OpenShift Container Platform

DACH Anwendertreffen

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Red Hat

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Red Hat

Red Hat

Agenda

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

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

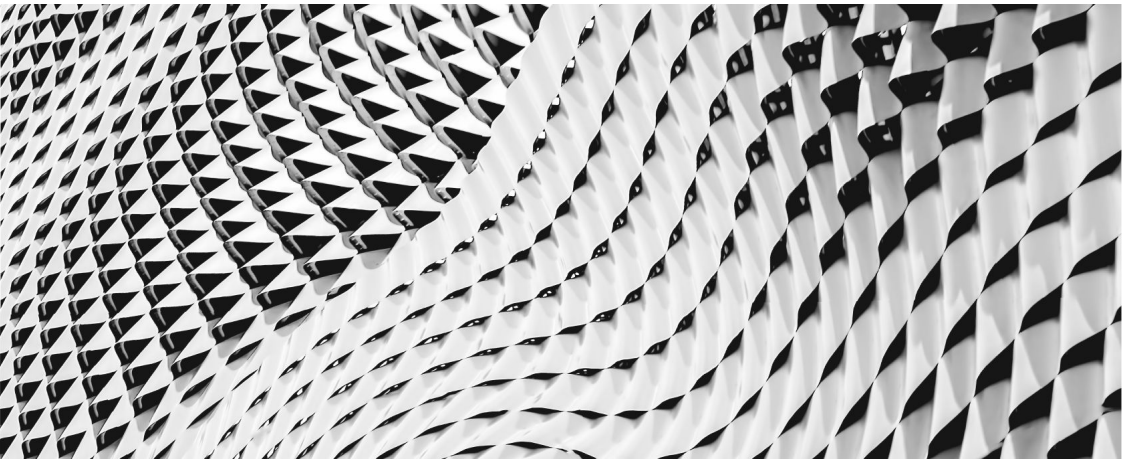

Multi-Arch


Public cloud


Managed cloud
(Azure, AWS, IBM, Google)

Red Hat

Containers



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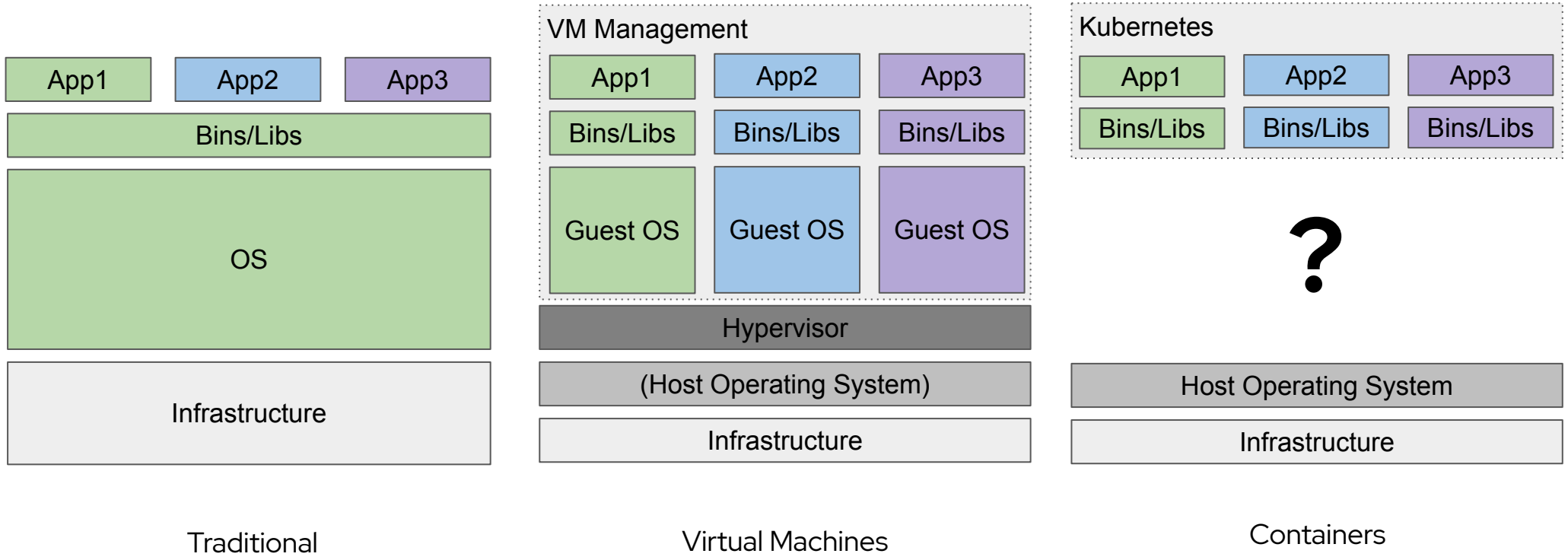
From Hosts to VM's to Containers



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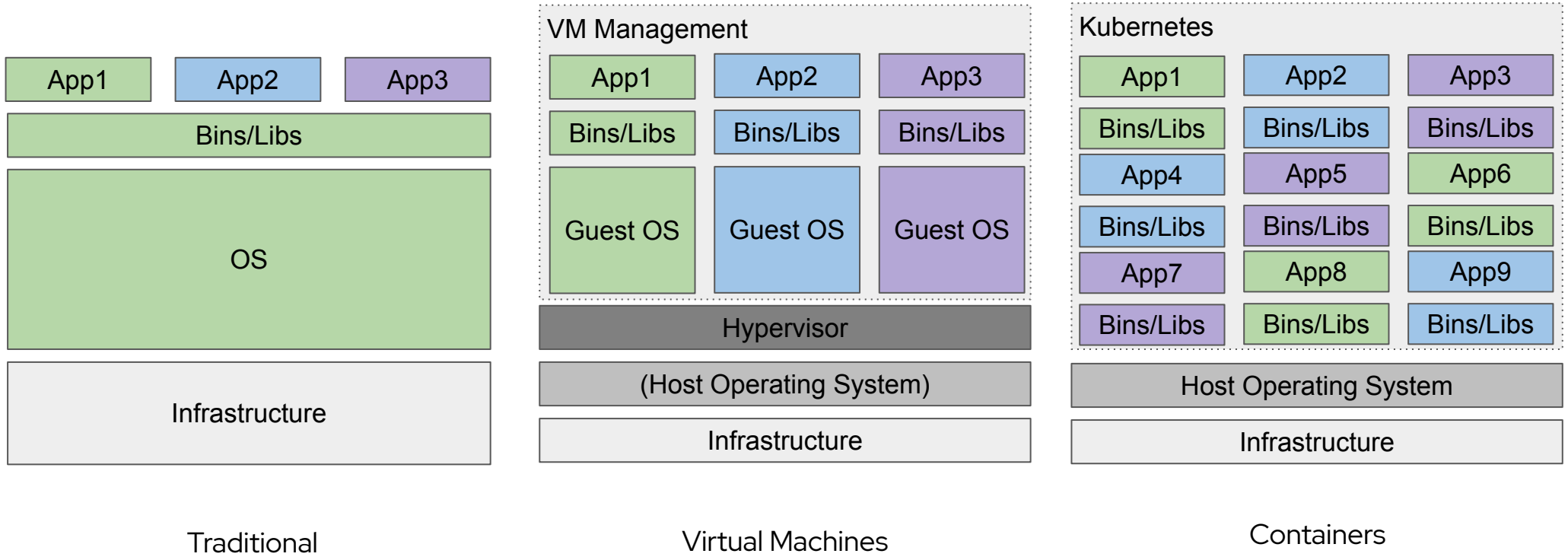
From Hosts to VM's to Containers



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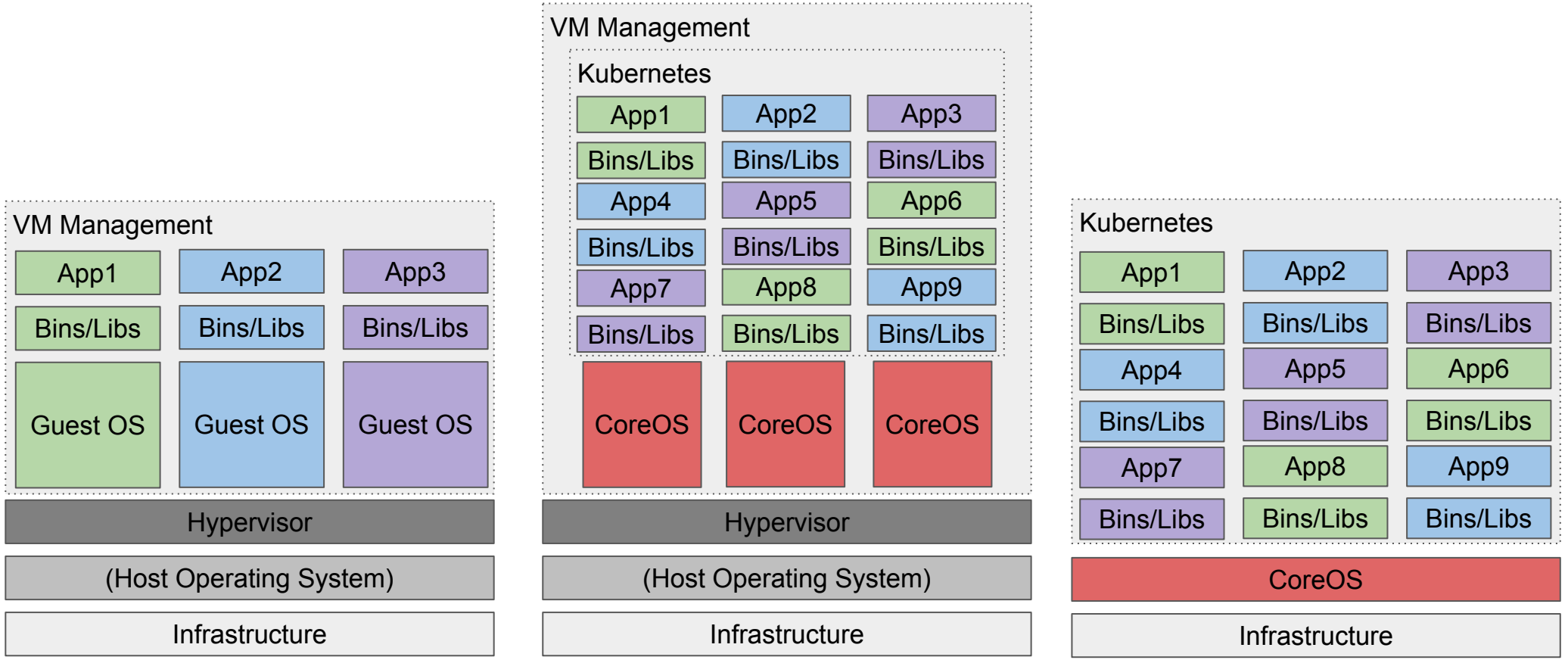
From Hosts to VM's to Containers



Virtual Machines

Containers on Virtual Machines

Native Containers

Red Hat

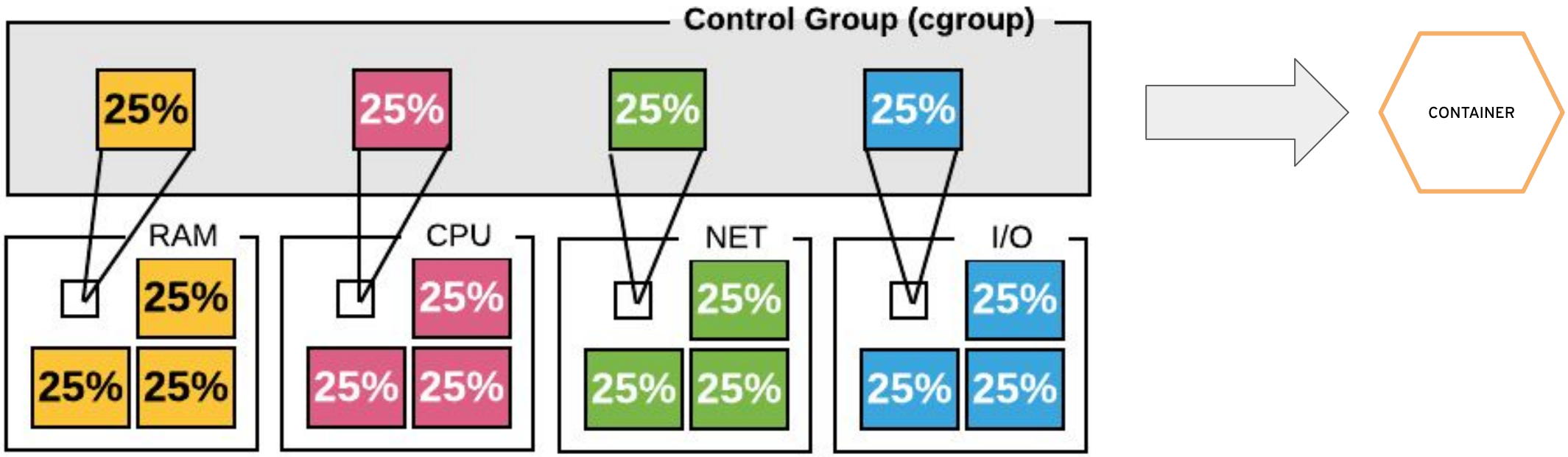
Container-Basics - Namespaces

A kernel feature, not a container feature

- It’s a process!

- Mount - isolate filesystem mount points
- UTS - isolate hostname and domainname
- IPC - isolate interprocess communication (IPC) resources
- PID - isolate the PID number space
- Network - isolate network interfaces
- User - isolate UID/GID number spaces
- Cgroup - isolate cgroup root directory

Container-Basics - Control Groups (cgroups)



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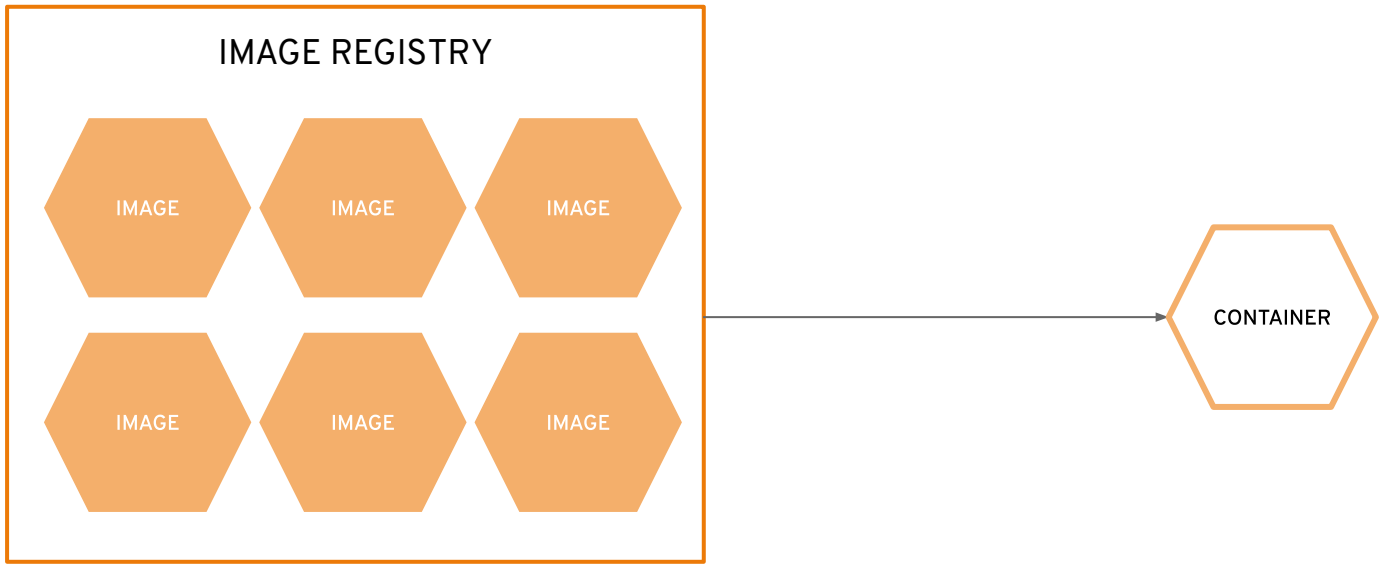
Container-Basics

- a container is the smallest compute unit

Container-Basics - Registry

- containers are created from container images

- container images are stored in an image registry



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Container-Basics - Registry

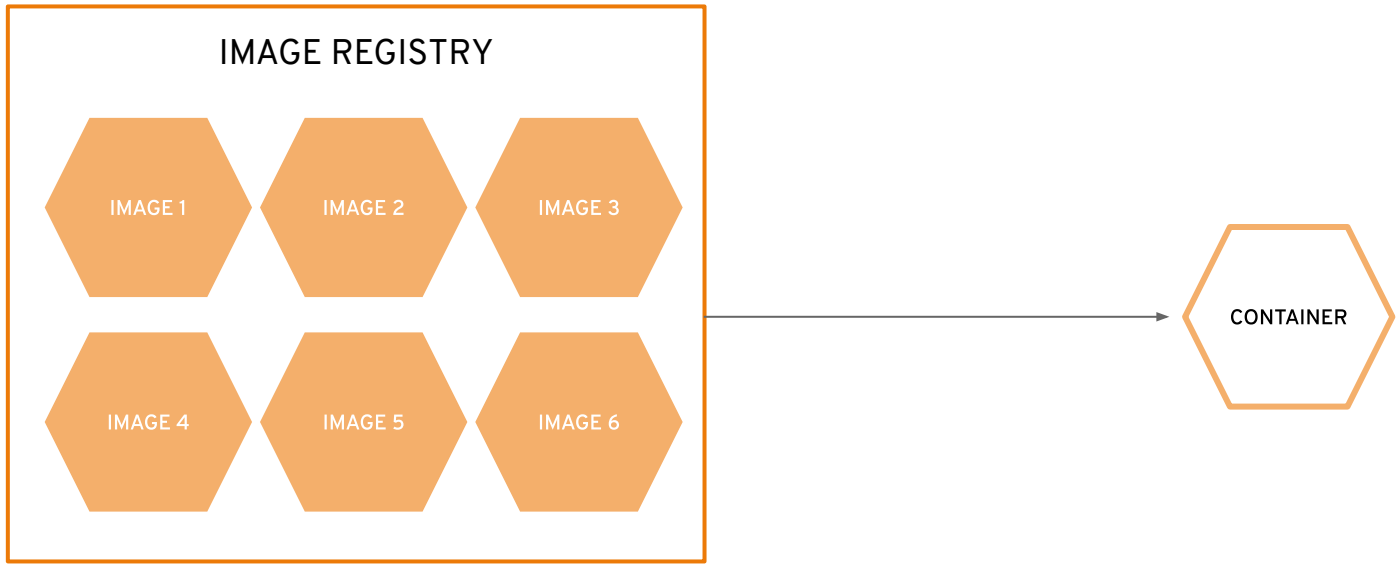
containers are created from container images

BINARY

RUNTIME (running process)

Container-Basics - Registry

container images are stored in an image registry



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Container-Basics - POD's

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

How to handle all these Containers?

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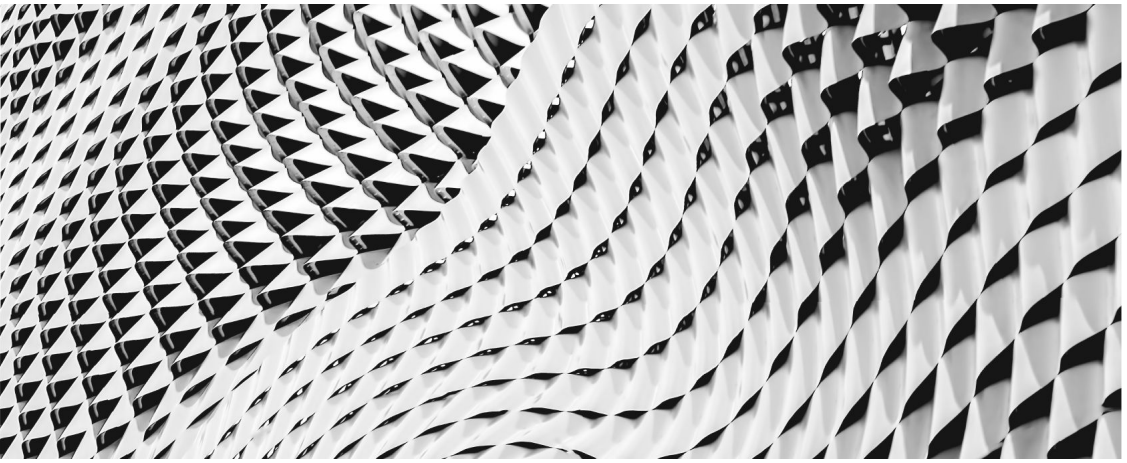
Kubernetes



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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.

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.

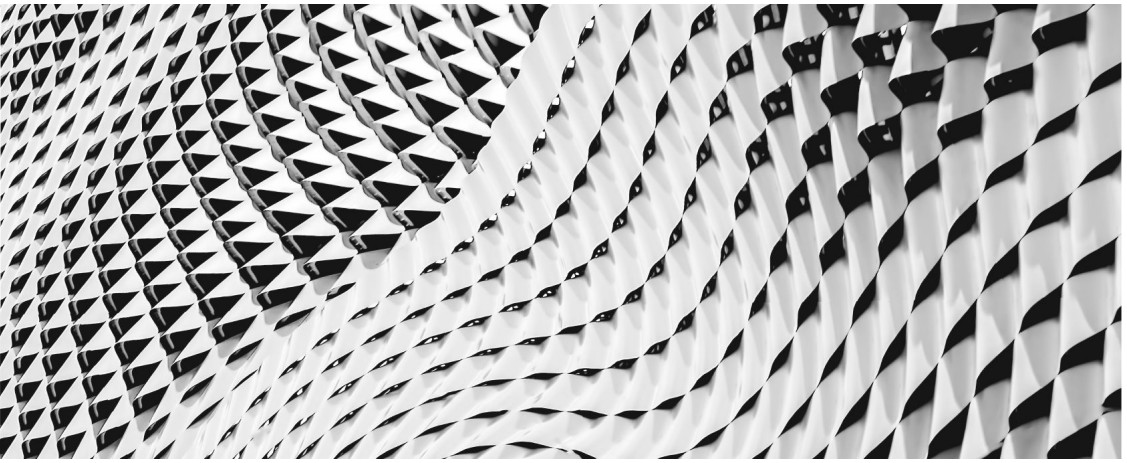
Kubernetes and what it can't do for you

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.

OpenShift



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

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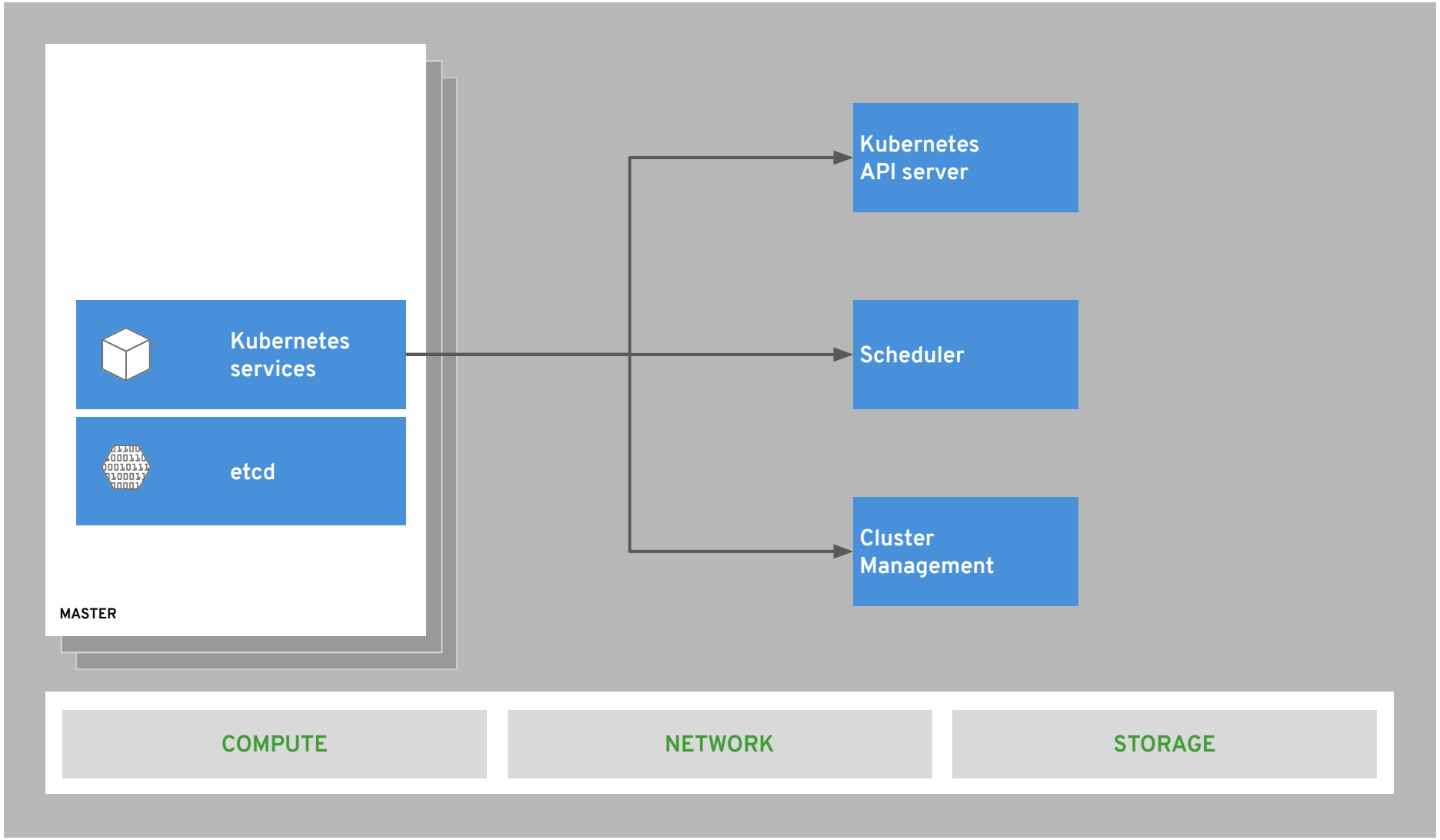
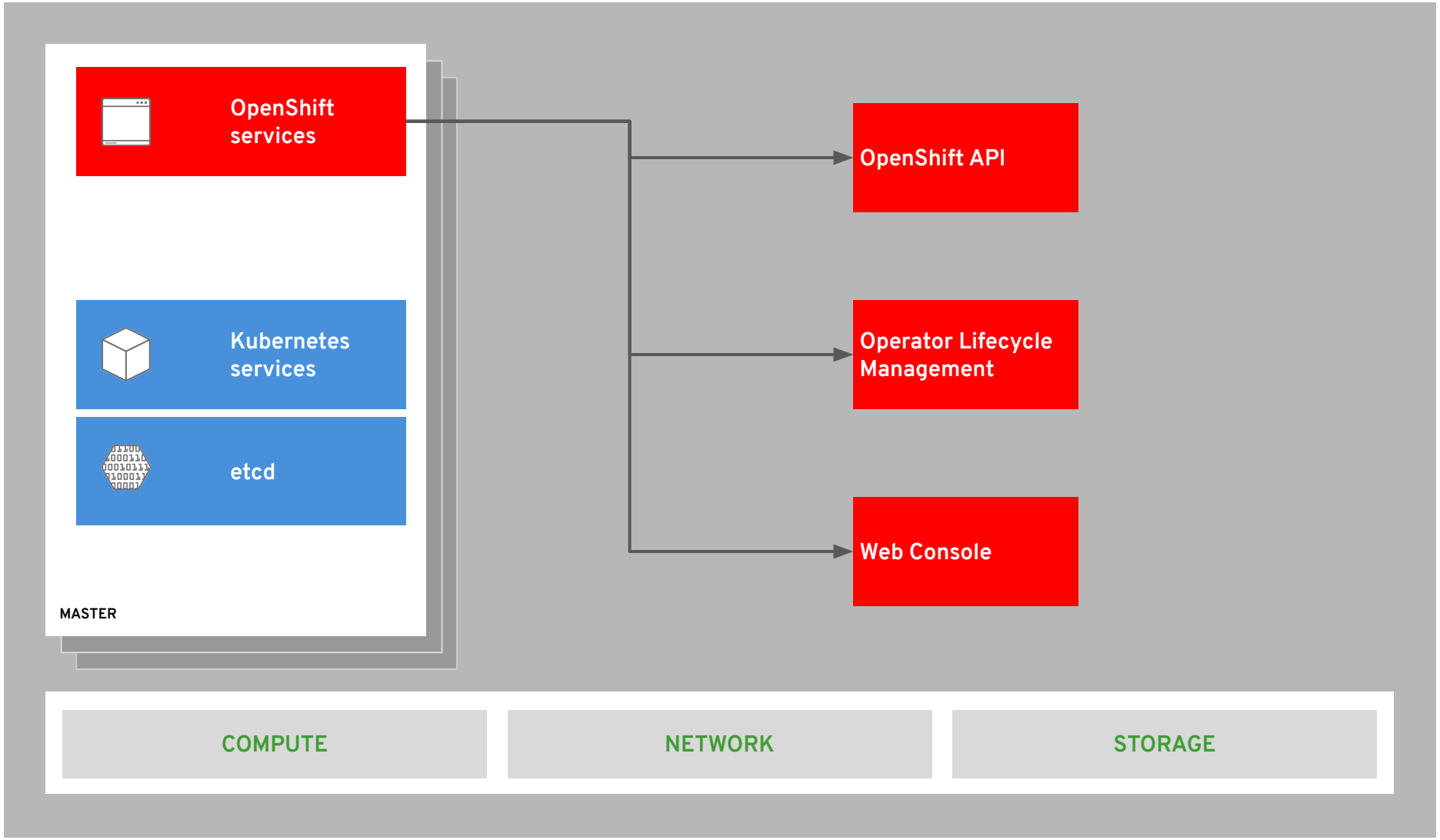
state of everything

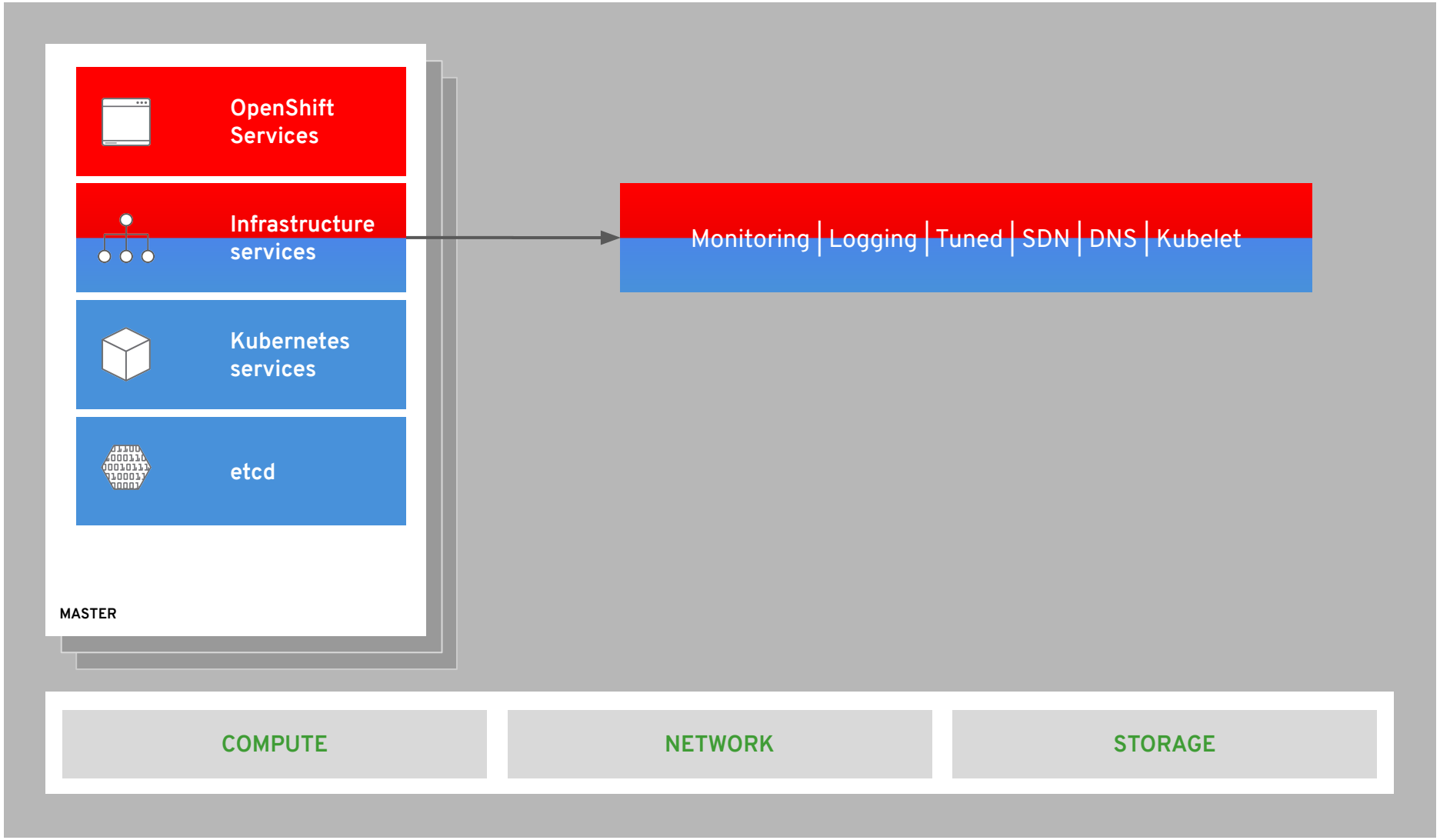
core kubernetes components



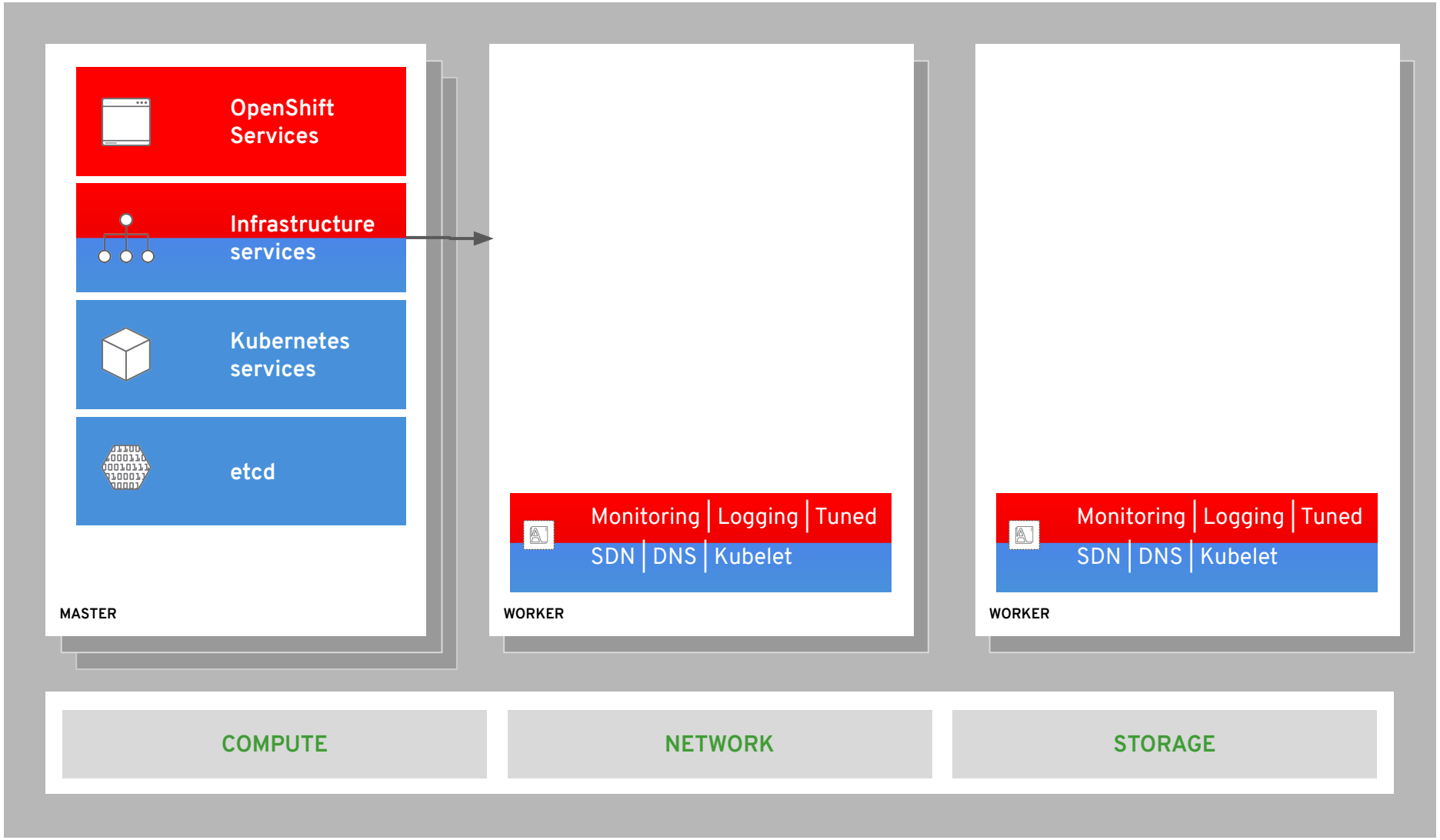
core OpenShift components



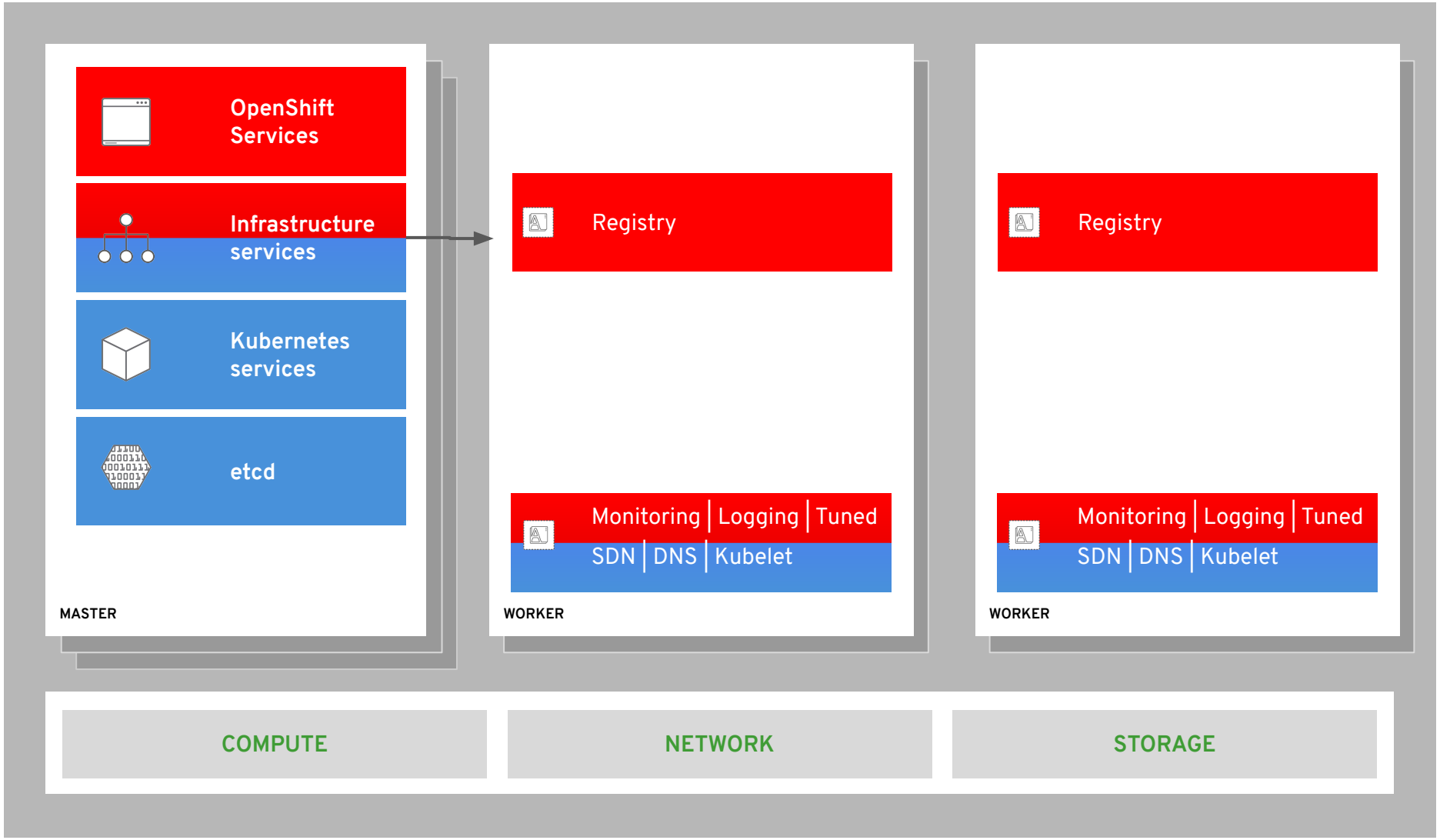
internal and support infrastructure services



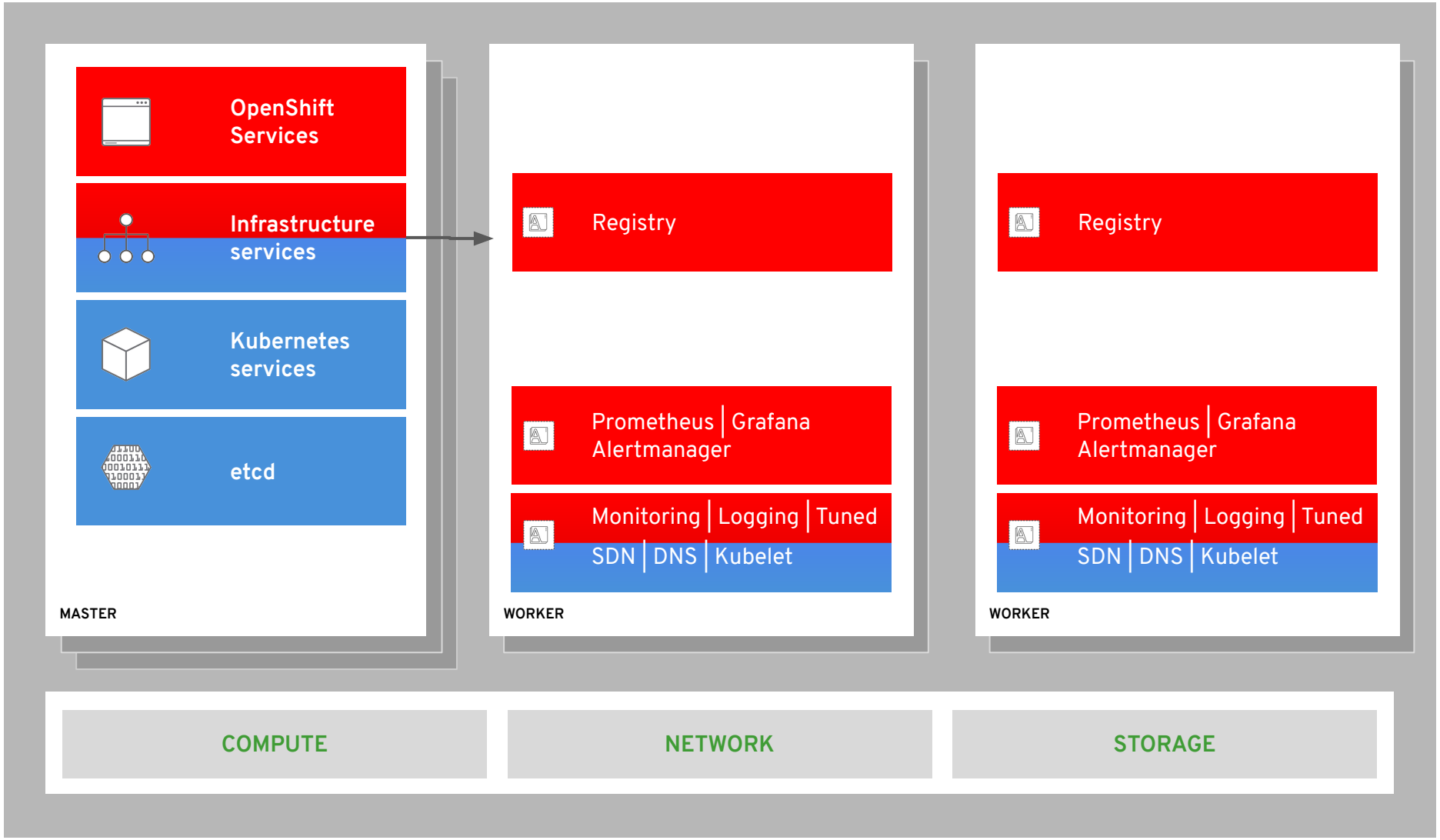
run on all hosts



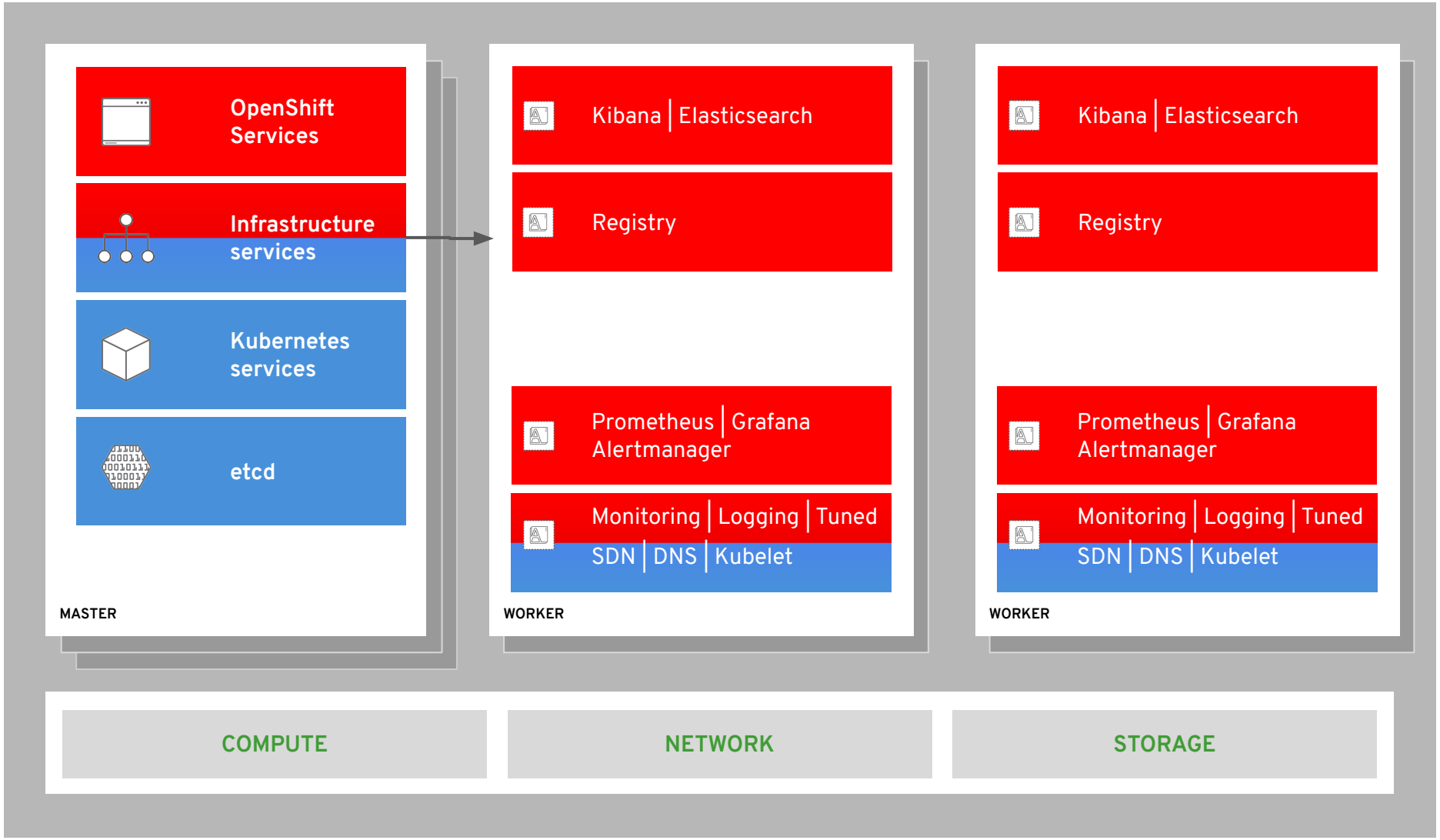
integrated image registry



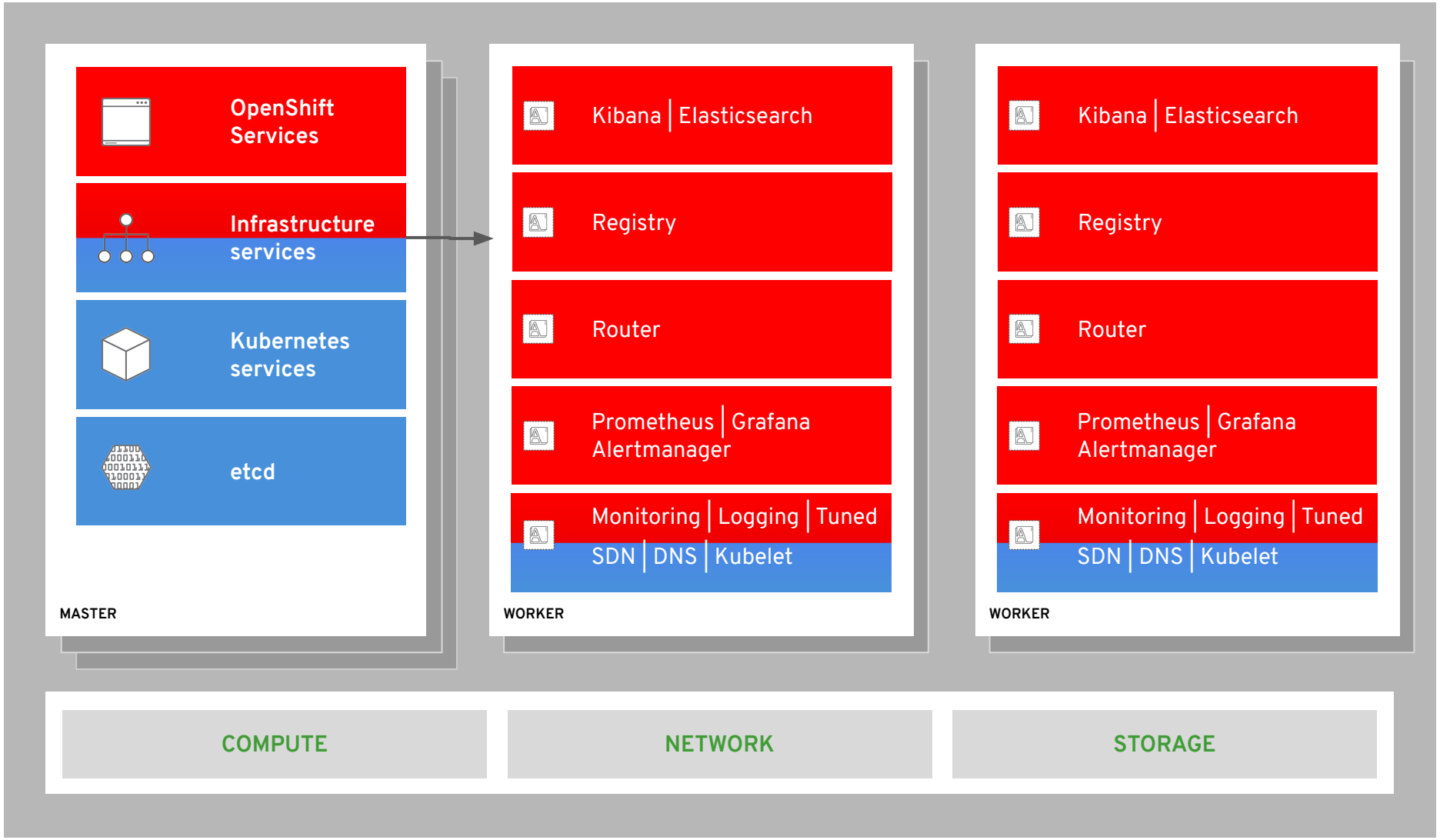
cluster monitoring



log aggregation

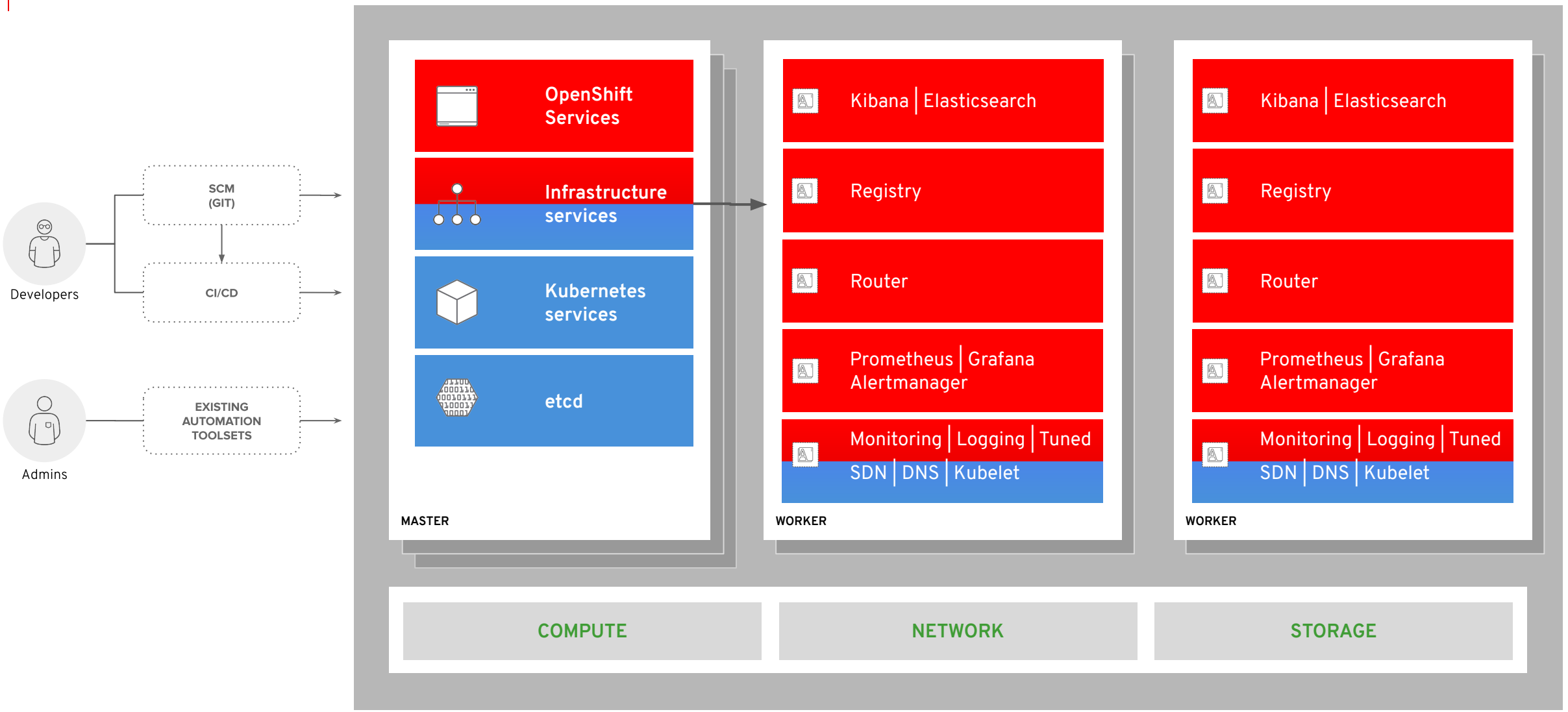


integrated routing

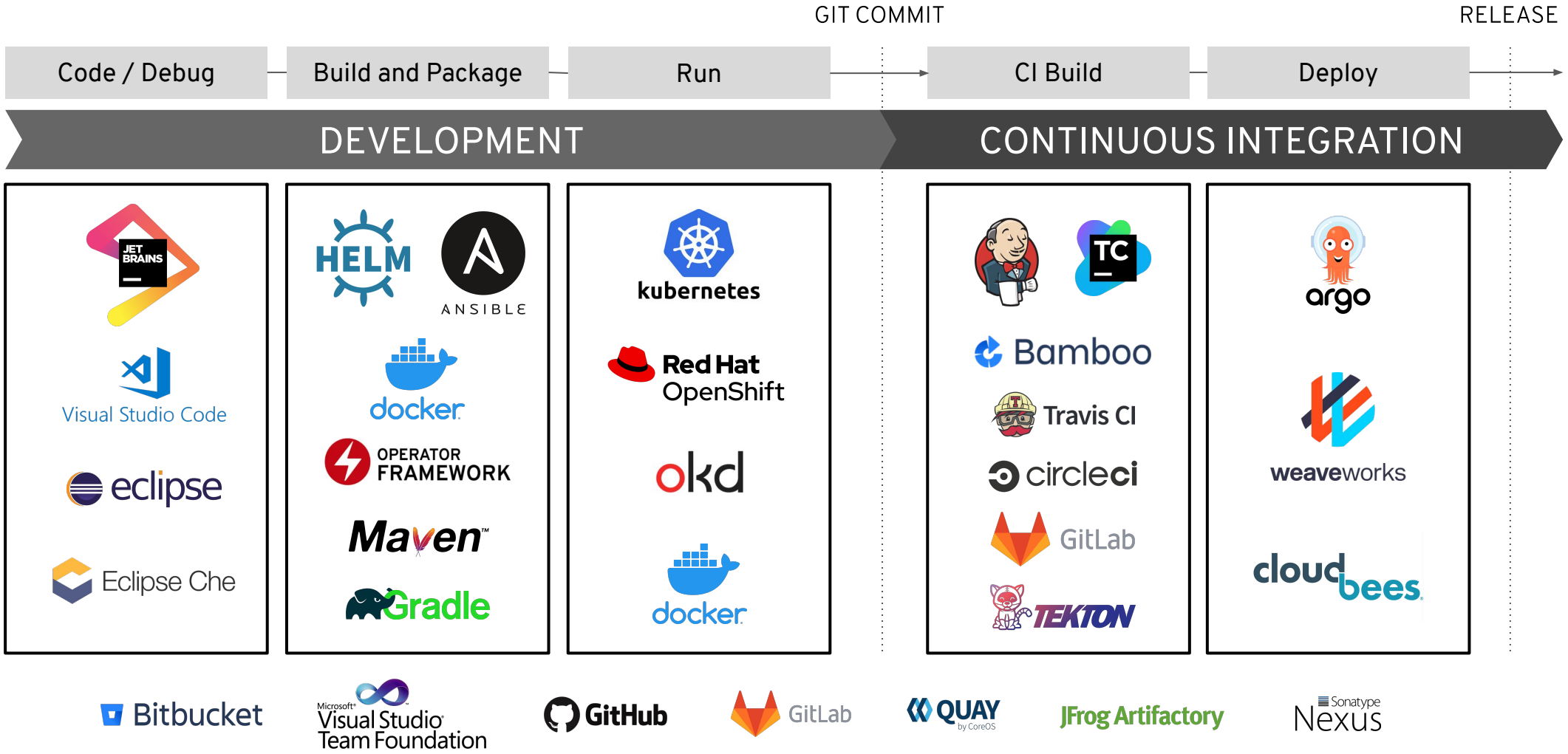


Red Hat

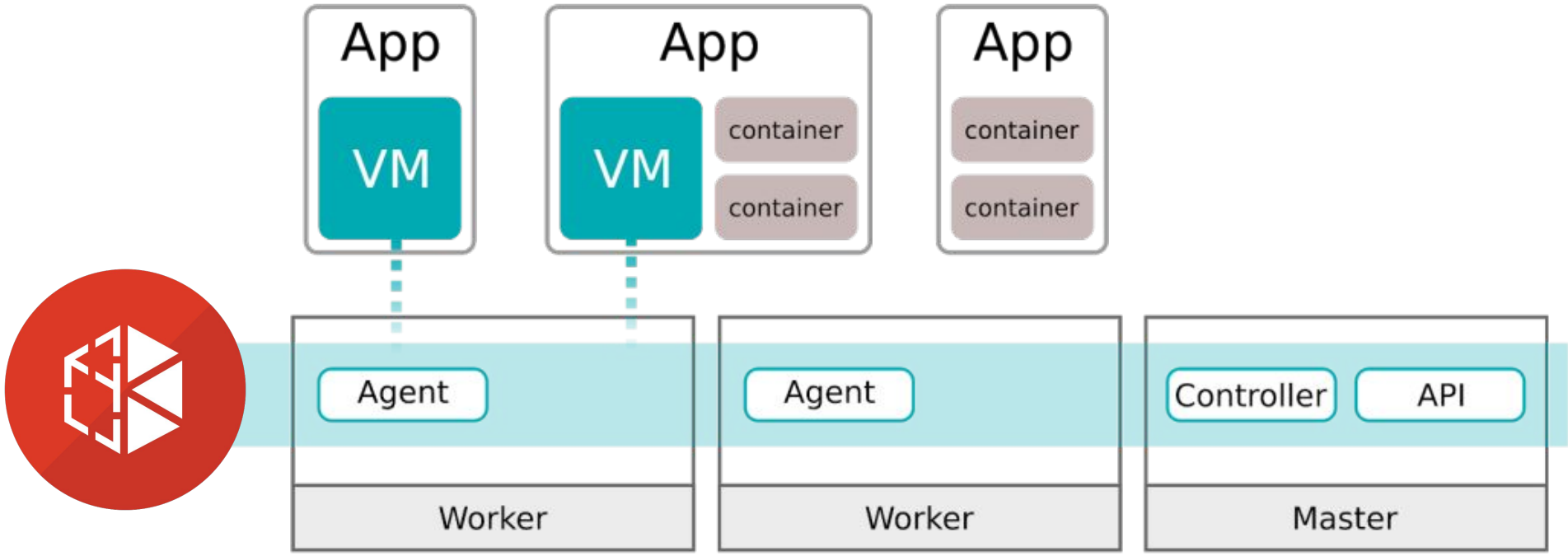
dev and ops via web, cli, API, and IDE



OpenShift integrates into your organization



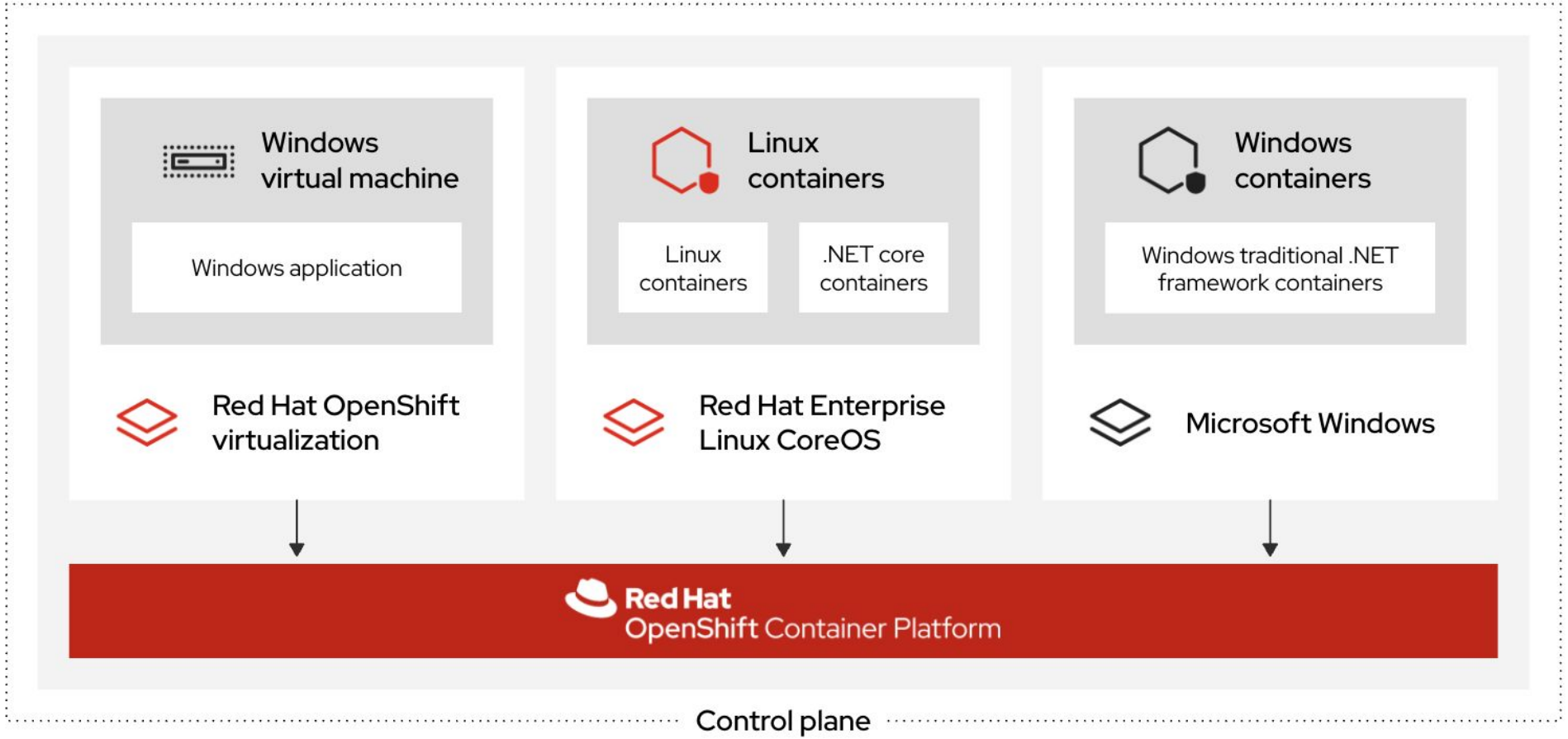
KubeVirt - Virtualization in Containers



Red Hat

Windows containers

Mixed Windows and Linux workloads



Kubernetes done right is hard

INSTALL

- Templating
- Validation
- OS setup

DEPLOY

- Identity & security access
- App monitoring & alerts
- Storage & persistence
- Egress, ingress, & integration
- Host container images
- Build/Deploy methodology
- Choice of footprint size

HARDEN

- Platform monitoring & alerts
- Metering & chargeback
- Platform security hardening
- Image hardening
- Security certifications
- Network policy
- Disaster recovery
- Resource segmentation

OPERATE

- OS upgrade & patch
- Platform upgrade & patch
- Image upgrade & patch
- App upgrade & patch
- Security patches
- Continuous security scanning
- Multi-environment rollout
- Enterprise container registry
- Cluster & app elasticity
- Monitor, alert, remediate
- Log aggregation

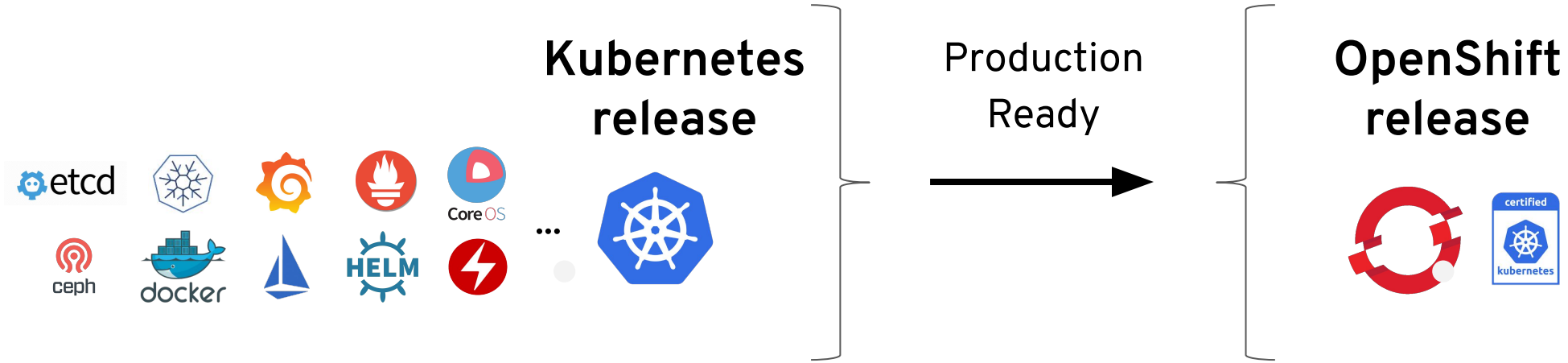
75%

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.

Red Hat

OpenShift is trusted enterprise Kubernetes



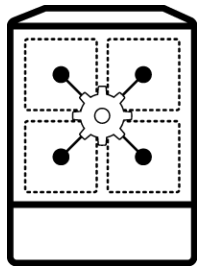
- Hundreds of defect and performance fixes
- 200+ validated integrations
- Certified container ecosystem
- 9-year enterprise life-cycle management
- Red Hat is a leading Kubernetes contributor since day 1

Red Hat

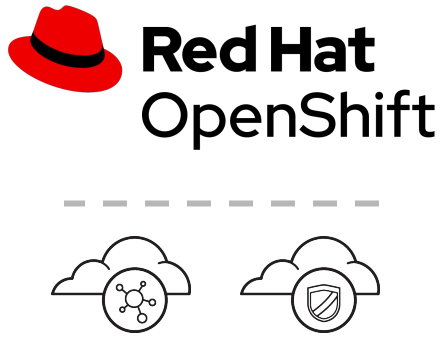
OpenShift Ecosystem

60+ Certified ISV Operators

Why customers choose Red Hat OpenShift



Trusted enterprise Kubernetes



Cloud-like experience everywhere

Empowering developers to innovate

Open source innovation

Red Hat

OpenShift Platform Services for Cloud Native Development

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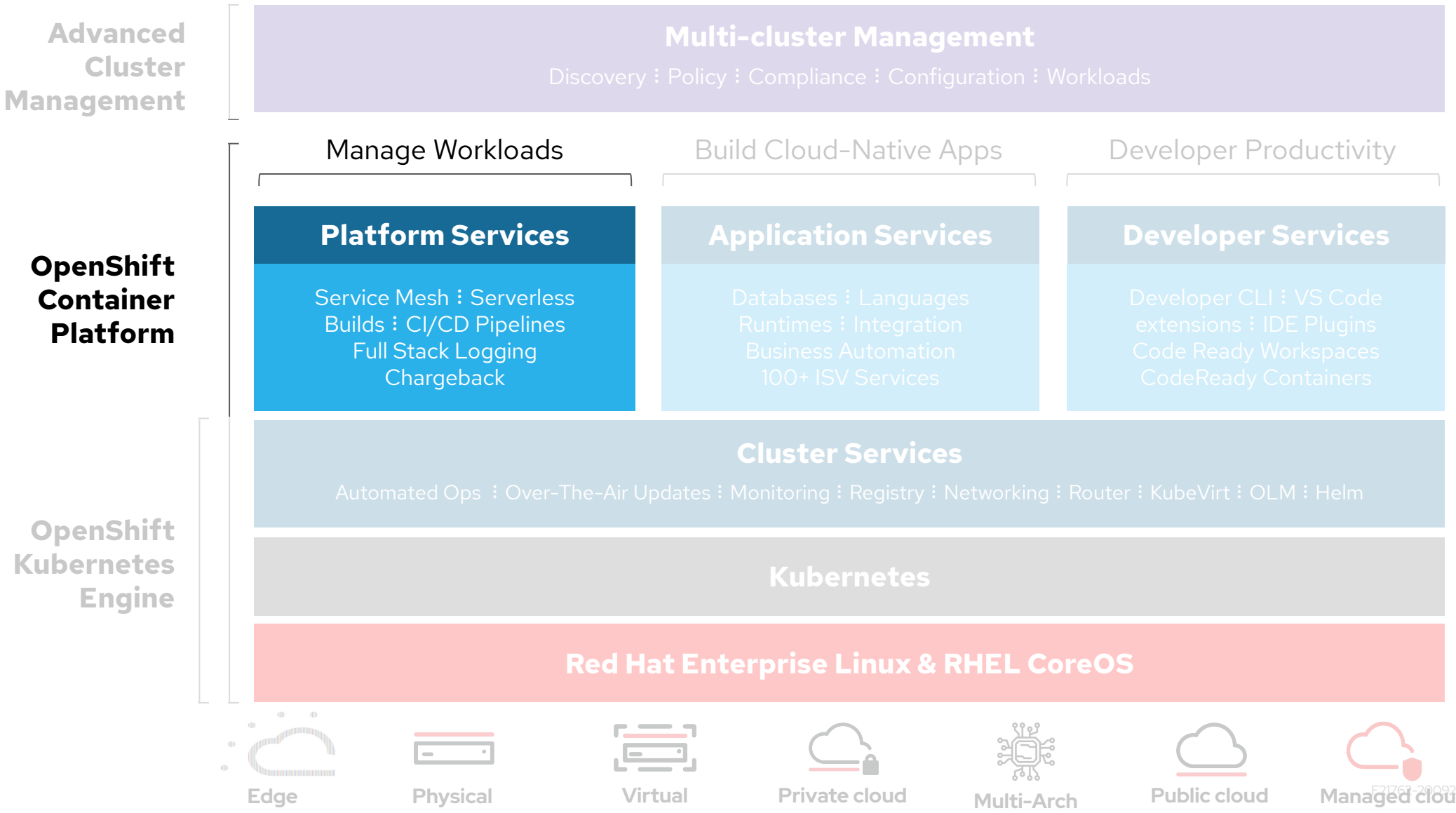
- OpenShift Platform Services
- OpenShift Serverless
- OpenShift ServiceMesh
- OpenShift Pipelines

OpenShift Container Platform



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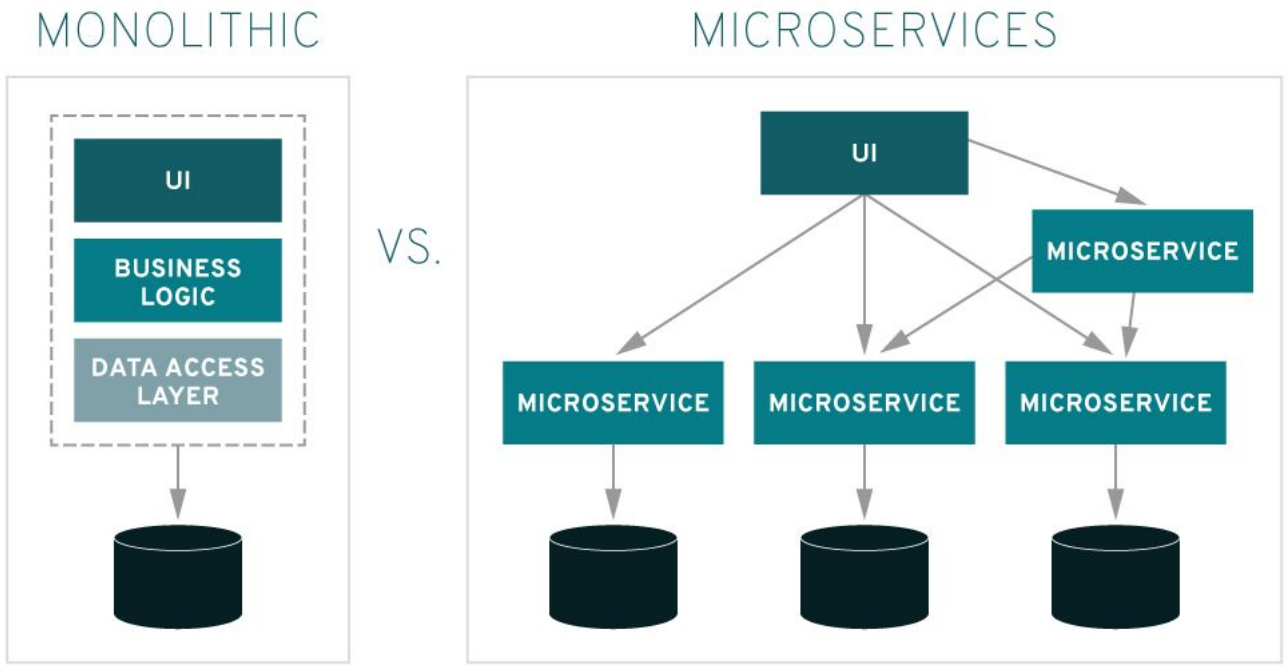
What are Microservices?

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

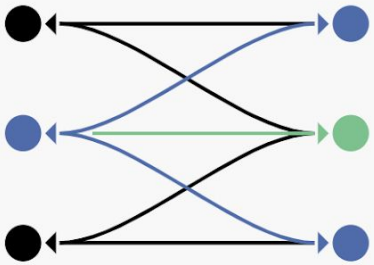
Malicious requests, DoS, id & access control

Highly Distributed Logs

Scattered logs, lots more logs to manage, access control

Istio Service Mesh

A modern way to manage the complexity of microservice applications

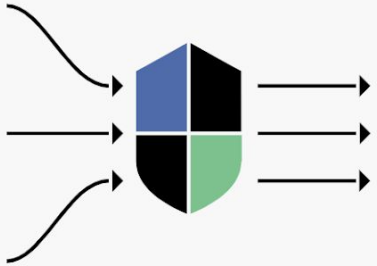


Connect

Intelligently control the flow of traffic and API calls between services, conduct a range of tests, and upgrade gradually with red/black deployments.

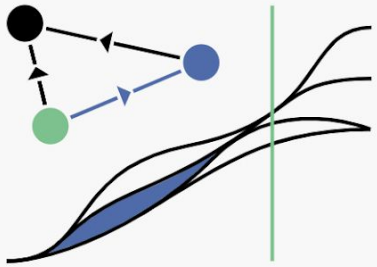
Secure

Automatically secure your services through managed authentication, authorization, and encryption of communication between services.



Control

Apply policies and ensure that they're enforced, and that resources are fairly distributed among consumers.



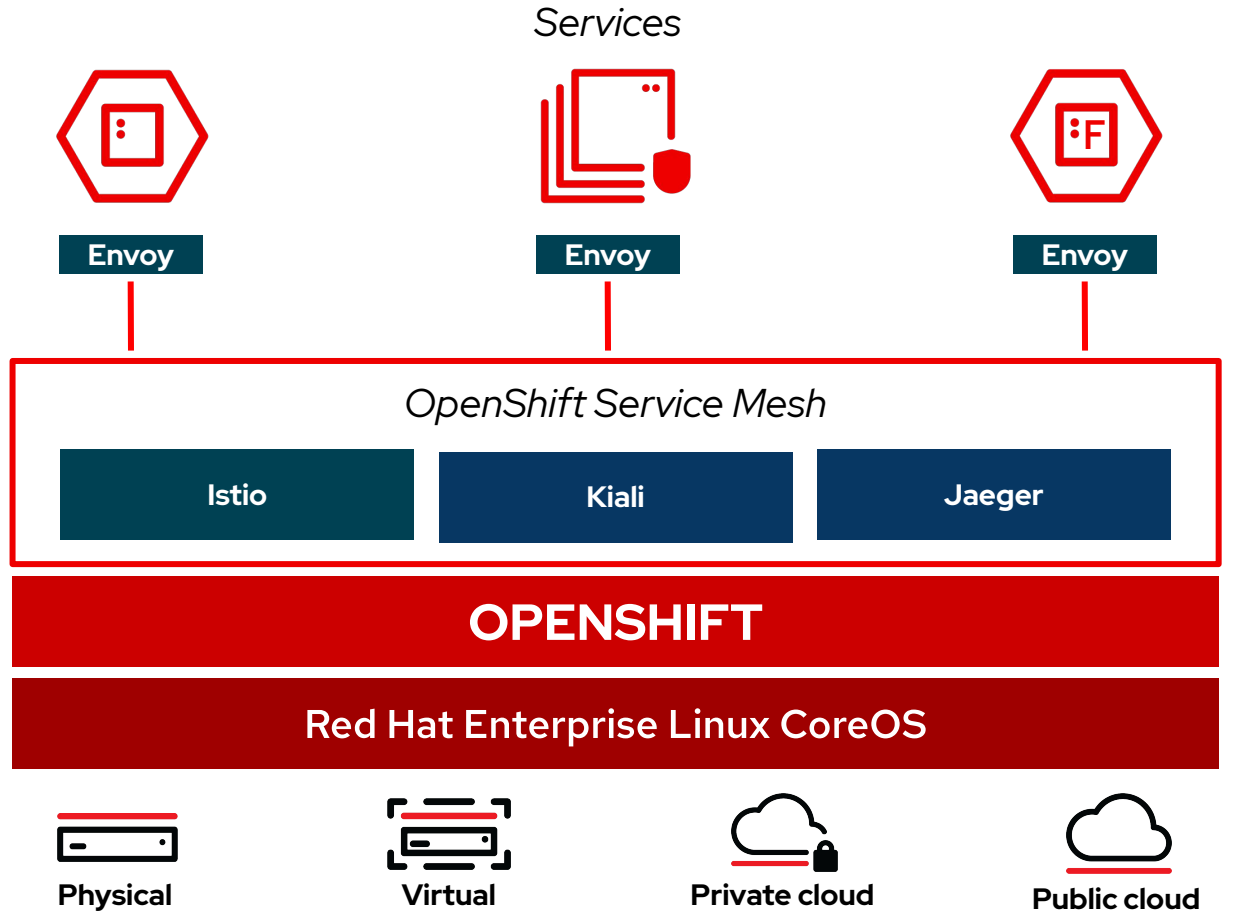
Observe

See what's happening with rich automatic tracing, monitoring, and logging of all your services.

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.



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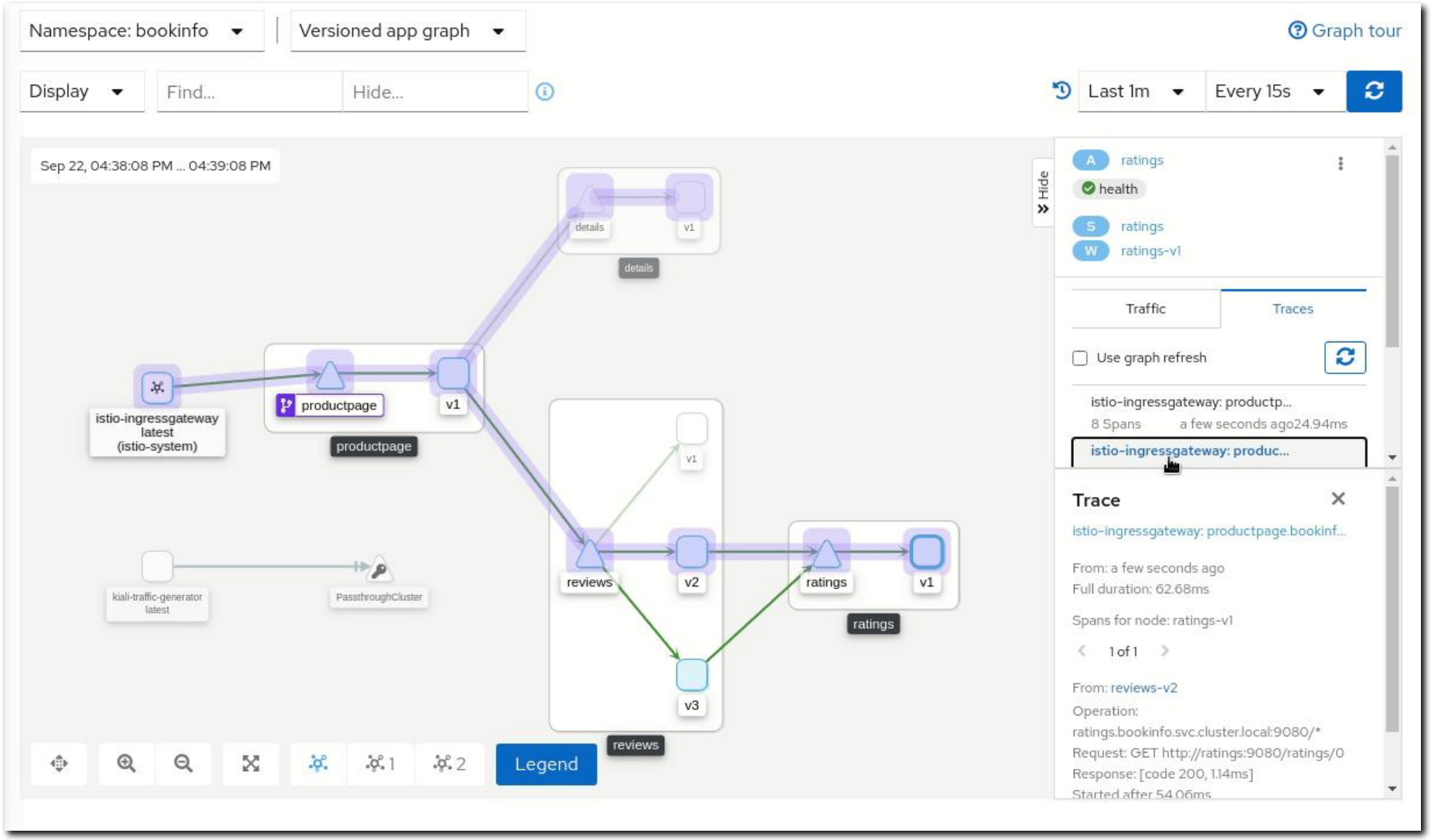
The future is Istio



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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"*

Source:
1. https://www.oreilly.com/radar/oreilly-serverless-survey-2019-concerns-what-works-and-what-to-expect/
2. Forrester - Now Tech: Serverless, Q4 2019

OpenShift Serverless

1.0

AWS Lambda, Functions...

Built around the FaaS components and other services such as API Gateways. It enabled a variety of use cases but it is far from ideal for general computing and with room for improvements.

- HTTP and other few Sources
- **Functions only**
- **Limited execution time (5 min)**
- No orchestration
- Limited local development experience

1.5

Serverless Containers

With the advent of Kubernetes, many frameworks and solutions started to auto-scale containers. Cloud providers created offerings using managed services completely abstracting Kubernetes APIs.

- Red Hat joins **Knative**
- Kubernetes based auto-scaling
- **Microservices and Functions**
- Easy to debug & test locally
- **Polyglot & Portable**
- Microsoft & Red Hat create **KEDA**

2.0

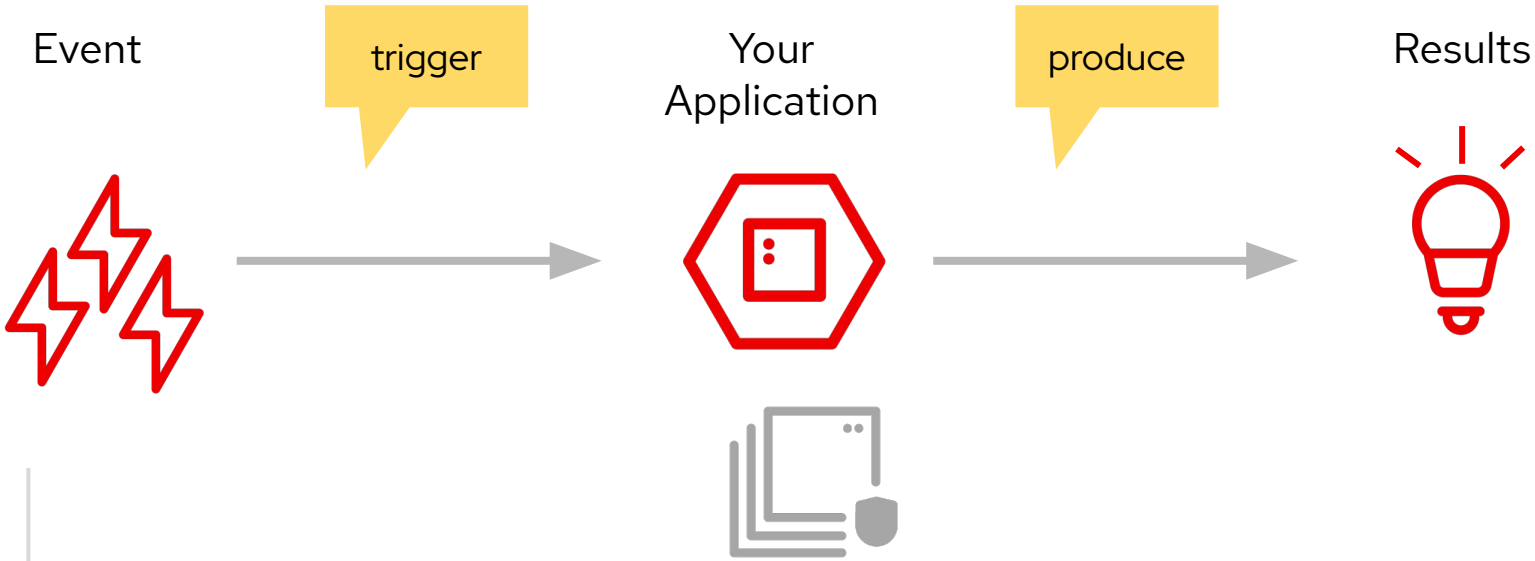
Integration & State

The maturity and benefits of Serverless are recognized industry wide and it adds the missing parts to make pattern suitable for general purpose workloads and used on the enterprise.

- Basic state handling
- **Enterprise Integration Patterns**
- Advanced Messaging Capabilities
- **Blended with your PaaS**
- Enterprise-ready event sources
- **Solutions and outcome focused**

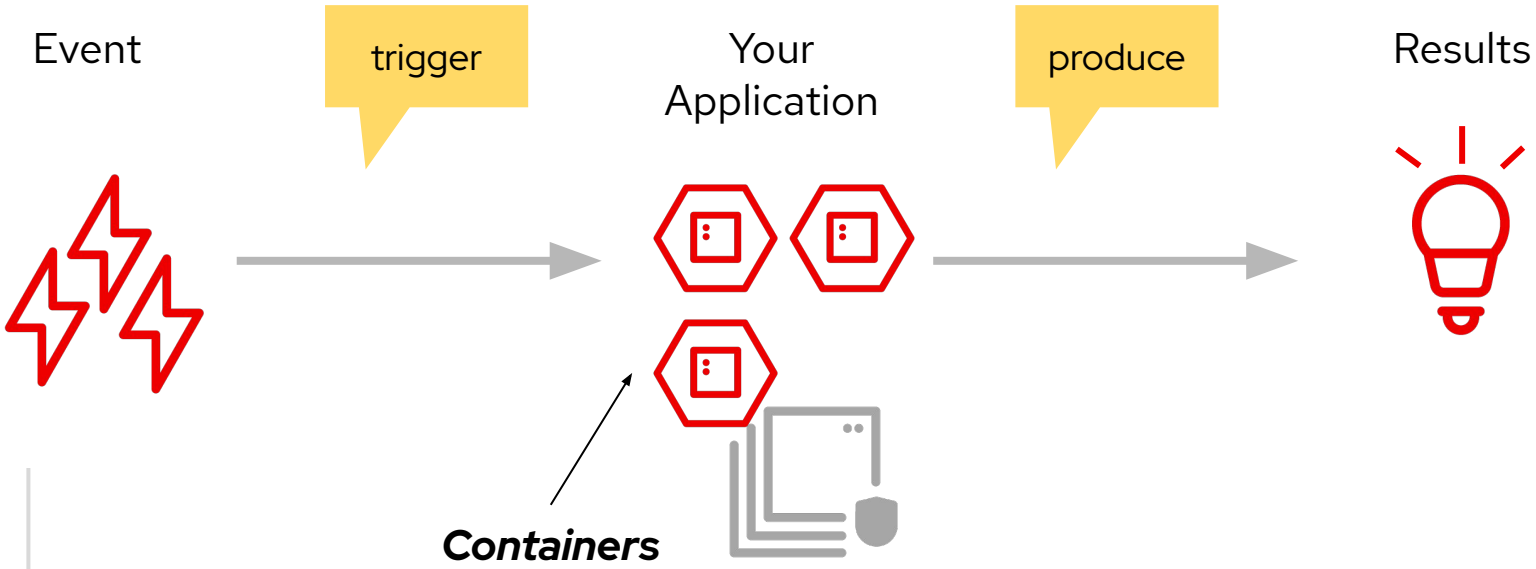
Serverless is still evolving...

The "Serverless Pattern"



- HTTP Requests
- Kafka Messages
- Image Uploaded
- New Order
- Login from user

The "Serverless Pattern" in k8s world



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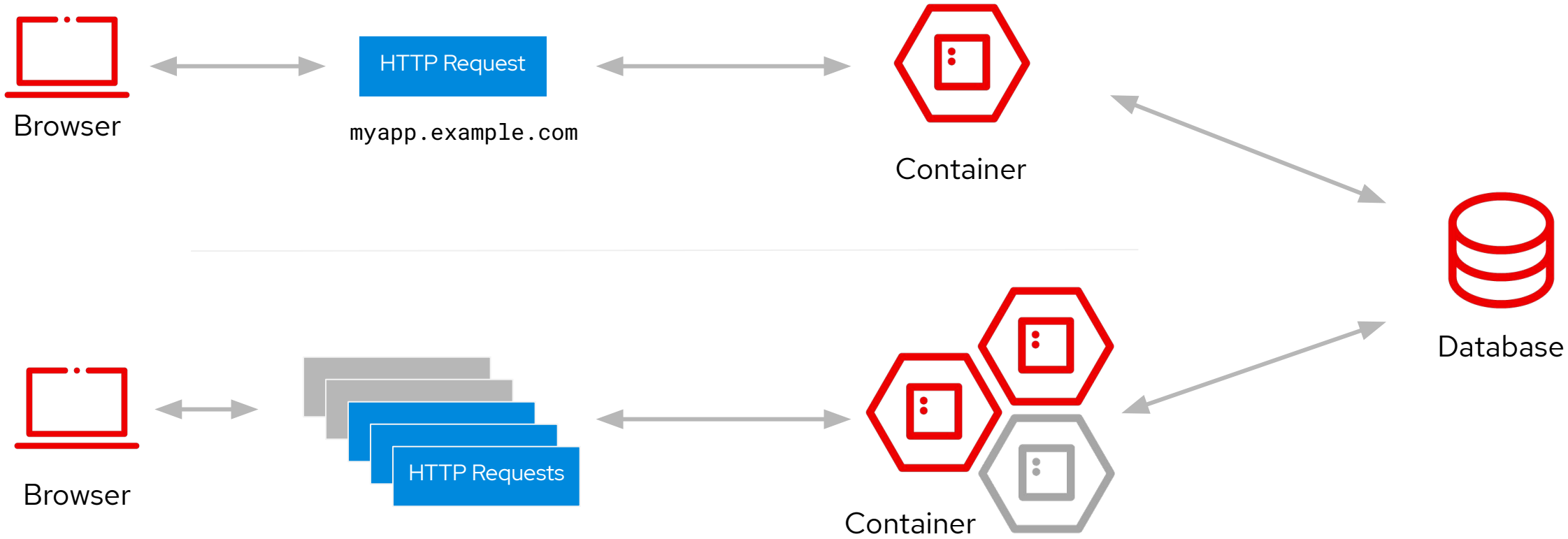
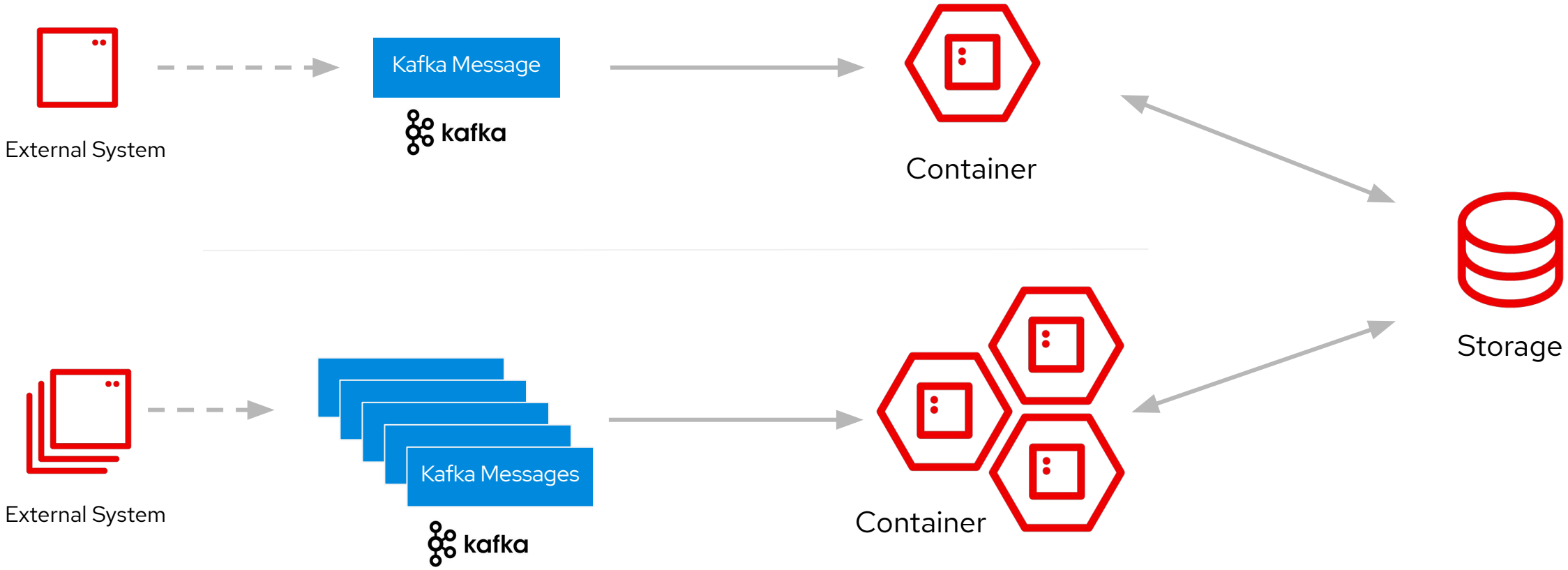
The "Serverless Pattern"

A serverless web application



The "Serverless Pattern"

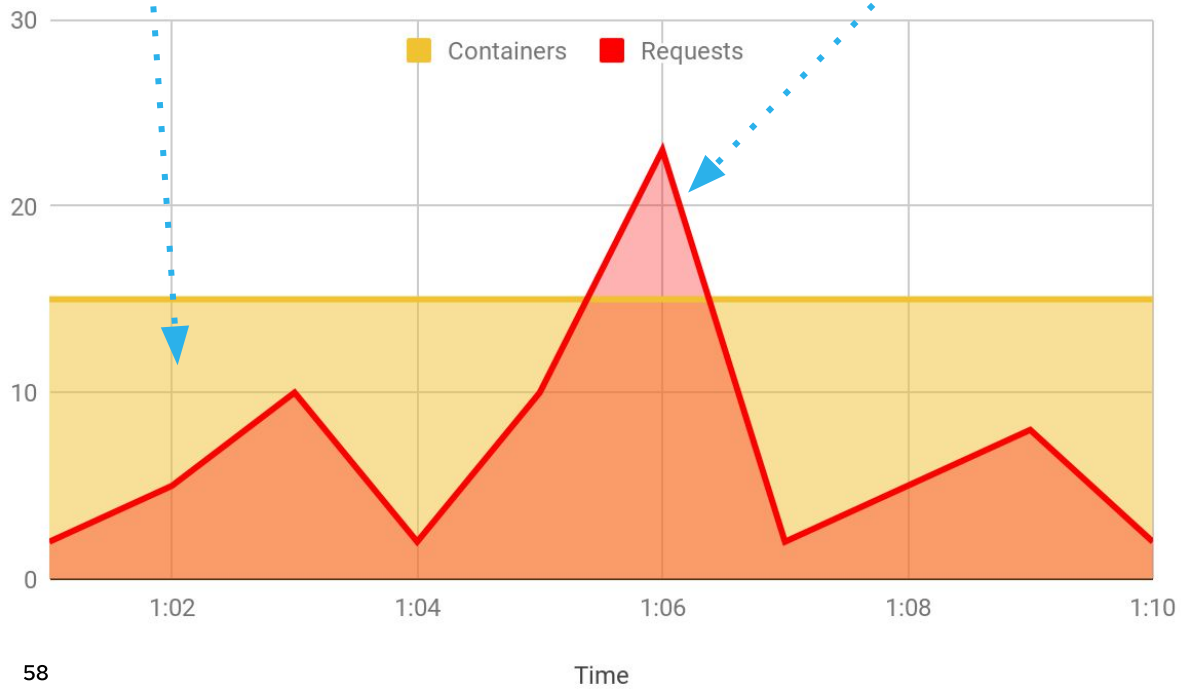
Processing a Kafka message



Serverless Operational Benefits

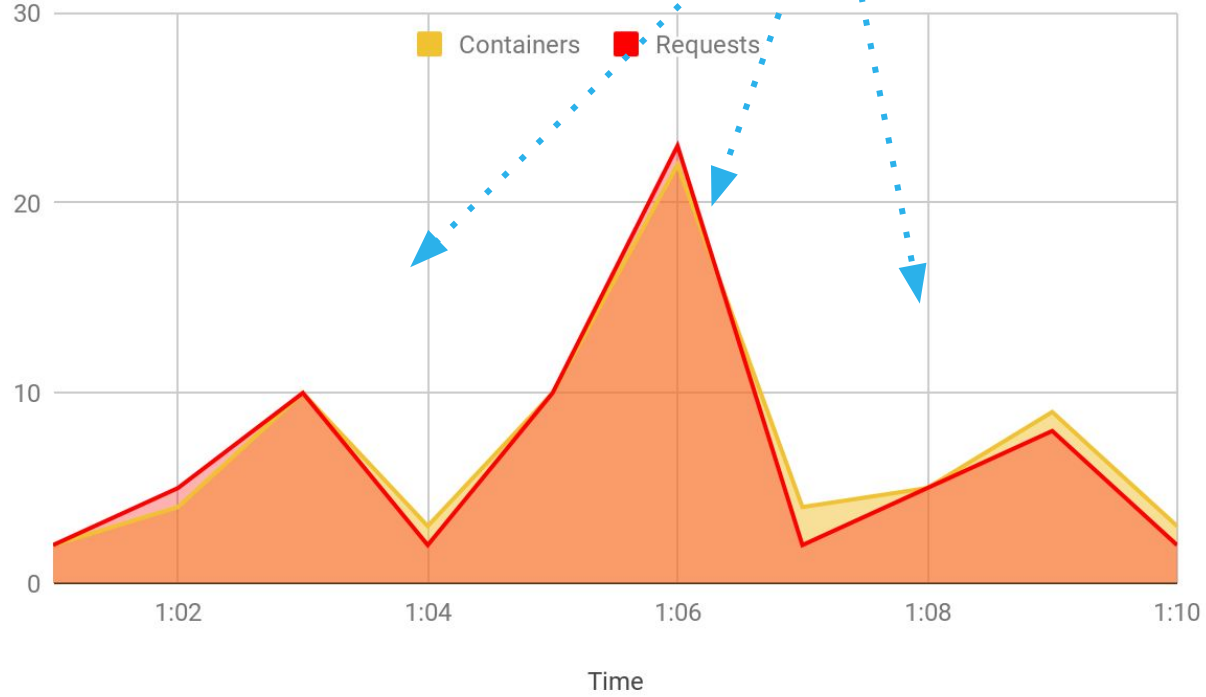
Over provisioning
Time in capacity planning
IT cost of idle resources

Under provisioning
Lost business revenue
Poor quality of service



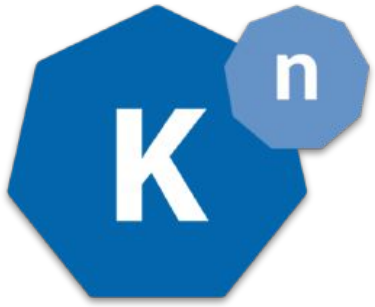
NOT Serverless

More applications
Direct line between IT
costs & business revenue



with Serverless

Serverless Enablers



Knative

Cloud Events

Knative

Bringing Serverless Applications to Kubernetes

SERVING

*A **request-driven** model that serves the **container** with your application and can "**scale to zero**".*

EVENTING

*Common **infrastructure** for consuming and producing **events** that will stimulate applications.*

CLIENT (kn)

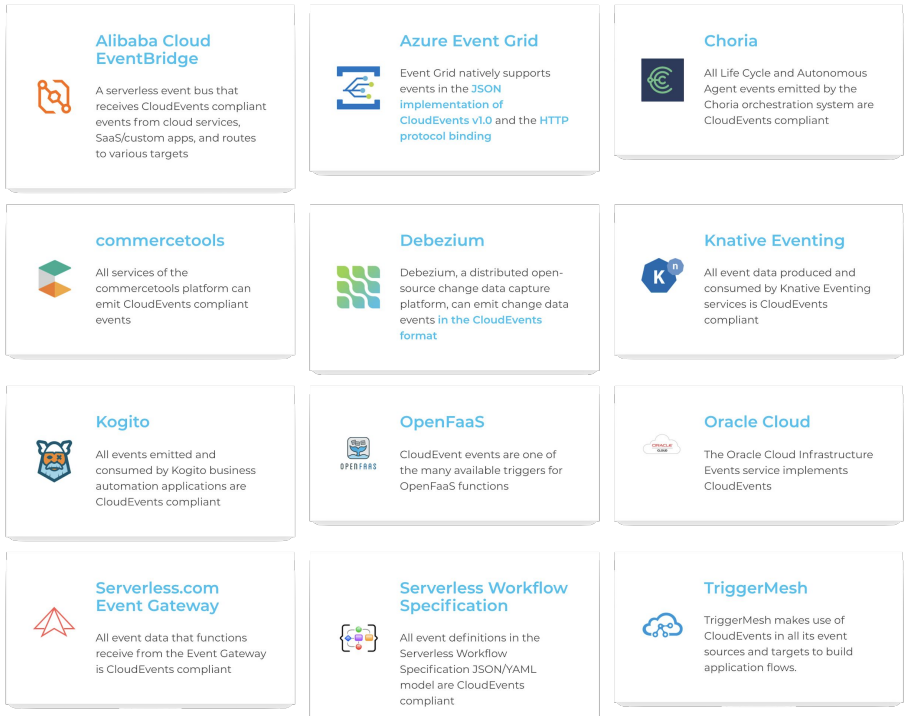
*Allows you to create resources interactively from the **command line** or from within scripts*

Cloud Events

A specification for describing event data in a common way

Consistency **Accessibility** **Portability**

https://cloudevents.io/



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

Developer Preview

Functions

Powerful CLI experience

- ✓ Local Developer Experience
- ✓ Based on Buildpacks
- ✓ Deploy as Knative Service
- ✓ Project templates
- ✓ Support for Cloud Events/HTTP
- ✓ **Runtimes:**


```
$ kn func help
Usage:
  func [command]

Available Commands:
  build       Build a function project as a container image
  completion  Generate completion scripts for bash, fish and zsh
  create      Create a function project
  delete      Undeploy a function
  deploy      Deploy a function
  describe    Show details of a function
  help        Help about any command
  init        Initialize a new Function project
  list        Lists deployed functions
  run         Run the function locally
  version     Print version.
```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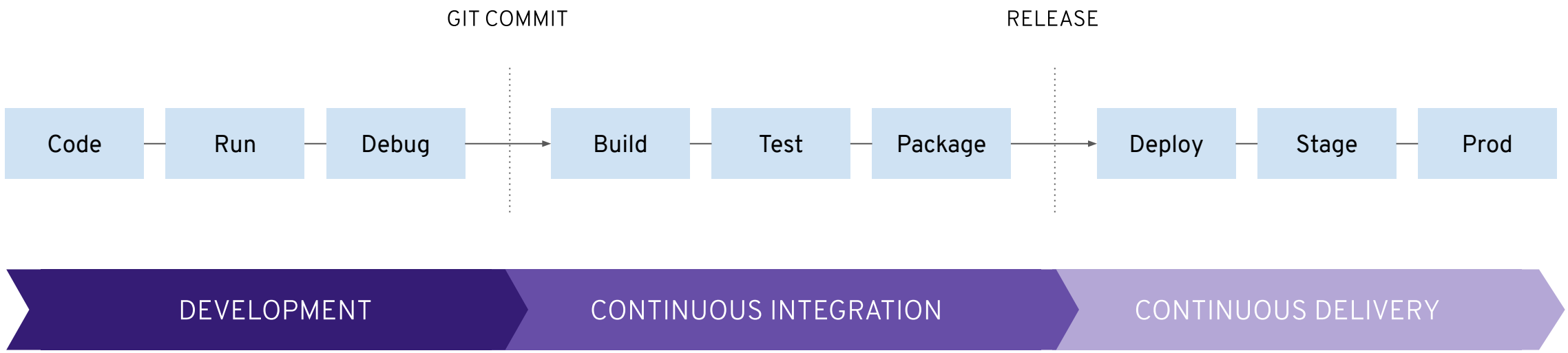
OpenShift Platform Services for Cloud Native Development

- OpenShift Platform Services
- OpenShift ServiceMesh
- OpenShift Serverless
- OpenShift Pipelines

Continuous Integration (CI) and Continuous Delivery (CD)



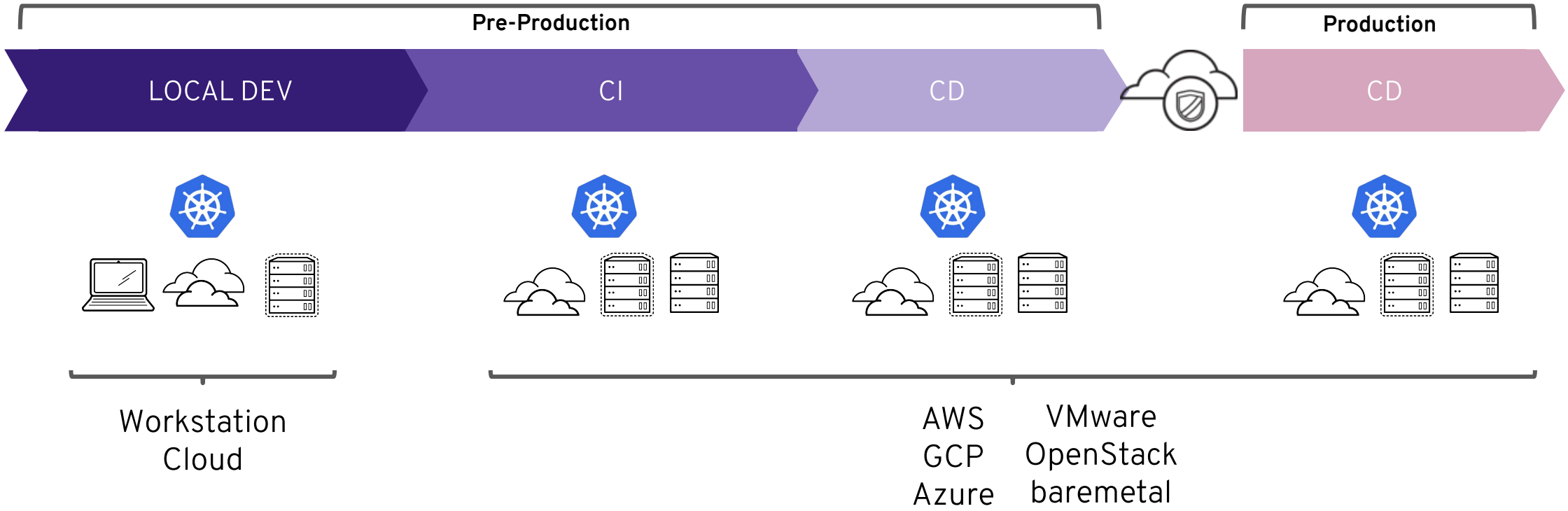
One Continuous Delivery

Multiple Clouds

Multiple Platforms

Multiple Geographies

Isolated Environments



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One Continuous Delivery

Multiple Clouds

Multiple Platforms

DEVELOPMENT | CONTINUOUS INTEGRATION | CONTINUOUS DELIVERY

Workstation

Kubernetes

Kubernetes

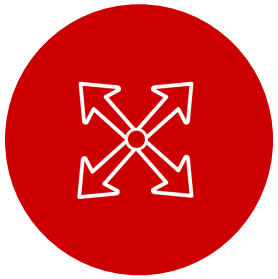
Kubernetes
Azure
AWS
GCP
VMware
OpenStack
baremetal

Red Hat

What is Cloud-Native Continuous Integration and Continuous Delivery (CI/CD)?

Containers

Built for container apps and runs on Kubernetes



Serverless

Runs serverless with no CI/CD engine to manage and maintain

DevOps

Designed with microservices and distributed teams in mind

OpenShift Pipelines

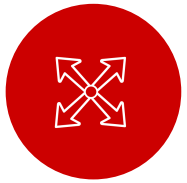
a Cloud-Native CI/CD Experience on OpenShift

Standard Kubernetes-style pipelines

Declarative pipelines with standard Kubernetes custom resources (CRDs) based on Tekton*

Build images with Kubernetes tools

Use tools of your choice (source-to-image, buildah, kaniko, jib, etc) for building container images



Run pipelines in containers

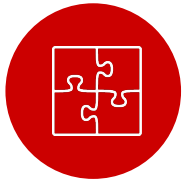
Scale pipeline executions on-demand with containers on Kubernetes

Deploy to multiple platforms

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

Powerful command-line tool

Run and manage pipelines with an interactive command-line tool



Integration with OpenShift and Tooling

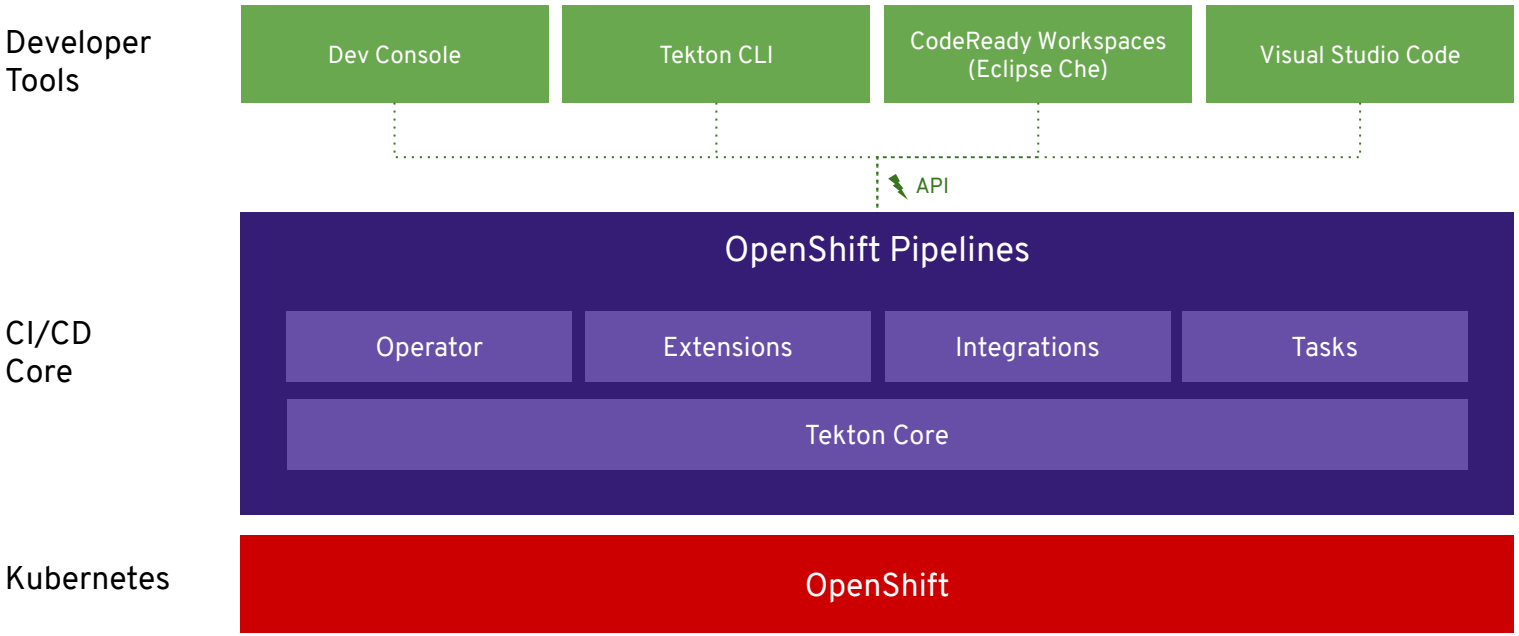
A CI/CD experience integrated with OpenShift, developer tools and IDE extensions

An open-source project for providing a set of shared and standard components for building Kubernetes-style CI/CD systems

Governed by the Continuous Delivery Foundation

Contributions from Google, Red Hat, Cloudbees, IBM, Pivotal and many more

OpenShift Pipelines Architecture



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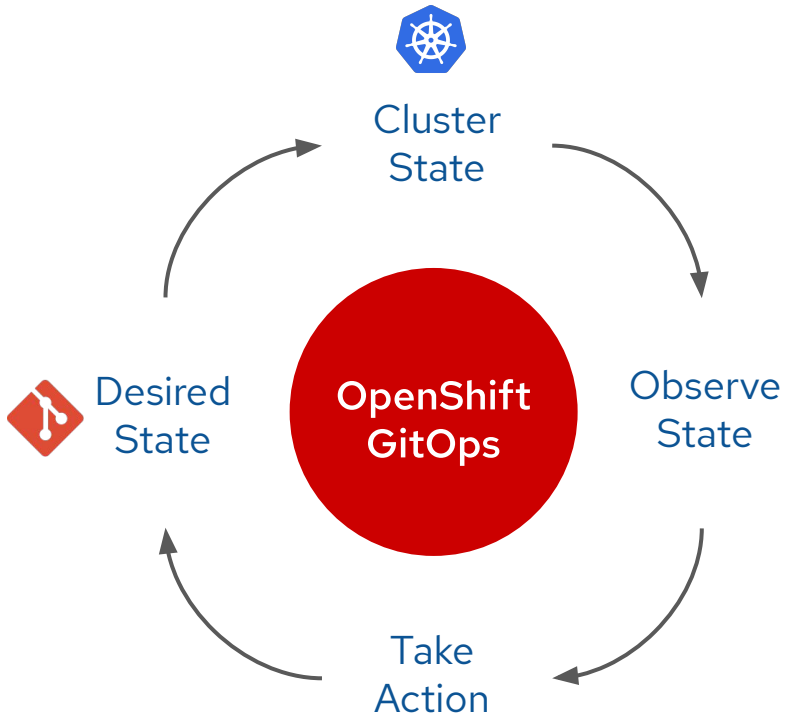
Tech Preview

OpenShift GitOps

(new add-on)

- 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



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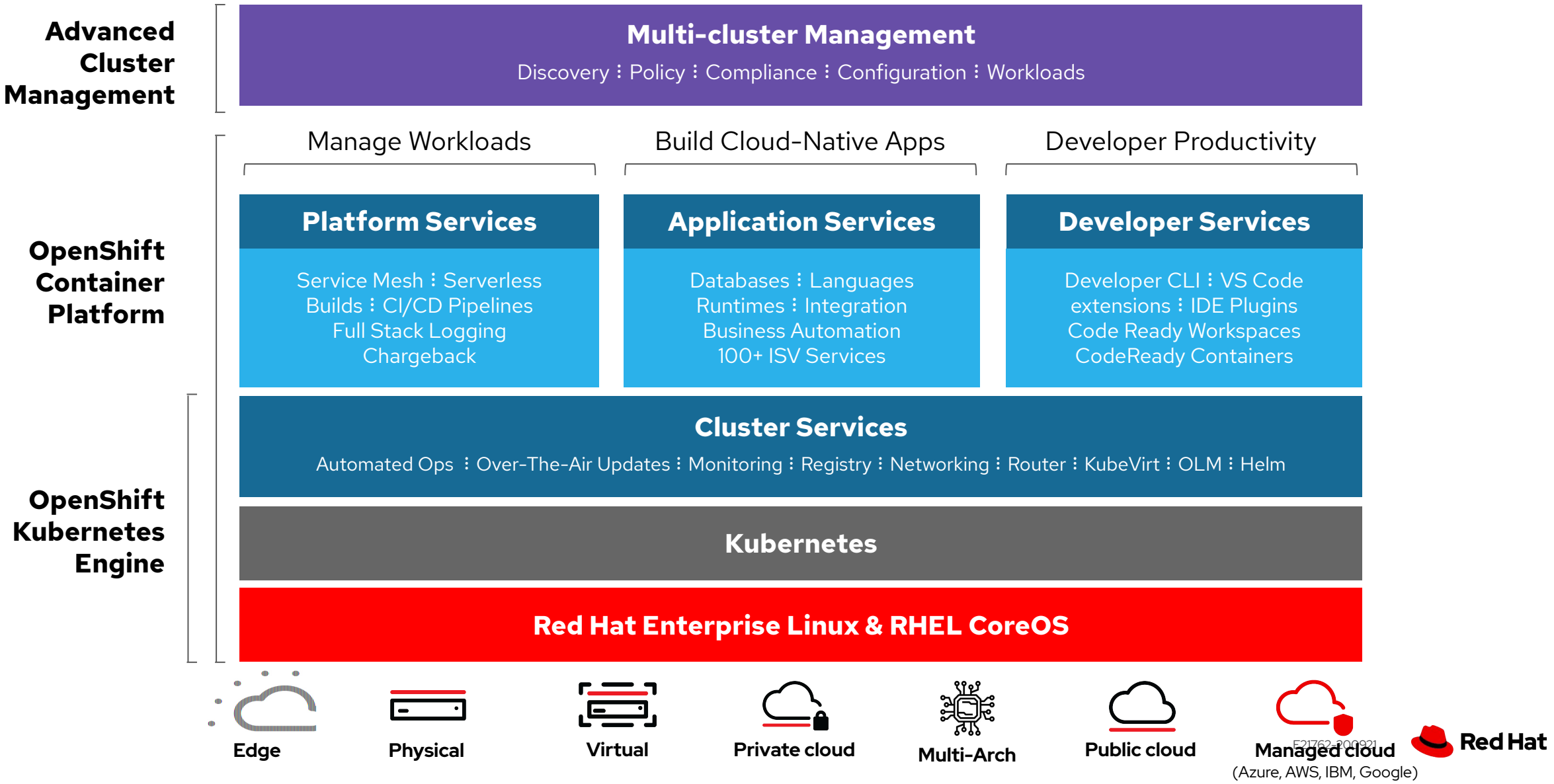
Wrap up

OpenShift Container Platform



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Red Hat Training

Links

Red Hat Trainings and Certification
IDC Business Value of RH Training

Red Hat

Value of Red Hat Certification

Key benefits when organizations provide Red Hat Training to their IT teams:

20% more efficient infrastructure management

50% faster resolution of help desk issues

71% less unplanned downtime

Additional benefits are achieved when teams include Red Hat Certified Professionals:

36% more efficient server administration

61% more efficient help desk

54% faster outage resolution

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Multiple ways of learning

 Classroom training	Train and test in a professional classroom environment led by Red Hat certified instructors.
 Red Hat Learning Subscription	Get one year of access to all of our online learning content (more than 50 courses), video classroom courses on select titles, and up to 400 hours of lab time.
 Virtual training	Experience live, instructor-led online training with the same high-quality, hands-on labs you'd find in our classrooms.
 Online learning	Take advantage of 90 days of access to course content and up to 80 hours of hands-on labs–all available online, at your pace, and on your schedule.
 Video classroom	Enjoy interactive "in-classroom" access to Red Hat's most popular courses, presented by experienced instructors, and recorded in HD video. Video classroom is a key feature of Red Hat Learning Subscription.
 On-site training	On-site training and exams delivered at your location, at one of our training centers, or online.
 Individual exams	Schedule to take an exam at select locations across the globe, and pick the date and time that work best for you.

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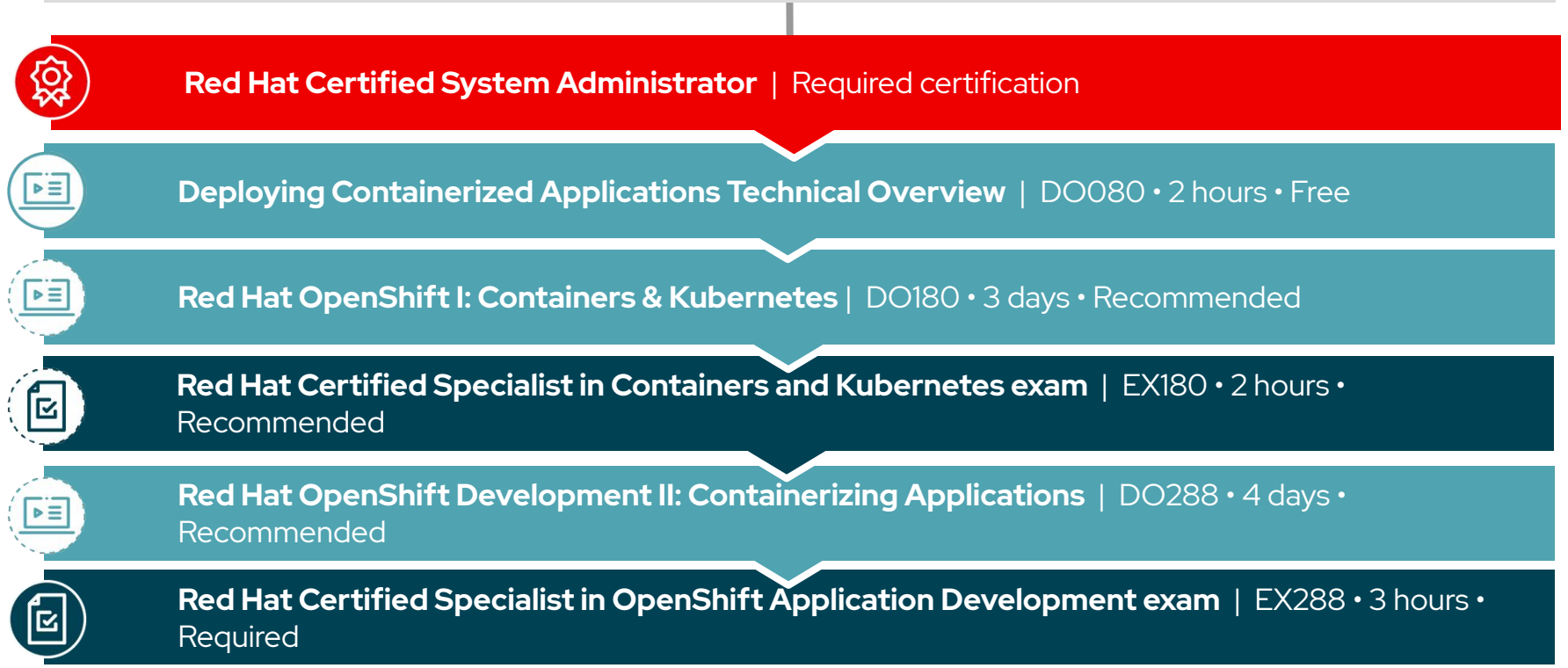
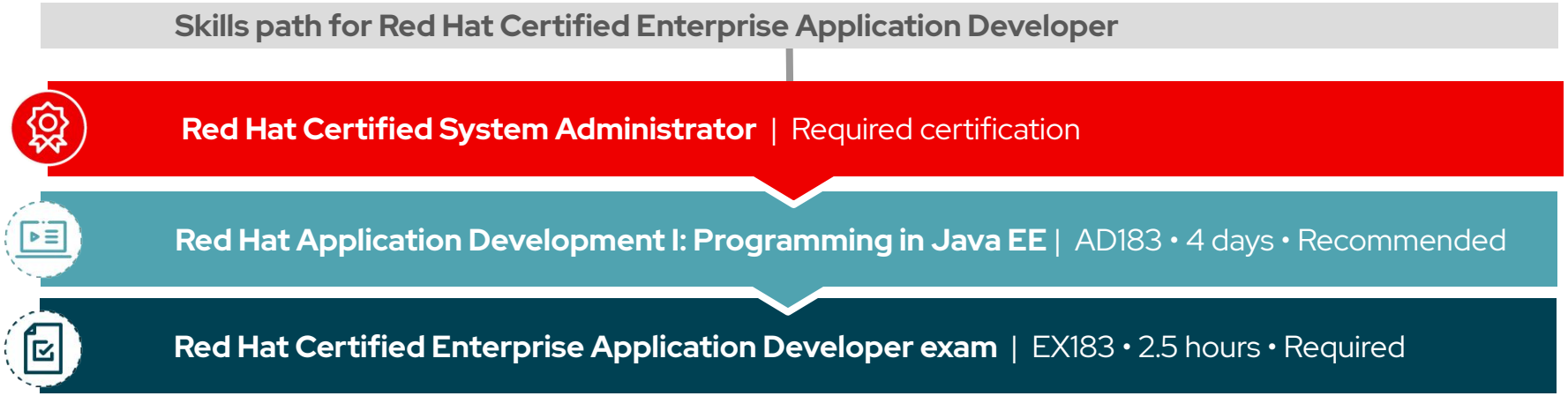
Skills path for Red Hat Certified Specialist in OpenShift Administration
Red Hat Certified System Administrator | Required certification
Deploying Containerized Applications Technical Overview | DO080 • 2 hours • Free
Red Hat OpenShift I: Containers & Kubernetes | DO180 • 3 days • Recommended
Red Hat Certified Specialist in Containers and Kubernetes exam | EX180 • 2 hours • Recommended
Red Hat OpenShift Administration II: Operating a Production Kubernetes Cluster | DO280 • 3 days • Recommended
Red Hat Certified Specialist in OpenShift Administration | EX280 • 3 hours • Required
Certification
Course
Exam
Required
Free
Recommended

Skills path for Red Hat Certified Specialist in OpenShift Application Development

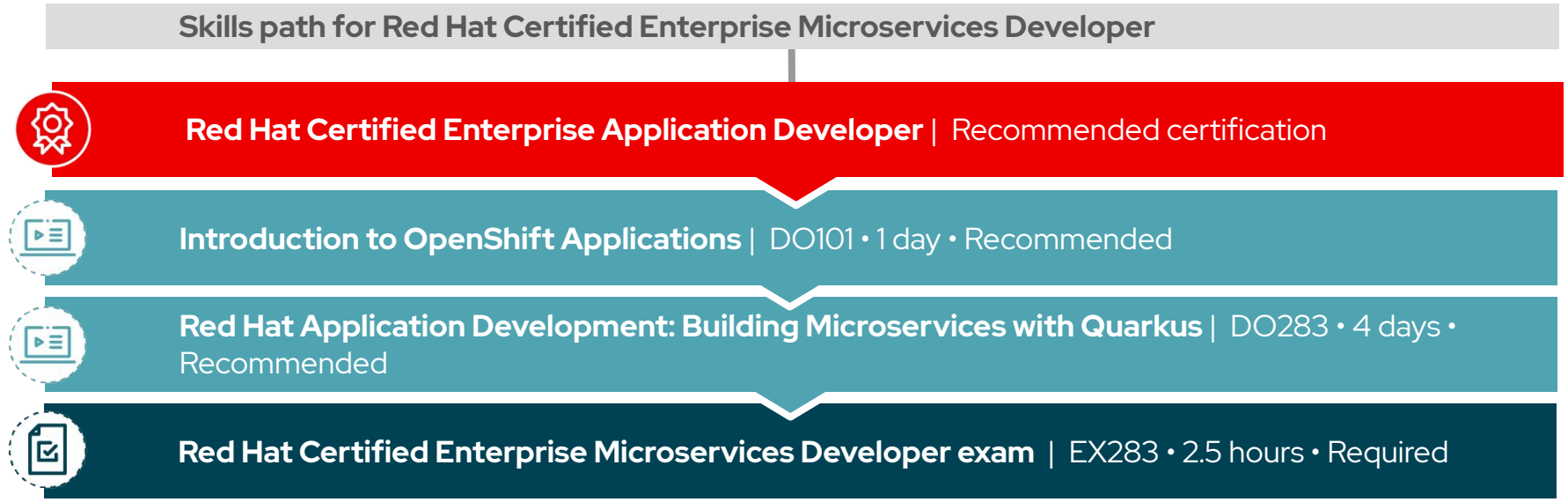


Certification | Course | Exam | Required | Free | Recommended

Red Hat


Skills path for Red Hat Certified Enterprise Application Developer
Red Hat Certified System Administrator | Required certification
Red Hat Application Development I: Programming in Java EE | AD183 • 4 days • Recommended
Red Hat Certified Enterprise Application Developer exam | EX183 • 2.5 hours • Required


Certification
Course
Exam
Required
Free
Recommended


Skills path for Red Hat Certified Enterprise Microservices Developer
Red Hat Certified Enterprise Application Developer | Recommended certification
Introduction to OpenShift Applications | DO101 • 1 day • Recommended
Red Hat Application Development: Building Microservices with Quarkus | DO283 • 4 days • Recommended
Red Hat Certified Enterprise Microservices Developer exam | EX283 • 2.5 hours • Required


Certification
Course
Exam
Required
Free
Recommended

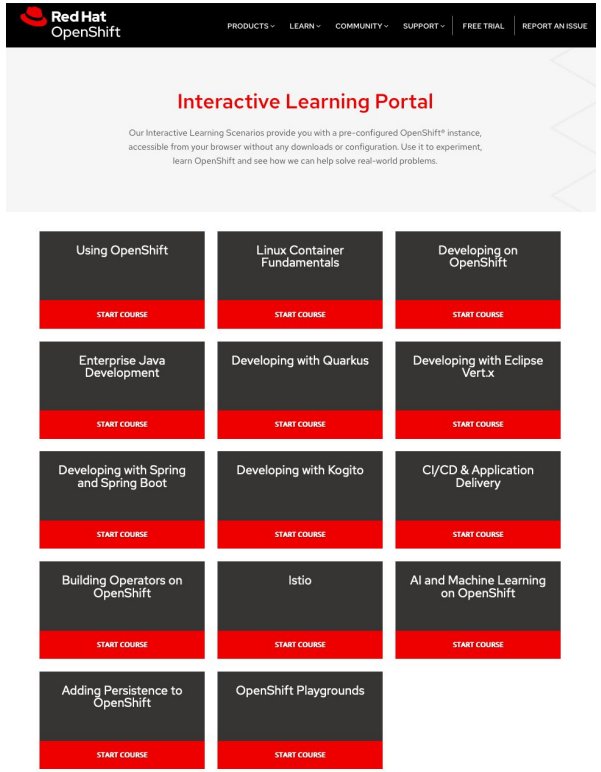
If you have any questions about courses and exams, please contact:

Marc Heinrich
Email: marc@redhat.com
Tel: +41 76 309 57 07

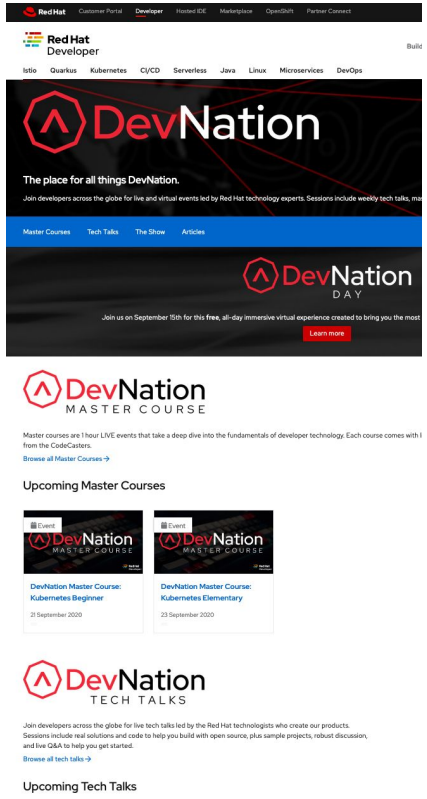
Red Hat Training

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

https://learn.openshift.com



https://developers.redhat.com/devnation



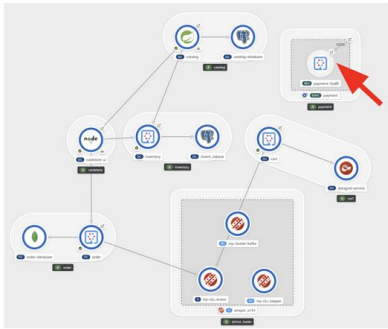
https://www.openshift.com/events

Guided Hands-On Workshops

CONTAINER CLOUD-NATIVE ROADSHOW V2

WHAT IS IT?

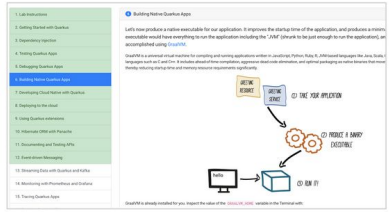
- Building Cloud-Native apps with OpenShift and Runtimes
- Modules based: choose from 4 modules
  - **Optimizing Existing Applications**
  - **Debugging, Monitoring and Continuous Delivery**
  - **Control Cloud Native Apps with Service Mesh**
  - **Advanced Cloud Native with Event-Driven Serverless**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



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Q&A

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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youtube.com/user/RedHatVideos


facebook.com/redhatinc


twitter.com/RedHat

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We'll be back at 13.00...

https://www.openshift-anwender.de/live