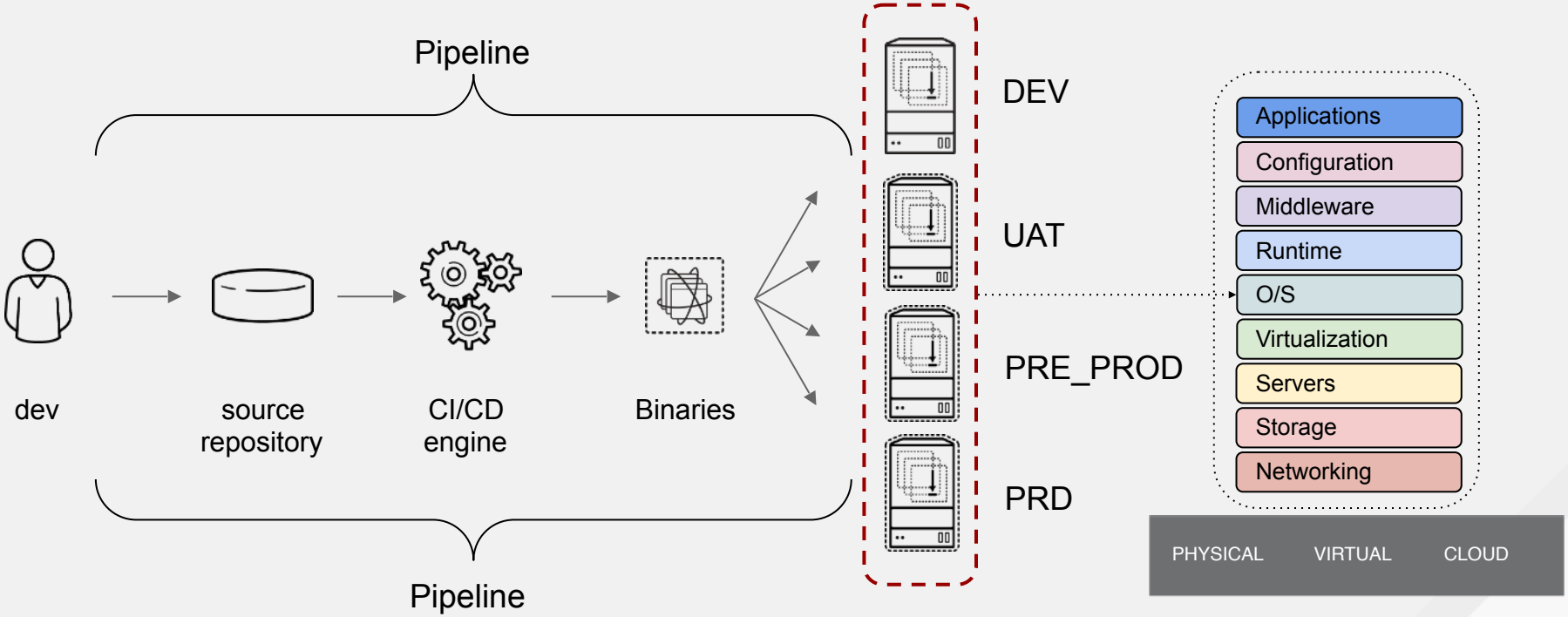
Red Hat OpenShift
Overview

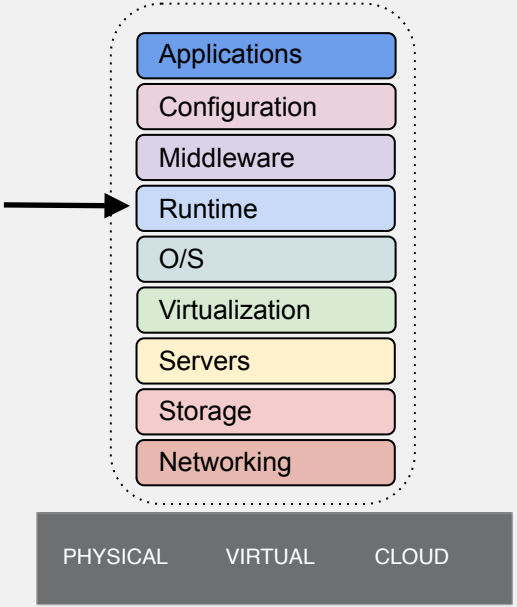
Waeil Eldoamiry
Solutions Architect

TRADITIONAL APPLICATION DELIVERY



zooooM on Runtime

I know how to code

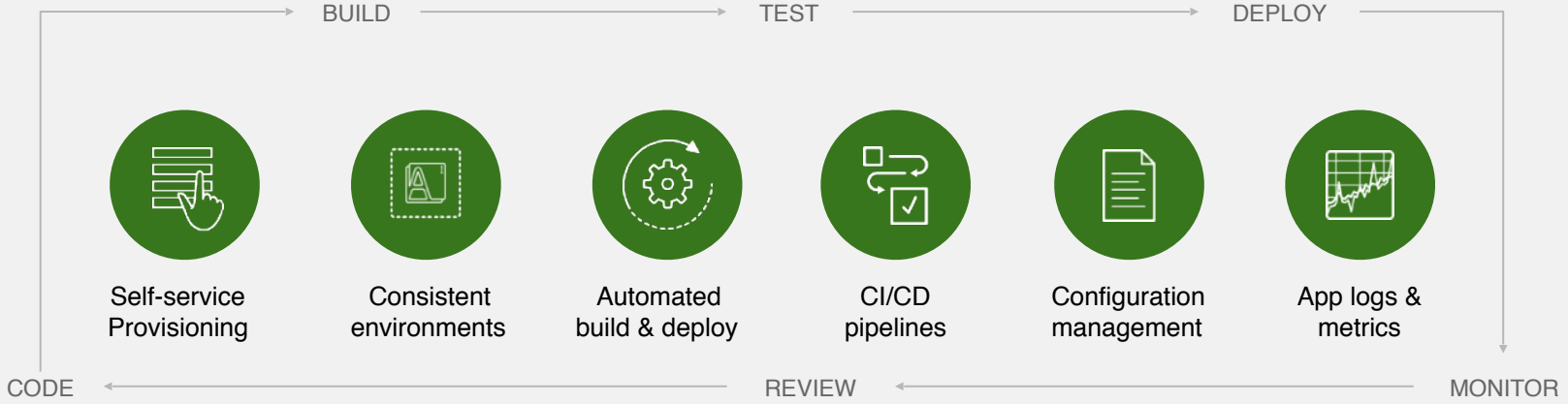


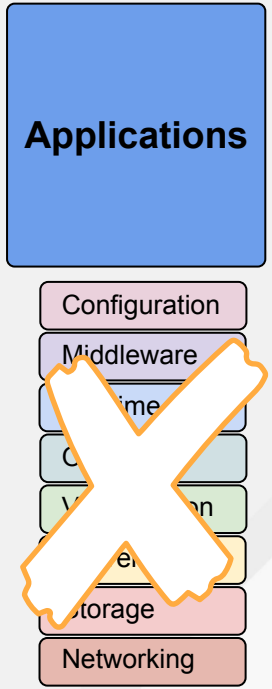
Challenges

- Coding
- Building Artifacts
- Testing (Unit, Integration, Load)
- Quality Review
- Deployment
- Configuration Management
- Traceability
- Observability

- Infrastructure
- High Availability
- Resiliency
- Security
- Scalability
- Logging
- Metrics
- RBAC

IS THERE A MAGIC SOLUTION



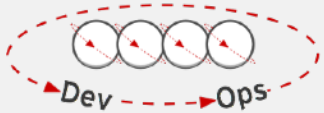


SOMETHING
What do we call it?

* coming soon

KEY TECHNOLOGY TRENDS

Development Process	Application Architecture	Deployment & Packaging	Application Infrastructure
Waterfall	Monolithic	Physical Servers	Datacenter
Agile	N-Tier	Virtual Servers	Hosted
DevOps	**Microservices**	**Containers**	**Cloud**



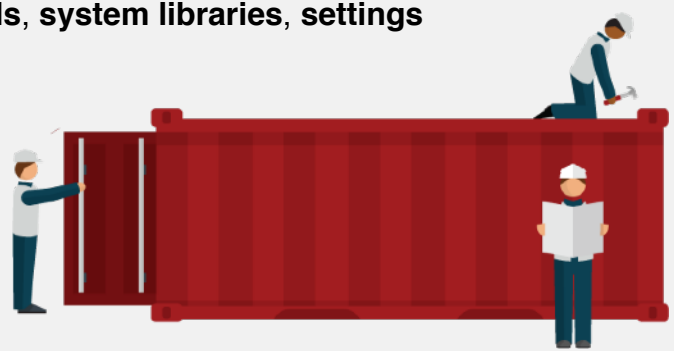
CONTAINERS

What is “Container”?

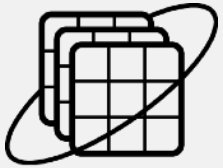
- Easy to deploy and portable across host systems
- Isolates applications on a host operating systems

Adopting a container strategy will allow **applications** to be easily **shared** and **deployed**.

A container image is a **lightweight**, **stand-alone**, executable package of a piece of software that includes everything needed to run it: **code**, **runtime**, **system tools**, **system libraries**, **settings**



Package application & dependencies
Simplify deployment
Speed delivery



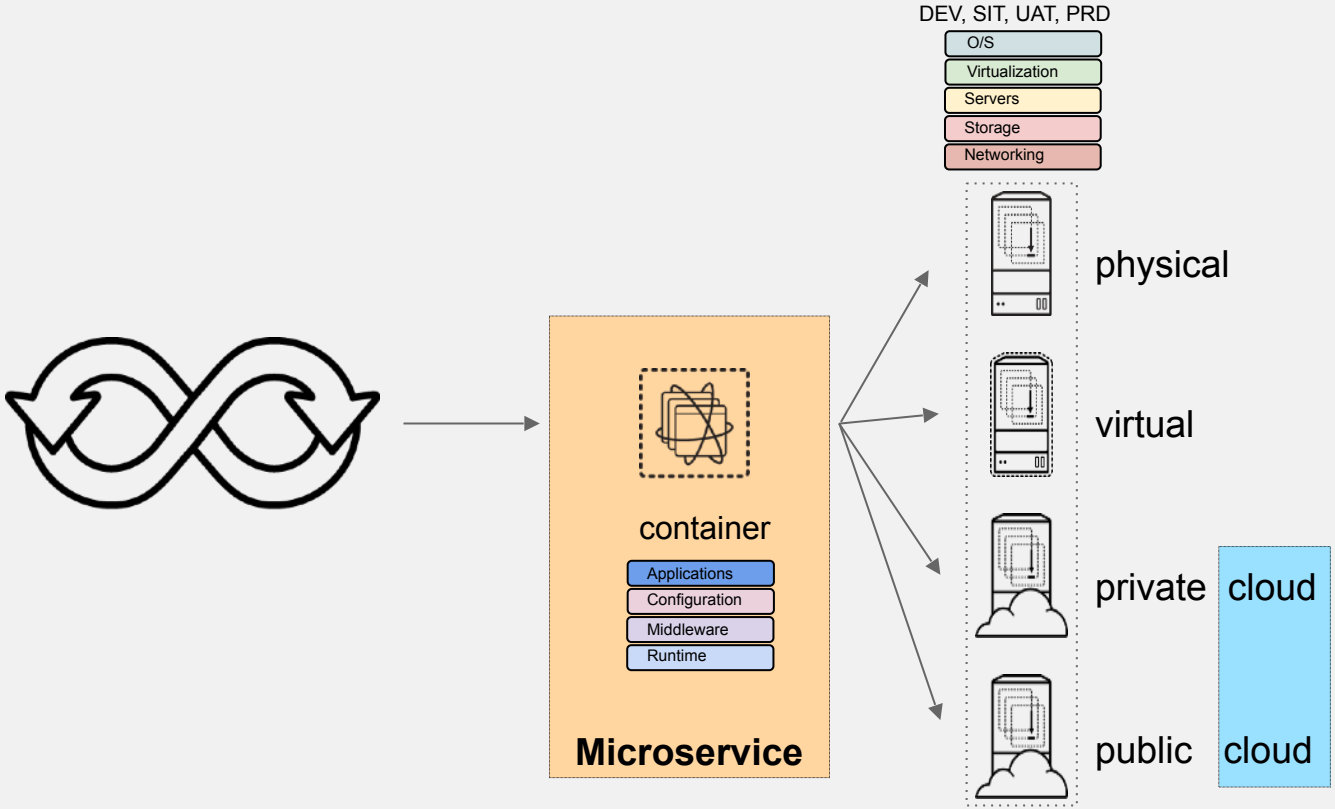
MICROSERVICES
CHARACTERISTICS

1. Componentization
   - Self contained
   - Independently Deployable
   - Independently Upgradable
2. Organized around business capabilities
3. Decentralized data management
4. Smart endpoints and dumb pipes
5. Location Transparency
6. Automation
7. API Focused
8. Decentralized Governance
9. Design for failure

DEVOPS

Everything as code	Application monitoring
Automate everything	Rapid feedback
Continuous Integration/Delivery	Rebuild vs. Repair
Application is always “releasable”	Delivery pipeline

MODERN APPLICATION DELIVERY



YOUR JOURNEY

DevOps

Self-Service, On-Demand, Elastic Infrastructure

Automation

CI & CD Deployment Pipeline

Advanced Deployment Techniques

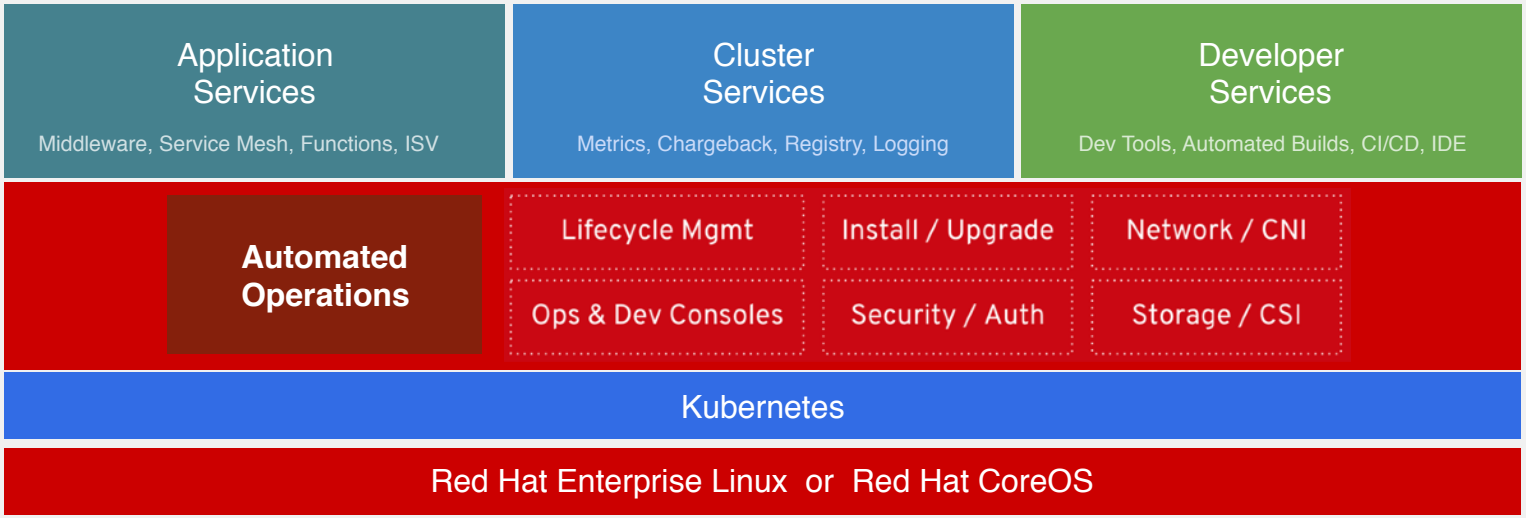
Advanced

Microservices

GET READY FOR THE BIG FIGHT!

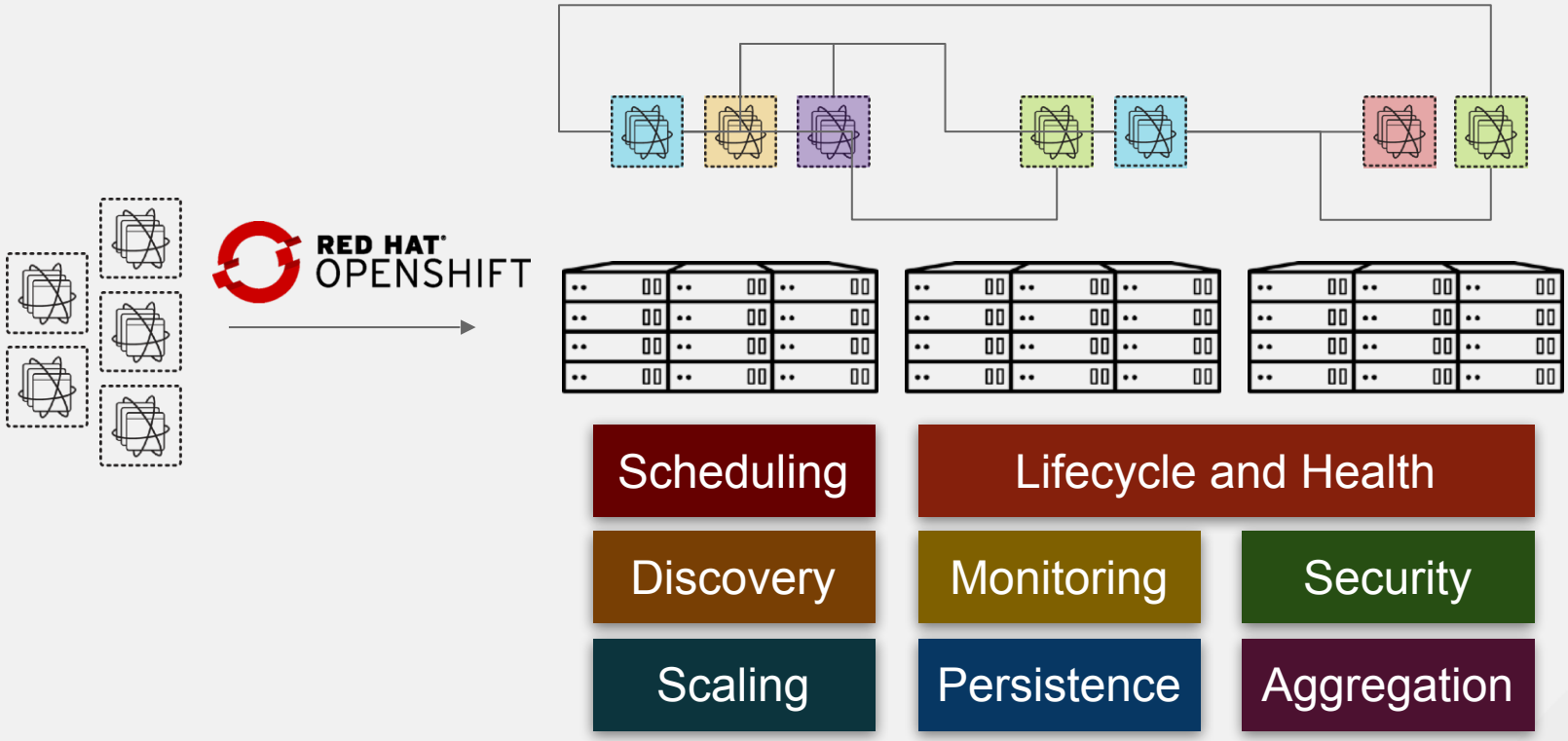
OPENSHIFT

OPENSHIFT CONTAINER PLATFORM



RED HAT® OPENSHIFT

CONTAINER ORCHESTRATION

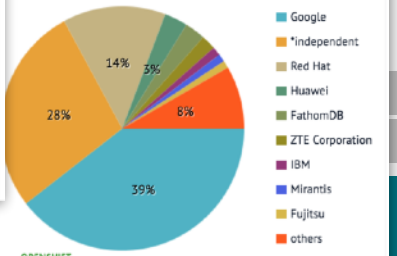


NOT ENOUGH, THERE IS MORE!

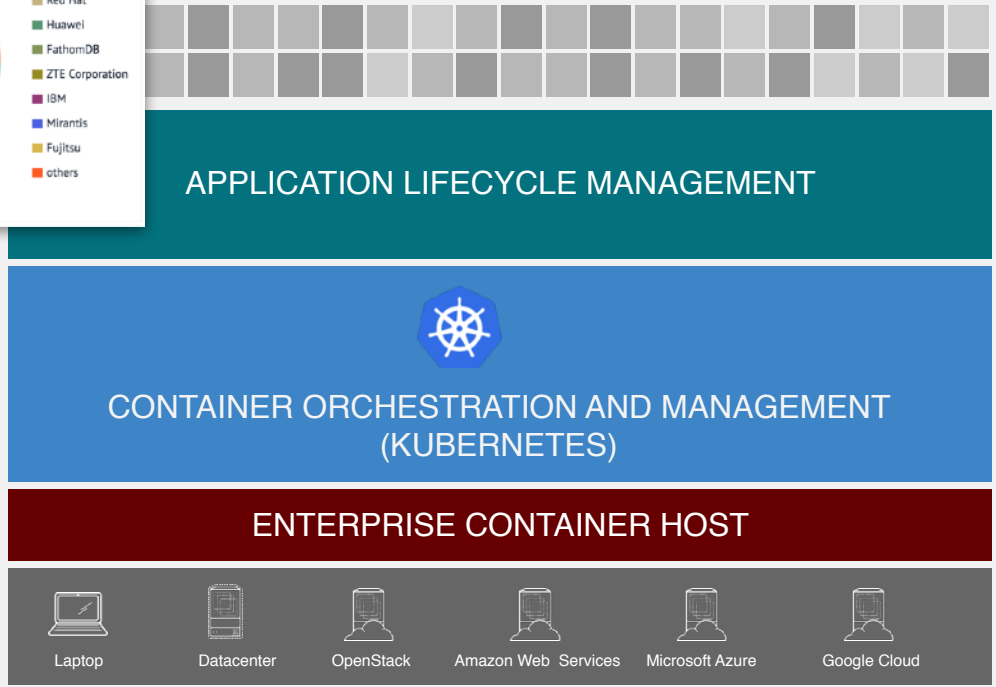
Multi-tenancy	Teams and Collaboration
Routing & Load Balancing	Quota Management
CI/CD Pipelines	Image Build Automation
Role-based Authorization	Container Isolation
Capacity Management	Vulnerability Scanning
Infrastructure Visibility	Chargeback

OPENSHIFT CONTAINER PLATFORM

#	Company	Commits
1	Google	41425
	*independent	28979
2	Red Hat	14313
3	Huawei	3238
4	FathomDB	2865
5	ZTE Corporation	2035
6	IBM	1223
7	Mirantis	1082
8	Fujitsu	1034
9	CoreOS	964



FEATURE	KUBERNETES	OPENSHIFT ORIGIN	OPENSHIFT CONTAINER PLATFORM
Multi-host container scheduling	✔	✔	✔
Self-service provisioning	✔	✔	✔
Service-discovery	✔	✔	✔
Persistent storage	✔	✔	✔
Multi-tenancy	⊗	✔	✔
Collaboration	⊗	✔	✔
Networking	⊗	✔	✔
Image registry	⊗	✔	✔
Monitoring	⊗	✔	✔
Log aggregation	⊗	✔	✔
CI/CD and DevOps	⊗	✔	✔
Application services (databases, runtimes, ...)	⊗	⊗	✔
Middleware services	⊗	⊗	✔
Built-in operational management	⊗	⊗	✔
Enterprise-grade operating system	⊗	⊗	✔
100% Open Source	✔	✔	✔
Community support	✔	✔	✔
Enterprise 24/7 Support	⊗	⊗	✔
Security response team	⊗	⊗	✔
Stable Lifecycle (7 years)	⊗	⊗	✔



ANY CONTAINER

RED HAT® OPENSHIFT

ANY INFRASTRUCTURE

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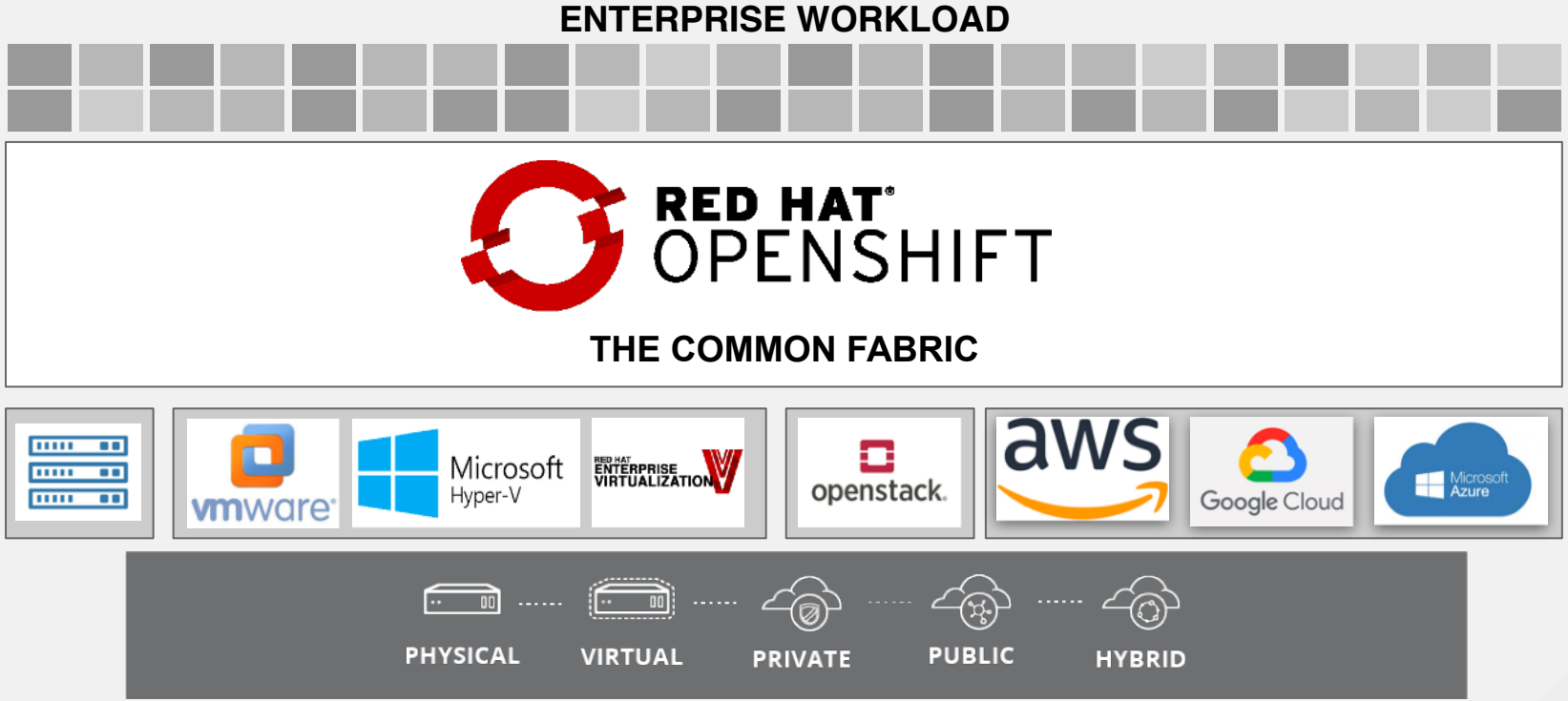
HYBRID CLOUD DEPLOYMENT



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Technology Focus

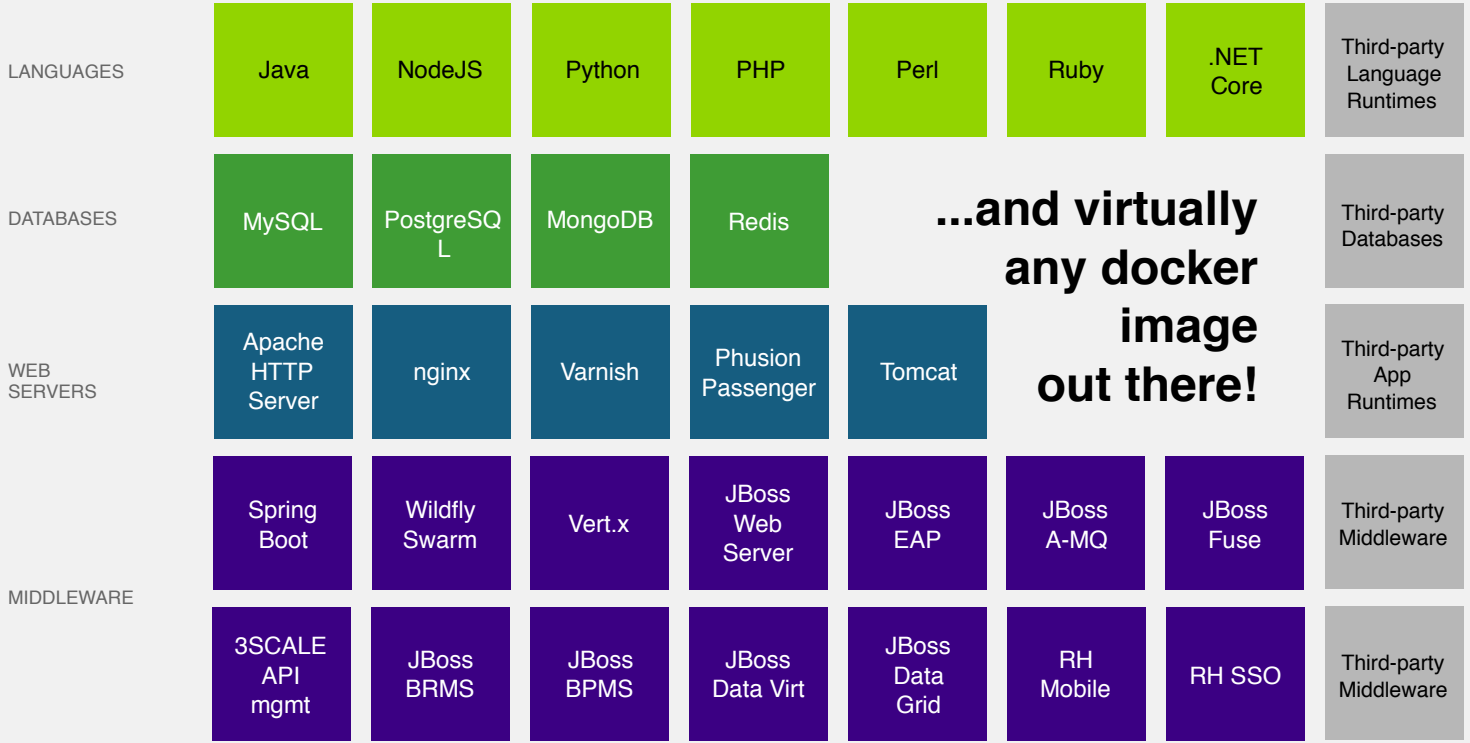
Developer Productivity

- Cross Technology Consistent Experience
- Service Catalog (Application Services)
- Self-Service Portal
- Automated Build and Deployment (CICD)
- Configuration Management
- Service Resiliency
- Team Organization (RBAC)
- Application Frameworks
- Service Mesh

Operational Efficiency

- Infrastructure transparency
- Built-In HA
- Advanced Deployment Strategies
- Self-Healing
- Auto Scaling
- Application Probs (Readiness and Liveness)
- Central Logging
- Metrics and capacity Management
- Automated Day 2 Ops
- Cloud Adoption

TRUE POLYGLOT PLATFORM



CrunchyData

GitLab

Iron.io

Couchbase

Sonatype

EnterpriseDB

NuoDB

Fujitsu

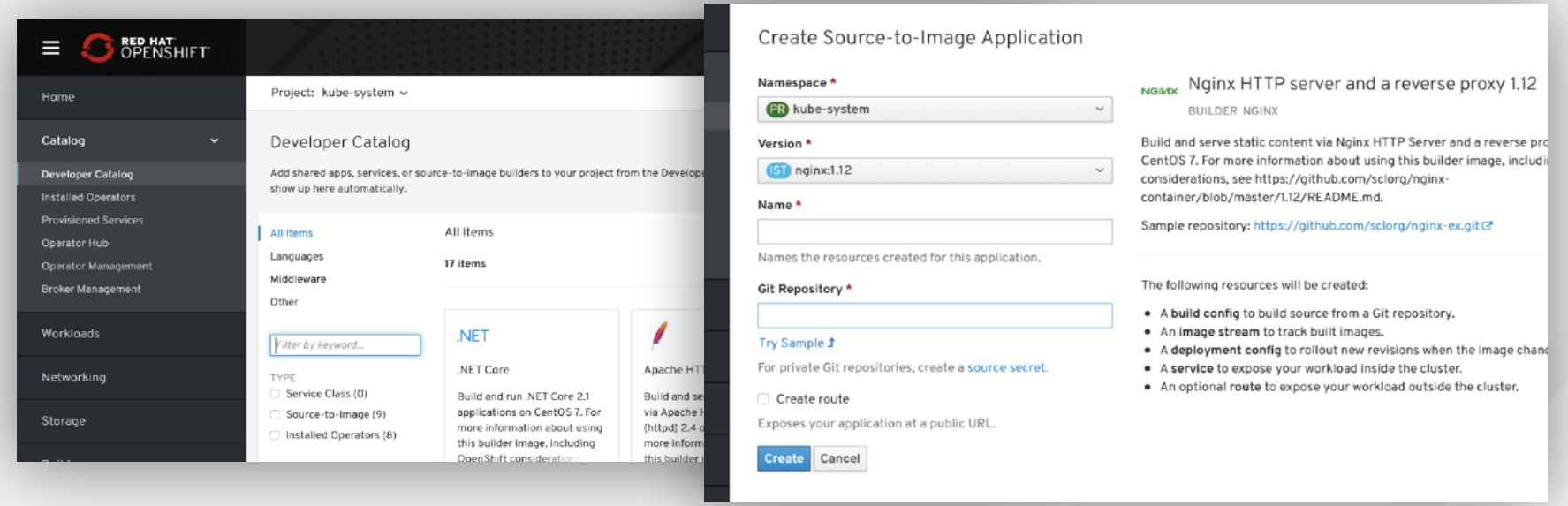
and many more

redhat

DEVELOPER SELF-SERVICE

ONBOARDING EXPERIENCE

- Entry point for a developer to access all services available to them
- Merges all capabilities from Operators, Service Catalog, Brokers, and S2I



* coming soon

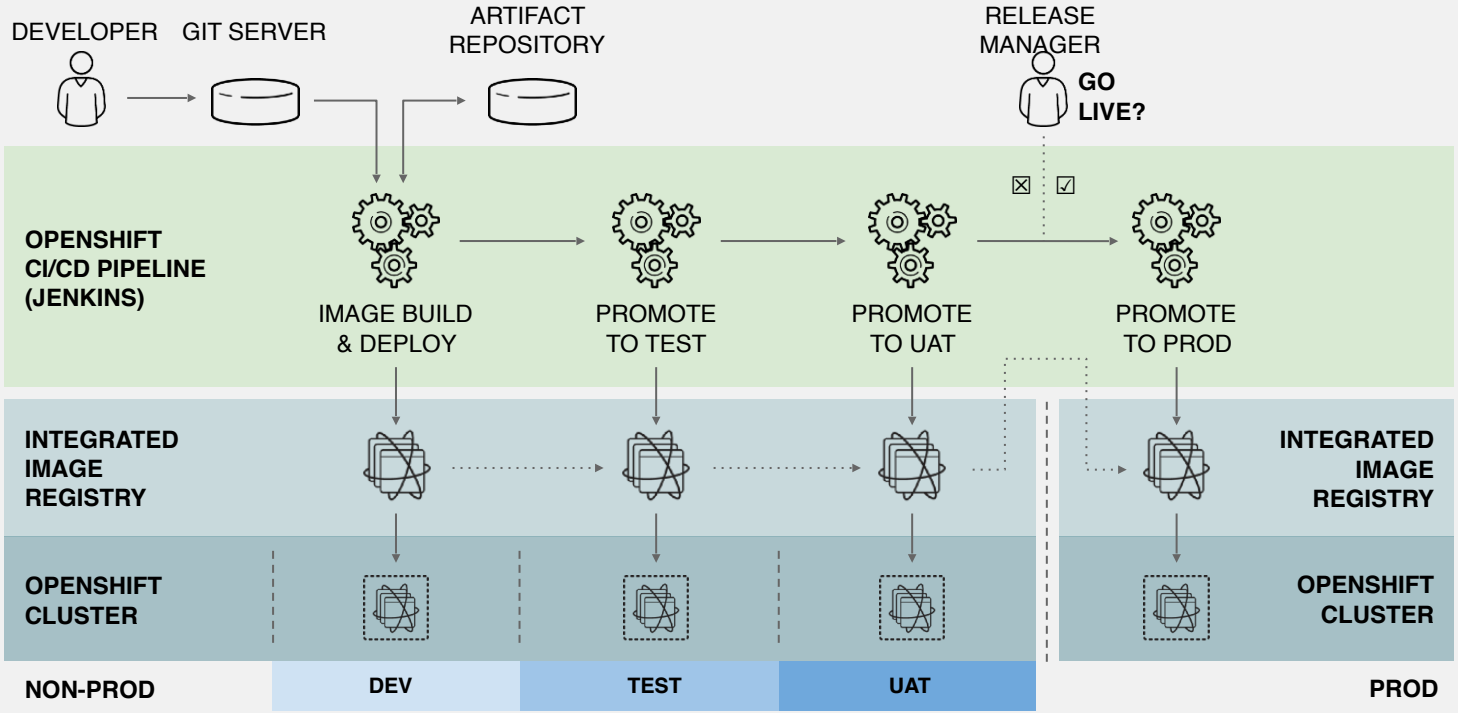
CROSS TECHNOLOGY DEVELOPMENT

CONSISTENT EXPERIENCE

- Consistent provisioning process (**Service Catalog**)
- Consistent Build and Deployment process (**S2I**)
- Dependencies hassle free application delivery (**Container Image**)
- Consistent Configuration Management (**IS, DC, ConfigMap, Secret**)
- Cross technology services resiliency (**self-healing, Autoscaling**)
- Cross technology health check (**Readiness and Lifeness Probs**)
- Cross technology deployment strategies (**Rolling, Canary, ..etc**)
- Cross technology Microservices platform (**Istio**)
- Cross technology Application Logs (**EFK**)
- Cross technology Web Based IDE (**Code Ready Workspaces**)
- Commonly used runtimes and Frameworks (**Spring Boot, Thorntail, Wildfly Swarm, Vert.x, Open Liberty**, ...etc)

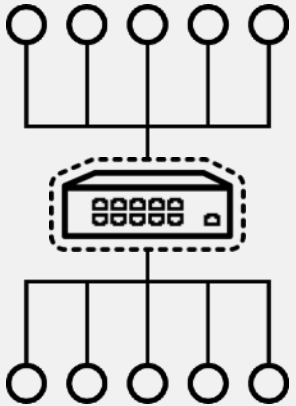
* coming soon

CONTINUOUS DELIVERY PIPELINE



OPENSHIFT NETWORKING

- Software Defined Networking (SDN) for a unified cluster network to enable pod-to-pod communication
- Built-in internal DNS to reach services by name
- OpenShift follows the Kubernetes Container Networking Interface (CNI) plug-in model



OPENSHIFT SDN

FLAT NETWORK (Default)

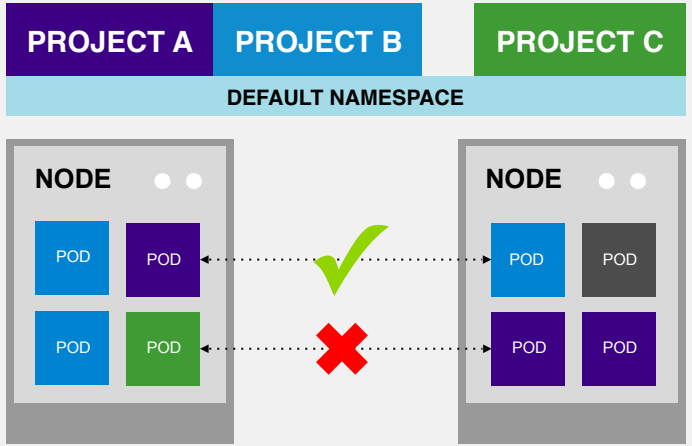
- All pods can communicate with each other across projects

MULTI-TENANT NETWORK

- Project-level network isolation
- Multicast support
- Egress network policies

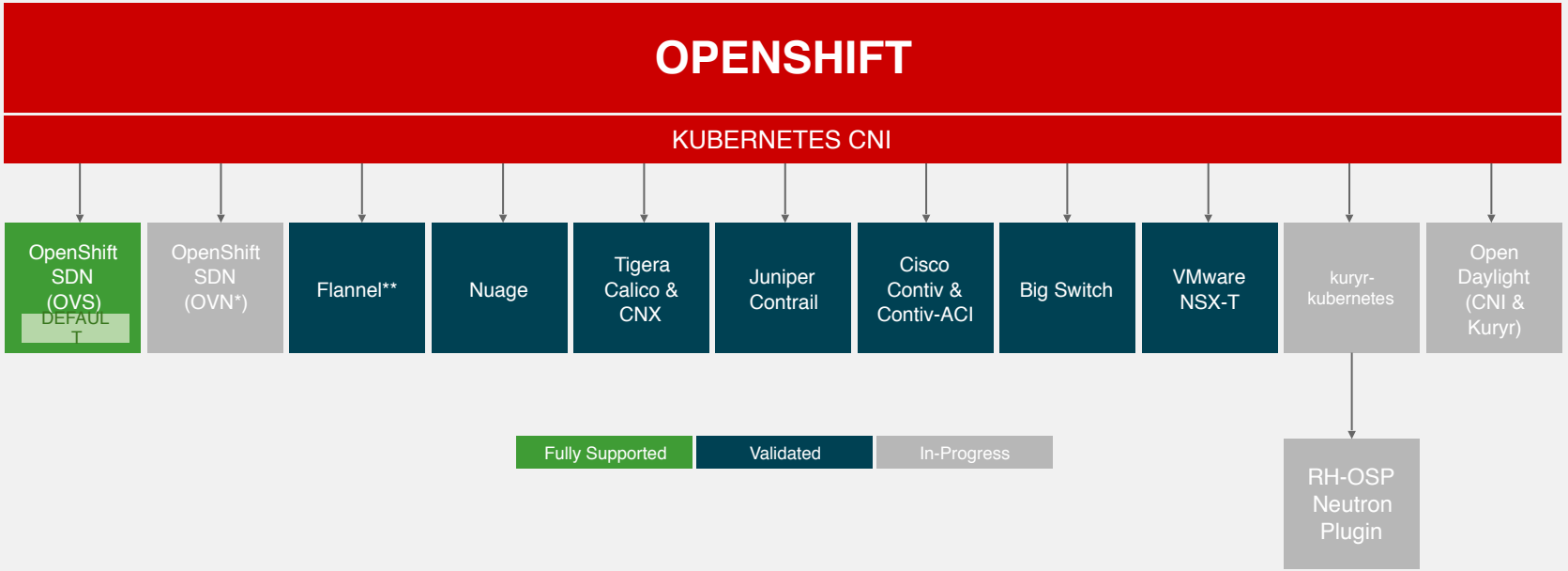
NETWORK POLICY

- Granular policy-based isolation



Multi-Tenant Network

OPENSHIFT NETWORK PLUGINS

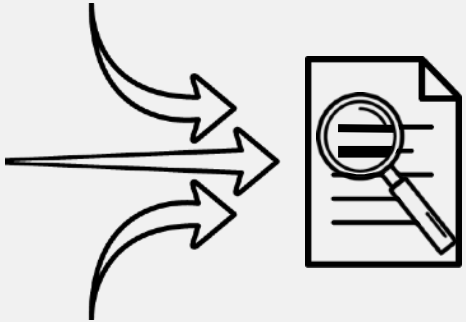


* Coming as default in OCP 4.1

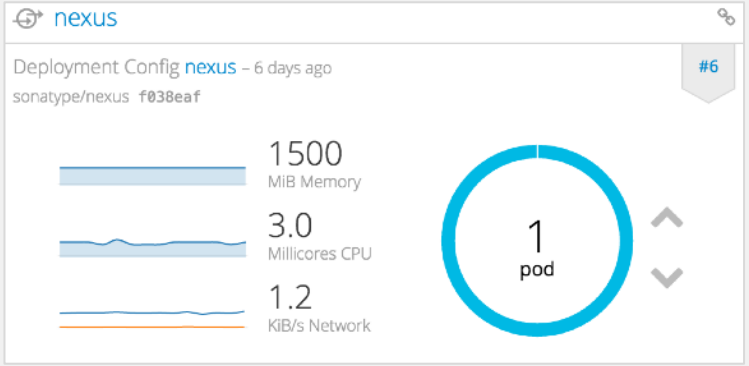
** Flannel is minimally verified and is supported only and exactly as deployed in the OpenShift on OpenStack reference architecture

CENTRAL LOG MANAGEMENT WITH EFK

- EFK stack to aggregate logs for hosts and applications
  - **Elasticsearch:** a search and analytics engine to store logs
  - **Fluentd:** gathers logs and sends to Elasticsearch.
  - **Kibana:** A web UI for Elasticsearch.
- Access control
  - Cluster administrators can view all logs
  - Users can only view logs for their projects
- Ability to send logs elsewhere
  - External elasticsearch, Splunk, etc



CONTAINER METRICS



HAWKULAR | HEAPSTER | PROMETHEUS | Grafana

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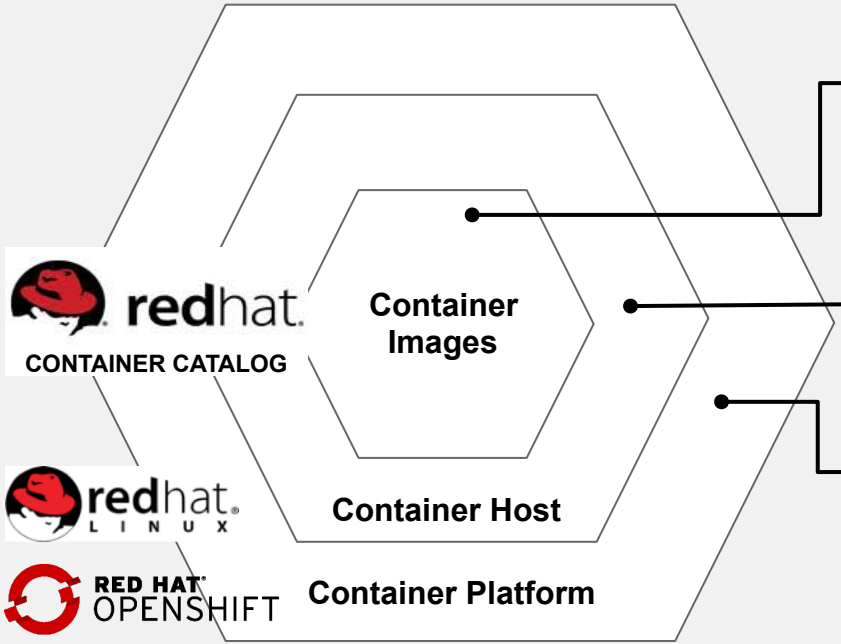
SECURITY



Trusted registry, Image scanning, signing, Isolation

SELinux, Cgroups, Kernel Namespaces, Seccomp

Authentication, RBAC, Quota, Resource Limits, Network Isolation, Audit, Trusted Registry, Control Image Availability, Image Scanning, Secret Management

PCI DSS Product applicability Guide to help customers understand how the Payment Card Industry Data Security Standard (PCI DSS) apply to the Red Hat OpenShift Container Platform.

https://www.redhat.com/en/resources/openshift-pci-product-applicability-guide-datasheet

PCI DSS Product applicability Guide

Greater security and compliance

- **PCI DSS product applicability guide** to help customers understand how the Payment Card Industry Data Security Standard (PCI DSS) apply to the Red Hat OpenShift Container Platform
- Red Hat engaged **Coalfire Systems, Inc.**, a respected Payment Card Industry Qualified Security Assessor (QSA) company, to conduct an independent technical assessment of OpenShift Container Platform running on RHEL and/or Atomic Host. The applicability guide examines the PCI DSS through the eye of a QSA and identifies where the various requirements apply, or do not apply, to the overall solution. Overall, Red Hat and Coalfire came to the conclusion that OpenShift could be configured and deployed in a way that would satisfy the PCI DSS, and we produced a Product Applicability Guide (PAG) to help you understand these opinions.
- Find the guide on https://www.redhat.com/en/resources/openshift-pci-product-applicability-guide-datasheet

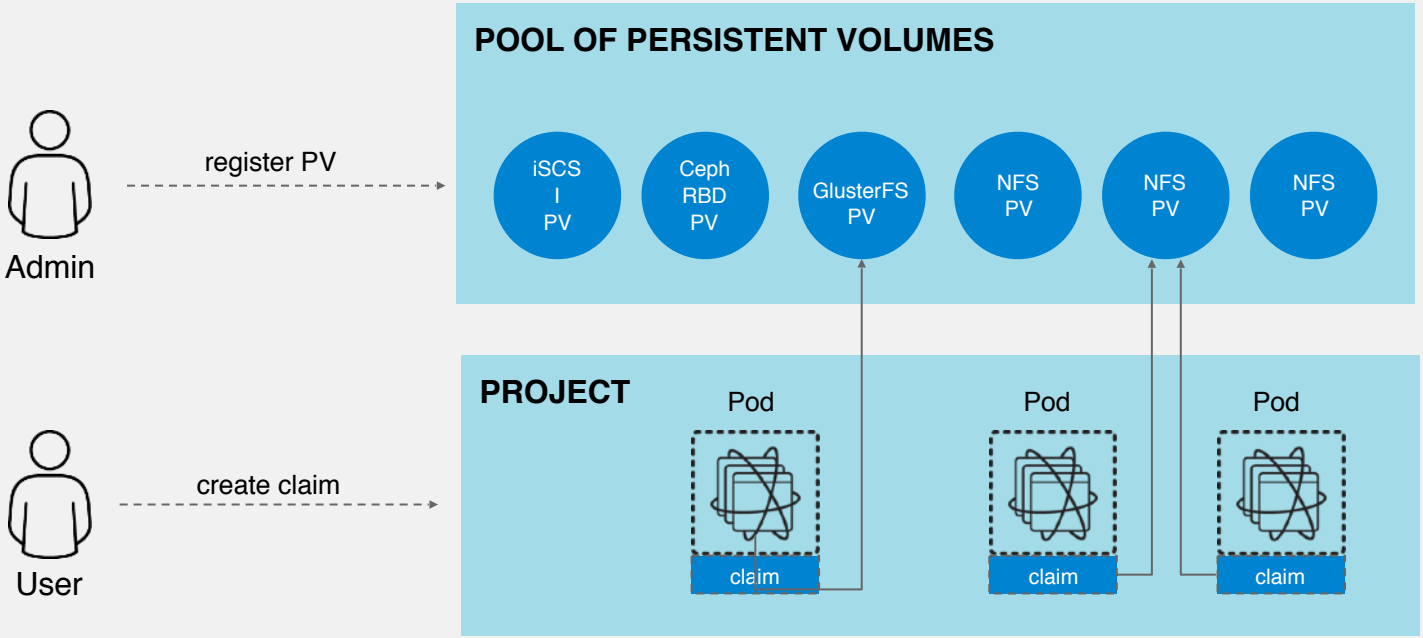
PERSISTENT STORAGE

- Persistent Volume (PV) is tied to a piece of network storage
- Provisioned by an administrator (static or dynamically)
- Allows admins to describe storage and users to request storage
- Assigned to pods based on the requested size, access mode, labels and type

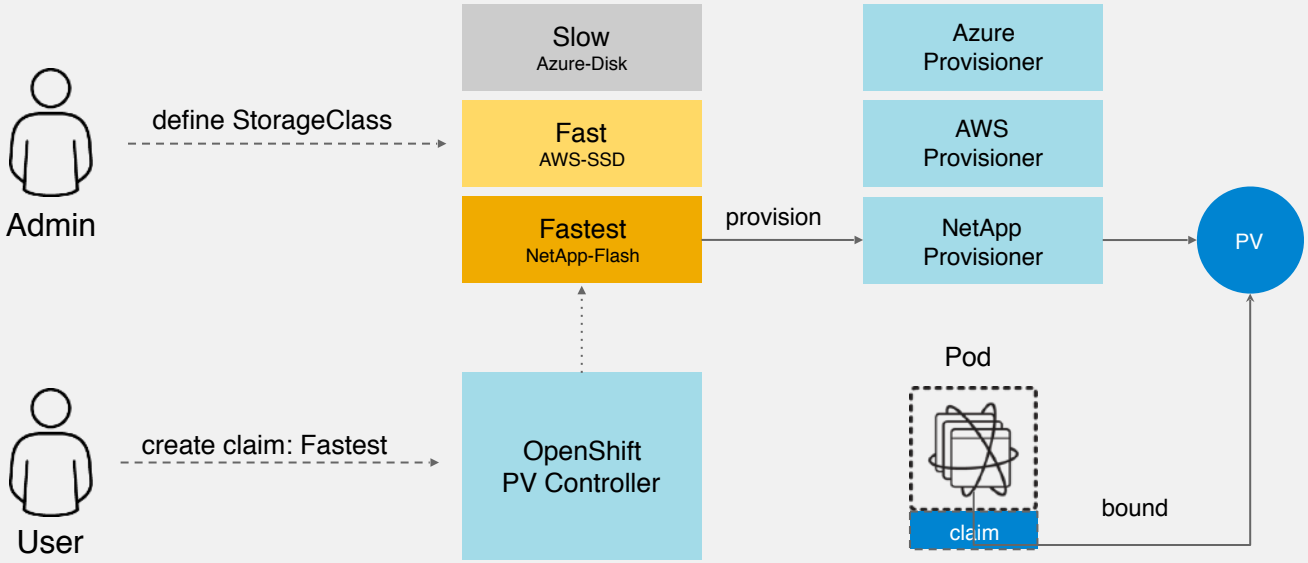
NFS	OpenStack Cinder	iSCSI	Azure Disk	AWS EBS	FlexVolume
GlusterFS	Ceph RBD	Fiber Channel	Azure File	GCE Persistent Disk	VMWare vSphere VMDK
		NetApp Trident*	Container Storage Interface (CSI)**		

* Shipped and supported by NetApp via TSANet
** Tech Preview

PERSISTENT STORAGE

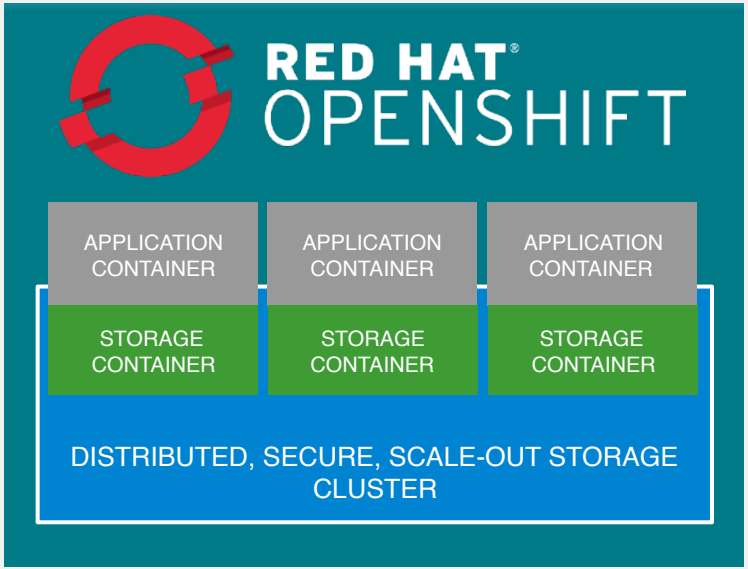


DYNAMIC VOLUME PROVISIONING

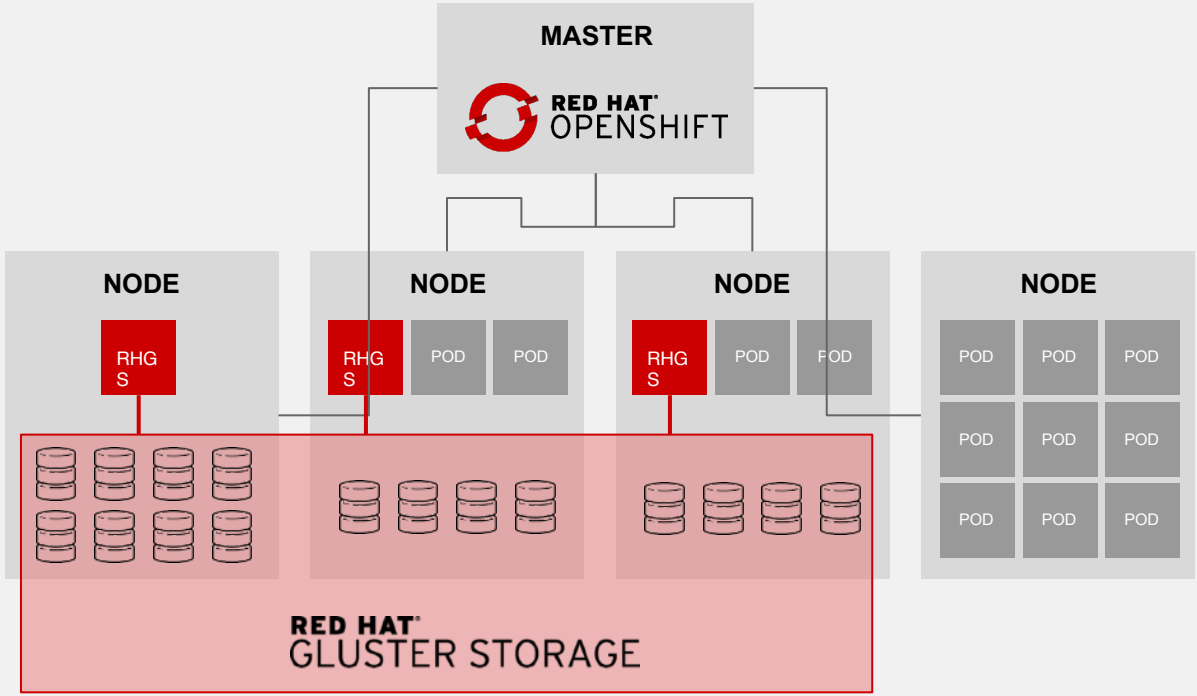


OPENSHIFT CONTAINER STORAGE

- Containerized Red Hat Gluster Storage
- Native integration with OpenShift
- Unified Orchestration using Kubernetes for applications and storage
- Greater control & ease of use for developers
- Lower TCO through convergence
- Single vendor Support



OPENSHIFT CONTAINER STORAGE



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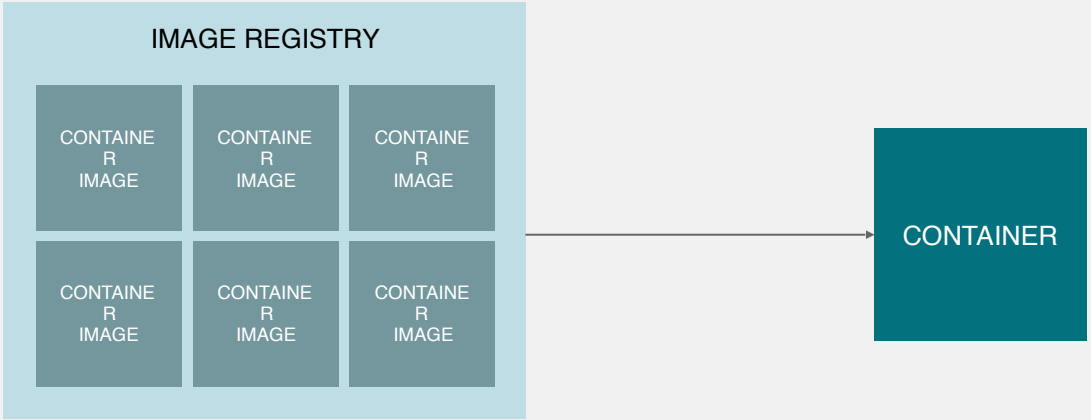
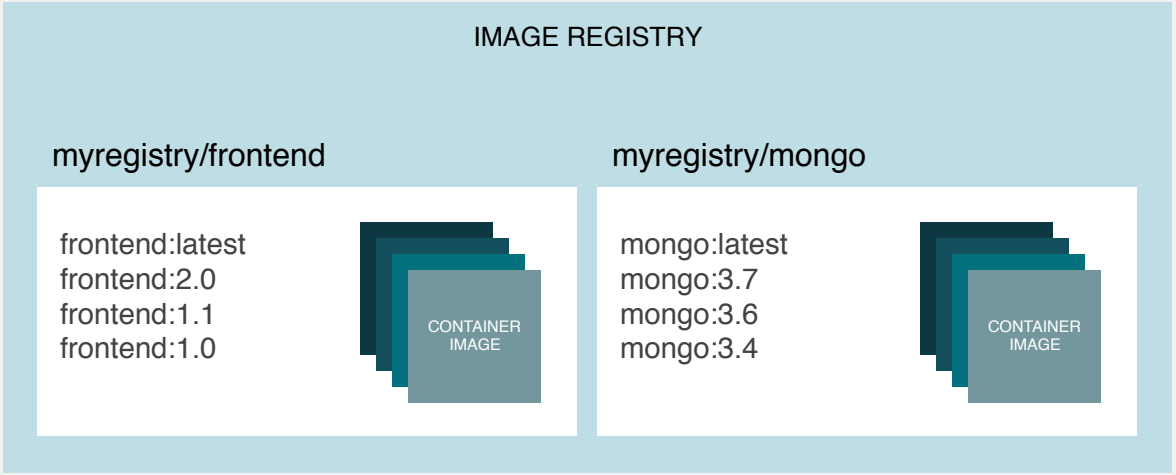
OPENSHIFT CONTAINER REGISTRY OCR

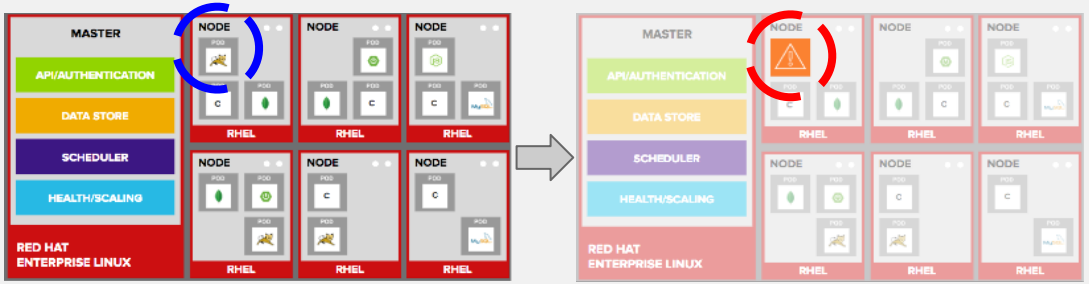


VERSIONING and RBAC

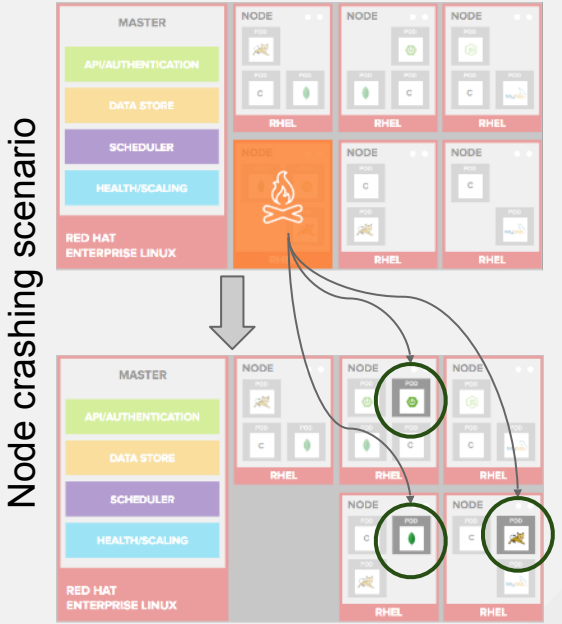


SELF-HEALING

PODS AND NODES



Pod crashing scenario



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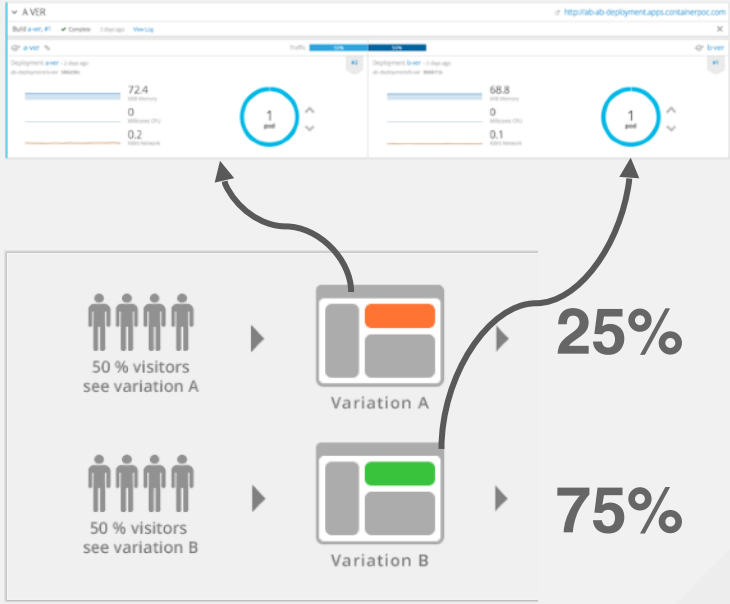
DEPLOYMENT STRATEGIES

Rolling, Recreate, Blue/Green, A/B

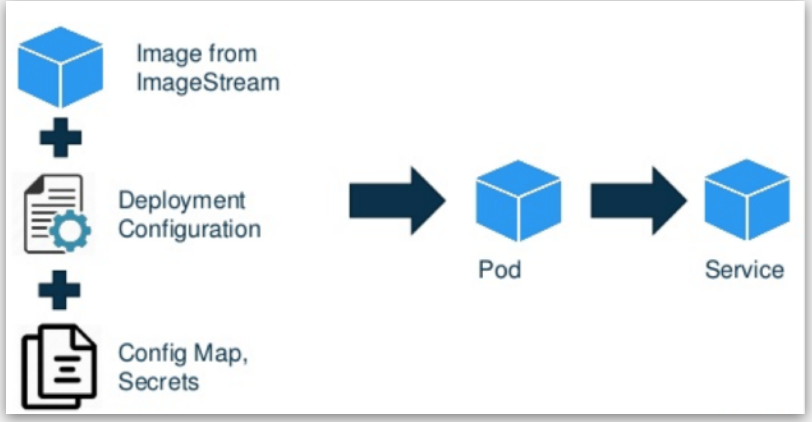
- Support for zero downtime deployment
- Canary deployment
  - A/B
  - Blue/Green
- Custom deployment strategy
  - Pre deployment hooks
  - Post deployment hooks
- Deployment triggers



CONFIGURATION MANAGEMENT

ConfigMap, Secret, Environment Parameters, Image Promotion

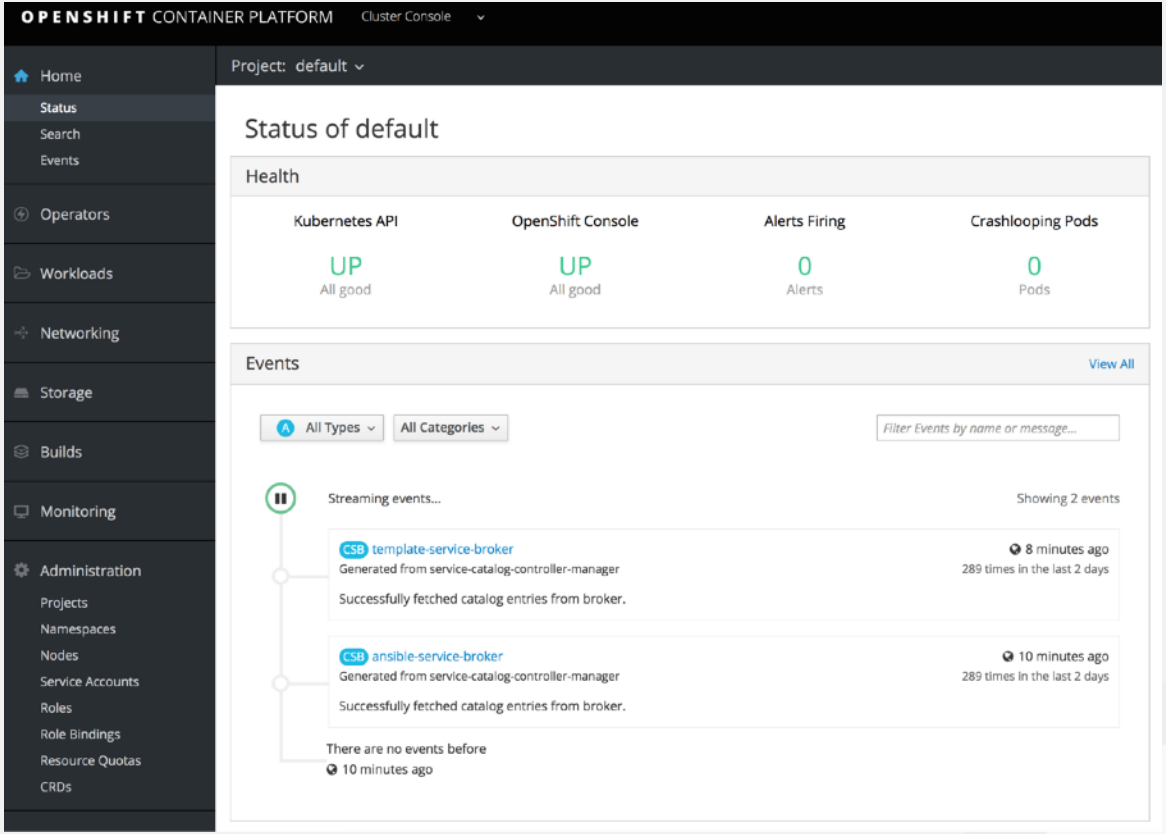
- The ConfigMap object provides mechanisms to inject containers with configuration data.
- The ConfigMap API object holds key-value pairs of configuration data that can be consumed in pods.
- Configuration data can be consumed in pods in a variety of ways. A ConfigMap can be used to:
  - Populate the value of environment variables.
  - Set command-line arguments in a container.
  - Populate configuration files in a volume.
- Secrets provides data encryption for data at rest and in motion



OPENSHIFT CLUSTER CONSOLE

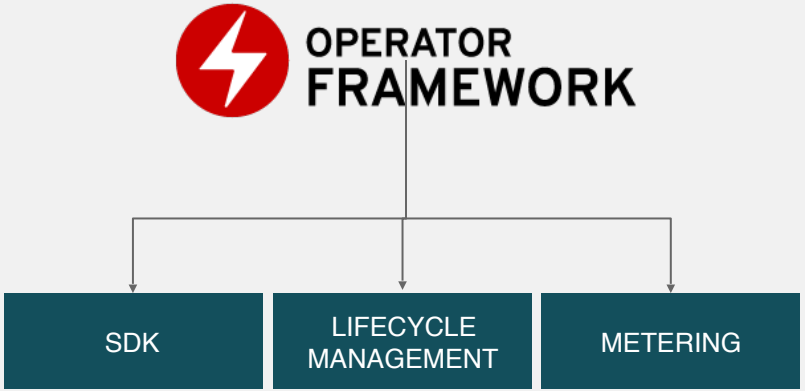
Cluster Management

- Overall Health
- Utilization
- Cluster Nodes
- Storage
- Networking
- Projects
- Workloads
- Built-in Dashboards
- Custom Dashboards
- RBAC
- More...



OPERATOR FRAMEWORK

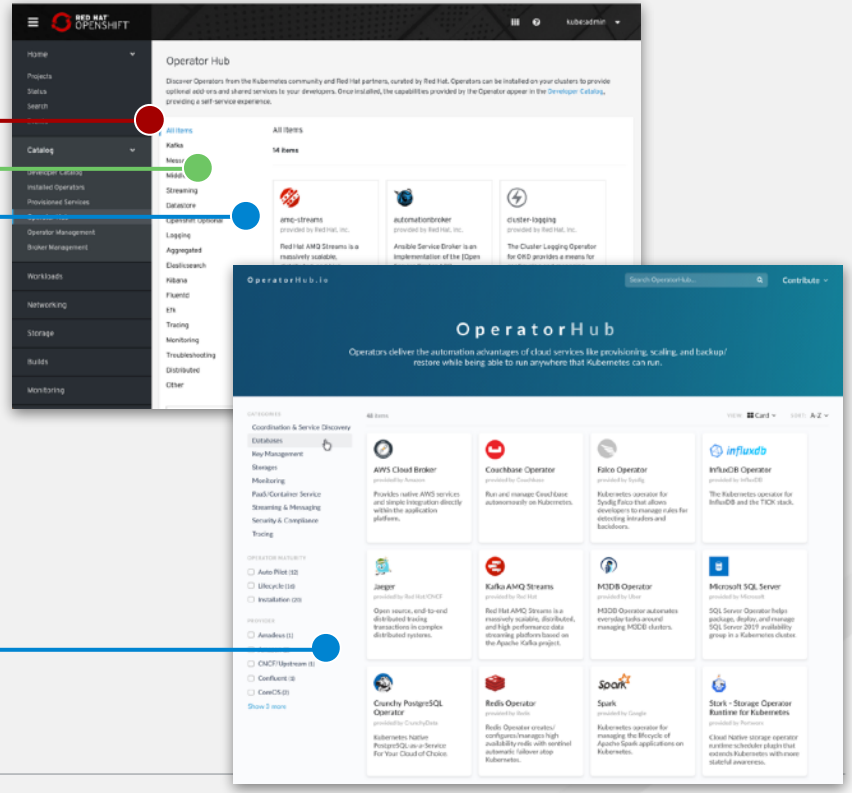
Operators codify operational knowledge and workflows to automate lifecycle management of containerized applications with Kubernetes



Operators are only targeting the platform, But also all workloads running on top of it!

OPERATOR HUB COMMUNITY
CERTIFIED & SUPPORTED OPENSHIFT OPERATORS

- Accessible to admins only
- Discovery/install of all optional components and apps
- Upstream and downstream content
- ISV partners will support their Operators



TYPES OF OPERATORS
Red Hat Products
ISV Partners
Community