THE KUBERNETES PLATFORM FOR BIG IDEAS

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Senior Solution Architect
Jan 2019


... so you want to do
containers and Kubernetes?


But Why?

SPEED!

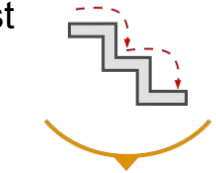
INNOVATION!

IT Must Evolve to Stay Ahead of Demands

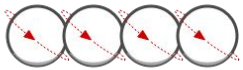
Development Process

Waterfall

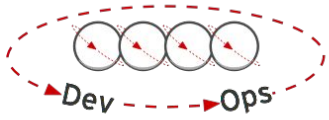
Test



Agile

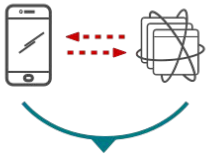


DevOps

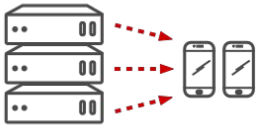


Application Architecture

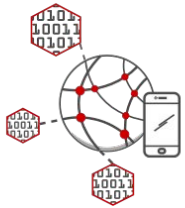
Monolithic



N-Tier



Microservices



Deployment & Packaging

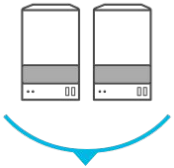
Physical Servers

Virtual Servers

Containers

Application Infrastructure

Datacenter



Hosted

Cloud

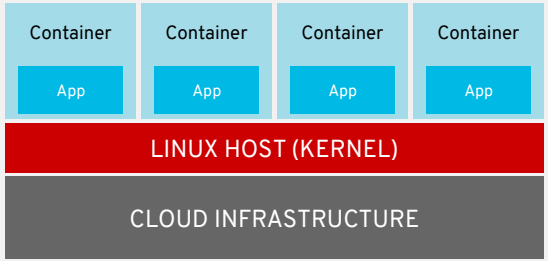
redhat.


What are containers?

WHAT ARE CONTAINERS?

CONTAINER BENEFITS FOR MULTIPLE TEAMS

CONTAINERS



Package all app dependencies
Integrated in Linux OS
Fully Open Source
Secure Isolation of Applications
Eliminates need for VM Hypervisor
Runs on Any Cloud Platform

DEVELOPERS

- CLOUD-NATIVE APPS
- SIMPLIFY PACKAGING
- SIMPLIFY TESTING

IT OPERATIONS

- CONSISTENT APP DEPLOYS
- AUTOMATED APP DEPLOYS
- IMPROVED APP PERFORMANCE
- MULTI-CLOUD CONSISTENCY

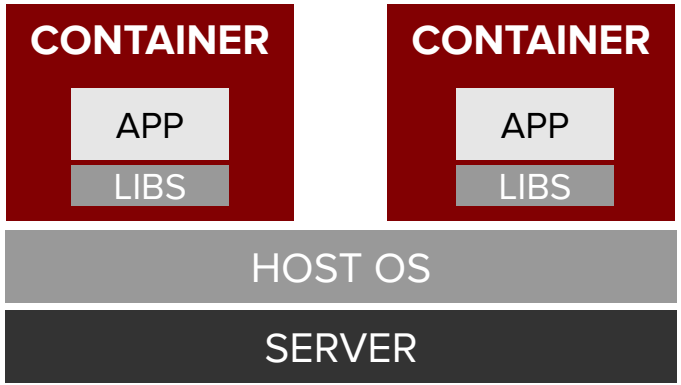
BUSINESS LEADERS

- ENABLE DEVOPS CULTURE
- ENABLE HYBRID CLOUD
- REDUCE VM LICENSING COSTS
- ACCELERATE APP-DEV CYCLES

Containers package applications with dependencies and isolate the runtime

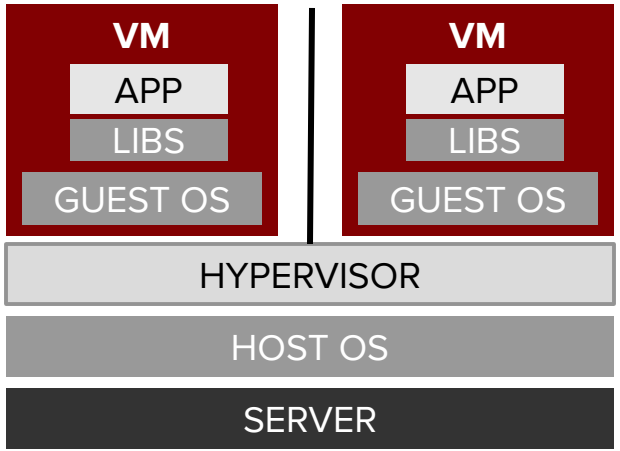
- Easy to deploy and portable across host systems
- Created from immutable, layered images
- Isolated from a host operating system.

  In RHEL, this is done through:
  - Control Groups (cgroups)
  - kernel namespaces
  - SELinux, sVirt, iptables
  - Docker

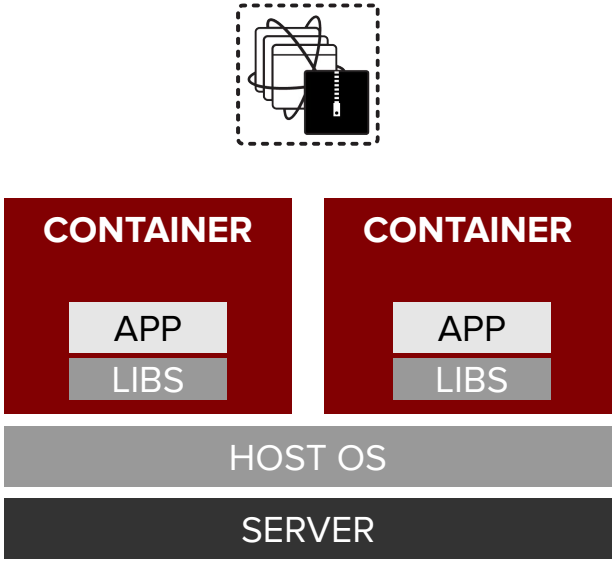


redhat.

Containers provide high density and efficiency at the expense of isolation



10 per Server



100 per Server

PHYSICAL SERVER

27 HRS

VIRTUAL MACHINE

12 MINS

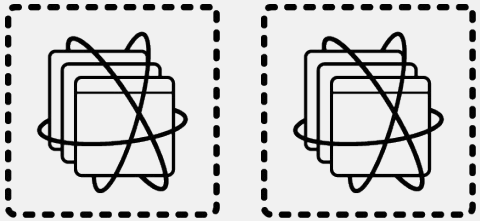
CONTAINER INSTANCE

10 SECS

redhat.


What is Kubernetes?

WHY DO CONTAINERS NEED KUBERNETES?



CONTAINERIZED APPLICATIONS

kubernetes

MANAGE CONTAINERS SECURELY

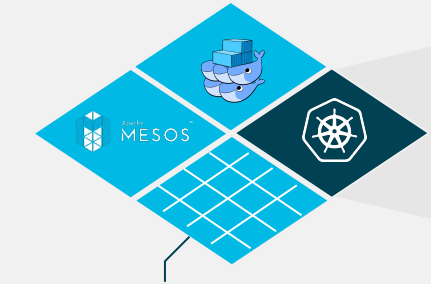
MANAGE CONTAINERS AT SCALE

INTEGRATE IT OPERATIONS

ENABLE HYBRID CLOUD

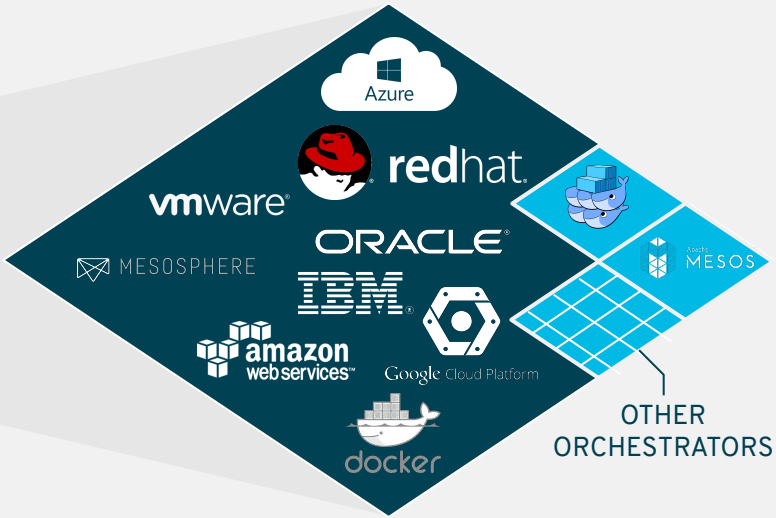
KUBERNETES IS THE CONTAINER ORCHESTRATION STANDARD

3 YEARS AGO
Fragmented landscape



OTHER ORCHESTRATORS
(Cloud Foundry Diego,
Nomad, Blox, etc.)

TODAY
Kubernetes consolidation

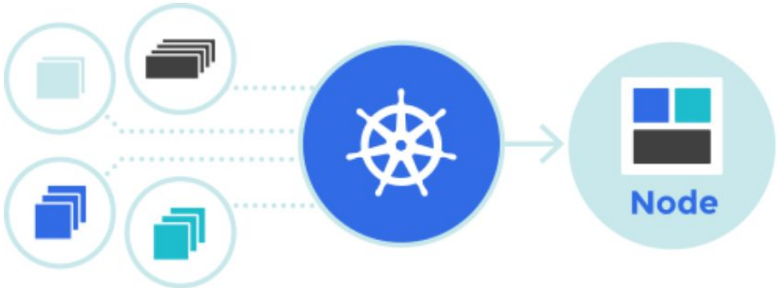


OTHER
ORCHESTRATORS

Red Hat bet early on Kubernetes. It has now become the dominant orchestration ecosystem

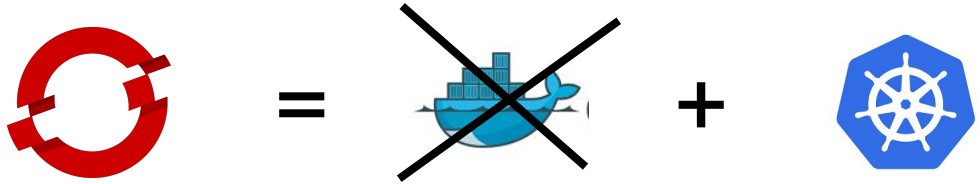
WHAT IS KUBERNETES?

- Orchestration of large amounts of running containers spread across a lot of hosts.
- “Kubernetes is an open-source platform for automating deployment, scaling, and operations of application containers across clusters of hosts, providing container-centric infrastructure.” [1]
- Open Sourced by google
- Planet Scale




What is OpenShift?

made easy



made easy

made easy

OPENSHIFT MAKES DOCKER UND KUBERNETES EASY TO USE

WHAT COMES IN KUBERNETES

- Container Scheduling on Multiple Hosts
- Self-healing
- Role Based Access Control
- Scaling
- Service Discovery
- Rolling Deploys and Rollbacks

WHAT OPENSHIFT ADDS OVER KUBERNETES

Ops:

- Software Defined Network
- Persistent Storage
- Container Native Storage (CNS / SDS)
- Log Aggregation and Analysis
- Monitoring | Telemetry
- Capacity Management
- Egress Routing for Enterprise integration
- Router Sharding
- Full Stack Support
- System Certifications and Patching
- …

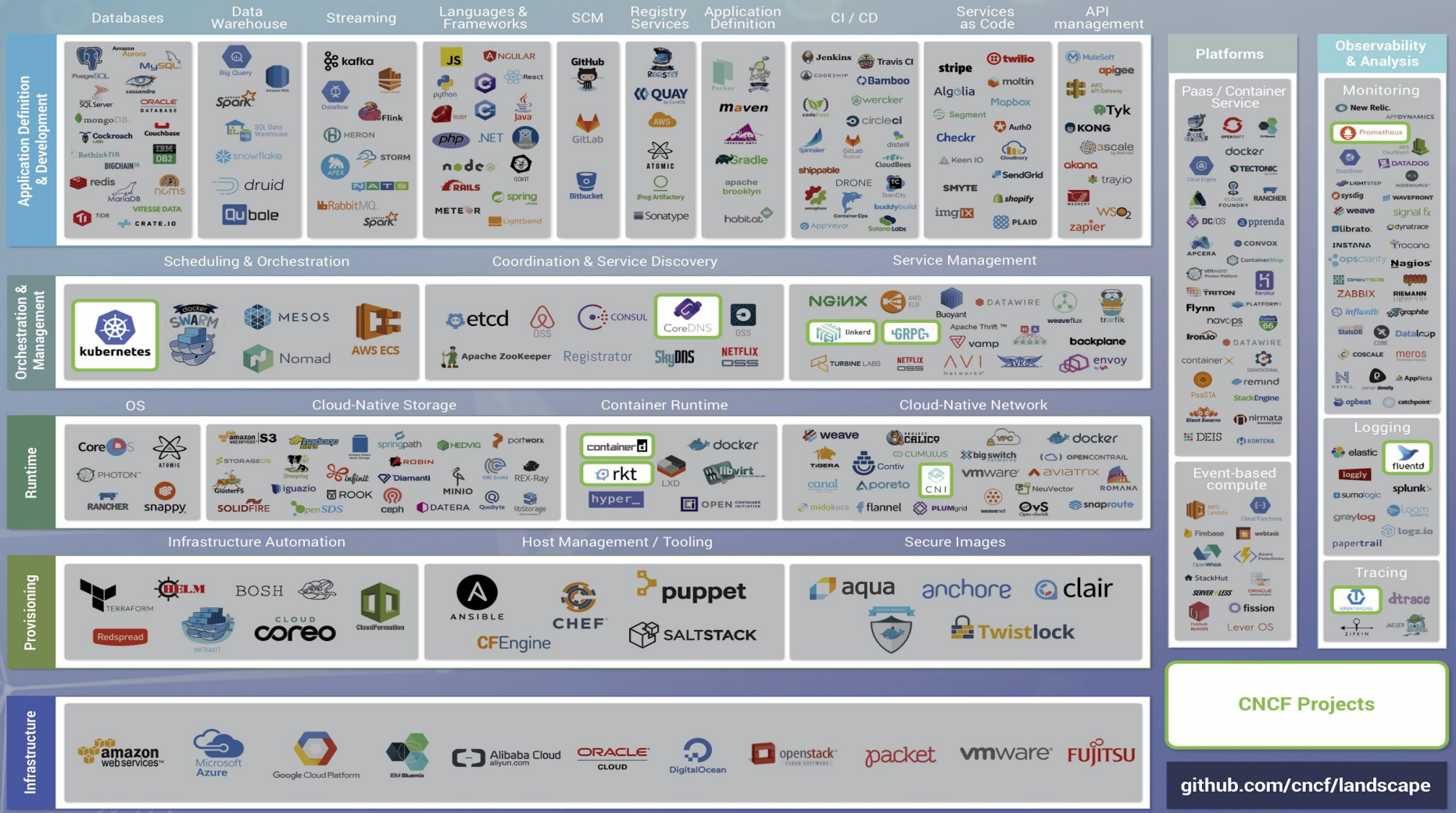
Dev:

- Automatically Triggered Deployments (CICD)
- Integrated Customizable Pipelines (CICD)
- Build and Deployment Configurations
- Weighted AB Testing
- Stateful Workloads (Storage, StatefulSets)
- Workload Containerization
- Self-service
- User Experience
- …

Security:

- Container Security and Isolation (SELinux, etc)
- Multi-tenancy
- Secured Registries
- Automated Deployment Patching
- …


DON'T
TRY THIS AT HOME !


Databases
Data Warehouse
Streaming
Languages & Frameworks
SCM
Registry Services
Application Definition
CI / CD
Services as Code
API management
Application Definition & Development
Scheduling & Orchestration
Coordination & Service Discovery
Service Management
Orchestration & Management
kubernetes
MESOS
Nomad
AWS ECS
etcd
CONSUL
CoreDNS
Apache ZooKeeper
Registrator
SkyDNS
NETFLIX OSS
NGINX
linkerd
gRPC
Buoyant
DATAWIRE
Apache Thrift
vamp
backplane
envoy
OS
Cloud-Native Storage
Container Runtime
Cloud-Native Network
Runtime
RANCHER
container
rkt
hyper_
docker
LXD
libvirt
OPEN CONTAINER INITIATIVE
weave
CALICO
CUMULUS
big switch
OPENCONTRAIL
Contiv
VMware
aviatrix
CNI
NeuVector
ROMANA
Aporeto
canal
flannel
PLUMgrid
OvS
snaproute
Infrastructure Automation
Host Management / Tooling
Secure Images
Provisioning
TERRAFORM
HELM
BOSH
CLOUD FOUNDRY
Redspread
CloudFormation
ANSIBLE
CHEF
CFEngine
puppet
SALTSTACK
aqua
anchore
clair
Twistlock
Infrastructure
amazon web services
Microsoft Azure
Google Cloud Platform
IBM Bluemix
Alibaba Cloud
ORACLE CLOUD
DigitalOcean
openstack
packet
vmware
FUJITSU
Platforms
Paas / Container Service
Event-based compute
Observability & Analysis
Monitoring
New Relic.
Prometheus
DATADOG
sysdig
WAVEFRONT
weave
signal fx
Nagios
ZABBIX
RIEMANN
graphite
Logging
elastic
fluentd
loggly
splunk
sumologic
graylog
papertrail
Tracing
OPENTRACING
dtrace
JAEGER
ZIPKIN
CNCF Projects
github.com/cncf/landscape

OPENSHIFT IS KUBERNETES
FOR THE ENTERPRISE

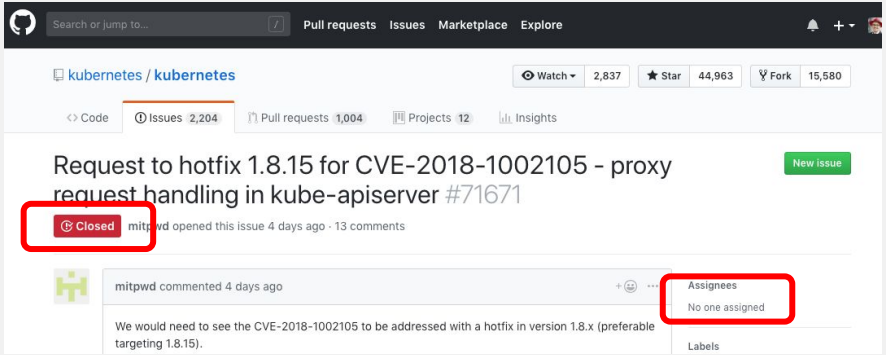
Security fixes
100s of defect and performance fixes
200+ validated integrations
Middleware integrations
(container images, storage, networking, cloud services, etc)
9 year enterprise lifecycle management
Certified Kubernetes

Community vs. Enterprise - Security Example

Dec 2018 - **Critical** (9.8 of 10) Kubernetes Security Vulnerability CVE-2018-1002105,

Kubernetes Community:

- Fixed **3** releases - (1.10, 1.11, 1.12)
- "All prior versions remain exposed and users should stop using them immediately"
- Requests to fix older versions are denied:



Enterprise OpenShift from Red Hat:

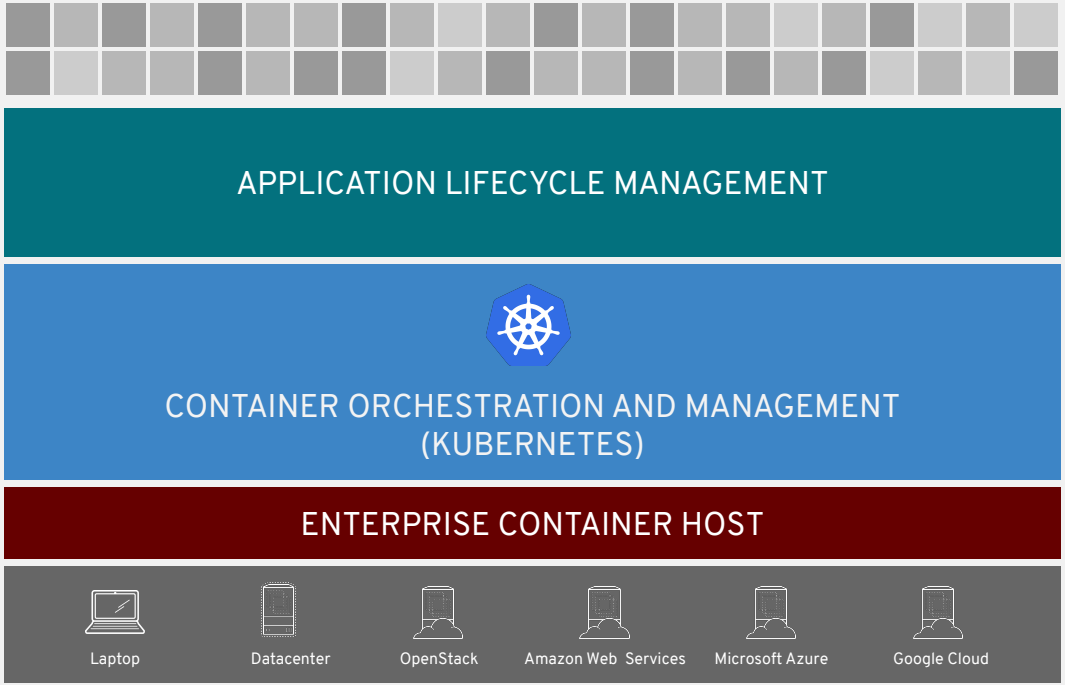
- Fixed **10** releases back to OpenShift V3.2 (which corresponds to kubernetes 1.2) :

Updates for Affected Products

Product	Package	Advisory/Update
OpenShift Container Platform v3.11	kubernetes	RHSA-2018:3537
OpenShift Container Platform v3.10	kubernetes	RHSA-2018:3549
OpenShift Container Platform v3.9	kubernetes	RHSA-2018:2908
OpenShift Container Platform v3.8	kubernetes	RHSA-2018:3551
OpenShift Container Platform v3.7	kubernetes	RHSA-2018:2906
OpenShift Container Platform v3.6	kubernetes	RHSA-2018:3598
OpenShift Container Platform v3.5	kubernetes	RHSA-2018:3624
OpenShift Container Platform v3.4	kubernetes	RHSA-2018:3752
OpenShift Container Platform v3.3	kubernetes	RHSA-2018:3754
OpenShift Container Platform v3.2	kubernetes	RHSA-2018:3742


OpenShift Overview

OPENSHIFT CONTAINER PLATFORM



ANY
CONTAINER

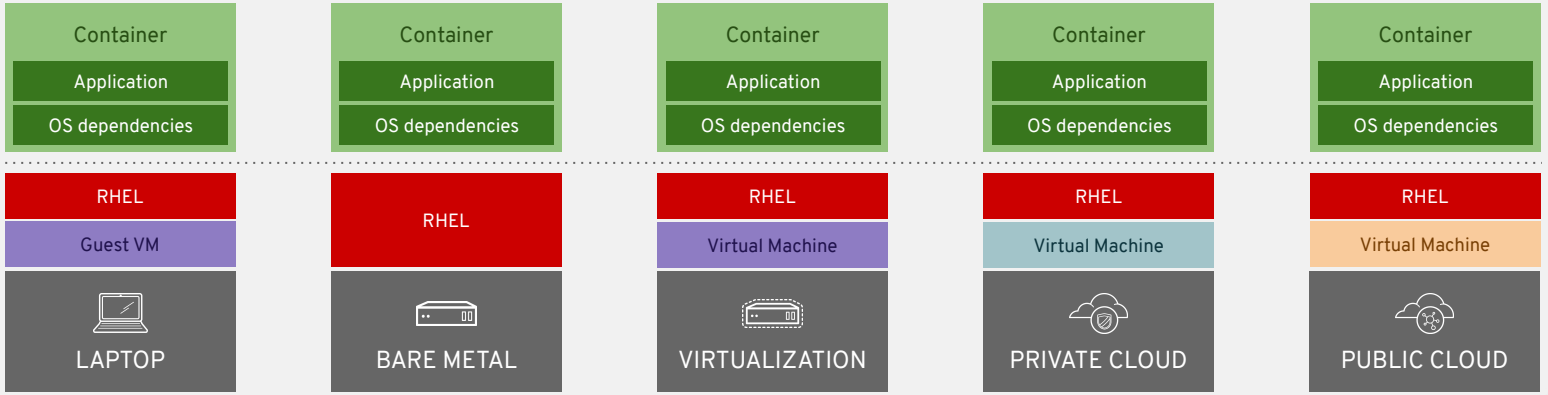
RED HAT®
OPENSHIFT

ANY
INFRASTRUCTURE

redhat.

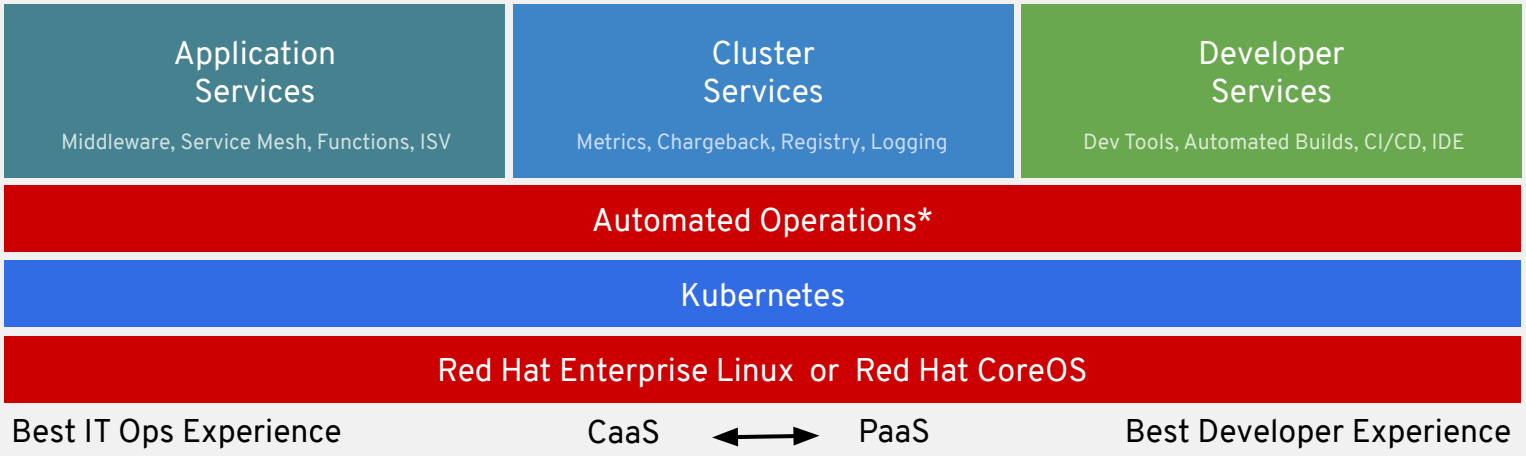
APPLICATION PORTABILITY WITH CONTAINERS

RHEL Containers + RHEL Host = Guaranteed Portability
Across Any Infrastructure



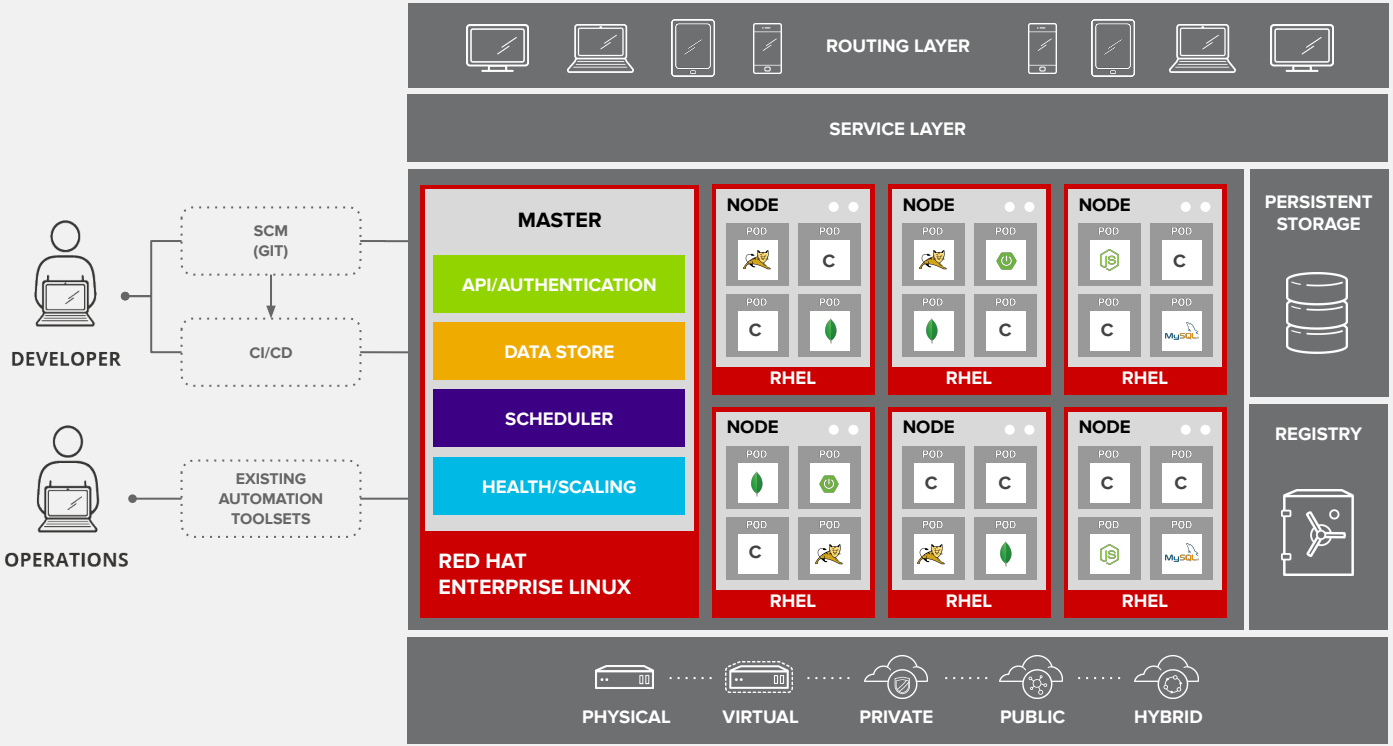
redhat.

OPENSHIFT CONTAINER PLATFORM



*coming soon

OPENSHIFT ARCHITECTURE




The Kubernetes platform for developers

Developers want to be productive and have choice

Choice of architectures
Choice of programming languages
Choice of databases
Choice of application services
Choice of development tools
Choice of build and deploy workflows

They don't want to have to worry about the infrastructure.

Photo: rawpixel on Unsplash

THE POWER OF THE OPENSHIFT ECOSYSTEM

RED HAT PORTFOLIO
Optimized for Containers

- RED HAT OPENSHIFT Application Runtimes
- RED HAT JBOSS WEB SERVER
- RED HAT JBOSS ENTERPRISE APPLICATION PLATFORM
- RED HAT DATA GRID
- RED HAT AMQ
- RED HAT FUSE
- RED HAT MOBILE
- RED HAT ANSIBLE Engine
- RED HAT QUAY CONTAINER REGISTRY
- RED HAT DECISION MANAGER
- RED HAT PROCESS AUTOMATION MANAGER
- RED HAT 3SCALE API MANAGEMENT
- RED HAT OPENSHIFT Container Storage

THIRD-PARTY ISV
Red Hat Container Catalog (100s certified)

IBM, Microsoft, SAP, New Relic, Couchbase, Crunchy Enterprise PostgreSQL, Sysdig, f5, Veritas, Zabbix, NetApp, Sonatype, JFrog, dynatrace, nuagenetworks

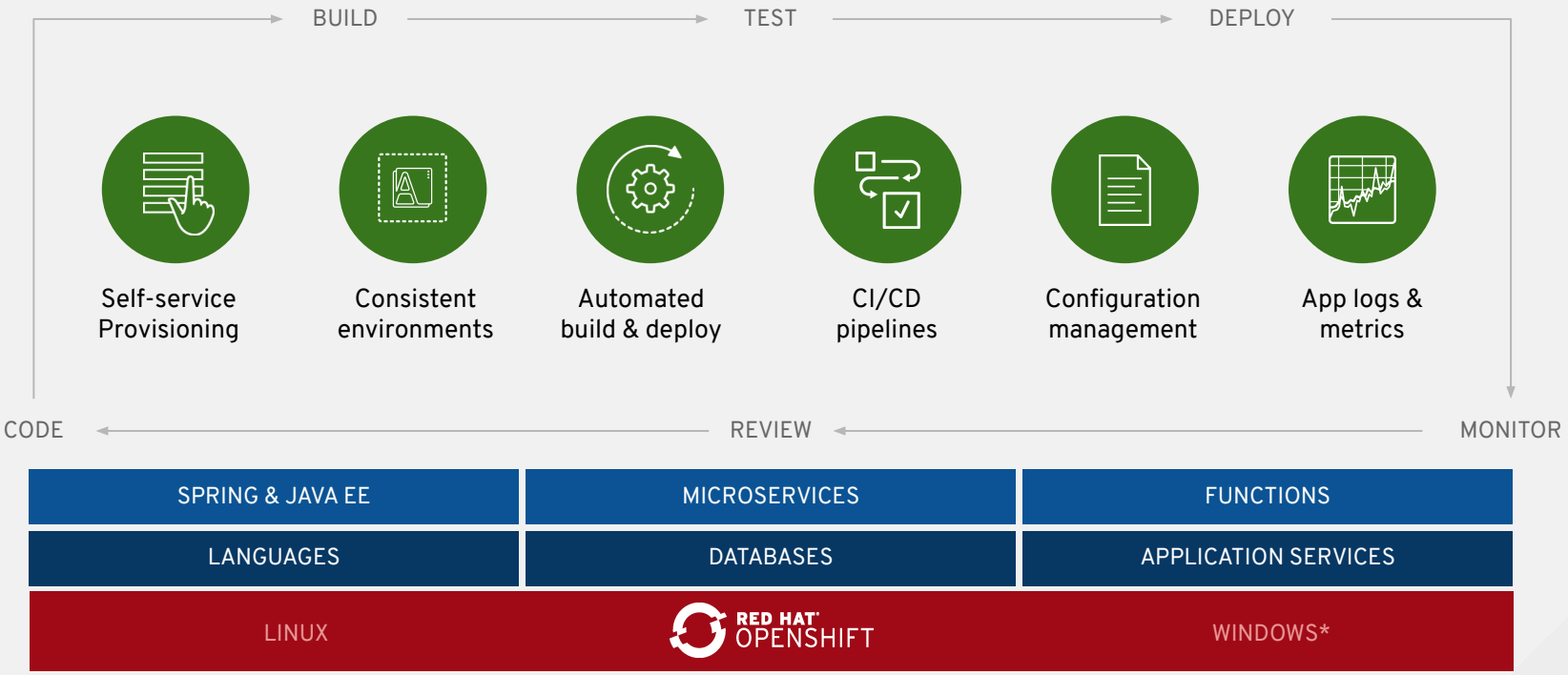
CLOUD SERVICES
Open Service Broker

amazon web services, Microsoft Azure, Google Cloud

RED HAT OPENSHIFT

RED HAT ENTERPRISE LINUX ECOSYSTEM
Hardware, Virtualization, Cloud and Service Provider Certifications

HOW OPENSHIFT ENABLES
DEVELOPER PRODUCTIVITY



* coming soon


The Kubernetes platform
for IT Operations

IT Operations needs secure, efficient and controlled processes

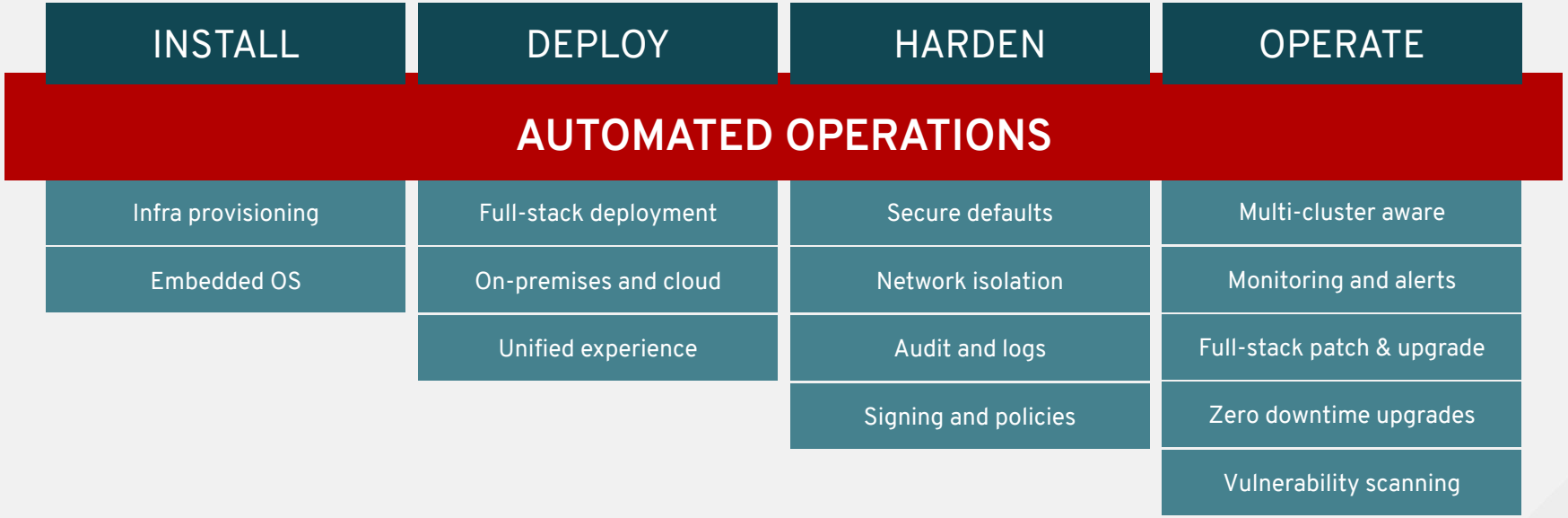
Automated* provisioning
Automated installations
Automated security scanning
Automated upgrades
Automated backups

And it needs to integrate with what you already have.

*coming soon

AUTOMATED CONTAINER OPERATIONS

Fully automated day-1 and day-2 operations



A CONSISTENT CONTAINER APPLICATION PLATFORM

FROM YOUR DATACENTER TO THE CLOUD

RED HAT® OPENSHIFT

BARE METAL, VSPHERE, RHV, OPENSTACK, AWS, AZURE, GOOGLE

COMPREHENSIVE CONTAINER SECURITY

CONTROL
Application Security

- Container Content
- CI/CD Pipeline
- Container Registry
- Deployment Policies

DEFEND
Infrastructure

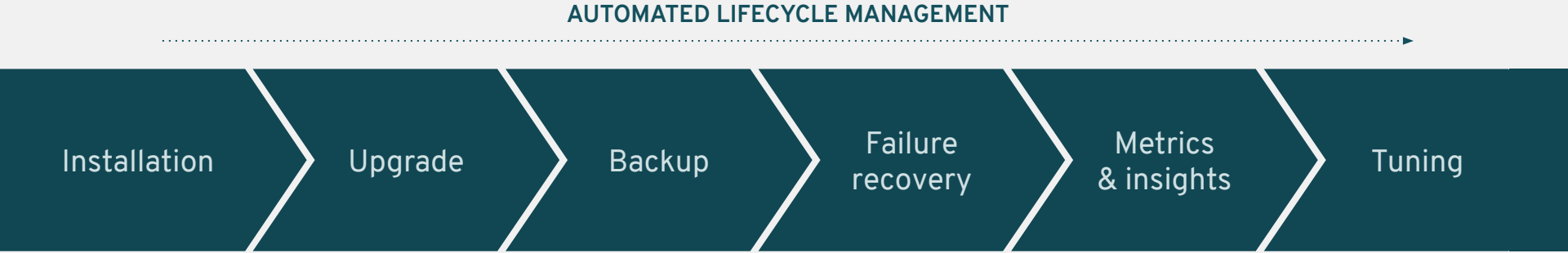
- Container Platform
- Container Host Multi-tenancy
- Network Isolation
- Storage
- Audit & Logging
- API Management

EXTEND

- Security Ecosystem

KUBERNETES OPERATOR FRAMEWORK

AN INNOVATIVE, MORE EFFICIENT WAY TO MANAGE CONTAINERIZED APPLICATIONS AT SCALE



Operators codify operational knowledge and workflows to automate lifecycle management of containerized applications with Kubernetes

MORE THAN JUST A KUBERNETES PLATFORM

RED HAT® QUAY CONTAINER REGISTRY

Enterprise image registry with geo-replication, time machine and security scanning

RED HAT® OPENSHIFT Container Storage

Container-optimized software-defined storage on OpenShift

CONTAINER-NATIVE VIRTUALIZATION*

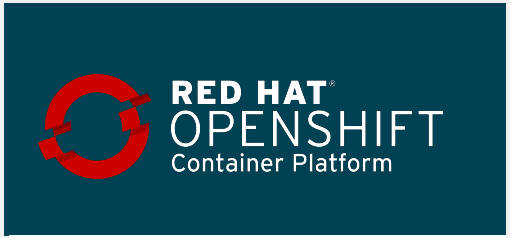
Single workflow for containers and virtual machines running on OpenShift

* coming soon

ONE PLATFORM
FLEXIBLE CONSUMPTION MODELS

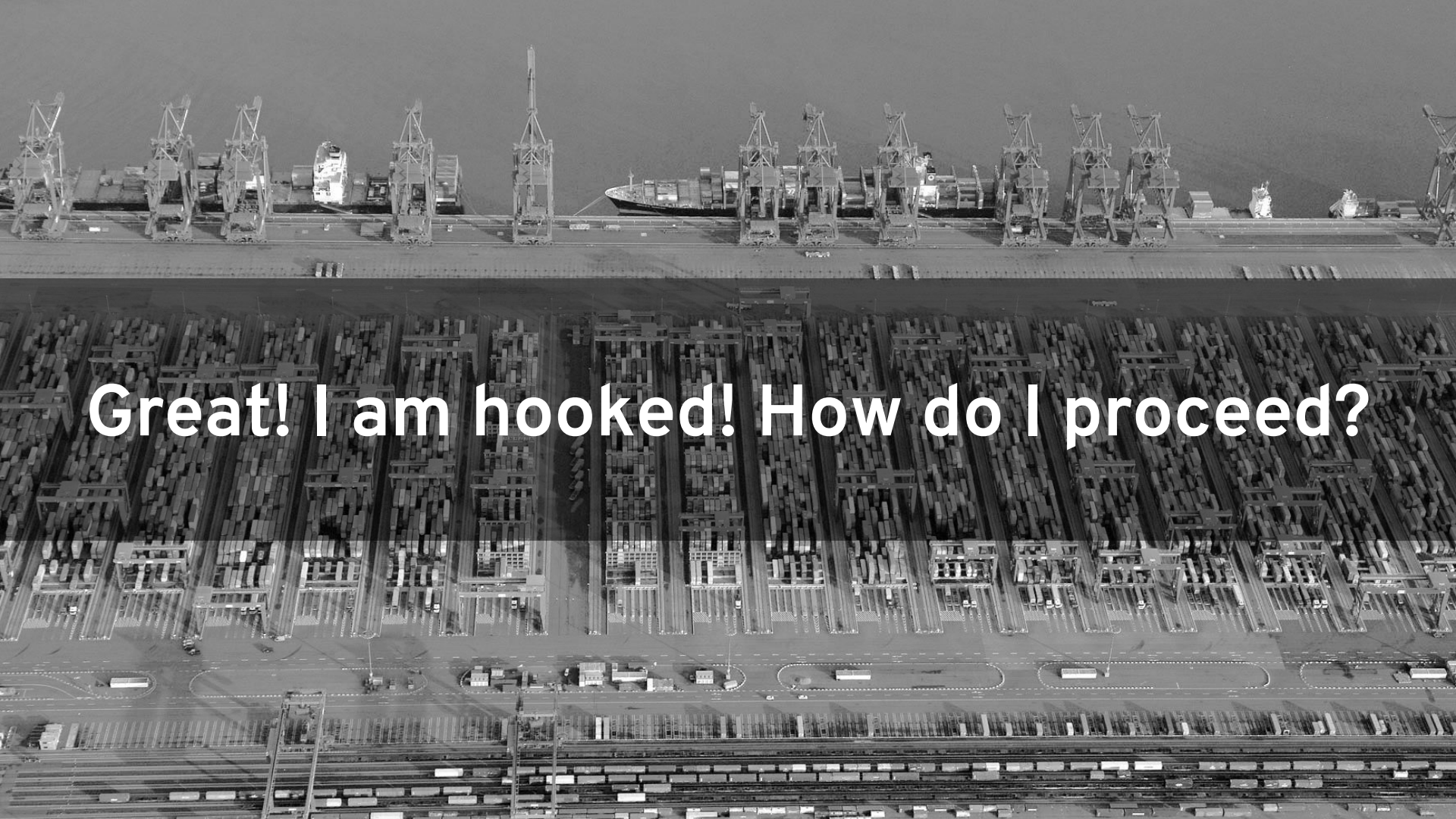
SaaS offering to build, deploy, and scale container applications in the cloud

Managed service offering on your choice of AWS, Azure* or Google



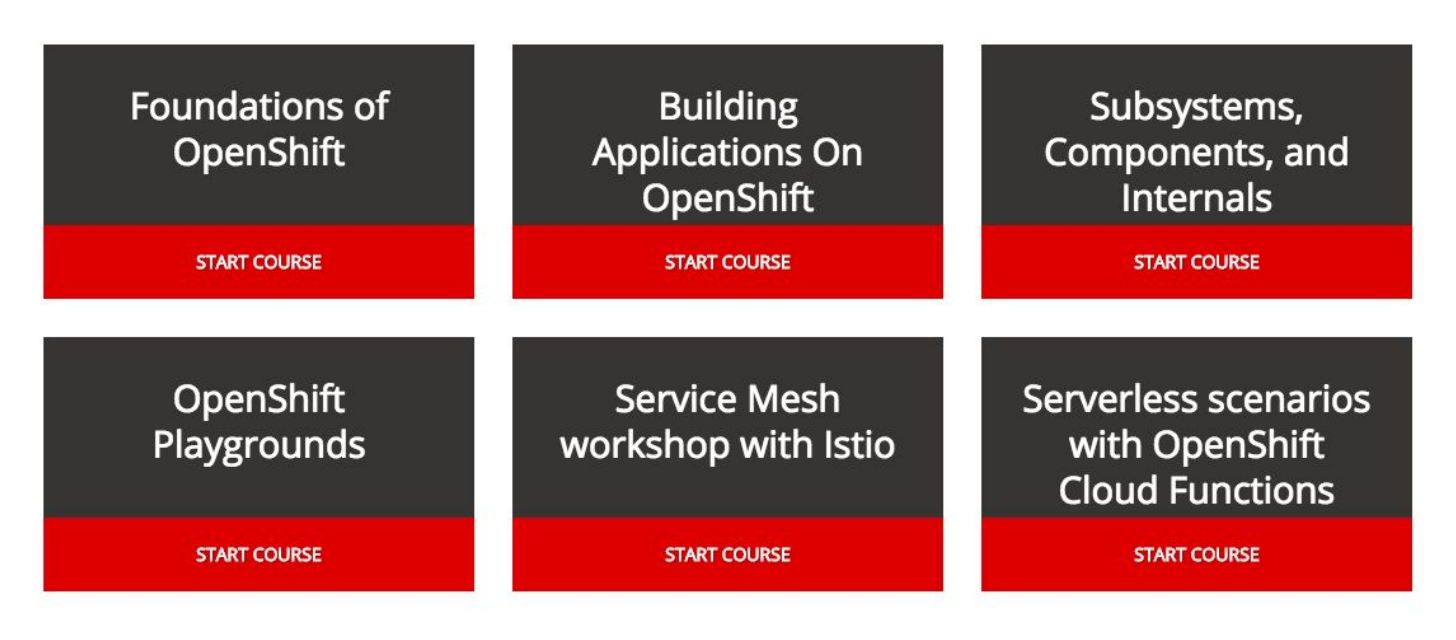
Manage your own secure, enterprise-grade Kubernetes platform

* announced for general availability in late 2018



Great! I am hooked! How do I proceed?

LEARN.OPENSHIFT.COM



Interactive Learning Scenarios provide you with a pre-configured OpenShift instance, accessible from your browser without any downloads or configuration.

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

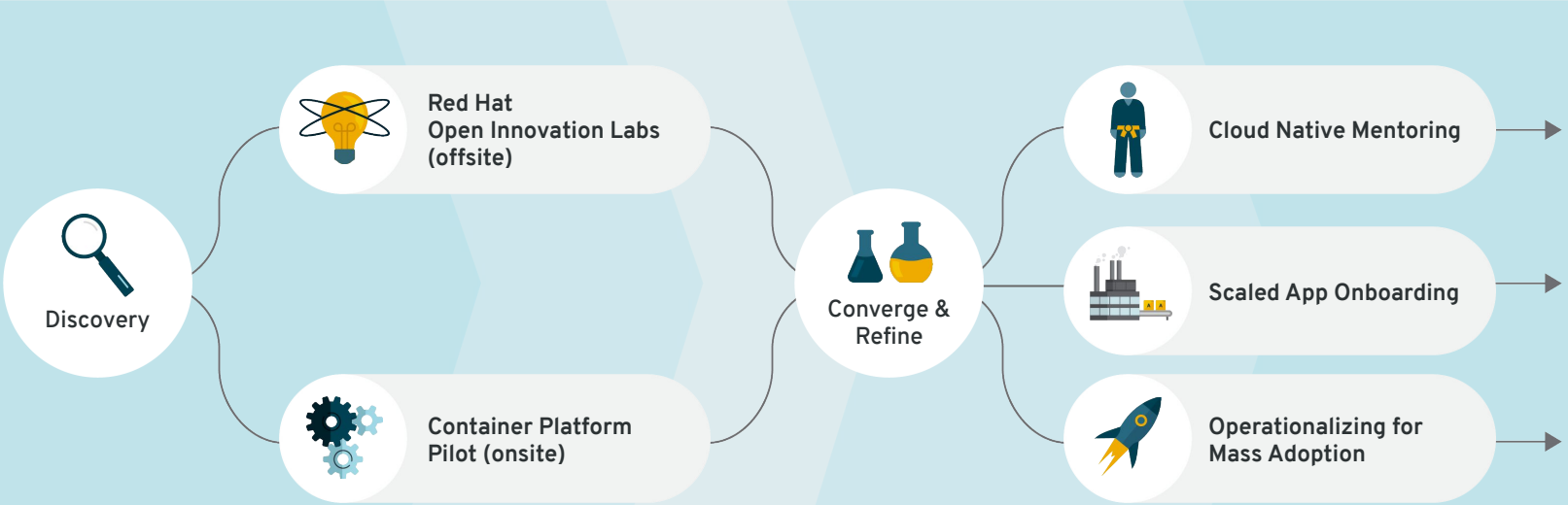
FRAMEWORK FOR SUCCESSFUL CONTAINER ADOPTION AND IT TRANSFORMATION:

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

CONTAINER ADOPTION PROGRAM



ESTIMATED PAYBACK TIME: 17 months [1]
TOTAL THREE-YEAR BENEFITS NPV: $10.1 M (USD) [1]

[1] The Total Economic Impact of Red Hat Consulting's Container Adoption Program and Open Innovation Labs, Forrester, 2018.

THANK YOU