OpenShift 4

For Developers

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Red Hat

Self introduction

Name: Wanja Pernath

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Base: Germany (very close to the Alps)

Role: EMEA Technical Partner Development Manager - OpenShift and MW

Experience: Years of Consulting, Training, PreSales at Red Hat and before

OpenShift Container Platform

Advanced Cluster Management

Multi-cluster Management

Discovery ⁝ Policy ⁝ Compliance ⁝ Configuration ⁝ Workloads

OpenShift Container Platform

Manage Workloads	Build Cloud-Native Apps	Developer Productivity
Platform Services	**Application Services**	**Developer Services**
Service Mesh ⁝ Serverless Builds ⁝ CI/CD Pipelines Full Stack Logging Chargeback	Databases ⁝ Languages Runtimes ⁝ Integration Business Automation 100+ ISV Services	Developer CLI ⁝ VS Code extensions ⁝ IDE Plugins Code Ready Workspaces CodeReady Containers

OpenShift Kubernetes Engine

Cluster Services

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

Kubernetes

Red Hat Enterprise Linux & RHEL CoreOS


Physical


Virtual


Private cloud


Public cloud


Managed cloud
(Azure, AWS, IBM, Red Hat)

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Web Console

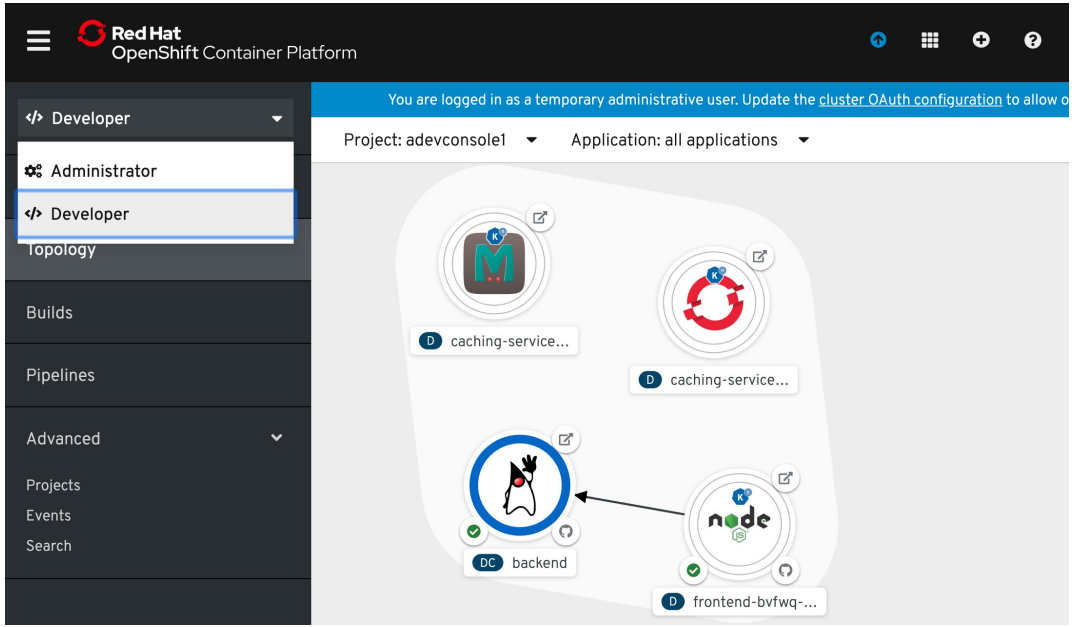
Photo by Unsplash

Red Hat

OpenShift Developer Console

An developer-specific perspective in the OpenShift UI that will sit beside the admin console and focus on developer use cases.

All OpenShift developer tool UIs will be surfaced here.



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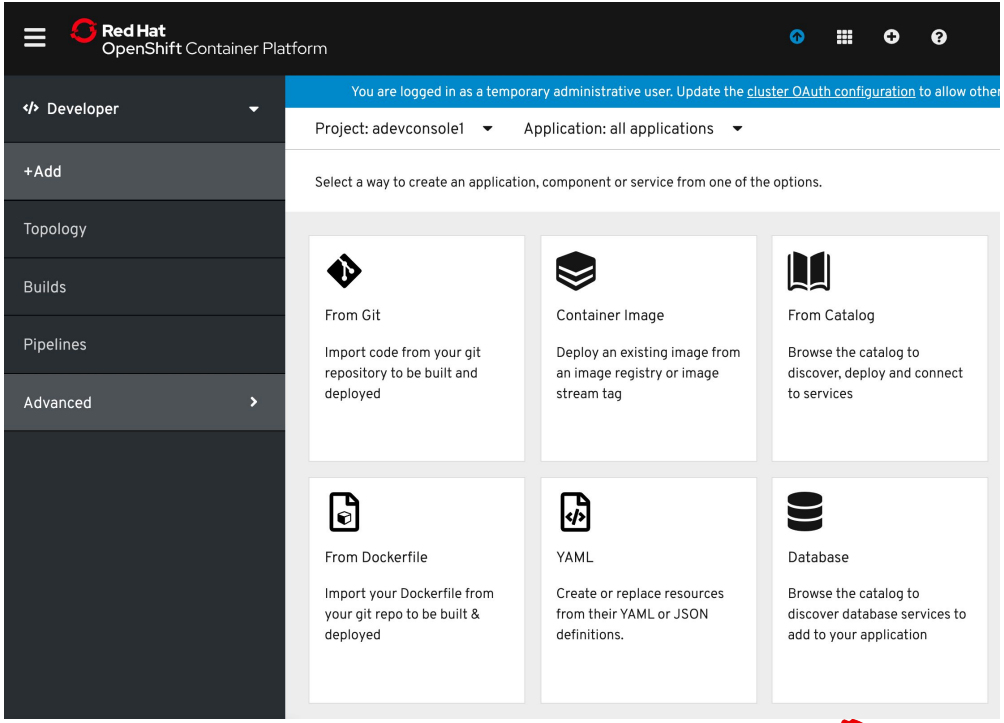
Developer Console: Create Applications

Key Features

- Import source from Git
- View existing container image
- Edit YAML definition
- Build from Dockerfile
- Explore services catalog
- Deploy database from catalog



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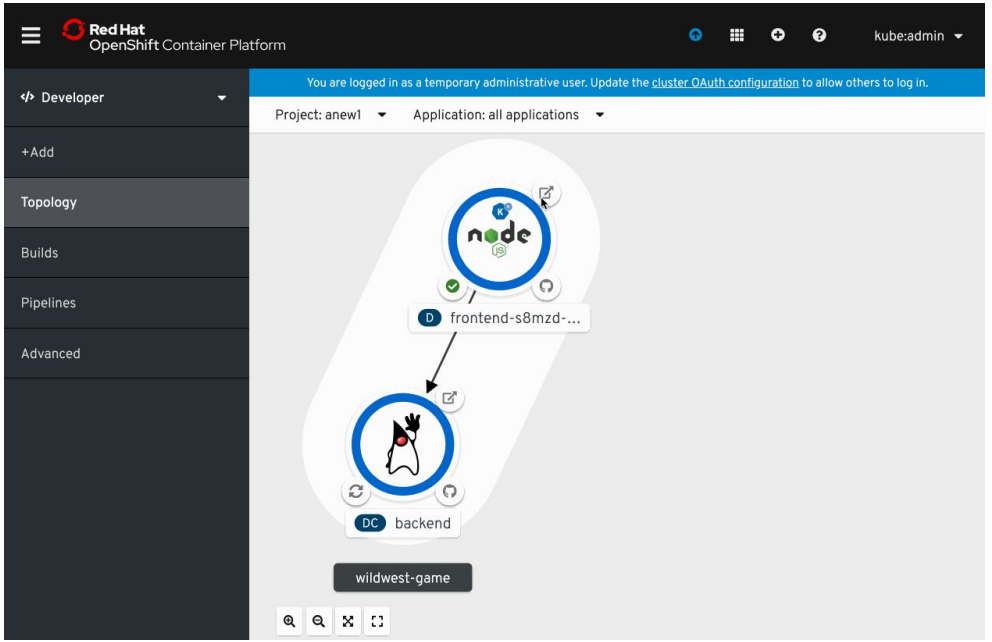
Developer Console: Application Topology

Key Features

- View structure and status of app components
- Drill into specific workloads
- Quickly navigate to pod logs
- Manually scale
- Pod donut!
- Access route/URL
- Linked build and source



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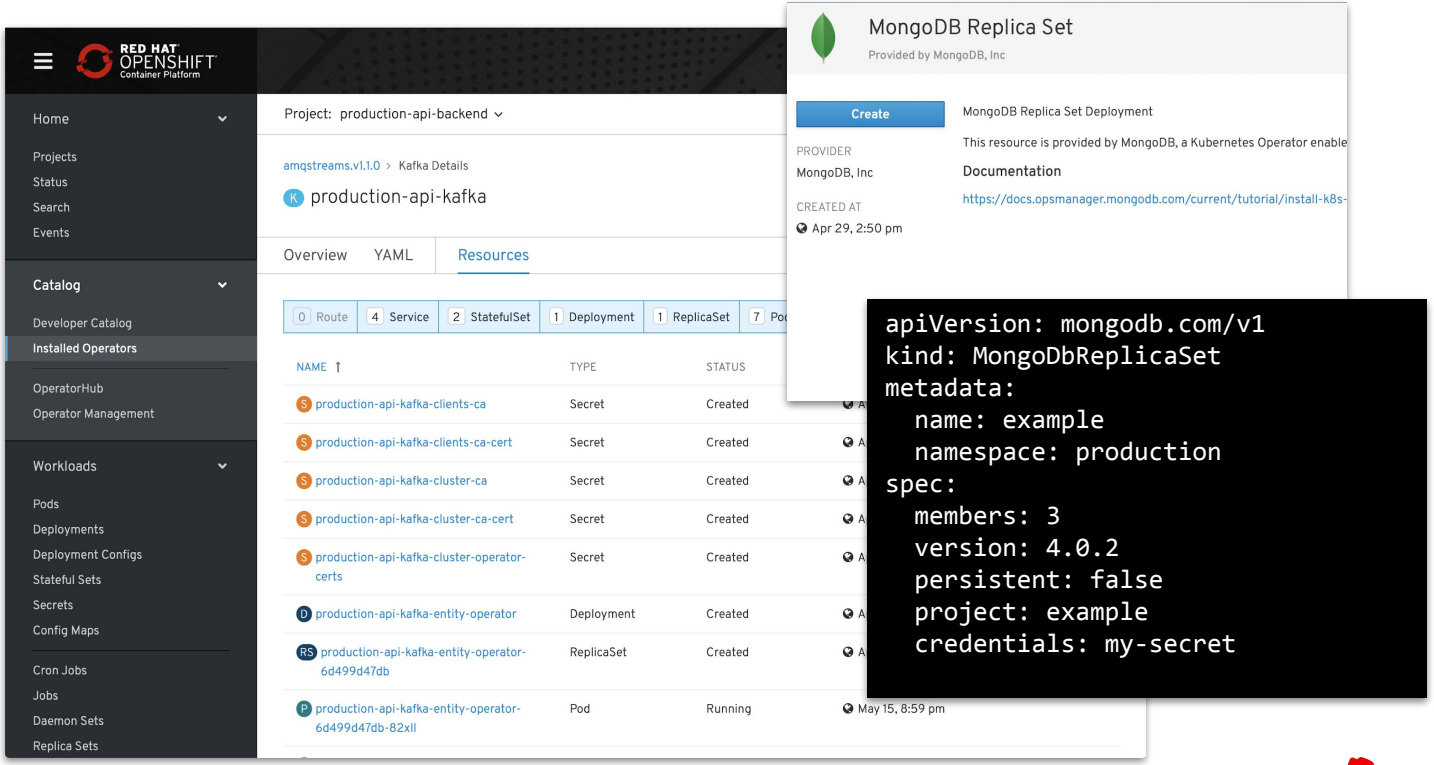
Self-service for developers



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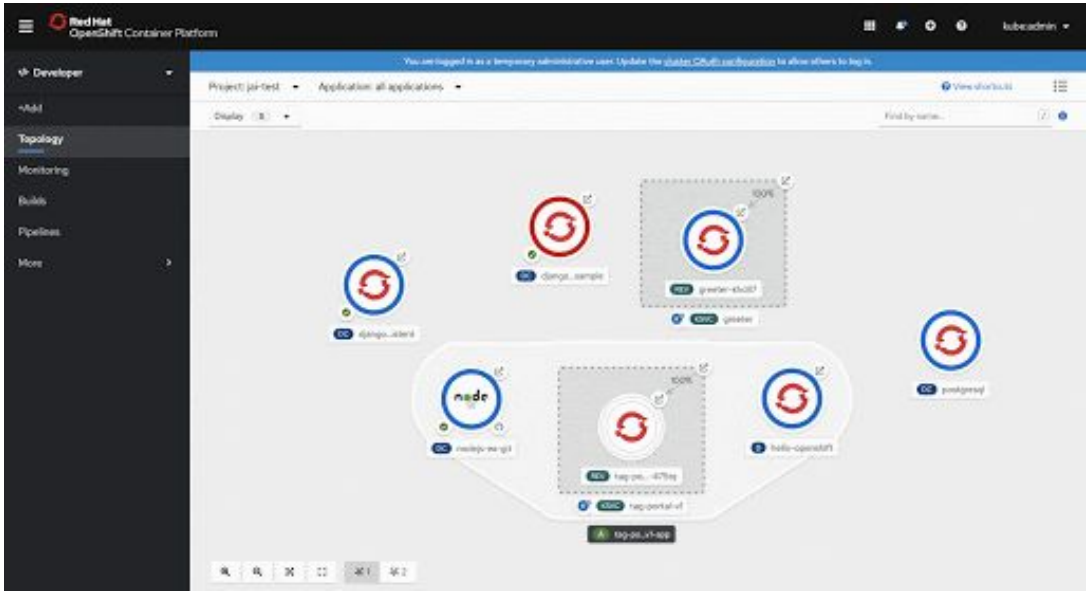
Understanding Complex Apps find

- Allow developers to easily find and focus on interested components
- Matched items are highlighted and non-matches are dimmed
- Indicates matches off of visible area



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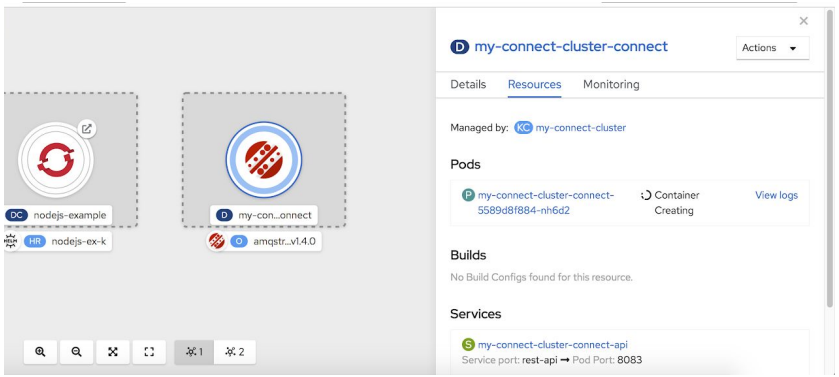
Understanding Complex Apps grouping, collapse

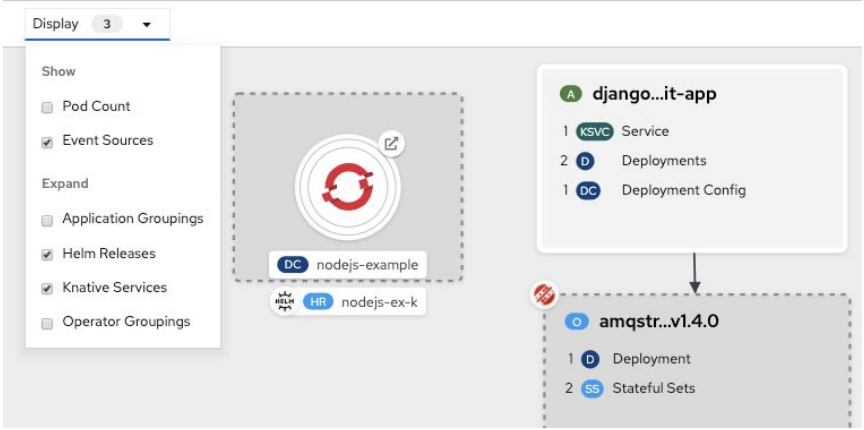
Operator-managed and Helm-based services

- Groups all resources to easily understand what is being managed by which CR/operator
- Add simple info in resources side panel, for custom resource or general resource parent



Collapse / Expand

- Manage large multi-application projects by expanding/collapsing certain grouping types
- Reduce Application, Helm, Knative and Operator to simple summary tiles



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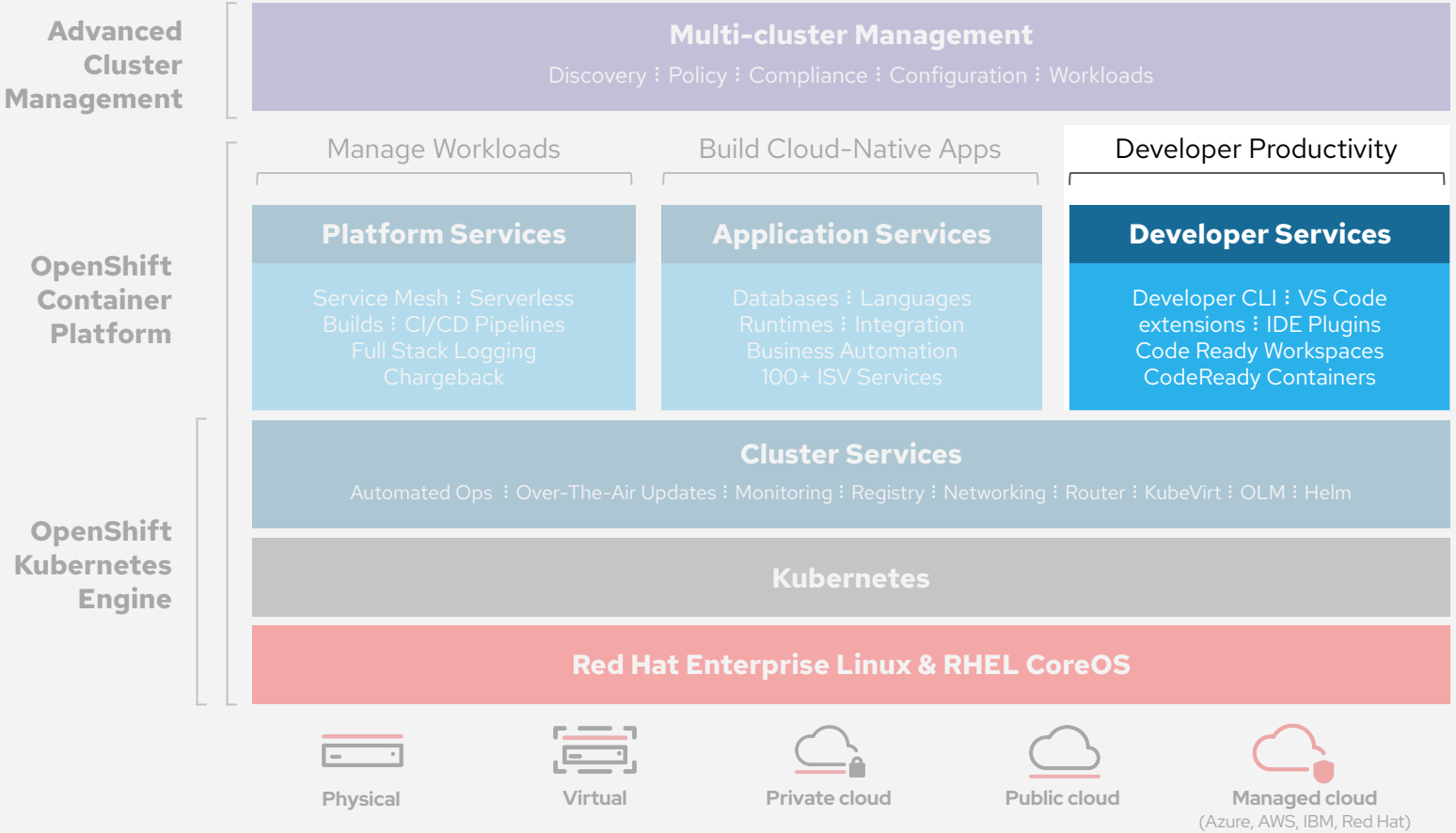
OpenShift Container Platform



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Desktop Tools, IDEs & Plugins

Photo by Unsplash

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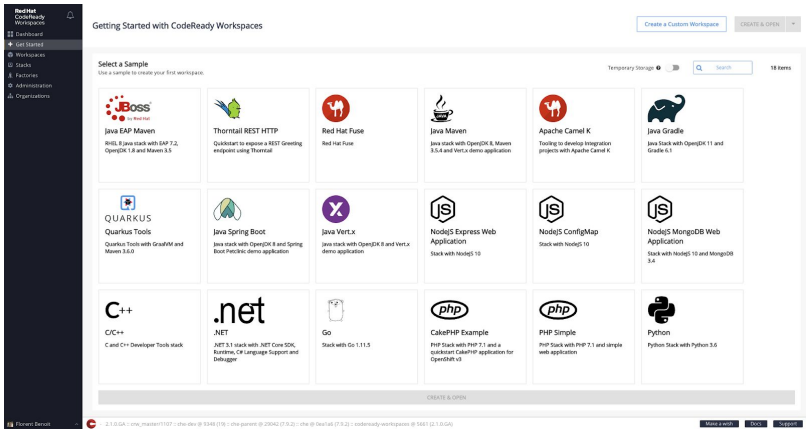
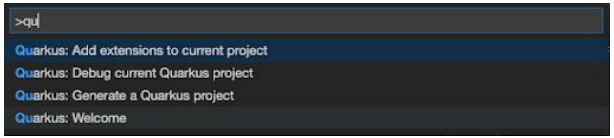
CodeReady Workspaces 2.x

- New onboarding experience – updated catalog and simple workspace creation options
- Quarkus support – includes stack and plugin
- Updated languages – .NET 3.1, Camel K, Java 11 & Gradle
- Air Gap improvements
- Many editor enhancements





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odo - OpenShift's Dev-Focused CLI

Developer-focused CLI for rapid development iterations on OpenShift

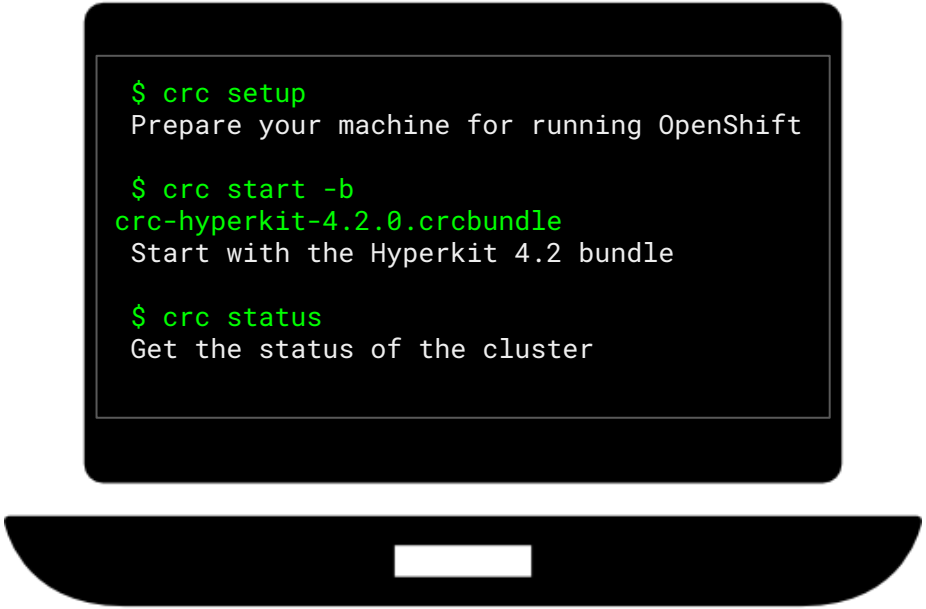
Simplifies building of microservices applications on OpenShift.

```
$ odo create wildfly backend
Component 'backend' was created.

$ odo push
Pushing changes to component: backend

$ odo create php frontend
Component 'frontend' was created.
To push source code to the component run 'odo push'

$ odo push
Pushing changes to component: frontend

$ odo url create
frontend - http://frontend-myapp.192.168.99.100.nip.io

$ odo watch
Waiting for something to change in /dev/frontend
```

CodeReady Containers

Environment to simplify local direct-to-OpenShift application development.

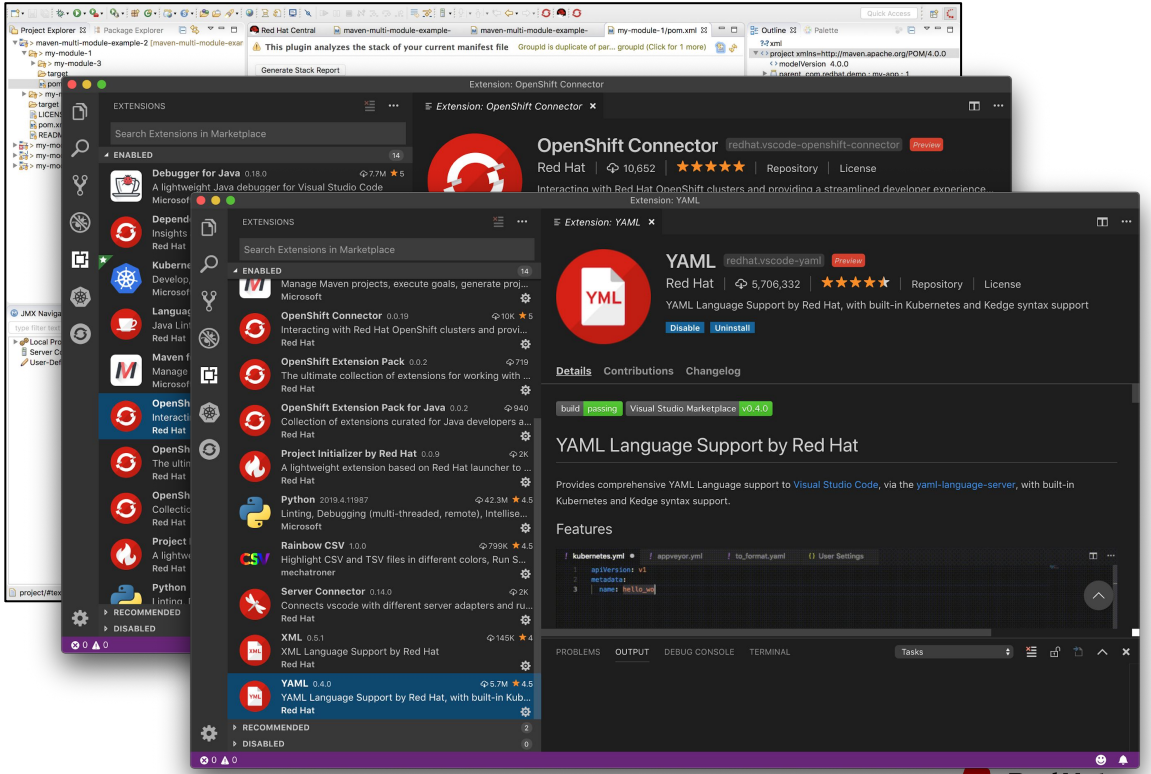
Available for:
- Linux (KVM)
- Windows (Virtualbox)
- MacOS (Virtualbox)



IDE Plugins for OpenShift

We have a suite of plugins to simplify working with OpenShift and YAML, as well as our Middleware products such as Java, Camel, Wildfly, and much more. These extensions are available for:

- Azure DevOps
- VS Code
- JetBrains IDEs (e.g. IntelliJ)
- CodeReady Workspaces
- CodeReady Studio
- Eclipse IDE/JBoss Tools



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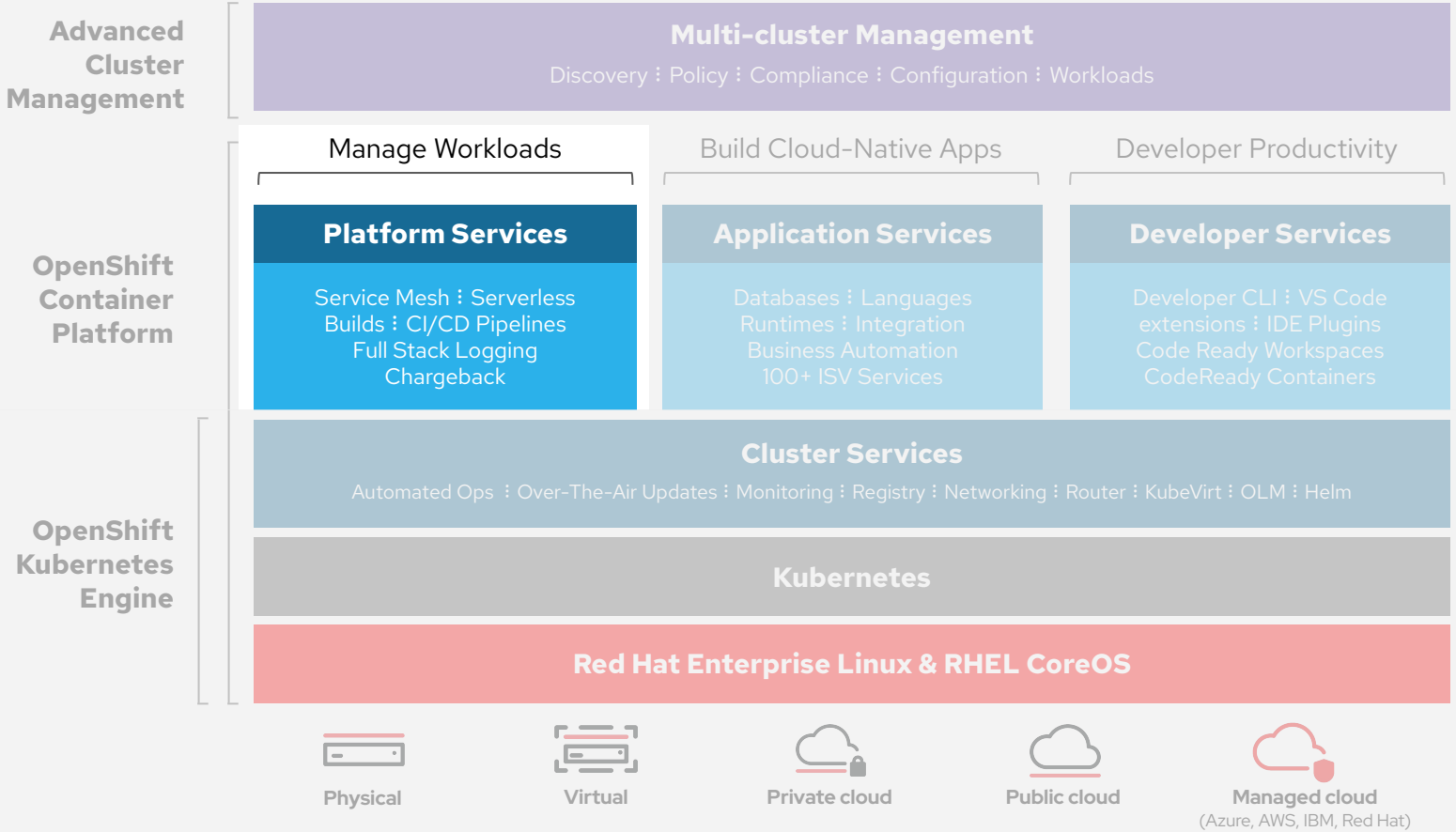
OpenShift Container Platform



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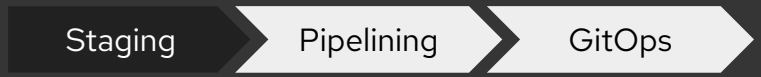
From Code to Image



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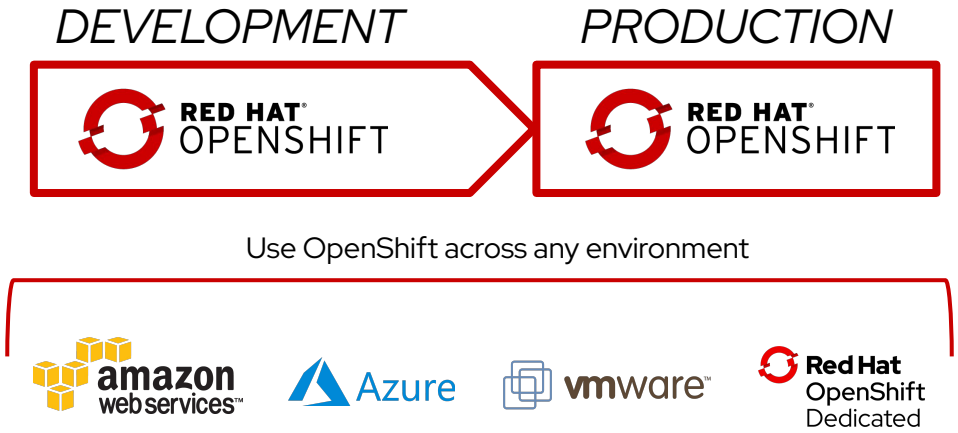
Red Hat OpenShift
Adds consistency and portability to your cloud journey



*** Develop on OpenShift for existing apps and new cloud-native apps**

*** Deploy on OpenShift in AWS, Azure, current environments or anywhere else**

One consistent development environment enables developers to move from project to project quickly. They don't need to learn new cloud-specific UIs and tools.

If teams need to leverage other cloud providers at any point it's easy to move specific apps because OpenShift provides an abstraction layer.

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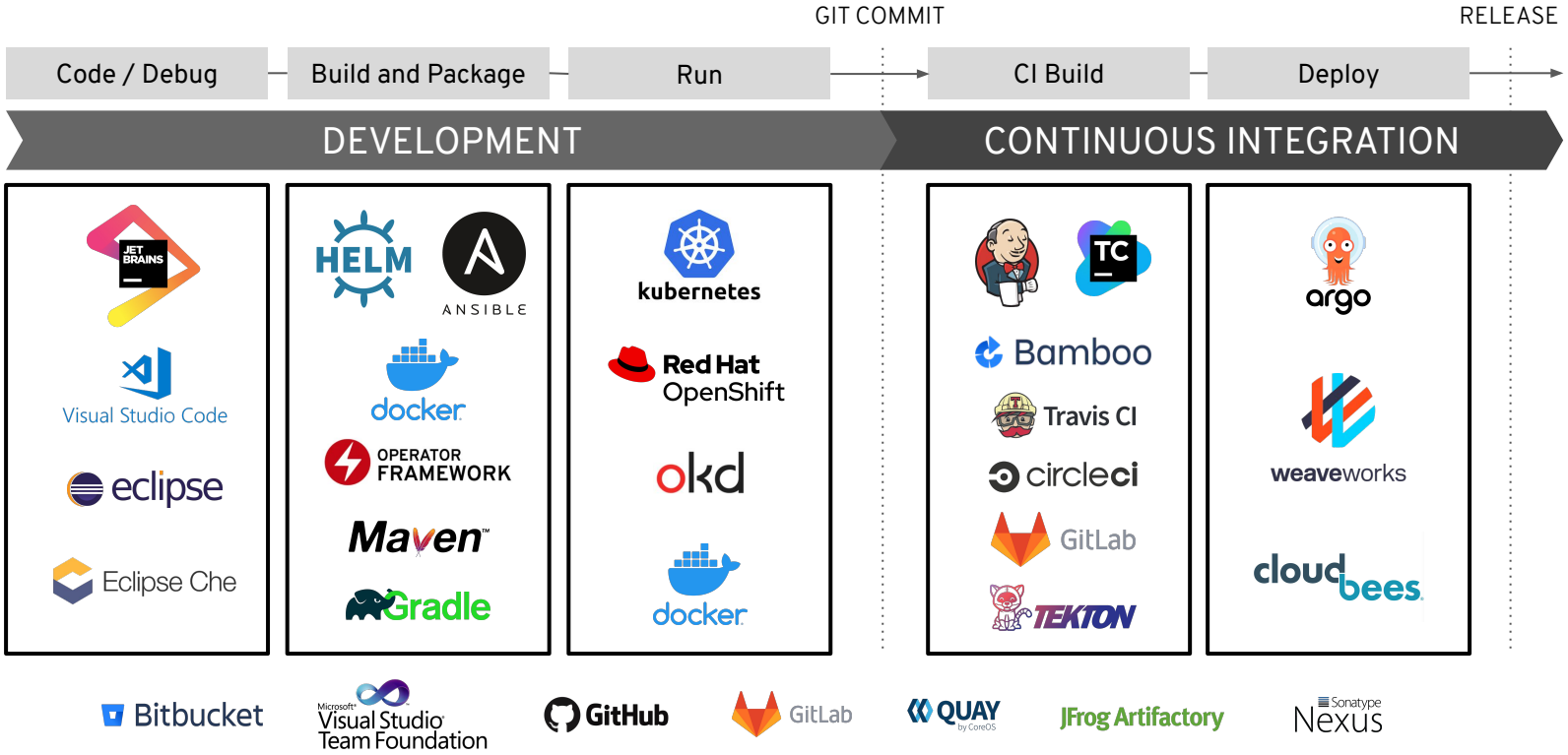
OpenShift integrates into your organization's preferred toolchain



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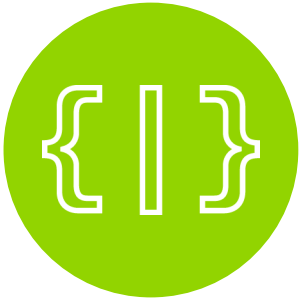
BUILD & DEPLOY

BUILD AND DEPLOY CONTAINER IMAGES

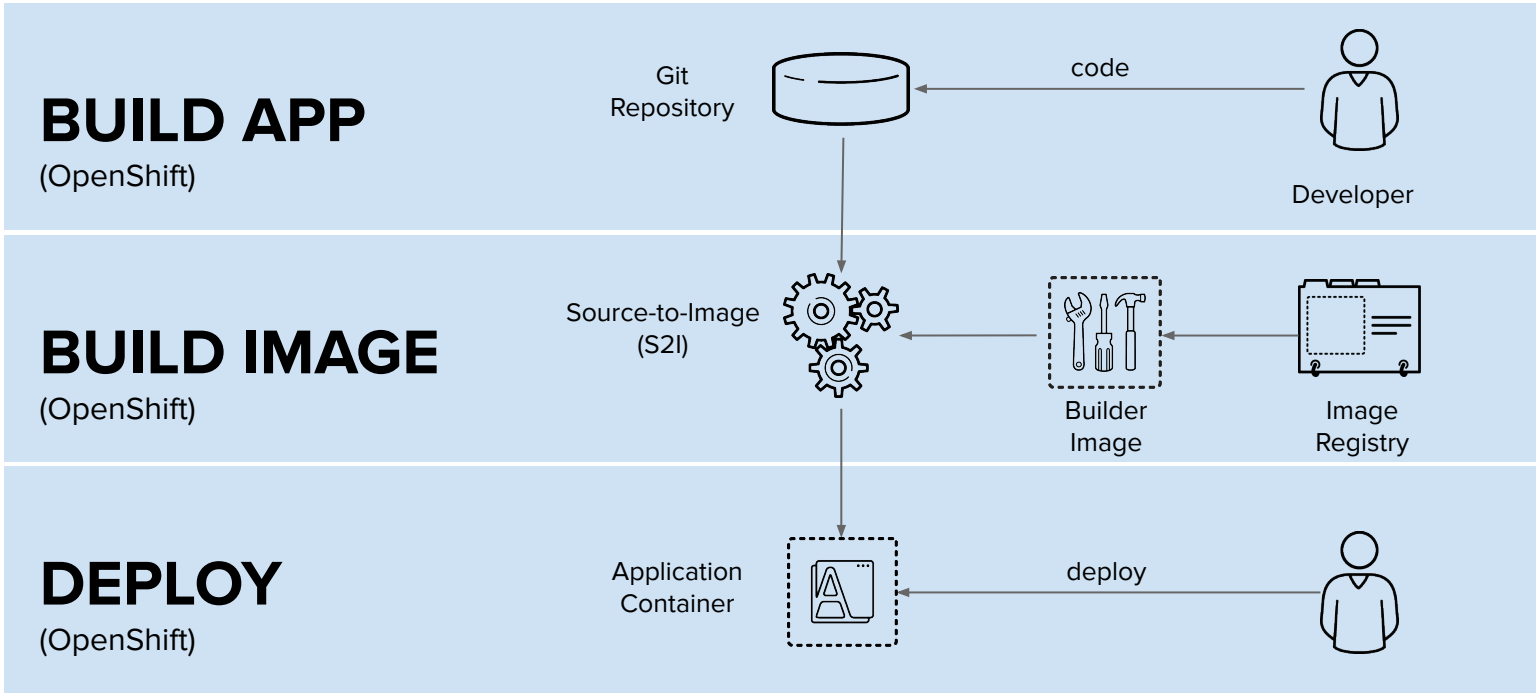


DEPLOY YOUR SOURCE CODE

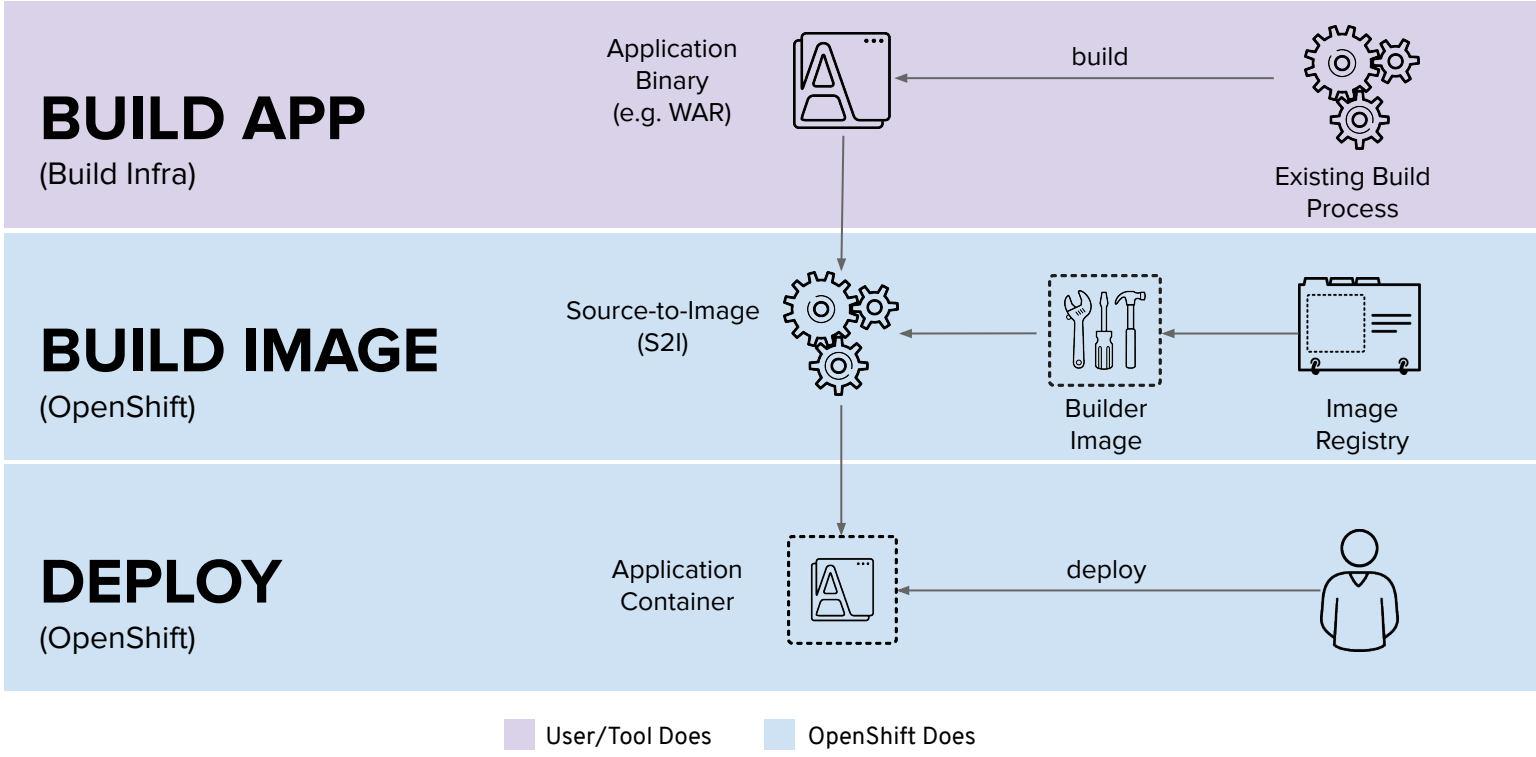
DEPLOY YOUR APP BINARY

DEPLOY YOUR CONTAINER IMAGE

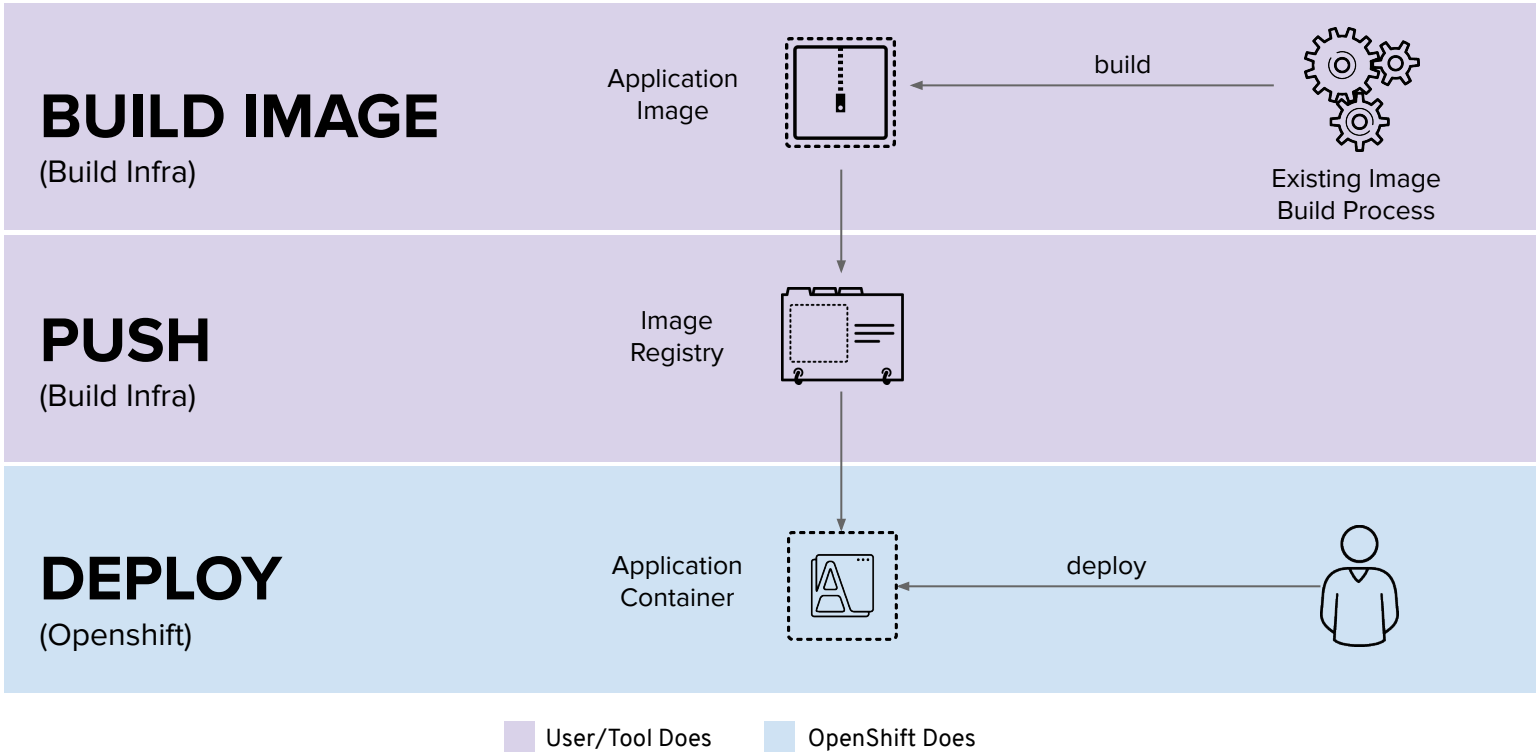
DEPLOY SOURCE CODE WITH SOURCE-TO-IMAGE (S2I)



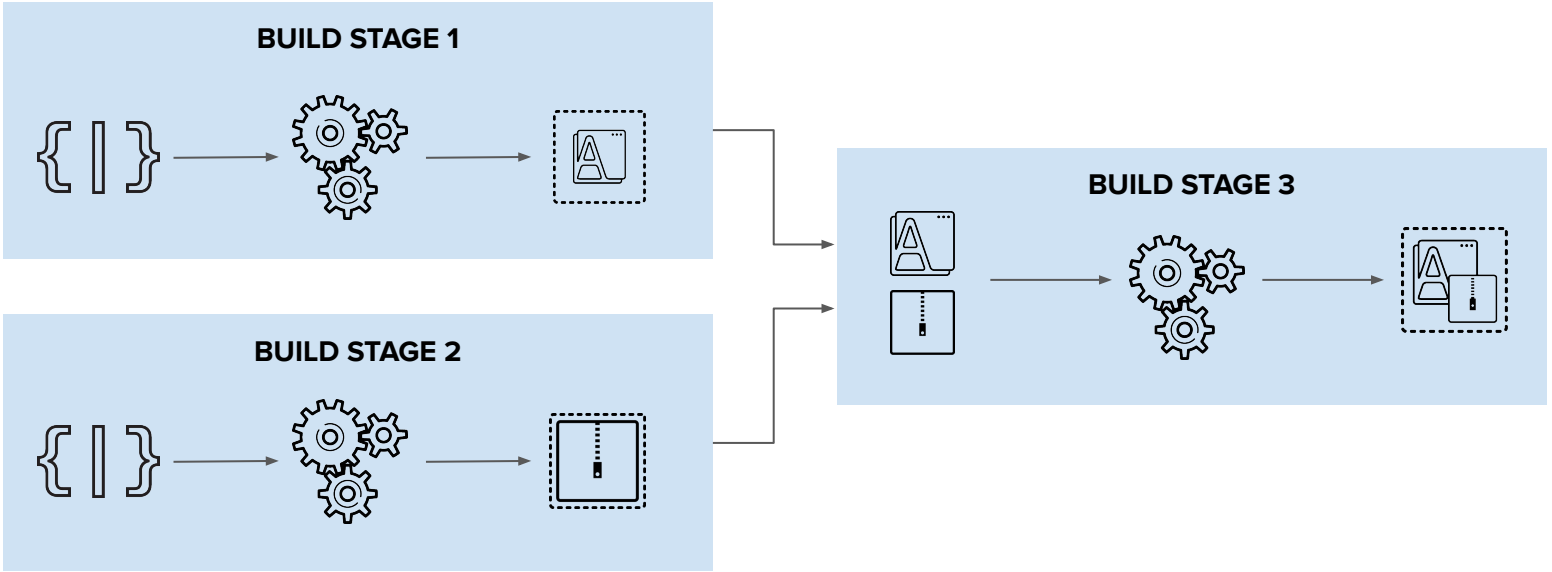
DEPLOY APP BINARY WITH SOURCE-TO-IMAGE (S2I)



DEPLOY DOCKER IMAGE

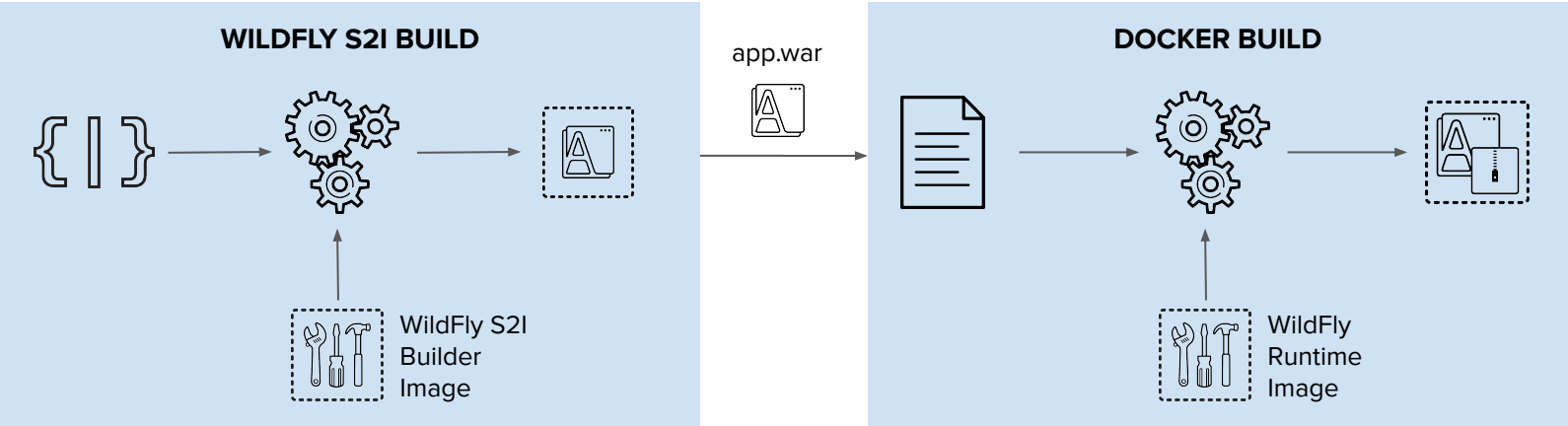


BUILD IMAGES IN MULTIPLE STAGES



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

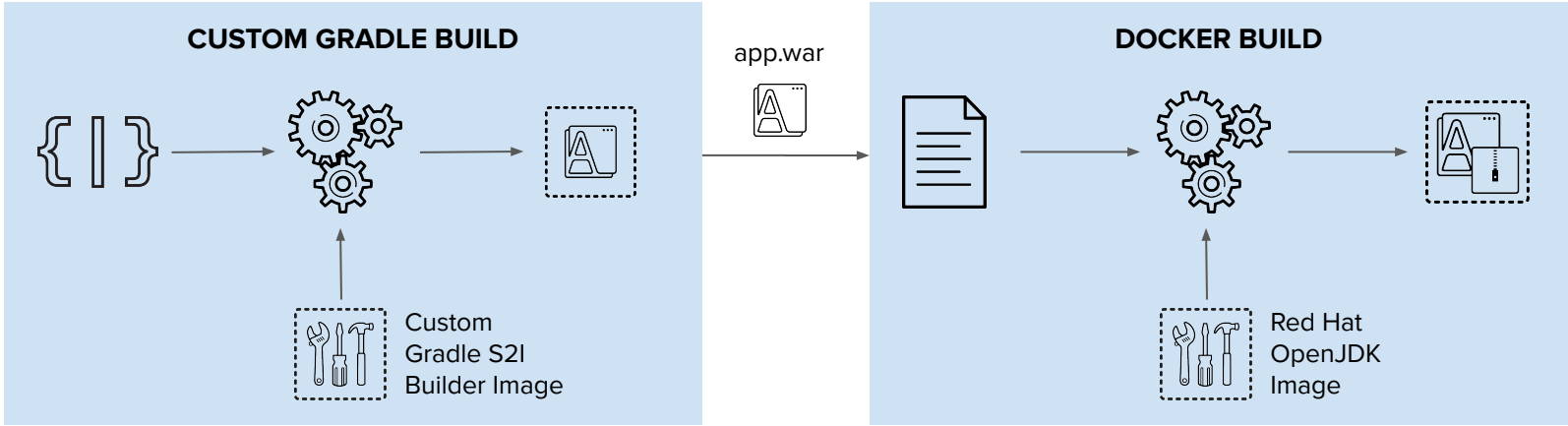
Use Source-to-Image to build app binaries and deploy on lean vanilla runtimes



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



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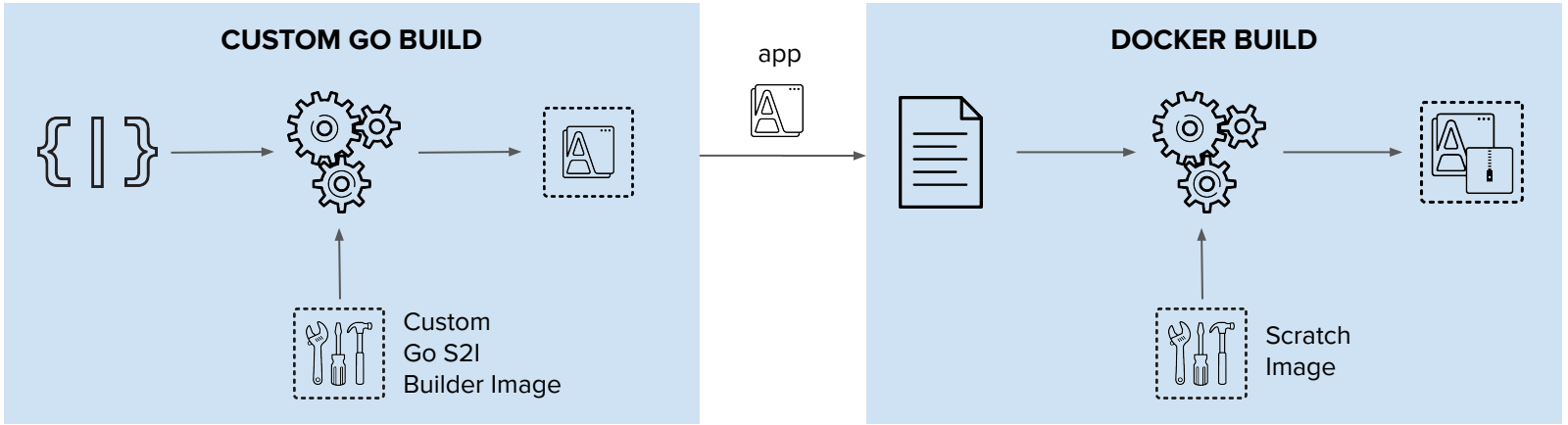
EXAMPLE: SMALL LEAN RUNTIMES

Build the app binary and deploy on small scratch images



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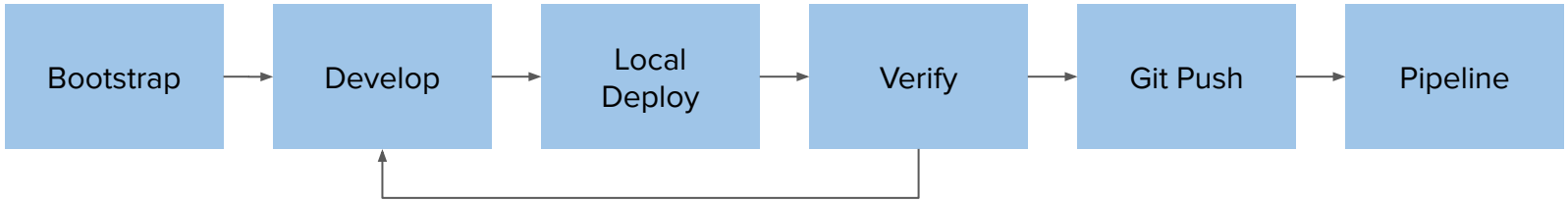
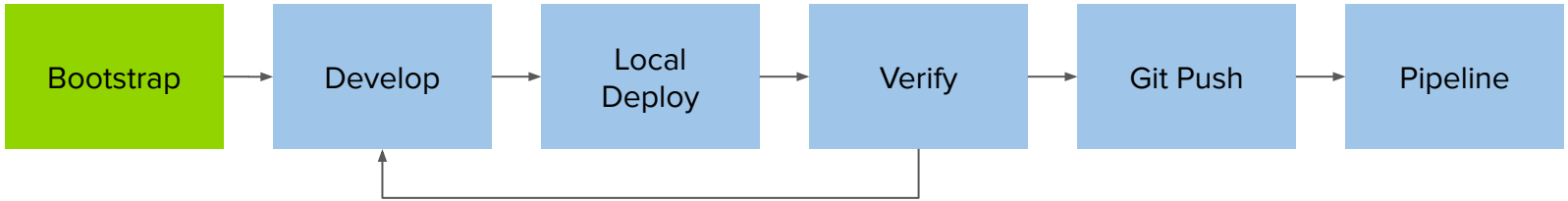
DEVELOPER WORKFLOW

LOCAL DEVELOPMENT WORKFLOW



RED HAT®
OPENSHIFT
Container Platform

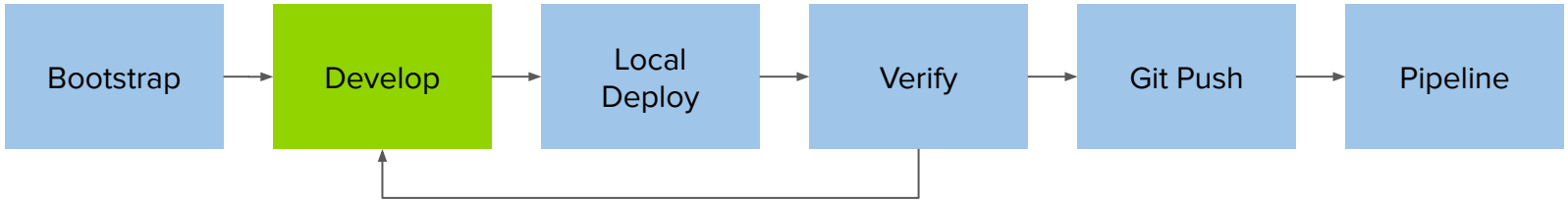
LOCAL DEVELOPMENT WORKFLOW



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

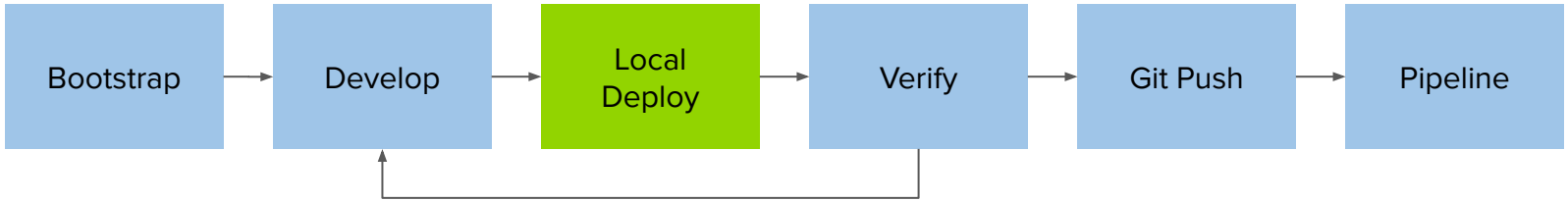
LOCAL DEVELOPMENT WORKFLOW



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

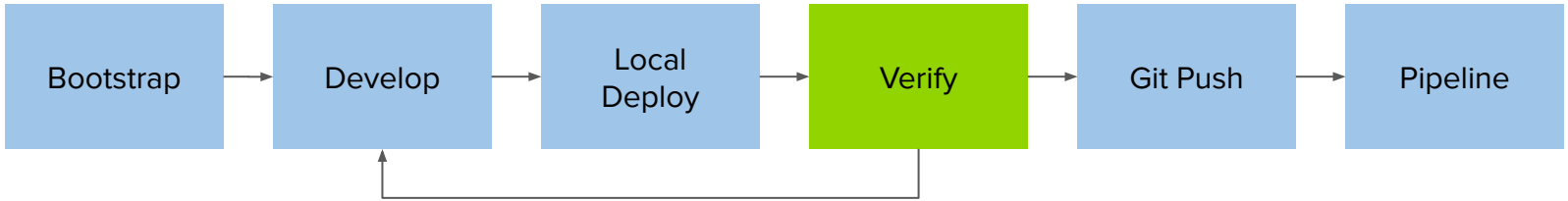
LOCAL DEVELOPMENT WORKFLOW



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

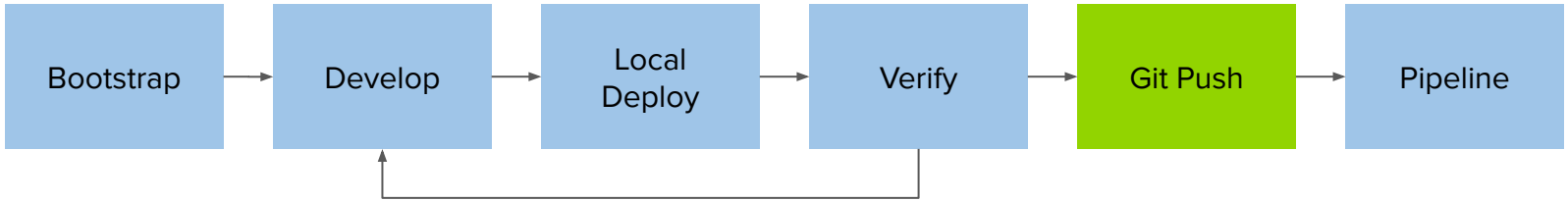
LOCAL DEVELOPMENT WORKFLOW



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

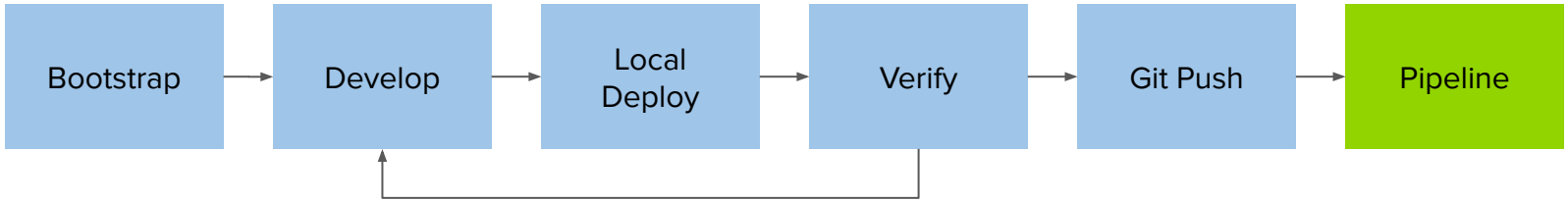
LOCAL DEVELOPMENT WORKFLOW



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

Packaging Basics


JUST MOVE IT ONLINE THEY SAID
HOW HARD COULD IT BE?

What

- Now I have coded and my app works on my Kubernetes cluster
  - All fine
  - All done
- But wait…
- How to move those things from DEV to Test?
- How to release my software?
- (No, it’s not just one image)
  - Deployment / DeploymentConfig
  - Service
  - PVCs
  - ConfigMaps
  - Route


I'M SCARED NOW

What

- How to automatically recreate your App with all resources and dependencies?
- Once you've created your App with all necessary resources, you need to somehow find a way to sync it with your stages (DEV/TEST/PRE-PROD...)
- How to redistribute your App?

Zip?
Tar?
Rsynch?
Binaries?
Configuration?
Templates?
Helm Charts?
Operators?
DIY?
Kustomize?

Beer!


TOO MANY CHOICES
TOO MANY OPTIONS
imgflip.com
TROLL ME

OpenShift Templates

What

- OpenShift Templates has been the first approach in OpenShift to make your project exportable and importable
  - All the RedHat middleware products were being used via templates
  - All Samples are still coming via templates
- Helm was too basic
- Helm required Tiller (a component which required root etc.)
- Operators did not exist
- It is basically a “oc get is,bc,build,dc,is,rc,route,service -o yaml > test.yaml”
  - With some editing
  - With QUITE some editing

Can I use it?

- Short answer: Of course!
- Longer answer: If you know that you are only using OpenShift inside your own Company then please use it.
  - A Template can configure even OpenShift specific types like BuildConfigs, ImageStreams, DeploymentConfigs…
  - Easily parametrized
  - With “oc process …” there is an easy way to process a template
  - Can easily being used in your CI/CD pipelines
  - Can be versioned
  - Not too complex
  - Proven to work, easily understandable

Szenarios to use Templates

- In-Cluster movements (DEV → TEST)
- Cross-Cluster movements (TEST → PREPROD → PROD)
- Templating Application setups, including BC for use by others
- Building special examples as templates could be consumed via UI by developers
- Distributing your Apps

Drawbacks?

- Templates are OpenShift specific
- Templates are OpenShift specific
- Templates are OpenShift specific
- (And a template file could become VERY large as it contains ALL kubernetes yaml's required to run the app)

Template DEMO

kustomize.io

What

- Kustomize is a project originally founded Google
- It's in "kubectl apply -k" and "oc apply -k" now
- Has its own CLI interface, called kustomize
- It's NOT templating
- It's using overlays and patching

```
$ tree
.
├── base
│   ├── configMap.yaml
│   ├── deployment.yaml
│   ├── kustomization.yaml
│   ├── route.yaml
│   └── service.yaml
└── overlays
    ├── production
    │   ├── deployment.yaml
    │   └── kustomization.yaml
    └── staging
        ├── kustomization.yaml
        ├── map.yaml
        └── route.yaml
```

How it works

kustomization.yaml contains information about what to do and how

```
$ cat base/kustomization.yaml
apiVersion: kustomize.config.k8s.io/v1beta1
kind: Kustomization
metadata:
  name: arbitrary

# Example configuration for the webserver
# at https://github.com/monopole/hello
commonLabels:
  app: my-hello
  org: acmeCorporation

resources:
- deployment.yaml
- service.yaml
- configMap.yaml
- route.yaml
```

```
$ cat overlays/staging/kustomization.yaml
namePrefix: staging-
commonLabels:
  variant: staging
commonAnnotations:
  note: Hello, I am staging!
bases:
- ../../base
patchesStrategicMerge:
- map.yaml
- route.yaml
```

```
$ cat overlays/production/kustomization.yaml
namePrefix: production-
commonLabels:
  variant: production
commonAnnotations:
  note: Hello, I am production!
bases:
- ../../base
patchesStrategicMerge:
- deployment.yaml
- route.yaml
```

How it works

kustomize build or oc/kubectl apply -k does handle everything for you

```
$ kustomize build base
---
apiVersion: v1
kind: Service
metadata:
  labels:
    app: my-hello
    org: acmeCorporation
  name: the-service
spec:
  ports:
  - port: 8666
    protocol: TCP
    targetPort: 8080
  selector:
    app: my-hello
    deployment: hello
    org: acmeCorporation
  type: LoadBalancer
---
```

```
$ kustomize build overlays/staging
---
apiVersion: v1
kind: Service
metadata:
  annotations:
    note: Hello, I am staging!
  labels:
    app: my-hello
    org: acmeCorporation
    variant: staging
  name: staging-the-service
spec:
  ports:
  - port: 8666
    protocol: TCP
    targetPort: 8080
  selector:
    app: my-hello
    deployment: hello
    org: acmeCorporation
    variant: staging
  type: LoadBalancer
---
```

Can I use it?

- Short answer: Of course!
- Longer answer: If you're looking for a solution that integrates nicely with GitOps, you should definitely have a look
  - Kustomize can also configure OpenShift specific types like Routes etc.
  - It does NOT use parameters
  - With kustomize CLI there is a nice way to test your layers
  - Can easily being used in your CI/CD pipelines
  - Can be versioned
  - Not too complex
  - Proven to work, easily understandable

Scenarios to use kustomize

- In-Cluster movements (DEV → TEST)
- Cross-Cluster movements (TEST → PREPROD → PROD)
- GitOps
- OpenShift Pipelines / Tekton
- NOT usable for application publishing / distribution

Drawbacks?

- You can only change existing entries and add new ones...
- You can't use it for redistribution

Resources

Automated Application Packaging and Distribution with OpenShift - Part 1/2 – Open Sourcerers

https://kustomize.io
https://github.com/kubernetes-sigs/kustomize
https://speakerdeck.com/spesnova/introduction-to-kustomize
https://github.com/wpernath/kustomize-demo

Kustomize-DEMO