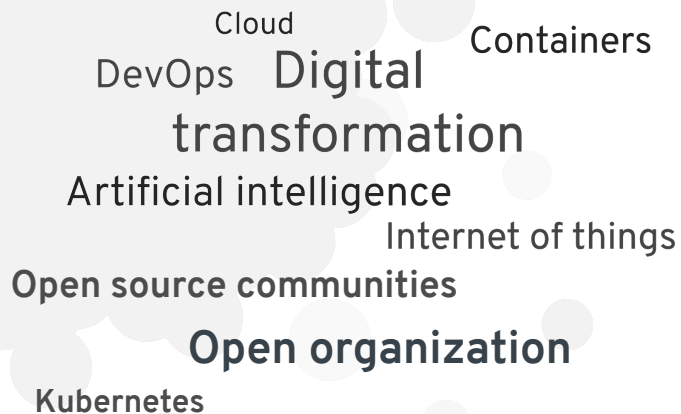




The Kubernetes platform
for big ideas

Big ideas drive business innovation



Cloud
DevOps **Digital** Containers
transformation
Artificial intelligence
Internet of things
Open source communities
Open organization
Kubernetes

Business innovation is all around us.

Every organization in every geography and in every industry can innovate and create more customer value and differentiation with open source technologies and an open culture.

Creating value depends on your ability to deliver applications faster

Cloud-native applications



AI & machine learning



Analytics



Internet of Things

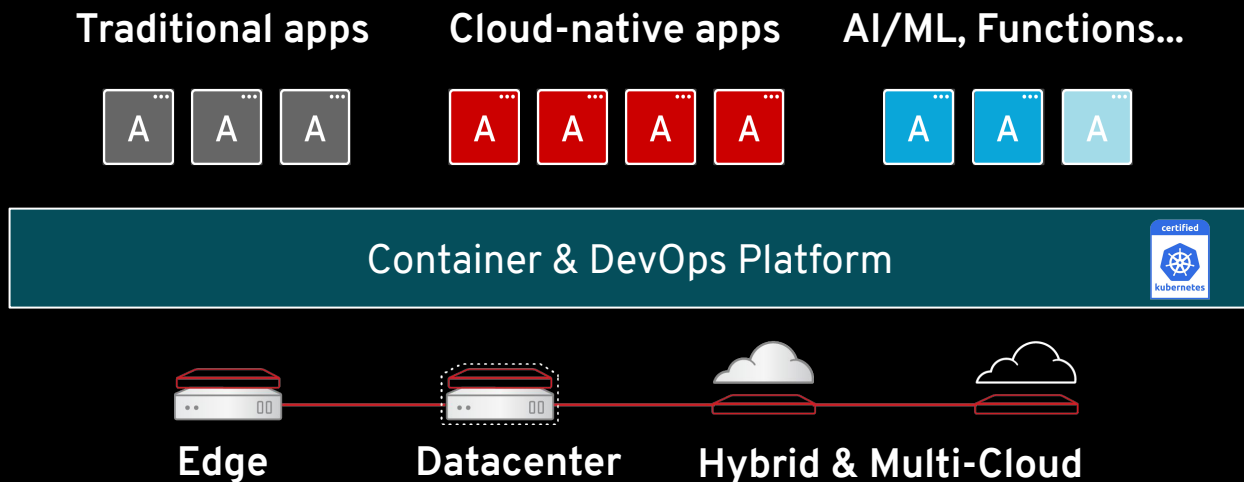


Innovation culture



Containers, Kubernetes, and hybrid cloud are key ingredients.
OpenShift is the best platform to deliver container-based applications.

With OpenShift you can deliver all your applications in a whole new way





“““

We got the idea to have all these tests we do with hardware on virtual test environments, and that's why we've come to OpenShift and containers.

Michael Denecke
Head of Test Technology
Volkswagen AG

VOLKSWAGEN
Autonomous Vehicle Testing

More than 1,000 Red Hat OpenShift customers



amadeus



BBVA KOHL'S



MODERNIZE APPS

WEB APPS

CLOUD NATIVE DEV

MULTI-CLOUD



ExxonMobil

SMARTBOW



T-Mobile Systems



BMW GROUP VORWERK

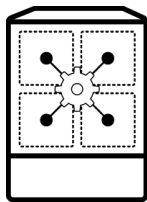
MOBILE

BIG DATA | ANALYTICS

AI | ML

IOT

Why customers choose Red Hat OpenShift



Trusted enterprise
Kubernetes



OPENSIFT



Cloud-like experience
everywhere



Empowering
developers to
innovate



Open source innovation

CONTAINER CHALLENGES

Container security

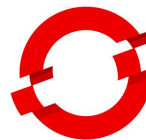
Image scanning, patching, and compliance

Day 2 management

Installations, upgrades, and maintenance
Integration of existing enterprise technology

Application delivery

Monitoring, metering, and management
Integration of existing developer tools



Red Hat OpenShift

Trusted enterprise Kubernetes

Continuous security, world-class support and services, and deep expertise to confidently run any application

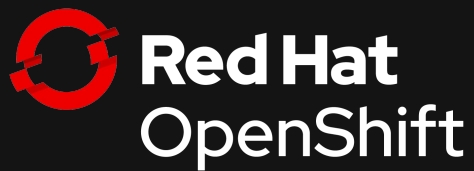
A cloud-like experience, everywhere

Full-stack automated operations on a consistent foundation across on-premises or hybrid cloud infrastructure

Empowerment for developers to innovate

Ability to get applications to production sooner with a wide range of technologies and streamlined workflows

Trusted enterprise Kubernetes



Trusted host, content,
platform

Full-stack automated
installation

Seamless updates

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

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

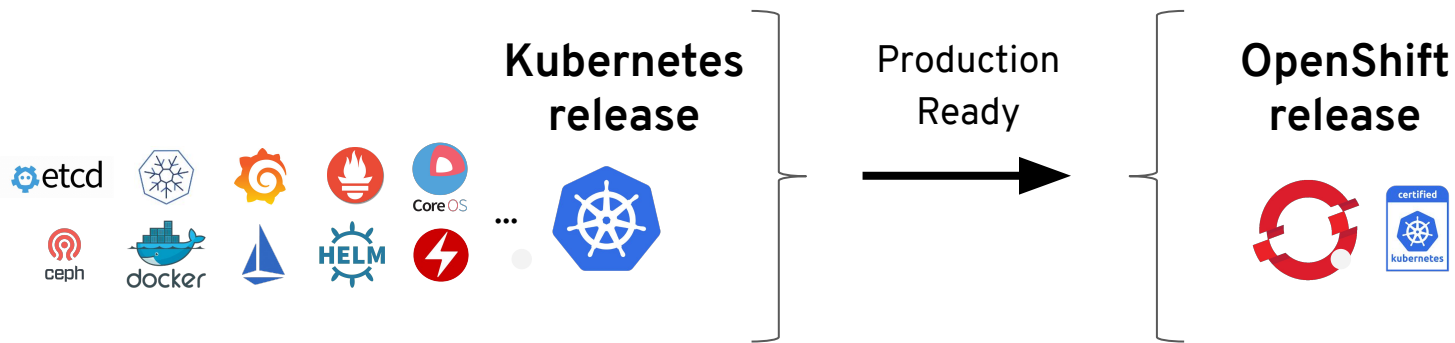


75%

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

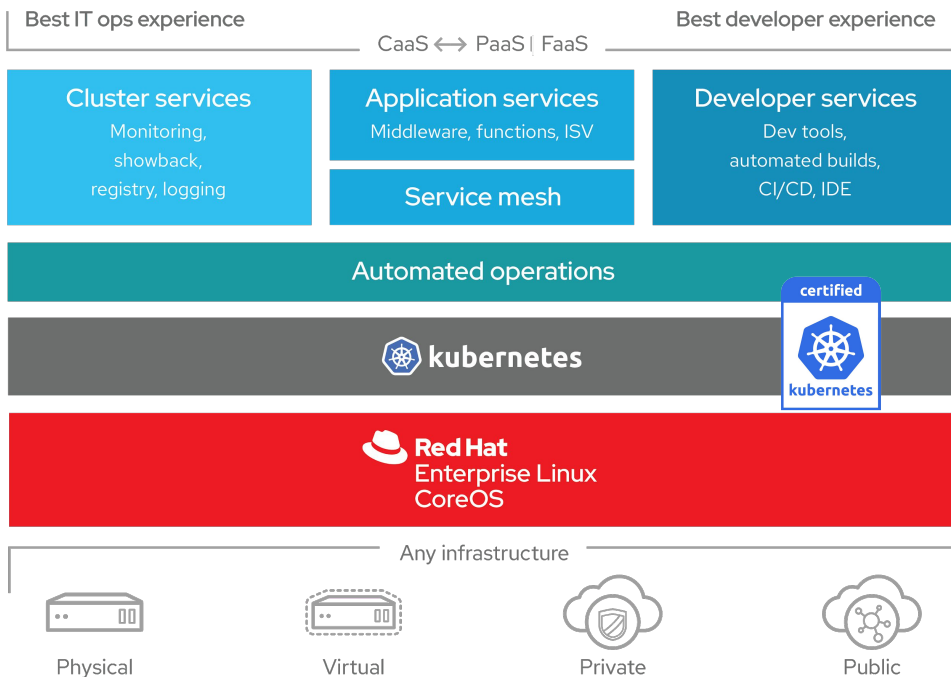
Source: The New Stack. *The State of the Kubernetes Ecosystem*, August 2017.

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 4 - A smarter Kubernetes platform



Automated, full-stack installation from the container host to application services

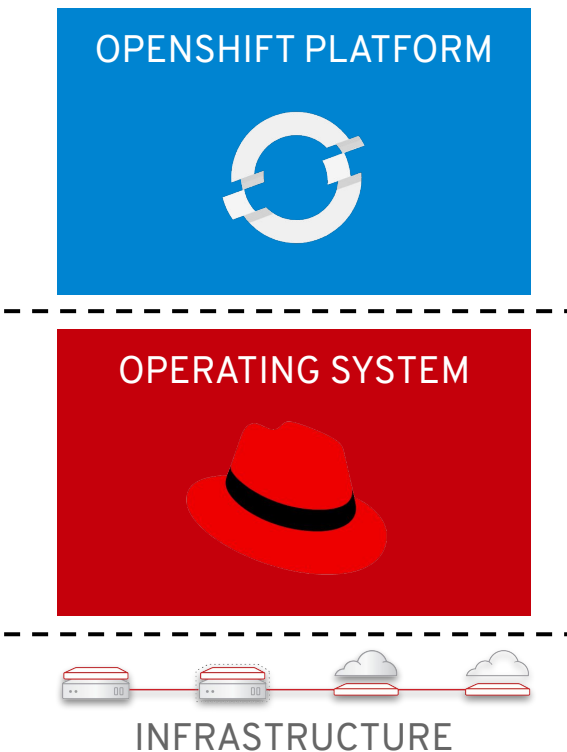
Seamless Kubernetes deployment to any cloud or on-premises environment

Autoscaling of cloud resources

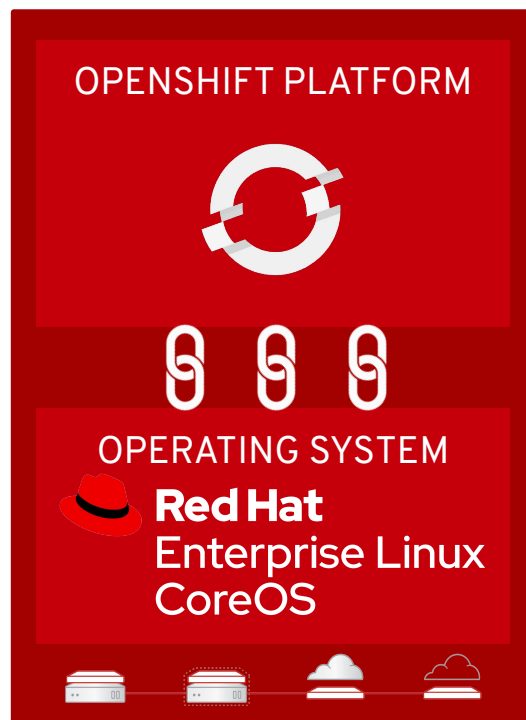
One-click updates for platform, services, and applications

Full-stack automated install

OPENSHIFT 3 & 4

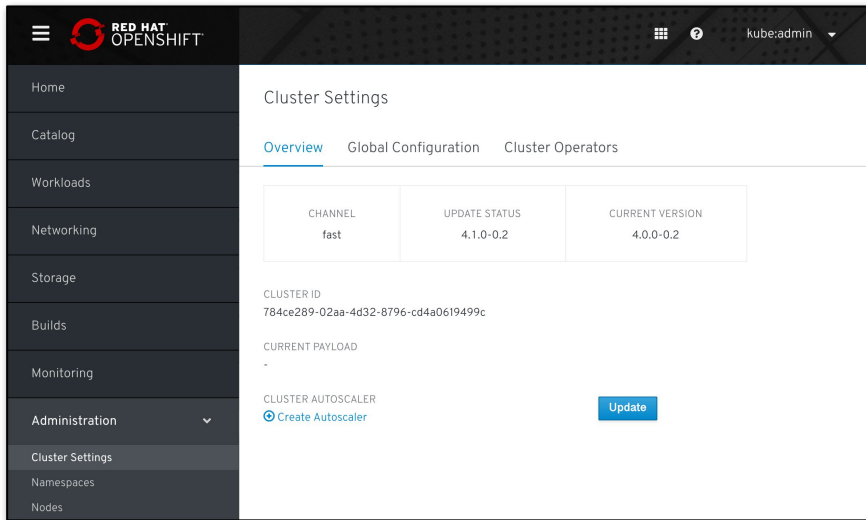


OPENSHIFT 4 (only)



Over the Air (OTA) Updates

- OpenShift retrieves the list of available updates
- Admin selects the target version
- OpenShift is updated over the air
- Auto-update support



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

“““

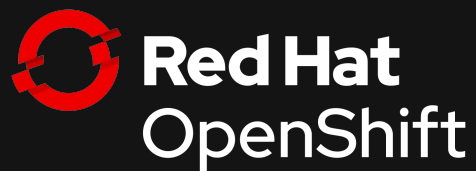
We can localize
clusters in different
markets if we need to
and therefore serve
our customers on a
worldwide scale.

Dr. Alexander Lenk
Lead Architect Connected
Vehicle, Digital Backend,
Big Data, Blockchain
BMW Group

BMW
Connected Drive



A cloud-like experience, everywhere



Operator Framework

Operator Hub &
ISV ecosystem

Multicluster
management

A consistent container application platform

FROM YOUR DATACENTER TO THE CLOUD



Automated
operations



Multi-tenant



Secure by
default



Network
traffic control



Over-the-air
updates



Monitoring
& chargeback



Pluggable
architecture



Bare metal, VMware vSphere, Red Hat Virtualization, Red Hat OpenStack Platform,
Amazon Web Services, Microsoft Azure, Google

Kubernetes adoption phases

1. Stateless apps

ReplicaSets
Deployments

2. Stateful apps

StatefulSets
Storage/CSI

3. Distributed systems

Data rebalancing
Autoscaling
Seamless upgrades

Automated container operations

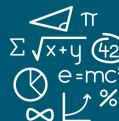
FULLY AUTOMATED DAY-1 AND DAY-2 OPERATIONS

INSTALL	DEPLOY	HARDEN	OPERATE
AUTOMATED OPERATIONS			
Infra provisioning	Full-stack deployment	Secure defaults	Multicluster aware
Embedded OS	On-premises and cloud	Network isolation	Monitoring and alerts
	Unified experience	Audit and logs	Full-stack patch & upgrade
		Signing and policies	Zero-downtime upgrades
			Vulnerability scanning

Kubernetes-native day 2 management



Flexible app
architectures



No reinvention
of core concepts



Uniform deploy
and debug



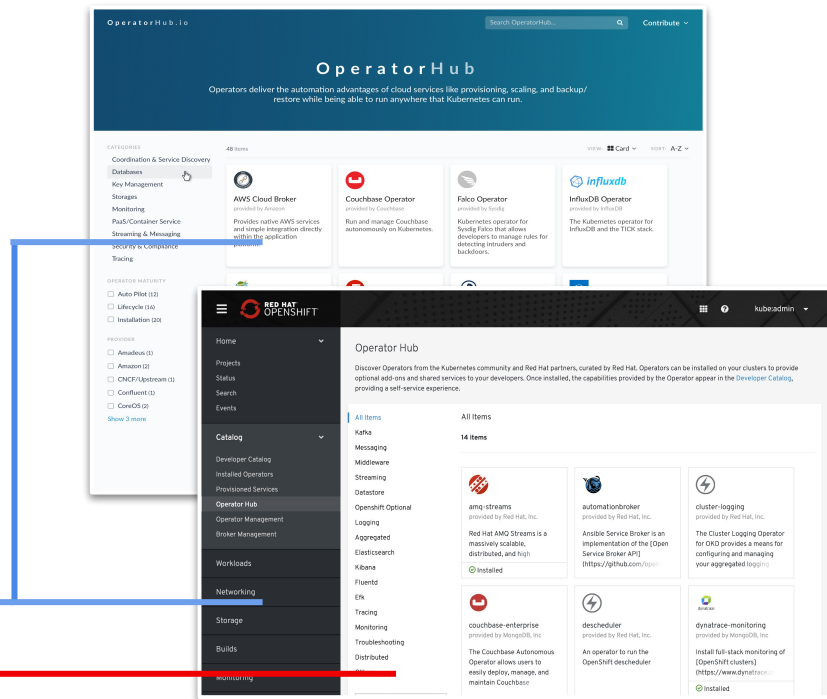
Truly hybrid

Operators codify operational knowledge and workflows to automate life-cycle management of containerized applications with Kubernetes

OperatorHub and certified Operators

- OperatorHub.io launched by Red Hat, AWS, Microsoft and Google
- OpenShift Operator Certification
- OperatorHub integrated into OpenShift 4

COMMUNITY OPERATORS
OPENSHIFT CERTIFIED OPERATORS



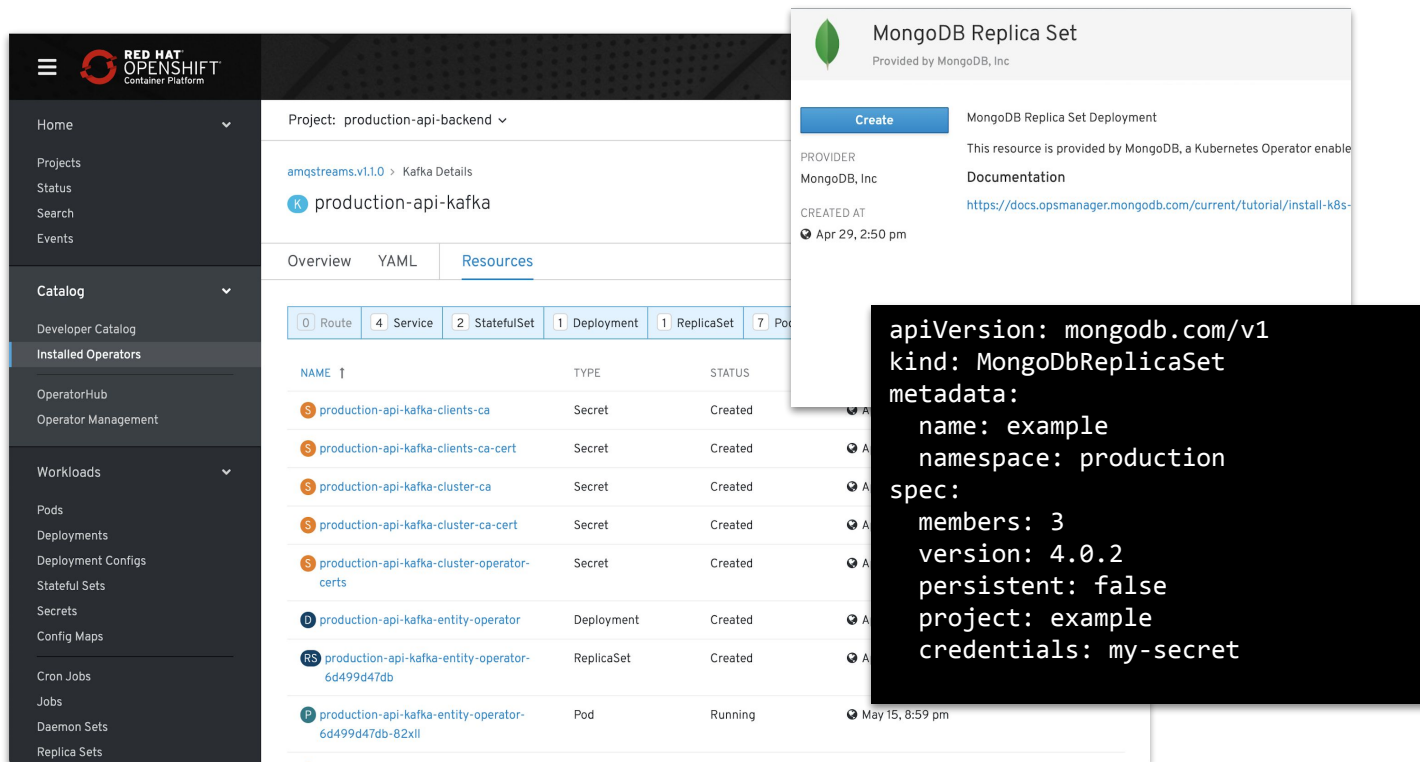
Full control for administrators

The screenshot displays the Red Hat OpenShift Container Platform interface. On the left is a dark sidebar with navigation links: Home, Catalog (expanded), OperatorHub, Operator Management, Workloads (expanded), and various workload types like Pods, Deployments, etc. The main content area shows the 'OperatorHub' page with a list of categories on the left and a grid of operator cards on the right. The 'All Items' tab is selected, showing 40 items. Two operator cards are visible: 'AMQ Streams' (provided by Red Hat, Inc.) and 'AppDynamics Cluster' (provided by AppDynamics). A modal window titled 'Create Operator Subscription' is overlaid on the right. It contains the following sections:

- Installation Mode ***
 - ☒ All namespaces on the cluster (default)
Operator will be available in all namespaces.
 - ☐ A specific namespace on the cluster
Operator will be available in a single namespace only.
- Update Channel ***
 - ☒ preview
- Approval Strategy ***
 - ☒ Automatic
 - ☐ Manual

At the bottom of the modal are 'Subscribe' and 'Cancel' buttons.

Self-service for developers



The screenshot displays the Red Hat OpenShift Container Platform console. The left sidebar contains navigation links: Home, Projects, Status, Search, Events, Catalog, Developer Catalog, Installed Operators, OperatorHub, Operator Management, Workloads, Pods, Deployments, Deployment Configs, Stateful Sets, Secrets, Config Maps, Cron Jobs, Jobs, Daemon Sets, and Replica Sets. The main content area shows the 'production-api-kafka' resource details for the 'production-api-backend' project. The 'Resources' tab is selected, showing a table of resources. A modal window for 'MongoDB Replica Set' is open, displaying deployment details and a YAML spec.

MongoDB Replica Set
Provided by MongoDB, Inc.

Create MongoDB Replica Set Deployment

This resource is provided by MongoDB, a Kubernetes Operator enabled by the MongoDB Operator.

PROVIDER
MongoDB, Inc.

CREATED AT
Apr 29, 2:50 pm

Documentation
<https://docs.opsmanager.mongodb.com/current/tutorial/install-k8s->

```
apiVersion: mongodb.com/v1
kind: MongoDbReplicaSet
metadata:
  name: example
  namespace: production
spec:
  members: 3
  version: 4.0.2
  persistent: false
  project: example
  credentials: my-secret
```

NAME	TYPE	STATUS
production-api-kafka-clients-ca	Secret	Created
production-api-kafka-clients-ca-cert	Secret	Created
production-api-kafka-cluster-ca	Secret	Created
production-api-kafka-cluster-ca-cert	Secret	Created
production-api-kafka-cluster-operator-certs	Secret	Created
production-api-kafka-entity-operator	Deployment	Created
production-api-kafka-entity-operator-6d499d47db	ReplicaSet	Created
production-api-kafka-entity-operator-6d499d47db-82xll	Pod	Running



“““

Using the Prometheus Operator, our dev teams are able to provision their own end-to-end monitoring.

We could not hope to manage the 344 Prometheus instances without the domain knowledge the Operator encapsulates.

Michael Goodness
Lead Systems Engineer
Ticketmaster

Why OpenShift for hybrid and multi-cloud deployments?

IDC Research: The Business Value of OpenShift on AWS

“““

Our developers say that OpenShift on AWS is very easy to use, and they are definitely more productive as a result ... seeing **60-70 percent increases in productivity levels.**

Financial Services

“““

We have a **multi-cloud environment** and OpenShift on AWS has features that make it **easier to be agile.**

Pharmaceutical

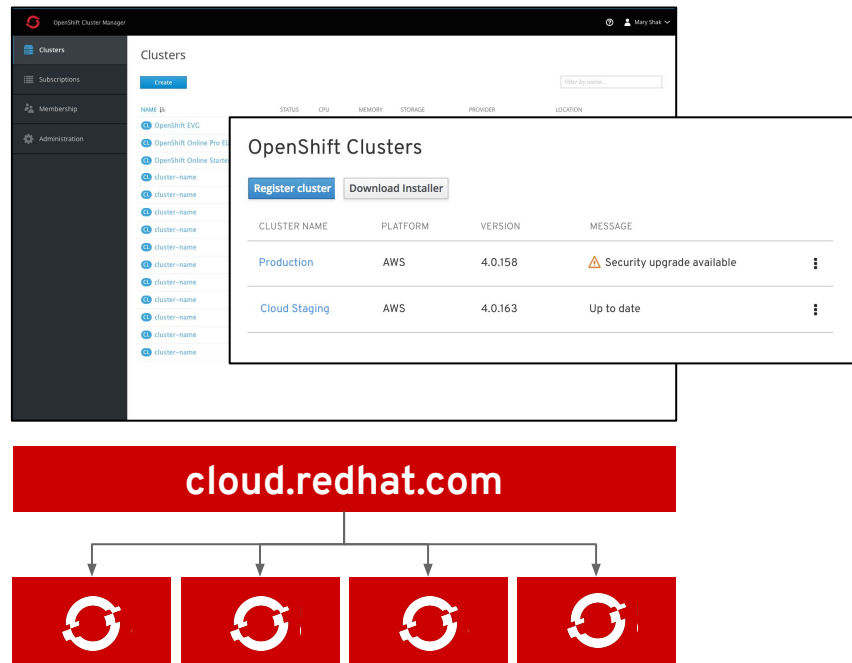
“““

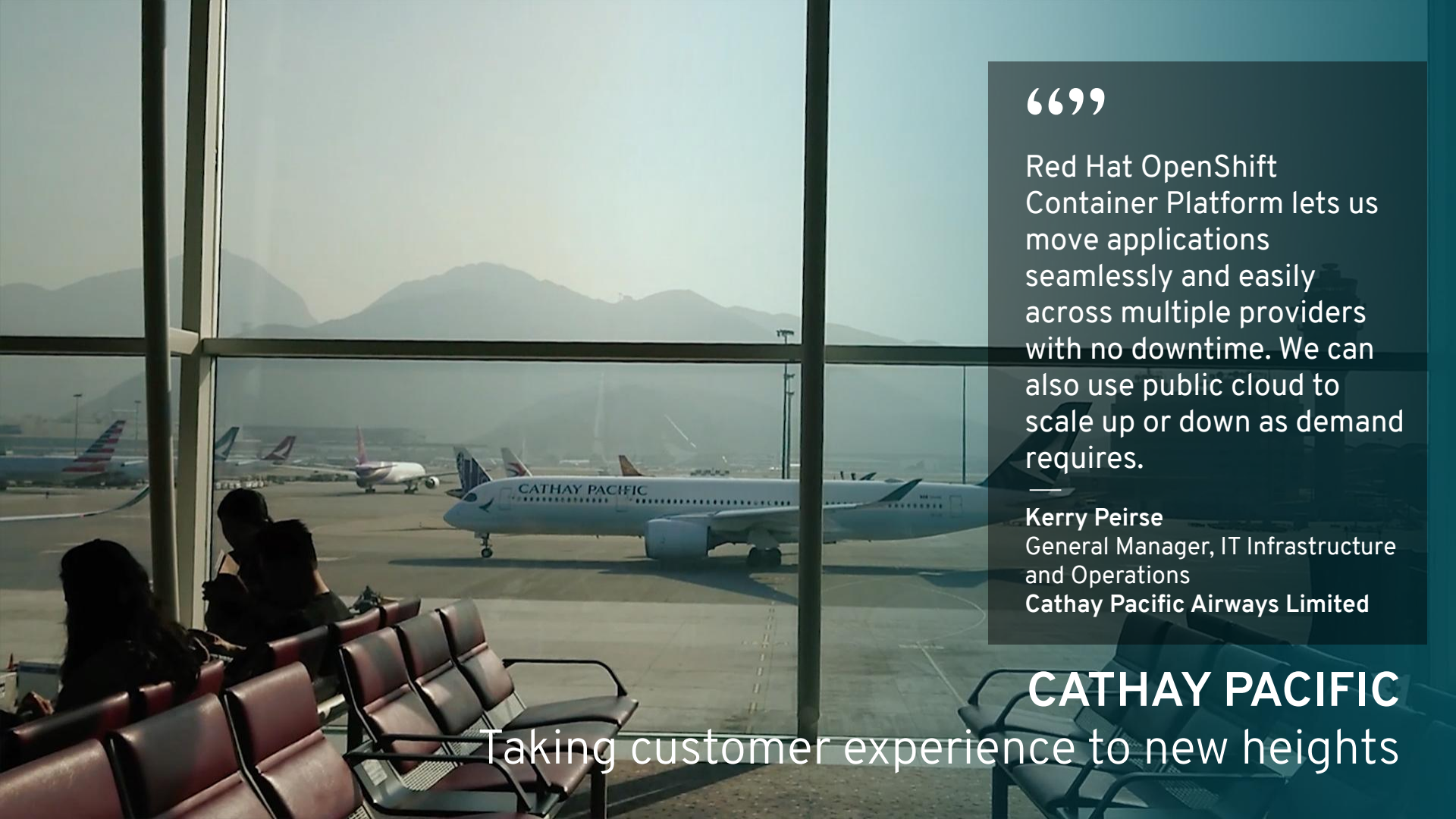
OpenShift on AWS has really helped us improve our reservation system and contributed to up to **15 percent more revenue, worth tens of millions of dollars per year.**

Hospitality

Delivering Kubernetes everywhere

- Manage multiple OpenShift clusters, across multiple cloud and on-premises environments
- Install and update OpenShift across all your cloud environments
- Centrally manage policy and deployments





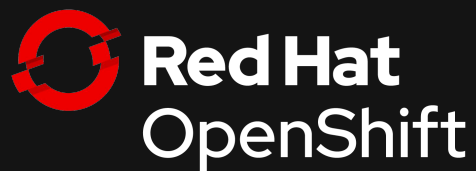
“““

Red Hat OpenShift Container Platform lets us move applications seamlessly and easily across multiple providers with no downtime. We can also use public cloud to scale up or down as demand requires.

Kerry Peirse
General Manager, IT Infrastructure
and Operations
Cathay Pacific Airways Limited

CATHAY PACIFIC
Taking customer experience to new heights

Empowering developers to innovate



Service mesh

Serverless

Red Hat CodeReady
Workspaces &
developer tooling

	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	 	 	

	OS	Cloud-Native Storage	Container Runtime	Cloud-Native Network
Runtime	 	 	 	

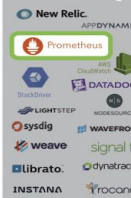
	Infrastructure Automation	Host Management / Tooling	Secure Images
Provisioning	 	 	

	Infrastructure

Observability & Analysis
Monitoring
Logging
Event-based compute
Tracing

CNCF Projects

github.com/cncf/landscape



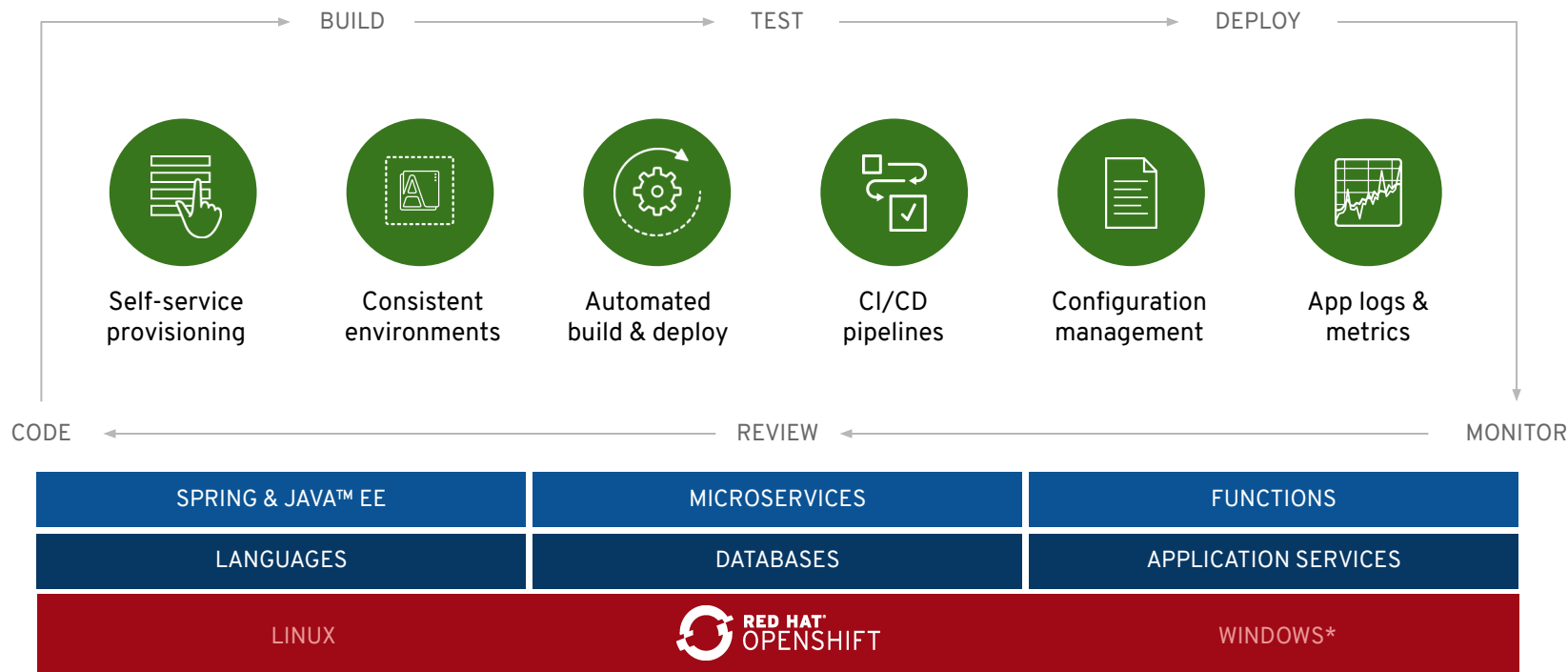
THE CLOUD-NATIVE APP DEV CHALLENGE



CNCF Projects

github.com/cncf/landscape

OpenShift enables developer productivity



* coming soon

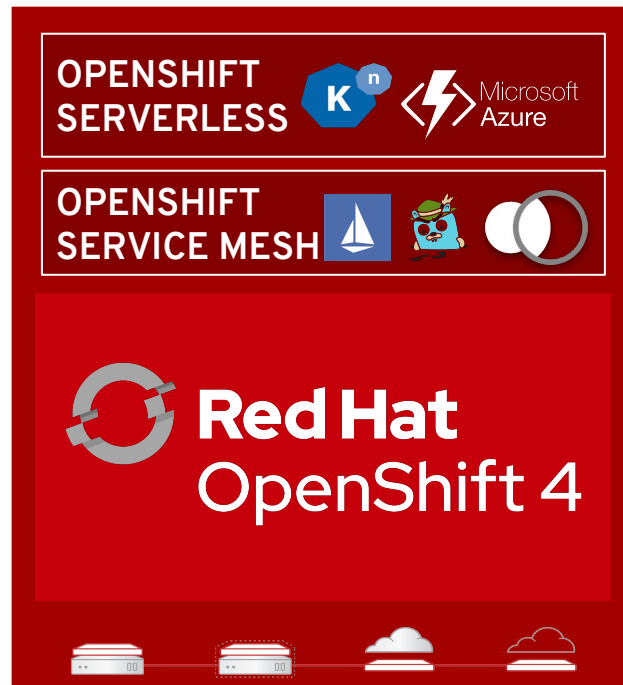
Building next-gen applications

OpenShift Service Mesh

- Integrated Service Mesh for enhanced security and network segmentation of microservices applications. Combines Istio, Kiali (UI), and Jaeger (Tracing) projects.

OpenShift Serverless

- Integrated serverless, enabling scale-to-zero FaaS services and event sources - built on the Knative framework.
- Support for Azure Functions
- Integrated with Camel-k for rich set of initial event sources: HTTP, Kafka, AMQP



Enabling greater developer productivity

CodeReady Workspaces

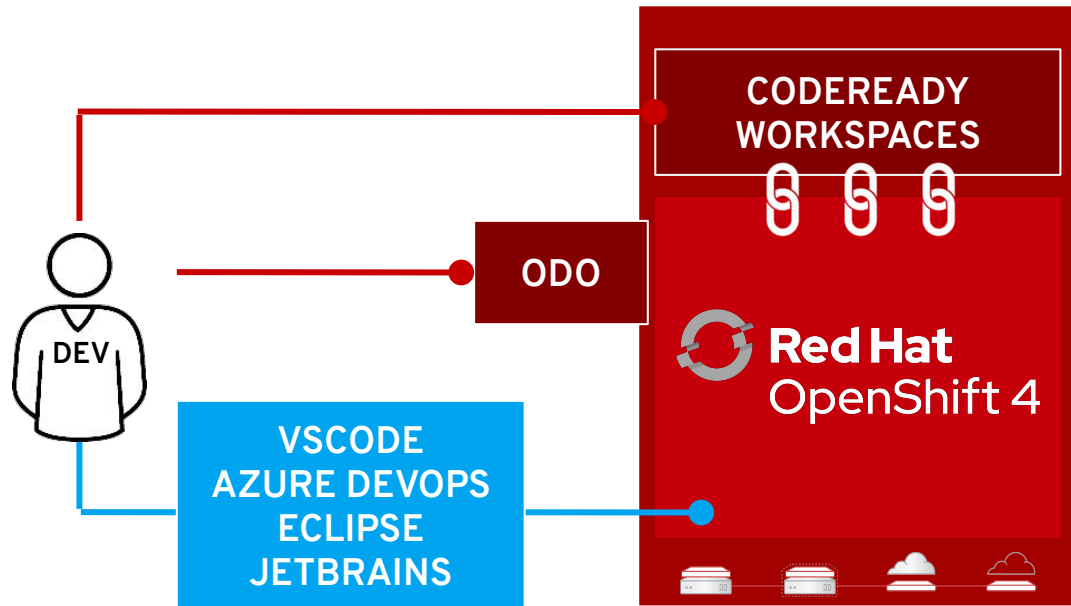
Web-Based IDE (Eclipse Che),
Collaborative Development,
integrated with CI/CD.

OpenShift ODO

Advanced developer CLI

OpenShift Plugins

Integration plugins - VScode, Azure
DevOps, Eclipse IDE, JetBrains



CodeReady Workspaces

The collaborative OpenShift-Native IDE. Free for any customer of OpenShift Dedicated or OpenShift Container Platform.

Container Workspaces



Workspace replicas to end “works on my machine” and enable team collaboration.

DevOps Integrations



Reference developer workspaces from any issue, failed build, or git notification.

Protect Source Code



Full access to source code without any of it landing on hard-to-secure laptops.

Based on the open Eclipse Che project

Red Hat Linux and Application Infrastructure

Plugin model for extensibility

Serverless support (coming soon)

Use It To: Replace VDI for devs, and enable true container-based DevOps.

EMIRATES NBD

Chat Banking

Banking is just a WhatsApp away 🟢

Chatting with your bank is now just as easy as chatting with your friends.

Introducing Emirates NBD Chat Banking via WhatsApp, a **24/7 secure and simple way** to get your banking needs on the go.



Subscribe through SMS
SMS WhatsApp to 4456 with
your registered mobile number



**Subscribe through
Mobile/ Online Banking**
Log into your Mobile or Online
Banking and click on the
Subscribe now button

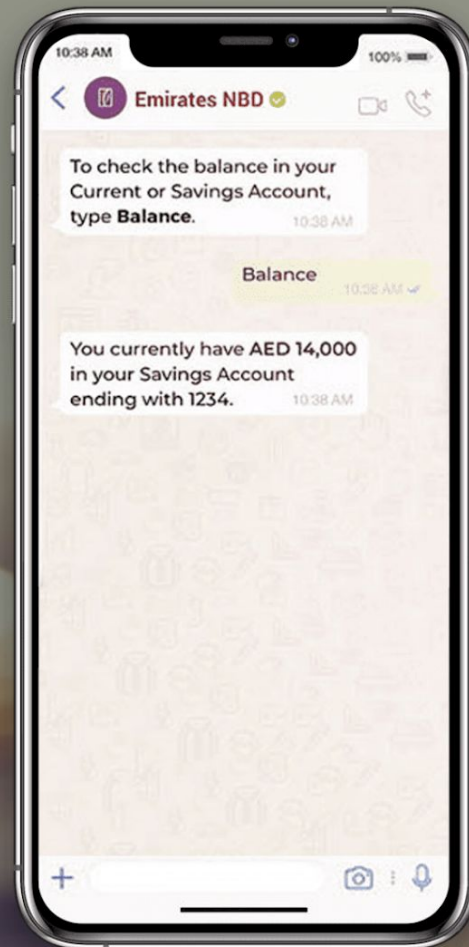


Chat securely
You will never be asked to share
your personal information, only
the last 4 digits of your Card or
Account number may
be required



Check for the green badge
Check for the green badge next
to Emirates NBD's name and
start chatting

[Click here](#) for Digital Banking Services Terms and Conditions





Lufthansa Technik

The Kubernetes platform for your business

“The moment we have an idea, we can start building the product.”

Tobias Mohr, Head of Technology and Infrastructure, Lufthansa Technik

Red Hat OpenShift business value



531%
5-year ROI

66%

Faster development
life cycle

36%

More applications
per year

8 MONTHS

Payback
period

US\$1.29M

Average annual
benefits per
100 developers

The Business Value of Red Hat OpenShift, IDC #US41845816, October 2017,
<https://www.redhat.com/en/resources/The-Business-Value-of-Red-Hat-OpenShift>.



10x

Increased application
development throughput
from 20 to 200 changes a
day

**OpenShift on AWS
& private cloud**



Months → Days

Improved time to market
by accelerating
development time

OpenShift on AWS



50%

Reduction in development
time for new services and
APIs. Launched a new cloud
platform in 10 days

**OpenShift on AWS, Azure, &
private cloud**

Source:

Cathay Pacific: Red Hat press release, [Cathay Pacific Takes Customer Experiences to New Heights with Red Hat's Hybrid Cloud Technologies](#), May 2018.

Hilton: Red Hat case study, [Hilton enhances digital guest experience with Red Hat container and automation technology](#), October 2018.

Schiphol: Red Hat case study, [Amsterdam Airport Schiphol builds agile cloud with Red Hat](#), August 2017.



- Transitioned 75% of workloads to internal cloud on OpenShift
- \$2.1 billion infrastructure cost savings*
- Improved 26 million daily customer interactions

*expected 7 year savings by the end of 2019

Source:

[Bank of America is putting the finishing touches on a 7-year cloud journey that has saved the bank billions and improved customer interactions.](#) Business Insider, June 2019

Multiple OpenShift Consumption Models



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



Azure
Red Hat
OpenShift

Joint engineering, operation,
and integrated support by
Microsoft and Red Hat



Freedom to install on-premises
or in the cloud to address your
hybrid deployments

HOSTED SERVICES

SELF-MANAGED

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.

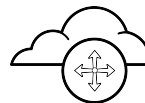


IMMERSE YOUR TEAM

Work side by side with experts in a residency-style engagement.

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

RED HAT CONTAINER ADOPTION PROGRAM



FRAMEWORK FOR SUCCESSFUL CONTAINER ADOPTION AND I.T. TRANSFORMATION:

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

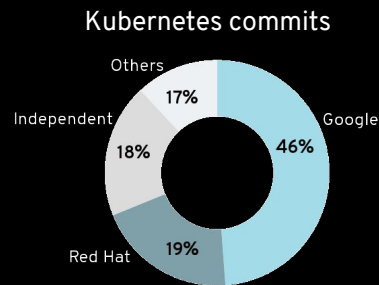
- Create a production platform and team to run it
- Create end-to-end container-driven deployment automation
- Scale application onboarding expertise
- Guide new Kubernetes-native development
- Align business with IT through **included Red Hat Open Innovation Labs**

TO BEGIN A COMPREHENSIVE PROGRAM (INCLUDING OPEN INNOVATION LABS): START WITH THE 12-WEEK RED HAT CONSULTING CONTAINER PLATFORM PILOT

Why is Red Hat the best choice?

THE 4 C's

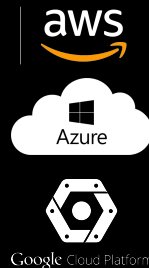
CODE



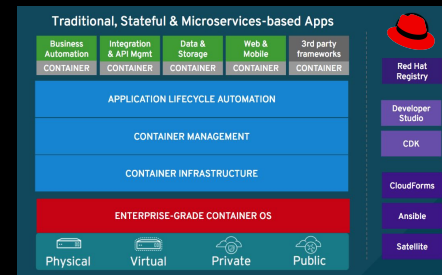
CUSTOMERS



CLOUD



COMPREHENSIVE



Red Hat is a leading Kubernetes developer & contributor with Google¹.

We make container development easy, reliable, & more secure.

1,000+ customers²

We have years of experience running OpenShift Online & OpenShift Dedicated services.

We have strong partnerships with cloud providers, ISVs, & CCSPs.

We have an extensive container catalog of certified partner images.

Our comprehensive portfolio of container products and services includes developer tools, security, application services, storage, & management.



Red Hat OpenShift 4

Trusted enterprise Kubernetes

- Trusted host, content, platform
- Full-stack automated install
- Seamless updates & day 2 management

A cloud-like experience, everywhere

- Operator Framework
- Operator Hub & certified ISVs
- Hybrid, multicluster management

Empowering developers to innovate

- OpenShift service mesh / Istio
- OpenShift serverless / Knative
- CodeReady Workspaces / Che

Thank You



linkedin.com/company/red-hat



youtube.com/user/RedHatVideos



facebook.com/redhatinc



twitter.com/RedHat

APPENDICES

Appendices

- [What's new with OpenShift 4?](#)
- [Azure Red Hat OpenShift](#)
- [OpenShift Dedicated](#)
- [What's included with an OpenShift subscription](#)
- [OpenShift Service Mesh](#)
- [Addressing the OpenShift vs. "Vanilla" Kubernetes Myth](#)
- [Comparing OpenShift vs Community Projects](#)
- [Docker support in OpenShift](#)
- [Getting started with Red Hat OpenShift](#)
- [Red Hat on Red Hat](#)
- [Press and analyst coverage](#)
- [OpenShift Customer Stories](#)

Appendix:

What's new with OpenShift 4?



Trusted enterprise Kubernetes

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

A cloud-like experience, everywhere

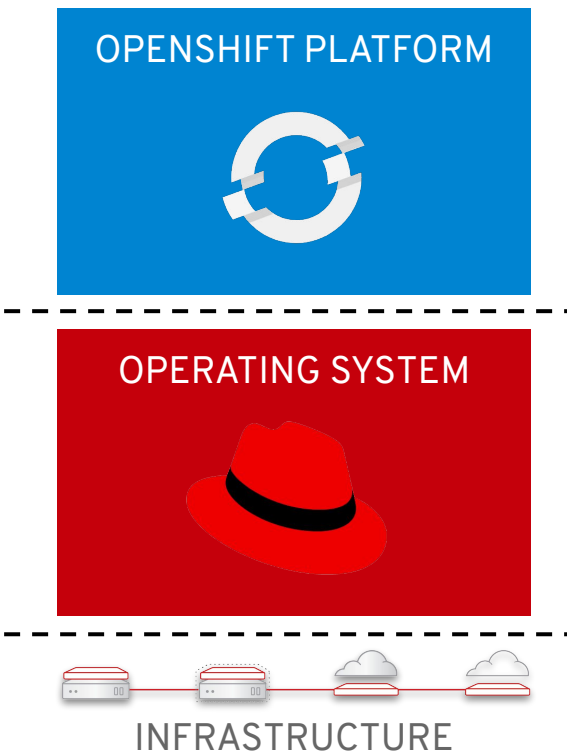
- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

Empowering developers to innovate

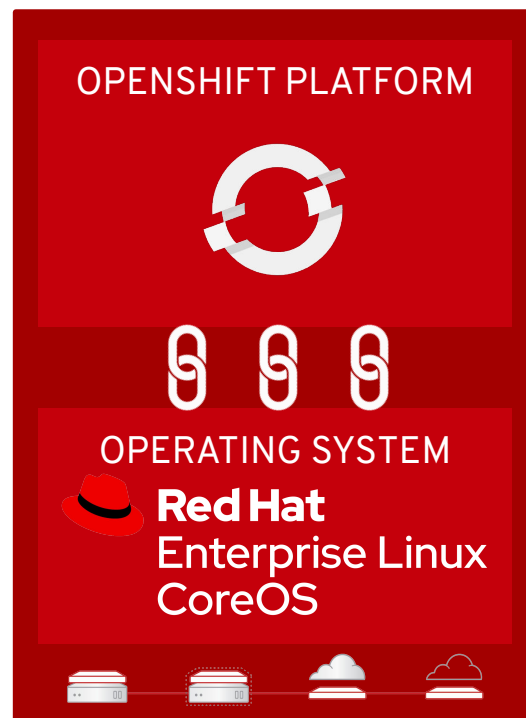
- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

FULL-STACK AUTOMATION

OPENSHIFT 3 & 4

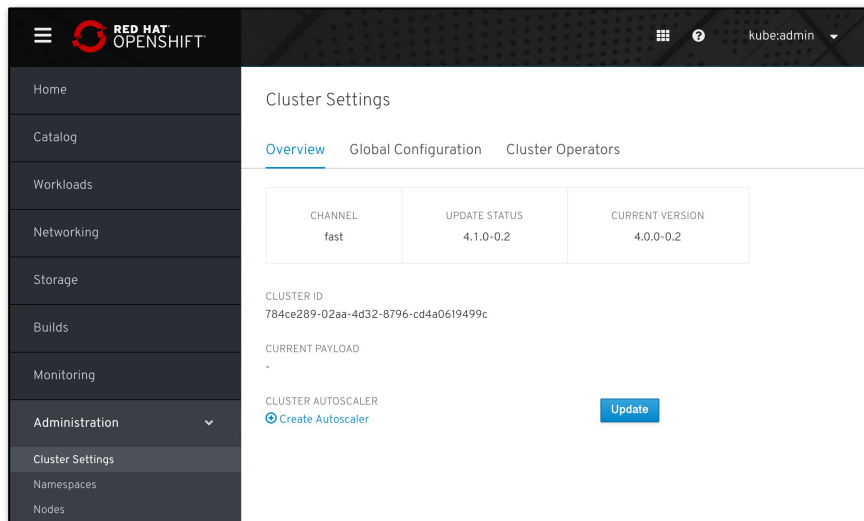


OPENSHIFT 4 (only)



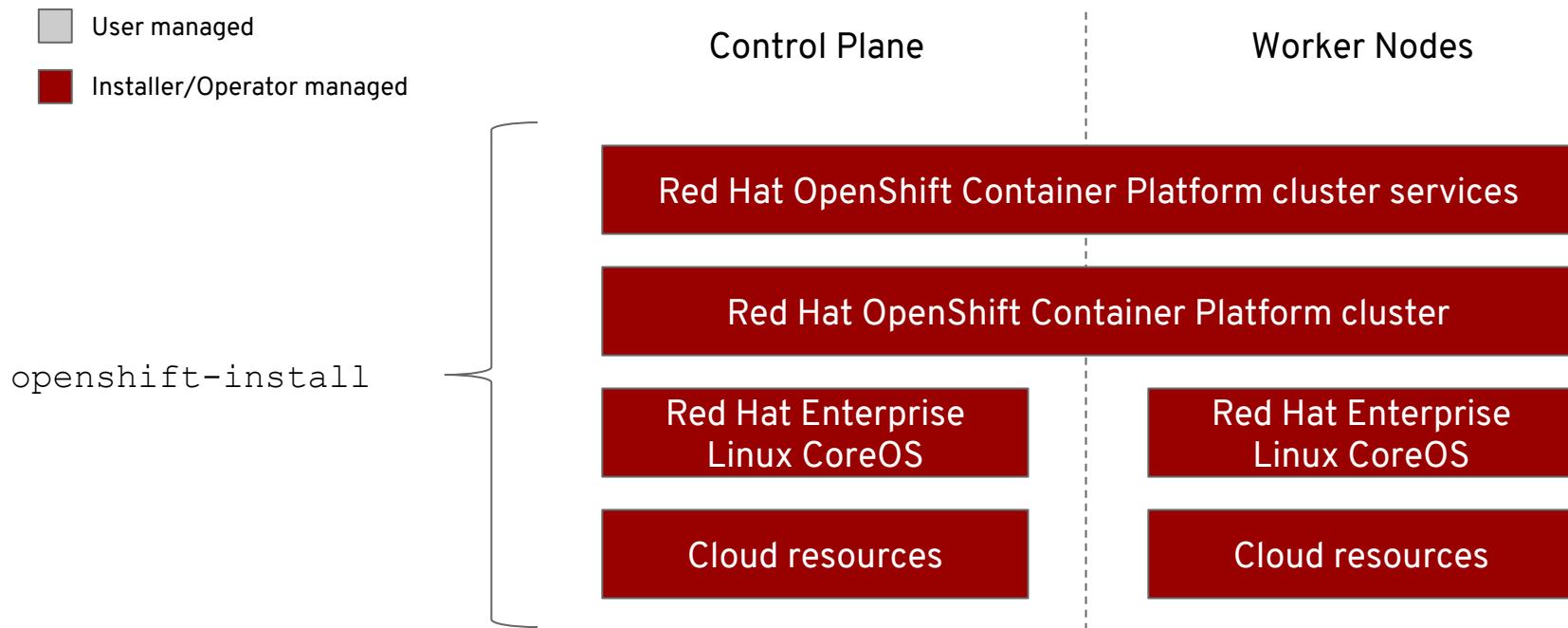
SEAMLESS UPDATES

- OpenShift retrieves list of available updates
- Admin selects the target version
- OpenShift is updated over the air
- Auto-update support



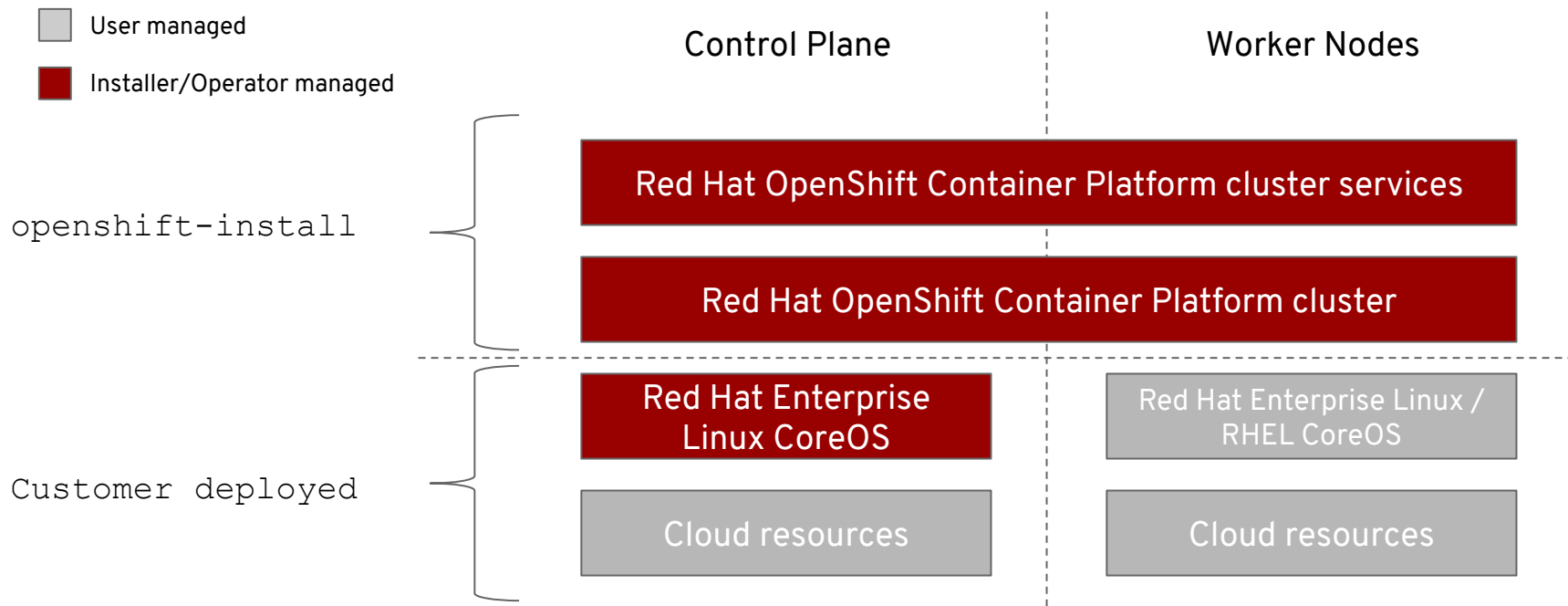
FULL STACK AUTOMATED INSTALLATION

DAY 1: OPENSIFT INSTALL - DAY 2: OPERATORS

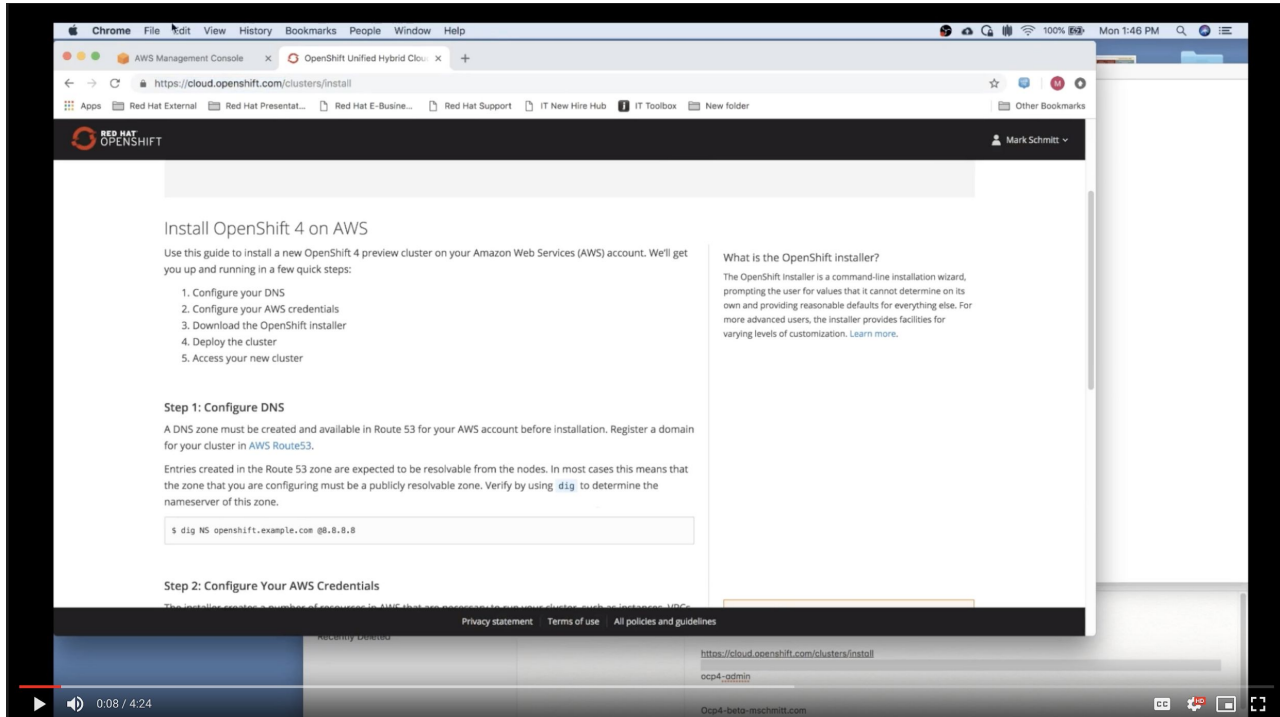


PRE-EXISTING INFRASTRUCTURE INSTALLATION

DAY 1: OPENSIFT INSTALL - DAY 2: OPERATORS + CUSTOMER MANAGED NODES & INFRA



DEMO: INSTALL OPENSSHIFT 4 ON AWS



Demo Link: https://drive.google.com/file/d/1d7MlygcBxH-_eUAxIO6Z9364veXiBJz4/view

PROVIDER ROADMAP FOR RED HAT OPENS SHIFT 4

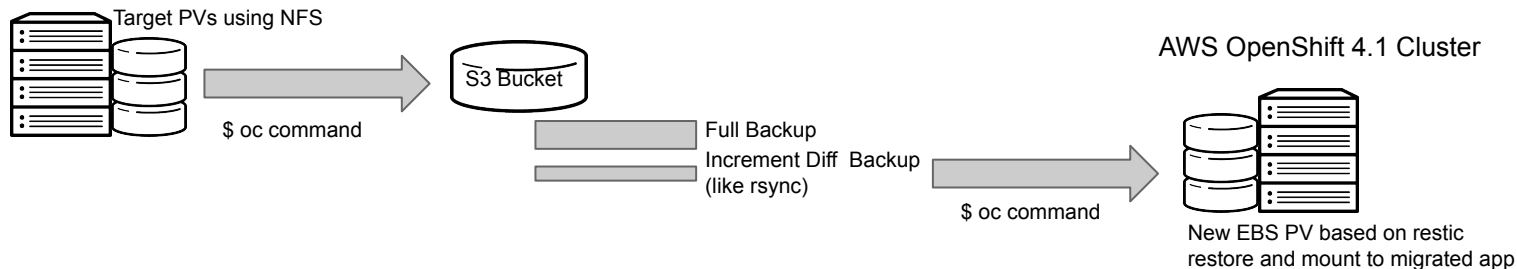
INSTALLER PROVISIONED
INFRASTRUCTURE (IPI)

USER PROVISIONED
INFRASTRUCTURE (UPI)



CLUSTER MIGRATION OPENSIFT 3 to 4

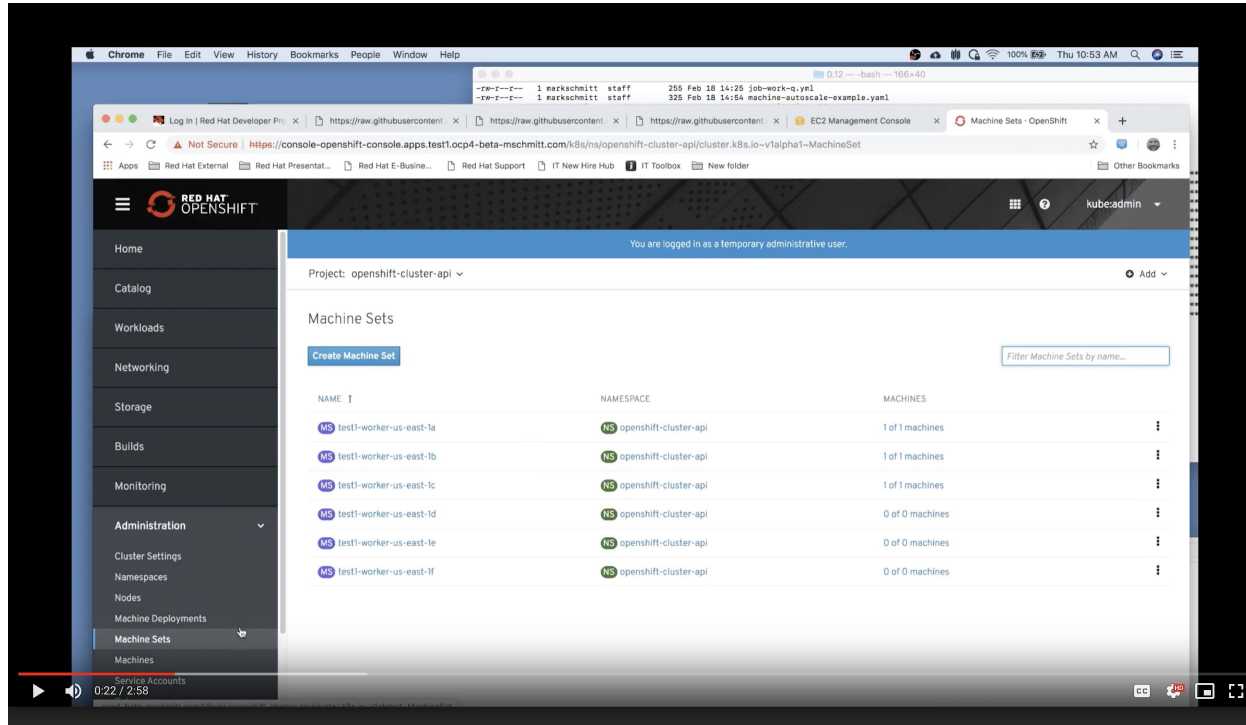
vSphere OpenShift 3.10 Cluster



- Deploy a replication of your applications from one OpenShift cluster to a different OpenShift cluster
- Enable cluster specific configuration from OpenShift 3 to work on a OpenShift 4 cluster
- Documentation on how to handle common network, storage, and machine/node re-use scenarios between OpenShift 3 and OpenShift 4 clusters

[Full Deck Here](#)

DEMO: OPENSIFT NODE AUTO-SCALING



The screenshot shows the OpenShift console interface. The left sidebar contains a navigation menu with options: Home, Catalog, Workloads, Networking, Storage, Builds, Monitoring, Administration (expanded), Cluster Settings, Namespaces, Nodes, Machine Deployments, Machine Sets (selected), and Machines. The main content area displays the 'Machine Sets' page for the 'openshift-cluster-api' project. It includes a 'Create Machine Set' button and a table of existing machine sets.

NAME	NAMESPACE	MACHINES
test1-worker-us-east-1a	openshift-cluster-api	1 of 1 machines
test1-worker-us-east-1b	openshift-cluster-api	1 of 1 machines
test1-worker-us-east-1c	openshift-cluster-api	1 of 1 machines
test1-worker-us-east-1d	openshift-cluster-api	0 of 0 machines
test1-worker-us-east-1e	openshift-cluster-api	0 of 0 machines
test1-worker-us-east-1f	openshift-cluster-api	0 of 0 machines

Demo Link: https://drive.google.com/file/d/1nF6dOCkHpDOxUaE_3-194v6h27TBJu-0/view



Trusted enterprise Kubernetes

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

A cloud-like experience, everywhere

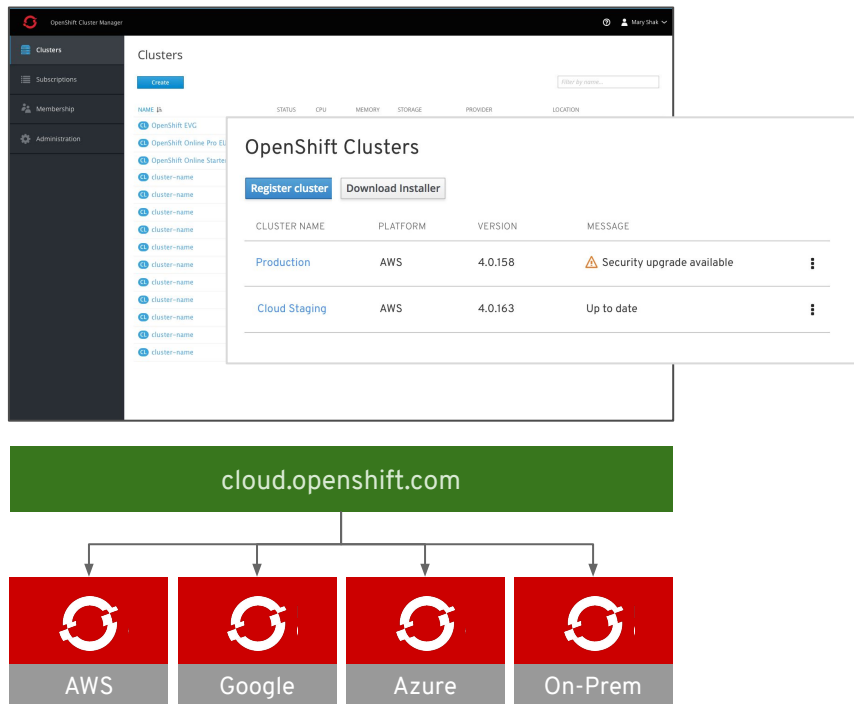
- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

Empowering developers to innovate

- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

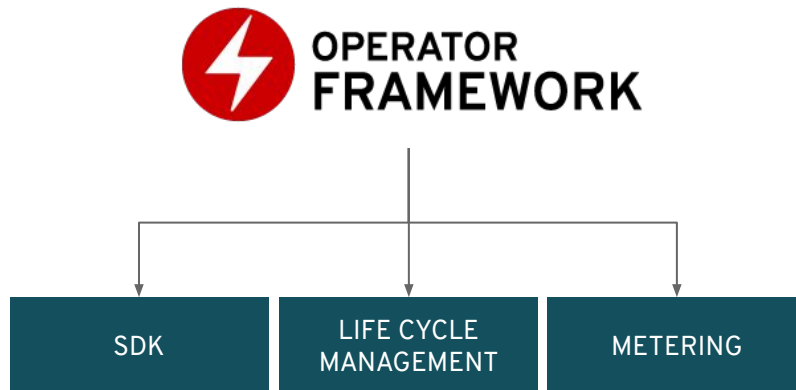
UNIFIED HYBRID CLOUD

- Cloud-based multicluster management
 - New clusters on AWS, Azure, Google, vSphere, OpenStack, and bare metal
 - Register existing clusters
 - Including OpenShift Dedicated
- Management operations
 - Install new clusters
 - View all registered clusters
 - Update clusters



OPERATOR FRAMEWORK

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

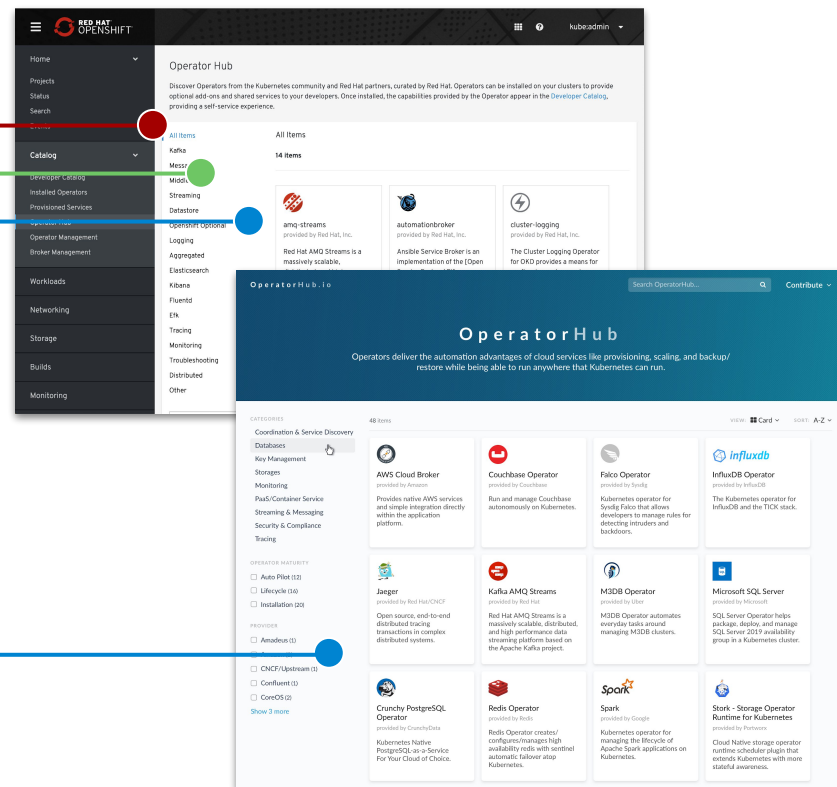


OPERATOR HUB

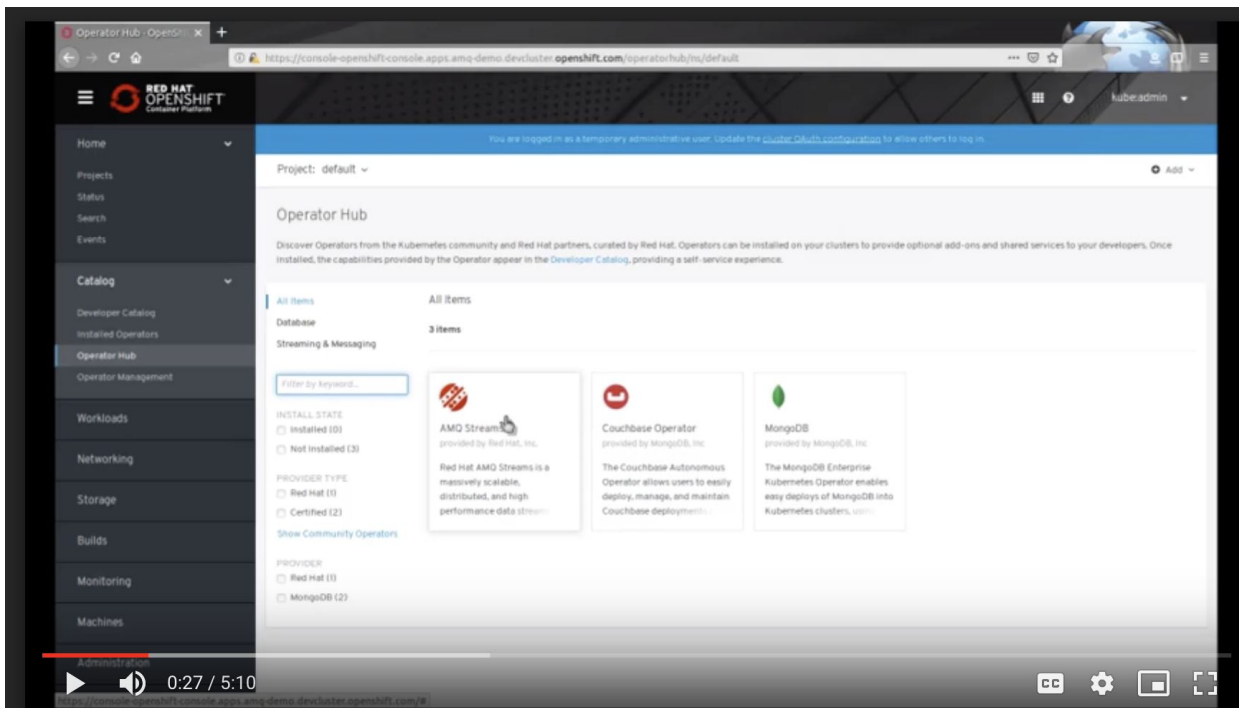
- Launched with AWS, Microsoft, and Google
- Discover and install optional components and apps
- Upstream & downstream content
- ISV partners will support their own Operators

TYPES OF OPERATORS

Red Hat products
ISV partners
Community



DEMO: OPERATORS IN ACTION



Demo Link: <https://drive.google.com/file/d/1dPxLIROOL7Ek1anub5Vr5P5sJzWSMC2f/view>



Trusted enterprise Kubernetes

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

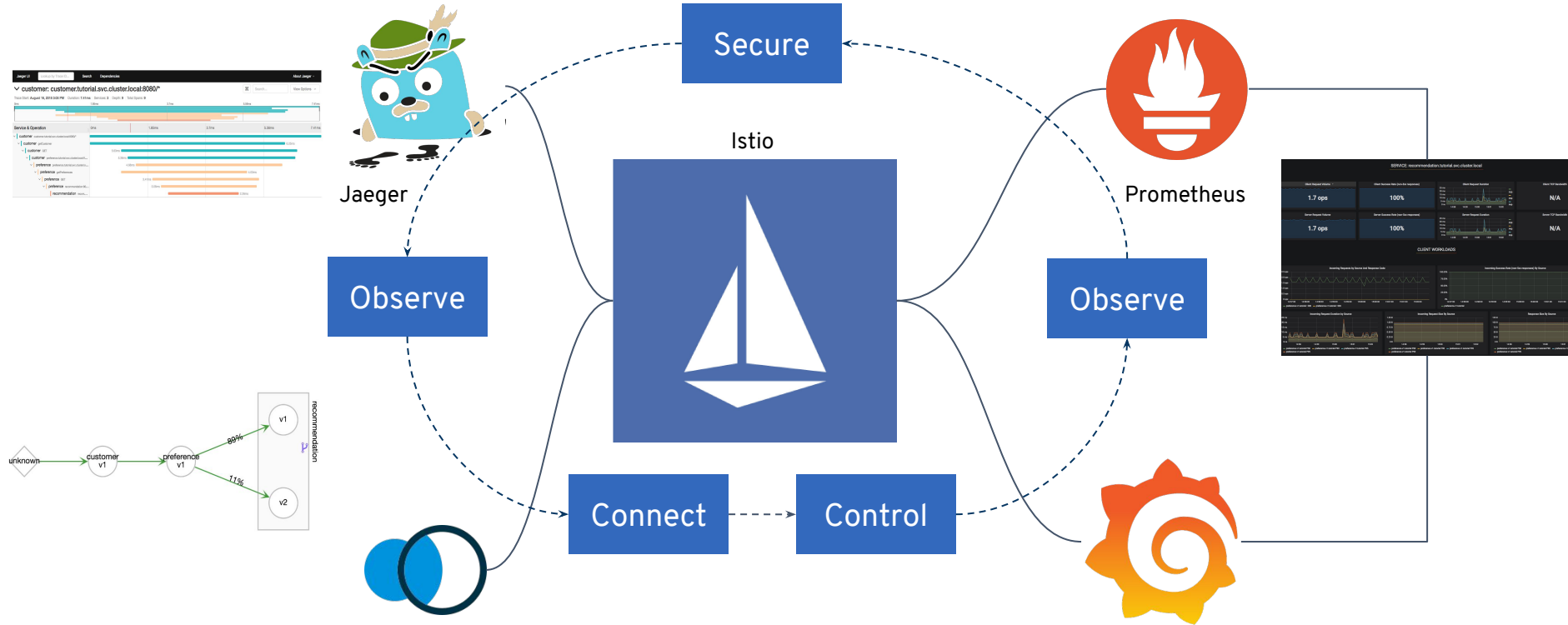
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- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

OPENSIFT SERVICE MESH / ISTIO



OPENSIFT AND KNATIVE OVERVIEW

"...an extension to Kubernetes exposing building blocks to build modern, source-centric, and container-based applications that can run anywhere".

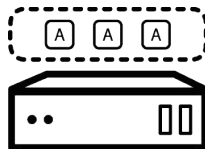
Build

A pluggable model for building artifacts, like jar files, zips or containers from source code.



Serving

An event-driven model that serves the container with your application and can "scale to zero".



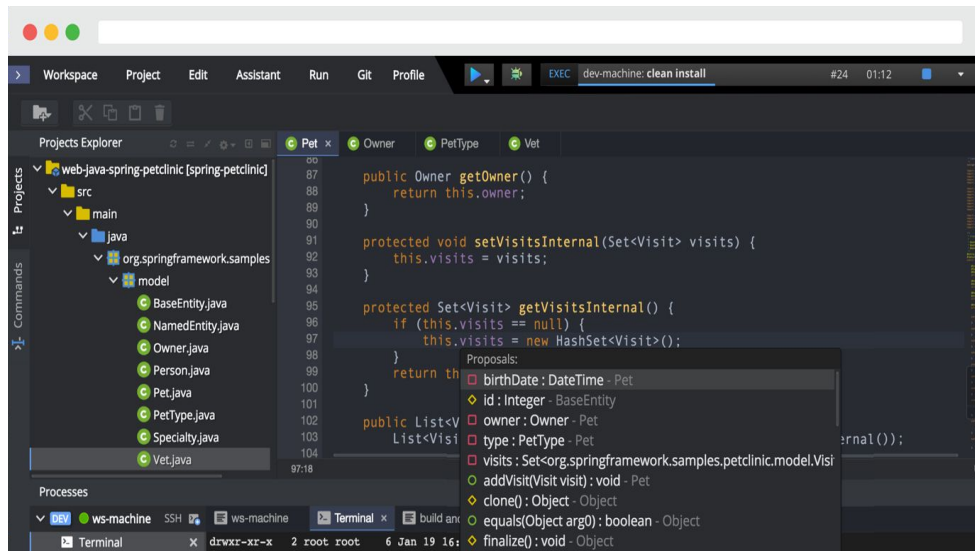
Events

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



CODEREADY WORKSPACES

- Browser-based Web IDE + Dev Environment in pods
- Red Hat supported Eclipse Che
- Bundled with OCP/OSD SKU
- Available on OCP and OSD
- Enabled via an operator
- RHEL 8-based stacks (tools and runtimes)



Eclipse Che



Trusted enterprise Kubernetes

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

A cloud-like experience, everywhere

- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

Empowering developers to innovate

- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

Appendix:

Azure Red Hat OpenShift

AZURE RED HAT OPENSIFT

Fully managed OpenShift service on Azure

Jointly engineered, operated, and supported by both Microsoft and Red Hat
with an integrated support experience

Build, deploy and scale apps with
confidence

In just minutes, deploy
enterprise-grade Red Hat OpenShift
clusters on Azure



Enterprise-grade operations, security and compliance

Industry-leading SLA of 99.9% availability
SOC, ISO, PCI DSS, CSA and HIPAA regulatory compliance *



Empower developers to Innovate

Support for a range of traditional, cloud native and serverless tools
Easily connect your applications to hundreds of Azure services such as
MySQL, PostgreSQL, Redis, Cosmos DB, and more



Scale on-demand. Pay as you go.

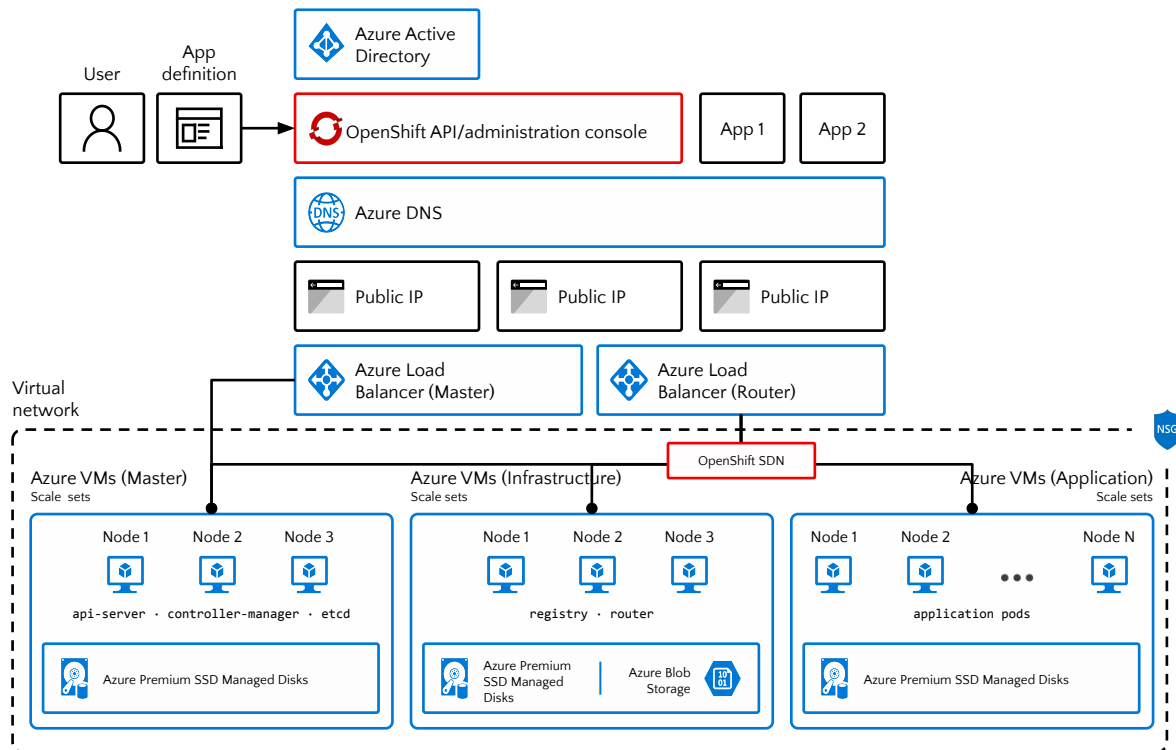
Scale as your application demand changes
Choice of standard, high-memory, or high-CPU application nodes

* Not compliant at GA. Will be compliant in upcoming months

RUNNING YOUR OWN RED HAT OPENSHIFT CLUSTER

Responsibilities	
User management	
Project and quota management	
Application lifecycle	
Cluster creation	
Cluster management	
Monitoring and logging	
Network configuration	
Software and security updates	
Platform support	

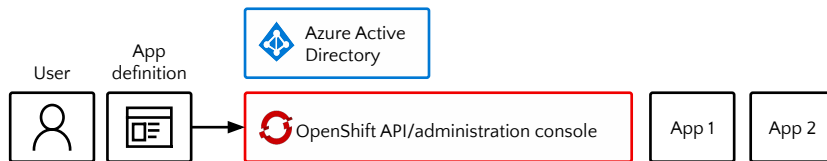
 Customer  Microsoft and Red Hat



SIMPLIFY OPERATIONS WITH AZURE RED HAT OPENS SHIFT

Responsibilities	
User management	Customer
Project and quota management	Customer
Application lifecycle	Customer
Cluster creation	Microsoft and Red Hat
Cluster management	Microsoft and Red Hat
Monitoring and logging	Microsoft and Red Hat
Network configuration	Microsoft and Red Hat
Software and security updates	Microsoft and Red Hat
Platform support	Microsoft and Red Hat

Customer Microsoft and Red Hat



Let Microsoft and Red Hat...

Manage all your clusters

Monitor and operate your VMs

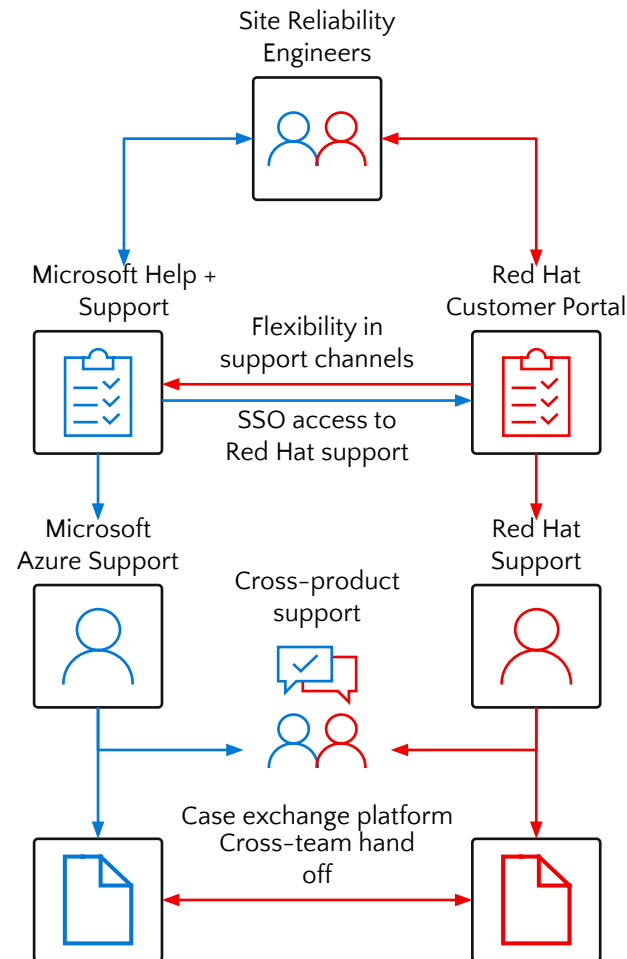
Secure your nodes

Manage environment patches

UNIFIED SUPPORT

Jointly engineered, operated,
and supported by Microsoft
and Red Hat

- In-portal integrated support experience is available 24x7
- ISO 27001 compliant B2B communication channel
- Co-located support with Red Hat on-site team
- Integrated case systems
- Microsoft and Red Hat security response team collaboration



ARO FEATURES



Flexible, self-service deployment
Create fully managed OpenShift clusters in minutes



Cluster node scaling
Scale on demand to meet resource demand



Azure Active Directory integration
Use Azure Active Directory to control access to your cluster with an integrated sign-on experience



Fully managed clusters
Master, infrastructure, and application nodes are managed by Microsoft and Red Hat; plus, no VMs to operate and no patching required



Virtual Network integration
Deploy your cluster into a new VNet, then use VNet peering to connect to your existing VNet and on-premises networks



High availability
Multiple masters and infrastructure nodes help ensure your cluster has no single point of failure



Regulatory compliance
Azure Red Hat OpenShift is compliant with SOC, ISO, PCI DSS, HIPAA, and more



First party Azure service
Clusters are deployed into your Azure subscription and included on your Azure bill



Persistent storage volumes
Azure Disk is pre-configured as the default storage class, providing dynamically provisioned Premium SSD's on-demand



Unified support
Jointly engineered, operated, and supported by Microsoft and Red Hat with an integrated support experience

ARO ROADMAP



Private Clusters

Create fully managed OpenShift clusters on your own private VNET with no public endpoints



BYOK for encryption at rest

Bring your own encryption keys for encrypting data on the OS and Data Disks



Certificate Rotation

Use Azure Active Directory to control access to your cluster with an integrated sign-on experience



Windows Containers Integration

Customers will be able to deploy Windows Containers and manage them from the OpenShift control plane



OpenShift 4.x Support

Ability to migrate from OpenShift 3.11



Multi-AZ stretched clusters

Support the ability to deploy OpenShift in multiple availability zones based on availability in Azure regions



Operator/CRD Support

Support for Operator and custom CRD



Multiple Node Pool Support

Support for multiple node pools



Cluster Auto-Scaling

Ability to auto-scale the clusters on-demand



Active Directory Group Sync

Control access to your cluster using Azure Active Directory group membership.

PRICING DETAILS

Highly available, fully managed cluster—starting with four application nodes*	Starts at \$16,000/year
On-demand scaling with additional application nodes*	Starts at \$0.761/hour
Use Reserved Virtual Machine instances to save costs	●
Choice of general purpose, compute optimized and memory optimized application nodes	●
Integrated support and operations	●
Pay through your existing Azure commitment	●
Service Level Agreement (SLA)	●

Azure Red Hat OpenShift vs Azure Kubernetes Service

Feature	Azure Red Hat OpenShift (ARO)	Azure Kubernetes Service (AKS)
Container Host	Red Hat Enterprise Linux based	Non-specified Linux provided by Microsoft
RHEL Container Support	Yes	
Windows Server Container Support	Yes	Yes
Orchestration	Red Hat OpenShift including Kubernetes	Generic Microsoft Kubernetes
Included Developer Experiences		Requires additional purchase
Hybrid	Yes	
Azure Stack	Yes	
Security Profile	Yes	Yes (Requires configuration)
Container Security	Continuous Container Security Pipeline Service	Self-Support Driven Container Security
Red Hat Middleware Supported	Yes	
Predictive Container Analytics Availability	Yes	
Service Level Agreement	Yes	Infrastructure only
Premier Support Level Included	YES	Additional Purchase
Support for certified containers	Premier Support for Red Hat, Microsoft, and 3rd party Red Hat certified containers	Only support for certain Microsoft-published containers
ISV Certification Program	Microsoft and Red Hat Partner Programs for certified ISV partners.	ISV only Self-support
Consumption Pricing	Yes	Yes

Appendix: OpenShift Dedicated

UPDATE TO DEC 2018 IMPROVEMENTS

Updated pricing for current version of OSD

OSD cluster price is reduced by 25% from \$48,000 to \$36,000. Price per node is reduced from \$12,000 to \$6,000.

Bring your own cloud account NEW SKUS

Use your AWS account to keep clusters in-house and leverage existing AWS discounts and security profiles.

Additional EC2 instance types NEW SKUS

Choose from memory-optimized, compute-optimized, or general purpose instance types, sized to meet your needs.

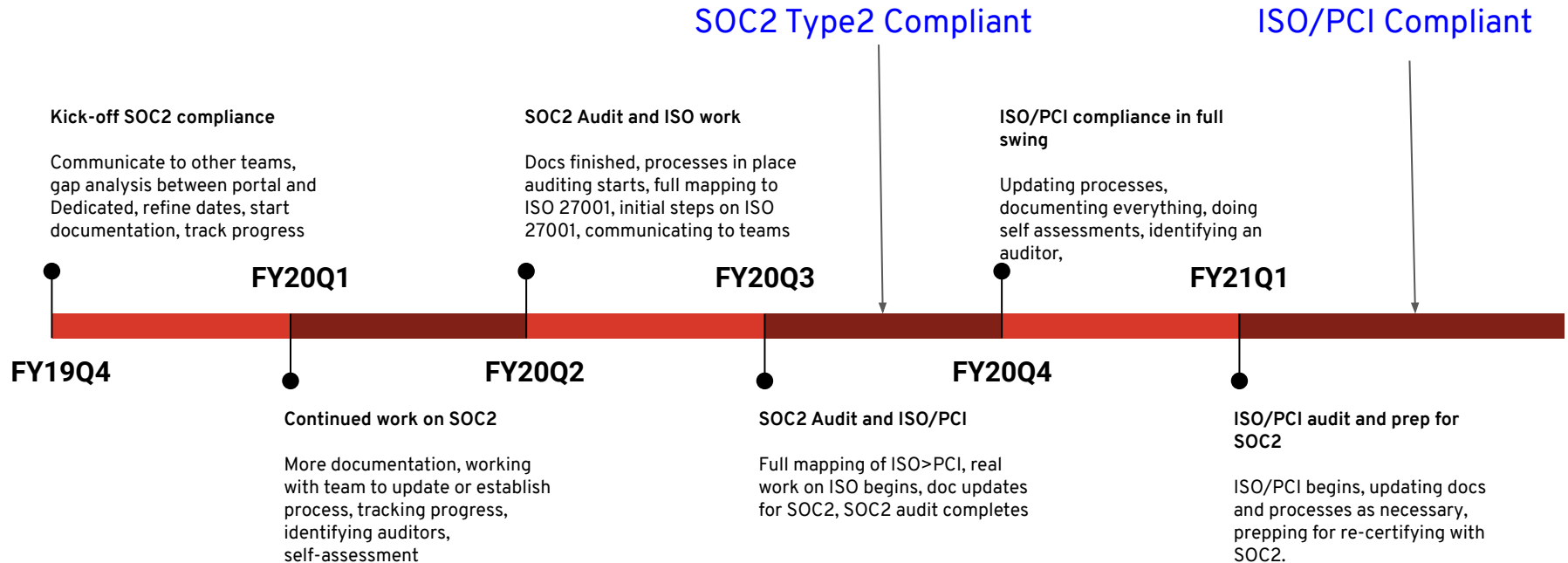
Multi-AZ stretched clusters NEW SKUS

Deploy your cluster across multiple zones in supported regions to maximize cluster availability.

Hourly pricing EFFECTIVE MAY 1, 2019

OpenShift Dedicated Add-on Nodes, Storage is now available for BYOC and Non BYOC customers. Add-ons will be metered hourly and billed monthly. No discounts on hourly SKU's and they are only available in private pricebooks.

COMPLIANCE ROADMAP



Azure Red Hat OpenShift vs OSD

	Azure Red Hat OpenShift (ARO)	OpenShift Dedicated (OSD)
Cloud Provider	Microsoft Azure	AWS
Cloud Integration	Yes, Portal + CLI	No
Support	Microsoft + Red Hat	Red Hat
Billing	Microsoft Azure (customer subscription)	Red Hat
Metered Billing	Yes, after base fee	Coming soon...
Self-service	Create, scale, upgrade, delete	Coming soon...
Compute Types	General Purpose, High Mem, High Compute	General Purpose, High Mem, High Compute
Vanity Domains + TLS	Yes	Route-level
Regulatory Compliance	SOC, ISO, PCI, DSS, HIPAA	No
Virtual Network Config	CIDR, Peering	CIDR, Peering, VPN, Direct Connect
App Logging	Coming soon...	EFK stack
App Metrics	Coming soon...	Cassandra, Hawkular, Heapster

Appendix:

What's included with a subscription?

INCLUDED WITH OPENSIFT CONTAINER PLATFORM

EVERYTHING NEEDED TO SET UP, RUN, AND MANAGE CONTAINERS IN PRODUCTION

CONTAINER INFRASTRUCTURE

- A subscription to run OpenShift application nodes; additional no-charge subscriptions for your master and infrastructure nodes
- RHEL entitlements for your host machines running OpenShift
- Private container registry
- Supported Docker and CRI-O container runtimes

VALIDATED CONTAINER IMAGES

- Unlimited use of JBoss Web Server (Tomcat) as container images on OpenShift
- Container images that form part of [Red Hat Software Collections](#)
- [Red Hat Single Sign-On](#) deployed as a container inside OpenShift - for use by any application

INCLUDED WITH OPENSIFT CONTAINER PLATFORM

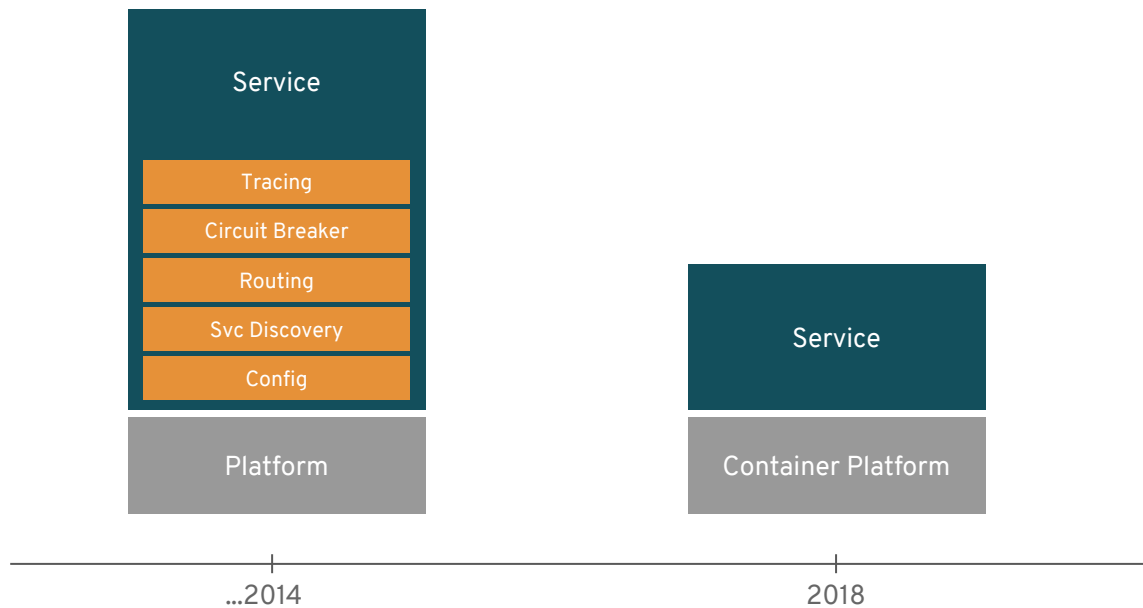
EVERYTHING NEEDED TO SET UP, RUN, AND MANAGE CONTAINERS IN PRODUCTION

OPERATIONAL TOOLING

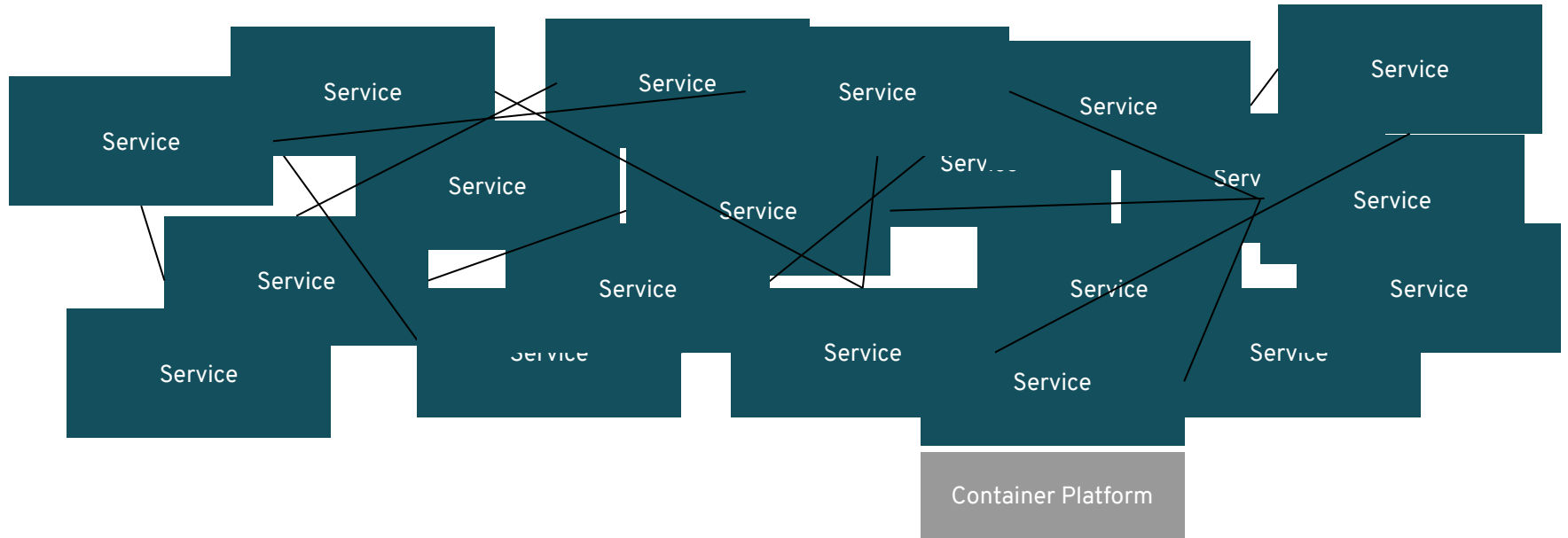
- Log aggregation with Elasticsearch, Kibana, and Fluentd
- Metrics, monitoring, and alerting with Prometheus, AlertManager and Kibana
- Supported software-defined networking (SDN) using Open vSwitch
- Setup, upgrades, and reference architectures with Ansible playbooks
- Service brokers and Ansible playbook bundle

Appendix: OpenShift Service Mesh

Microservices Evolution



Microservices Reality

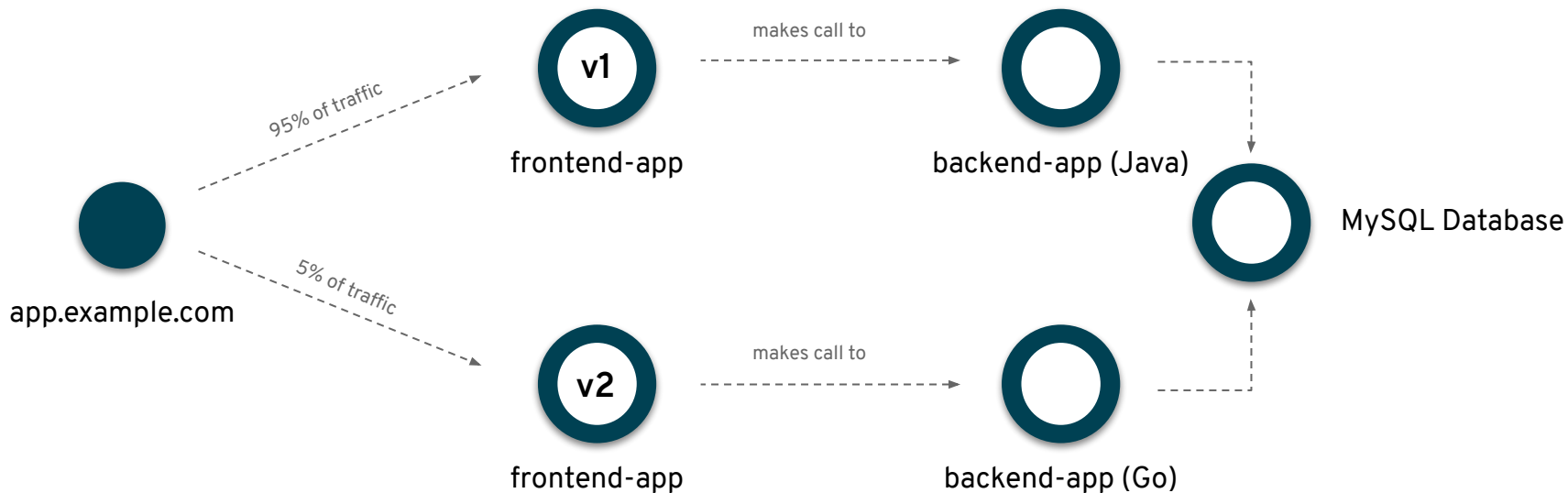


Enter the Service Mesh

- Infrastructure layer to help manage for service-to-service communication, delivering enhanced security and traf for microservices applications.
 - Load balancing
 - Routing rules
 - Service monitoring and logging
 - Secure cross-service communications

Simplify the Mess With a Service Mesh

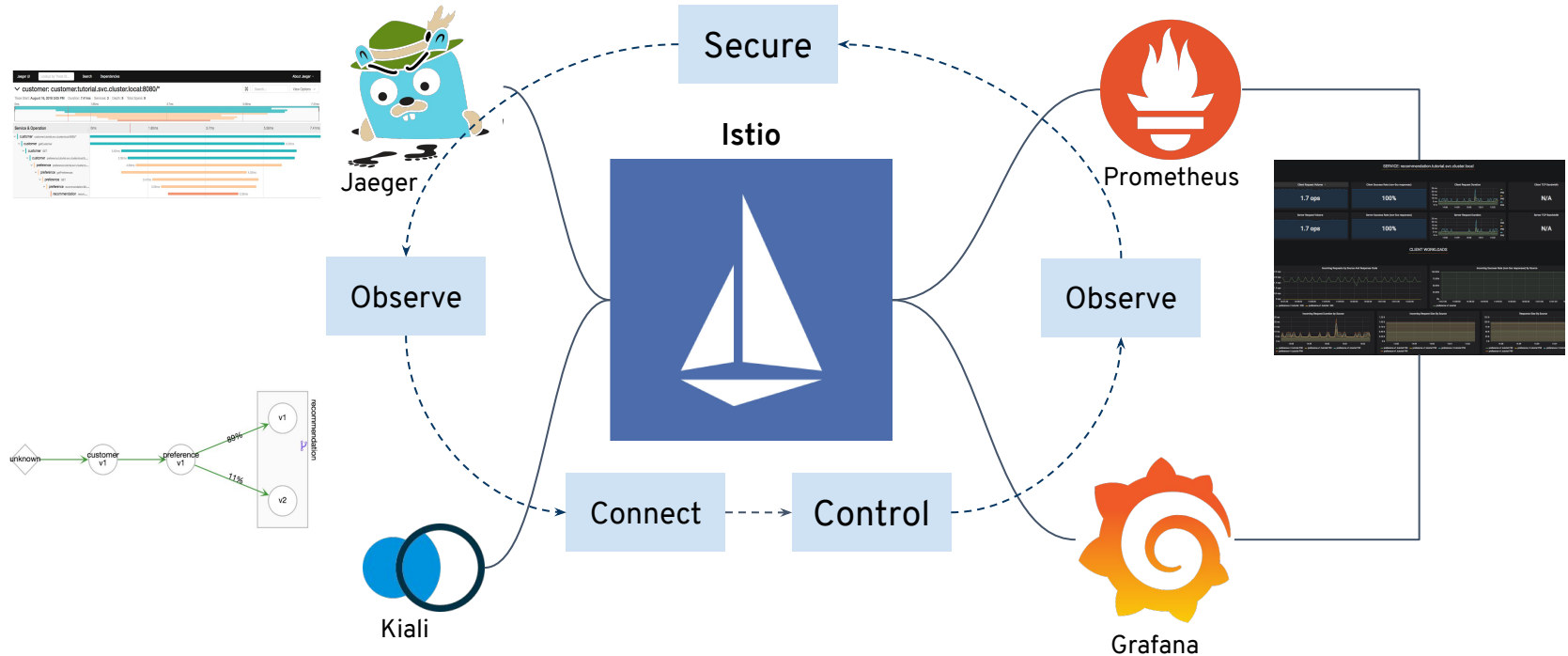
Control flow of traffic between application components



Limitations to the Service Mesh

- On its own, the Service Mesh is just the communication layer
 - Limited measurement functionality
 - Limited observation capabilities
 - Not a complete set of tools developers need to build and deploy microservices

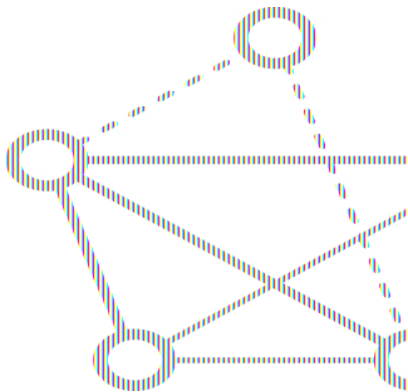
OpenShift Service Mesh



OpenShift Service Mesh

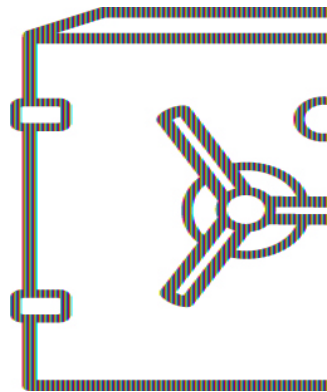
Connect

Control the flow of traffic between services



Secure

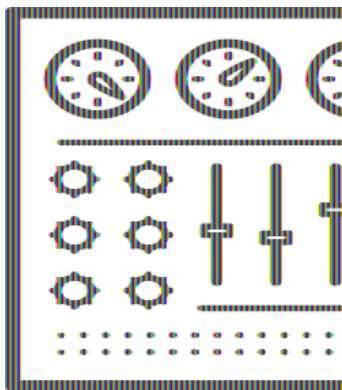
Application independent security



OpenShift Service Mesh

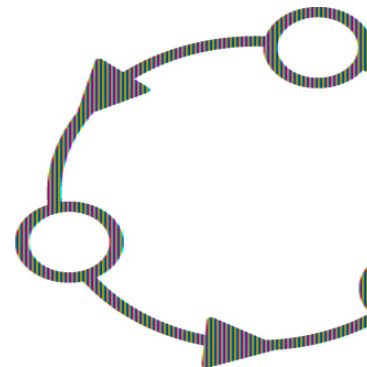
Control

Uniform abstraction for policy control



Observe

Visibility into application deployments



OpenShift Service Mesh

BENEFITS

1. Complete service mesh, including tracing and visualization capabilities, packaged for ease of use
2. Built with key open source projects and integrations
3. Extend security through the service mesh into the API layer with 3scale API management integration

USE CASES

- Adaptive traffic management
- Service performance tracing
- Secure communications and API access

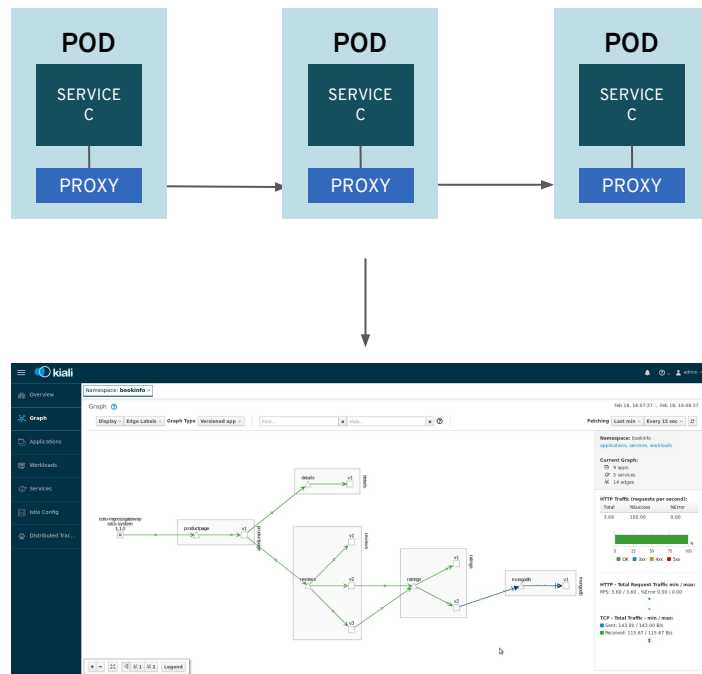
Distributed Tracing with Jaeger

- Discover service relationships and process times, transparent to the services
- Visualize the service execution times across the application
- Identify potential latency issues in each service



Service Mesh Observability with Kiali

- Kiali works to visualise the service mesh topology
- Identify which services are part of the service mesh and how they are connected
- Understand the topology and health of the service mesh



Reducing Installation and Management Overhead

- Leveraging the Kubernetes Operator model to embed logic into a single package
 - Automation of OpenShift Service Mesh Operator installation reduces complexity to get service mesh running quickly
 - Business logic for installation and updates of all components (Istio, Jaeger and Kiali) in one place
 - Rely on the baked-in best practices and human operational knowledge of the software for configuration and upgrades

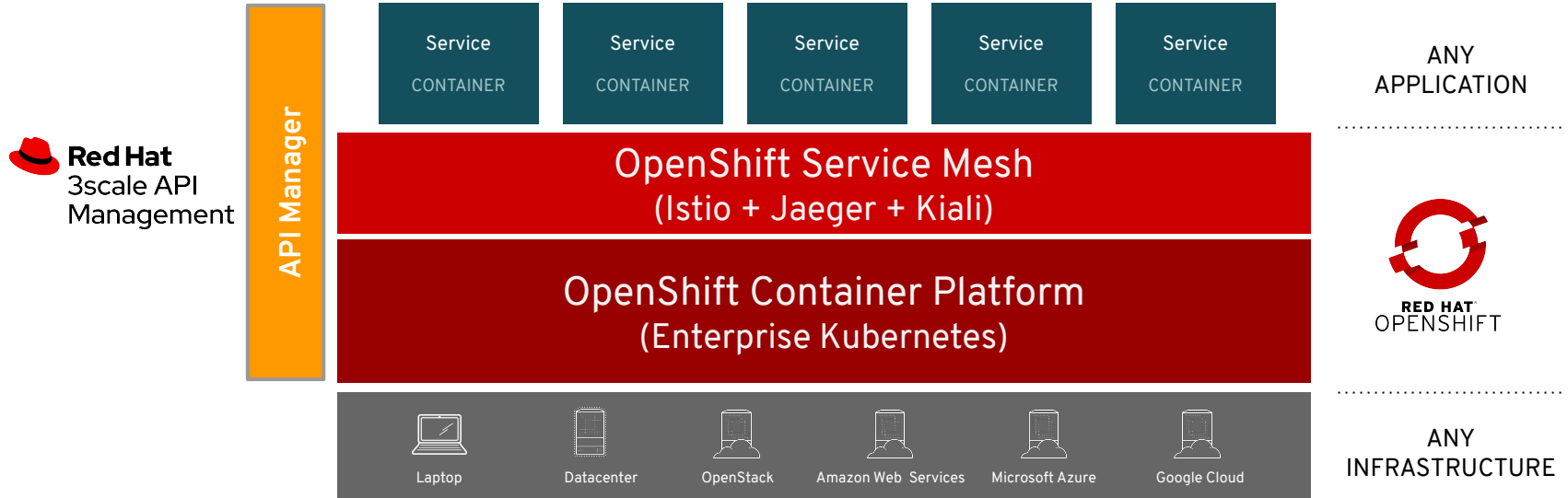
Do I need API Management with the Service Mesh?

- Do you have tens / hundreds of services / APIs?
- Are the applications consuming your APIs internal services?
- Do you have a need to package those services into consumable API products?
- Are there different classes of consumers in need of consuming these API products?
E.g. internal applications, partner applications, etc.
- Do you need a portal where API consumers can explore available API products
(composed by services deployed in different environments / clusters / etc.) and
get immediate access to them?

Bringing API Management to the Service Mesh

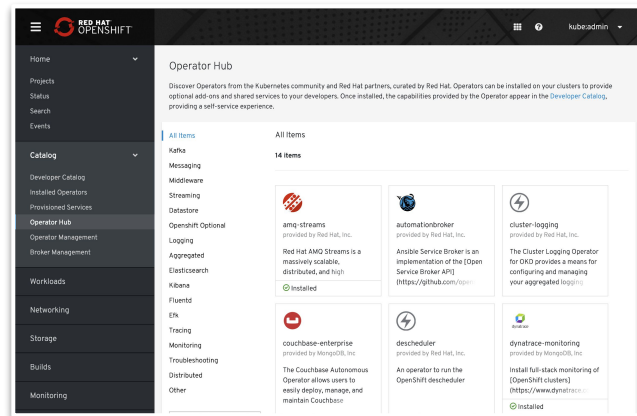
- The 3scale Istio Mixer Adapter gives your services exposed within the service mesh API management capabilities.
- Developer access via developer portal and documentation, configuring different types of access for different type of developers, usage analytics, billing and invoicing.
- Quota enforcement, caching, and analytics are available at the 'API product' level.

Distributed Services Platform



OpenShift Service Mesh Availability

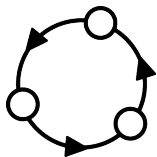
- OpenShift Service Mesh is available at no additional cost for licensed OpenShift customers
- OpenShift Service Mesh Operator will be found from the embedded OperatorHub interface through the OpenShift interface



Appendix: OpenShift vs. “Vanilla” Kubernetes Myths

THE VANILLA KUBERNETES MYTHS

Why IT shops swoon over “Vanilla” Kubernetes and its perceived value



Ultimate portability across Kubernetes Clusters



No “vendor lock-in”



Always on latest version

THE VANILLA KUBERNETES REALITY

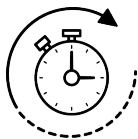
“Vanilla” Kubernetes is not really vanilla at all



Every vendor configures their Kubernetes distribution differently



Every vendor operates Kubernetes differently; this matters



No vendor is in lockstep with the latest upstream

* <https://medium.com/@jzelinskie/youre-not-running-vanilla-kubernetes-2f2359666bf9>

KUBERNETES CONFORMANCE

Interoperability at the API



“The new Certified Kubernetes Conformance Program gives enterprise organizations the confidence that workloads that run on any Certified Kubernetes Distribution or Platform will work correctly on any other version,” said Dan Kohn, Executive Director, Cloud Native Computing Foundation. **“The interoperability that this program ensures is essential to Kubernetes meeting its promise of offering a single open source software project supported by many vendors that can deploy on any public, private or hybrid cloud.”**

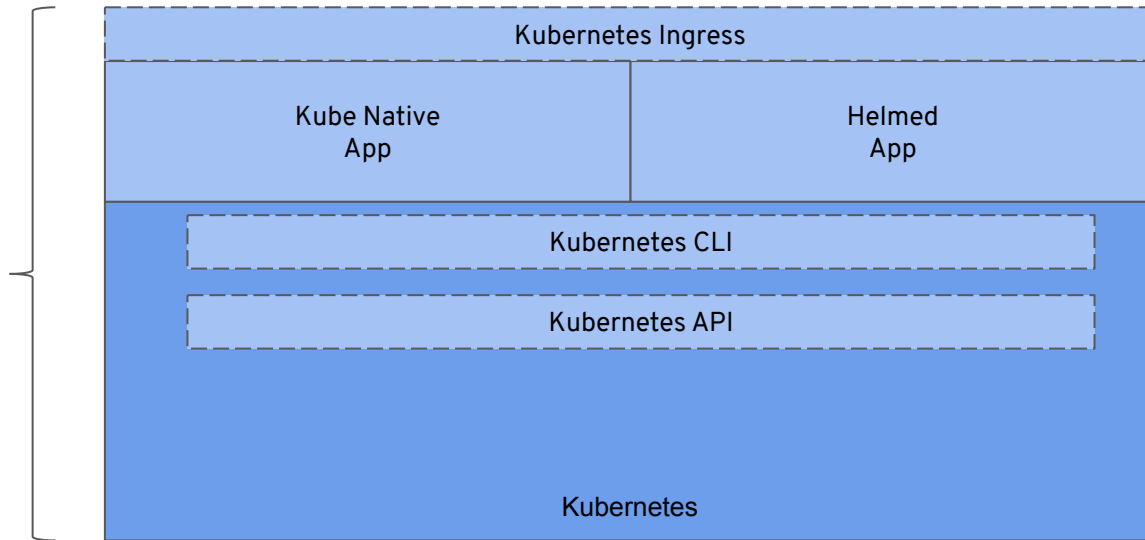
One of the goals of the project has always been **consistency and portability**. Kubernetes sits on top of the infrastructure and enables you to **describe your workload in a common format**. Kubernetes **makes it easy to move workloads from one place to another**, or combine disjointed environments with a shared control plane.

This **program gives end users the confidence** that when they use a **Certified Kubernetes** product they **can rely on a high level of common functionality**. It gives Independent Software Vendors (ISVs) **confidence that if their customer is using a Certified Kubernetes platform that their software will behave as expected**.

* <https://github.com/cncf/k8s-conformance>

UPSTREAM KUBERNETES

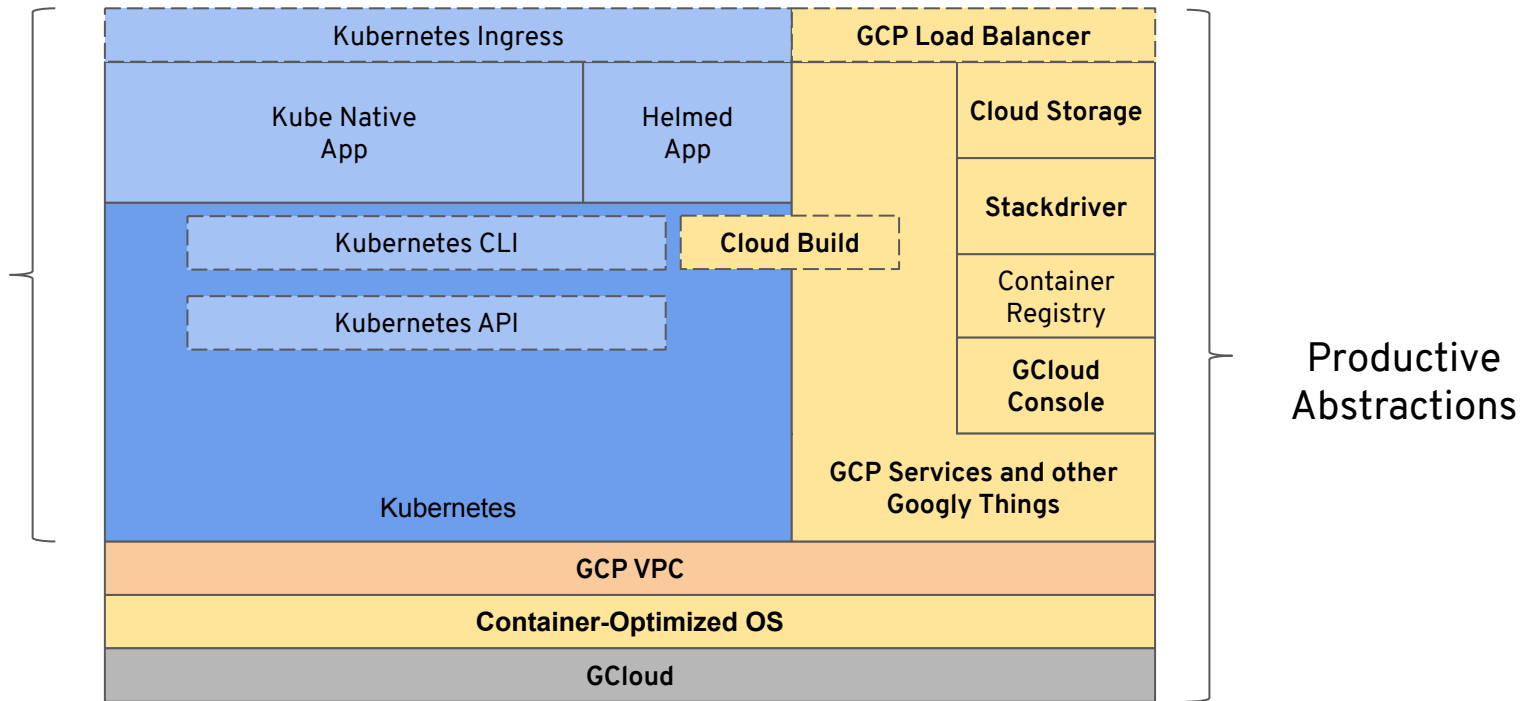
Upstream is closest to “Vanilla”



* Not comprehensive. Not even close.

GKE

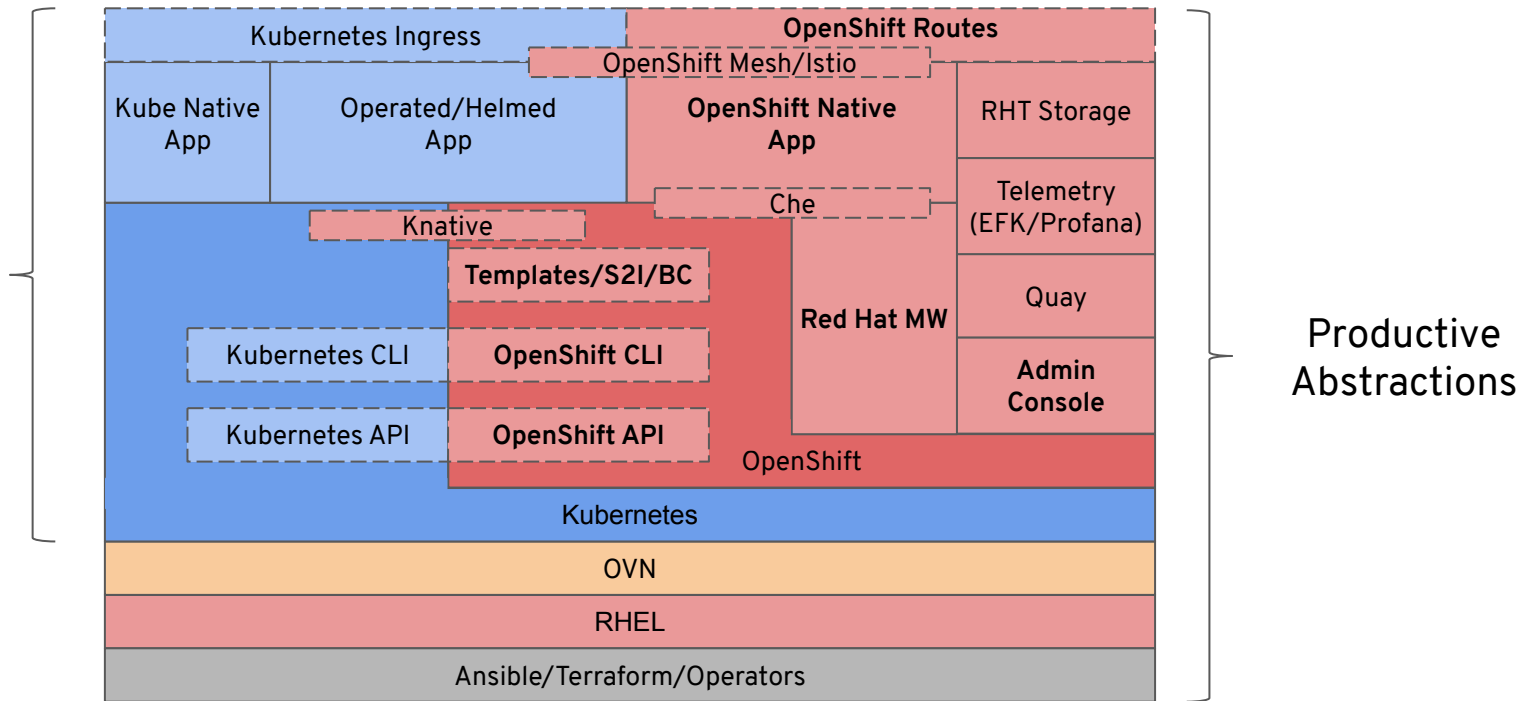
Even one of the Kube founders is not “Vanilla”



* Not comprehensive. Not even close. GCP only APIs in **bold**.

OPENSIFT

Certified “Pure” Kubernetes and productive abstractions



* Not comprehensive. Not even close. Red Hat or OpenShift only APIs in **bold**.

KUBERNETES CONFORMANCE

OpenShift is 100% Kubernetes

Branch: master **k8s-conformance / v1.11 / openshift /** Create new file Upload files Find file History

smarterclayton and taylorwaggoner OpenShift v1.11 conformance results (#385) Latest commit 7615279 on Nov 28, 2018

PRODUCT.yaml OpenShift v1.11 conformance results (#385) 3 months ago

README.md OpenShift v1.11 conformance results (#385) 3 months ago

e2e.log OpenShift v1.11 conformance results (#385) 3 months ago

junit_01.xml OpenShift v1.11 conformance results (#385) 3 months ago

version.txt OpenShift v1.11 conformance results (#385) 3 months ago

README.md

This conformance report is generated by the OpenShift CI infrastructure. The canonical source location for this test script is located at <https://github.com/openshift/origin/blob/master/test/extended/conformance-k8s.sh>

This file was generated by:

Commit 17bd01127a26f49de8b5a9f420e465de7c32dea8 Tag v3.11.0-63-g17bd011

To recreate these results

1. Install an [OpenShift cluster](#)
2. Retrieve a `.kubeconfig` file with administrator credentials on that cluster and set the environment variable `KUBECONFIG`

`export KUBECONFIG=PATH_TO_KUBECONFIG`



GCS Storage Browser

Builds

2

2018-11-27 23:31 EST took 2h0m

1

2018-11-27 23:15 EST took 2h49m

View earlier builds...

* Don't believe me? Check out and repeat the conformance test on your own OpenShift install at <https://github.com/cncf/k8s-conformance/tree/master/v1.11/openshift>

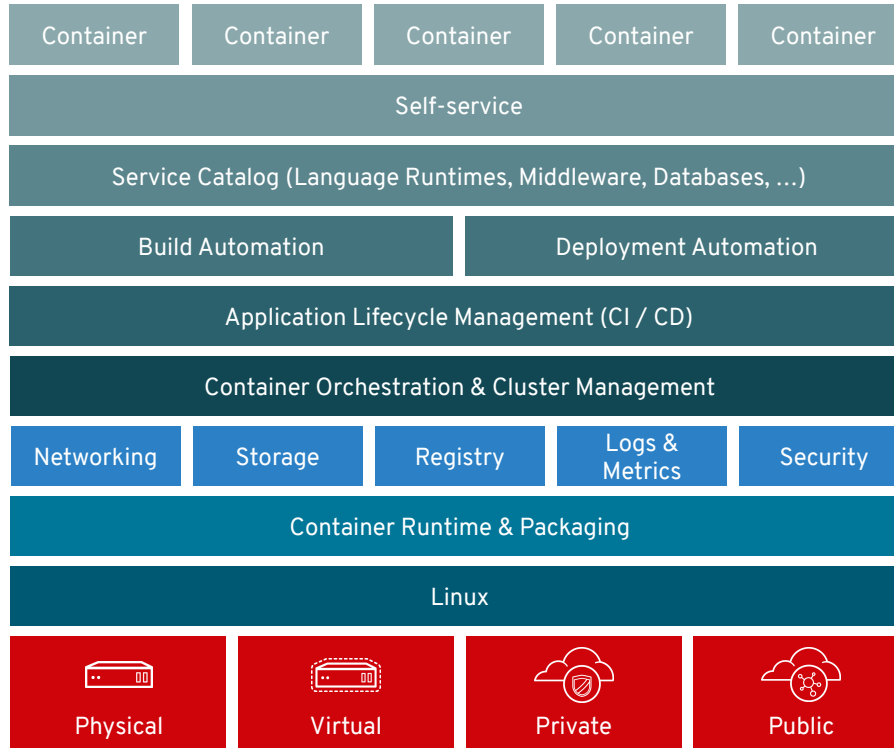
1
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8

Appendix: Community projects vs enterprise software products

DIY CONTAINER STACK CHALLENGES

Bring your own middleware, data & other services. Build out a service catalog / interface to enable self-service deployment.

Pull Kubernetes or other orchestration (Mesos, Swarm) from rapidly moving upstream & support / maintain yourself. Do all the work required to integrate it into your enterprise IT environment (networking, storage, registry, security, logging, metrics, etc.)



Take existing application build/CI & deployment tools and evolve to add container image build & mgt., continuous deployment, etc.

Pull Docker container runtime from rapidly moving upstream and support, secure and maintain it yourself.

Support and manage your own Linux community distro or build on existing RHEL or 3rd party commercial Linux offerings.

CONTAINER INFRASTRUCTURE AND MANAGEMENT

	Kubernetes	OKD*	OpenShift
Multi-host container scheduling	✓	✓	✓
Self-service provisioning	✓	✓	✓
Service discovery	✓	✓	✓
Enterprise Linux operating system			✓
Image registry		✓	✓
Validated storage plugins		✓	✓
Networking and validated networking plugins		✓	✓
Log aggregation and monitoring		✓	✓
Multi-tenancy		✓	✓
Metering and chargeback			✓

* OKD is the open source project [formerly known as OpenShift Origin](#)

DEVELOPER EXPERIENCE

	Kubernetes	OKD*	OpenShift
Automated image builds	No developer or application services	✓	✓
CI/CD workflows and pipelines		✓	✓
Certified application services			✓
Certified middleware			✓
Certified databases			✓
200+ certified ISV solutions			✓

* OKD is the open source project [formerly known as OpenShift Origin](#)

ENTERPRISE SUPPORT AND COMMUNITY

	Kubernetes	OKD	OpenShift
Community forums and resources	✓	✓	✓
Zero downtime patching and upgrades			✓
Enterprise 24/7 support			✓
9 year support lifecycle			✓
Security response team			✓

External review: [10 most important differences between OpenShift and Kubernetes](#)

Appendix: Docker Support in OpenShift 4

IS DOCKER THE BEST AVAILABLE CONTAINER ENGINE?

Potential limitations surrounding Docker

- Build requires a “big fat” daemon on every host
- Regression for integration with container platforms
Kubernetes/OpenShift
- Build has secret handling issues
- Root/privileged concerns at runtime
- Root/privileged concerns with daemon
- Build requires a running container



OPEN CONTAINER
INITIATIVE

- Docker, Red Hat et al. June 2015
- Two specifications
 - Image format
 - How to package an OCI Image with sufficient information to launch the application on the target platform
 - Runtime
 - How to launch a “filesystem bundle” that is unpacked on disk
- Version 1.0 of each released July 19th 2017
- Distribution spec started in April, 2018.

CONTAINER INNOVATION CONTINUES

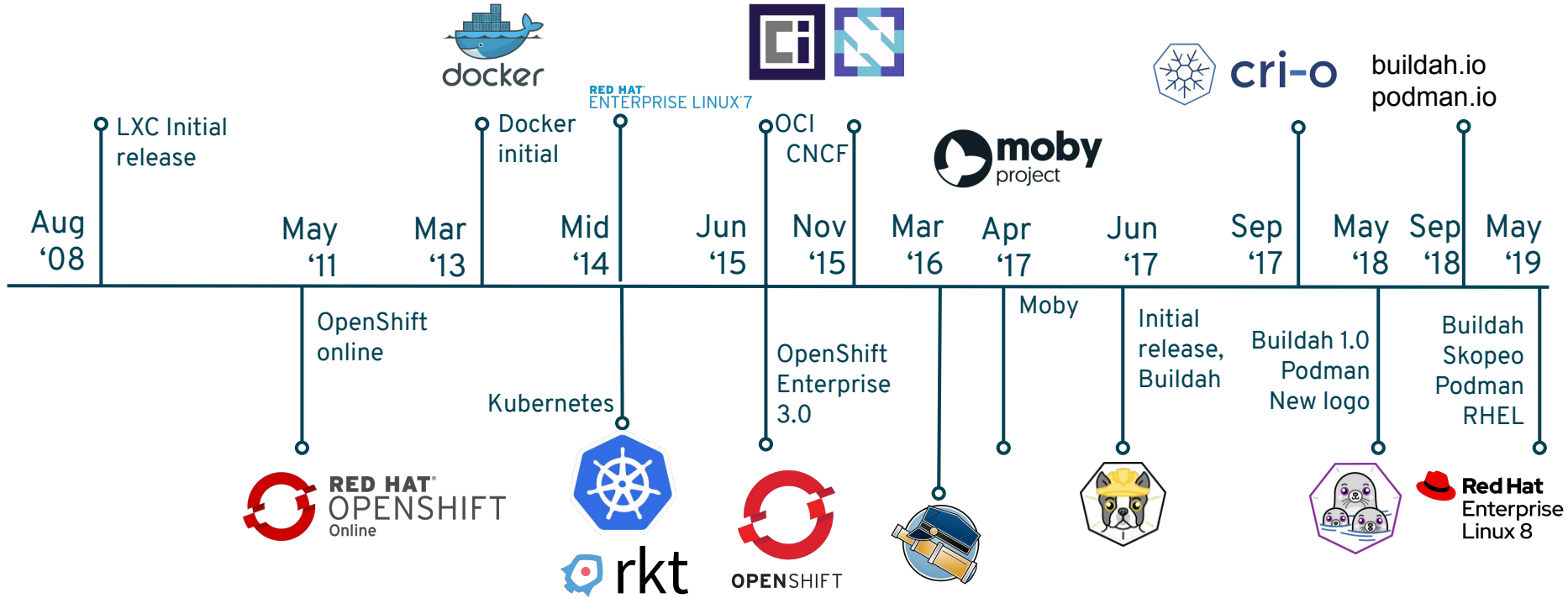
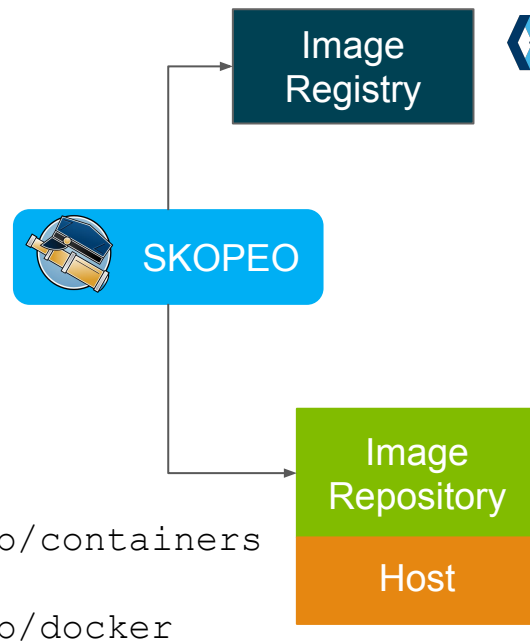


IMAGE COPY WITH SKOPEO

- Built for interfacing with Docker registry
- CLI for images and image registries
- Rejected by upstream Docker “_(ツ)_/”
- Allows remote inspection of image meta-data - no downloading
- Can copy from one storage to another

SECURITY FEATURES

Share securely
No daemon
Inspect remote images
No pulling potentially malicious images
Non-root copy. Bridge between registries.



The new container CLI

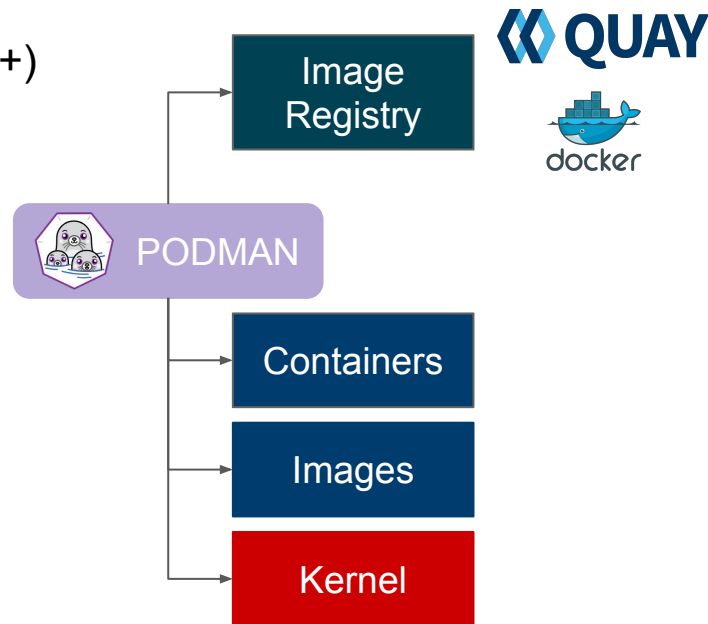


podman

- @ podman.io
- Client only tool, based on the Docker CLI. (same+)
- No daemon!
- Storage for
 - Images - `containers/image`
 - Containers - `containers/storage`
- Runtime - `runc`
- Shares state with CRI-O and with Buildah!

SECURITY FEATURES

Run and develop securely
No daemon
Run without root
Isolate with user namespaces
Audit who runs what



Why use Buildah?

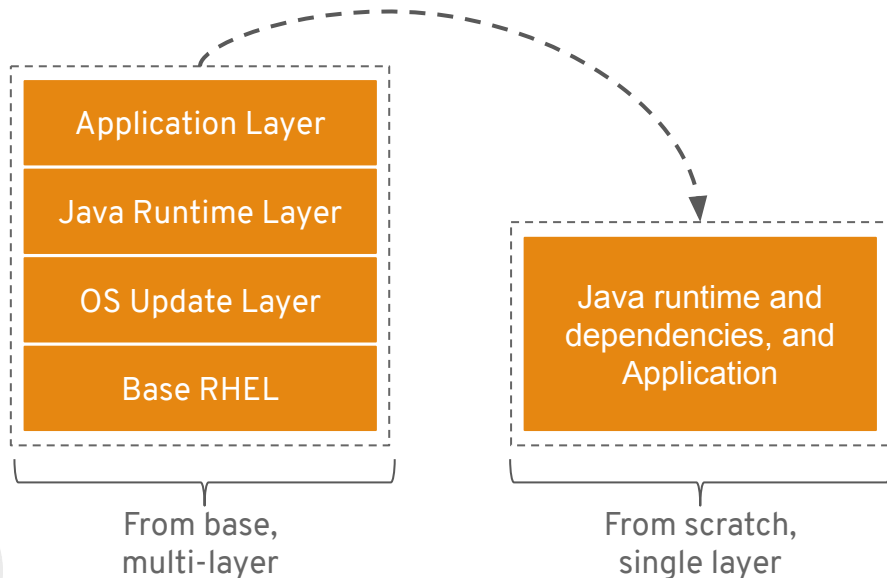


buildah

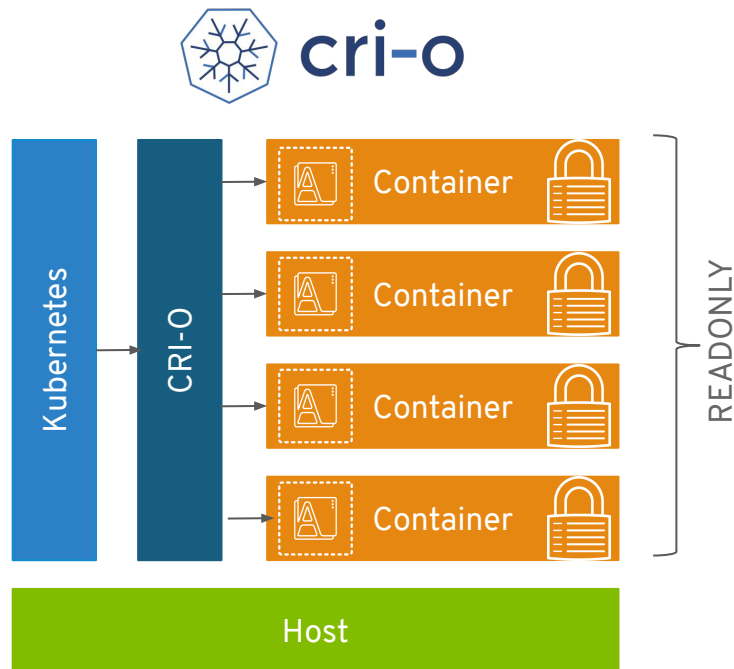
- Now buildah.io
- Builds OCI compliant images
- No daemon - no “docker socket”
- Does not require a running container
- Can use the host’s user’s secrets.
- Single layer, from scratch images are made easy and it ensures limited manifest.
- If needed you can still maintain Dockerfile based workflow

SECURITY FEATURES

Build securely
No daemon
Shrink the attack surface
Fine-grained control of the layers
Run builds isolated
Better secret management



OCI AND CRI-O



- A Kubernetes thing
- Now part of CNCF! (April 8th)
- OCI daemon
- Implements Kubelet Container Runtime Interface (CRI)



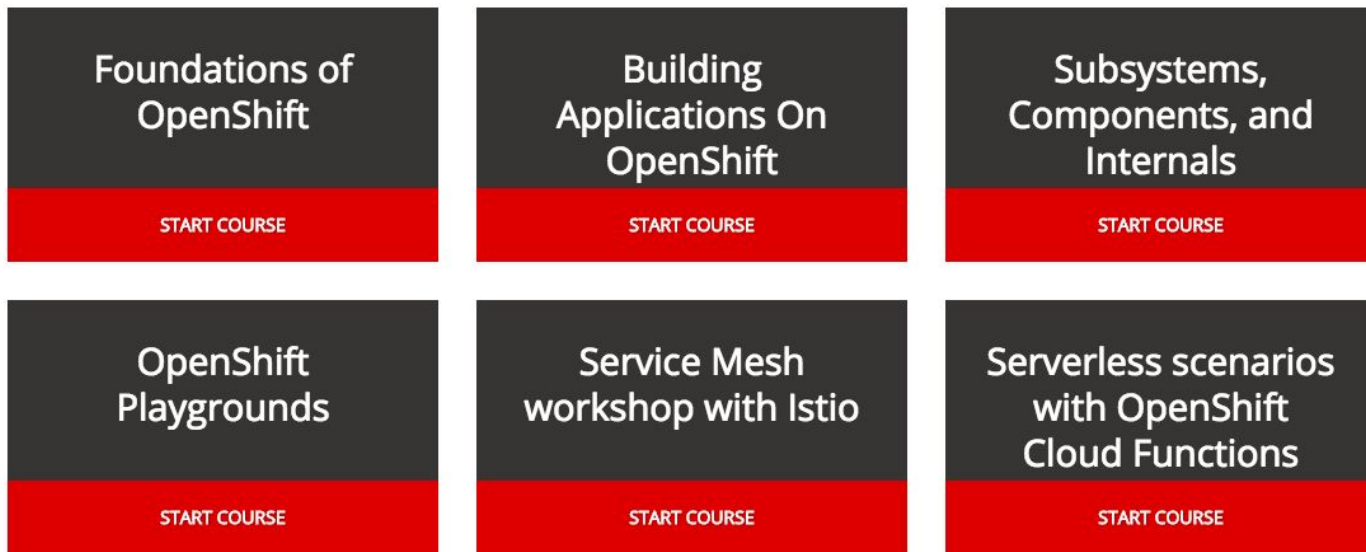
SECURITY FEATURES

Run securely in a production cluster
No daemon
Read-only containers
Enable fewer capabilities
User namespaces
FIPS mode support



Appendix: Getting started with Red Hat OpenShift

LEARN.OPENSIFT.COM



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

CONTAINER PLATFORM DISCOVERY SESSION

A ONE DAY, NO-COST PLANNING SESSION



GOAL:

To understand the customer's business drivers and technical use cases to propose a solution architecture.



DETAIL:

Discussion guided by Red Hat Consulting Architect

Attendees from both Infrastructure Operations and Application Development

Red Hat will provide tailored proposal for services



RED HAT PROVIDES:

Our vision for container platforms

Guided assessment of organizational readiness for containers and DevOps using Red Hat Consulting's "Ready to Innovate" framework

Application delivery modernization goals

High-level recommendations

Red Hat container platform service offerings



CONTAINER PLATFORM PILOT (CAP INC. 1)

12 WEEKS



GOAL:

A meaningful workload runs in production on a minimally viable container platform managed by a small team of skilled customer engineers



MILESTONES:

- One workload running in production OpenShift container platform
- Production environment with minimum viable operational capability
- End-to-end process for delivering applications to production container platform demonstrated and captured, including organizational roles and responsibilities
- Customer Operations team mentored to build OpenShift clusters with minimal assistance
- Next phase planned with prioritized backlog or story map for infrastructure, deployment pipeline, and application development.



ENVIRONMENTS:

- Lab OpenShift cluster for infrastructure testing
- Non-production OpenShift cluster for development and testing of containerized applications prior to their production release
- MVP production OpenShift cluster

Appendix:

Red Hat on Red Hat

How we think about the business

What got us here won't get us there

the Why

We believe open hybrid cloud will enable us to:

- Match the speed and adaptability demands of the digital business
- Improve availability, resiliency, and durability of our digital systems

While we continue to reduce operating expense.

the How

How we get there:



1. Think business first

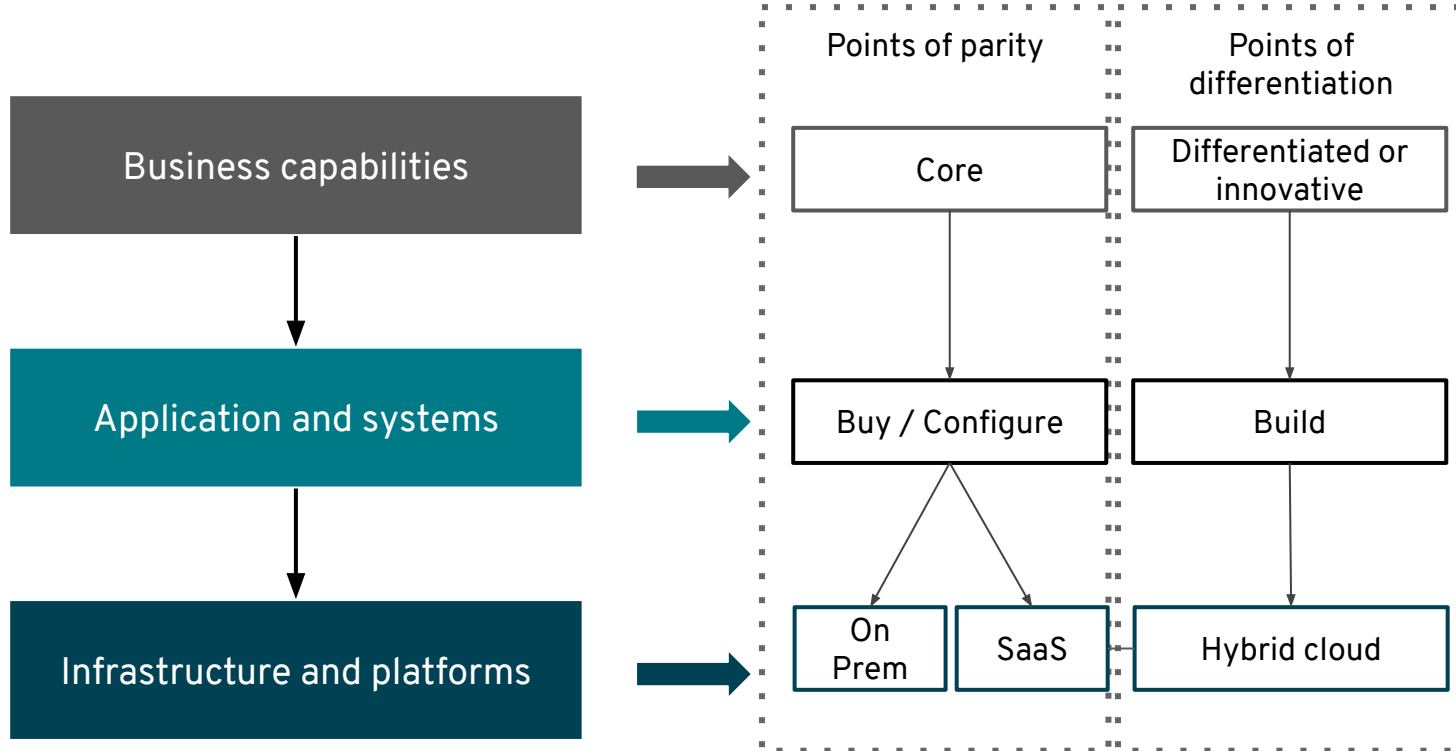


2. Guide work via a roadmap



3. Adapt based on data

Our approach to digital business



RED HAT
INSIGHTS
RED HAT
AMBASSADORS

RED HAT
OPENSIFT
Application Runtimes

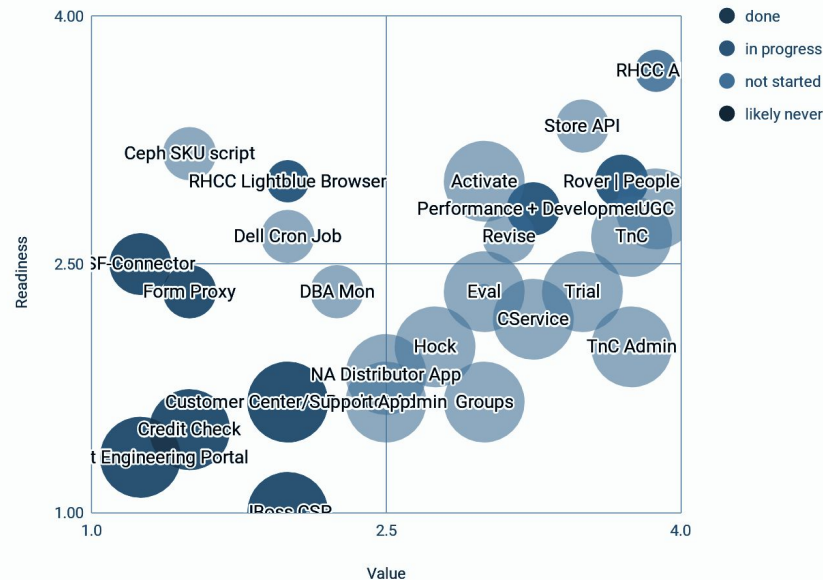
RED HAT
OPENSIFT
Container Platform

How we identify and prioritize applications

Assess value and readiness of each application:

- Value criteria
 - Change rate
 - Lifespan
- Readiness criteria
 - Business criticality
 - Business support
 - Architectural gaps

ADS PaaS Migration and Modernization Analysis



Note: specific use cases like end-of-life hardware or constraints on operating system upgrades (e.g.) may justify a re-platforming approach and yield other technical benefits.

OpenShift deployments at Red Hat



Empowering innovation

Why: Innovation

Who: Any associate

What: Single cluster, public cloud

How much: 1,000+ apps



Development & build pipeline

Why: Development & build

Who: Engineering primarily

What: Single cluster in datacenter

How much: 689 projects across 34,530 containers



Mission-critical workloads

Why: Enterprise availability

Who: Mission-critical systems

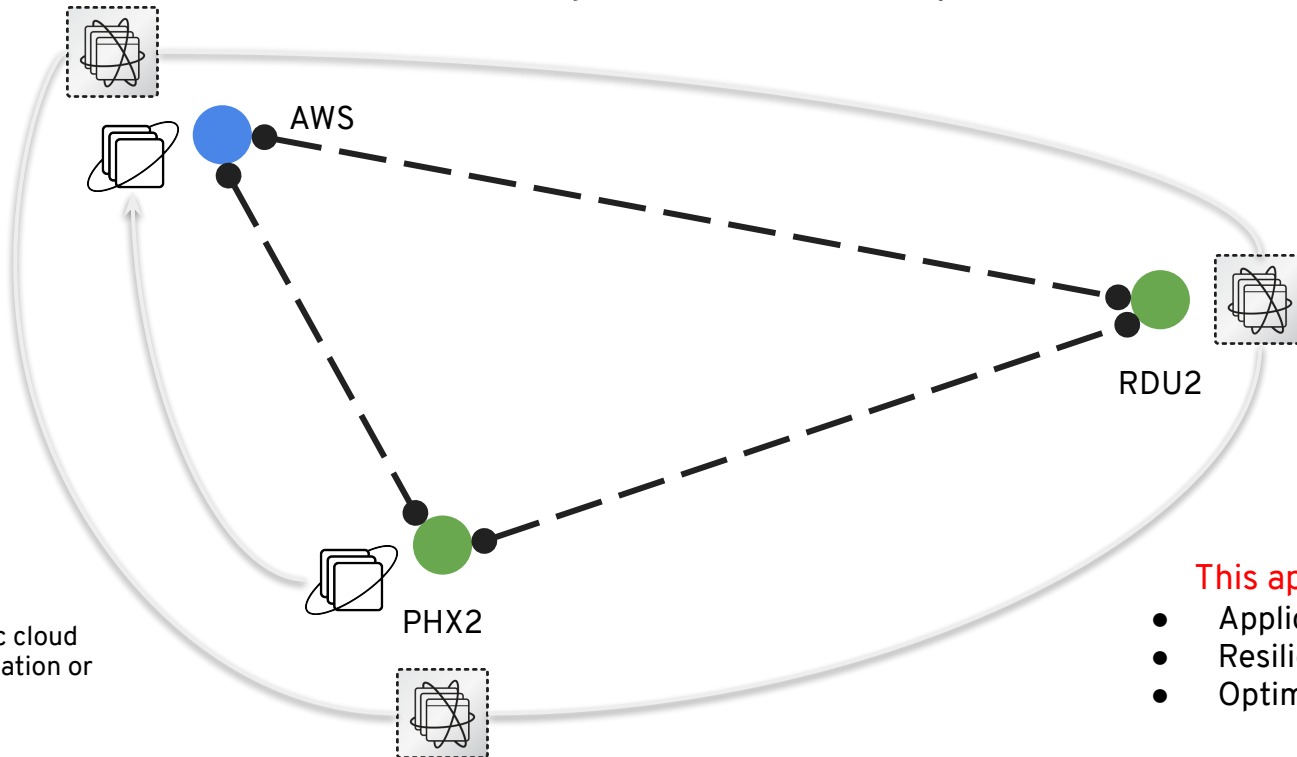
What: 3x multi-site clusters



Open Hybrid Cloud in Action

Multi-site active workloads across the globe for key data and business function services.

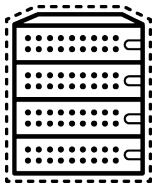
(Diagram is illustrative only)



This approach enables

- Application portability
- Resiliency & availability
- Optimized costs

Benefits of OpenShift at Red Hat



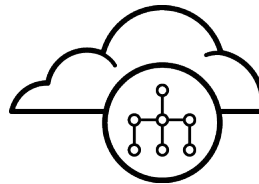
Gain efficiency

~55% lower
infrastructure
footprint per
application¹



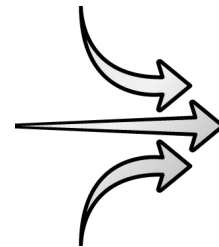
Improve Security

Automatic platform
& image rebuilds
weekly and
automatic CVE-
triggered rebuilds



Increase Resilience

Multi-site-active,
hybrid cloud
deployment = **zero**
downtime



Move Faster

40% acceleration
in time to market
for feature
enhancements due
to automation of
delivery pipeline¹

¹According to Red Hat IT internal data

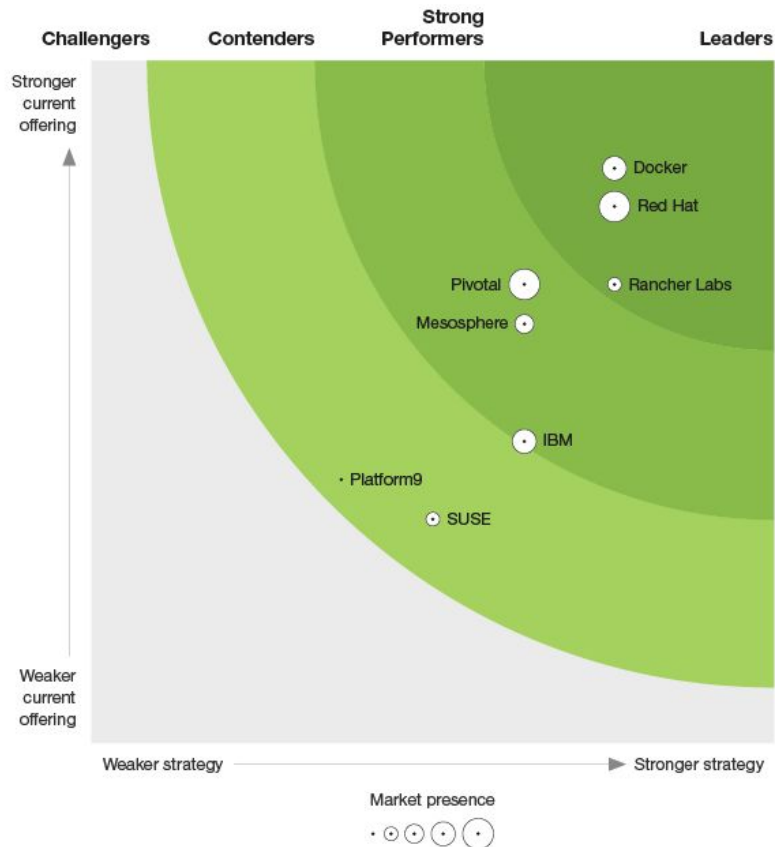
Appendix:

Industry analyst comparisons

THE FORRESTER NEW WAVE™

Enterprise Container Platform Software Suites

Q4 2018



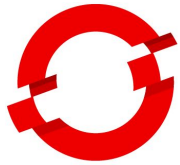
Red Hat named a Leader in The Forrester New Wave™

[Enterprise Container Platform Software Suites, Q4 2018 report](#)

- Leads the pack with excellent user experience and integration capabilities
- Popular with Red Hat customers who prefer strong ecosystem synergy

The Forrester New Wave™ is copyrighted by Forrester Research, Inc. Forrester and Forrester Wave™ are trademarks of Forrester Research, Inc. The Forrester New Wave™ is a graphical representation of Forrester's call on a market. Forrester does not endorse any vendor, product, or service depicted in the Forrester New Wave™. Information is based on best available resources. Opinions reflect judgment at the time and are subject to change.

RED HAT OPENSIFT BUSINESS VALUE



Red Hat
OpenShift

531%
5-year ROI

66%

Faster development
life cycle

36%

More applications
per year

8 MONTHS

Payback
period

US\$1.29M

Average annual
benefits per
100 developers

The Business Value of Red Hat OpenShift, IDC #US41845816, October 2017,
<https://www.redhat.com/en/resources/The-Business-Value-of-Red-Hat-OpenShift>.

Why OpenShift for hybrid and multi-cloud deployments?

IDC research: The business value of OpenShift on AWS

“““

Our **developers** say that OpenShift on AWS is very easy to use, and they are definitely **more productive as a result.**

Financial services

“““

We have a **multi-cloud environment** and OpenShift on AWS has features that make it **easier to be agile ...**

Pharmaceutical

“““

OpenShift on AWS has really helped us improve our reservation system and contributed to up to **15 percent more revenue, worth tens of millions of dollars per year.**

Hospitality

OpenShift Customer Stories

More than 1,000 customers around the globe



MODERNIZE APPS



WEB APPS



CLOUD NATIVE DEV



MULTI-CLOUD



MOBILE



BIG DATA | ANALYTICS



AI | ML



IOT



OpenShift in Financial Services



OPEN BANKING

TRANSACTION
EFFICIENCY

PAYMENTS

DIGITAL ENGAGEMENT



CAPITAL ONE



CAPITAL MARKETS

CORE BANKING

MOBILE

RISK ANALYSIS



“”

Red Hat OpenShift Container Platform lets us move applications seamlessly and easily across multiple providers with no downtime. We can also use public cloud to scale up or down as demand requires.

Kerry Peirse

General Manager, IT Infrastructure and Operations
Cathay Pacific Airways Limited

Transforming the automobile industry



“““

We can localize clusters in different markets if we need to and therefore serve our customers on a worldwide scale.

Dr. Alexander Lenk
Lead Architect Connected Vehicle, Digital Backend, Big Data, Blockchain
BMW Group



Volkswagen

“““

We got the idea to have all these tests we do with hardware on virtual test environments, and that's why we've come to OpenShift and containers.

Michael Denecke
Head of Test Technology
Volkswagen AG



“““

New applications that once took over a week are now up and running after just a few hours.

Christian Köberl & Johannes Grumböck
Software & Infrastructure Architects,
Porsche Informatik GmbH

Source:

BMW: [Red Hat Summit 2019 keynote](#), YouTube, 9 May 2019.

Volkswagen: [Red Hat Summit 2019 keynote](#), YouTube, 7 May 2019.

Porsche: Red Hat blog, [Ready to adapt: Providing applications and services worldwide easily and quickly](#), August 2018.



Rethinking banking and financial services



“““

We're no longer building technology like a bank. We're building technology like a technology company.

David Gledhill

Group Chief Information Officer,
Head of Group Technology & Operations
DBS Bank



“““

What we've set out to do with Fabric and Red Hat OpenShift Container Platform is to democratize IT. We've given access to powerful technologies to every developer at the bank.

Tom Gilbert

Managing Director, Global Head of Cloud,
Application, and Integration Platforms,
Deutsche Bank



“““

If we wanted to align with open source and the best of cloud-native stacks, Kubernetes, and containers, Red Hat OpenShift was the right choice.

Miguel Rio Tinto

Group CIO
Emirates NBD

Source:

DBS: [Red Hat Summit 2019 keynote](#), YouTube, 7 May 2019.

Deutsche Bank: Red Hat case study, [Deutsche Bank democratizes development with Red Hat-based global platform](#), May 2019.

Emirates NBD: Red Hat success story, [Emirates NBD builds cloud platform to offer innovative banking services](#).



A safer, more enjoyable experience in the air



“““

Job No. 1 was to pick up all of that data and create two master repositories. ... We're building the APIs and actually housing them in Red Hat OpenShift and opening up access to that data not just to customer touch points, but to empower our frontline employees so that they've got the tools and the insights.

Rahul Samant

Executive Vice President and Chief Information Officer
Delta Air Lines



“““

Red Hat OpenShift Container Platform lets us move applications seamlessly and easily across multiple providers with no downtime. We can also use public cloud to scale up or down as demand requires.

Kerry Peirse

General Manager, IT Infrastructure and Operations
Cathay Pacific Airways Limited



“““

The moment we have an idea, we can start building the product. This agility is something we have never experienced before.

Tobias Mohr

Head of Technology and Infrastructure, AVIATAR
Lufthansa Technik

Source:

Delta: [Red Hat Summit 2019 keynote](#), YouTube, 7 May 2019..

Cathay Pacific: Red Hat case study, [Global airline transforms to digital, hybrid cloud IT infrastructure](#), October 2018.

Lufthansa Technik: Red Hat success story page, [Lufthansa Technik builds a digital foundation with Red Hat](#), May 2018.



Saving people's lives



“““

We provide a 5-hour head start in treating sepsis. And in the hands of clinicians, 5 hours saves lives.

Dr. Edmund Jackson
VP & Chief Data Scientist
HCA Healthcare



“““

With Red Hat's technology, we are able to create an open, scalable, and shareable platform capable of reducing the time it takes to analyze key images from hours to minutes.

Dr. Ellen Grant
Director of Fetal and Neonatal Neuroimaging Research, **Boston Children's Hospital**,
& Professor of Radiology and Pediatrics, **Harvard Medical School**

Source:

HCA Healthcare: [Red Hat Summit 2019 keynote](#), YouTube, 9 May 2019..

Boston Children's Hospital: Red Hat press release, [Red Hat Collaborates with the Massachusetts Open Cloud and Leading Children's Hospital to Help Shape the Future of Medical Image Processing](#), May 2018.





グループ各社のWebアプリケーションをパブリッククラウド上のコンテナ基盤に集約し、セキュリティ、運用効率、開発スピードを向上

**OpenShift
on AWS**



ふくおかフィナンシャルグループ

国内第一号ユーザーとして、DevOpsによるアジャイル開発手法の導入と開発工程を内製化

**OpenShift
Open Innovation Labs**



開発のセルフサービス化が実現し、より迅速なサービスリリースが可能に

OpenShift

Source:

Tokaiホールディングス Pacific: Red Hat press release, <https://www.redhat.com/ja/about/press-releases/tokai-group-adopts-red-hat-openshift-dedicated-fully-managed-container-platform>

ふくおかフィナンシャルグループ : Red Hat press release, <https://www.redhat.com/ja/about/press-releases/rhapan-ffg-participates-in-red-hat-open-innovation-labs-and-adopts-red-hat-openshift-to-realize-digital-transformation>

ぐるなび: Red Hat press release, <https://www.redhat.com/ja/about/press-releases/rhapan-gurunavi-realized-self-service-development-red-hat-openshift-container-platform>



Delta's challenge was to support their industry-leading reliability while embarking on a transformation journey to modernize their infrastructure, applications and skill base.



Solution

Delta consolidated all data systems into two repositories: Customer, and Business.

Why Red Hat

Delta wanted employees to have access to that data/ Red Hat offered Open Hybrid Cloud and API management.

Results

Front line employees can now access customer data anywhere.

Products & Services

Red Hat OpenShift, Red Hat 3Scale, RHEL.



“““



Job #1 was to pick up all that data and create two repositories. We're building the APIs and housing them in Red Hat OpenShift and opening up access to that data not just to customer touch points, but to empower our front line employees so they have the power and the insights.

Rahul Samant
EVP and CIO, Delta

[Watch the session](#)

Source:
Insert source data here
Insert source data here
Insert source data here

ExxonMobil enabled disruptive engineering on the cloud,
worldwide, for over 100 teams.

ExxonMobil

Solution

Hybrid Cloud Platform to enable developers to innovate

Why Red Hat

ExxonMobil wanted to disrupt faster / Red Hat enabled this effort, and provided guidance.

Results

Over 130 teams now build on the OpenShift platform at ExxonMobil

Products & Services

Red Hat OpenShift.

“““



You have to automate everything. Everything we're doing is infrastructure as code. Red Hat consultants also taught us how to use CI/CD patterns.

Austen Smack

Container Platforms Product Owner, ExxonMobil

[Watch the session from Red Hat Summit.](#)



Volkswagen faced an exponential increase in the number of hardware and software tests needed in order to build autonomous cars.



Volkswagen

Solution

VW enabled integration tests at scale on custom hardware

Why Red Hat

VW wanted a fast solution and a culture change, Red Hat offered both.

Results

Now running millions of tests, and internal IT culture has moved away from top-down management.

Products & Services

Red Hat OpenShift, Red Hat Open Innovation Lab



“““

Working together in the Open Innovation Lab way says; ‘don’t be so top-down management driven, give the responsibility to the team,’ and we want to do that at Volkswagen.”

Michael Denecke

Head of Test Technology at
Volkswagen AG

[Watch the session from Red Hat Summit.](#)
[Watch their OpenShift Commons Session](#)

BMW GROUP

Dr. Alexander Lenk

Lead architect Connected Vehicle, Digital Backend, Big Data, Blockchain



BMW GROUP

STORY OVERVIEW:

This was not the BMW Group's first time joining us at Red Hat Summit. Last year they spoke in a breakout session about how they drive digitalization by containerizing the connected car backend. This year they were on the main stage sharing the continuation of their story and how they moved to the hybrid cloud space by using Red Hat OpenShift on the public cloud. The BMW Group enables connected cars worldwide with the cloud and uses OpenShift Dedicated for their business-critical applications, serving new markets in addition to the existing on-prem deployments.

BMW has 12 million connected cars and 30% annual growth, resulting in 1 billion requests per week.

BMW GROUP

Solution

BMW started to migrate their entire backend to OpenShift in 2016, which resulted in not only an IT transformation but cultural transformation as well.

Why Red Hat

Need the ability to scale to build AI/ML platform.

Results

Running 12,000 containers on 19 clusters worldwide.

Products & Services

Red Hat OpenShift

UPS

Ken Finnerty

President of Information Technology



STORY OVERVIEW:

Our 2018 Innovator of the Year winner joined us on the mainstage to share a new story focused on the digital transformation needed to provide a modern customer experience. In this talk Ken Finnerty shared how UPS leveraged Red Hat Technologies including Fuse, AMQ and OpenShift to support the developers ability to design, build and deploy modular software needed to achieve a personalized customer experience, cost efficiencies, and maximum value in the supply chain.

the call open and digital.

acts can you develop?



+61 02

Tu deconnes
You're kidding

+61 02

Et je peux discuter de notre reseau telecom
And I can discuss our telecom network

+61 01

No, I'm not
mais non

+61 01

Why not. Let's have a conversation about it
Pourquoi ne pas nous en parler



OPTUS

Transforming communications

+61 02

You mean that we can

Optus deployed a new generation of virtualized mobile core functions in order to digitize native phone calls and allowed software developers revolutionize carrier networks.

OPTUS

Solution

Optus recently used Red Hat OpenShift Container Platform to deploy a new generation of virtualized mobile core functions.

Results

Launched a digitized native phone call service that can transcribe and translate voice. Their software developers are revolutionizing carrier networks.

Products & Services

Red Hat OpenShift Container Platform

“““



**Guillaume
Poulet-Mathis**

Senior Innovation Manager



Vasily Chekalkin

Principal Software
Engineer

We are opening a safe environment for software developers to build, deploy and operate a new breed of Telco applications. This is a unique opportunity to uplift equipment legacy into the digital age.

—
Guillaume Poulet-Mathis
Senior Innovation Manager

[Watch their Product Demo from Red Hat Summit](#)
[Watch their entire session from Red Hat Summit.](#)

HCA Healthcare

Dr. Edmund Jackson

Chief data scientist



STORY OVERVIEW:

Sepsis is an overwhelming response to infection that turns the body's immune system against itself. In the absence of early detection, it can rapidly lead to tissue damage, severe organ failure and death. As one of the nation's leading providers of healthcare services, HCA Healthcare is now leveraging artificial intelligence, based on data from millions of hospitalizations, to help detect sepsis up to 18 hours earlier than traditional screenings. Jackson shared how his team used Red Hat OpenShift Container Platform and Red Hat Enterprise Linux to develop Sepsis Prediction & Optimization of Therapy (SPOT), a predictive algorithm and workflow for the early detection and treatment of sepsis that is helping to save lives.

Emirates NBD

Ali Rey

Vice president, Cloud Platform



STORY OVERVIEW:

During this keynote, attendees will hear about Emirates NBD's efforts to become the first bank in the Middle East to launch its own private cloud. Rey will share how the bank transitioned to a private cloud, named Sahab, built on Red Hat OpenShift Container Platform in six months and utilizing other Red Hat technologies. He discussed how, by embracing open source solutions, it moved further into compliance with open banking, which is mandated by GDPR. Through real time data analysis, Emirates NBD is able to deliver more personalized products and services for their customers more quickly.

KOHL'S

Ritch Houdek

Senior vice president of Technology



KOHL'S®



STORY OVERVIEW:

Created hybrid cloud PaaS solution in order to better support application modernization, especially with containers, general support the Kohl's general cloud migration initiative to provide a flexible, scalable, self-service, based platform to aid in driving IT transformation, accelerate development, and reduce cloud cost.

BP

Ed Alford

Vice president, Digital Transformation
IT&S



STORY OVERVIEW:

As a global energy business, BP is not daunted by the dual challenge of delivering the energy the world demands with fewer emissions. Technology is a fundamental part of BP's strategic response; including delivering digital solutions that help simplify processes and enhance productivity. BP is transforming its technology function to help solve these large, complex challenges even more effectively and efficiently. In this session, Alford shared part of BP's journey: the development of its Application Engineering Services' Digital Conveyor, a package of automations designed to empower developers and engineering teams to provision their own Red Hat OpenShift Container Platform environments.

**STORY OVERVIEW:**

As Germany's leading bank, Deutsche Bank embarked on a journey to become more technology-led. This required it to consolidate and simplify its application estate, improve both developer productivity and server utilization, and, in doing so, reduce the running costs of infrastructure. Gilbert explored how Red Hat technology, including Red Hat OpenShift Container Platform, has enabled Deutsche Bank to be more agile, flexible and deliver applications in weeks instead of months. In addition, he talked about how the culture has shifted further towards an open source way of working, embracing collaborative principles and DevOps.

[Watch their session from Red Hat Summit.](#)

“““



This journey has been just as much about a culture change as it has about technology, if not more. Anyone in our bank can contribute to this platform, and we release new iterations of the platform every few weeks.

Tom Gilbert

Managing Director, Global Head of Cloud
Application and Integration Platforms, Deutsche
Bank

Watch their session from Red Hat Summit.

Challenge: Improve Velocity



Solution

Needed to shrink software and product delivery times from multiple years to weeks.

Why Red Hat

Lockheed Martin wanted to deliver innovation faster. Red Hat OpenShift enabled faster development.

Results

Shrank tools approval process from months and years, to a few days. Improved vendor delivery from years to days. Improved forecasting accuracy by 40% on first usage.

Products & Services

Red Hat OpenShift, Red Hat Open Innovation Labs.



“““

We initiated a new team with the Red Hat enablement. As a result, our forecasting accuracy for that team after one enablement improved 40%.

Michael Cawood

Vice President, Product Development, F-16/F-22
Integrated Fight, Lockheed Martin

Watch their session from Red Hat Summit.

DBS Bank



David Gledhill

Group chief information officer and head
of Group Technology & Operations



STORY OVERVIEW:

For three years, DBS Bank Limited has been focused on its digital agenda that has included many facets from culture change and employee mindsets, to re-architecting technology infrastructure and leveraging Big Data, biometrics and AI. Gledhill shared how, with the goal of making banking more simple and seamless for customers, DBS Bank Limited implemented Red Hat hybrid cloud technologies to build new applications and improve user experiences at a faster pace and deliver quicker enhancements or incremental services offerings to better compete in the digital world.

Challenge: Transform to a Digital First Bank.



Solution

DBS Bank has become a primarily digital bank, increasing expansion opportunities beyond brick and mortar.

Why Red Hat

DBS Bank wanted an open hybrid cloud, Red Hat provided the foundations.

Results

Over 358 APIs and +50% of all workloads now on Red Hat and RHEL.

Products & Services

Red Hat OpenShift, Red Hat Linux.

“““



We're no longer building technology like a bank, we're building technology like a technology company. A big part of that was moving to an open source stack and building on commodity hardware. That's where Red Hat came in.

David Gledhill

Group CIO and head of Group Technology and Operations, DBS Bank

Abercrombie & Fitch knew their eCommerce platform was due for a full refresh, and they A&F needed tighter controls and consistency of eComm platforms, and optimize CI/CD pipeline.

Abercrombie & Fitch

Solution

After a false start with another vendor, A&F chose OpenShift because it's off-the-shelf ready and has an existing customer base from which to draw on other customer experiences.

Why Red Hat

"Red Hat knows how to implement and operate it so we were able to partner with them to help us through the journey."

Results

"Our go-live was amazingly quiet!" A&F were able to deliver new technology in a very short timeframe.

Products & Services

Red Hat OpenShift, Red Hat Ansible.



“““



This journey is actually easier than it looks. It's all Linux features/ideas that have been around a long time, just assembled in a new way.

Tony Sirianni

Senior Manager, Abercrombie and Fitch

Challenge: Compete more effectively with Fintech startups by empowering software developers with capability to build microservices based apps at pace.

Anonymous Fintech Organization

Solution

Simplified, standardized, microservices based Hybrid Cloud app dev platform using vert.x (async microservices framework) and OpenShift.

Why Red Hat

Enterprise open source software, helped with DevOps culture, trust, relationship, Openshift allows enabling Hybrid Cloud with a standard set of services.

Results

Improved speed of app development (No metrics shared in the session)

Products & Services

Red Hat OpenShift.

Challenge: Digitally transform the legacy business processes & customer experience to survive in the highly competitive health insurance business, decrease cost, and improve employee morale.

Florida Blue

Solution

On-prem PaaS based on Red Hat OpenShift, with the much needed executive sponsorship, DevOps culture, and running this as a program.

Why Red Hat

Relationship, Technology, Open Source principles.

Results

Improved speed of app development (No metrics shared in the session), able to attract and retain talent, happy developers, happy customers.

Products & Services

Red Hat OpenShift, mostly on-prem. Looking at using OpenShift across clouds in the future - IBM, AWS, Azure, etc. but need to understand how security and regulations change over time to host apps in the cloud



Challenge: Stay competitive by reducing the time and cost required to develop autonomous vehicles, and transform from a “car maker” to a “mobility provider”.

**BMW
GROUP**



Solution

High Performance D3 platform to gather and analyze massive amount of data from the global BMW test fleet for autonomous driving..

Why Red Hat

Relationship, Technology, Open Source principles.

Results

Faster autonomous driving development as now BMW manufacturing R&D teams are able to collect, store, and analyze vehicle sensor data in seconds rather than days or weeks.

Products & Services

Red Hat OpenShift



Disney Pixar

Challenge: Improving scalability using cloud-native solutions.

Solution

Moved from manual provisioning to BMAAS

Why Red Hat

Team is small so support was vital.

Results

Achieved infrastructure as code and develop a devops culture.

Products & Services

Red Hat OpenShift on OpenStack, Red Hat Ansible, Red Hat Enterprise Linux, Support

Challenge: Migrate to a cloud-based infrastructure.

U.S Citizenship and Immigration Services

Solution

Event driven architecture, DevOps culture

Why Red Hat

USCIS wanted both a cultural and technology shift, Red Hat was able to help facilitate both

Results

Helped convert 45% of processing to electronic processing, tracking toward goal of 100% by 2020.

Products & Services

Red Hat OpenShift

Numerical Algorithms Group

Challenge: Reduce costs by virtualizing GPU heavy workstations

Solution

Numerical Algorithms Group needed a flexible HPC environment for Oil and Gas research

Why Red Hat

NAG wanted to gain virtualization efficiencies by standardizing on a central server

Results

~80% cost savings (\$10K to \$2K per user)
Stable and scalable

Products & Services

Red Hat Virtualization

Santander

Challenge: Internal IT for financial institution focused on creating a global private cloud and networking

Solution

Wanted to build a global, private cloud for worldwide digital banking services, including networking.

Why Red Hat

Santander wanted a global platform, Red Hat build an OpenStack cloud

Results

Massive scale, 10's of thousands of running containers
Agile scaling vs HCI, can grow storage/compute separately
Increased performance, agility and at reduced cost

Products & Services

Red Hat OpenStack, Red Hat Ceph, Red Hat Ansible

Challenge: Reduce time-to-innovation while maintaining security and compliance.

Solution

Société Générale built a Cloud Innovation Platform for their developers

Why Red Hat

Société Générale wanted a cloud development platform that could accelerate innovation and still allow them to maintain the security and regulatory requirements of EU financial services industry.

Results

Reduced time-to-code from 2 months (2016) to 5 minutes (2018) by designing a sandboxed cloud platform that allowed them to push security and regulatory requirements to the border

Products & Services

Red Hat OpenShift, Red Hat CodeReady Workspaces



Société
Générale

Société Générale

“

In 2016, even in our private and public cloud development environments, it could take up to 2 months to provision a secure environment for an innovation project, during which developers could not even start coding. We can now do it in 5 minutes.

Patrice Lachance

Technical Adviser, Société Générale

Watch their session from Red Hat Summit.



Spark

Challenge: Migrating 230 Services to Containers.

Solution

Red Hat Fuse

Why Red Hat

Spark wanted to get agile and migrate to containers

Results

230 services on track to be migrated to containers within 6 months.

Products & Services

RHEL, Red Hat OpenShift, Red Hat Fuse.

Spark

“““

On our last release, we fixed 18 bugs in 2 days, and the release team was like "How did you do that?" It was thanks to containers. In April we moved 40 services (to containers) in a month, which was amazing.

Nilay Rathod

Domain Chapter Lead, Spark New Zealand

[Watch their session from Red Hat Summit.](#)

Challenge: Meteorcomm reduced complexity by moving to containers.

Meteorcomm

Solution

Meteorcomm reduced complexity

Why Red Hat

Meteorcomm wanted to reduce complexity and move to containers.

Results

Retired technical debt, enabled zero-downtime upgrades

Products & Services

Red Hat OpenShift, Red Hat A-MQ, RHEL

“““

We take advantage of OpenShift’s rolling upgrade deployment strategy so we can very easily do zero downtime upgrades.

Meteorcomm

Lance Pitt

Senior Manager of Engineering and development;
Meteorcomm

Source:
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Watch their session from Red Hat Summit.