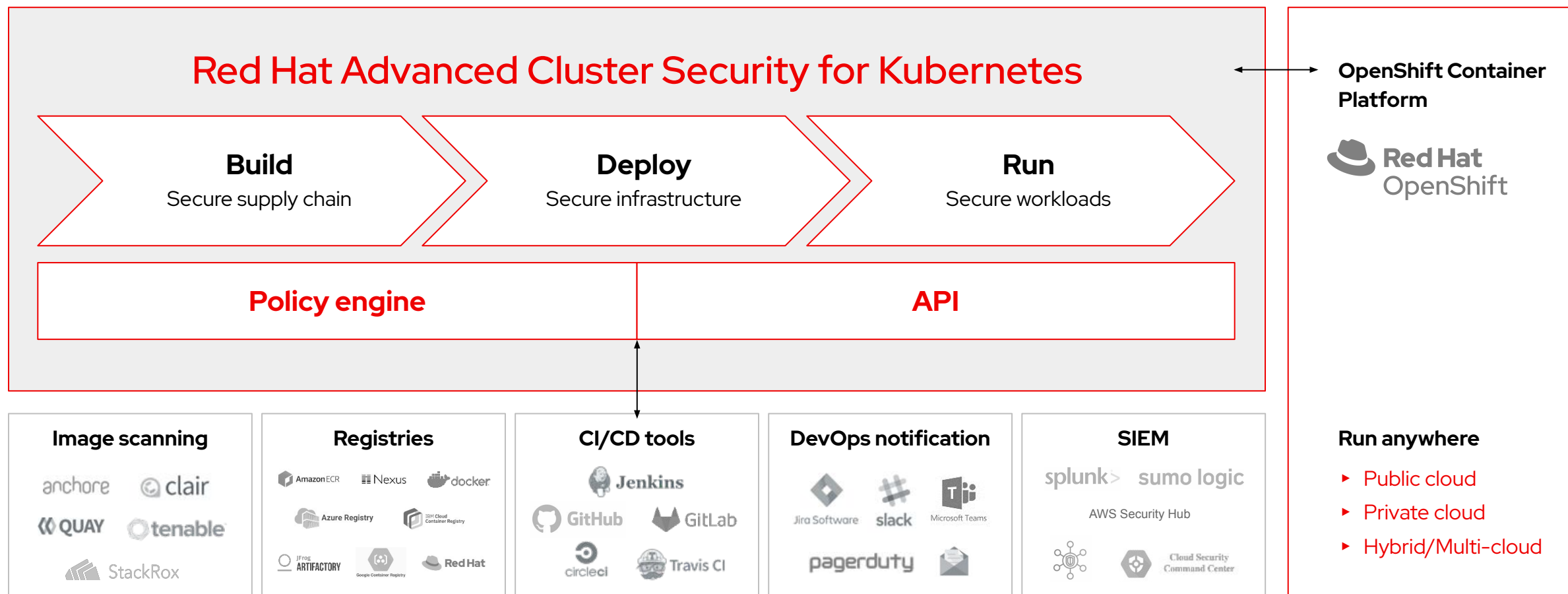
Red Hat OpenShift +
Red Hat ACM +
Red Hat Quay

Red Hat OpenShift
Platform Plus

Red Hat Advanced
Cluster Security

DevSecOps

Red Hat
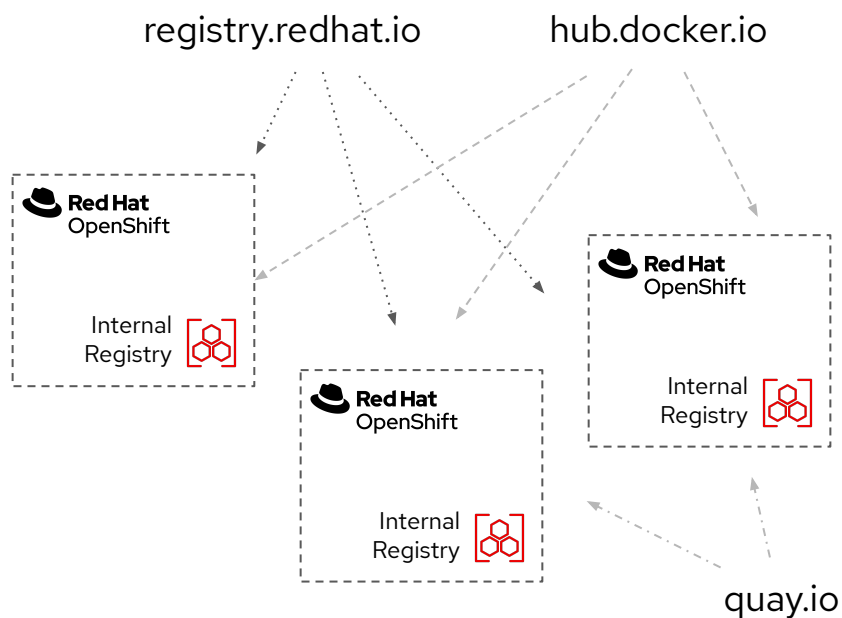
RHACS Integration and Focus

Red Hat Advanced Cluster Security for Kubernetes

OpenShift Container Platform

Red Hat OpenShift

Build
Secure supply chain

Deploy
Secure infrastructure

Run
Secure workloads

Policy engine

API

Image scanning
anchore   clair
QUAY   tenable
StackRox

Registries
Amazon ECR   Nexus   docker
Azure Registry   IBM Cloud Container Registry
JFrog ARTIFACTORY   Google Container Registry   Red Hat

CI/CD tools
Jenkins
GitHub   GitLab
circleci   Travis CI

DevOps notification
Jira Software   slack   Microsoft Teams
pagerduty

SIEM
splunk>   sumo logic
AWS Security Hub
Cloud Security Command Center

Run anywhere
▸ Public cloud
▸ Private cloud
▸ Hybrid/Multi-cloud

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Red Hat

OpenShift Platform Services for Cloud Native Development

▶ OpenShift Advanced Cluster Management

▶ OpenShift Advanced Cluster Security

▶ OpenShift Quay

# Multi-cluster requires content governance and single source of truth for authorized software

registry.redhat.io   hub.docker.io

Red Hat OpenShift
Internal Registry

Red Hat OpenShift
Internal Registry

Red Hat OpenShift
Internal Registry

quay.io
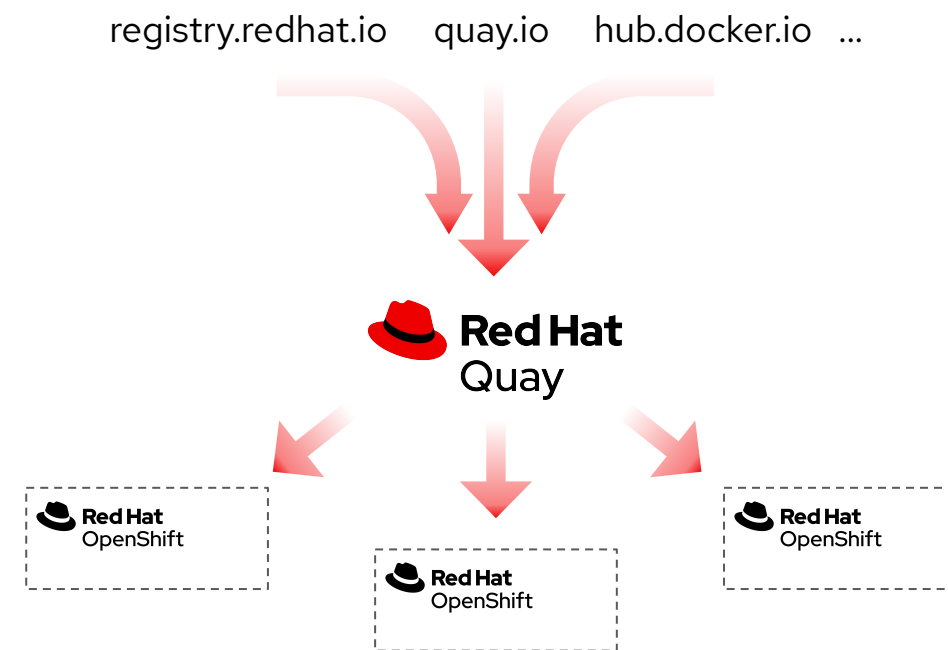
Each cluster with their own view of available software
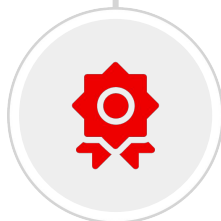
Red Hat Quay provides a registry platform for modern multi-cluster landscapes

registry.redhat.io   hub.docker.io

registry.redhat.io   quay.io   hub.docker.io   ...
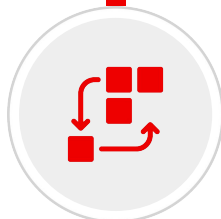
Each cluster with their own view of available software
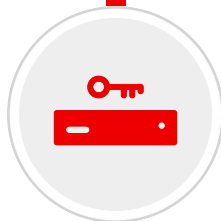
All clusters with a "single source of truth" of available / authorized software

Red Hat Quay

Trusted, open source container registry platform that runs everywhere, but runs best with Red Hat OpenShift

Scalability without limits, from a single a container host to Kubernetes clusters, on-premise or on public cloud
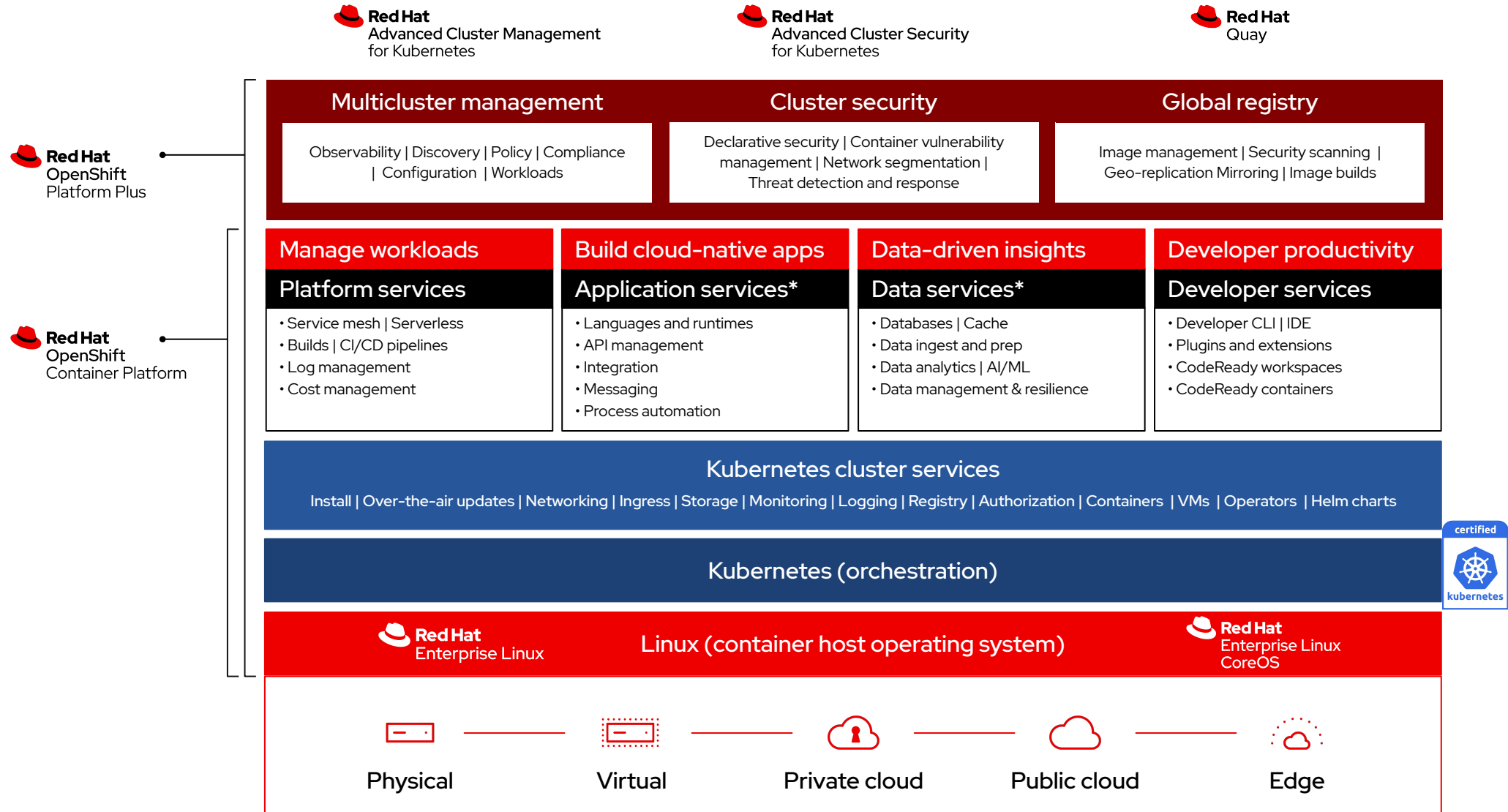
Global governance and security controls, with image vulnerability scanning, access controls, geo-replication, etc.

Runs as a **self-managed container registry** on RHEL or automated via an **Operator on OpenShift**

Red Hat

Wrap up

Red Hat

Red Hat open hybrid cloud platform

Red Hat
Advanced Cluster Management
for Kubernetes

Red Hat
Advanced Cluster Security
for Kubernetes

Red Hat
Quay

Red Hat
OpenShift
Platform Plus

Multicluster management

Observability | Discovery | Policy | Compliance
| Configuration | Workloads

Cluster security

Declarative security | Container vulnerability
management | Network segmentation |
Threat detection and response

Global registry

Image management | Security scanning |
Geo-replication Mirroring | Image builds

Red Hat
OpenShift
Container Platform

Manage workloads
Platform services
- Service mesh | Serverless
- Builds | CI/CD pipelines
- Log management
- Cost management

Build cloud-native apps
Application services*
- Languages and runtimes
- API management
- Integration
- Messaging
- Process automation

Data-driven insights
Data services*
- Databases | Cache
- Data ingest and prep
- Data analytics | AI/ML
- Data management & resilience

Developer productivity
Developer services
- Developer CLI | IDE
- Plugins and extensions
- CodeReady workspaces
- CodeReady containers

Kubernetes cluster services

Install | Over-the-air updates | Networking | Ingress | Storage | Monitoring | Logging | Registry | Authorization | Containers | VMs | Operators | Helm charts

Kubernetes (orchestration)

certified
kubernetes

Red Hat
Enterprise Linux

Linux (container host operating system)

Red Hat
Enterprise Linux
CoreOS

Physical

Virtual

Private cloud

Public cloud

Edge

V0000000

Red Hat

* Red Hat OpenShift® includes supported runtimes for popular languages/frameworks/databases. Additional capabilities listed are from the Red Hat Application and Data Services portfolio.

Red Hat Services for OpenShift adoption

RED HAT OPEN INNOVATION LABS
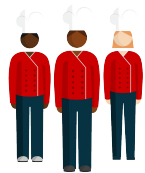
EXPERIMENT
Rapidly build prototypes, do DevOps, and be agile.

CATALYZE INNOVATION
Bring modern application development back to your team.
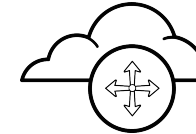
IMMERSE YOUR TEAM
Work side by side with experts in a residency-style engagement.

TO SHOW YOUR TEAMS HOW OPENSHIFT AND MODERN DEVELOPMENT PRACTICES CAN DRIVE INNOVATION: START WITH A 4- TO 12-WEEK LABS RESIDENCY

RED HAT CONTAINER ADOPTION PROGRAM
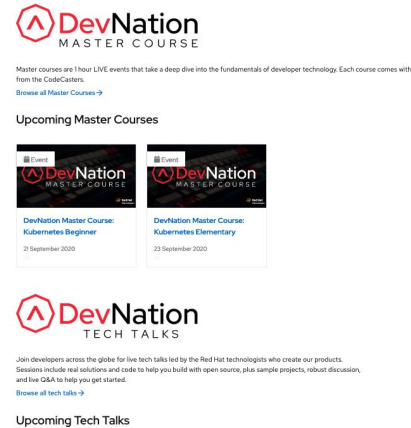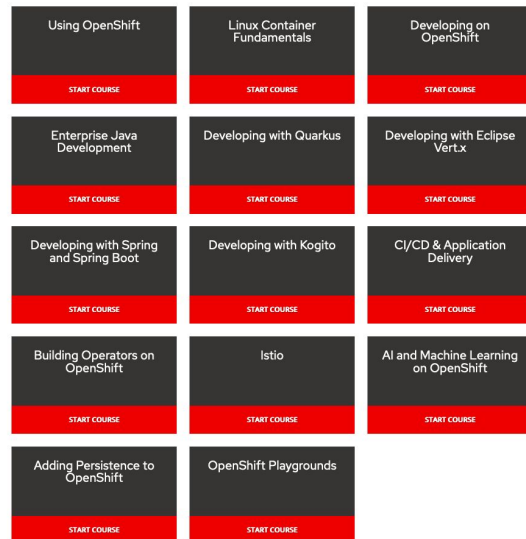
FRAMEWORK FOR SUCCESSFUL CONTAINER ADOPTION AND I.T. TRANSFORMATION:

Mentoring, training, and side-by-side collaboration to:

- Create a production platform and team to run it
- Create end-to-end container-driven deployment automation
- Scale application onboarding expertise
- Guide new Kubernetes-native development
- Align business with IT through **included Red Hat Open Innovation Labs**
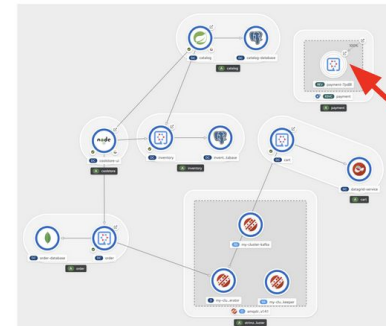
TO BEGIN A COMPREHENSIVE PROGRAM (INCLUDING OPEN INNOVATION LABS): START WITH THE 12-WEEK RED HAT CONSULTING CONTAINER PLATFORM PILOT

(Free-of-charge) Enablement for Cloud-Native

## https://learn.openshift.com

https://developers.redhat.com/devnation

Guided Hands-On Workshops
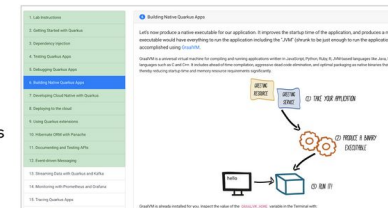
CONTAINER CLOUD-NATIVE ROADSHOW V2

WHAT IS IT?

- Building Cloud-Native apps with OpenShift and Runtimes
- Modules based: choose from 4 modules
  - **Optimizing Existing Applications**
  - **Debugging, Monitoring and Continuous Delivery**
  - **Control Cloud Native Apps with Service Mesh**
  - **Advanced Cloud Native with Event-Driven Serverless**
- Developer and Architects audience

QUARKUS HANDS-ON WORKSHOP

WHAT IS IT?

- Designed to be a half-to-full day hands-on experience introducing Quarkus to Java developers
- CodeReady Workspaces, Quarkus and OpenShift
  - And AMQ Streams, RH-SSO, ...
- Developer topics such as:
  - Dependency Injection
  - Testing/Debugging/Native compilation Quarkus Apps
  - Deploying to OpenShift
  - Hibernate ORM with Panache
  - Event-driven Messaging
  - Security

https://www.openshift.com/events

Red Hat

Red Hat Developer

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twitter.com/rhdevelopers

OpenShift Container Platform

Q&A

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Red Hat

Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

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