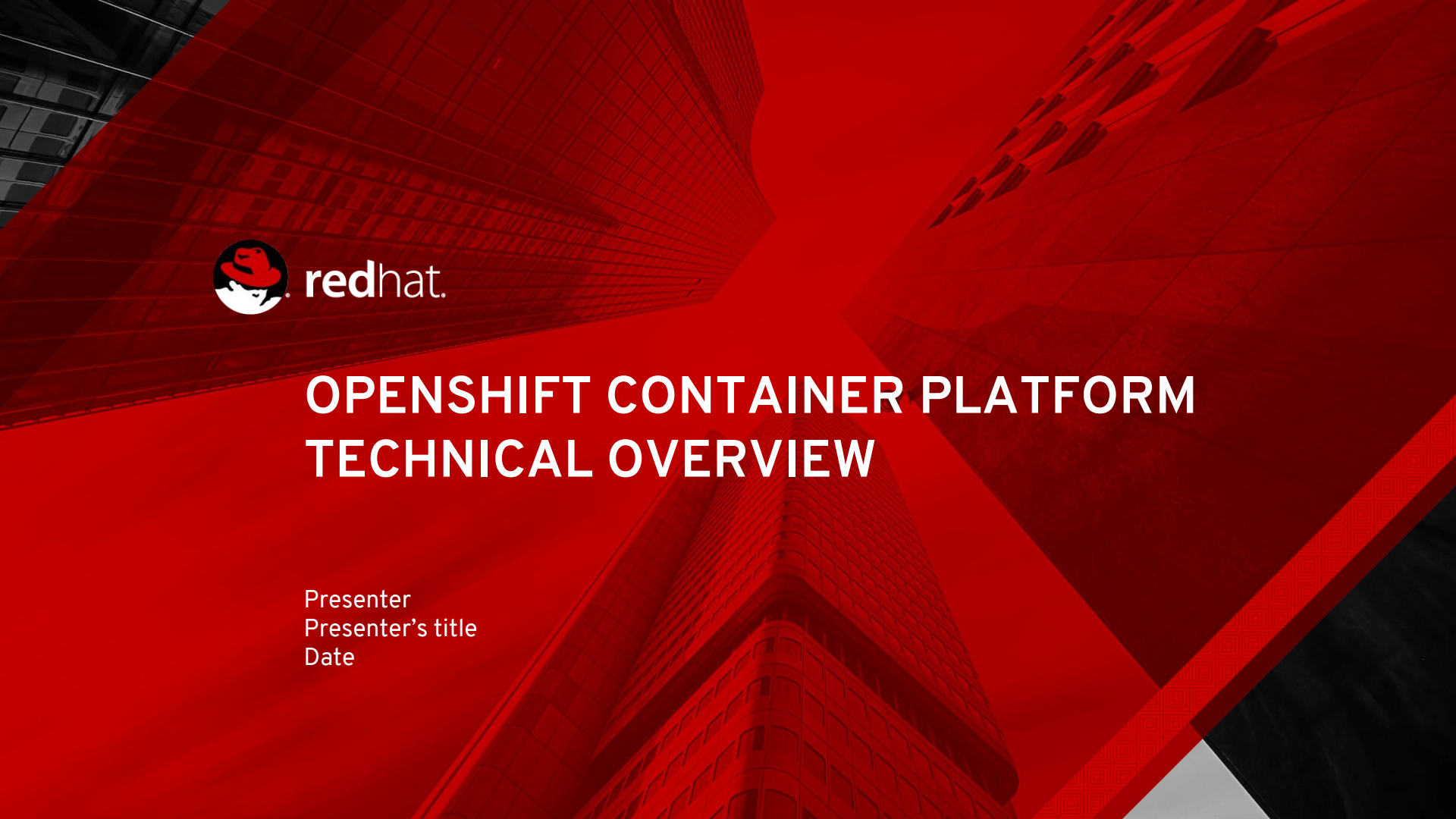
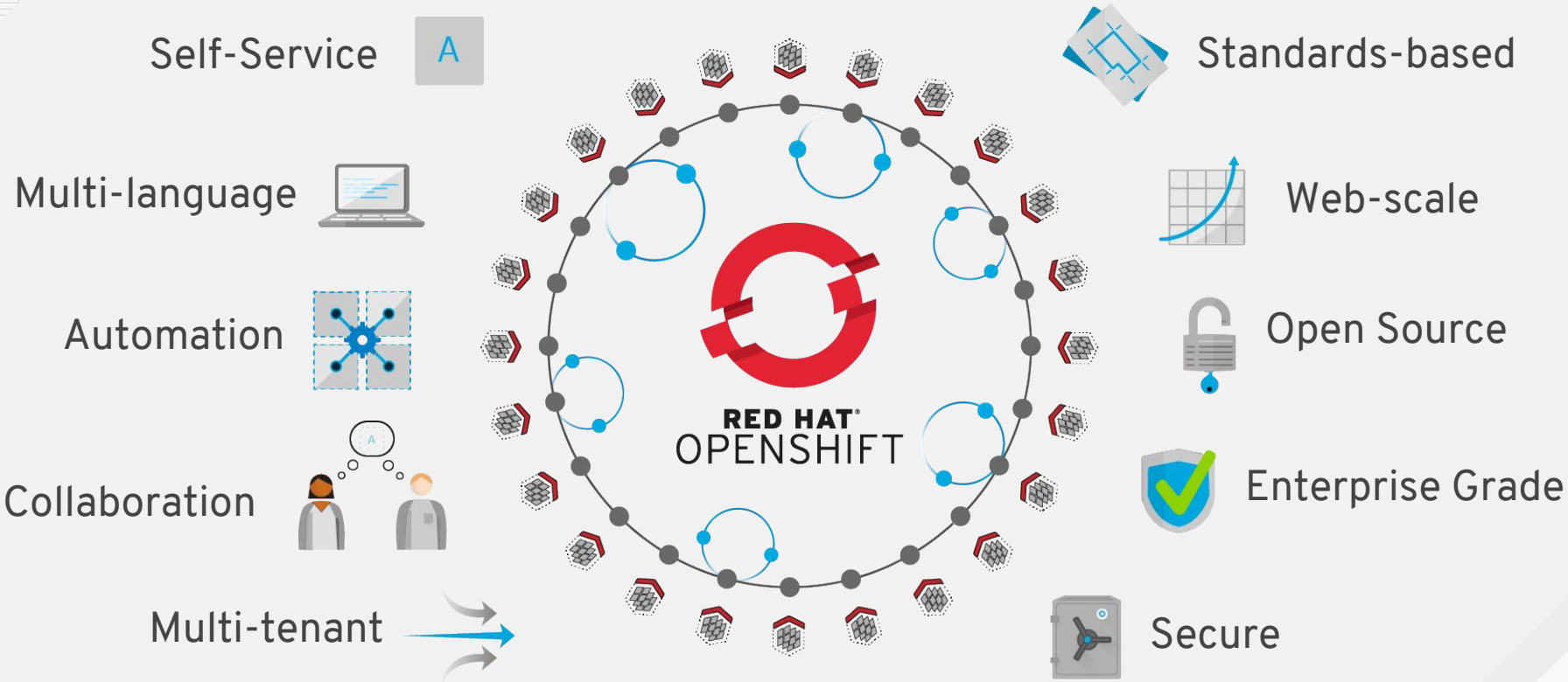
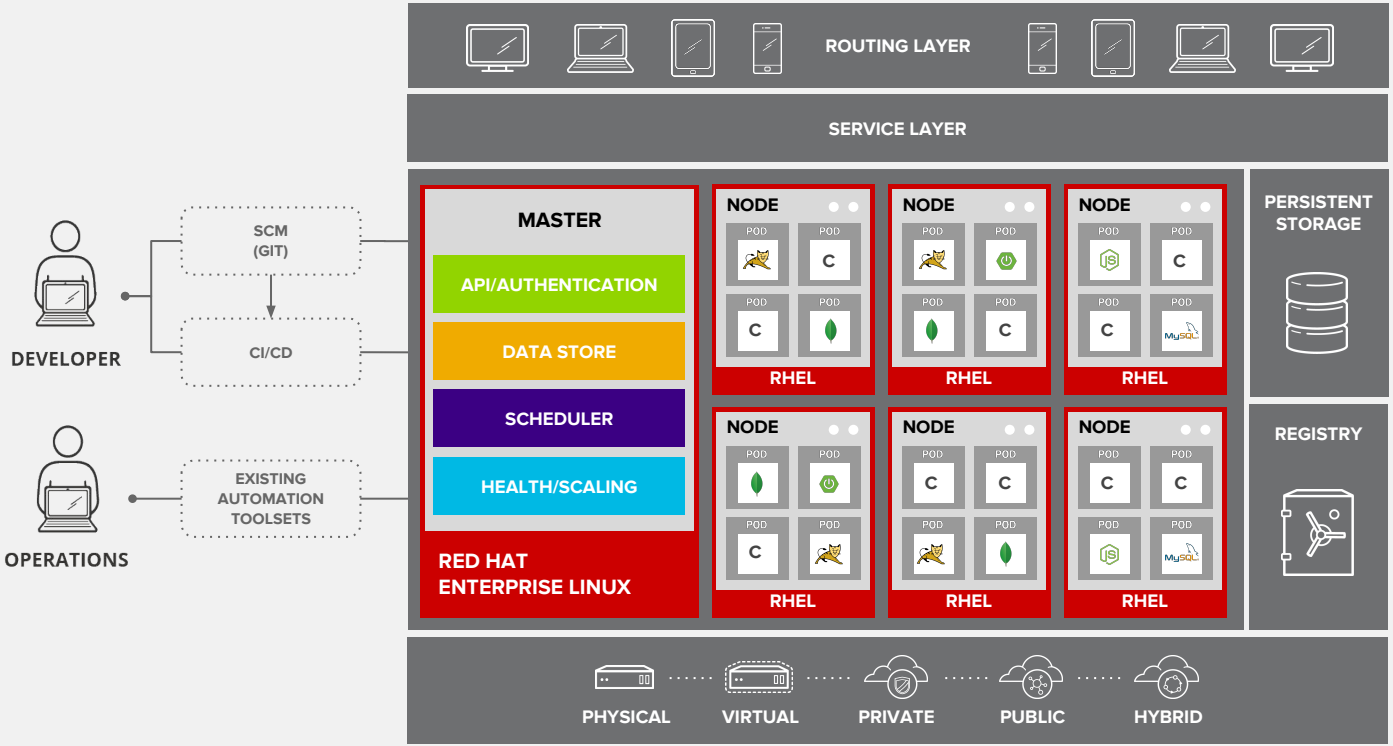


OPENSHIFT CONTAINER PLATFORM TECHNICAL OVERVIEW

Presenter
Presenter's title
Date


Self-Service
Multi-language
Automation
Collaboration
Multi-tenant
RED HAT
OPENSHIFT
Standards-based
Web-scale
Open Source
Enterprise Grade
Secure

OPENSHIFT ARCHITECTURE

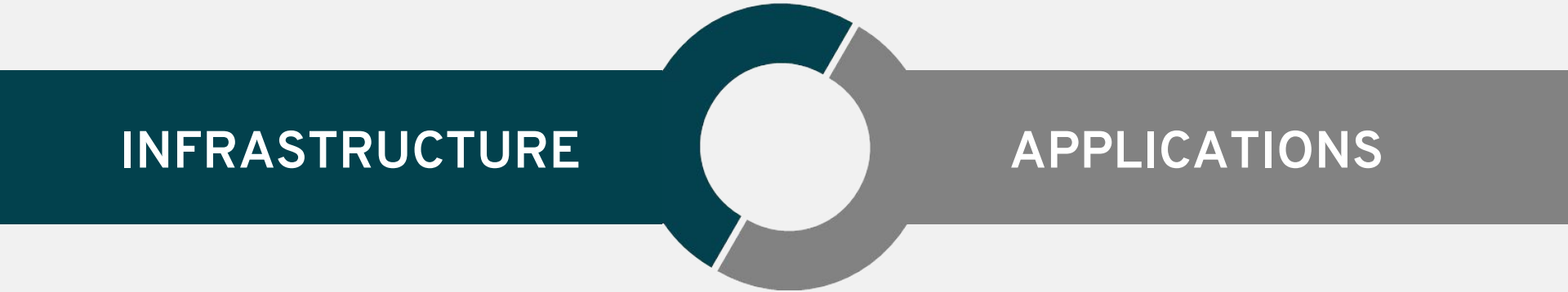


redhat.


LINUX CONTAINERS
redhat.

WHAT ARE CONTAINERS?

It Depends Who You Ask

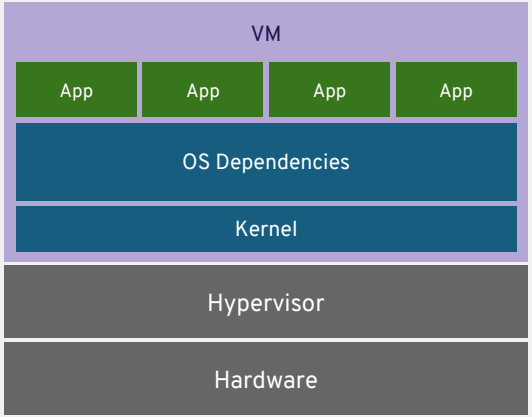


- Application processes on a shared kernel
- Simpler, lighter, and denser than VMs
- Portable across different environments

- Package apps with all dependencies
- Deploy to any environment in seconds
- Easily accessed and shared

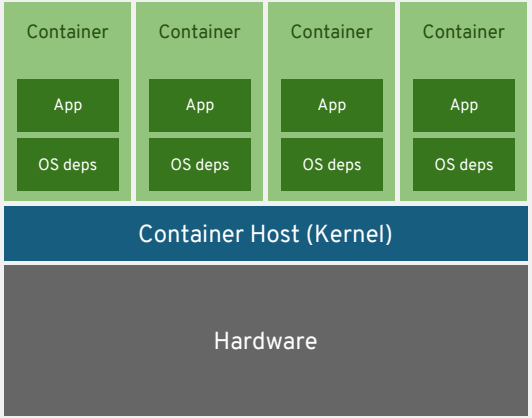
VIRTUAL MACHINES AND CONTAINERS

VIRTUAL MACHINES



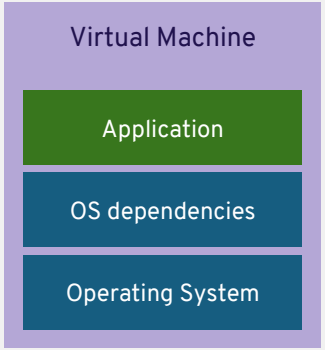
virtual machines are isolated
apps are not

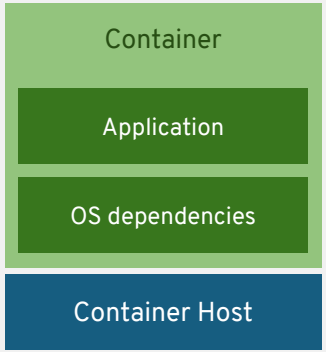
CONTAINERS



containers are isolated
so are the apps

VIRTUAL MACHINES AND CONTAINERS

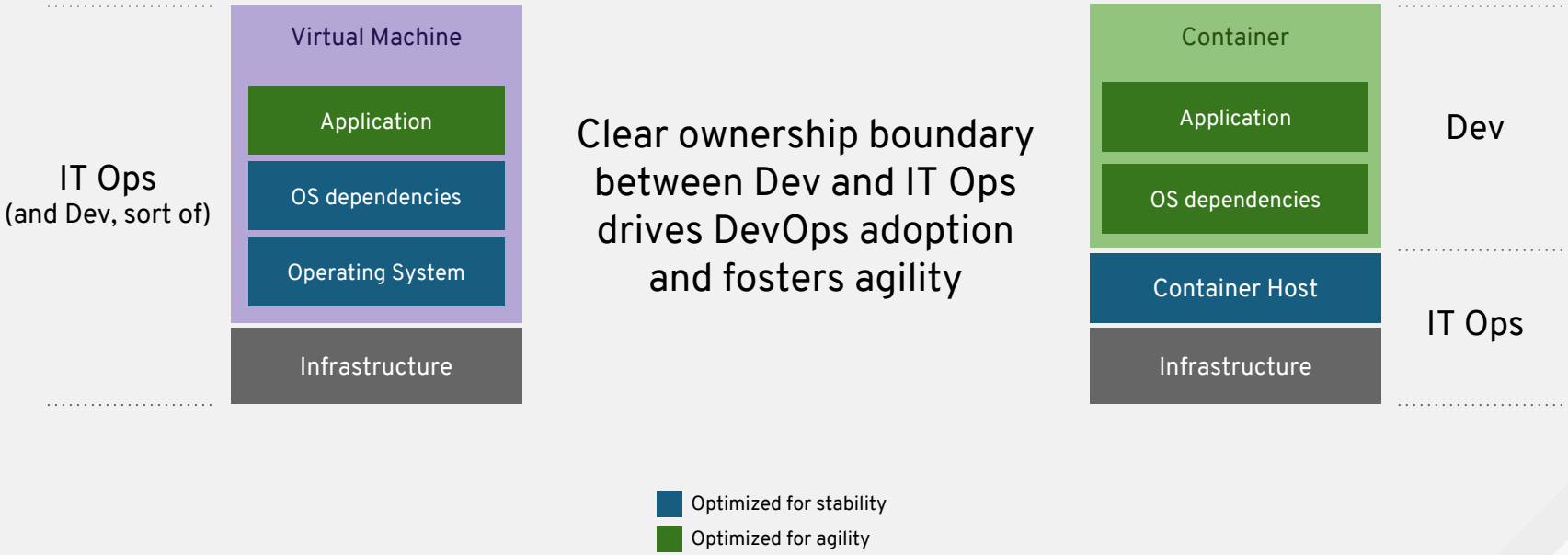




- ✚ VM Isolation
- ▬ Complete OS
- ▬ Static Compute
- ▬ Static Memory
- ▬ High Resource Usage

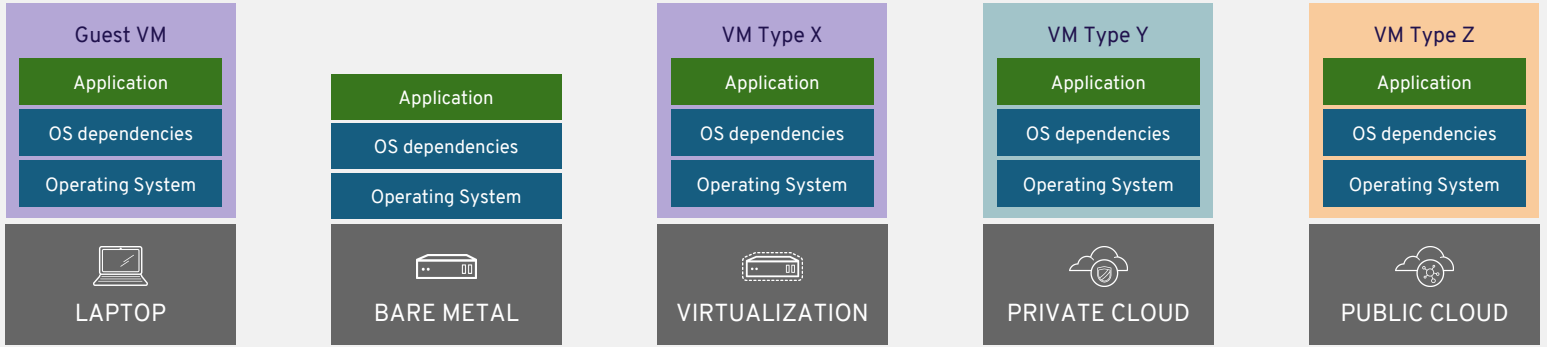
- ✚ Container Isolation
- ✚ Shared Kernel
- ✚ Burstable Compute
- ✚ Burstable Memory
- ✚ Low Resource Usage

VIRTUAL MACHINES AND CONTAINERS

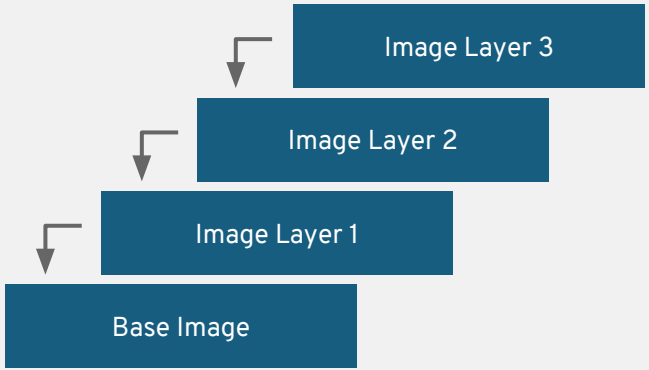


APPLICATION PORTABILITY WITH VM

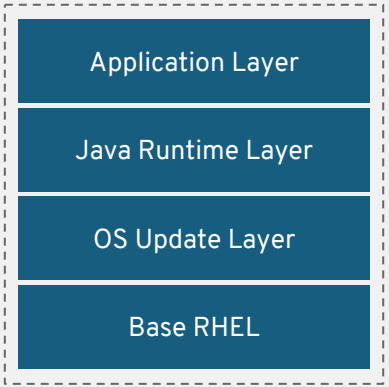
Virtual machines are NOT portable across hypervisor and do NOT provide portable packaging for applications



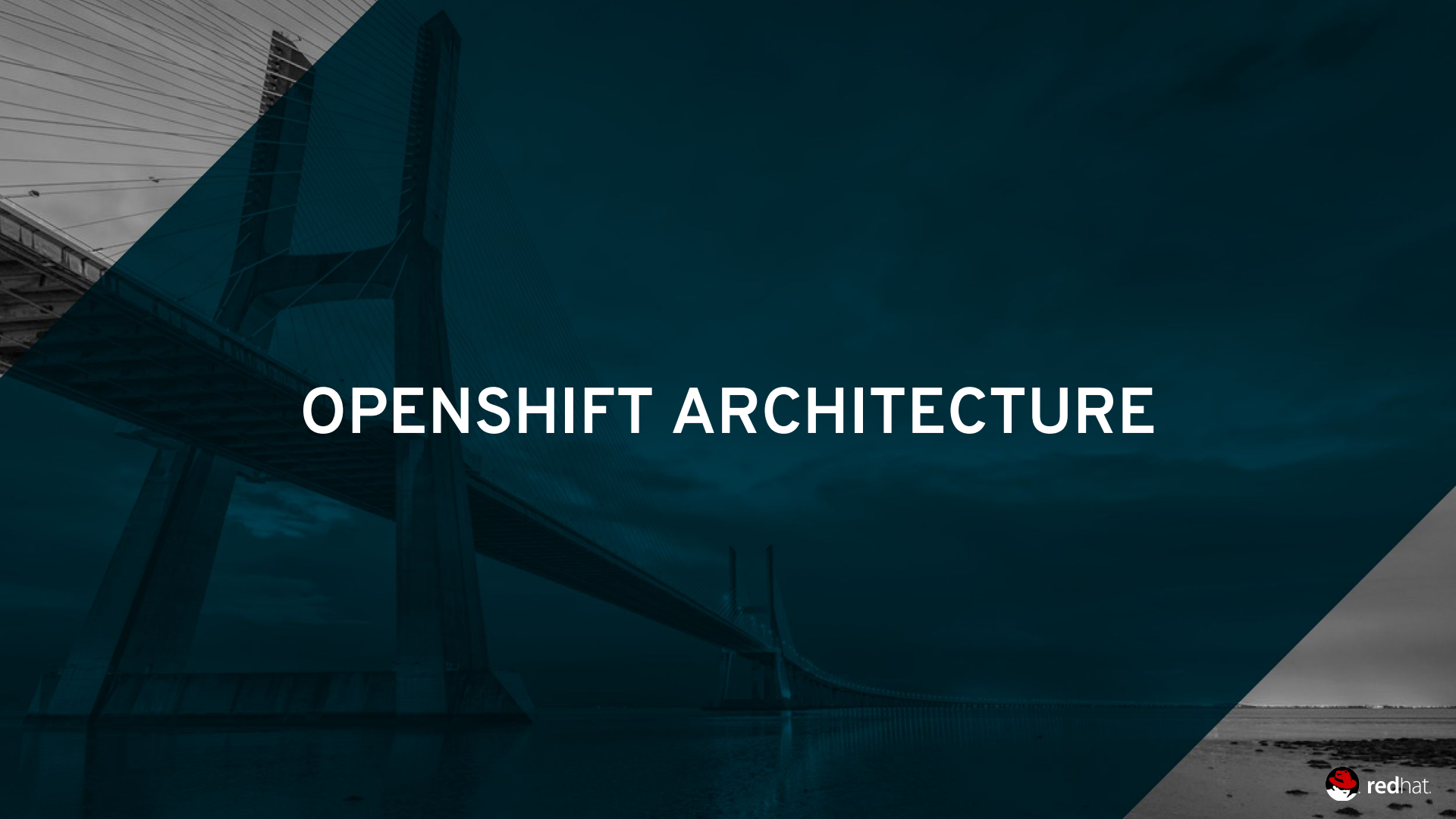
RAPID SECURITY PATCHING USING CONTAINER IMAGE LAYERING



Container Image Layers



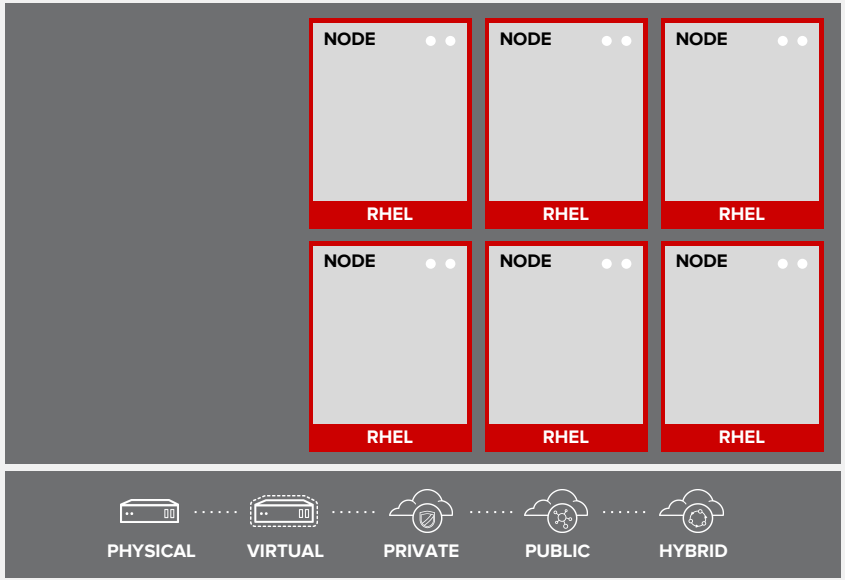
Example Container Image


OPENSHIFT ARCHITECTURE
redhat.

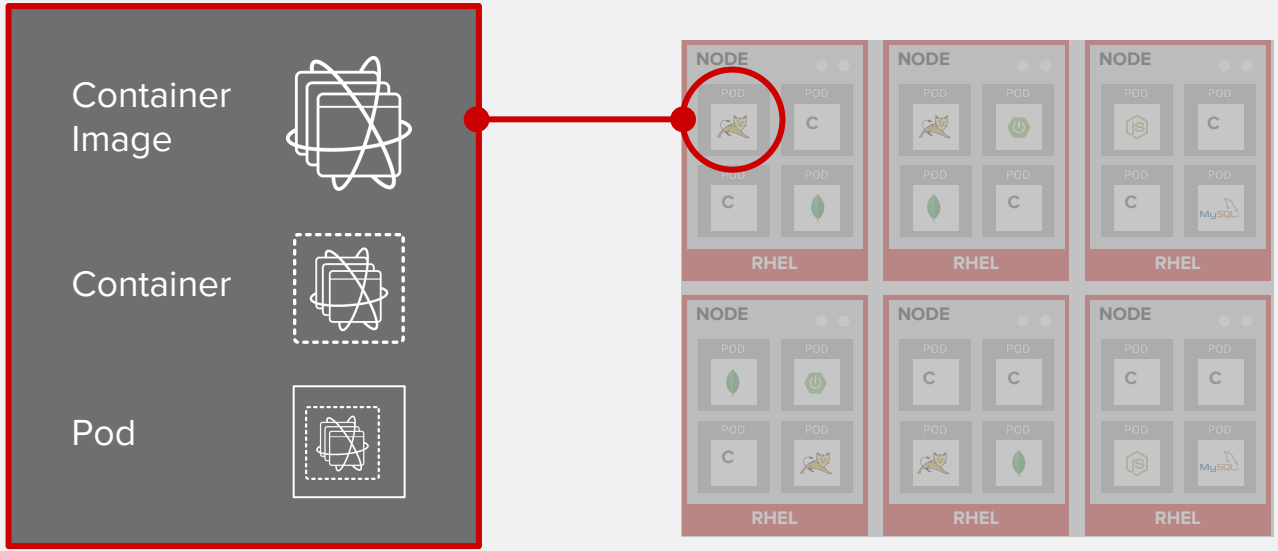
YOUR CHOICE OF INFRASTRUCTURE

redhat.

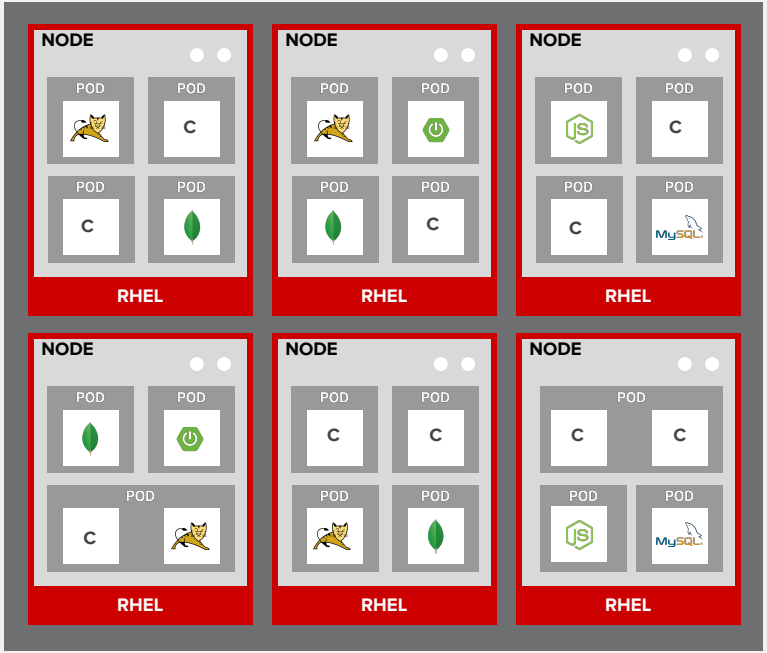
NODES RHEL INSTANCES WHERE APPS RUN



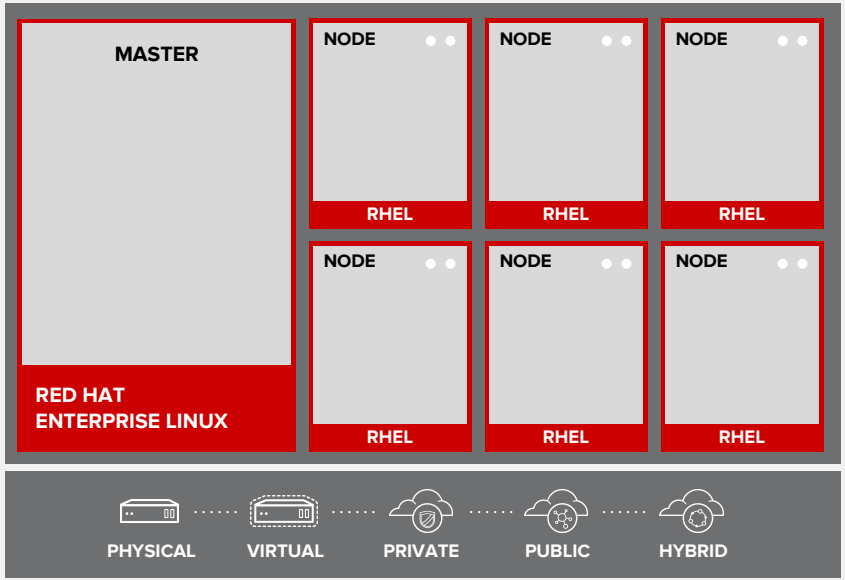
APPS RUN IN CONTAINERS



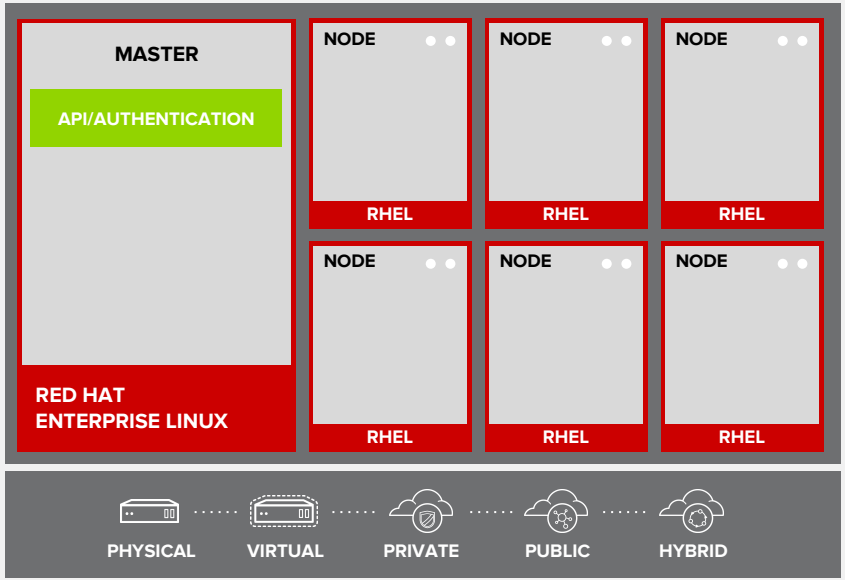
PODS ARE THE UNIT OF ORCHESTRATION



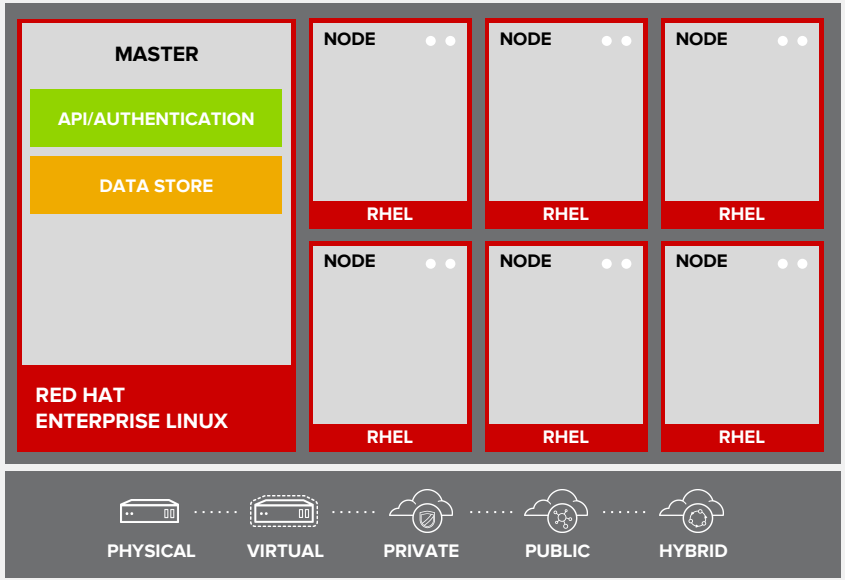
MASTERS ARE THE CONTROL PLANE



API AND AUTHENTICATION

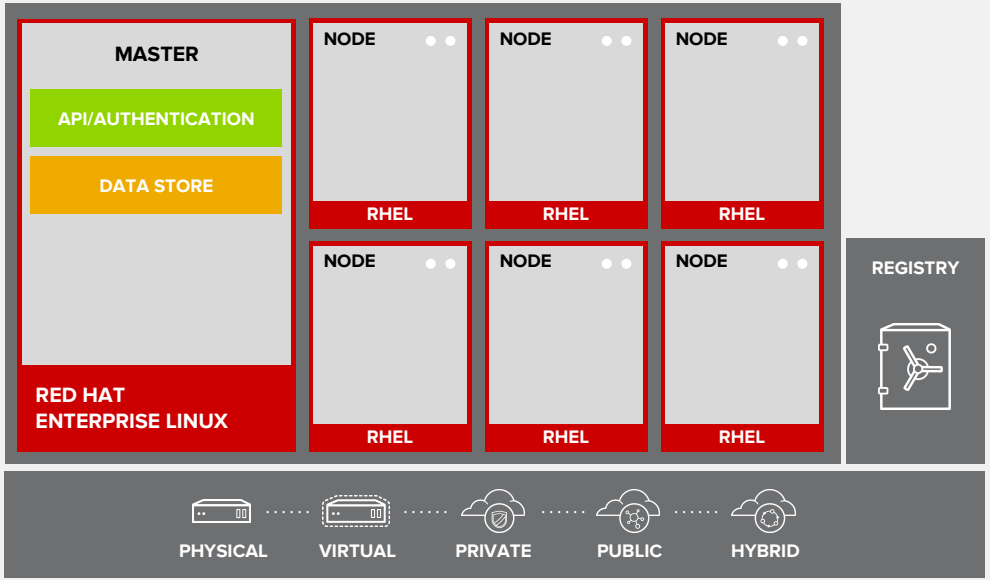


DESIRED AND CURRENT STATE



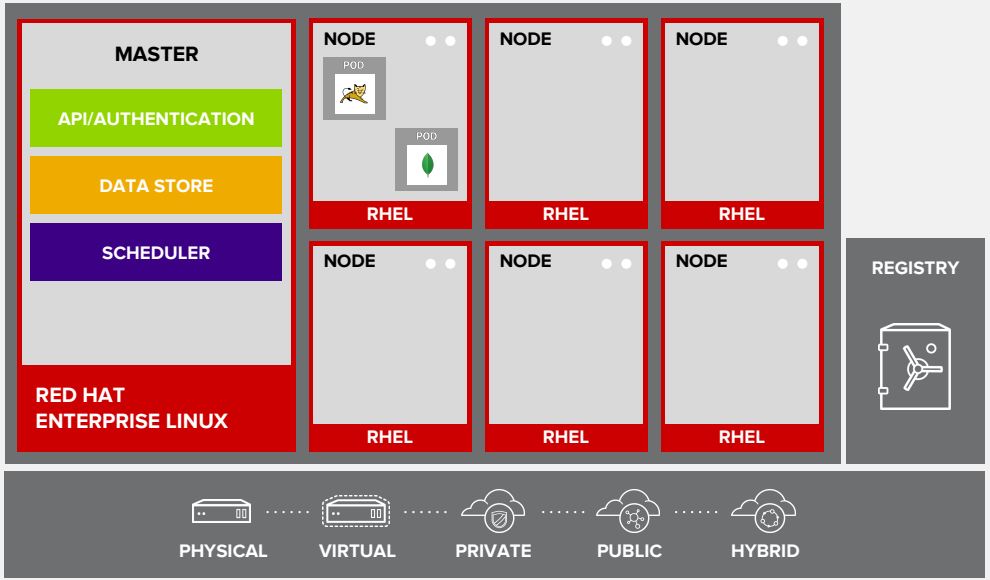
redhat.

INTEGRATED CONTAINER REGISTRY

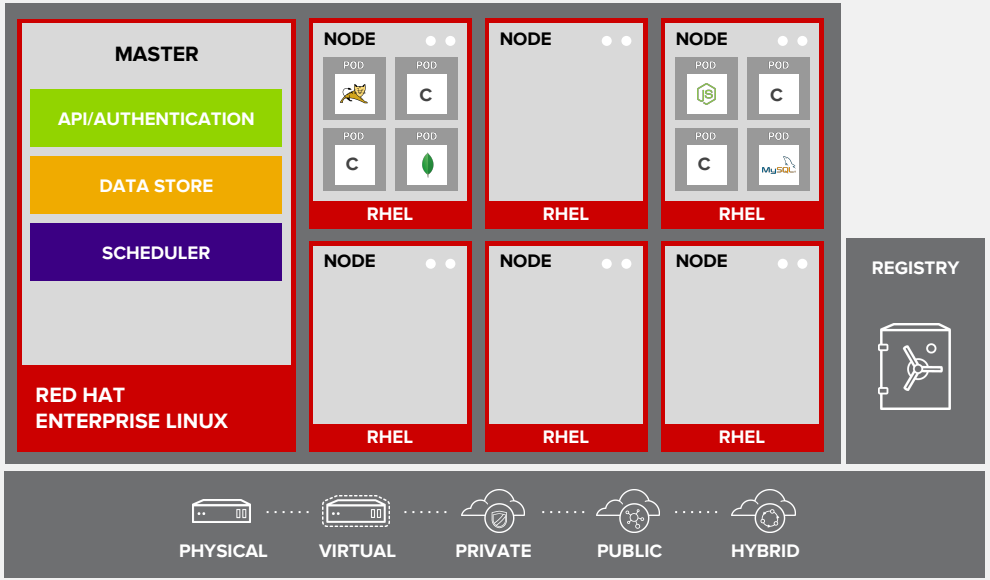


redhat.

ORCHESTRATION AND SCHEDULING



PLACEMENT BY POLICY



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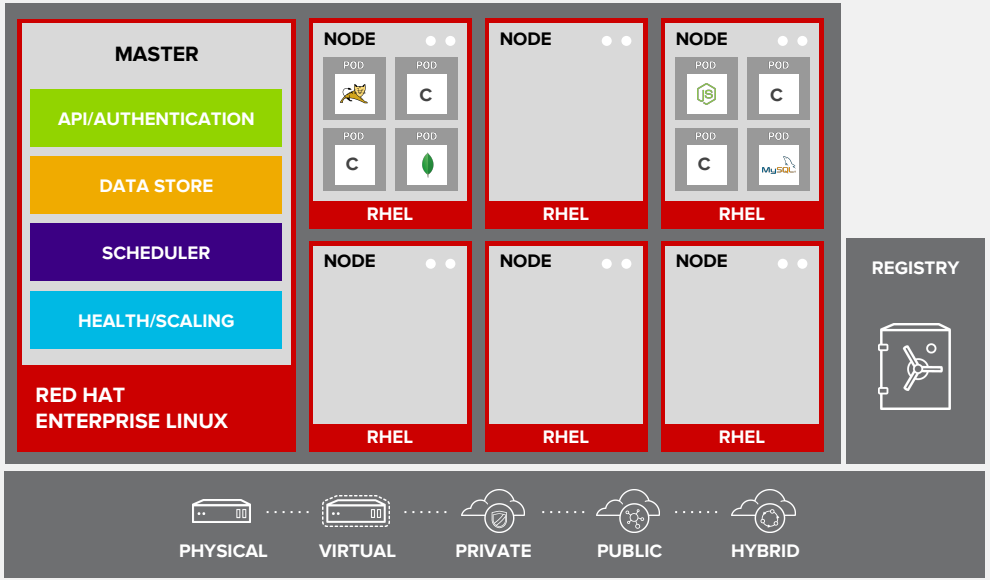
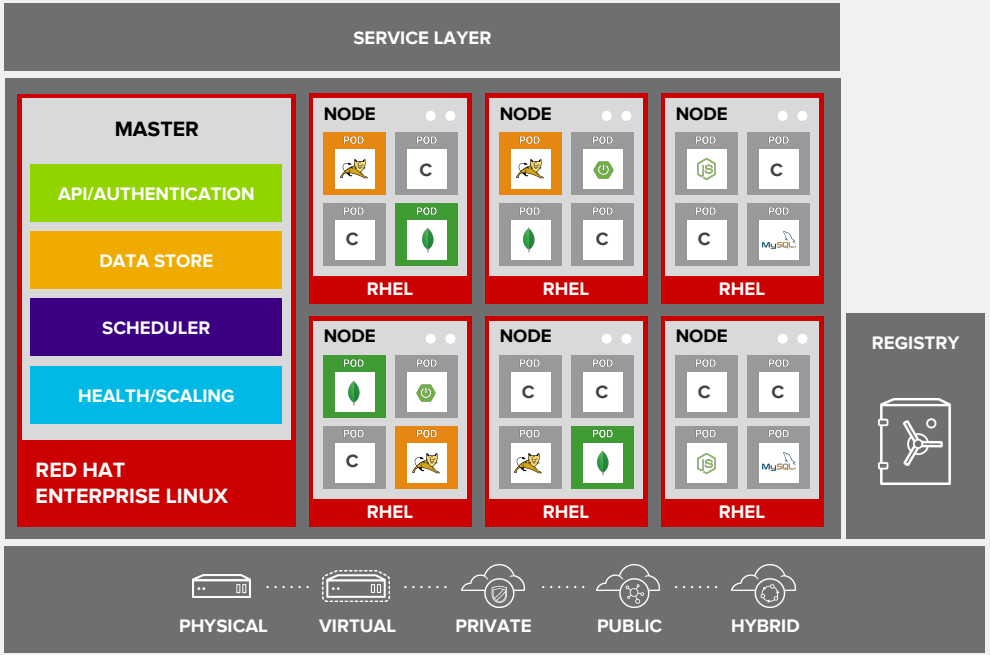
AUTOSCALING PODS



redhat.

SERVICE DISCOVERY



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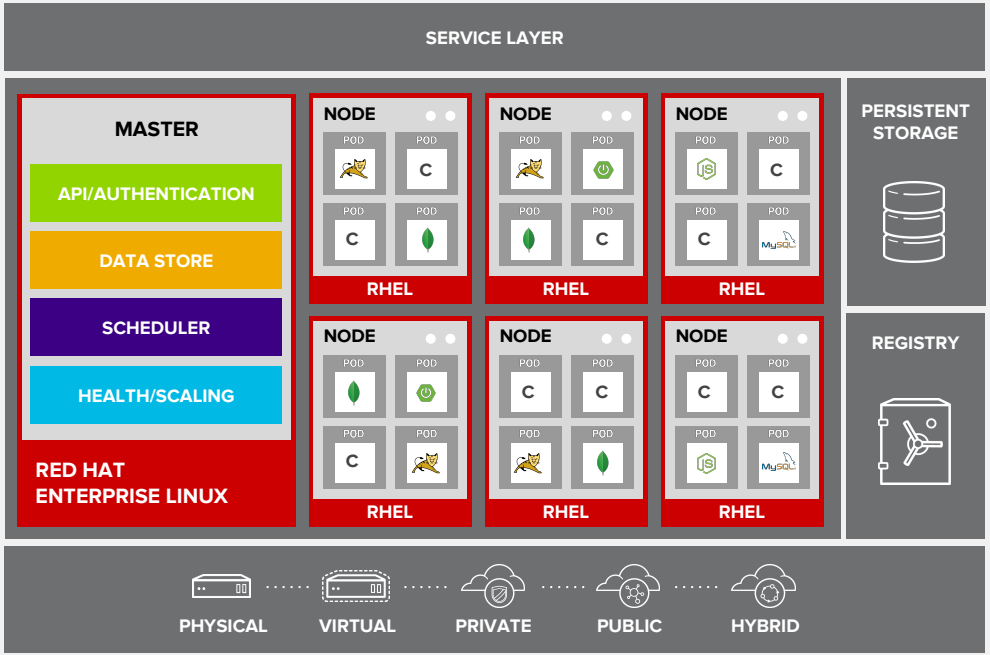
PERSISTENT DATA IN CONTAINERS



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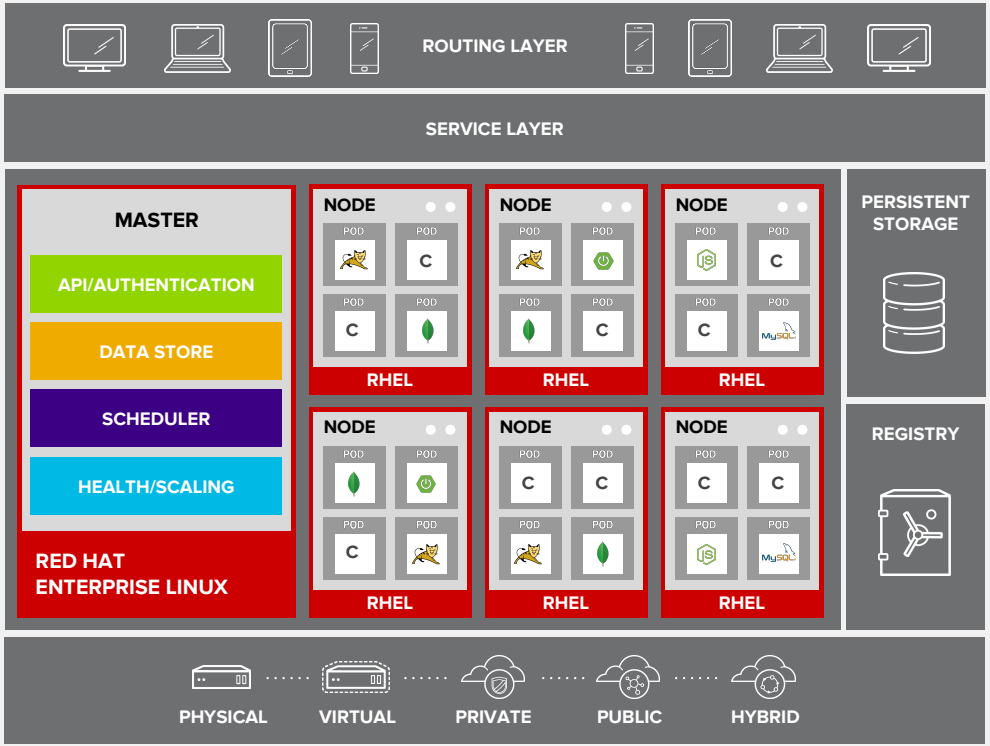
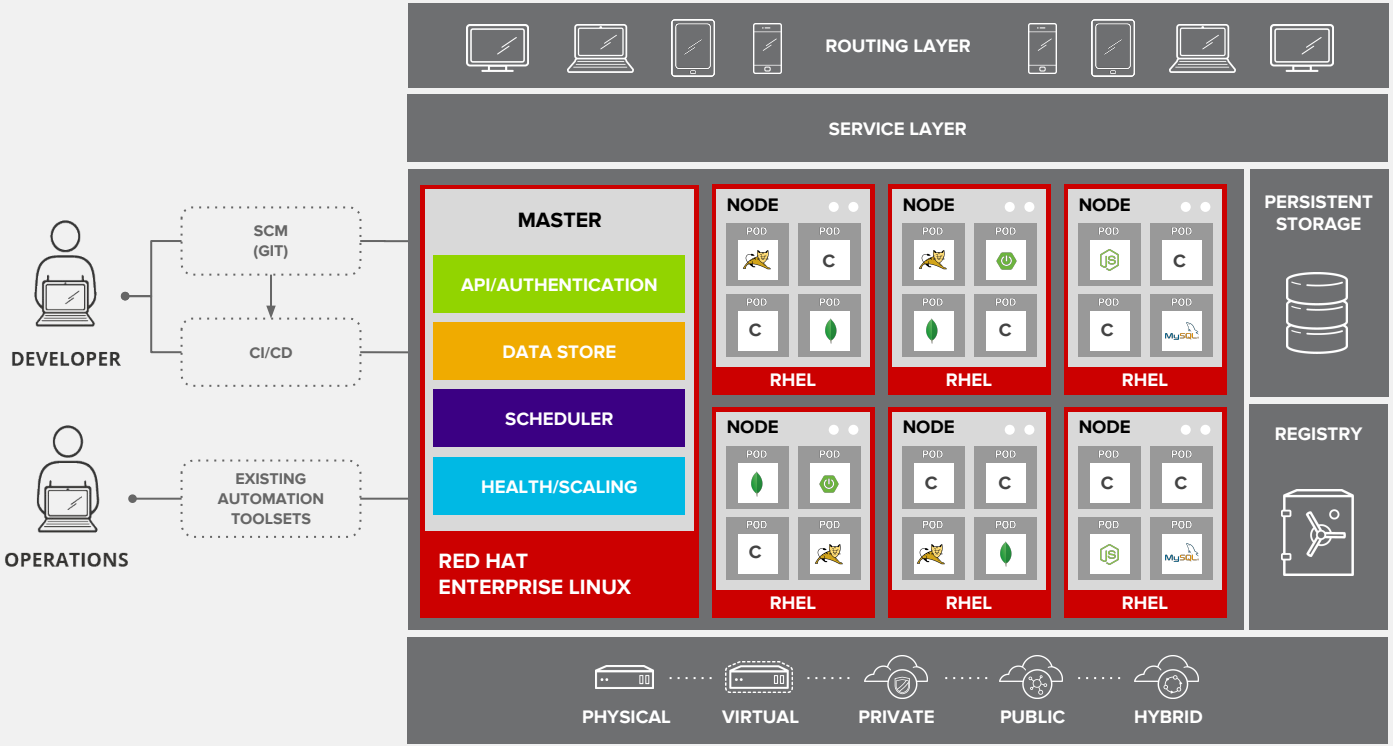
ROUTING AND LOAD-BALANCING



redhat.

ACCESS VIA WEB, CLI, IDE AND API



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Traditional, Stateful, and Microservices-based Apps

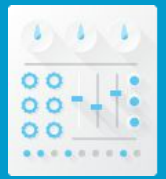
Business Automation	Integration	Data & Storage	Web & Mobile
Container	Container	Container	Container

Self-Service

Service Catalog
(Language Runtimes, Middleware, Databases)

Build Automation | Deployment Automation

OpenShift Application Lifecycle Management
(CI/CD)



Container Orchestration & Cluster Management
(kubernetes)

Networking | Storage | Registry | Logs & Metrics | Security

Infrastructure Automation & Cockpit

Enterprise Container Host

Container Runtime & Packaging
(Docker)

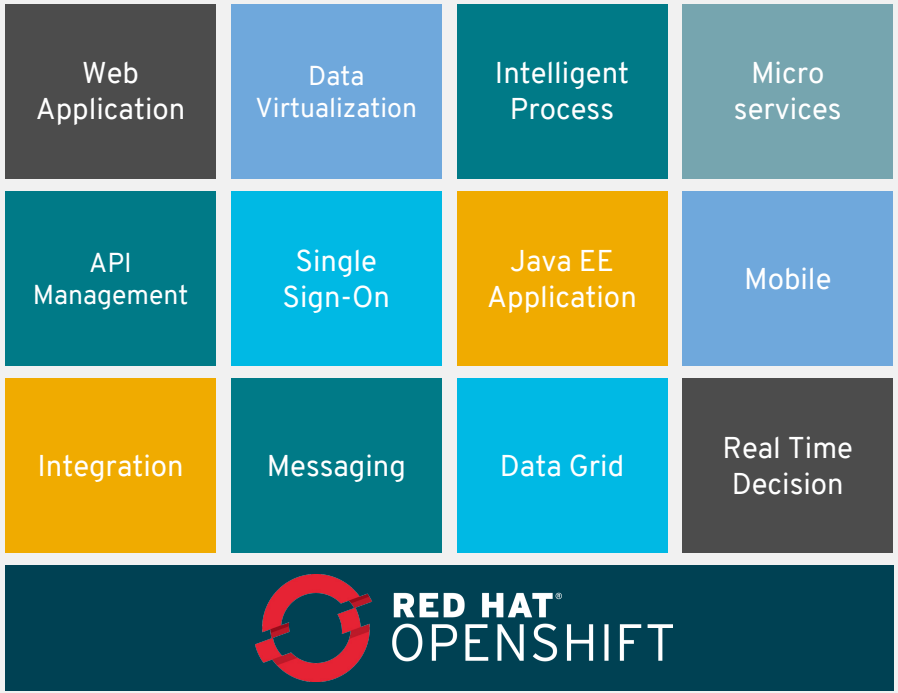
Atomic Host | Red Hat Enterprise Linux

JBOSS EAP
JBOSS DATA GRID
JBOSS DATA VIRTUALIZATION
JBOSS AM-Q
JBOSS BRMS
JBOSS BPM
JBOSS FUSE
RED HAT MOBILE
3 Scale

redhat.

APPLICATION SERVICES

A PLATFORM THAT GROWS WITH YOUR BUSINESS



TRUE POLYGLOT PLATFORM

CrunchyData

GitLab

Iron.io

Couchbase

Sonatype

EnterpriseDB

NuoDB

Fujitsu

and many more

TESTED AND VERIFIED MICROSERVICES FRAMEWORKS

LAUNCH

Spring Boot | Netflix Hystrix | Netflix Ribbon

SUPPORTED MICROSERVICES RUNTIMES

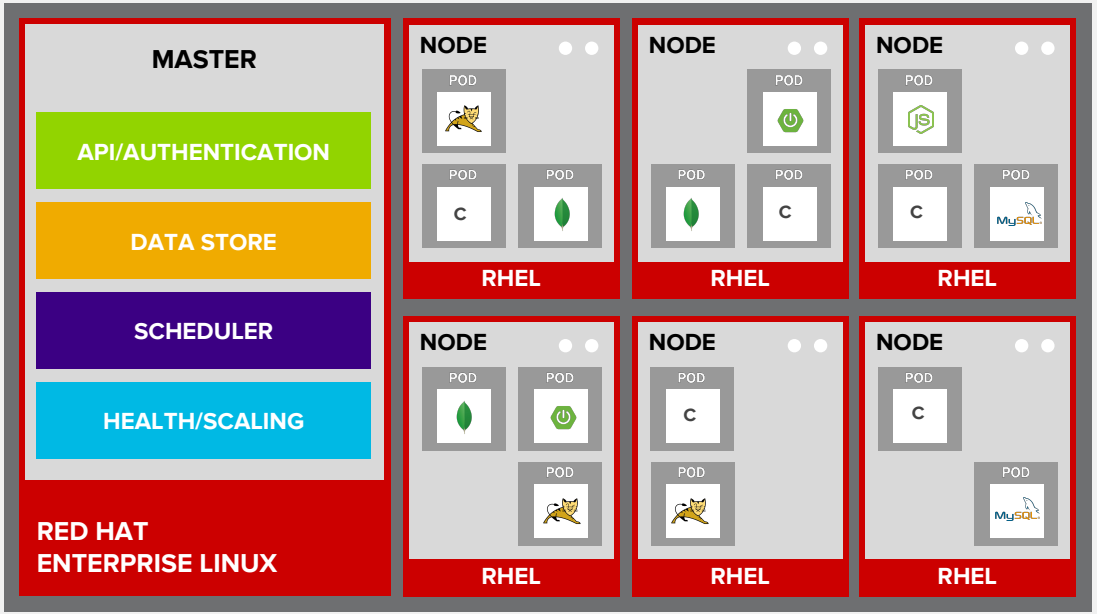
Reactive	MicroProfile	Server-side JS	Java EE	Java EE Web
Eclipse Vert.x	WildFly Swarm	Node.js	JBoss EAP	Embedded Tomcat

Modern, Cloud-Native Application Runtimes and
an Opinionated Developer Experience

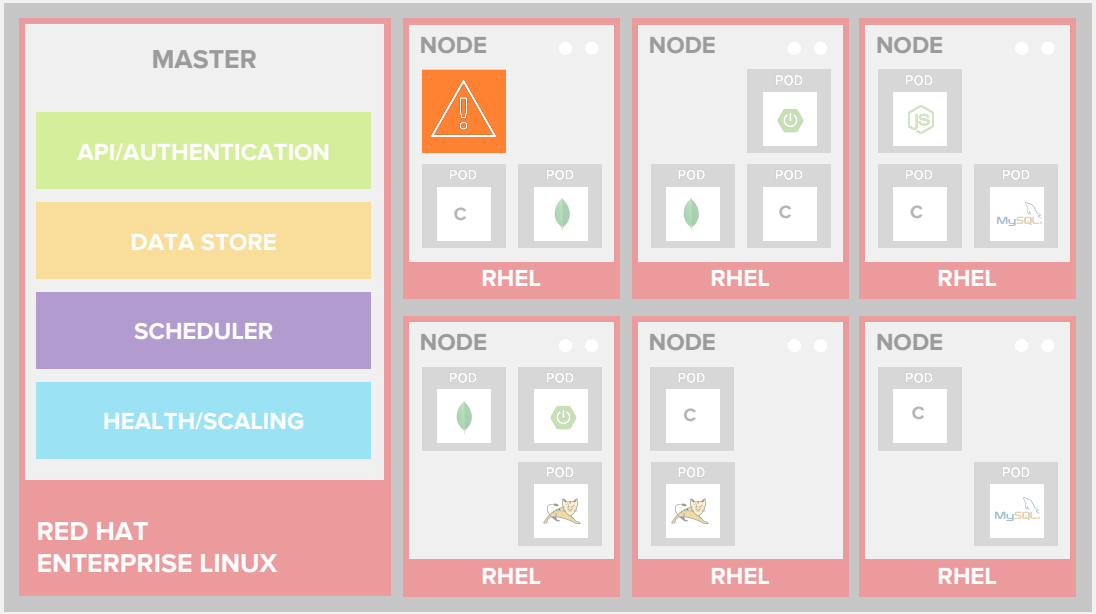

TECHNICAL DEEP DIVE
redhat.

MONITORING APPLICATION HEALTH

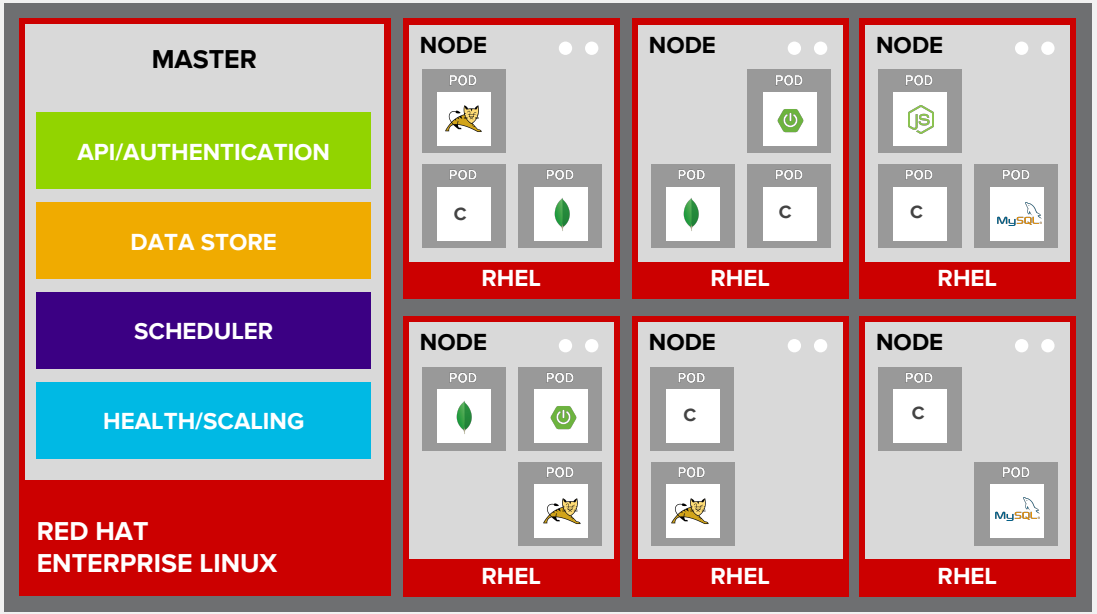
AUTO-HEALING FAILED PODS



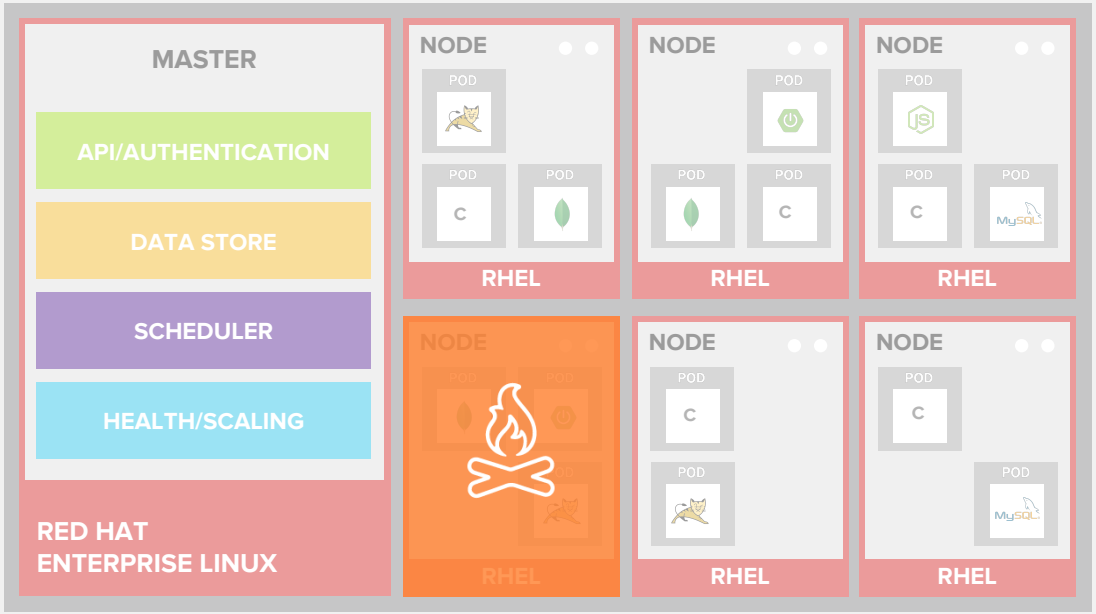
AUTO-HEALING FAILED CONTAINERS



AUTO-HEALING FAILED CONTAINERS

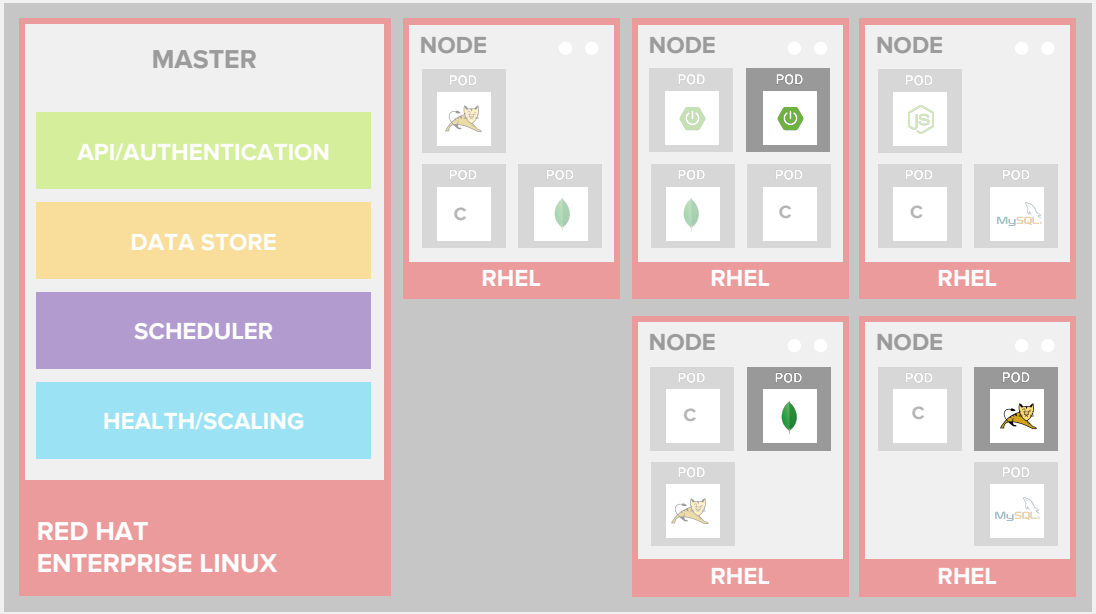


AUTO-HEALING FAILED CONTAINERS



redhat.

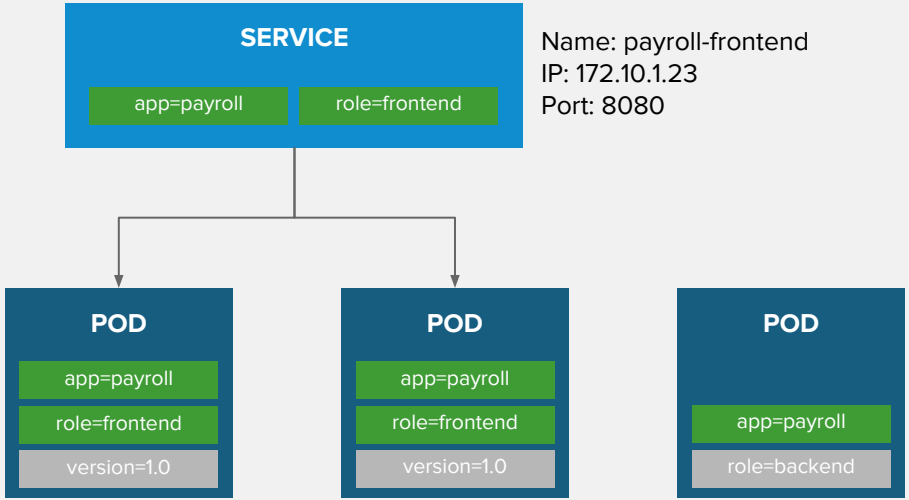
AUTO-HEALING FAILED CONTAINERS



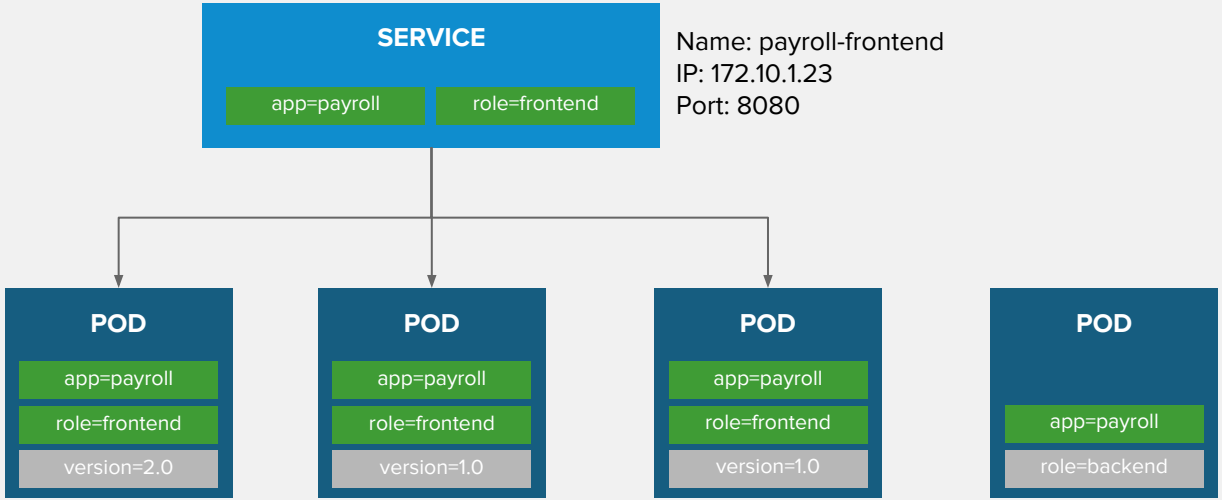
redhat.

NETWORKING

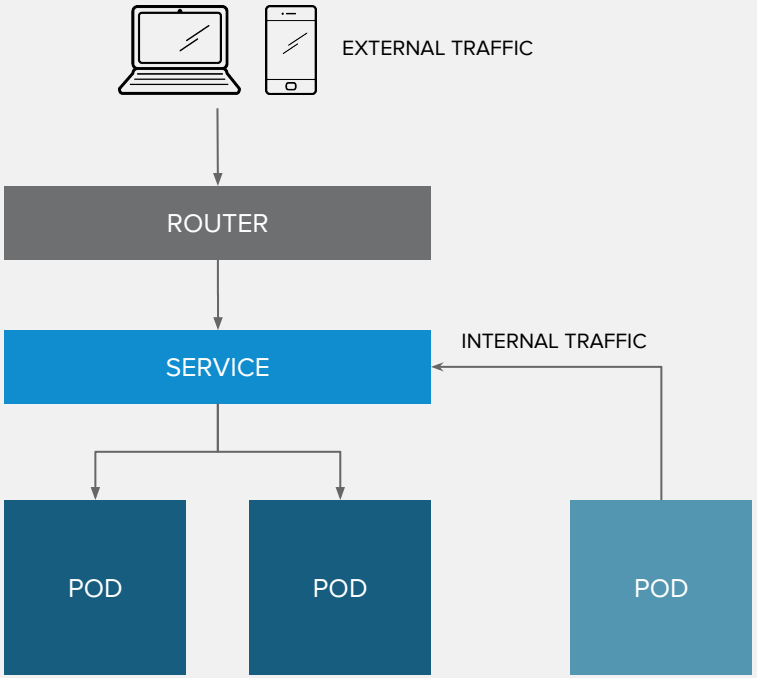
BUILT-IN SERVICE DISCOVERY
INTERNAL LOAD-BALANCING



BUILT-IN SERVICE DISCOVERY
INTERNAL LOAD-BALANCING

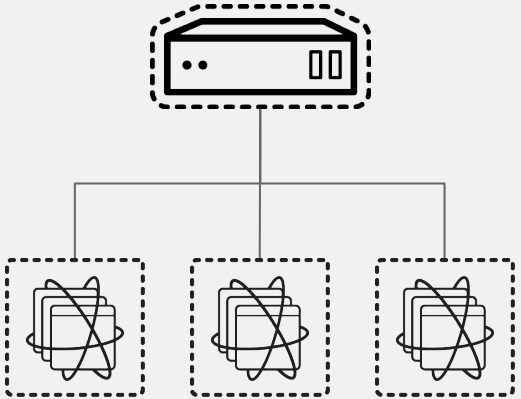


ROUTE EXPOSES SERVICES EXTERNALLY



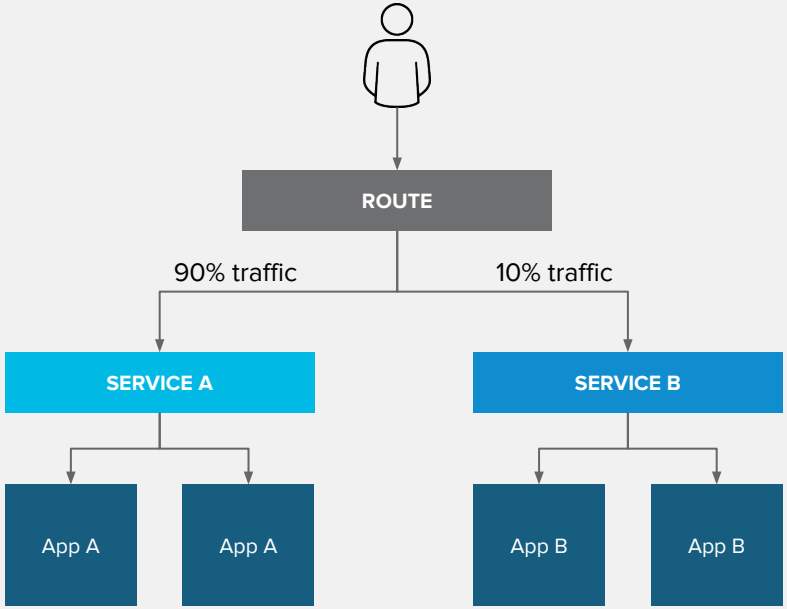
ROUTING AND EXTERNAL LOAD-BALANCING

- Pluggable routing architecture
  - HAProxy Router
  - F5 Router
- Multiple-routers with traffic sharding
- Router supported protocols
  - HTTP/HTTPS
  - WebSockets
  - TLS with SNI
- Non-standard ports via cloud load-balancers, external IP, and NodePort



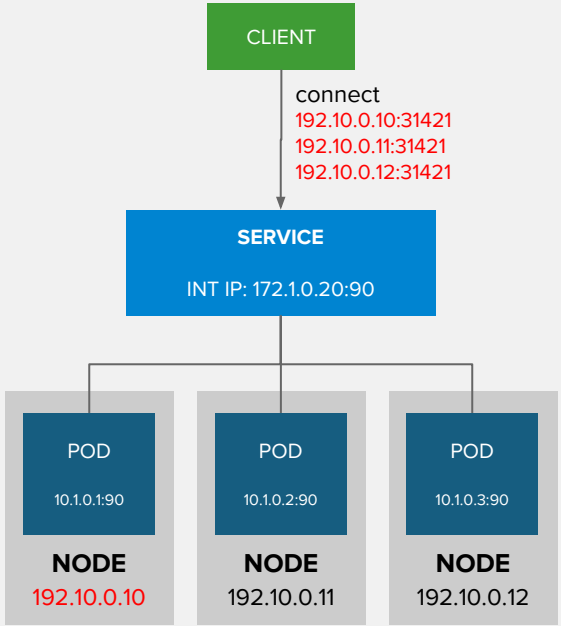
ROUTE SPLIT TRAFFIC

Split Traffic Between Multiple Services For A/B Testing, Blue/Green and Canary Deployments



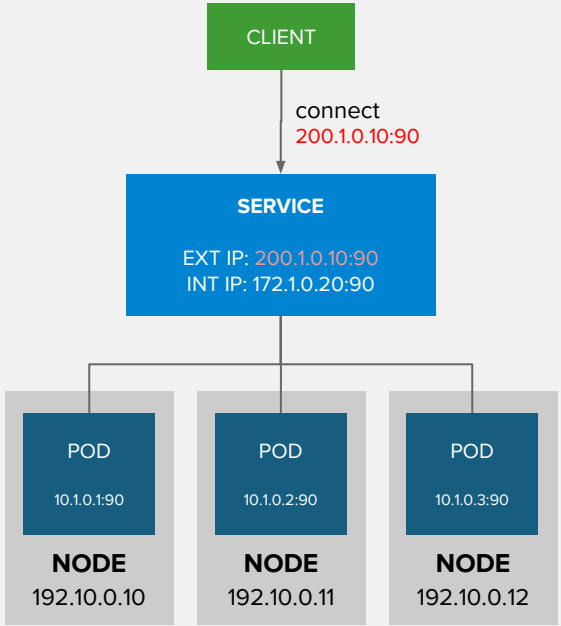
EXTERNAL TRAFFIC TO A SERVICE ON A RANDOM PORT WITH NODEPORT

- NodePort binds a service to a unique port on all the nodes
- Traffic received on any node redirects to a node with the running service
- Ports in 30K-60K range which usually differs from the service
- Firewall rules must allow traffic to all nodes on the specific port

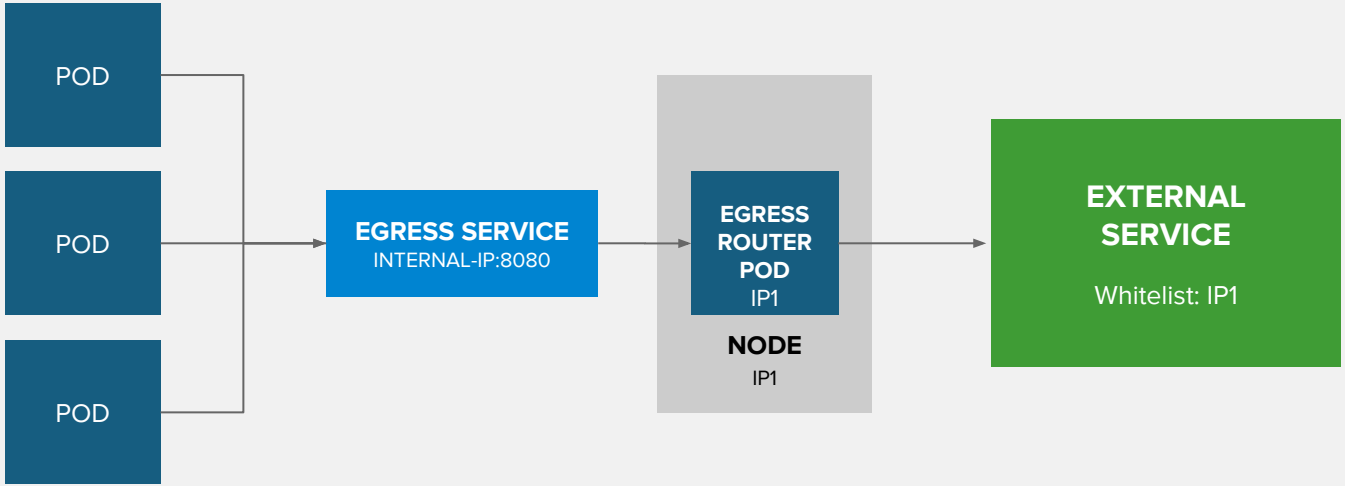


EXTERNAL TRAFFIC TO A SERVICE ON ANY PORT WITH INGRESS

- Access a service with an external IP on any TCP/UDP port, such as
  - Databases
  - Message Brokers
- Automatic IP allocation from a predefined pool using Ingress IP Self-Service
- IP failover pods provide high availability for the IP pool

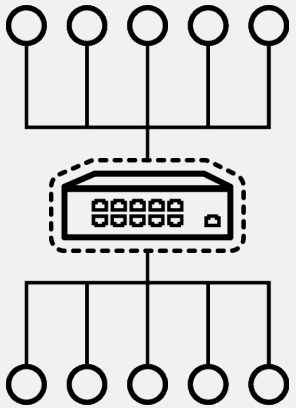


CONTROL OUTGOING TRAFFIC SOURCE IP WITH EGRESS ROUTER

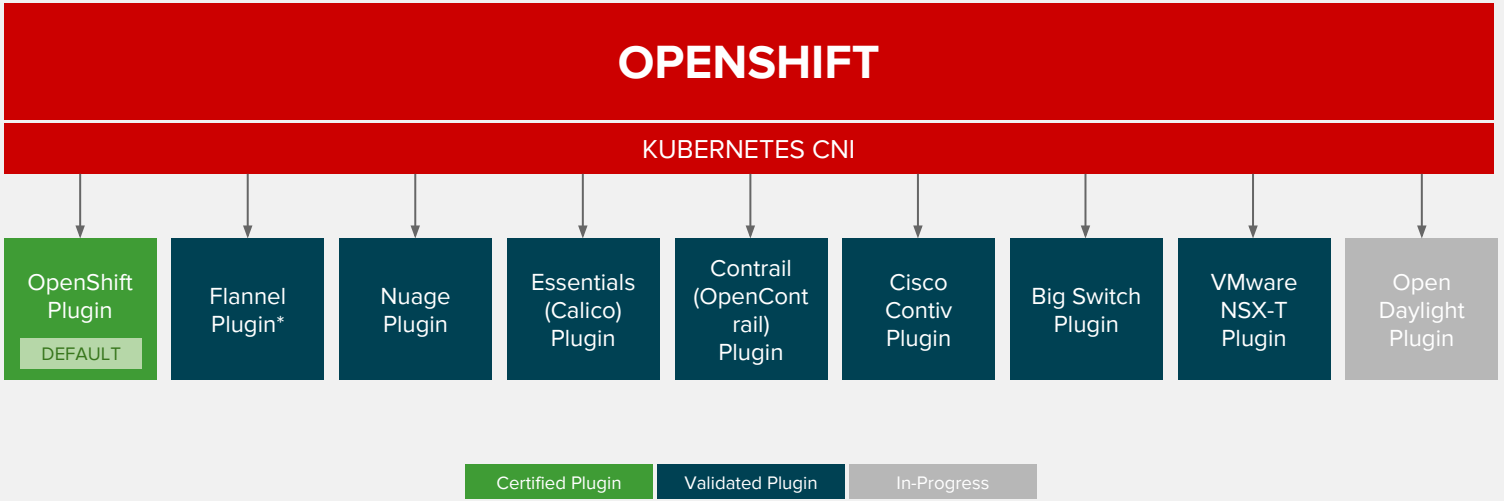


OPENSHIFT NETWORKING

- Built-in internal DNS to reach services by name
- Split DNS is supported via SkyDNS
  - Master answers DNS queries for internal services
  - Other nameservers serve the rest of the queries
- Software Defined Networking (SDN) for a unified cluster network to enable pod-to-pod communication
- OpenShift follows the Kubernetes Container Networking Interface (CNI) plug-in model

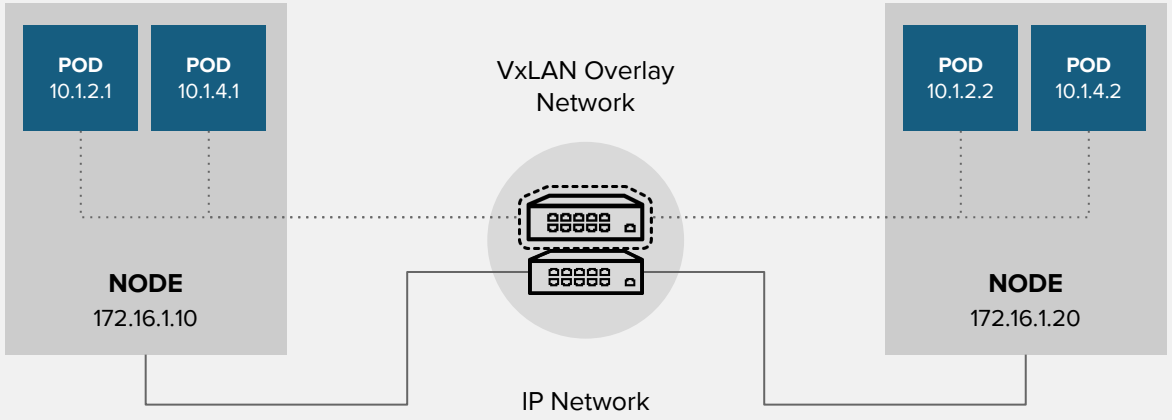


OPENSHIFT NETWORK PLUGINS



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

OPENSHIFT NETWORKING



OPENSHIFT SDN

FLAT NETWORK (Default)

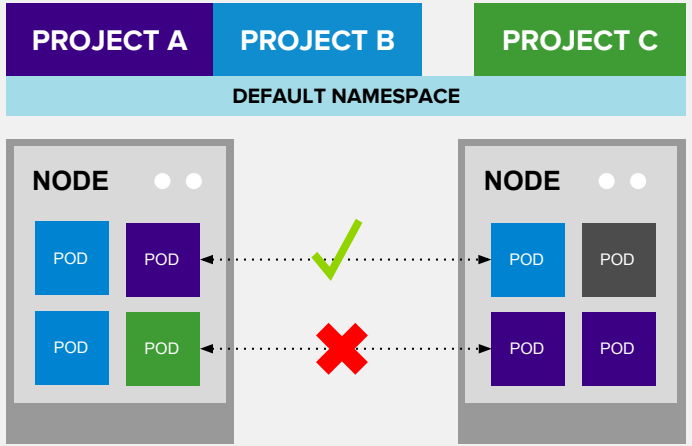
- All pods can communicate with each other across projects

MULTI-TENANT NETWORK

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

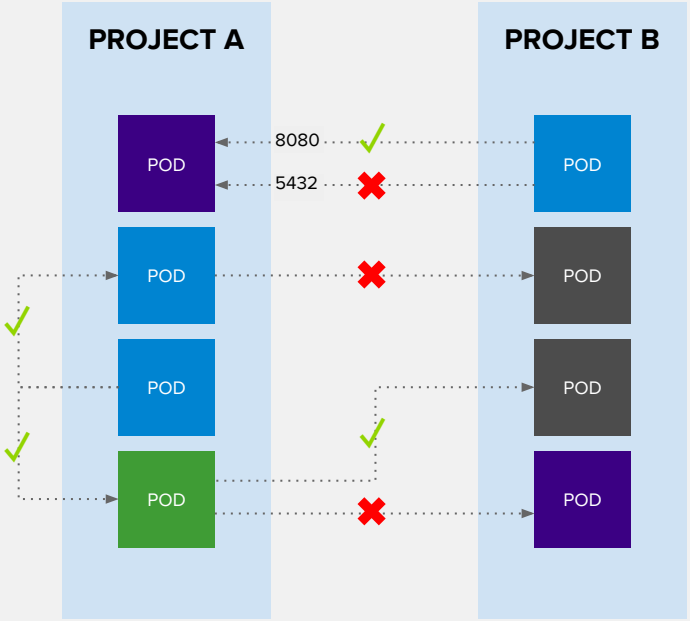
NETWORK POLICY (Tech Preview)

- Granular policy-based isolation



Multi-Tenant Network

OPENSHIFT SDN - NETWORK POLICY



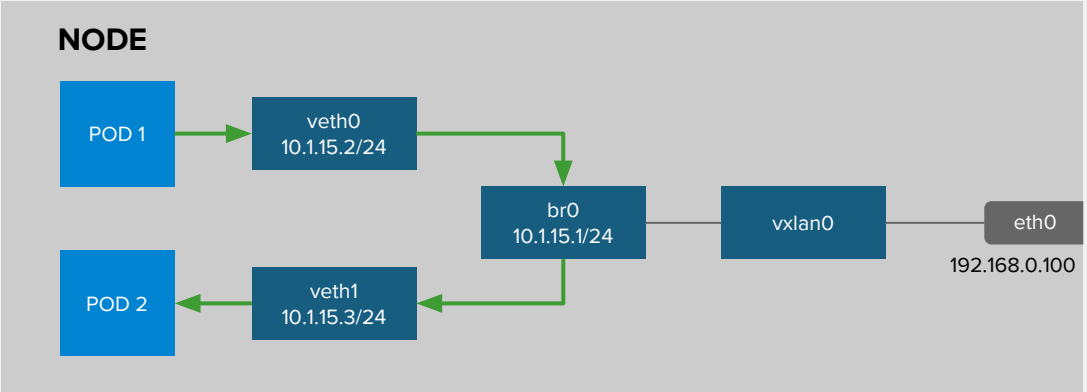
Example Policies

- Allow all traffic inside the project
- Allow traffic from green to gray
- Allow traffic to purple on 8080

```
apiVersion: extensions/v1beta1
kind: NetworkPolicy
metadata:
  name: allow-to-purple-on-8080
spec:
  podSelector:
    matchLabels:
      color: purple
  ingress:
  - ports:
    - protocol: tcp
      port: 8080
```

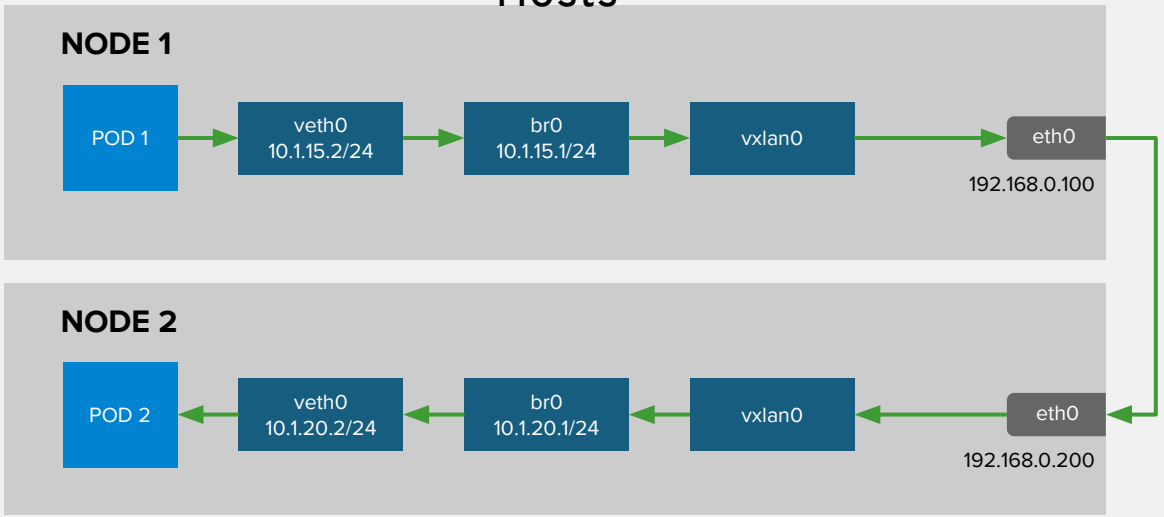
OPENSHIFT SDN - OVS PACKET FLOW

Container to Container on the Same Host



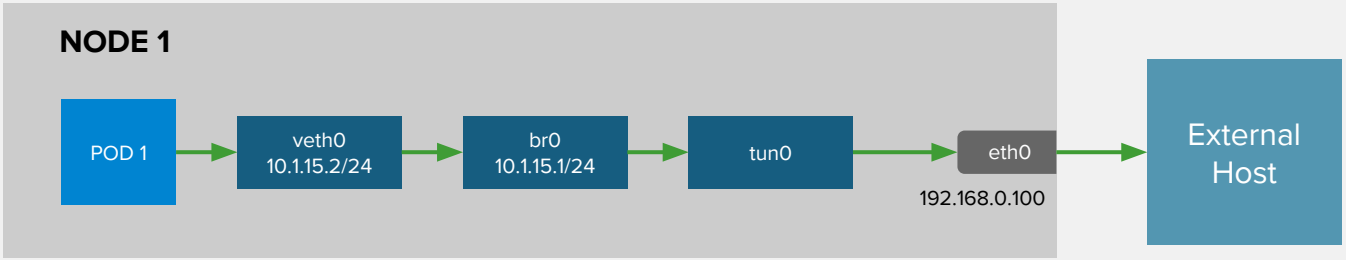
OPENSHIFT SDN - OVS PACKET FLOW

Container to Container on the Different Hosts

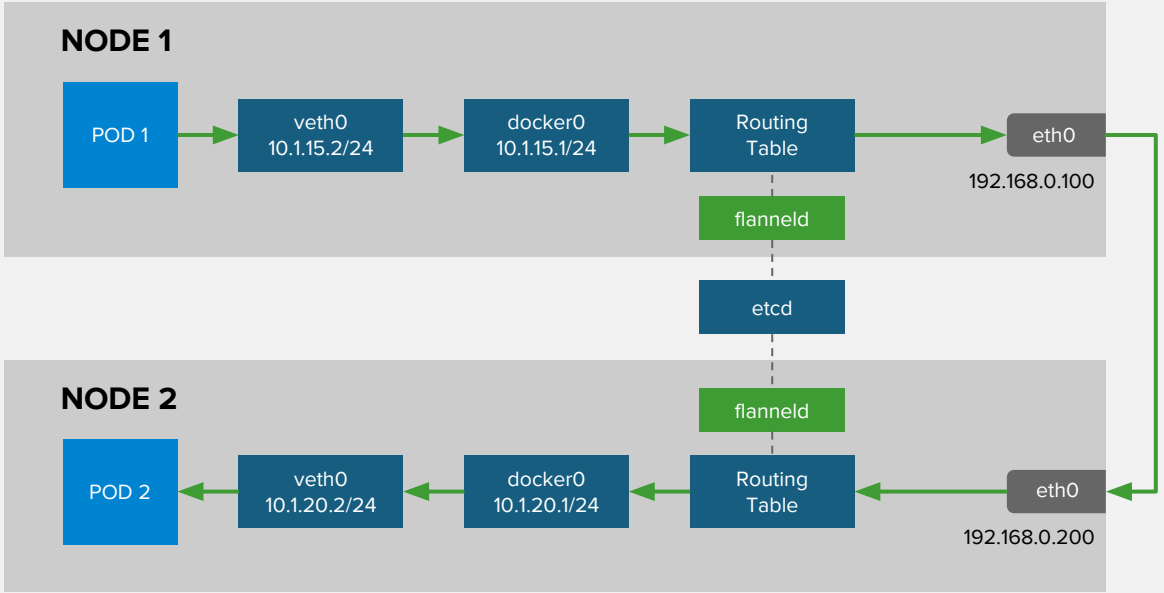


OPENSHIFT SDN - OVS PACKET FLOW

Container Connects to External Host



OPENSHIFT SDN WITH FLANNEL FOR OPENSTACK

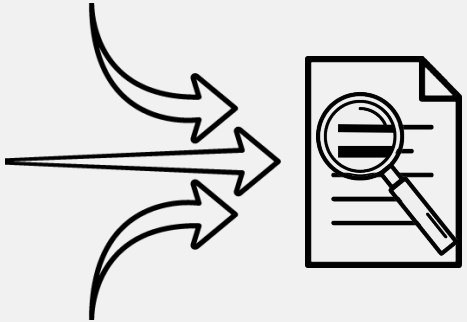


Flannel is minimally verified and is supported only and exactly as deployed in the OpenShift on OpenStack reference architecture https://access.redhat.com/articles/2743631

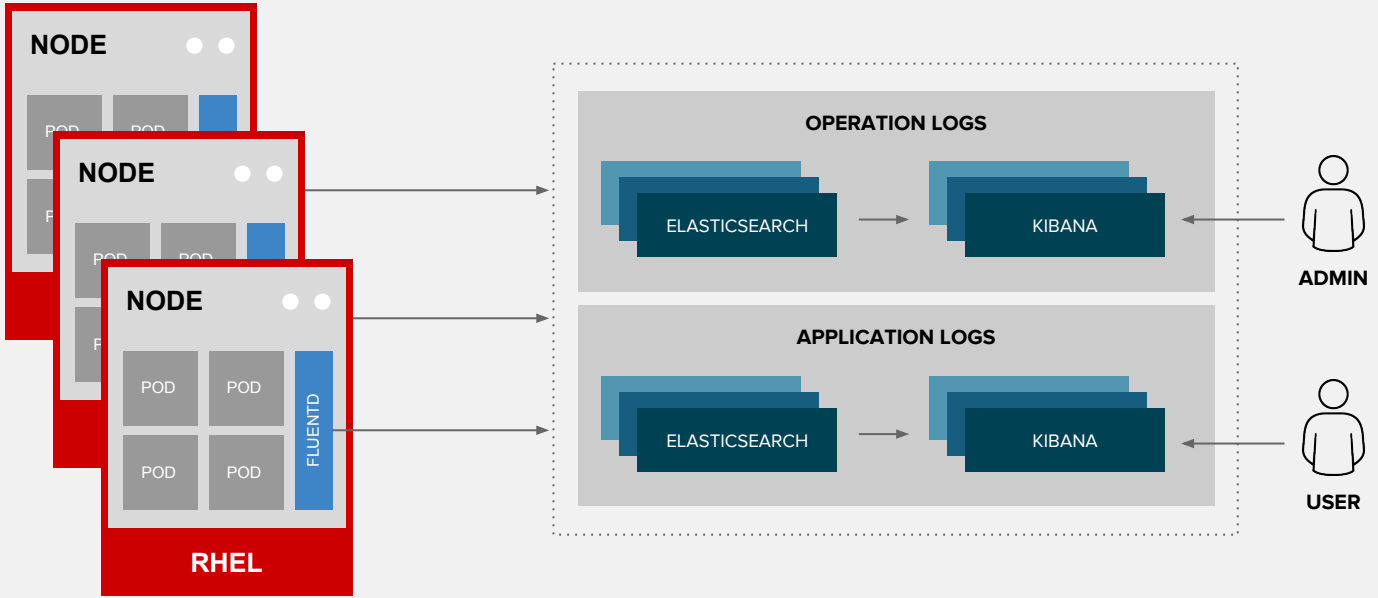
LOGGING & METRICS

CENTRAL LOG MANAGEMENT WITH EFK

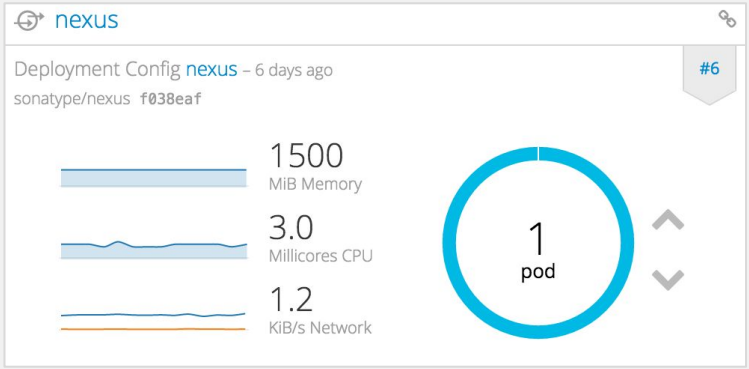
- EFK stack to aggregate logs for hosts and applications
  - **Elasticsearch:** an object store to store all logs
  - **Fluentd:** gathers logs and sends to Elasticsearch.
  - **Kibana:** A web UI for Elasticsearch.
- Access control
  - Cluster administrators can view all logs
  - Users can only view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

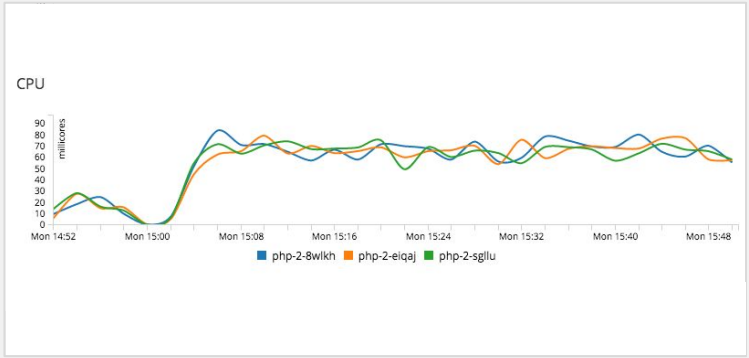


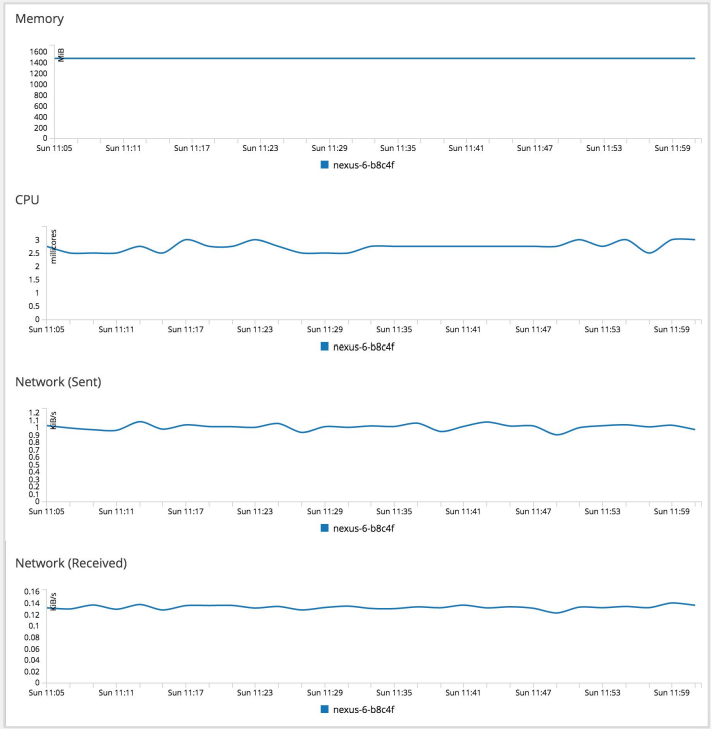
CENTRAL LOG MANAGEMENT WITH EFK



CONTAINER METRICS







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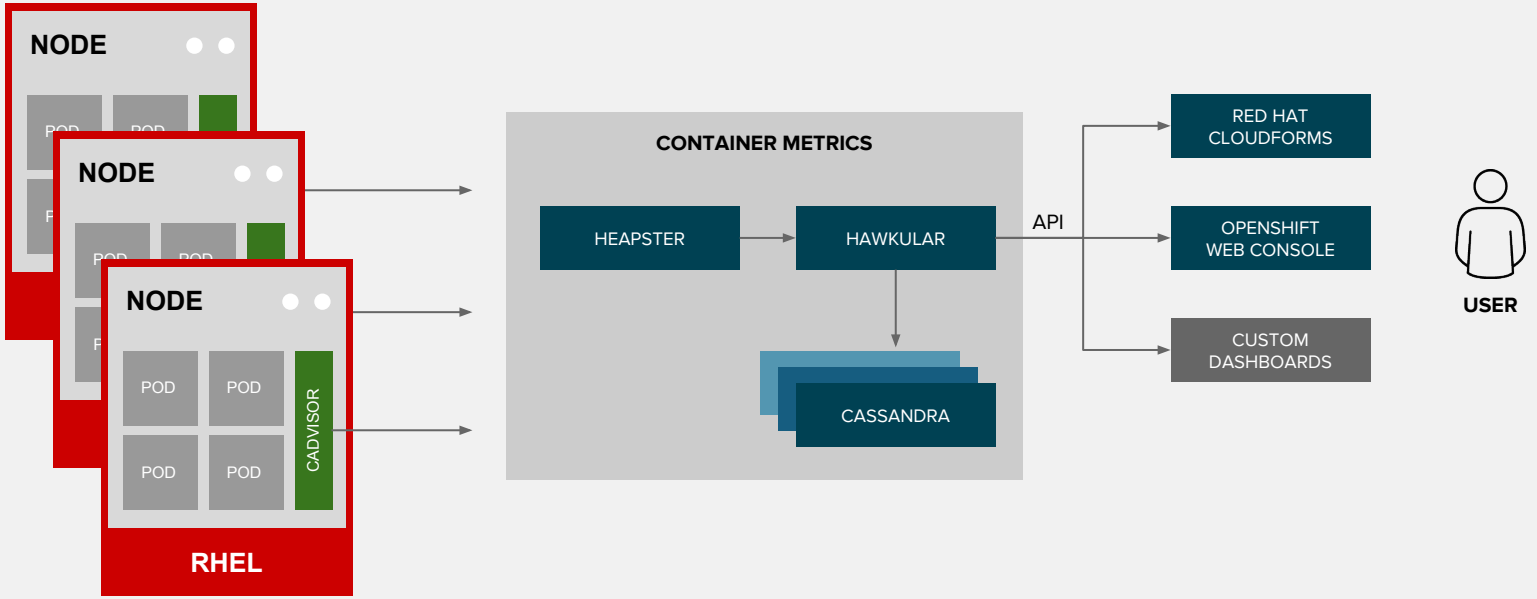
CONTAINER METRICS



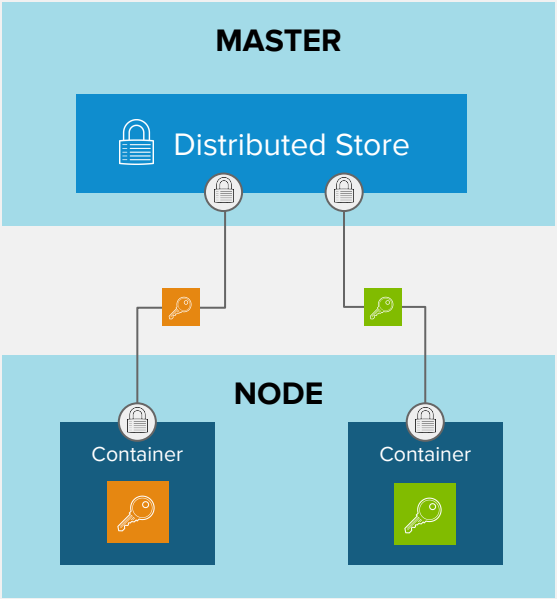
SECURITY

TEN LAYERS OF CONTAINER SECURITY

- Container Host & Multi-tenancy
- Container Platform
- Network Isolation
- Container Registry
- Storage
- Federated Clusters
- API Management
- Deploying Container
- Container Content
- Building Containers

SECRET MANAGEMENT

- Secure mechanism for holding sensitive data e.g.
  - Passwords and credentials
  - SSH Keys
  - Certificates
- Secrets are made available as
  - Environment variables
  - Volume mounts
  - Interaction with external systems
- Encrypted in transit
- Never rest on the nodes

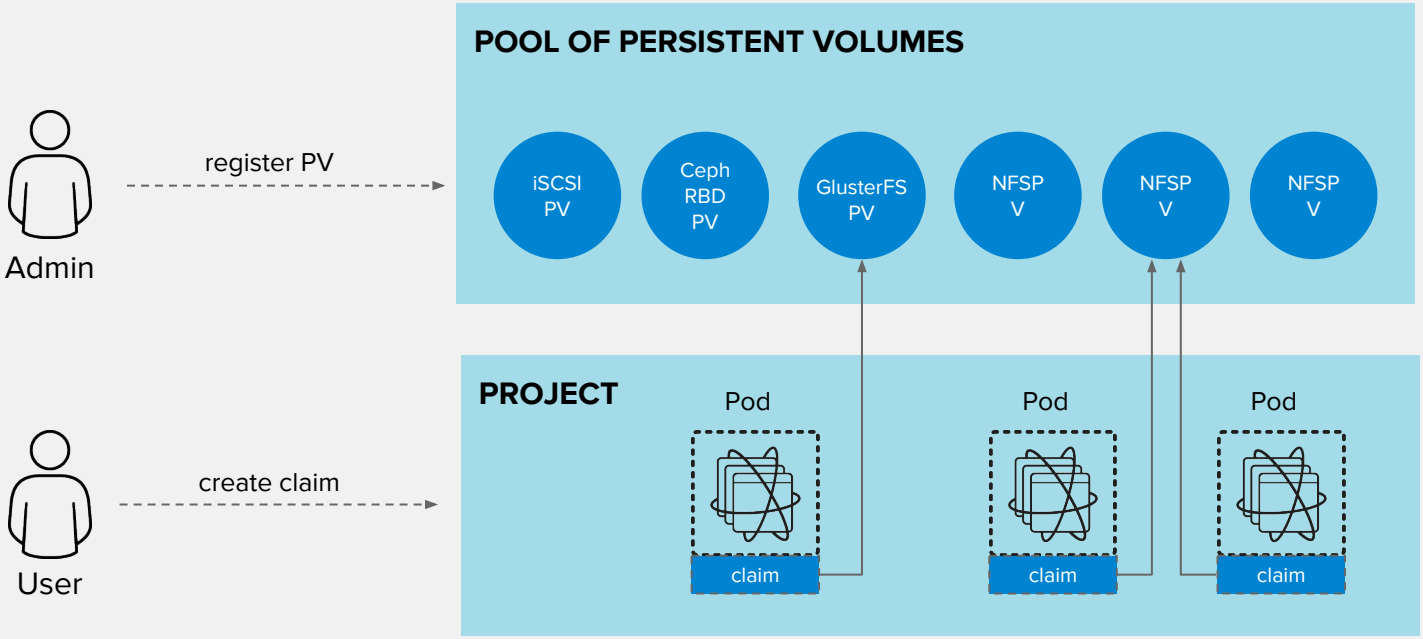


PERSISTENT STORAGE

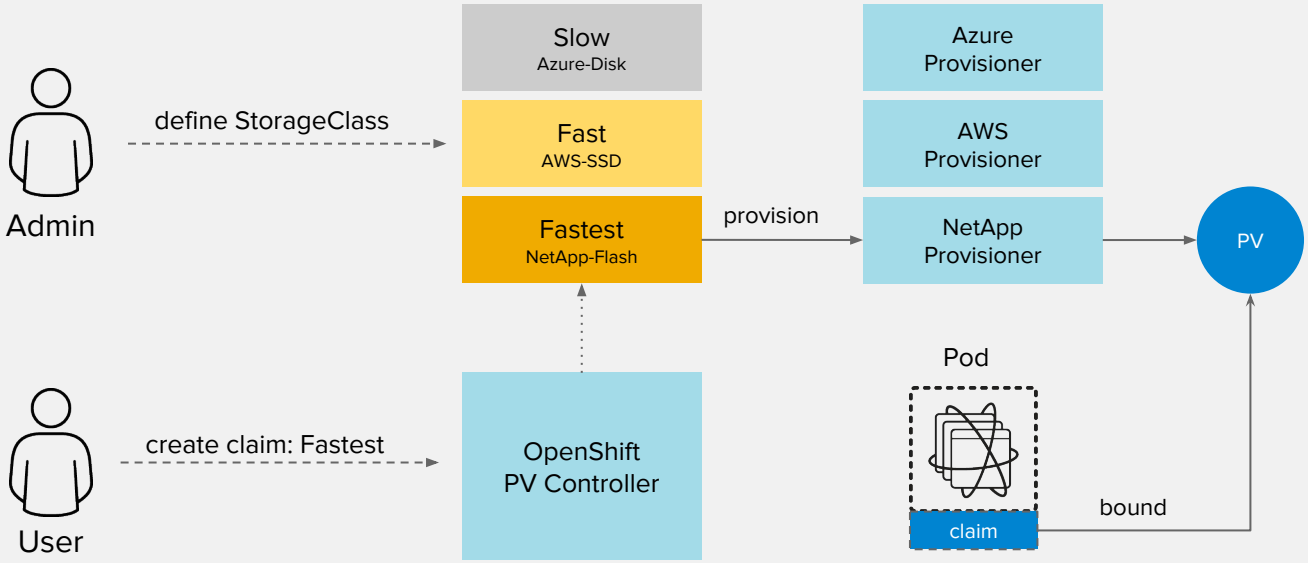
PERSISTENT STORAGE

- 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

PERSISTENT STORAGE

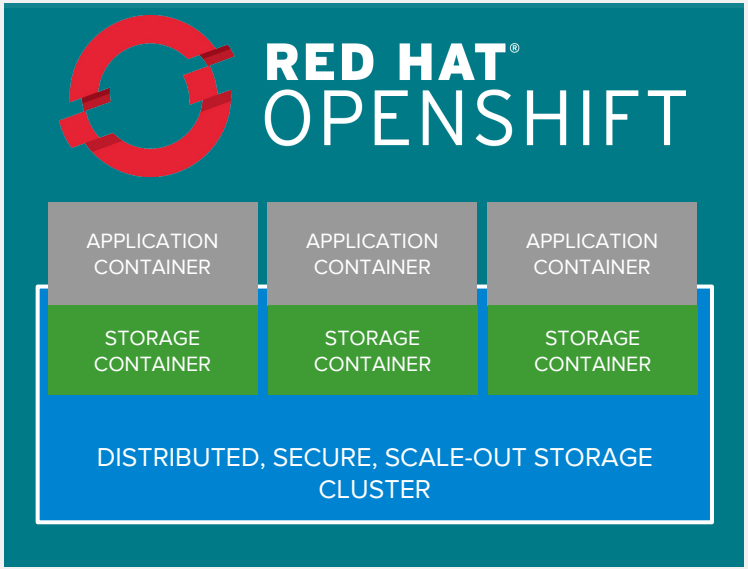


DYNAMIC VOLUME PROVISIONING

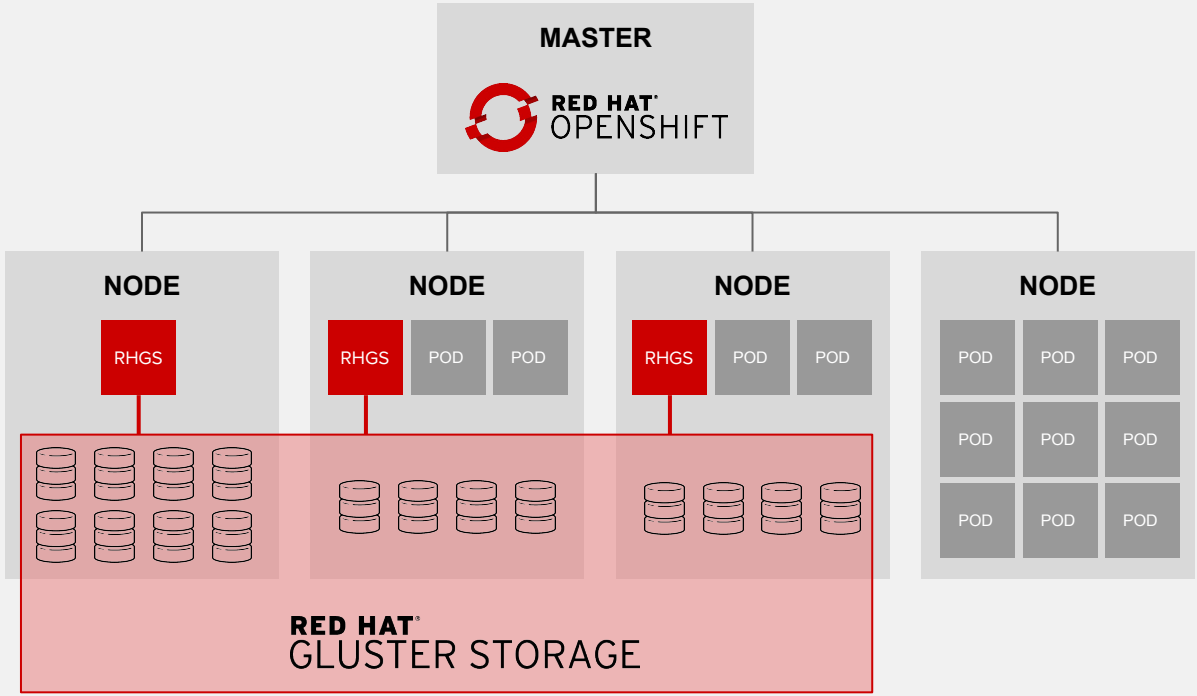


CONTAINER-NATIVE STORAGE

- 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



CONTAINER-NATIVE STORAGE



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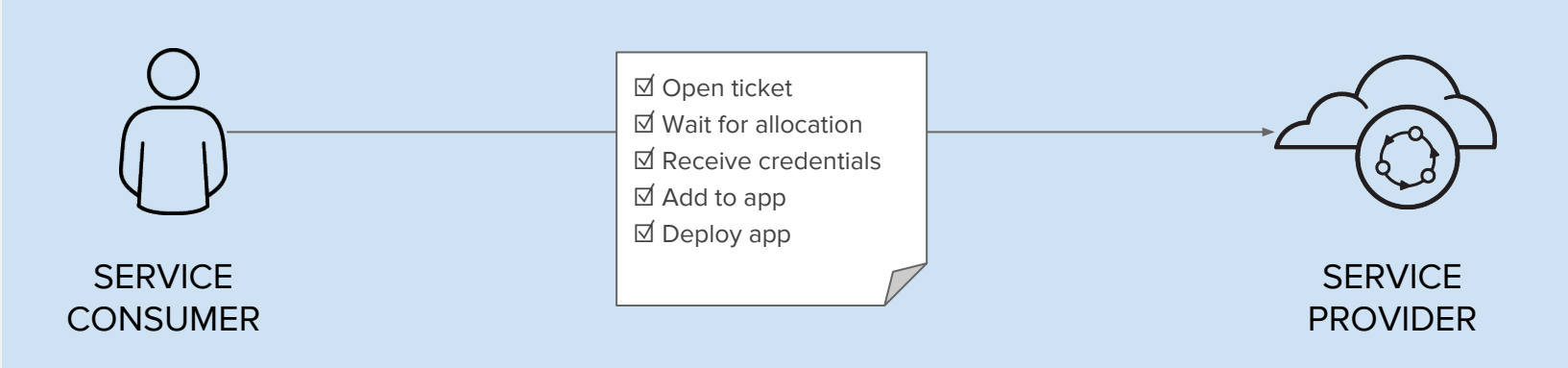
SERVICE BROKER

WHY A SERVICE BROKER?



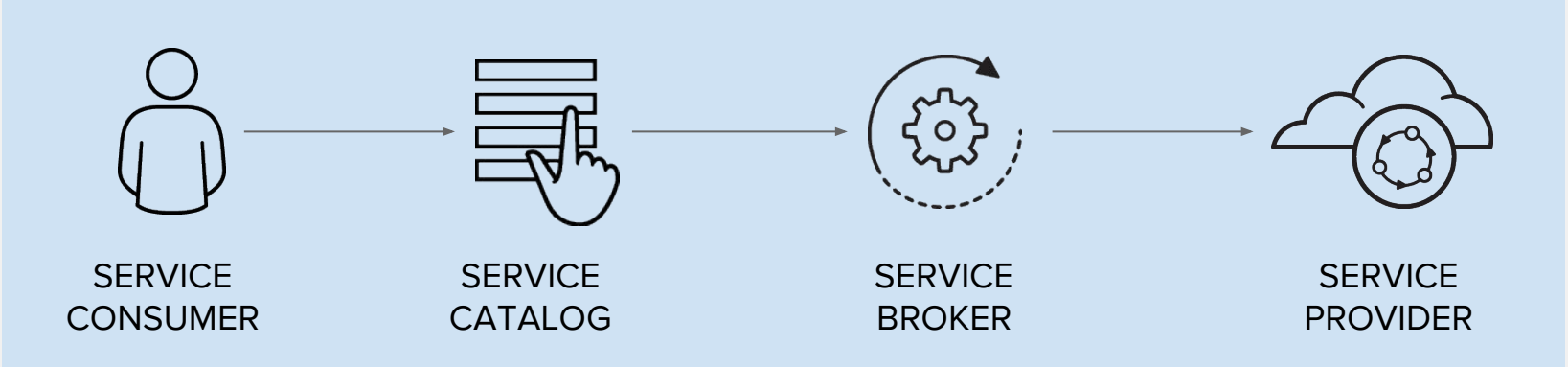
Manual, Time-consuming and Inconsistent

OPEN SERVICE BROKER API™

A multi-vendor project to standardize how services are consumed on cloud-native platforms across service providers

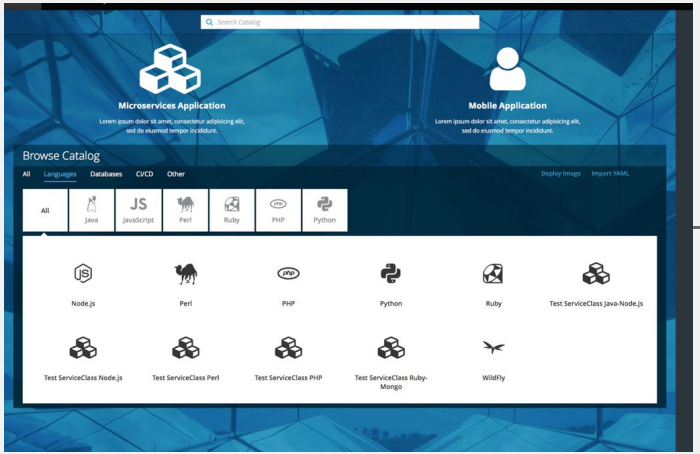
FUJITSU Pivotal IBM redhat. Google SAP

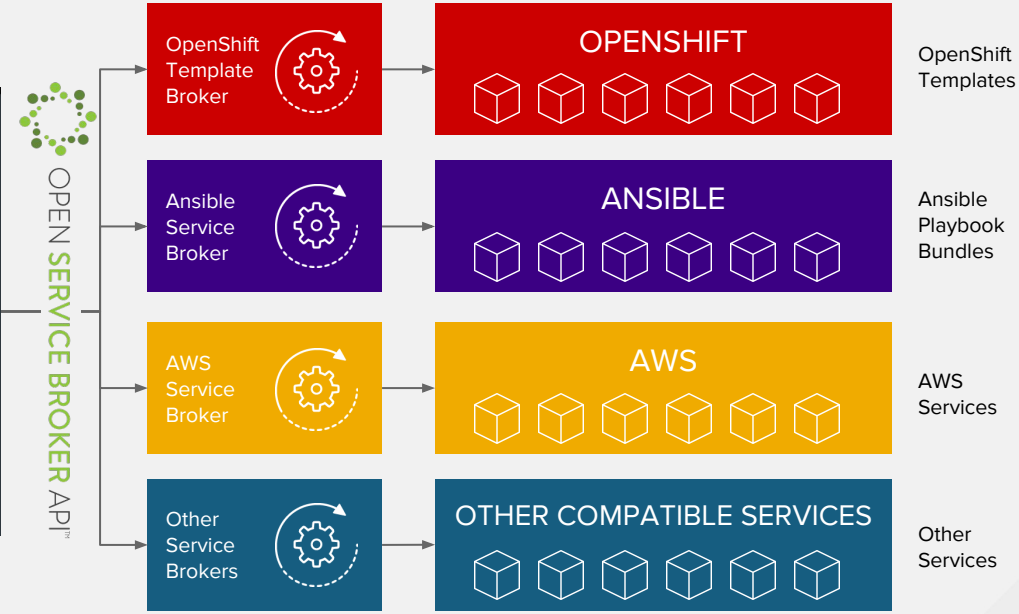
WHAT IS A SERVICE BROKER?



Automated, Standard and Consistent

OPENSHIFT SERVICE CATALOG





OPENSHIFT SERVICE CATALOG

OCP 3.6 TECH PREVIEW

OCP 3.7 GA

redhat.

SERVICE BROKER CONCEPTS

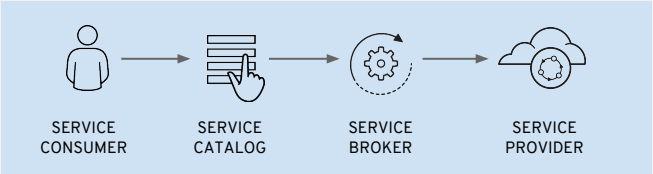
SERVICE: an offering that can be used by an app e.g. database

PLAN: a specific flavor of a service e.g. Gold Tier

SERVICE INSTANCE: an instance of the offering

PROVISION: creating a service instance

BIND: associate a service instance and its credentials to an app



HOW TO ADD A SERVICE BROKER

- Deploy service broker on or off OpenShift
- Register the broker referring to the deployed broker

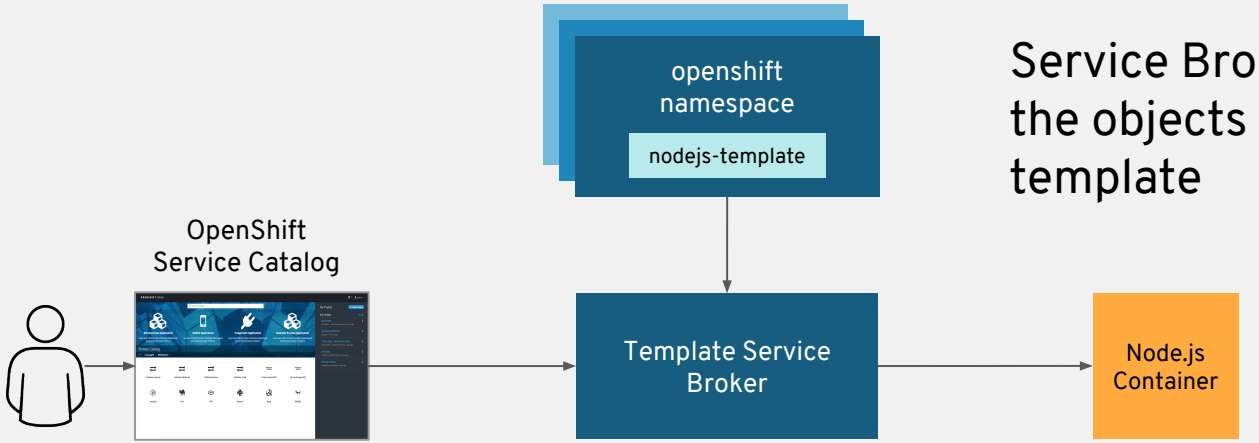
```
apiVersion: servicecatalog.k8s.io/v1alpha1
kind: Broker
metadata:
  name: asb-broker
spec:
  url: https://asb-1338-ansible-service-broker.10.2.2.15.nip.io
```

- Register the broker services by creating ServiceClass resources (the service broker might automatically perform this step)

TEMPLATE SERVICE BROKER

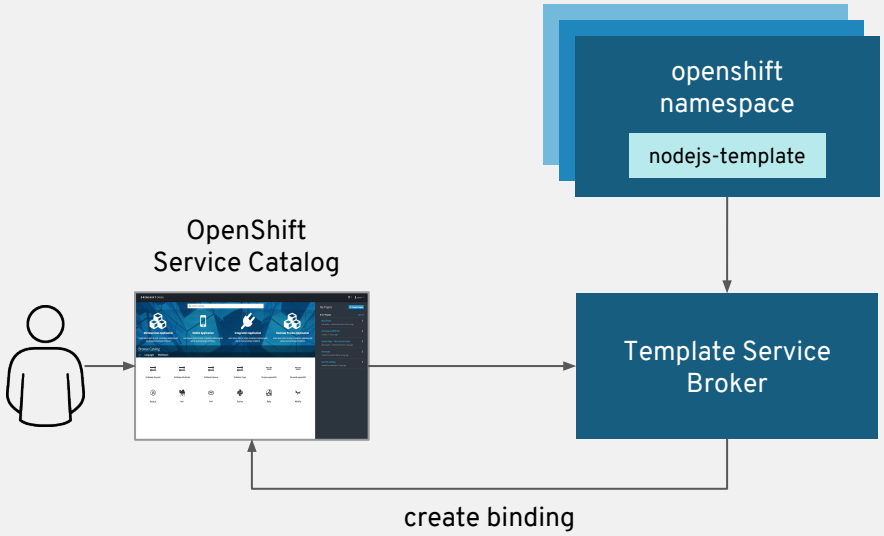
- Exposes Templates and Instant Apps in the Service Catalog
- Pulled from openshift namespace by default
- Multiple namespaces can be configured for template discovery

TEMPLATE SERVER BROKER PROVISIONING



Service Broker creates a the objects from the template

TEMPLATE SERVICE BROKER BINDING



Service Broker creates a binding and secret for any credentials (config map, secret, etc) created by the template

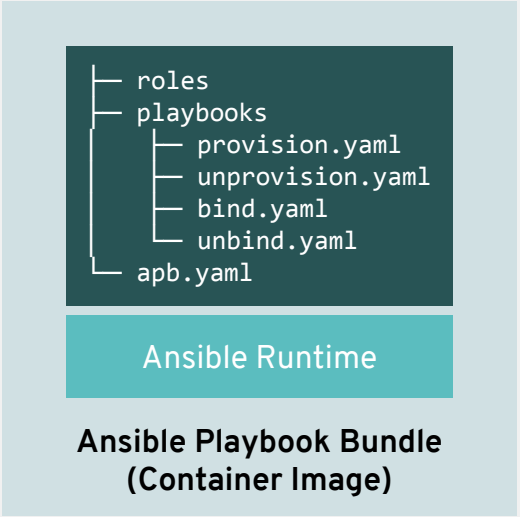
Node.js
Container

ANSIBLE SERVICE BROKER

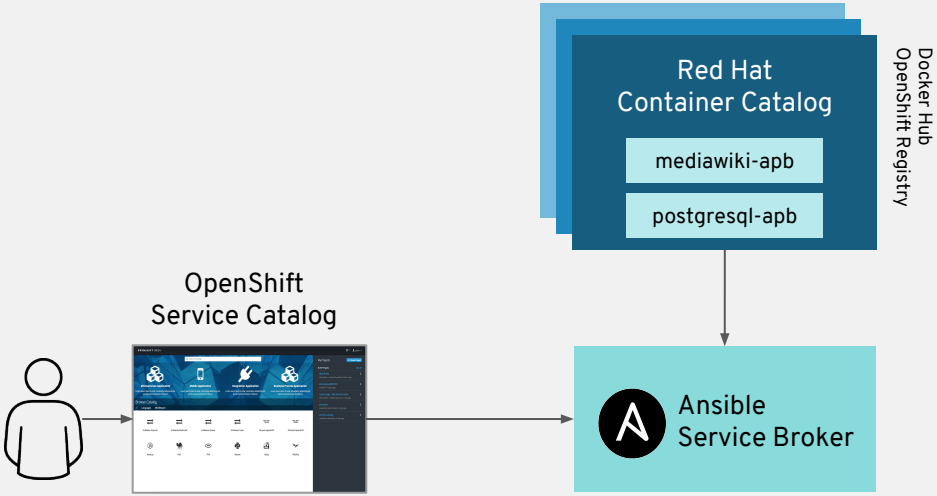
- Use Ansible on OpenShift
  - Deploy containerized applications
  - Provision external services (e.g. Oracle database)
  - Provision cloud services (e.g. AWS RDS)
  - Orchestrate multi-service solutions
  - Conditional logic for control on deployments (e.g. database is initialized)
- Leverage existing Ansible playbooks
- Anything you can do with Ansible, you can do with ASB

ANSIBLE PLAYBOOK BUNDLES (APB)

- Lightweight application definition
- Packaged as a container image
- Embedded Ansible runtime
- Metadata for parameters
- Named playbooks for actions
- Leverage existing Ansible playbooks
- Registry is queried to discover APBs

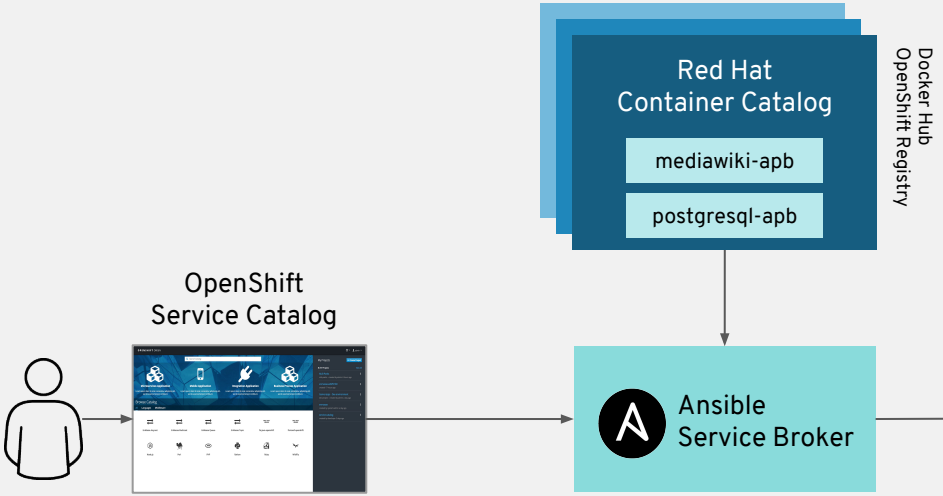


ANSIBLE SERVICE BROKER PROVISIONING



Discover and list APBs from the configured image registries

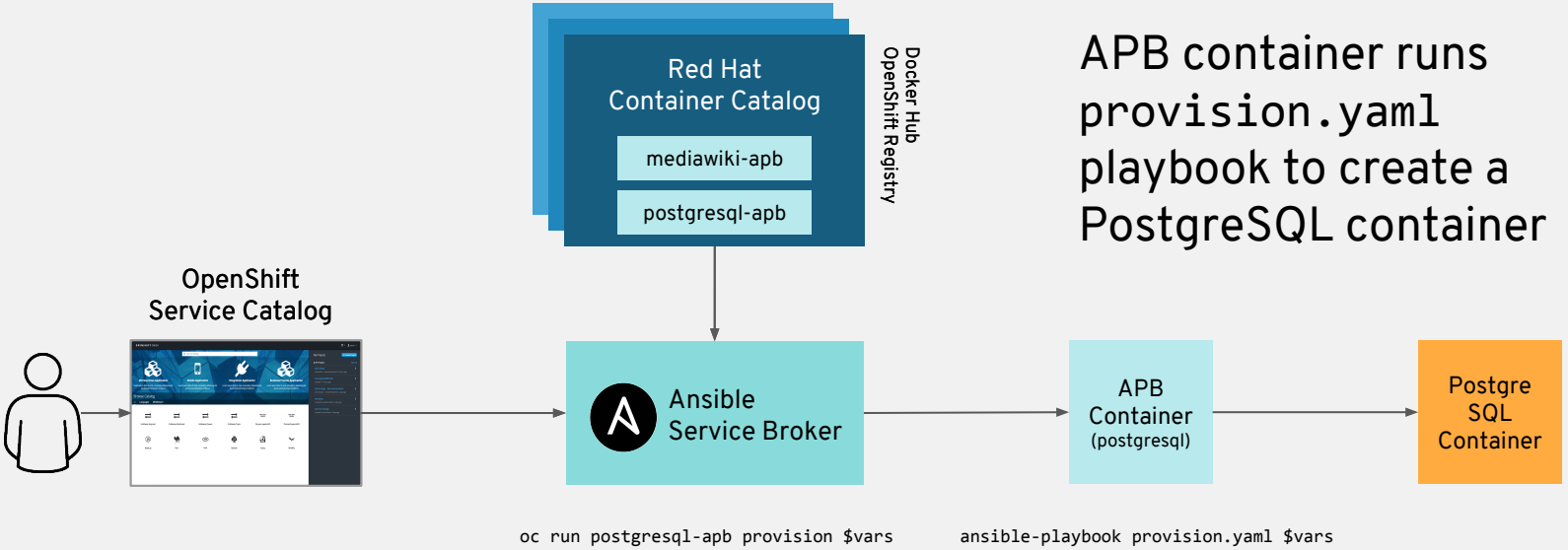
ANSIBLE SERVICE BROKER PROVISIONING



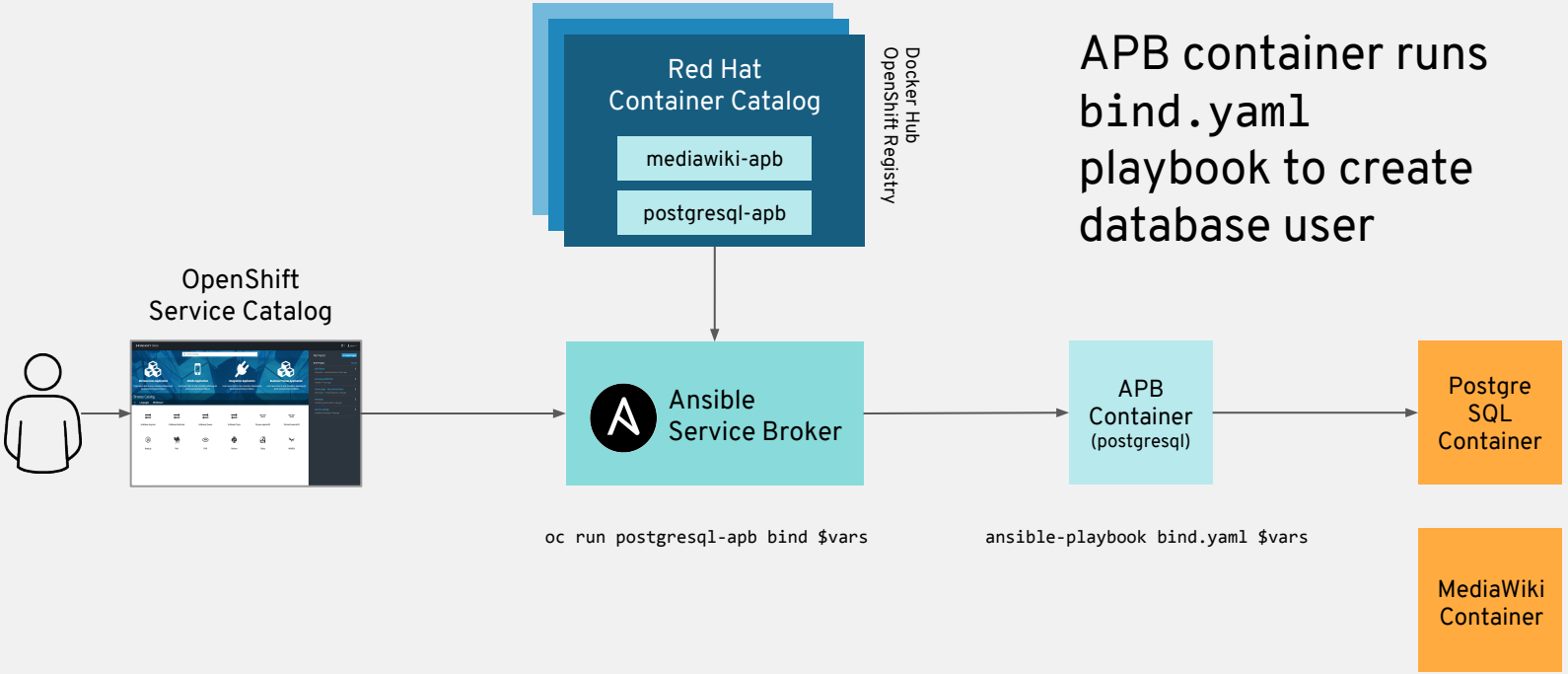
Pull APB image and run it with the broker action as a parameter

```
oc run postgresql-apb provision $vars
```

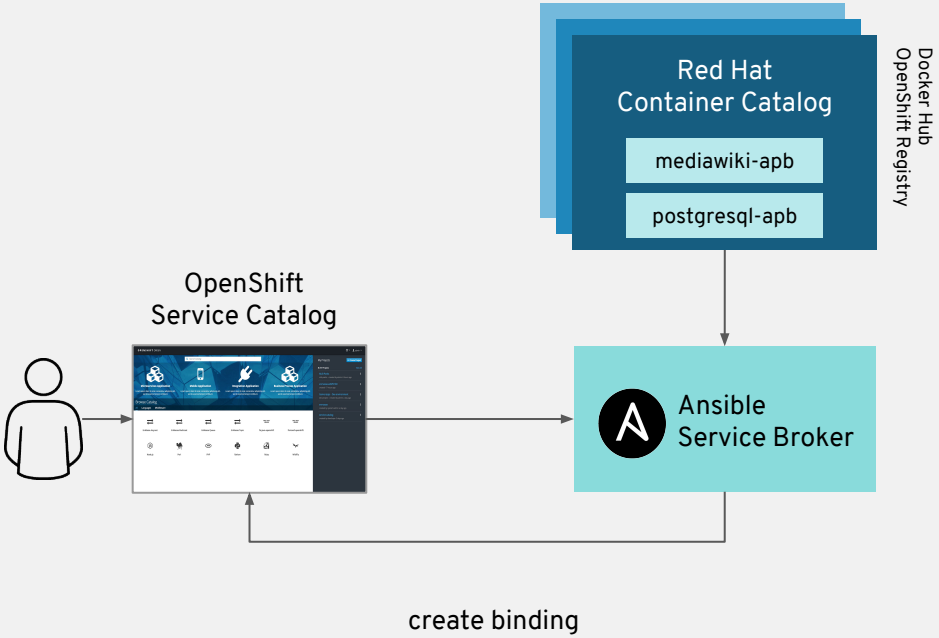
ANSIBLE SERVICE BROKER PROVISIONING



ANSIBLE SERVICE BROKER BINDING



ANSIBLE SERVICE BROKER BINDING

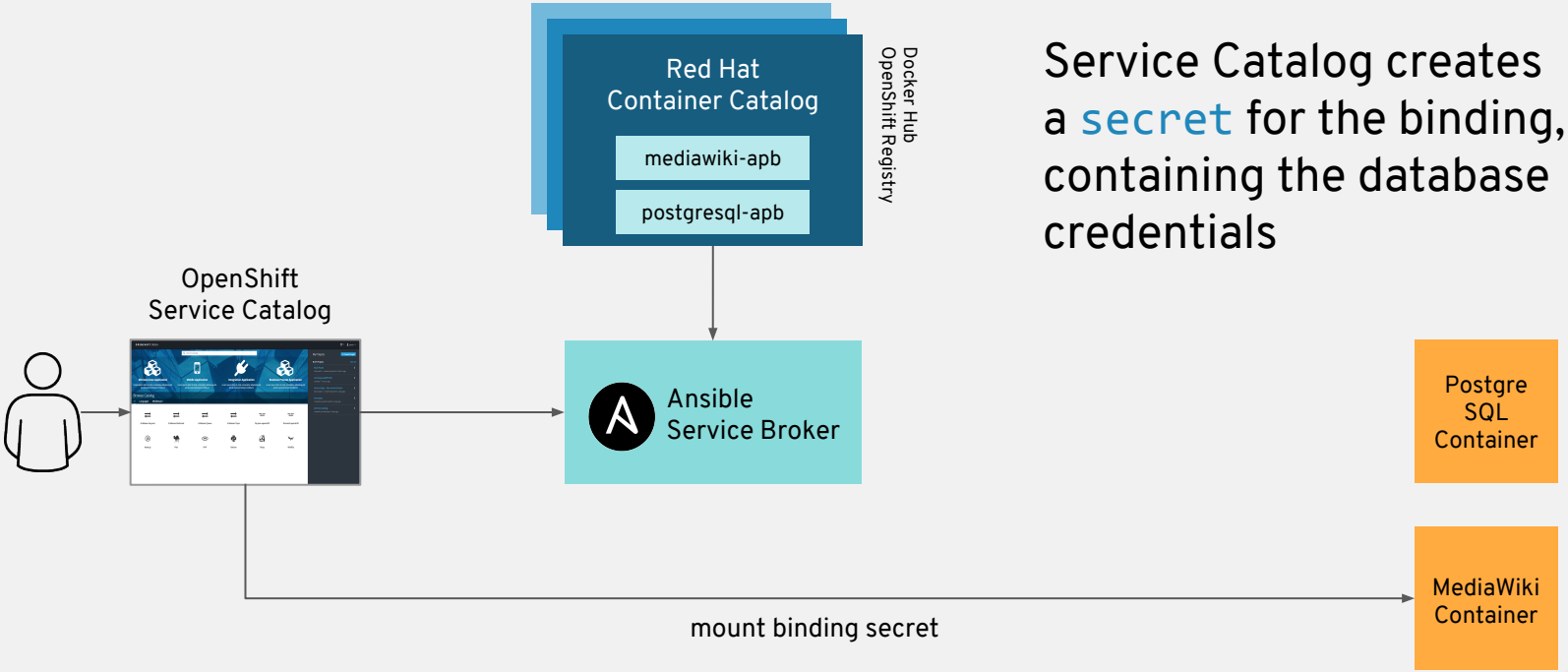


APB container goes away and Service Broker creates a `binding` for the PostgreSQL service

Postgre SQL Container

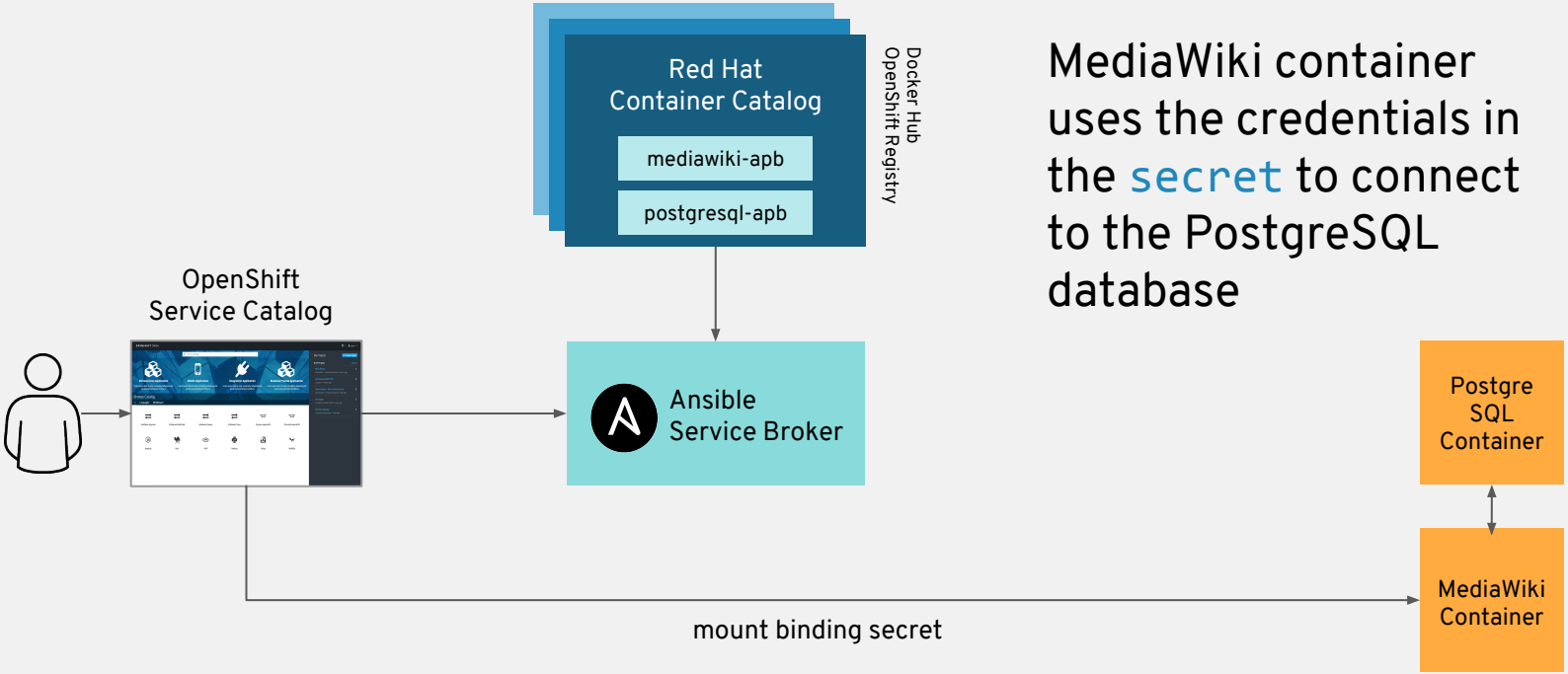
MediaWiki Container

ANSIBLE SERVICE BROKER BINDING



Service Catalog creates a `secret` for the binding, containing the database credentials

ANSIBLE SERVICE BROKER BINDING



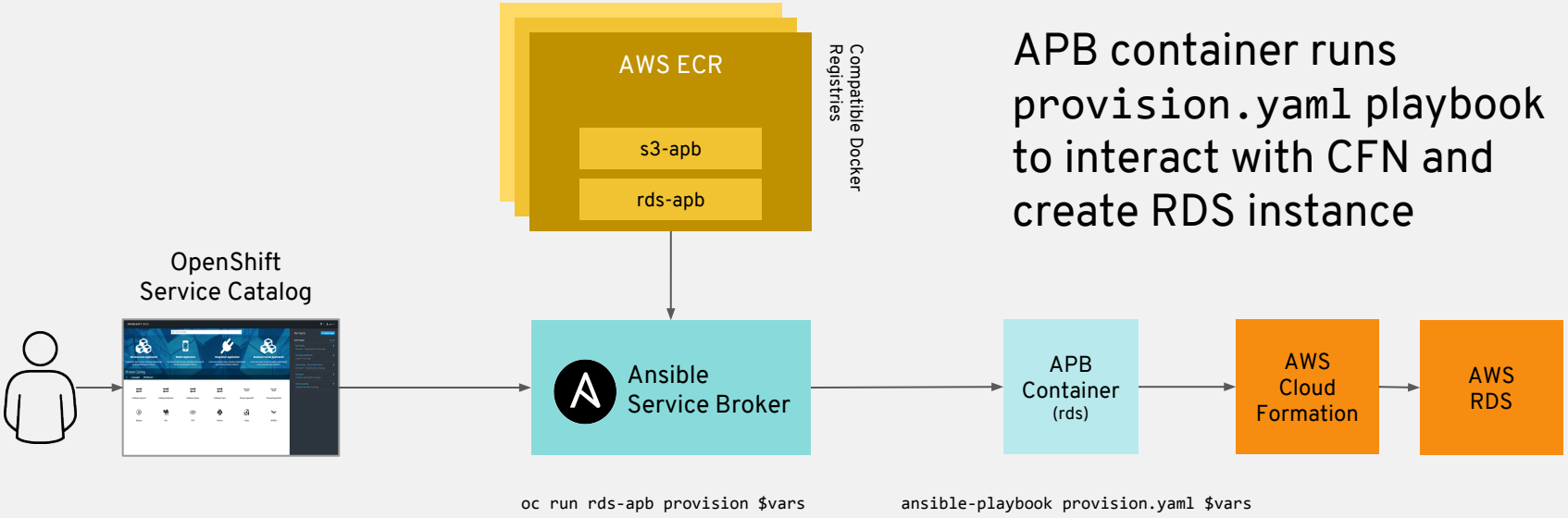
MediaWiki container uses the credentials in the `secret` to connect to the PostgreSQL database

AWS SERVICE BROKER

- Targets Top 10 AWS Services
- Uses Ansible Playbook Bundles
- Available in OpenShift 3.7

SQS	SNS
RDS	EMR
DynamoDB	Redshift
Lambda	SES
S3	ELB

AWS PROVISIONING



OPERATIONAL MANAGEMENT

TOP CHALLENGES OF RUNNING CONTAINERS AT SCALE

OPERATIONAL EFFICIENCY

SERVICE HEALTH

SECURITY & COMPLIANCE

FINANCIAL MANAGEMENT

RED HAT® CLOUDFORMS

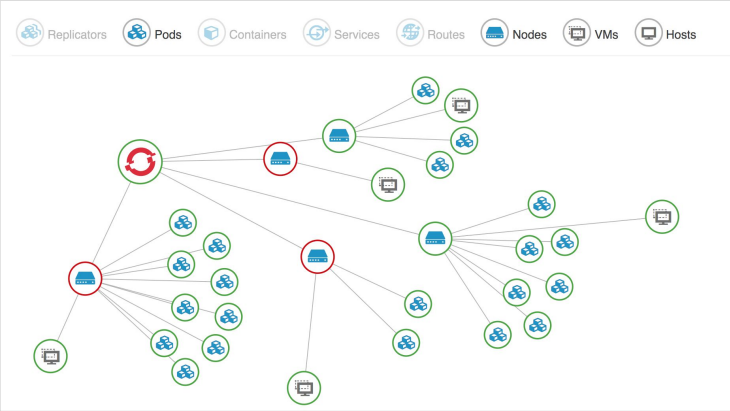
Operational Management Across the Stack

- Real-time discovery
- Visualize relationships
- Monitoring and alerts
- Vulnerability scanning
- Security compliance
- Workflow and policy
- Automation
- Chargeback

OPERATIONAL EFFICIENCY

- CloudForms continuously discovers your infrastructure in near real time.
- CloudForms discovers and visualizes relationships between infra components
- CloudForms cross references inventory across technologies.
- CloudForms offers custom automation via control policy or UI extensions

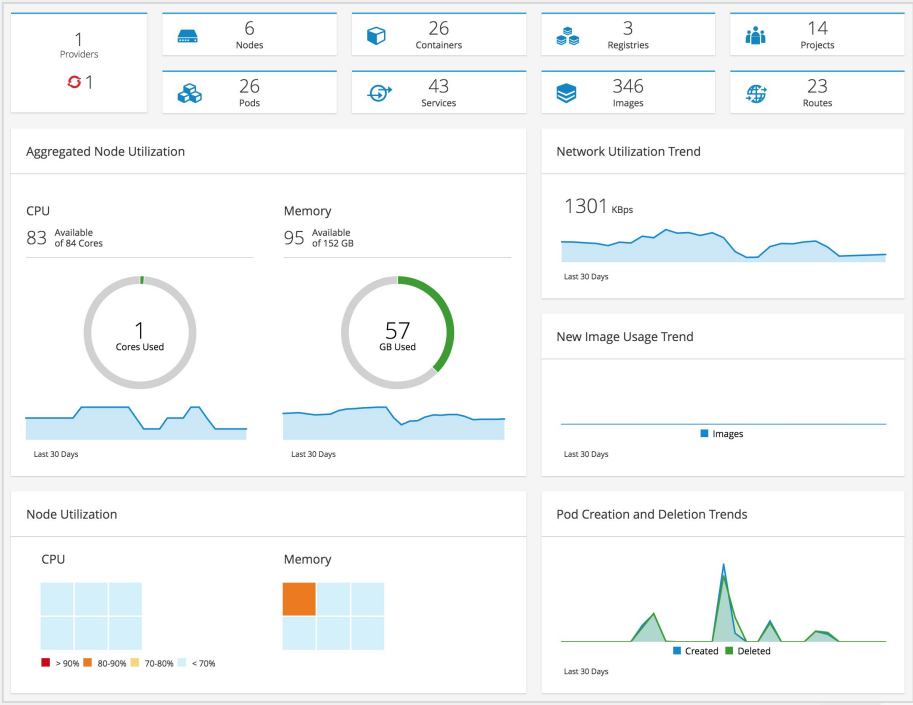
OPERATIONAL EFFICIENCY



Projects by Number of Pods Widget

Project Name	Number of Pods
demo-project	12
demo-project	7
default	3
openshift-infra	3
management-infra	3
default	2
cloudforms	1
openshift-infra	0
openshift	0
management-infra	0

Relationships	
Containers Provider	OpenShift Container Platform
Project	cicd
Container Services	1
Replicator	gogs-1
Containers	1
Node	ocp-node-2.lab.example.com
Underlying Instance	ocp-node-2.lab.example.com
Container Images	1



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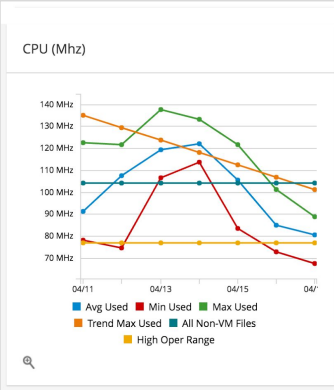
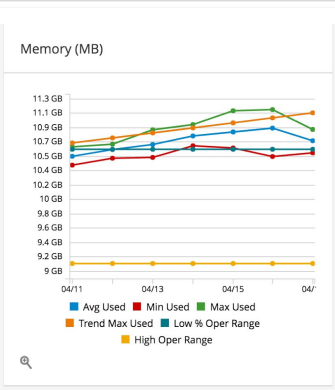
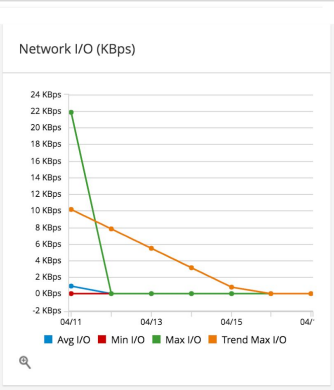
SERVICE HEALTH

- CloudForms monitors resource consumption and shows trends
- CloudForms alerts on performance thresholds or other events
- CloudForms offers right-sizing recommendations
- CloudForms enforces configuration and tracks it over time.

SERVICE HEALTH







Time Stamp	Type	Name	Event Type	Severity	Message
01/02/18 07:23:10 UTC	Cluster / Deployment Role	Raleigh	Memory Usage	1	Memory - Peak Aggregate Used for Child VMs for Collected Intervals (MB) is projected to reach 765.6 GB (100% of Memory Max Total)
11/01/17 06:18:52 UTC	Cluster / Deployment Role	Raleigh	Memory Usage	1	Memory - Peak Aggregate Used for Child VMs for Collected Intervals (MB) is projected to reach 689 GB (90% of Memory Max Total)
07/31/17 04:42:25 UTC	Cluster / Deployment Role	Raleigh	Memory Usage	2	Memory - Peak Aggregate Used for Child VMs for Collected Intervals (MB) is projected to reach 574.2 GB (75% of Memory Max Total)
02/26/17 02:01:39 UTC	Cluster / Deployment Role	Raleigh	Memory Usage	3	Memory - Peak Aggregate Used for Child VMs for Collected Intervals (MB) is projected to reach 382.8 GB (50% of Memory Max Total)

Normal Operating Ranges (up to 30 days' data)

	Max	High	Average	Low
CPU	745.90 MHz	705.74 MHz	663.99 MHz	622.23 MHz
CPU Usage	100.00%	15.36%	14.10%	12.84%
Memory	7.7 GB	7.57 GB	7.37 GB	7.18 GB
Memory Usage	65.00%	63.46%	61.78%	60.11%

Right-Sizing (Conservative - derived from Absolute Maximum)

	Current	Recommended	% Savings	Savings
Processors	4	5	-25.0%	-1
Memory	12288 MB	7988 MB	35.0%	4300 MB

Right-Sizing (Moderate - derived from High NORM)

	Current	Recommended	% Savings	Savings
Processors	4	1	75.0%	3
Memory	12288 MB	7800 MB	36.5%	4488 MB

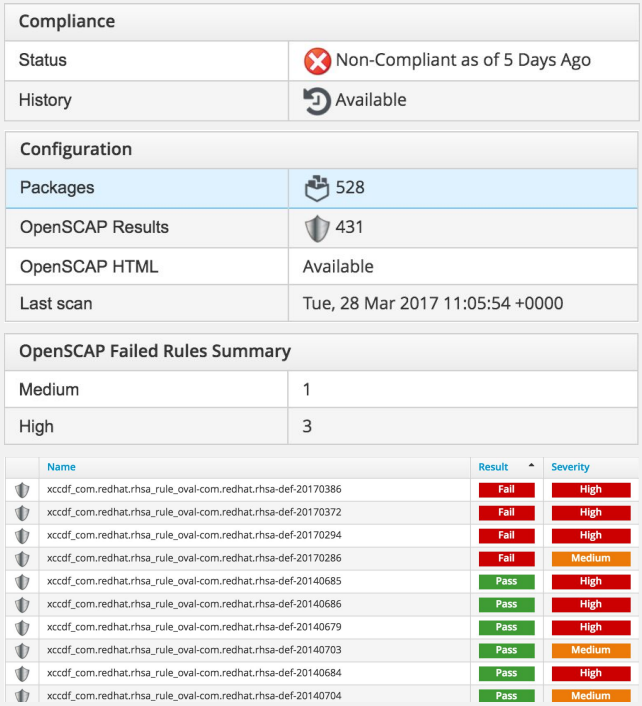
Right-Sizing (Aggressive - derived from Average NORM)

	Current	Recommended	% Savings	Savings
Processors	4	1	75.0%	3
Memory	12288 MB	7596 MB	38.2%	4692 MB

SECURITY & COMPLIANCE

- CloudForms finds and marks nodes non-compliant with policy.
- CloudForms allows reporting on container provenance.
- CloudForms scans container images using OpenSCAP.
- CloudForms tracks genealogy between images and containers.

SECURITY & COMPLIANCE



Compliance	
Status	Non-Compliant as of 5 Days Ago
History	Available

Configuration	
Packages	528
OpenSCAP Results	431
OpenSCAP HTML	Available
Last scan	Tue, 28 Mar 2017 11:05:54 +0000

OpenSCAP Failed Rules Summary	
Medium	1
High	3

Name	Result	Severity
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20170386	Fail	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20170372	Fail	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20170294	Fail	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20170286	Fail	Medium
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140685	Pass	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140686	Pass	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140679	Pass	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140703	Pass	Medium
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140684	Pass	High
xccdf_com.redhat.rhsa_rule_oval-com.redhat.rhsa-def-20140704	Pass	Medium

Compliance and Scoring

The target system did not satisfy the conditions of 4 rules! Please review rule results and consider applying remediation.

Rule results

427 passed | 4

Severity of failed rules

1 medium | 3 high

Score

Scoring system	Score	Maximum	Percent
urn:xccdf:scoring:default	99.071922	100.000000	99.07%

Rule Overview

pass | fail | notchecked
fixed | error | notselected
informational | unknown | notapplicable

Search through XCCDF rules | Search

Group rules by: Default

Title	Severity	Result
Automatically generated XCCDF from OVAL file: com.redhat.rhsa-RHEL7.xml 4x fail		
RHSA-2017:0286: openssl security update (Moderate)	medium	fail
RHSA-2017:0294: kernel security update (Important)	high	fail
RHSA-2017:0372: kernel-aarch64 security and bug fix update (Important)	high	fail
RHSA-2017:0386: kernel security, bug fix, and enhancement update (Important)	high	fail

FINANCIAL MANAGEMENT

- Define cost models for infrastructure and understand your cost.
- Rate schedules per platform and per tenant with multi-tiered and multi-currency support
- CloudForms shows top users for CPU, memory, as well as cost.
- Chargeback/showback to projects based on container utilization.

FINANCIAL MANAGEMENT

Top CPU Consumers (Last Hour)

VM Name	CPU Usage	Allocated vCPUs	VM Vendor
overcloud1-telus	21.4%	8	vmware
manageiq-euwe-2	18.3%	4	redhat
manageiq-euwe-3	14.0%	4	redhat
Lenovo XClarity Administrator - Do not delete	9.1%	2	vmware
vcenter6	8.0%	4	vmware

Updated December 21, 2016 20:17 | Next January 11, 2017 23:45

Top Memory Consumers (last hour)

VM Name	Memory Usage	Allocated Memory
CF41_DB	100.0%	16 GB
CF42_UI2	97.7%	8 GB
CF42_UI1	97.7%	8 GB
manageiq-euwe-3	97.6%	8 GB
CF42_google1	97.0%	8 GB

Updated January 11, 2017 23:49 | Next January 12, 2017 00:05

Saved Report "ChargeBack by Project - Tue, 18 Apr 2017 17:59:28 +0000"

Date Range	Project Name	Project Uid	Cpu Cores Used Cost	Memory Used Cost	Total Cost
04/17/2017	cicd	b8f35aee-e974-11e6-89d9-fa163ec3f31d	$24.00	$30.33	$66.34
04/17/2017	default	4c767b2b-df4d-11e6-8850-fa163ec3f31d	$24.00	$4.90	$40.90
04/17/2017	ifixed	acc6113d-ed77-11e6-8c6a-fa163ec3f31d	$24.00	$28.77	$64.77
04/17/2017	jritenour-demo	47ee9d2a-efae-11e6-8c6a-fa163ec3f31d	$24.00	$28.80	$64.80
04/17/2017	mlbparks	4666e252-e296-11e6-8a49-fa163ec3f31d	$24.00	$406.96	$442.96
04/17/2017	openshift-infra	4e37af93-df4d-11e6-8850-fa163ec3f31d	$24.06	$992.75	$1,290.78
04/17/2017	stage	b771432a-e974-11e6-89d9-fa163ec3f31d	$24.00	$491.89	$527.89
04/17/2017					
Totals:			$168.07	$1,984.40	$2,498.43
All Rows					
Totals:			$168.07	$1,984.40	$2,498.43

REFERENCE ARCHITECTURES

REFERENCE ARCHITECTURES

OpenShift on VMware vCenter

OpenShift on Red Hat OpenStack Platform

OpenShift on Amazon Web Services

OpenShift on Google Cloud Platform

OpenShift on Microsoft Azure

OpenShift on Red Hat Virtualization

OpenShift on HPE Servers with Ansible Tower

OpenShift on VMware vCenter 6 with Gluster

Deploying an OpenShift Distributed Architecture

OpenShift Architecture and Deployment Guide

OpenShift Scaling, Performance, and Capacity Planning

Application Release Strategies with OpenShift

Building Polyglot Microservices on OpenShift

Building JBoss EAP 6 Microservices on OpenShift

Building JBoss EAP 7 Microservices on OpenShift

Business Process Management with JBoss BPMS on OpenShift

Build and Deployment of Java Applications on OpenShift

Building Microservices on OpenShift with Fuse Integration...

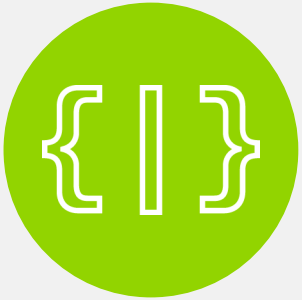
JFrog Artifactory on OpenShift Container Platform

Spring Boot Microservices on Red Hat OpenShift

API Management with Red Hat 3scale on OpenShift

BUILD AND DEPLOY CONTAINER IMAGES

BUILD AND DEPLOY CONTAINER IMAGES

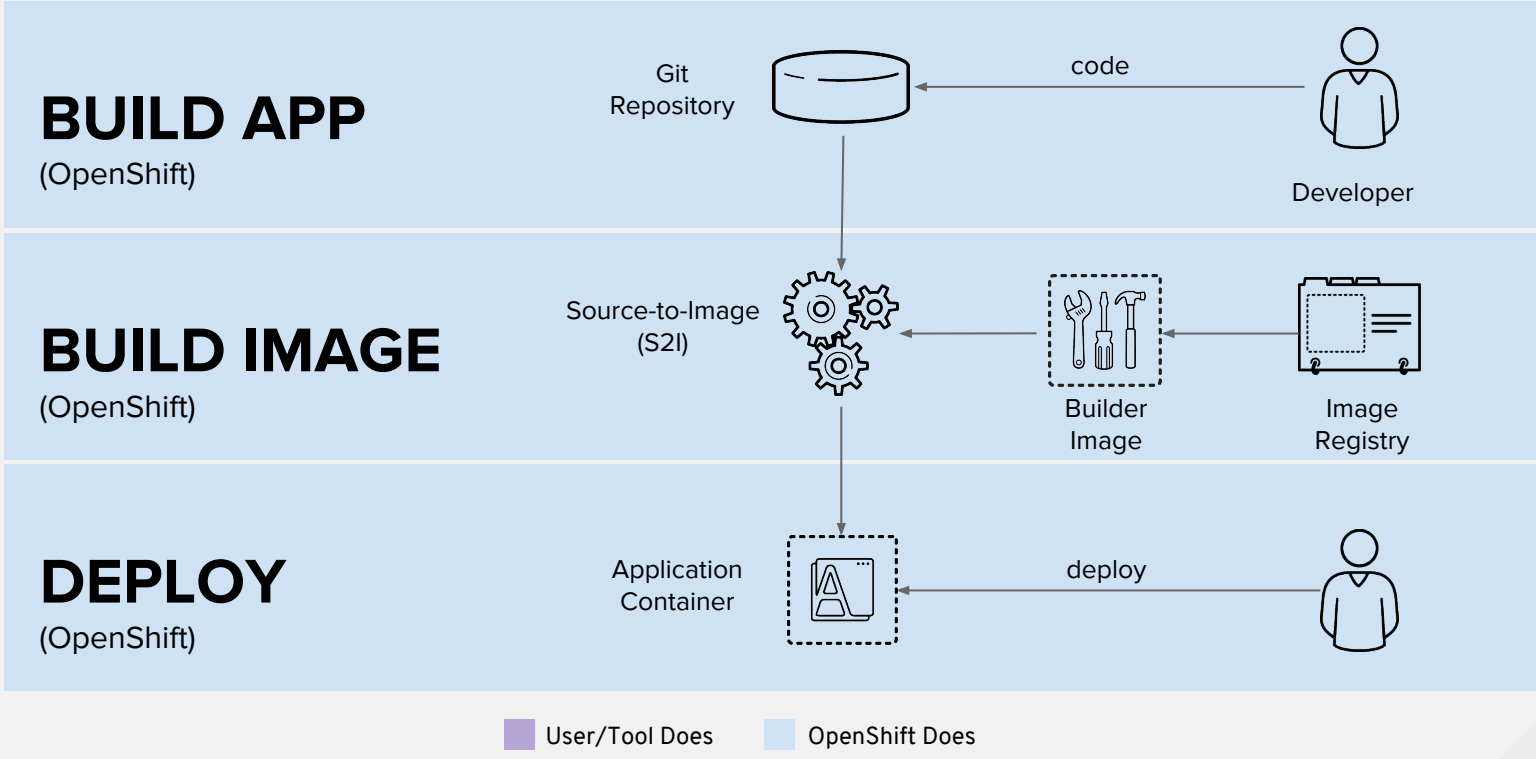


DEPLOY YOUR SOURCE CODE

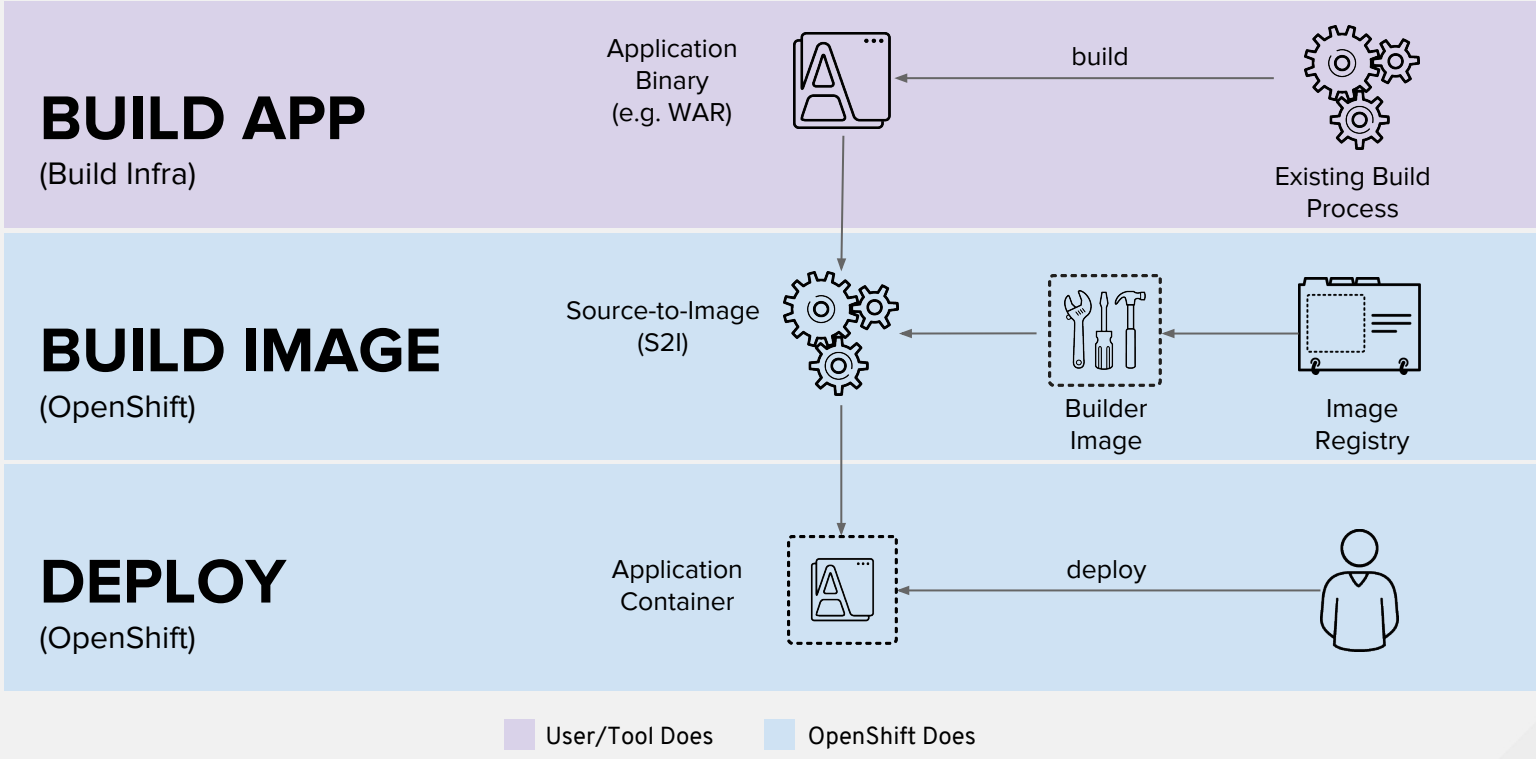
DEPLOY YOUR APP BINARY

DEPLOY YOUR CONTAINER IMAGE

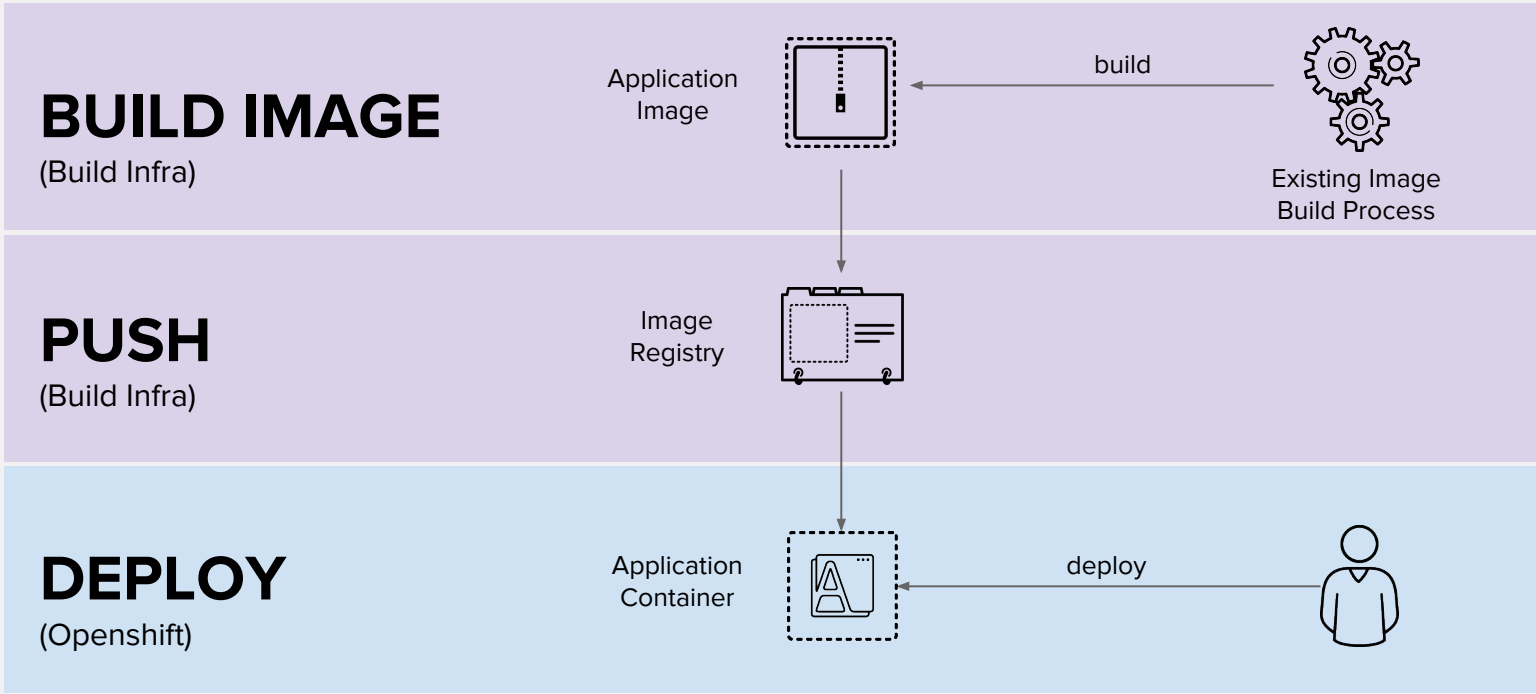
DEPLOY SOURCE CODE WITH SOURCE-TO-IMAGE (S2I)



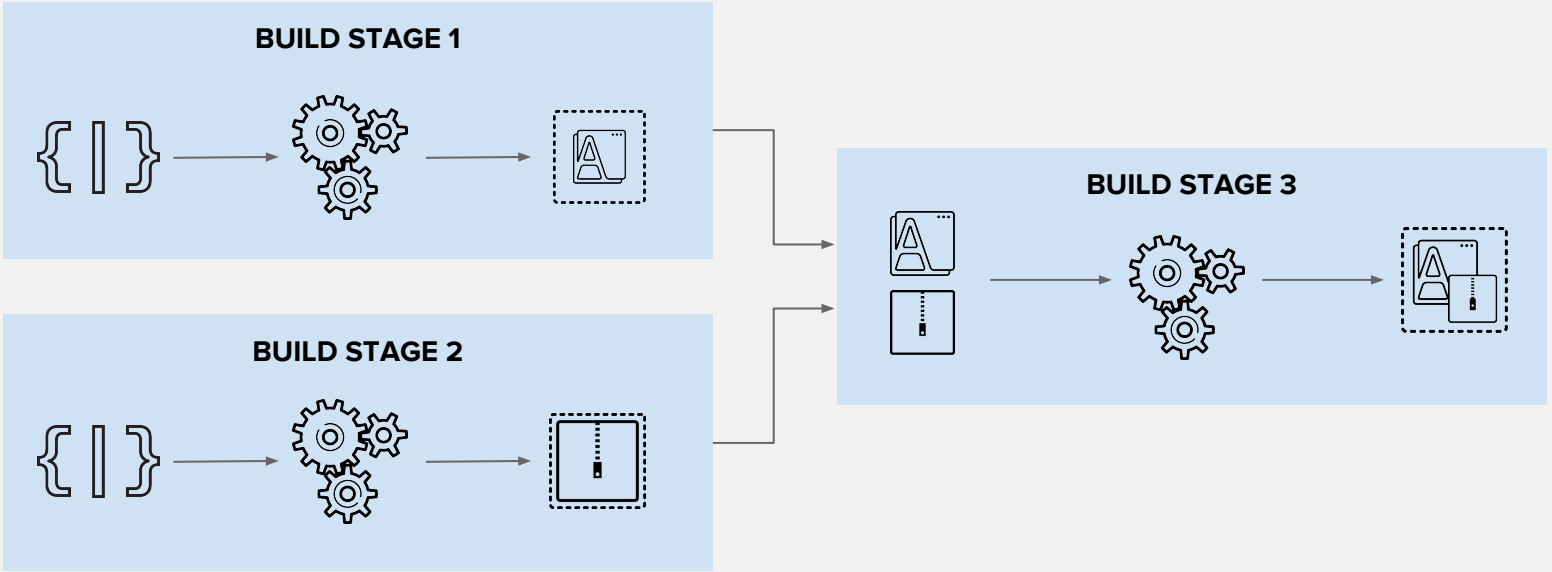
DEPLOY APP BINARY WITH SOURCE-TO-IMAGE (S2I)



DEPLOY DOCKER IMAGE

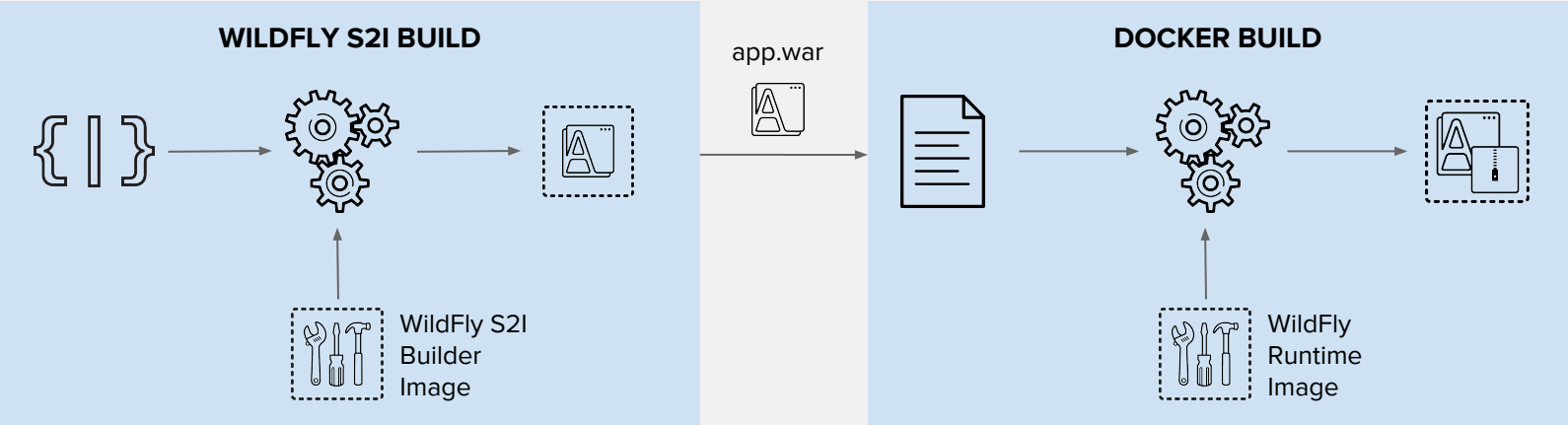


BUILD IMAGES IN MULTIPLE STAGES



EXAMPLE: USE ANY RUNTIME IMAGE WITH SOURCE-TO-IMAGE BUILDS

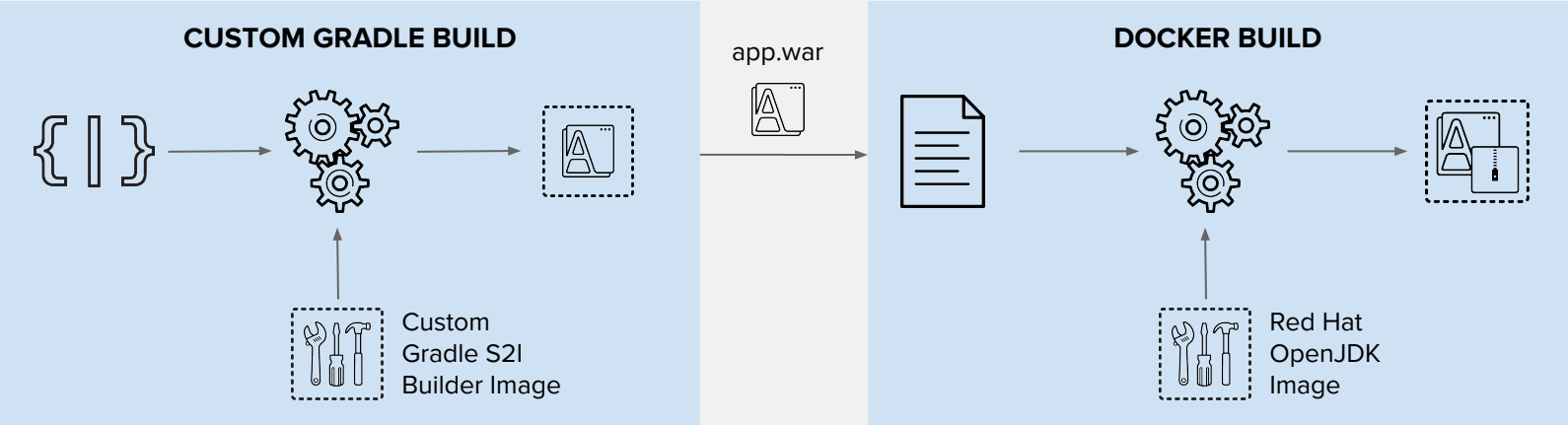
Use Source-to-Image to build app binaries and deploy on lean vanilla runtimes



read more on https://blog.openshift.com/chaining-builds/

EXAMPLE: USE ANY BUILD TOOL WITH OFFICIAL RUNTIME IMAGES

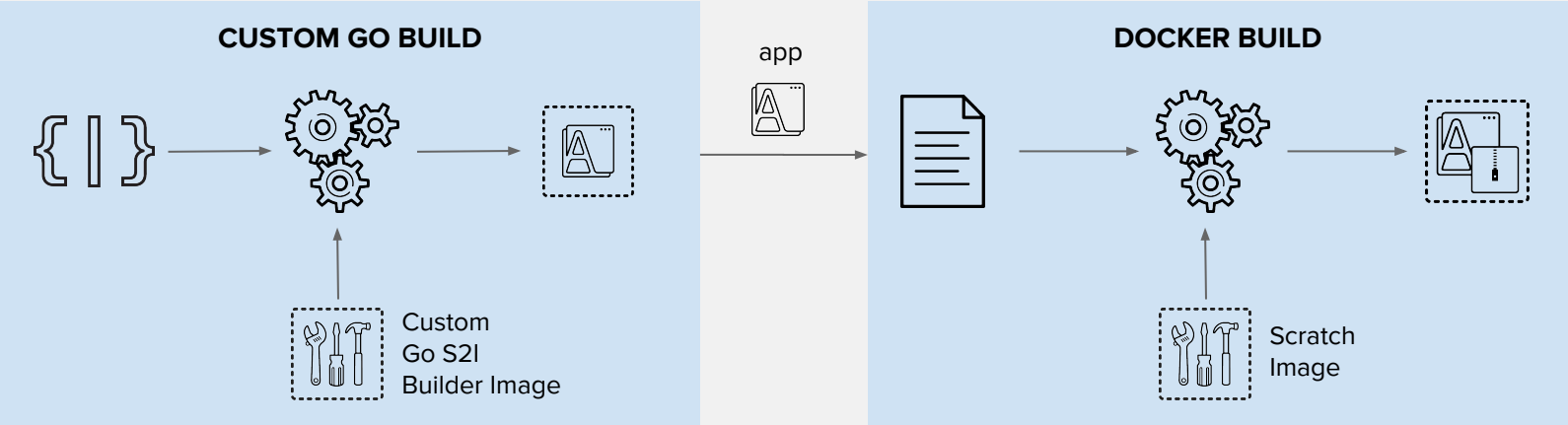
Use your choice of build tool like Gradle and deploy to official images like the JDK image



read more on https://blog.openshift.com/chaining-builds/

EXAMPLE: SMALL LEAN RUNTIMES

Build the app binary and deploy on small scratch images



read more on https://blog.openshift.com/chaining-builds/

CONTINUOUS INTEGRATION (CI)
CONTINUOUS DELIVERY (CD)

CI/CD WITH BUILD AND DEPLOYMENTS

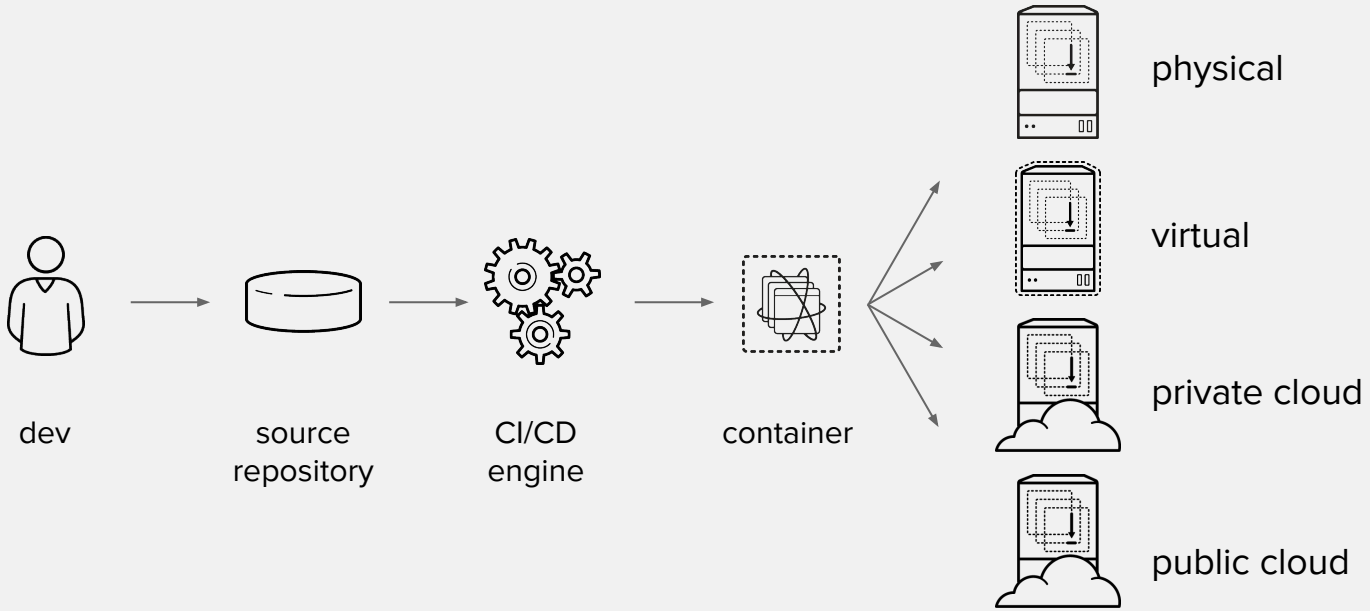
BUILDS

- Webhook triggers: build the app image whenever the code changes
- Image trigger: build the app image whenever the base language or app runtime changes
- Build hooks: test the app image before pushing it to an image registry

DEPLOYMENTS

- Deployment triggers: redeploy app containers whenever configuration changes or the image changes in the OpenShift integrated registry or upstream registries

CONTINUOUS DELIVERY WITH CONTAINERS

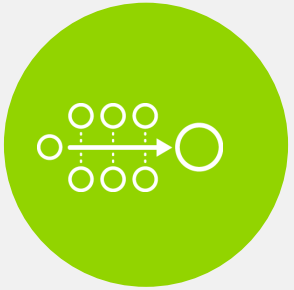


DevOps Excellence Awards 2017

OPENSHIFT LOVES CI/CD

JENKINS-AS-A SERVICE ON OPENSHIFT

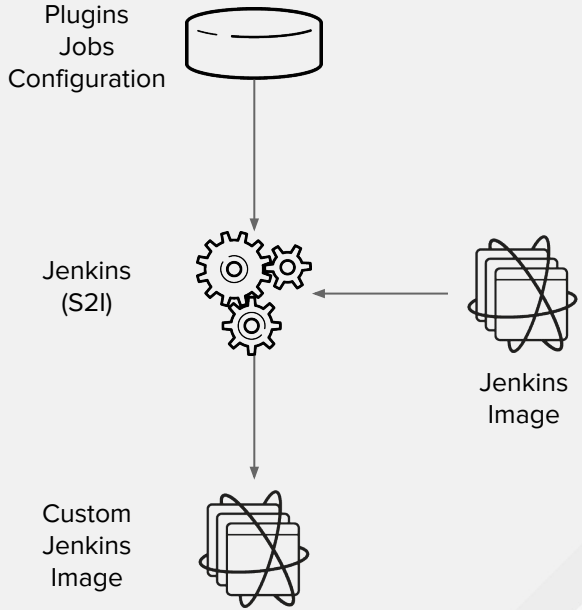
HYBRID JENKINS INFRA WITH OPENSHIFT



EXISTING CI/CD DEPLOY TO OPENSHIFT

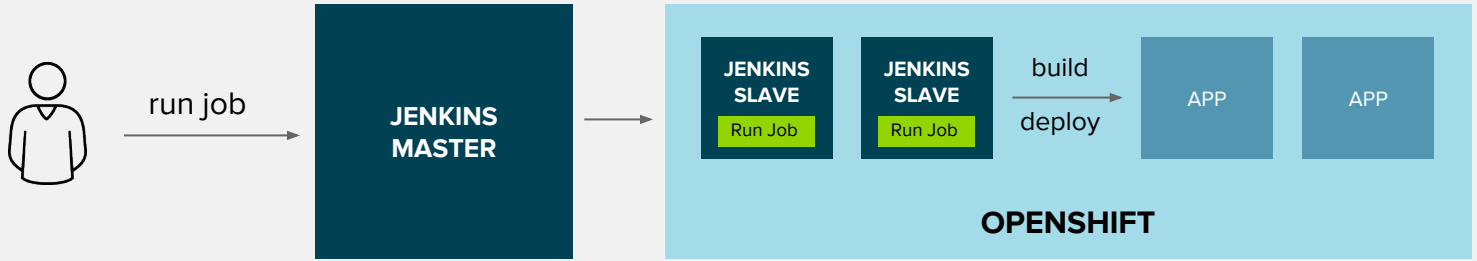
JENKINS-AS-A-SERVICE ON OPENSHIFT

- Certified Jenkins images with pre-configured plugins
  - Provided out-of-the-box
  - Follows Jenkins 1.x and 2.x LTS versions
- Jenkins S2I Builder for customizing the image
  - Install Plugins
  - Configure Jenkins
  - Configure Build Jobs
- OpenShift plugins to integrate authentication with OpenShift and also CI/CD pipelines
- Dynamically deploys Jenkins slave containers



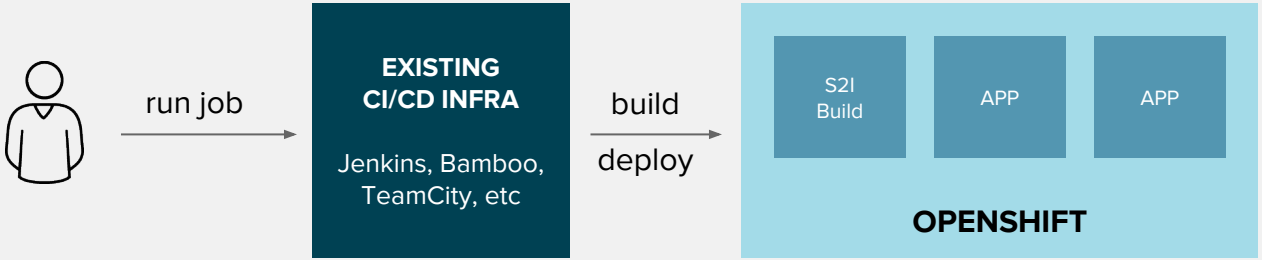
HYBRID JENKINS INFRA WITH OPENSHIFT

- Scale existing Jenkins infrastructure by dynamically provisioning Jenkins slaves on OpenShift
- Use Kubernetes plug-in on existing Jenkin servers



EXISTING CI/CD DEPLOY TO OPENSHIFT

- Existing CI/CD infrastructure outside OpenShift performs operations against OpenShift
  - OpenShift Pipeline Jenkins Plugin for Jenkins
  - OpenShift CLI for integrating other CI Engines with OpenShift
- Without disrupting existing processes, can be combined with previous alternative



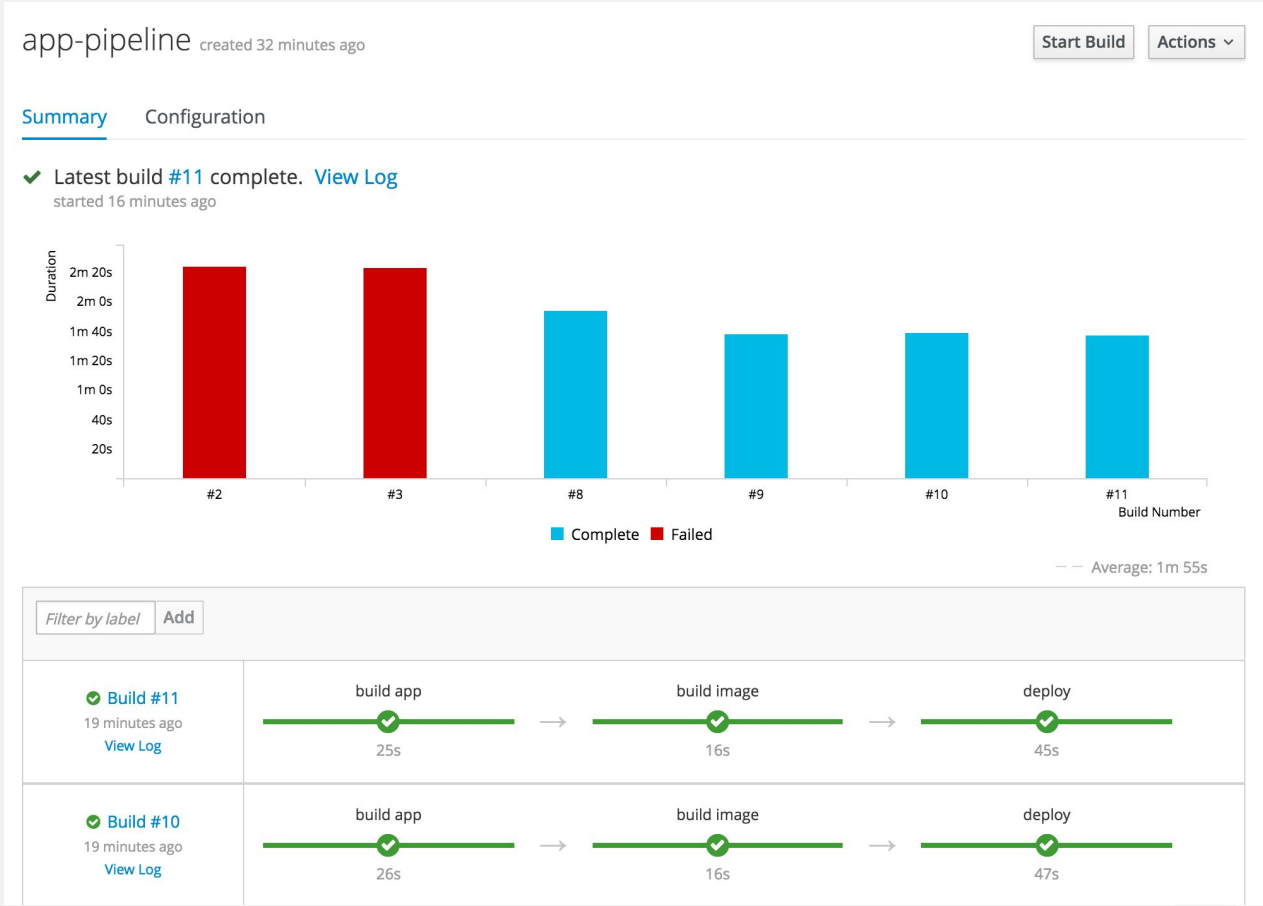
OPENSHIFT PIPELINES

- OpenShift Pipelines allow defining a CI/CD workflow via a Jenkins pipeline which can be started, monitored, and managed similar to other builds
- Dynamic provisioning of Jenkins slaves
- Auto-provisioning of Jenkins server
- OpenShift Pipeline strategies
  - Embedded Jenkinsfile
  - Jenkinsfile from a Git repository

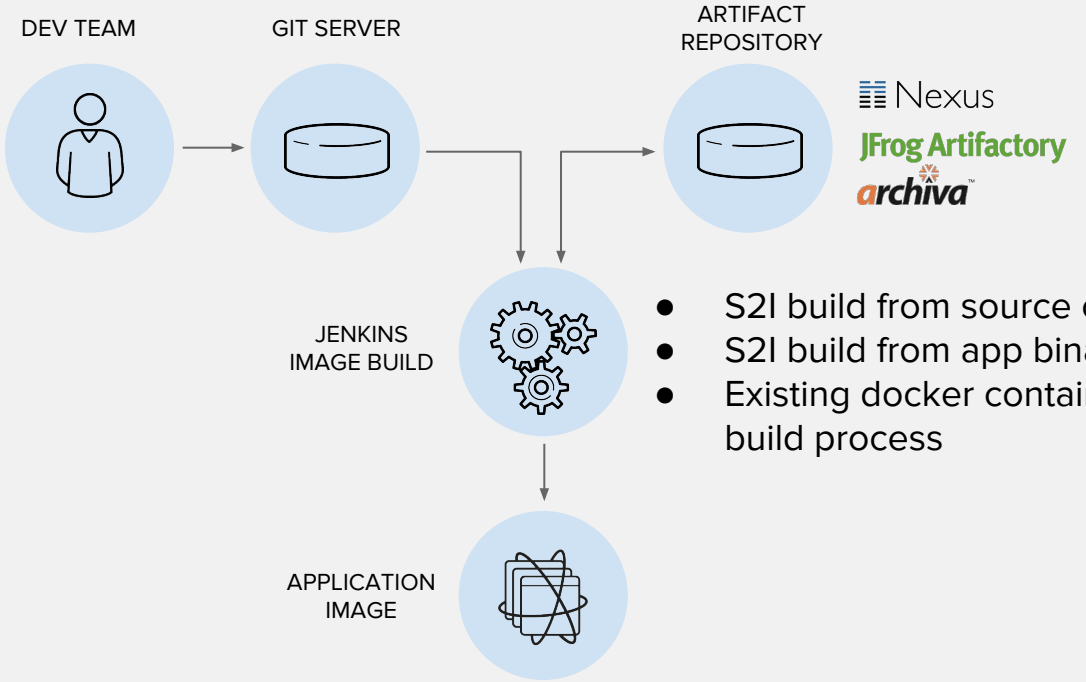
```
apiVersion: v1
kind: BuildConfig
metadata:
  name: app-pipeline
spec:
  strategy:
    type: JenkinsPipeline
    jenkinsPipelineStrategy:
      jenkinsfile: |-
        node('maven') {
          stage('build app') {
            git url: 'https://git/app.git'
            sh "mvn package"
          }
          stage('build image') {
            sh "oc start-build app --from-file=target/app.jar
          }
          stage('deploy') {
            openshiftDeploy deploymentConfig: 'app'
          }
        }
```

Provision a Jenkins slave for running Maven

OpenShift Pipelines in Web Console

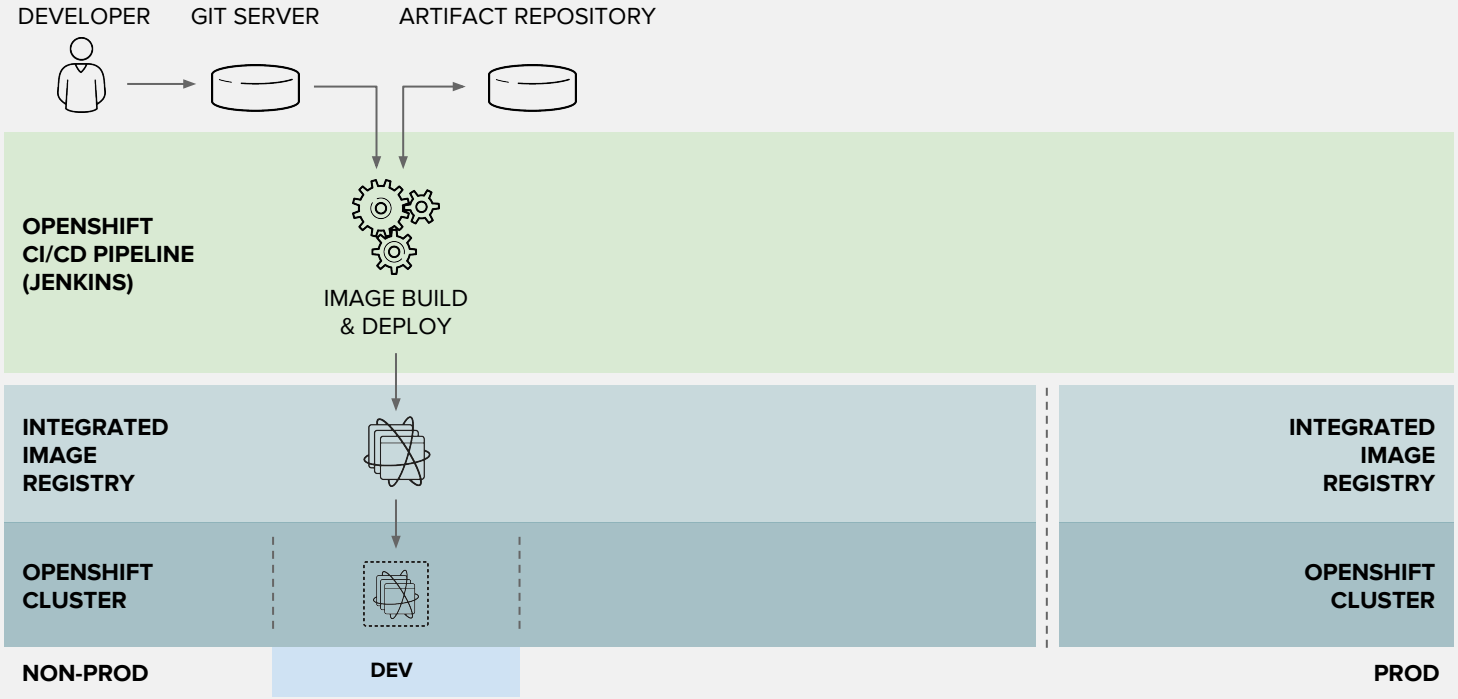


CONTINUOUS DELIVERY PIPELINE

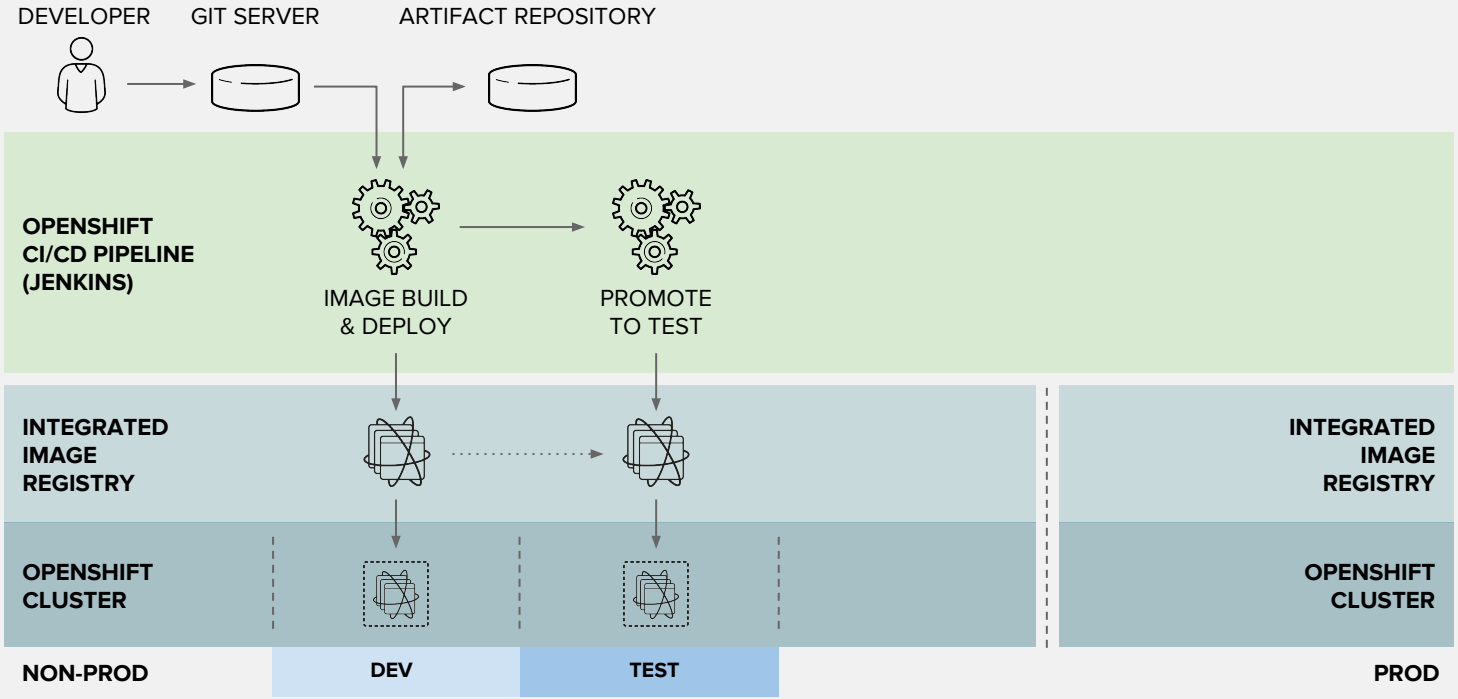


- S2I build from source code
- S2I build from app binary
- Existing docker container image build process

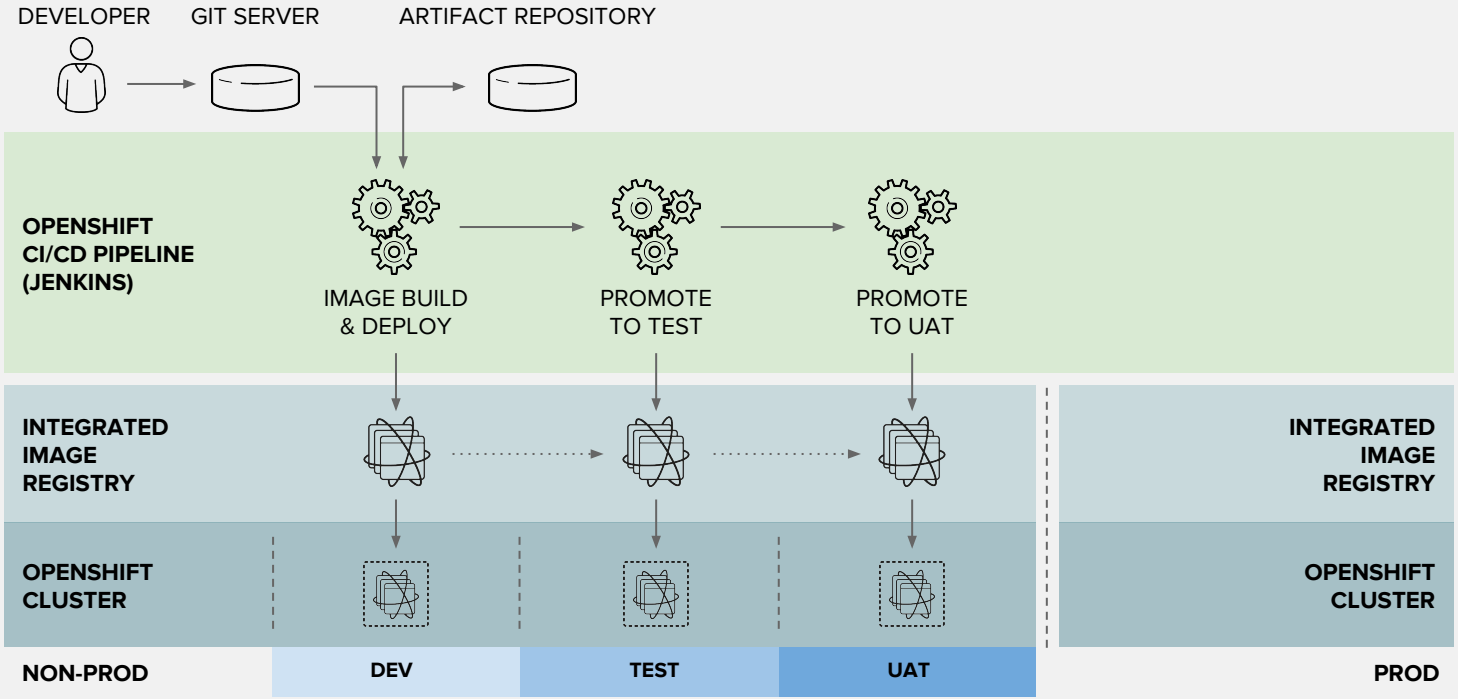
CONTINUOUS DELIVERY PIPELINE



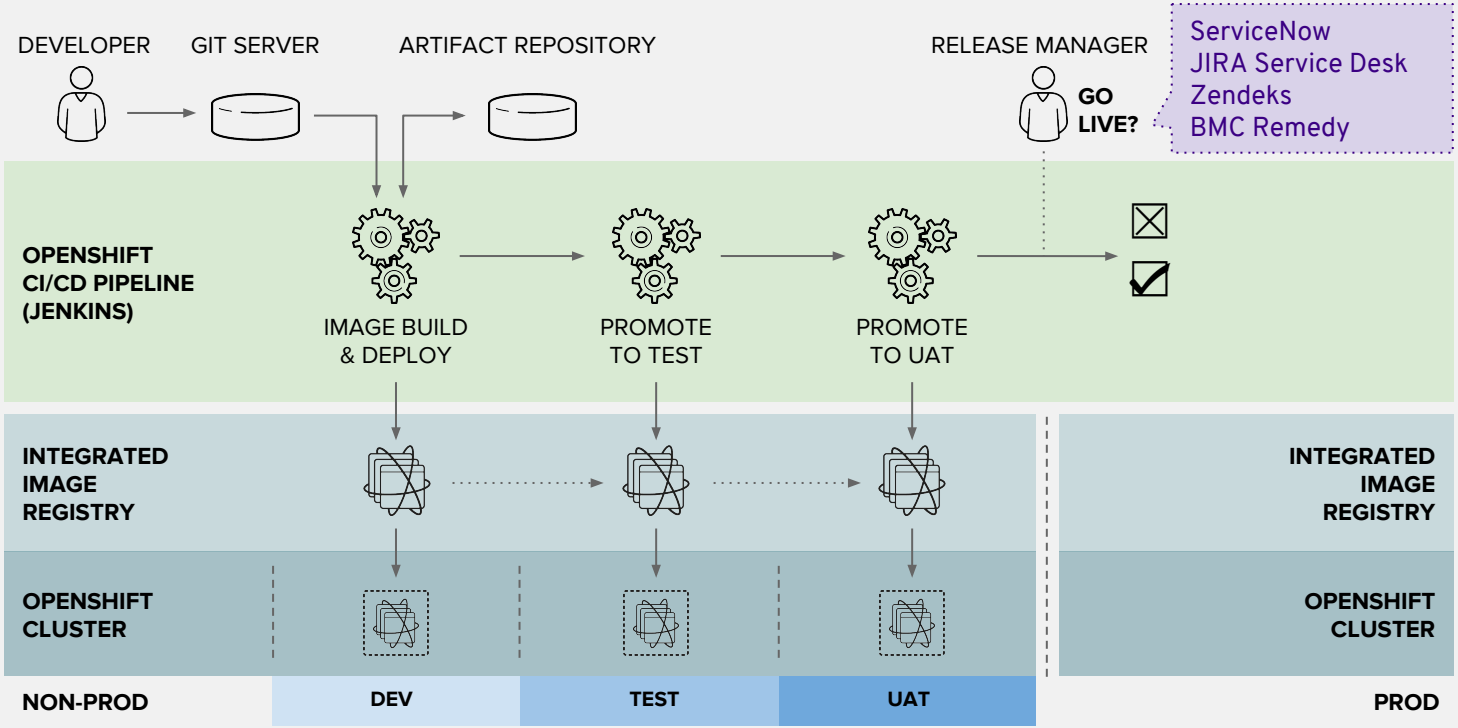
CONTINUOUS DELIVERY PIPELINE



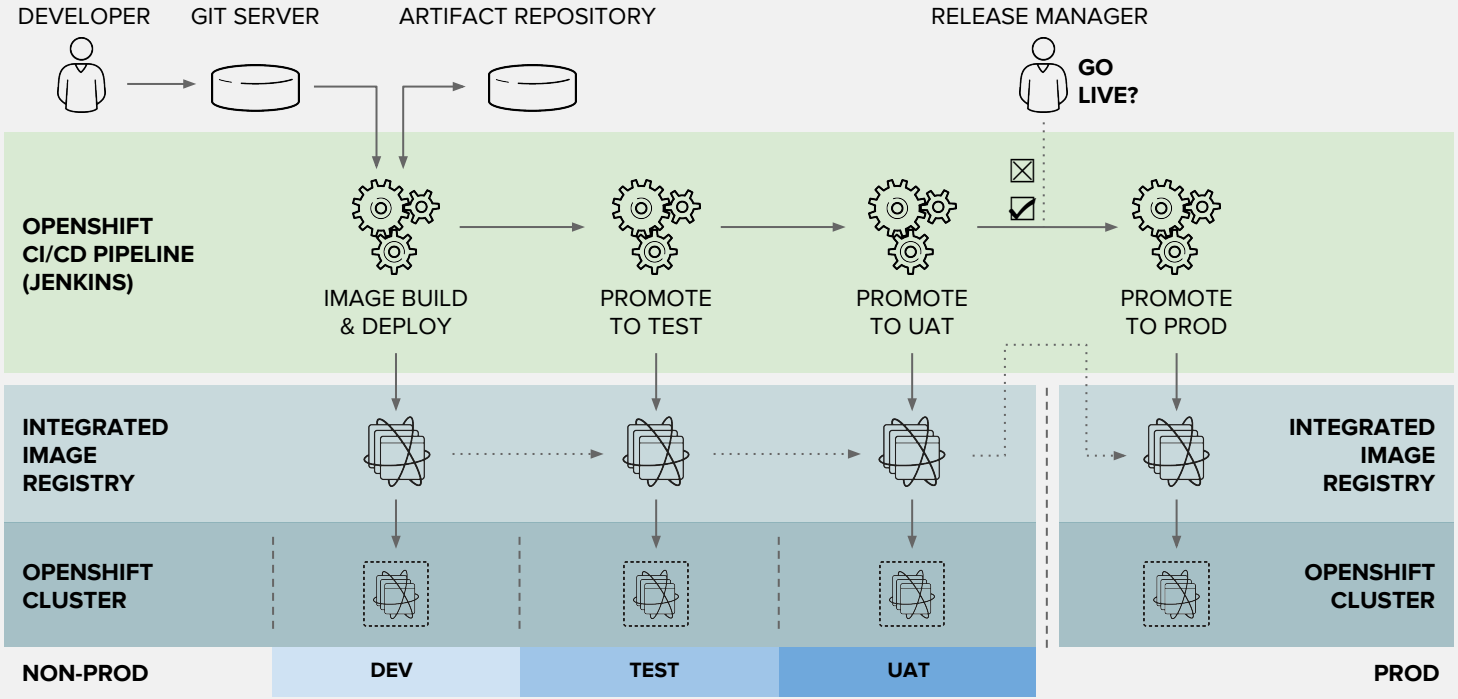
CONTINUOUS DELIVERY PIPELINE



CONTINUOUS DELIVERY PIPELINE

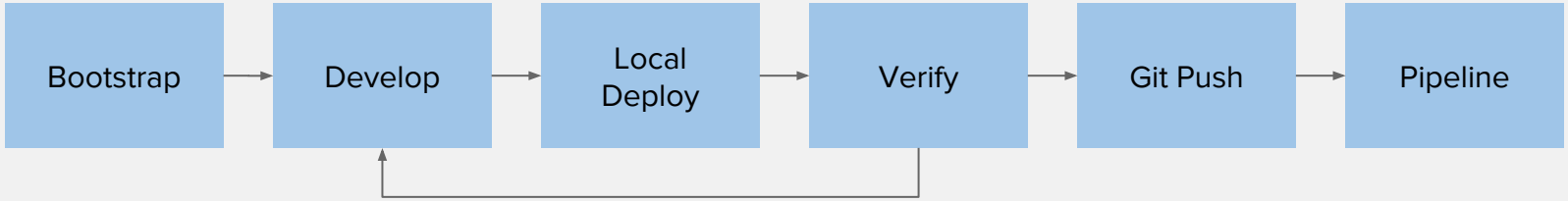


CONTINUOUS DELIVERY PIPELINE



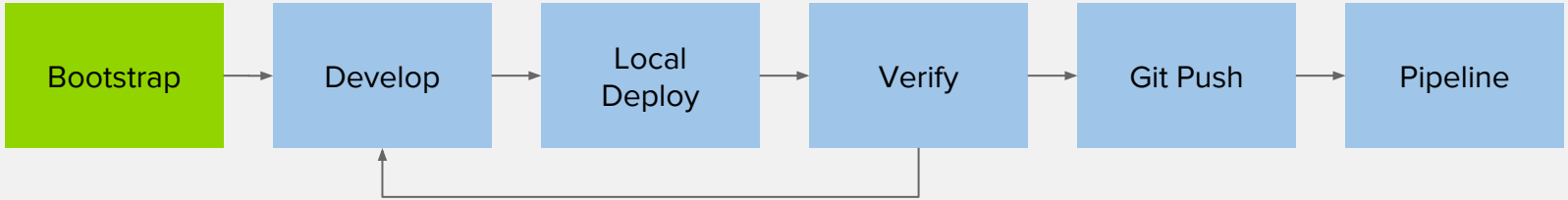
DEVELOPER WORKFLOW

LOCAL DEVELOPMENT WORKFLOW



RED HAT® OPENSHIFT Container Platform

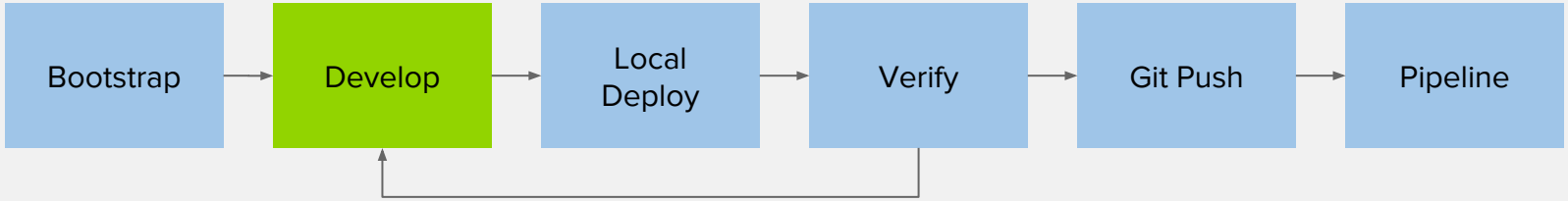
LOCAL DEVELOPMENT WORKFLOW



BOOTSTRAP

- Pick your programming language and application runtime of choice
- Create the project skeleton from scratch or use a generator such as
  - Maven archetypes
  - Quickstarts and Templates
  - OpenShift Generator
  - Spring Initializr

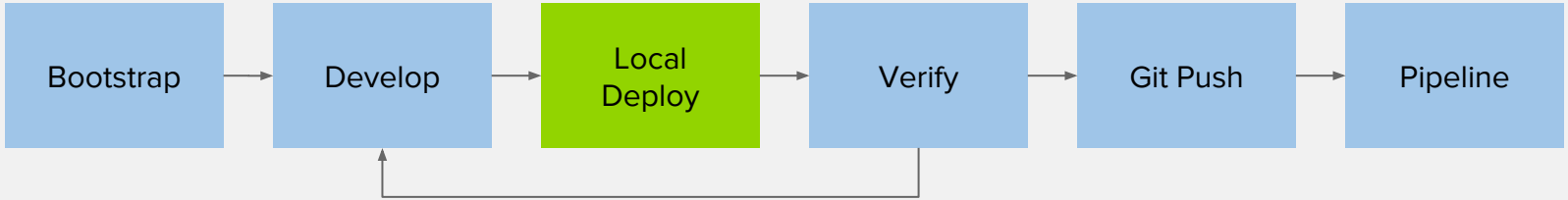
LOCAL DEVELOPMENT WORKFLOW



DEVELOP

- Pick your framework of choice such as Java EE, Spring, Ruby on Rails, Django, Express, ...
- Develop your application code using your editor or IDE of choice
- Build and test your application code locally using your build tools
- Create or generate OpenShift templates or Kubernetes objects

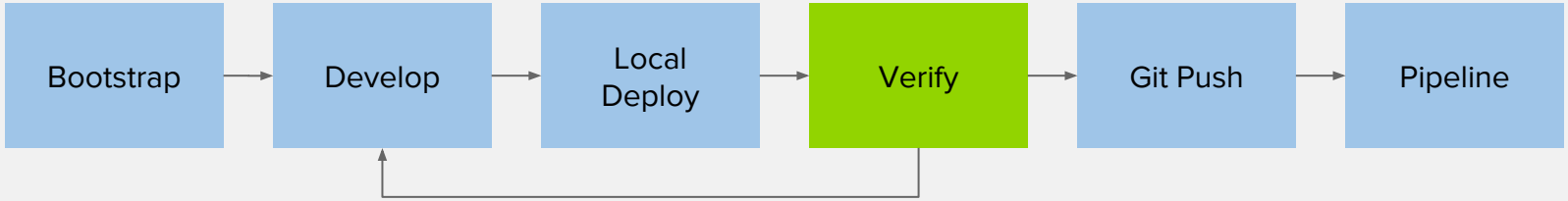
LOCAL DEVELOPMENT WORKFLOW



LOCAL DEPLOY

- Deploy your code on a local OpenShift cluster
  - Red Hat Container Development Kit (CDK), minishift and oc cluster
- Red Hat CDK provides a standard RHEL-based development environment
- Use binary deploy, maven or CLI rsync to push code or app binary directly into containers

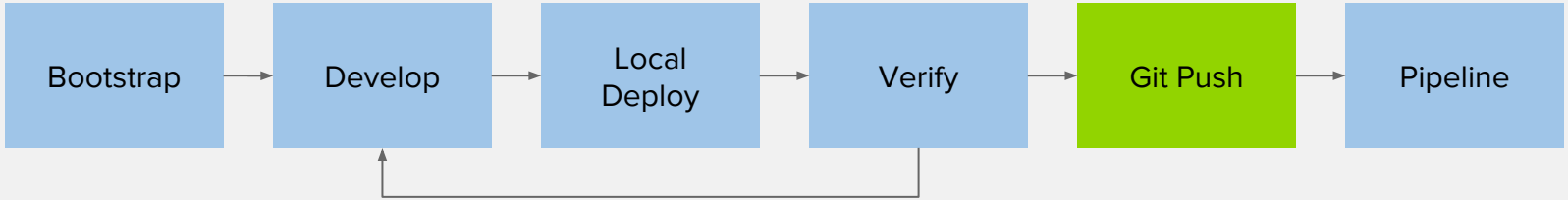
LOCAL DEVELOPMENT WORKFLOW



VERIFY

- Verify your code is working as expected
- Run any type of tests that are required with or without other components (database, etc)
- Based on the test results, change code, deploy, verify and repeat

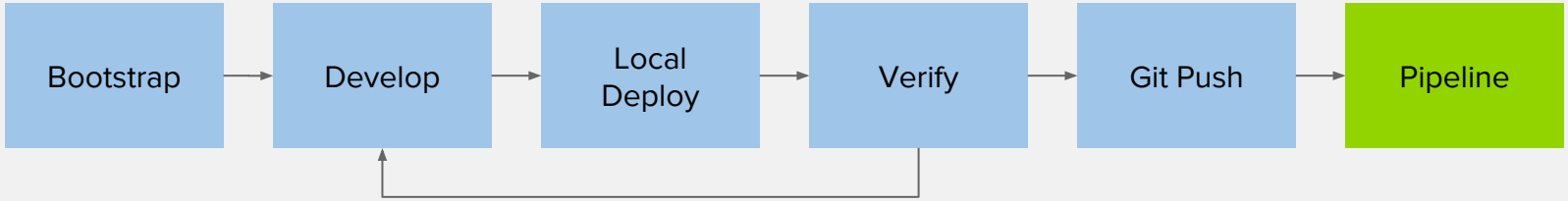
LOCAL DEVELOPMENT WORKFLOW



GIT PUSH

- Push the code and configuration to the Git repository
- If using Fork & Pull Request workflow, create a Pull Request
- If using code review workflow, participate in code review discussions

LOCAL DEVELOPMENT WORKFLOW



PIPELINE

- Pushing code to the Git repository triggers one or multiple deployment pipelines
- Design your pipelines based on your development workflow e.g. test the pull request
- Failure in the pipeline? Go back to the code and start again

redhat.

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