

OpenShift Container Platform

DACH Anwendertreffen

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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

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



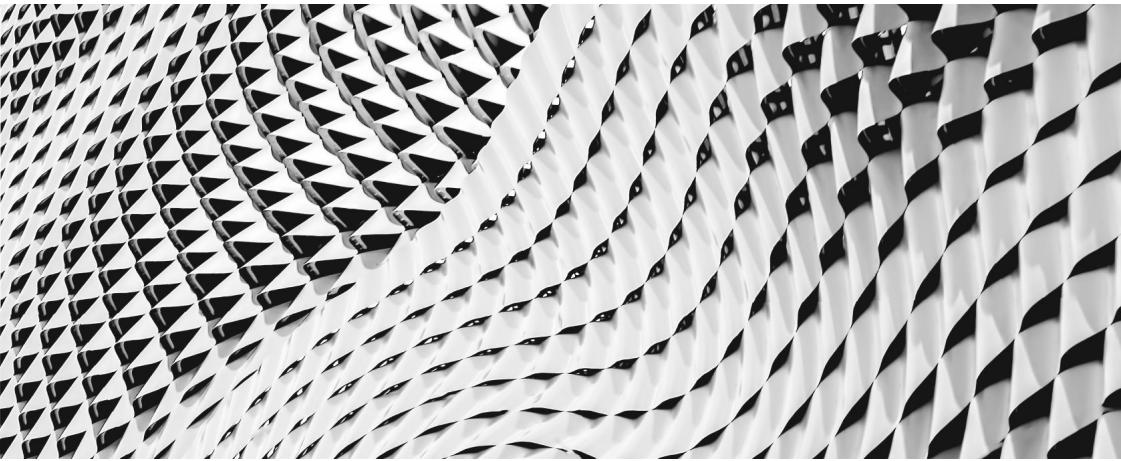
Public cloud



Managed cloud
(Azure, AWS, IBM, Google)



Containers



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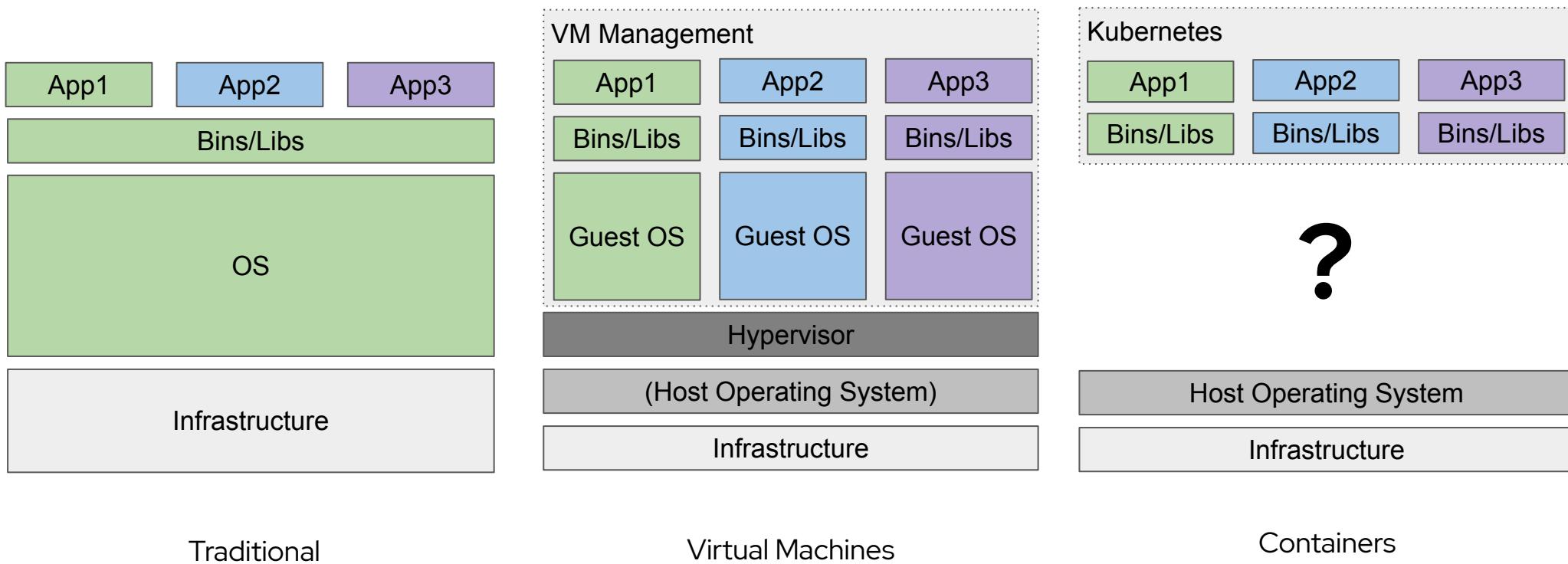
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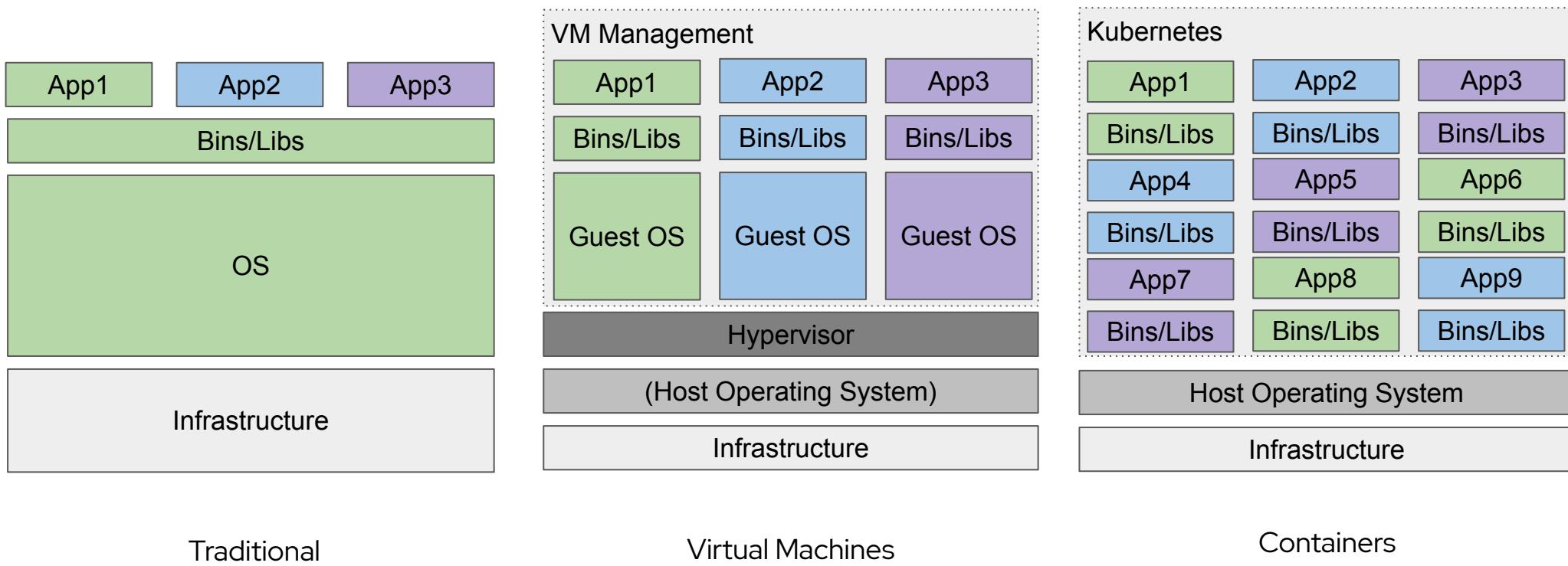
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From Hosts to VM's to Containers



From Hosts to VM's to Containers

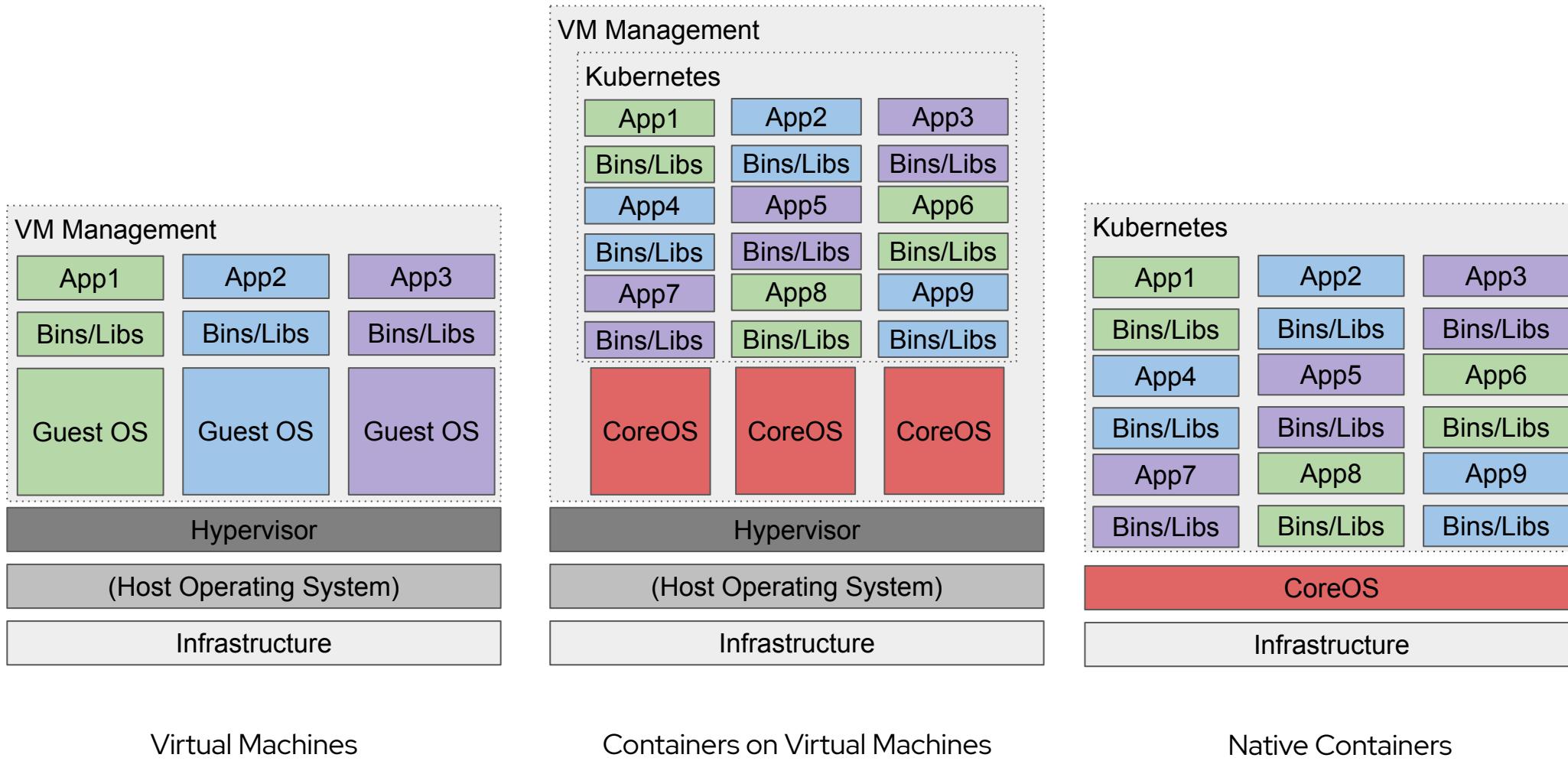


Traditional

Virtual Machines

Containers

From Hosts to VM's to Containers



Virtual Machines

Containers on Virtual Machines

Native Containers

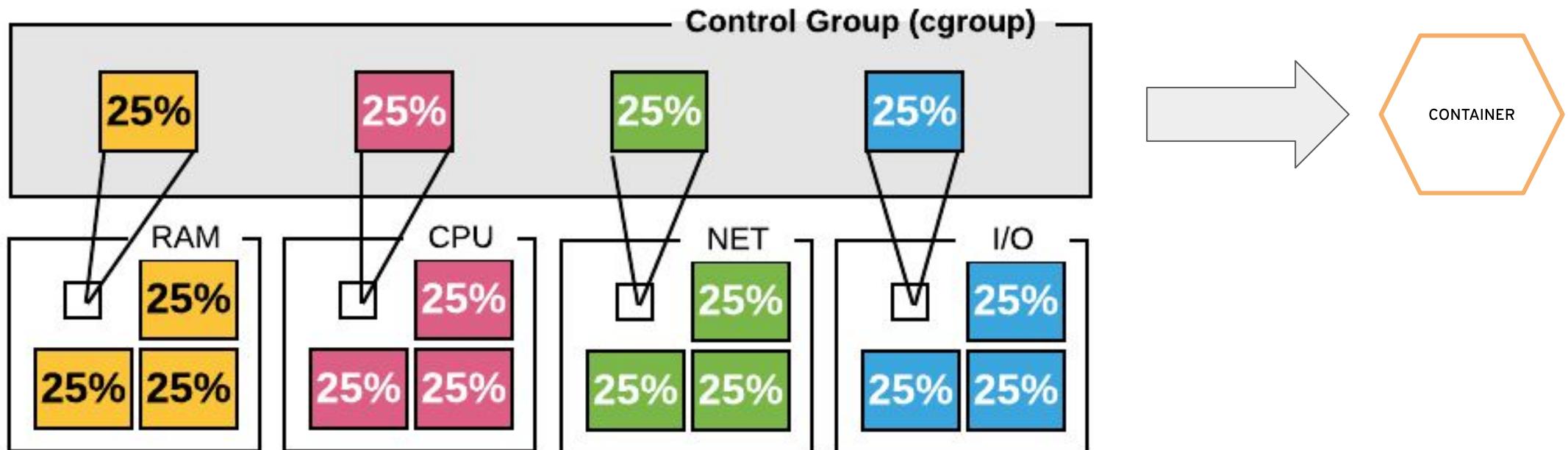
Container-Basics - Namespaces

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)



Container-Basics

- a container is the smallest compute unit



Container-Basics - Registry

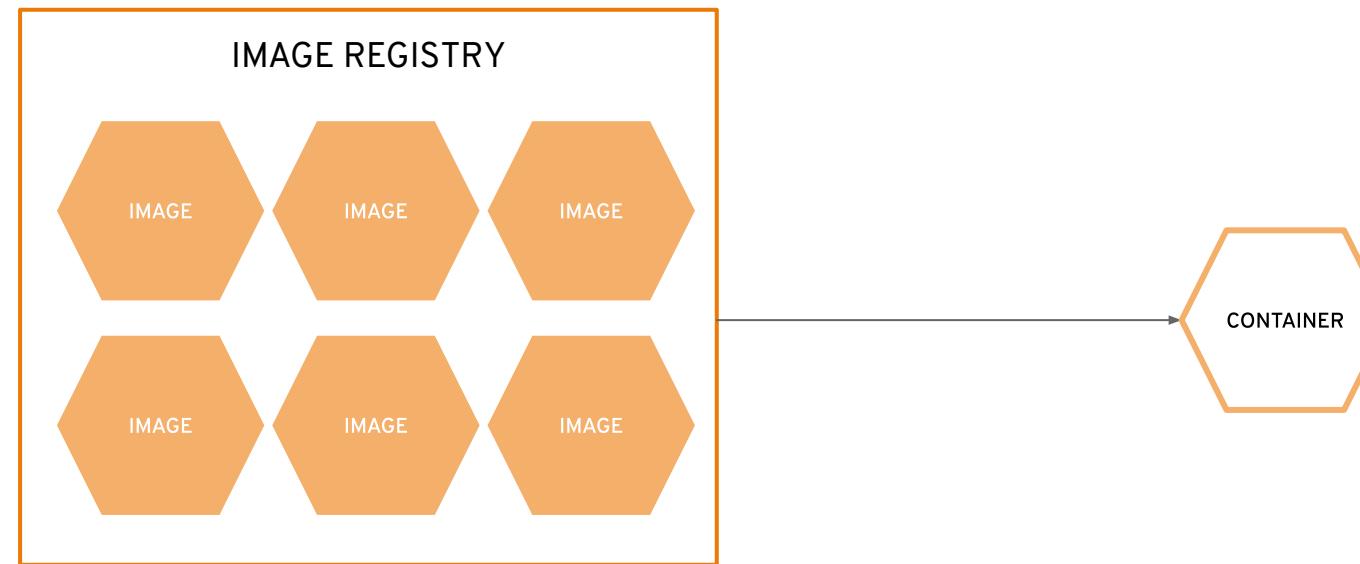
- containers are created from container images



BINARY

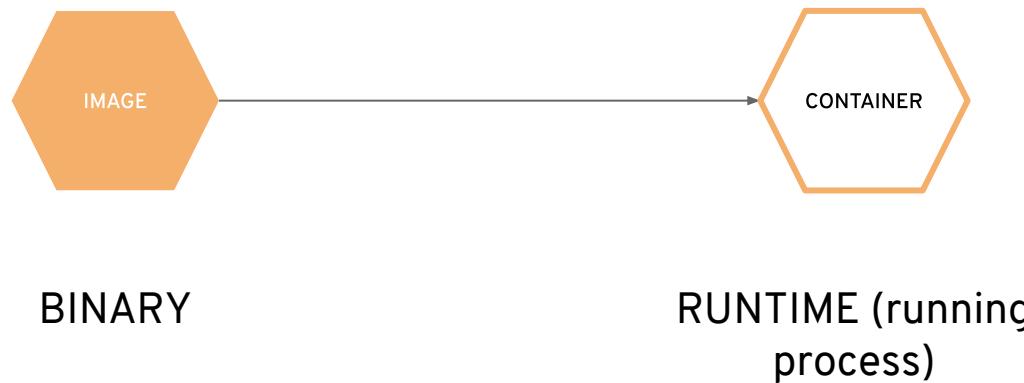
RUNTIME

- container images are stored in an image registry



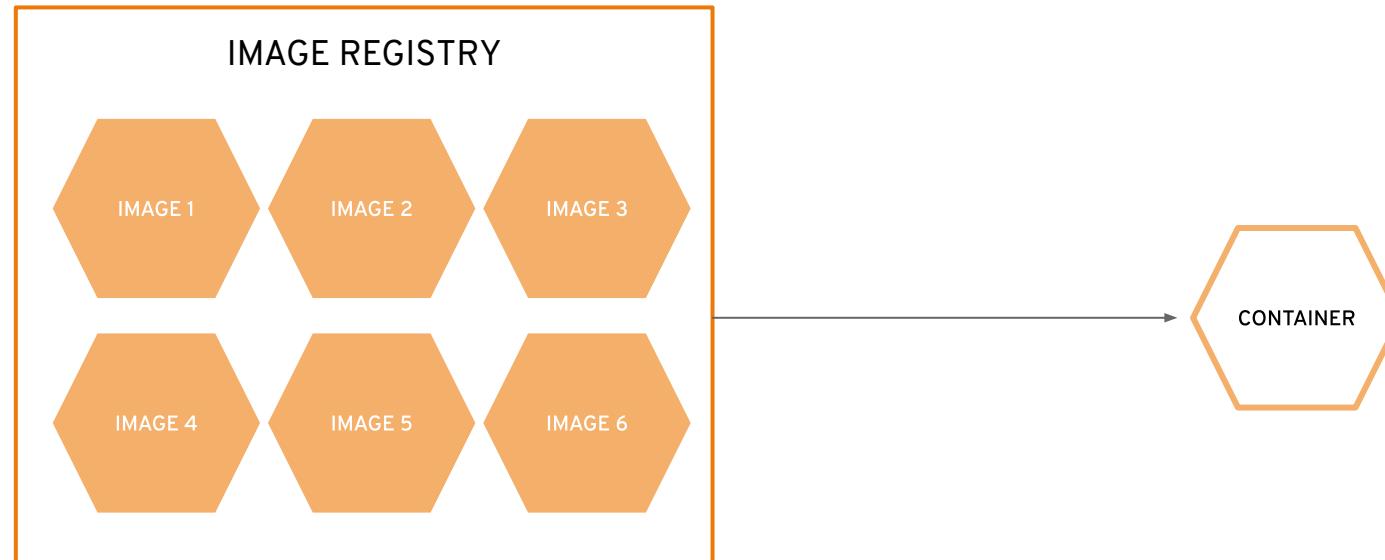
Container-Basics - Registry

containers are created from container images



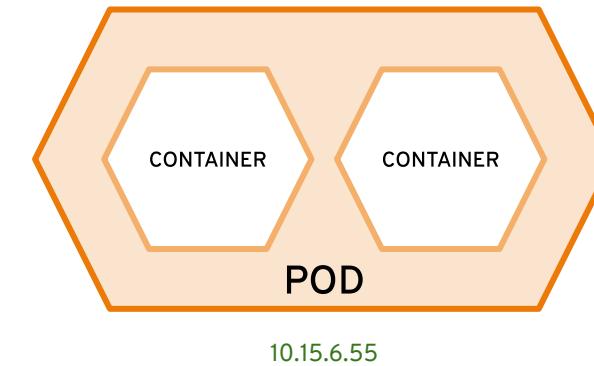
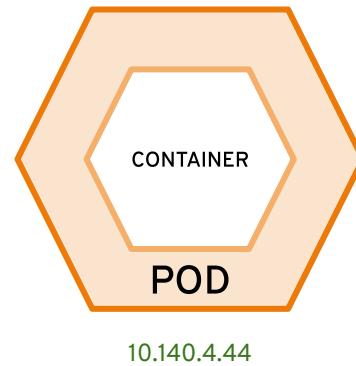
Container-Basics - Registry

container images are stored in an image registry



Container-Basics - POD's

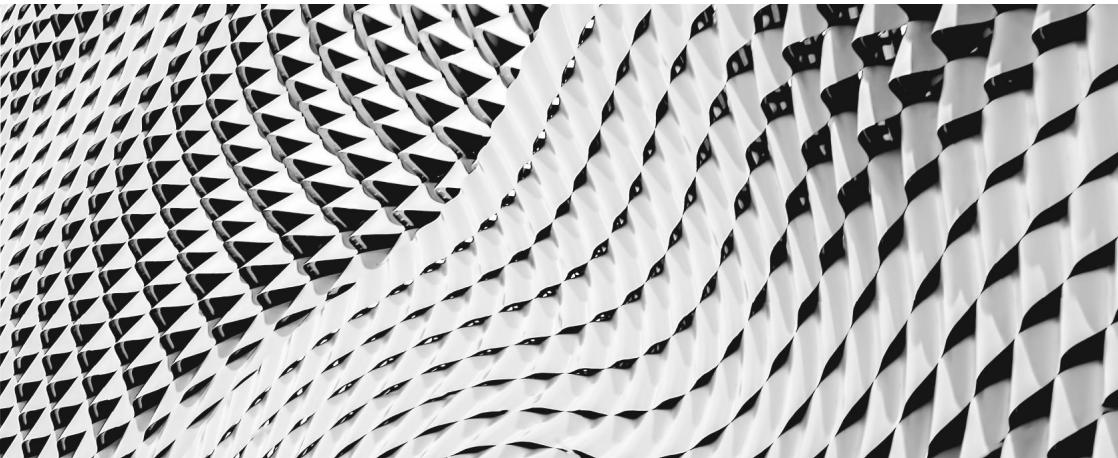
- containers are wrapped in pods which are units of deployment and management



How to handle all these Containers?



Kubernetes



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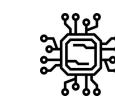
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Kubernetes and what it can do for you



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.

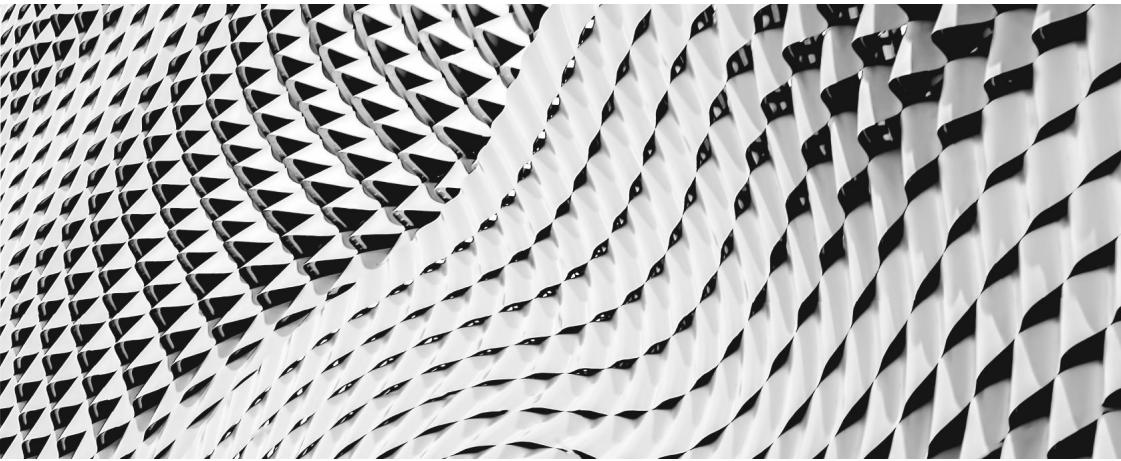


Does not provide application-level services, such as middleware (for example, message buses), data-processing frameworks (for example, Spark), databases (for example, PostgreSQL), caches, nor cluster storage systems (for example, Ceph) as built-in services.



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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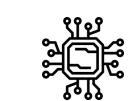
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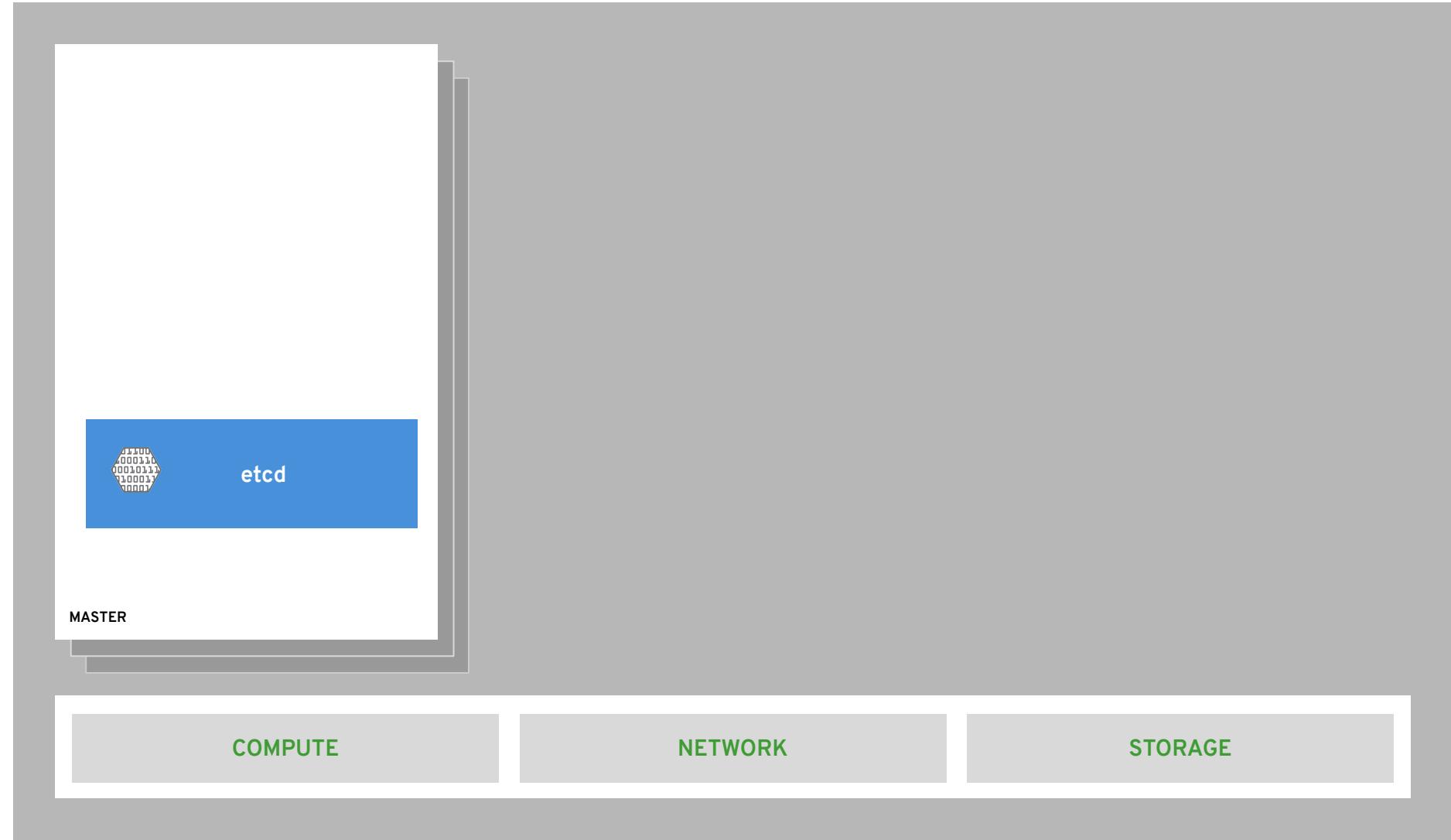
Public cloud



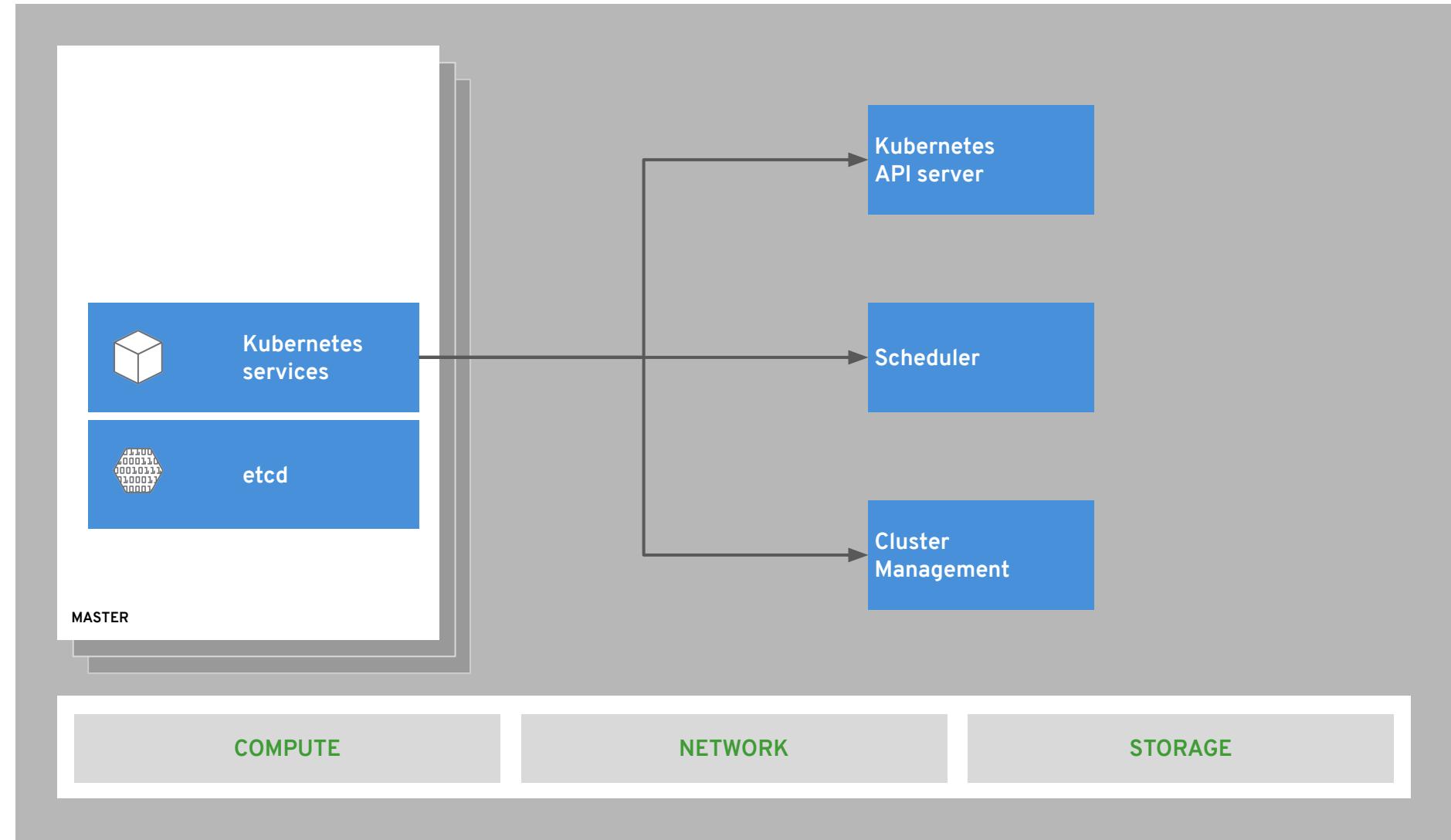
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(Azure, AWS, IBM, Google)



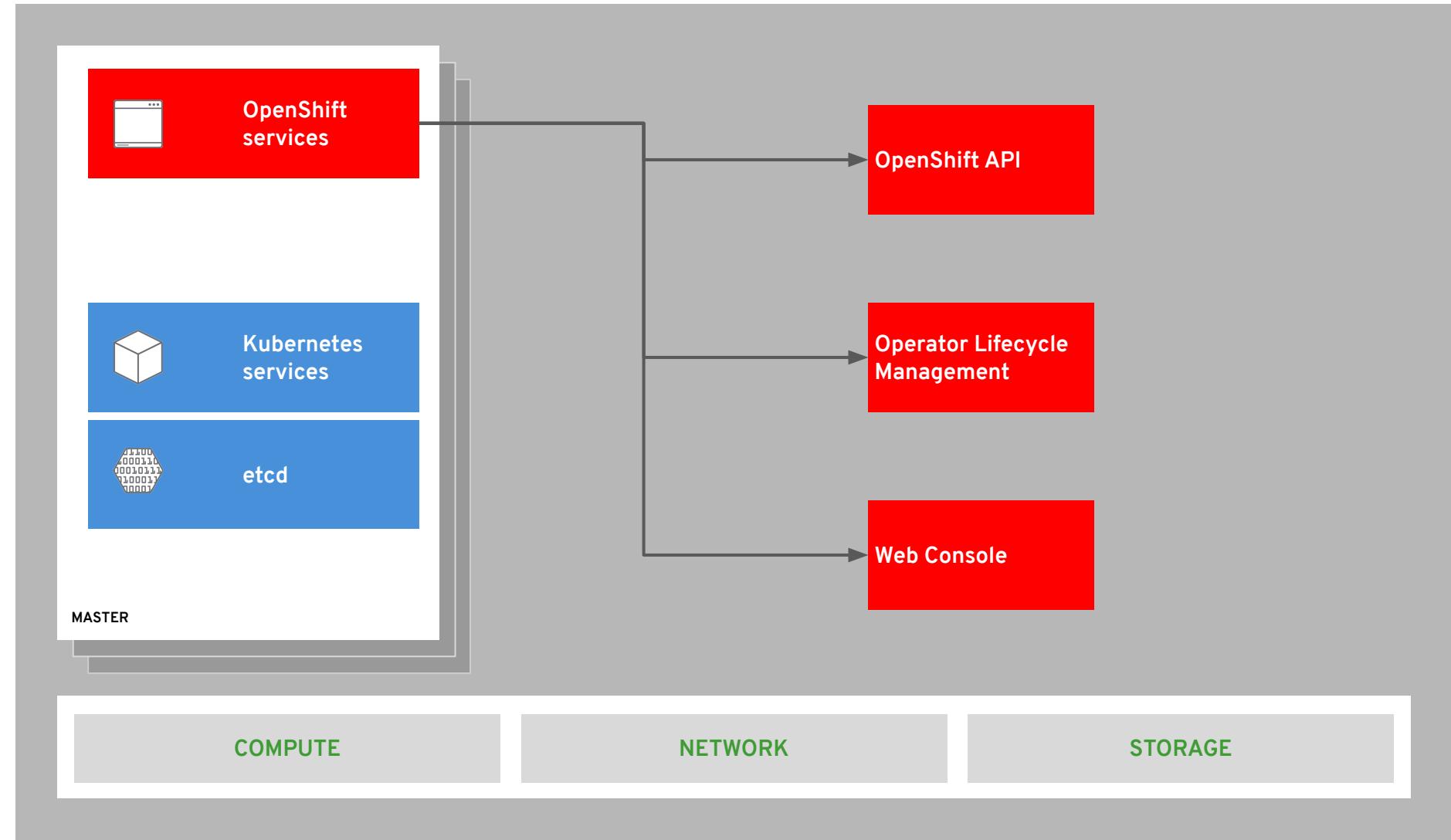
state of everything



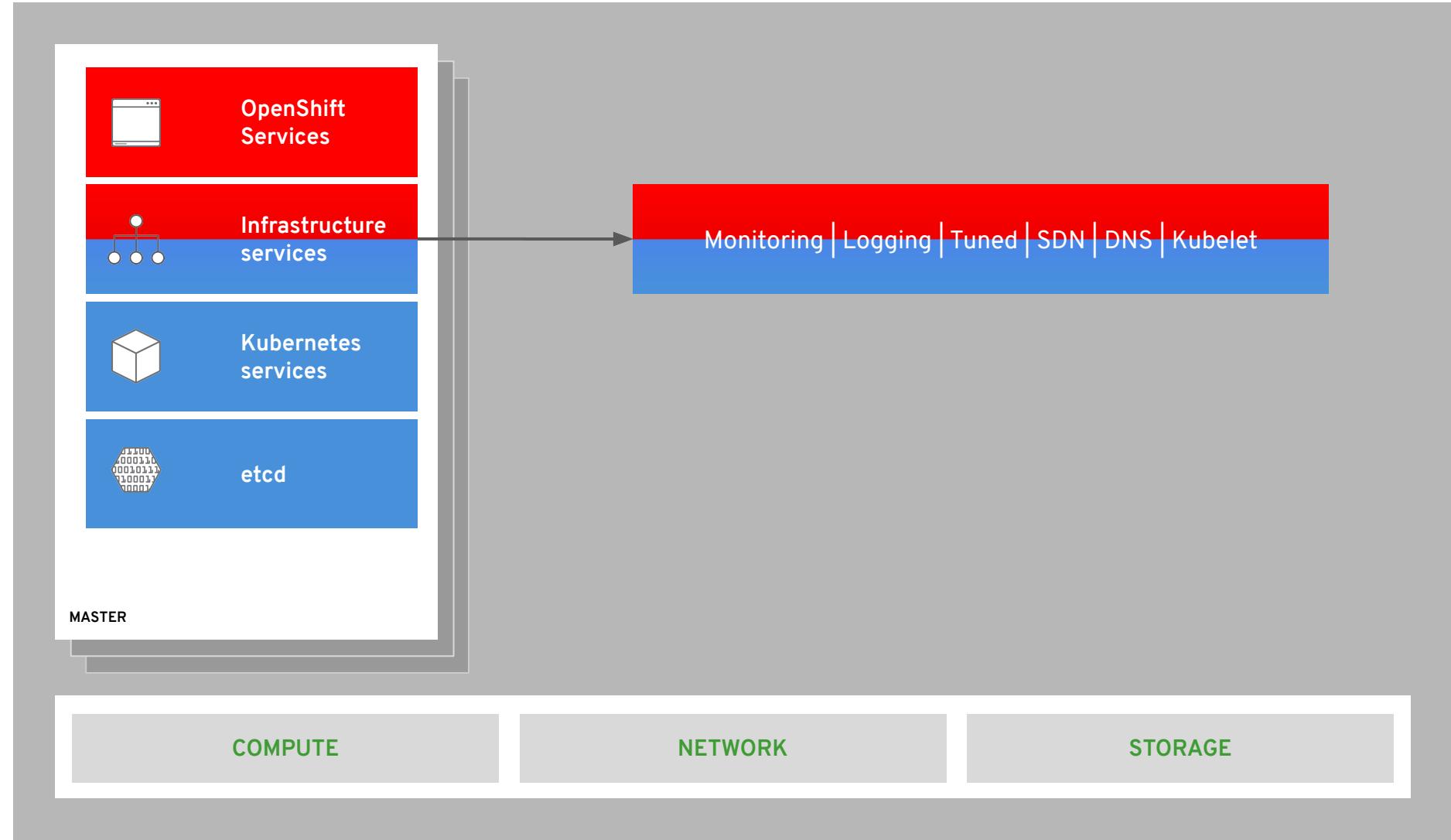
core kubernetes components

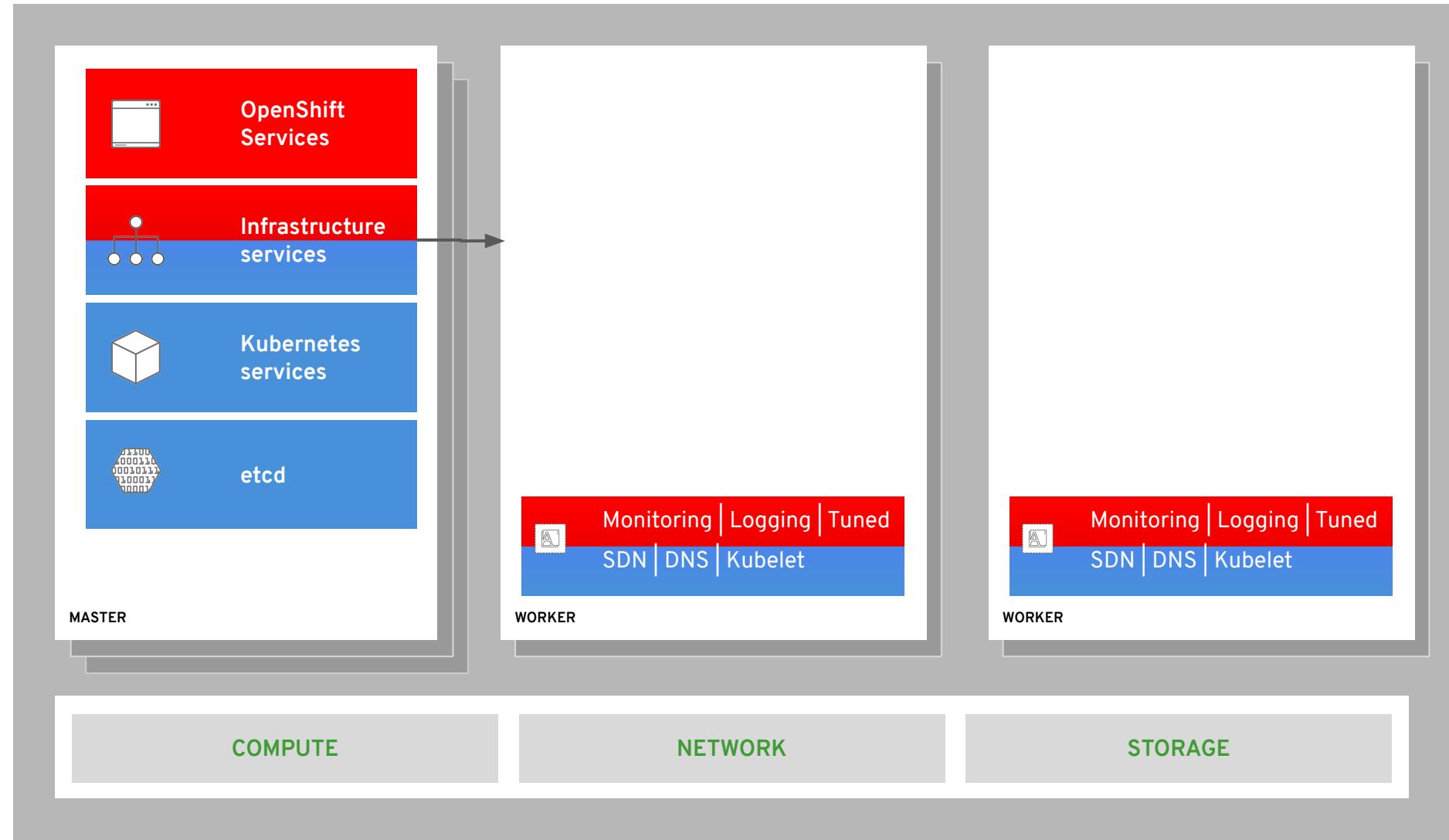


core OpenShift components

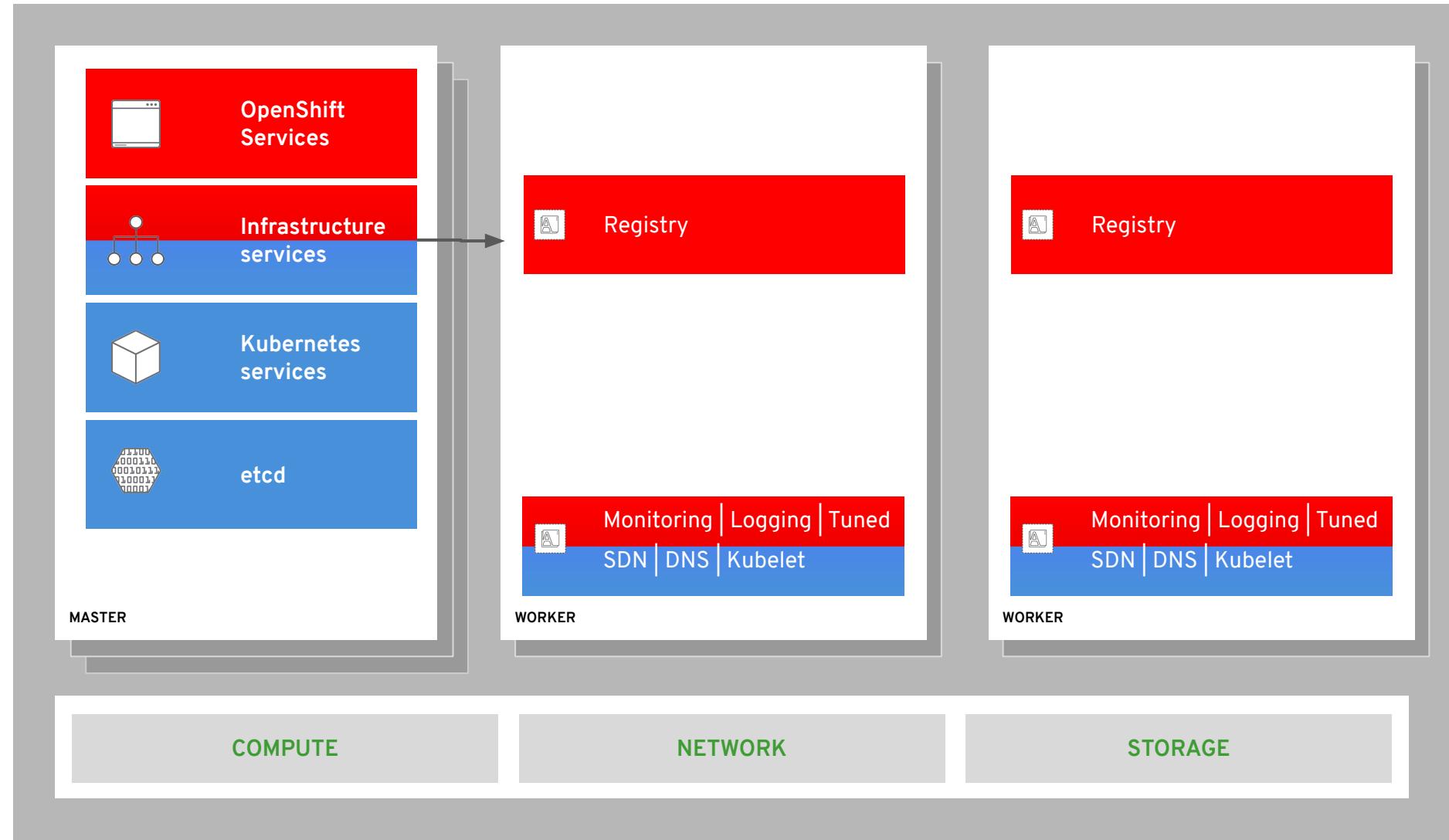


internal and support infrastructure services

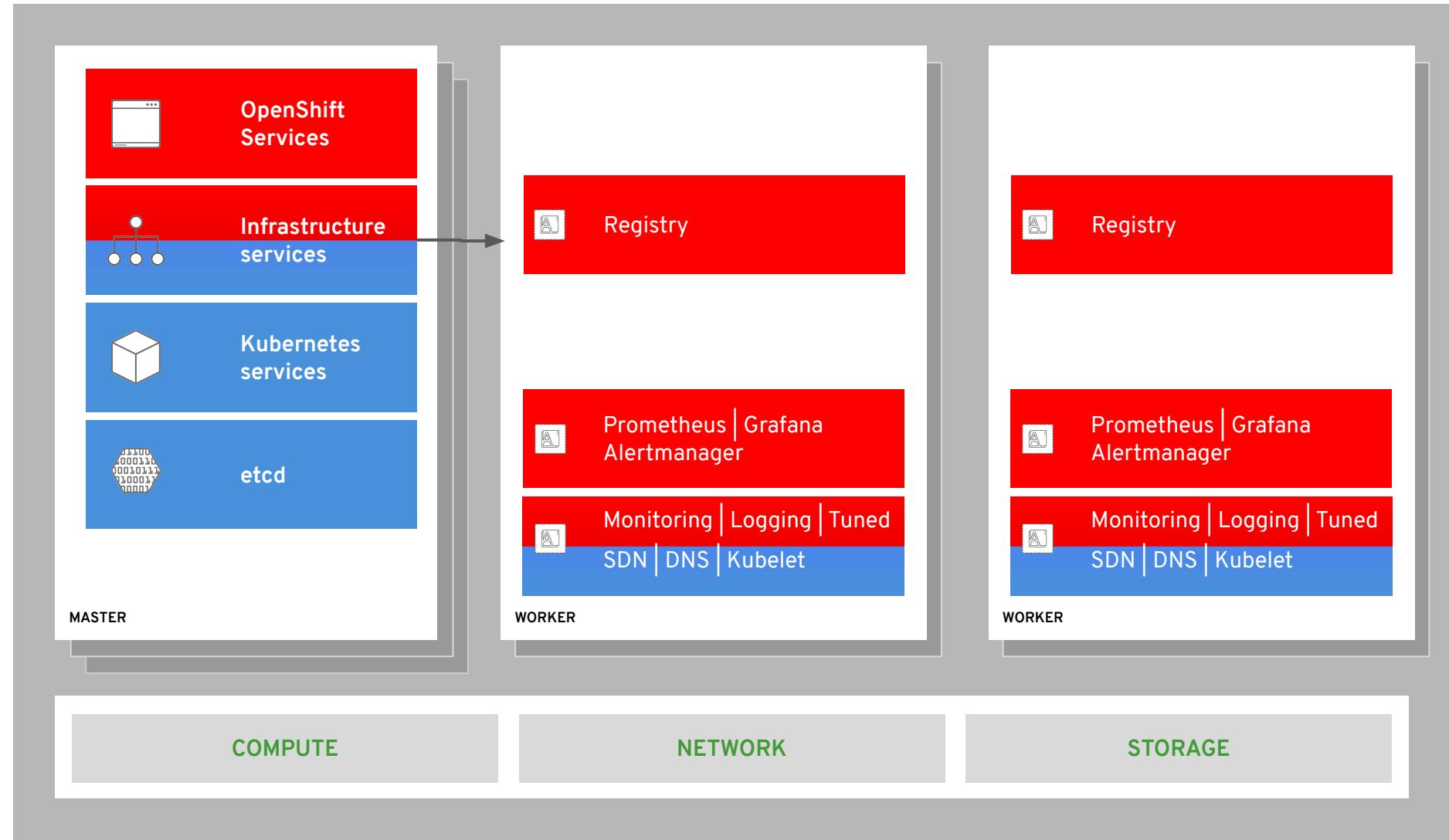




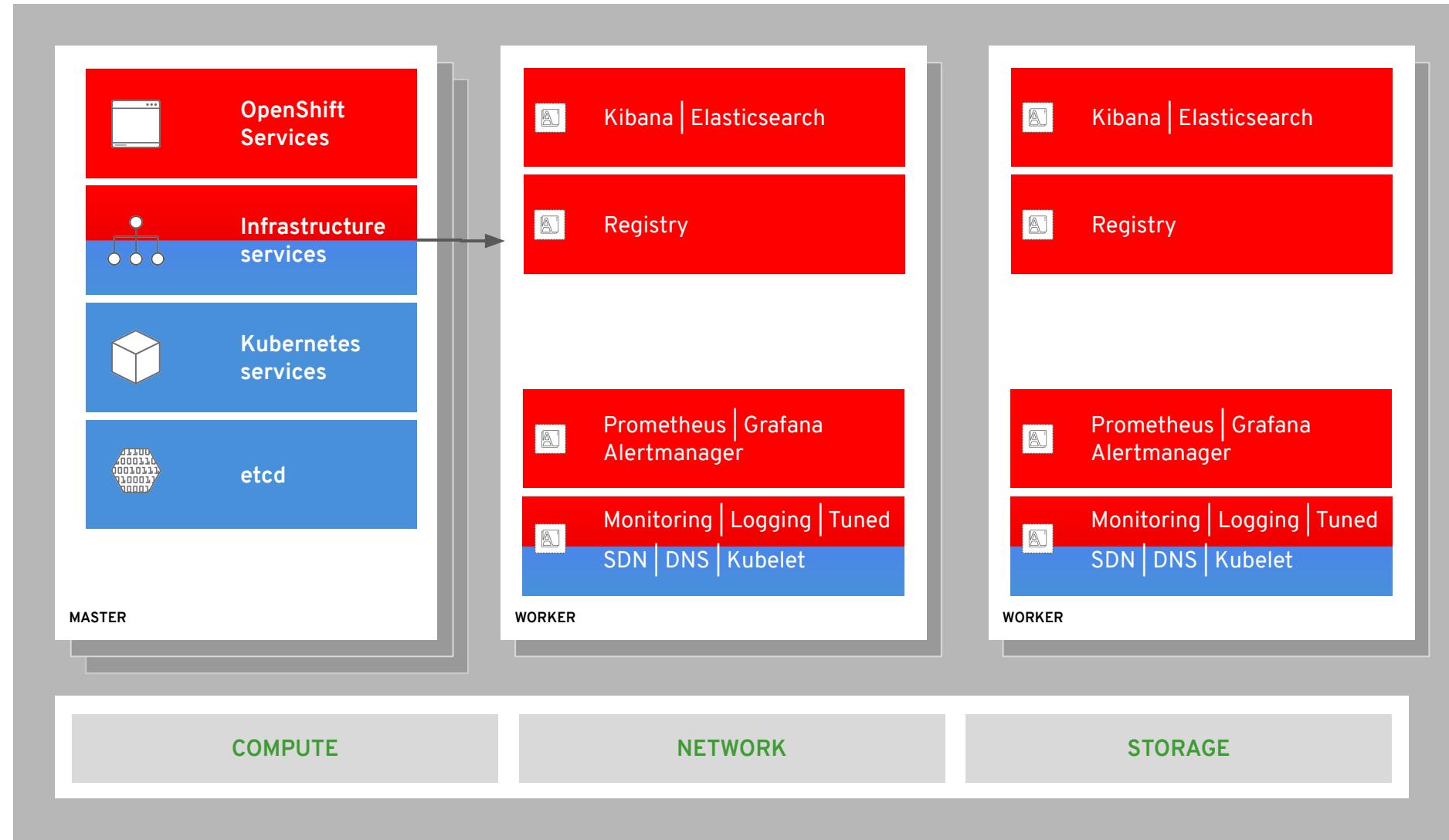
integrated image registry



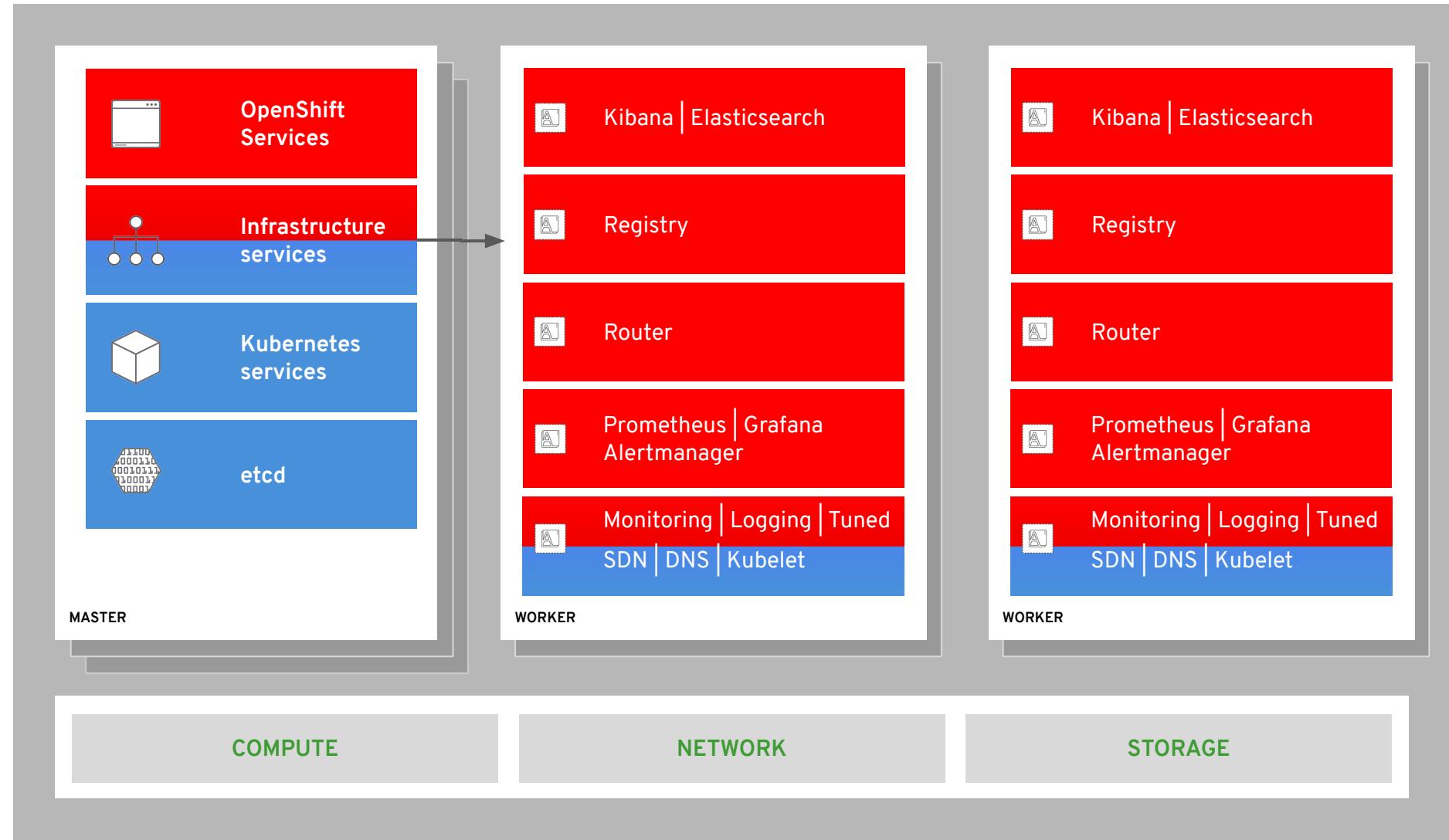
cluster monitoring



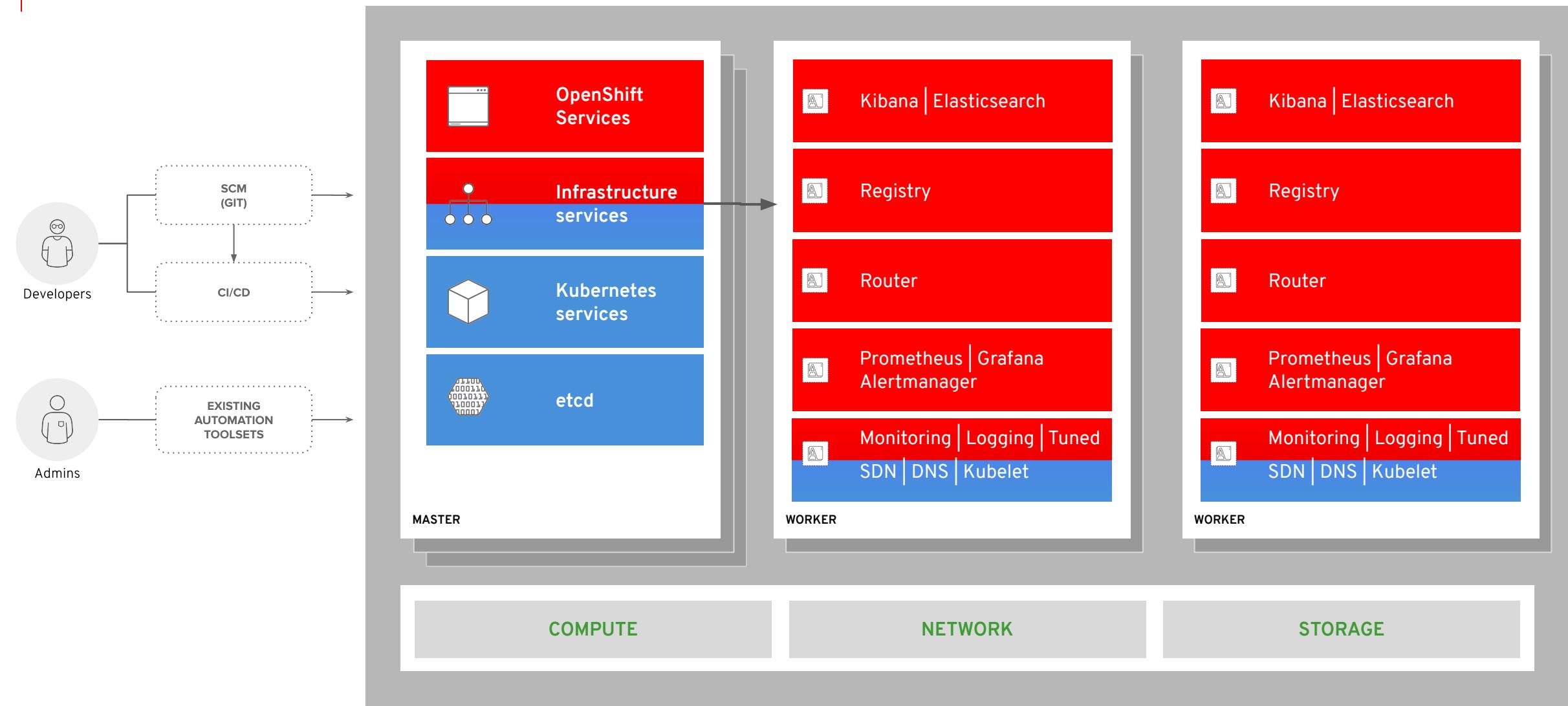
log aggregation



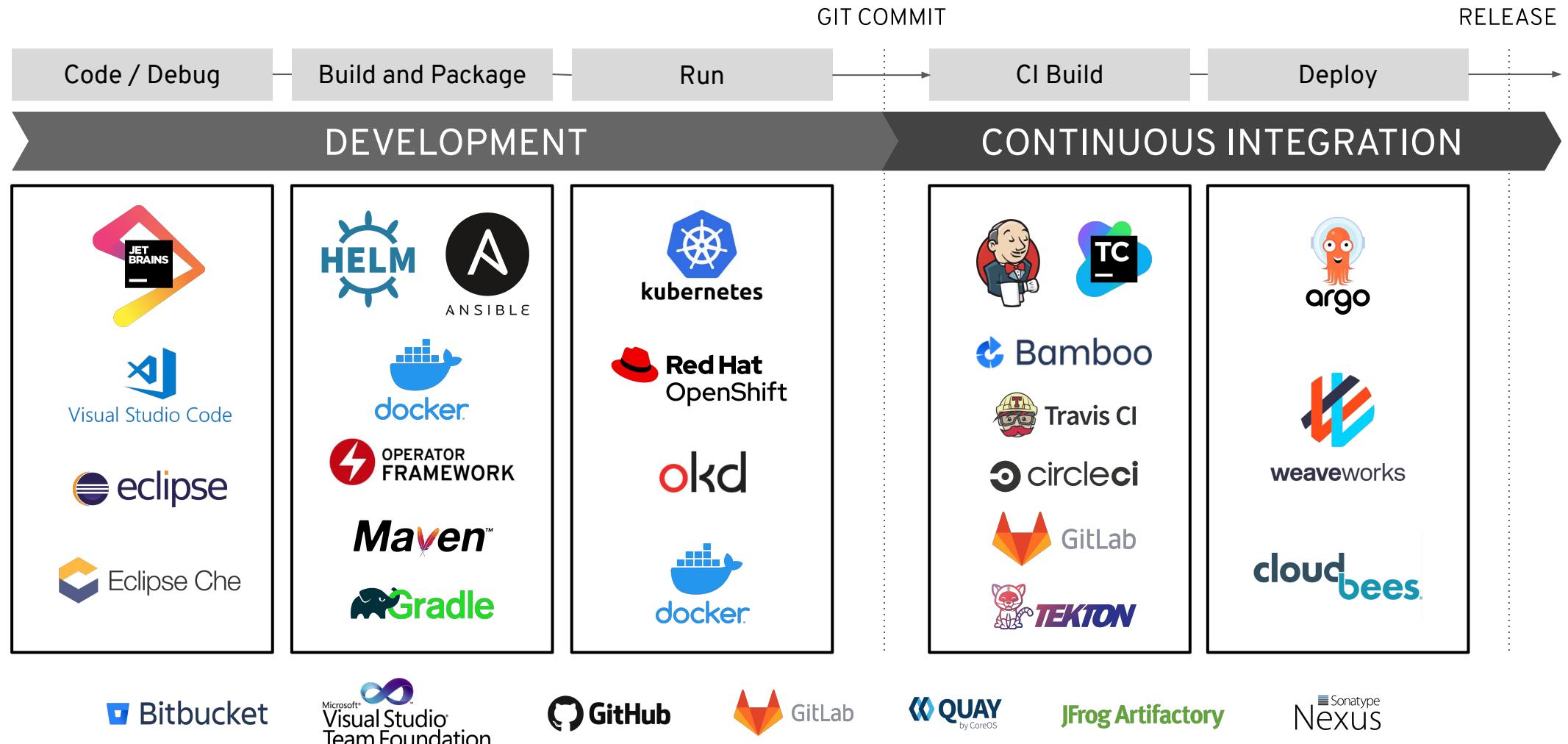
integrated routing



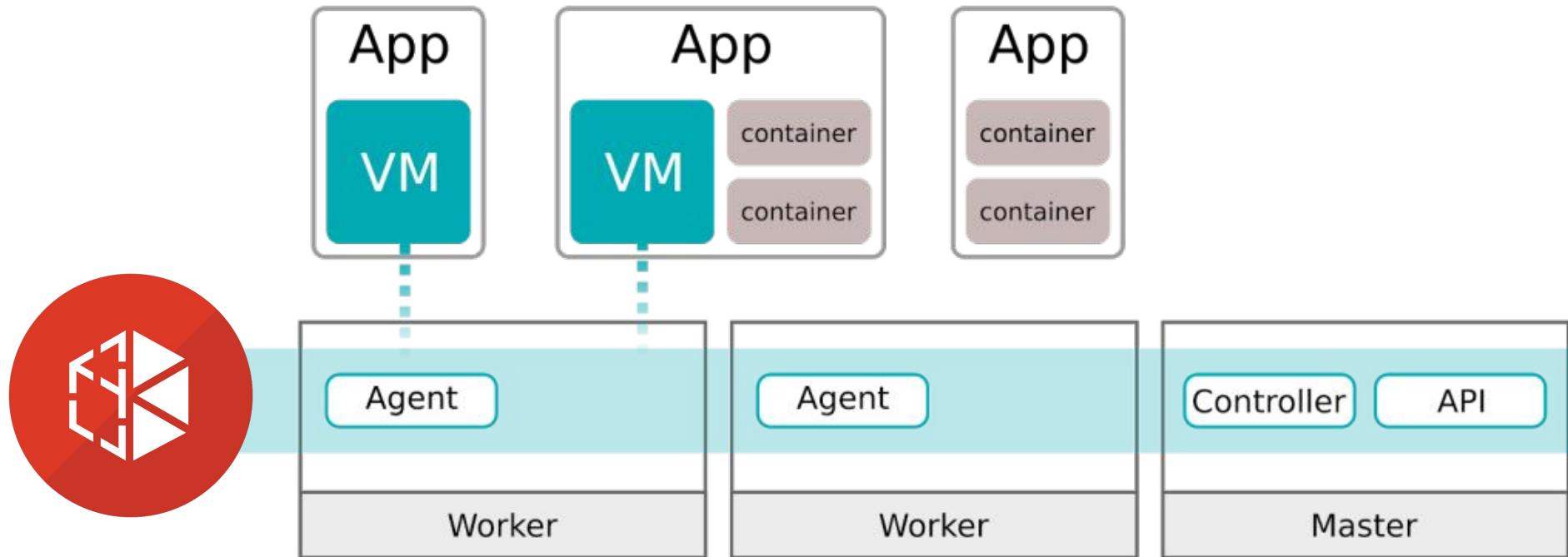
dev and ops via web, cli, API, and IDE



OpenShift integrates into your organization

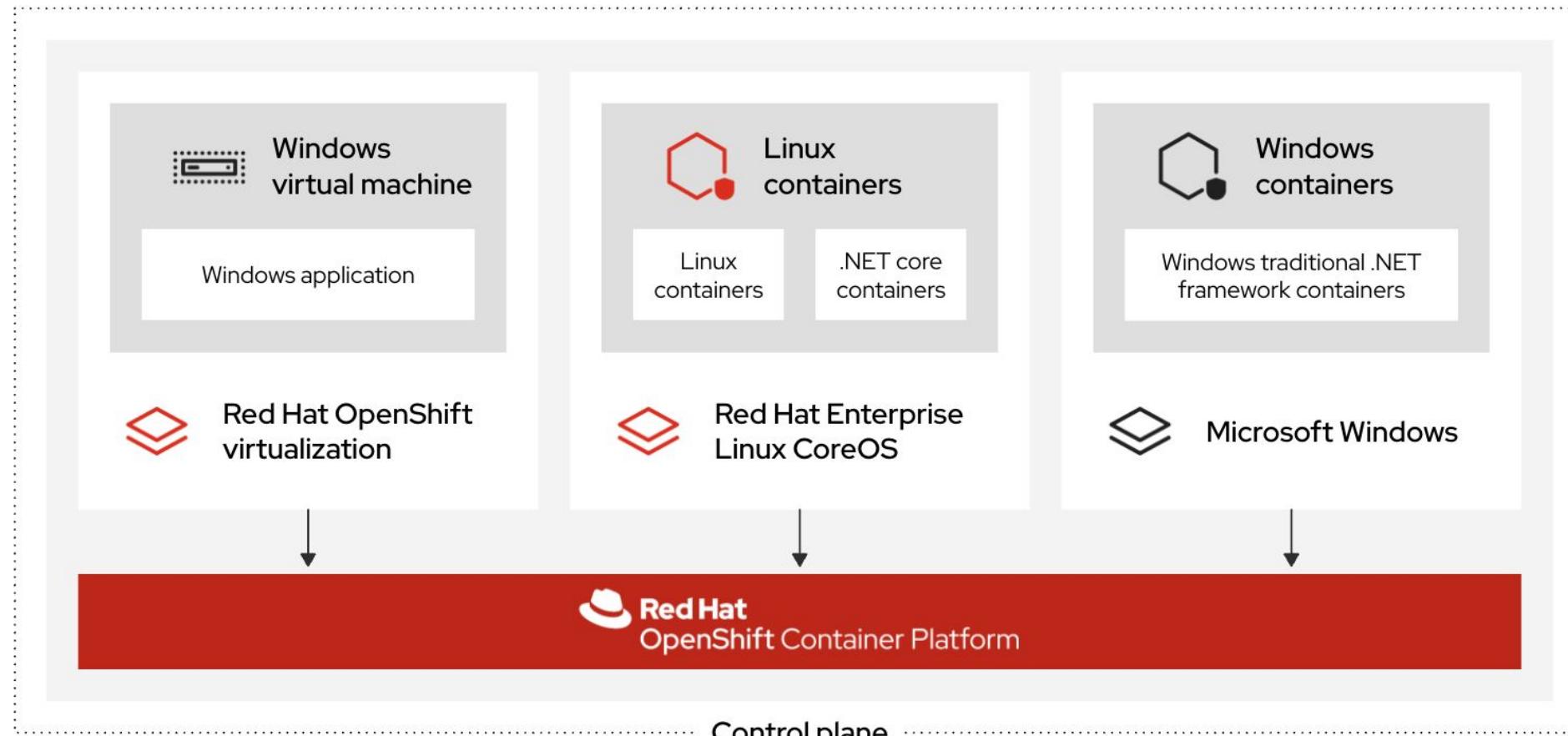


KubeVirt - Virtualization in Containers



Windows containers

Mixed Windows and Linux workloads



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%

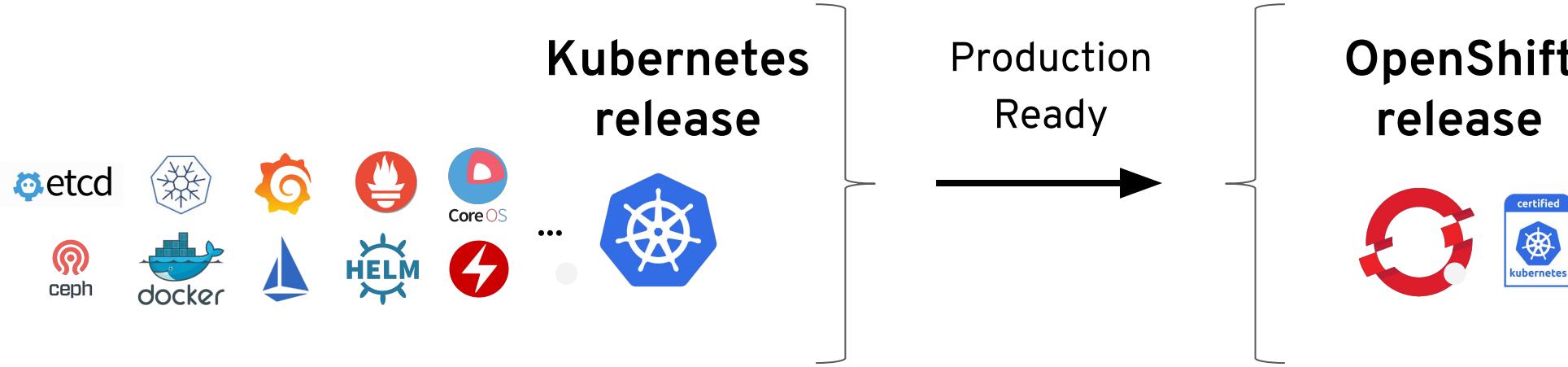
of enterprise users identify
complexity of implementation and
operations as the top blocker to adoption

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

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OpenShift is trusted enterprise Kubernetes



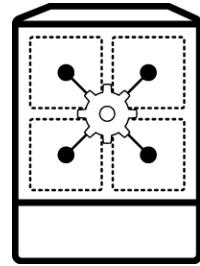
- Hundreds of defect and performance fixes
- 200+ validated integrations
- Certified container ecosystem
- 9-year enterprise life-cycle management
- Red Hat is a leading Kubernetes contributor since day 1

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

V0000000

 Red Hat

OpenShift Platform Services for Cloud Native Development

OpenShift Platform Services for Cloud Native Development

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

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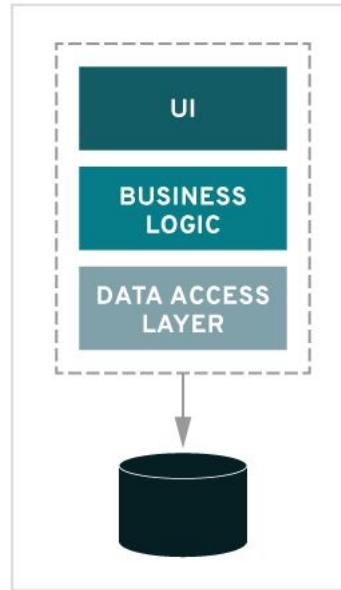
- ▶ OpenShift Platform Services
- ▶ OpenShift ServiceMesh
- ▶ OpenShift Serverless
- ▶ OpenShift Pipelines

What are Microservices?

an architectural style that structures an application as a collection of services

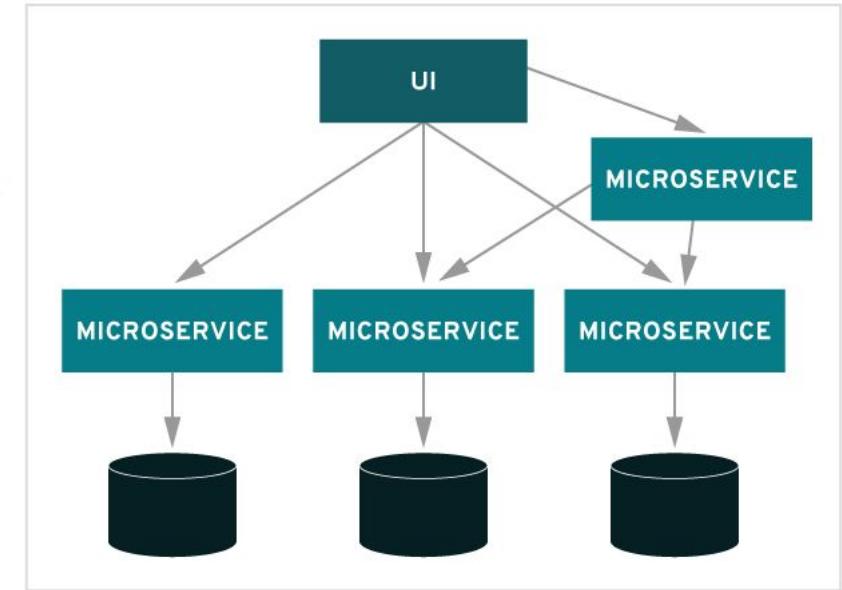
- ▶ Single purpose
- ▶ Independently deployable
- ▶ Have their context bound to a biz domain
- ▶ Owned by a small team
- ▶ Often stateless

MONOLITHIC



VS.

MICROSERVICES



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

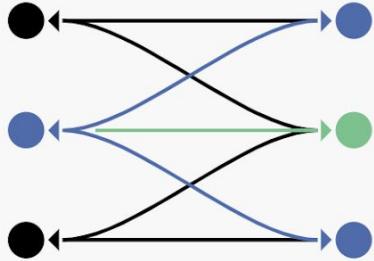
Malicious requests, DoS, id & access control

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



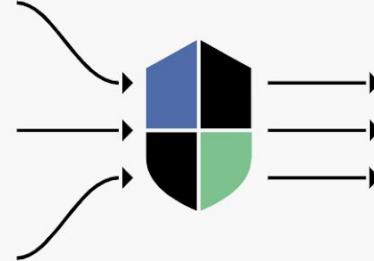
Connect

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



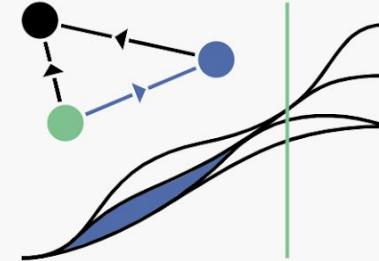
Secure

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

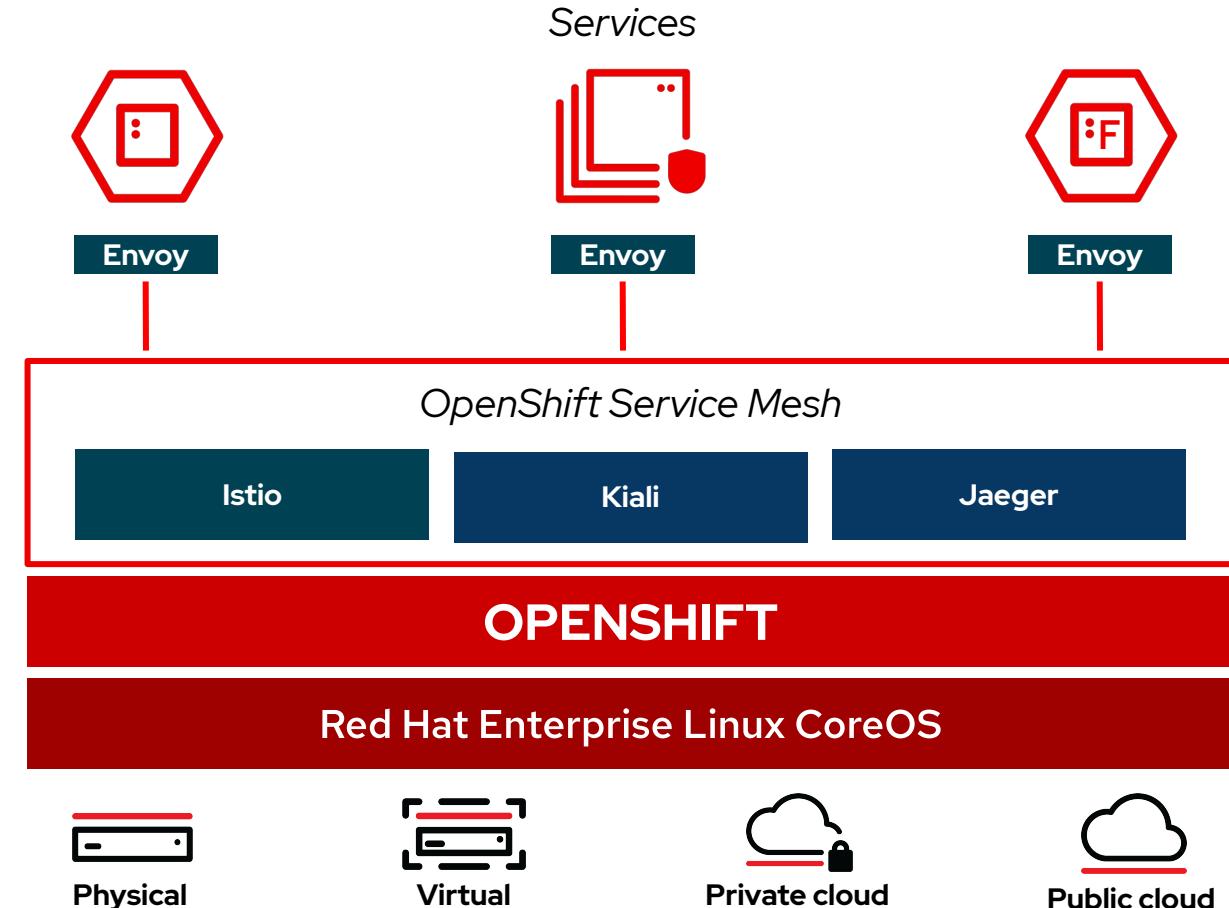
See what's happening with rich automatic tracing, monitoring, and logging of all your services.



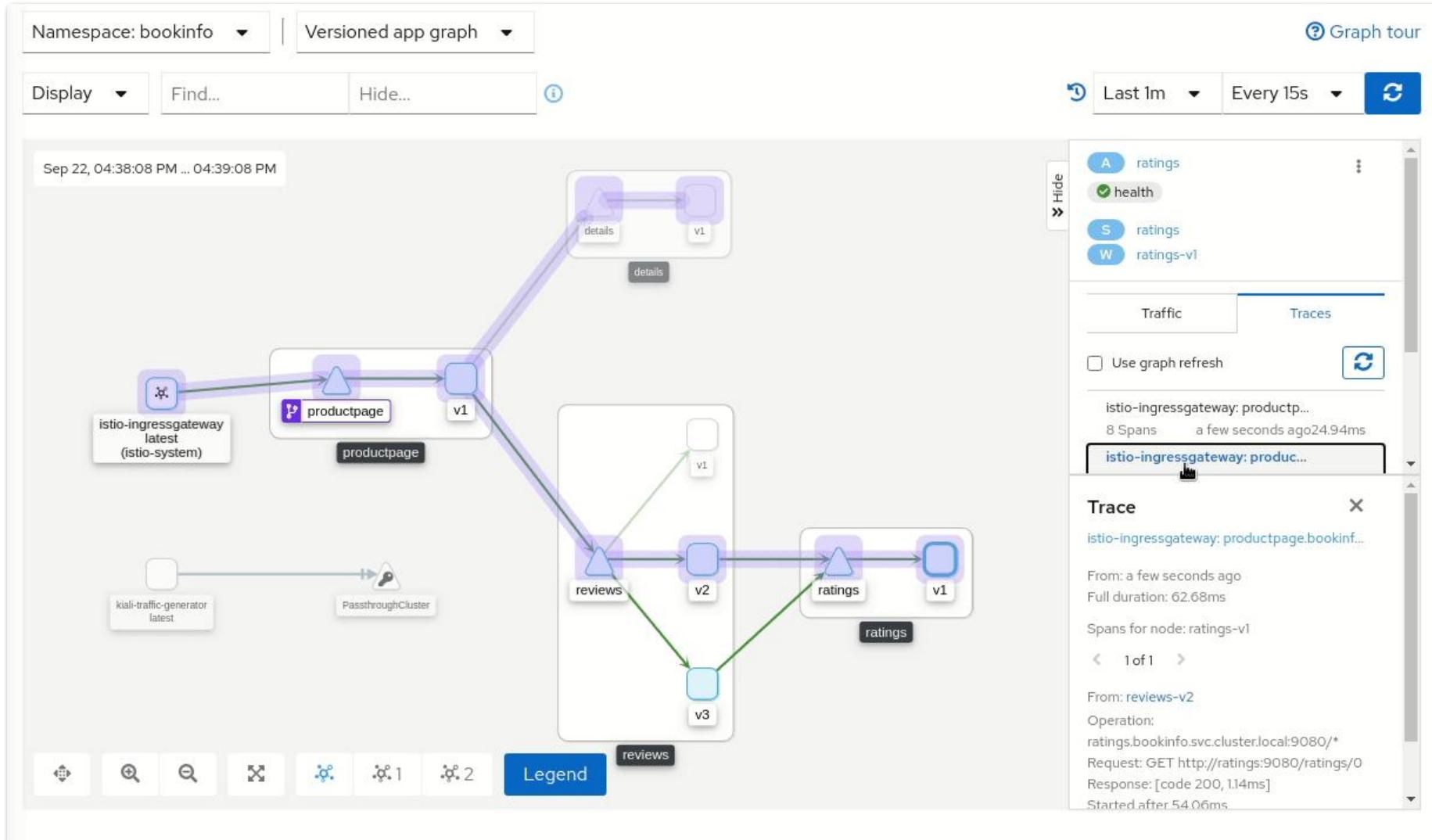
OpenShift Service Mesh

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.



The future is Istio



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- ▶ OpenShift Serverless
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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*"

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

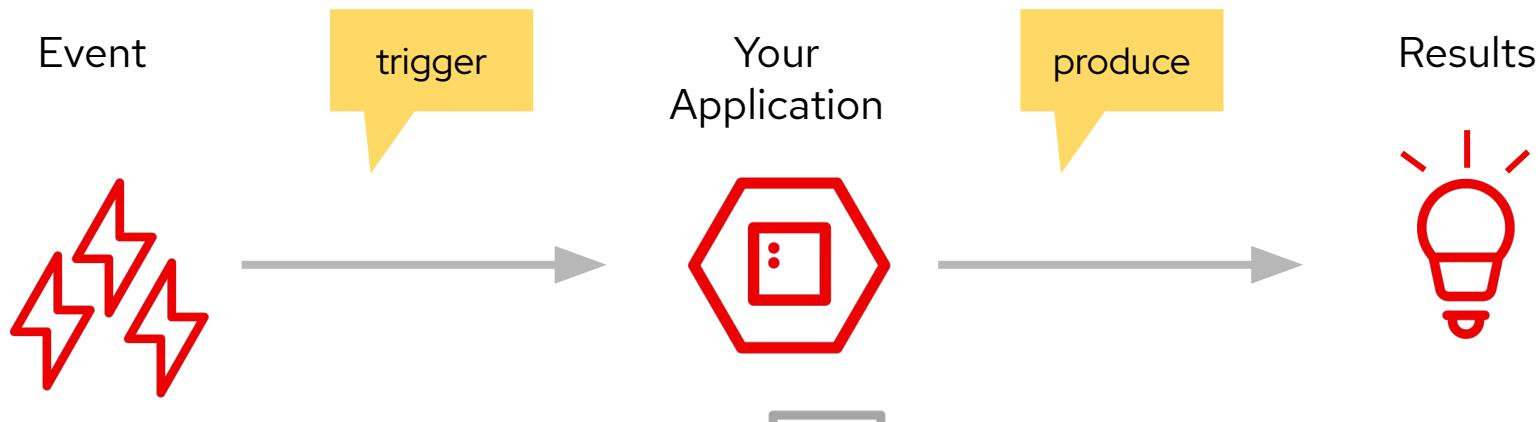
The maturity and benefits of Serverless are recognized industry wide and it adds the missing parts to make pattern suitable for general purpose workloads and used on the enterprise.

- 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

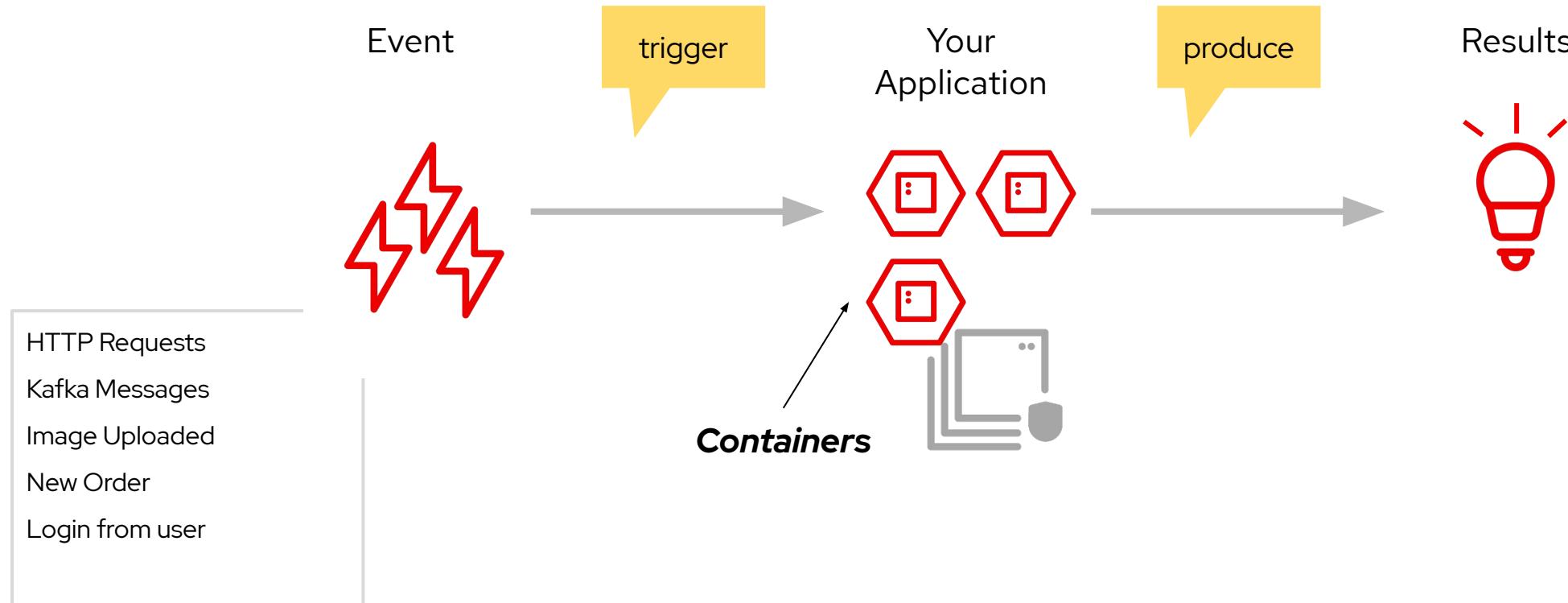
Kafka Messages

Image Uploaded

New Order

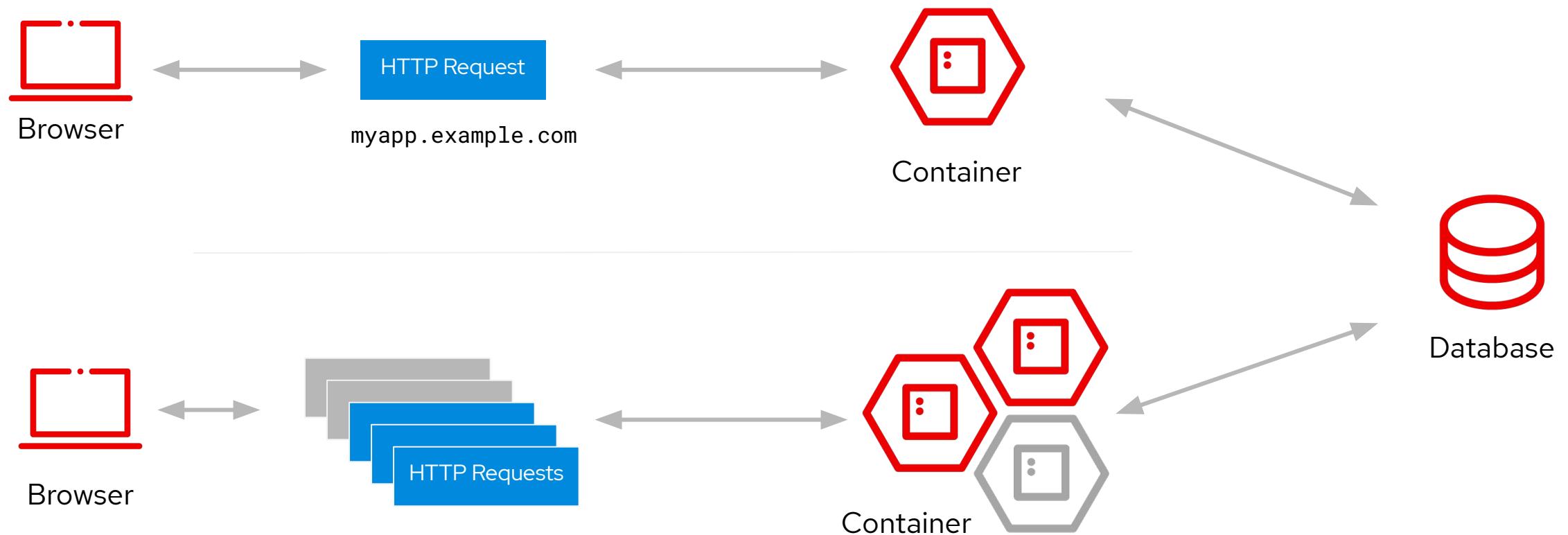
Login from user

The "Serverless Pattern" in k8s world



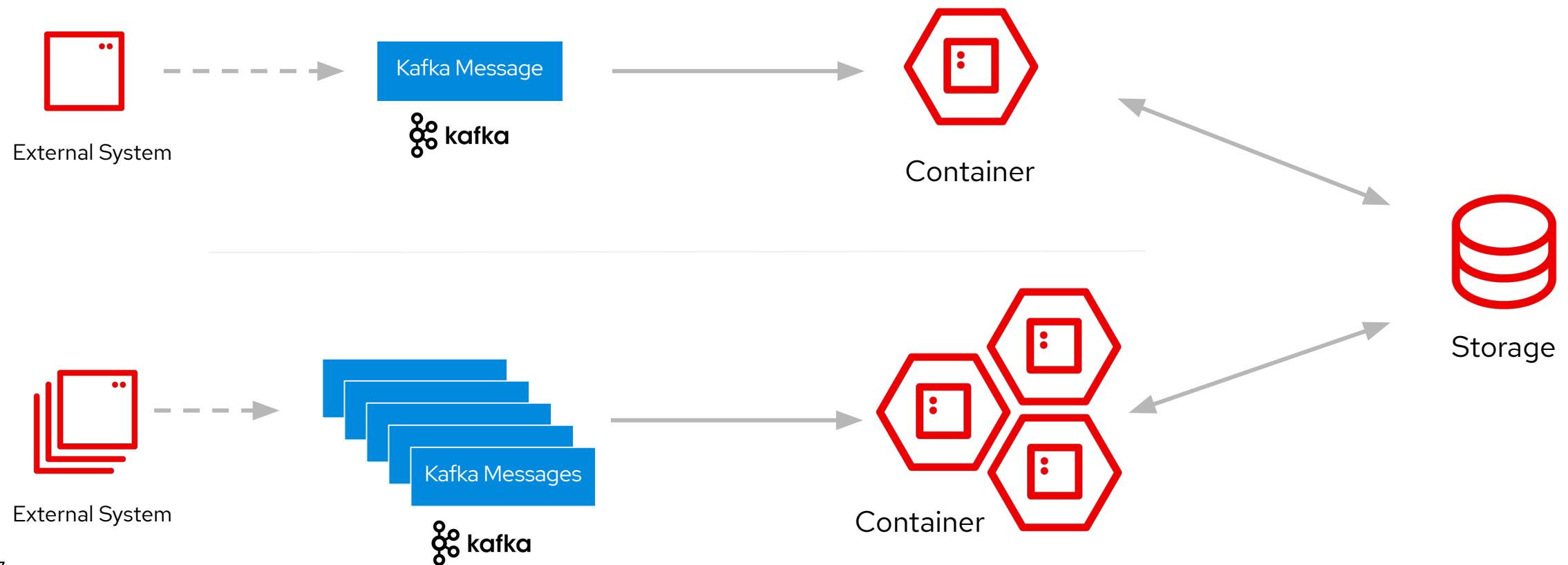
The "Serverless Pattern"

A serverless web application



The "Serverless Pattern"

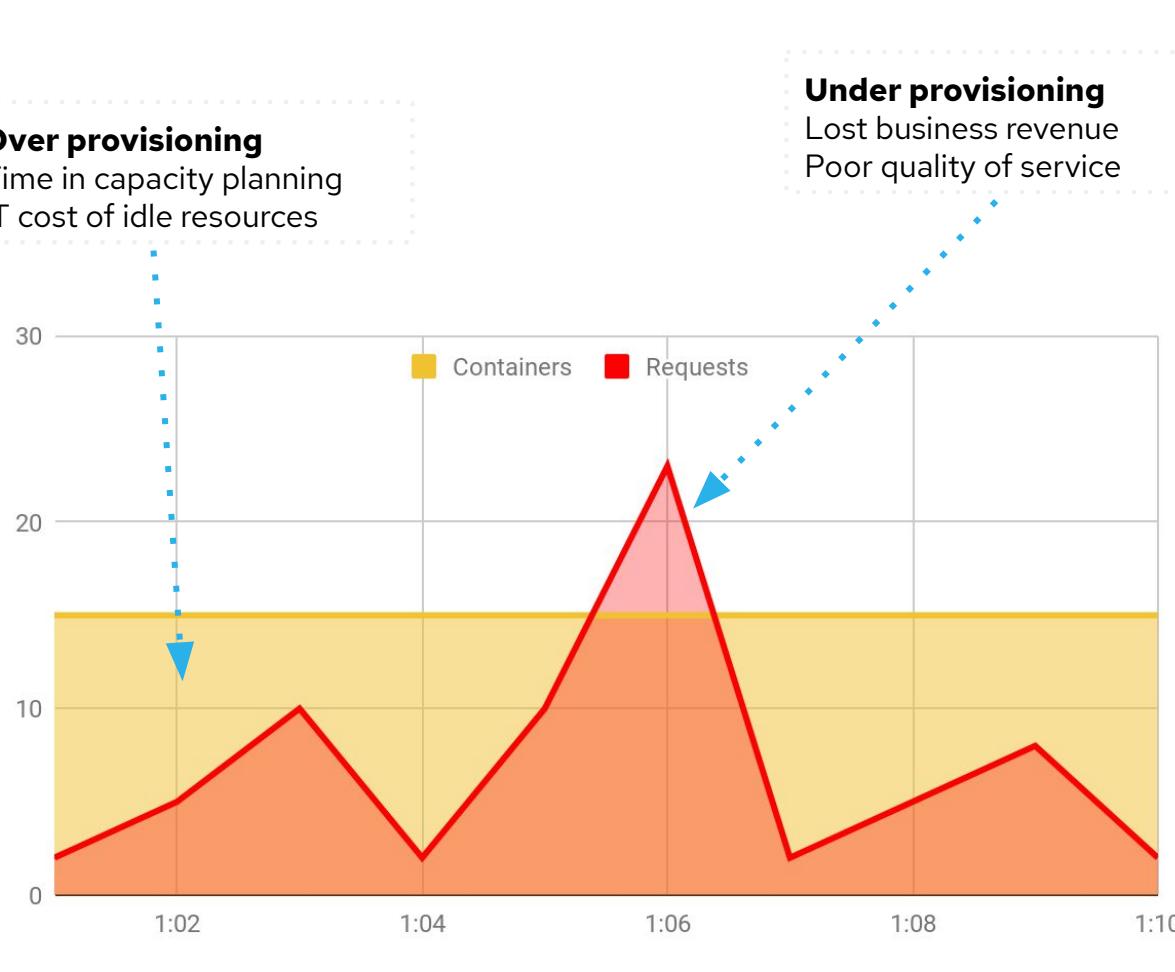
Processing a Kafka message



Serverless Operational Benefits

Over provisioning

Time in capacity planning
IT cost of idle resources

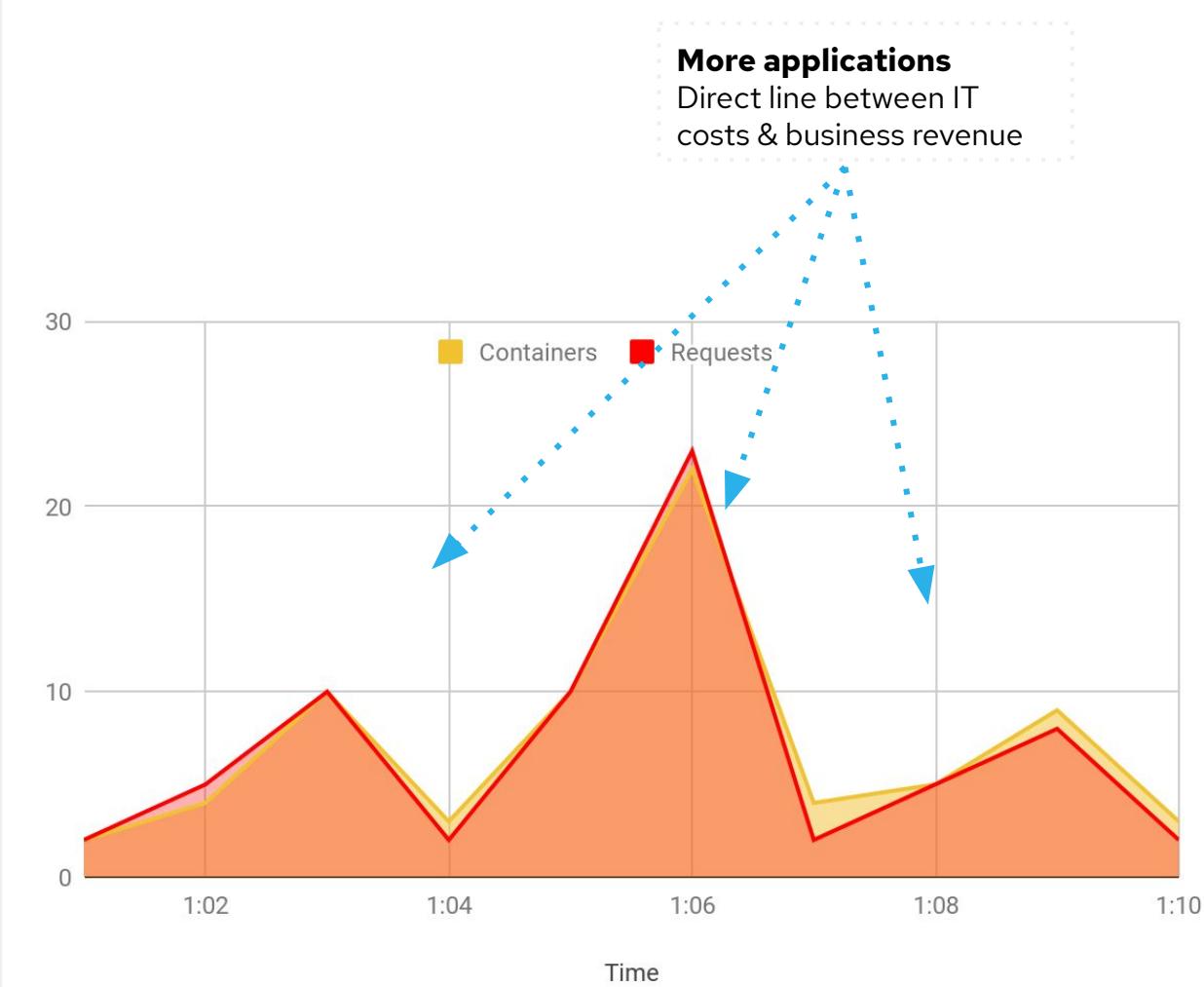


Under provisioning

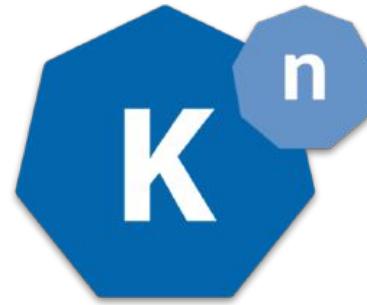
Lost business revenue
Poor quality of service

More applications

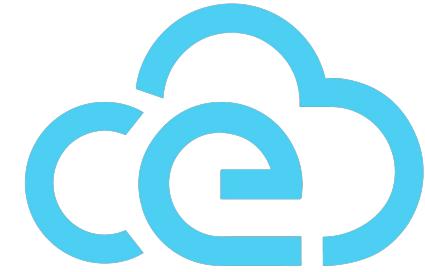
Direct line between IT costs & business revenue



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.

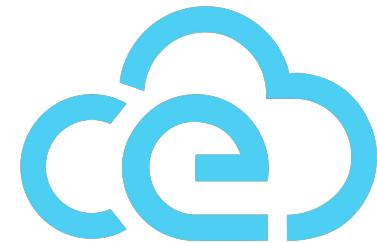


CLIENT (kn)

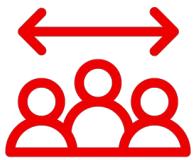
Allows you to create resources interactively from the **command line** or from within scripts

Cloud Events

A specification for describing event data in a common way



Consistency Accessibility Portability



<https://cloudevents.io/>

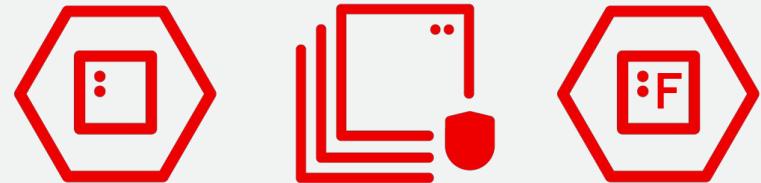
Alibaba Cloud EventBridge  A serverless event bus that receives CloudEvents compliant events from cloud services, SaaS/custom apps, and routes to various targets	Azure Event Grid  Event Grid natively supports events in the JSON implementation of CloudEvents v1.0 and the HTTP protocol binding	Choria  All Life Cycle and Autonomous Agent events emitted by the Choria orchestration system are CloudEvents compliant
commercetools  All services of the commercetools platform can emit CloudEvents compliant events	Debezium  Debezium, a distributed open-source change data capture platform, can emit change data events in the CloudEvents format	Knative Eventing  All event data produced and consumed by Knative Eventing services is CloudEvents compliant
Kogito  All events emitted and consumed by Kogito business automation applications are CloudEvents compliant	OpenFaaS  CloudEvent events are one of the many available triggers for OpenFaaS functions	Oracle Cloud  The Oracle Cloud Infrastructure Events service implements CloudEvents
Serverless.com Event Gateway  All event data that functions receive from the Event Gateway is CloudEvents compliant	Serverless Workflow Specification  All event definitions in the Serverless Workflow Specification JSON/YAML model are CloudEvents compliant	TriggerMesh  TriggerMesh makes use of CloudEvents in all its event sources and targets to build application flows.

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

Functions

Powerful CLI experience

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



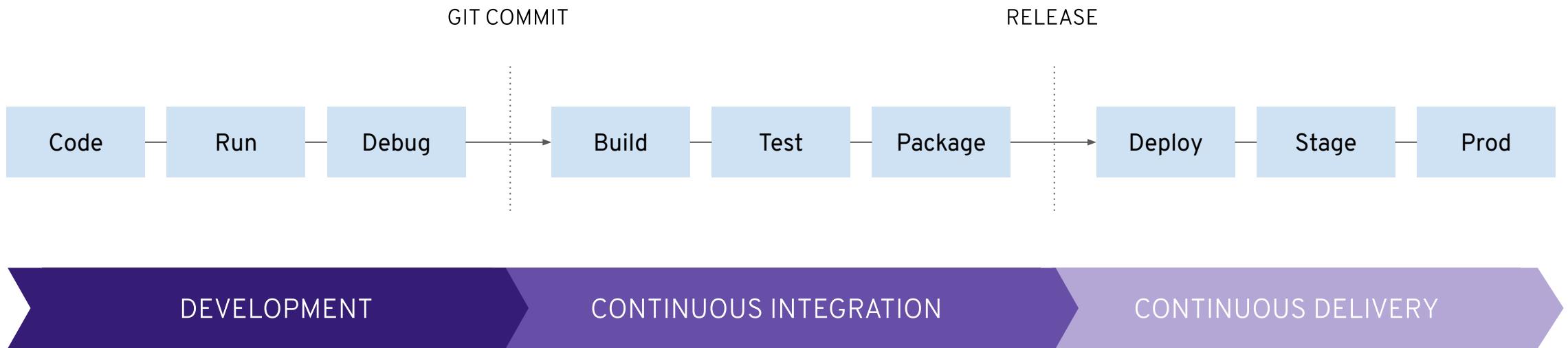
```
$ kn func help
Usage:
  func [command]

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.
```

OpenShift Platform Services for Cloud Native Development

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

Continuous Integration (CI) and Continuous Delivery (CD)



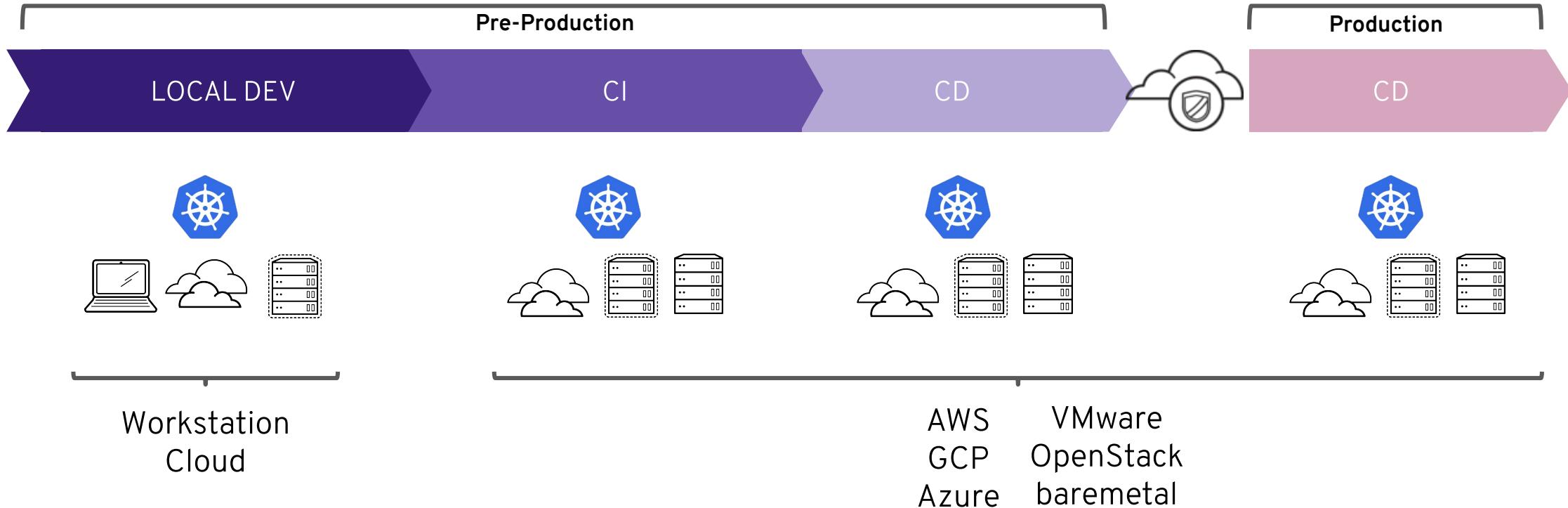
One Continuous Delivery

Multiple Clouds

Multiple Geographies

Multiple Platforms

Isolated Environments



One Continuous Delivery

Multiple Clouds

Multiple Platforms

DEVELOPMENT

CONTINUOUS INTEGRATION

CONTINUOUS DELIVERY



Workstation



Kubernetes



Kubernetes



Kubernetes

Azure

AWS

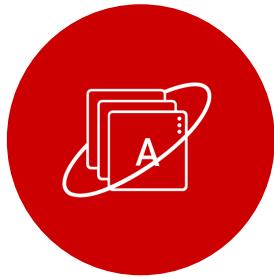
GCP

VMware

OpenStack

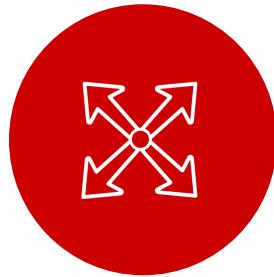
baremetal

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



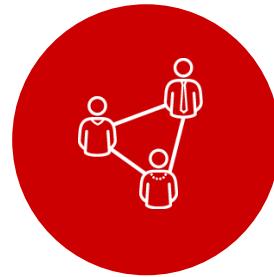
Containers

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

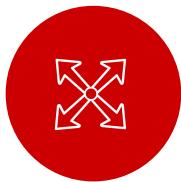
OpenShift Pipelines

a Cloud-Native CI/CD Experience on OpenShift



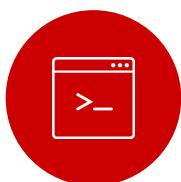
Standard Kubernetes-style pipelines

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



Run pipelines in containers

Scale pipeline executions on-demand with containers on Kubernetes



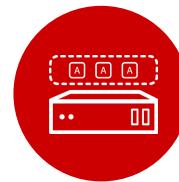
Powerful command-line tool

Run and manage pipelines with an interactive command-line tool



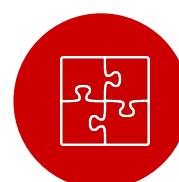
Build images with Kubernetes tools

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



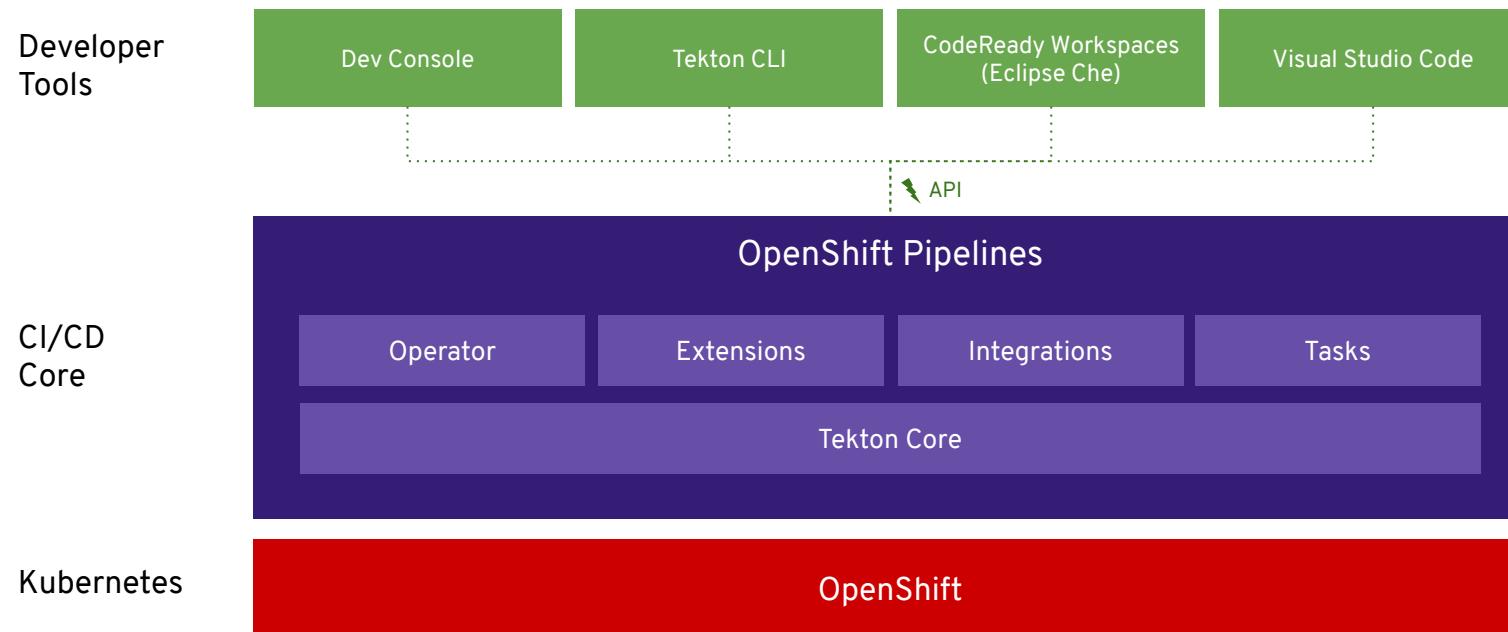
An open-source project for providing a set of shared and standard components for building Kubernetes-style CI/CD systems



CD.FOUNDATION

Governed by the Continuous Delivery Foundation
Contributions from Google, Red Hat, Cloudbees, IBM, Pivotal and many more

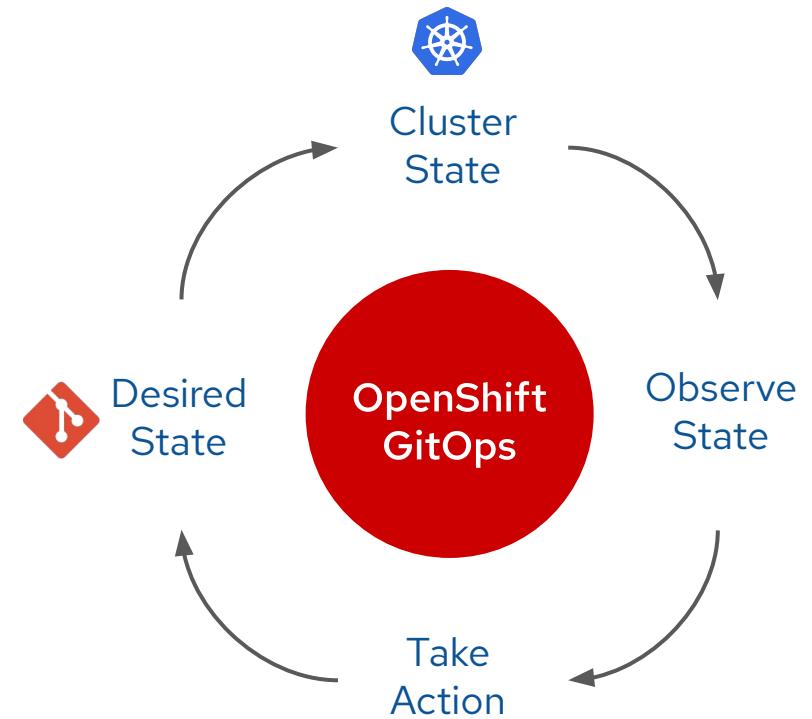
OpenShift Pipelines Architecture



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



Wrap up

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

Cluster Services

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

Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS



Edge



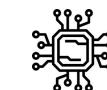
Physical



Virtual



Private cloud



Multi-Arch



Public cloud



Managed cloud
(Azure, AWS, IBM, Google)



Red Hat Training

Links

[Red Hat Trainings and Certification](#)

[IDC Business Value of RH Training](#)

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

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.

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



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 Development II: Containerizing Applications | DO288 • 4 days • Recommended



Red Hat Certified Specialist in OpenShift Application Development exam | EX288 • 3 hours • Required



Certification



Course



Exam



Required



Free



Recommended

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

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

<https://learn.openshift.com>

The screenshot shows the Red Hat OpenShift Interactive Learning Portal. At the top, there's a navigation bar with links for PRODUCTS, LEARN, COMMUNITY, SUPPORT, FREE TRIAL, and REPORT AN ISSUE. Below the navigation is a section titled "Interactive Learning Portal" which includes a brief description: "Our Interactive Learning Scenarios provide you with a pre-configured OpenShift® instance, accessible from your browser without any downloads or configuration. Use it to experiment, learn OpenShift and see how we can help solve real-world problems." Below this, there's a grid of 12 course modules, each with a "START COURSE" button:

- Using OpenShift
- Linux Container Fundamentals
- Developing on OpenShift
- Enterprise Java Development
- Developing with Quarkus
- Developing with Eclipse Vertx
- Developing with Spring and Spring Boot
- Developing with Kogito
- CI/CD & Application Delivery
- Building Operators on OpenShift
- Istio
- AI and Machine Learning on OpenShift
- Adding Persistence to OpenShift
- OpenShift Playgrounds

<https://www.openshift.com/events>

<https://developers.redhat.com/devnation>

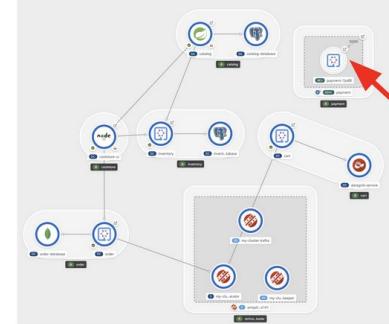
The screenshot shows the DevNation website. At the top, there's a navigation bar with links for Customer Portal, Developer, Hosted IDE, Marketplace, OpenShift, and Partner Connect. Below the navigation is a banner for "DevNation DAY" with the text "Join us on September 15th for this free, all-day immersive virtual experience created to bring you the most". Below the banner, there are three main sections: "Master Courses", "Tech Talks", and "The Show". Under "Master Courses", there's a section for "Upcoming Master Courses" featuring "DevNation Master Course: Kubernetes Beginner" (21 September 2020) and "DevNation Master Course: Kubernetes Elementary" (23 September 2020). Under "Tech Talks", there's a section for "Upcoming Tech Talks" featuring "DevNation TECH TALKS".

Guided Hands-On Workshops

CONTAINER CLOUD-NATIVE ROADSHOW V2

WHAT IS IT?

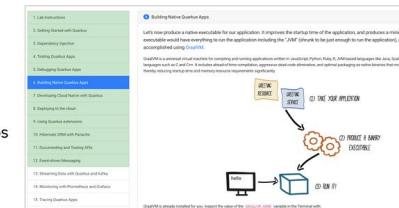
- Building Cloud-Native apps with OpenShift and Runtimes
- Modules based: choose from 4 modules
 - Optimizing Existing Applications
 - Debugging, Monitoring and Continuous Delivery
 - Control Cloud Native Apps with Service Mesh
 - Advanced Cloud Native with Event-Driven Serverless
- Developer and Architects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



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.

 [linkedin.com/company/red-hat](https://www.linkedin.com/company/red-hat)

 [youtube.com/user/RedHatVideos](https://www.youtube.com/user/RedHatVideos)

 [facebook.com/redhatinc](https://www.facebook.com/redhatinc)

 twitter.com/RedHat



We'll be back at 13.00...

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