Version 3.3
04/14/22

Provided by Tech Skills Transformations LLC

Prerequisites

- Modern system with at least 8G of memory and 20G free storage
- VirtualBox installed and running
  http://www.virtualbox.org

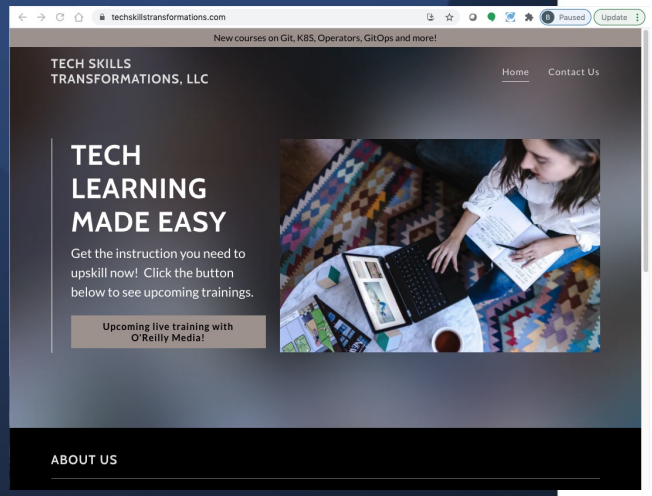
- Virtual machine (.ova file) installed in VirtualBox
  https://www.dropbox.com/s/hdm7qumyjwm91ry/ArgoCD-GitOps-v2.ova?dl=0
  OR
  https://bclconf.s3.us-west-2.amazonaws.com/ArgoCD-GitOps-v2.ova

- Workshop docs are in https://github.com/skilldocs/gitops
- Setup doc is at
  https://github.com/skilldocs/gitops/blob/main/gitops-setup.pdf
- Labs doc for workshop
  https://github.com/skilldocs/gitops/blob/main/gitops-labs.pdf

Continuous Delivery in Kubernetes with ArgoCD

Brent Laster

About me



- Founder, Tech Skills Transformations LLC
- R&D DevOps Director
- Global trainer – training (Git, Jenkins, Gradle, CI/CD, pipelines, Kubernetes, Helm, ArgoCD, operators)
- Author -
  - OpenSource.com
  - Professional Git book
  - Jenkins 2 – Up and Running book
  - Continuous Integration vs. Continuous Delivery vs. Continuous Deployment mini-book on Safari
- https://www.linkedin.com/in/brentlaster
- @BrentCLaster
- GitHub: brentlaster

Professional Git Book

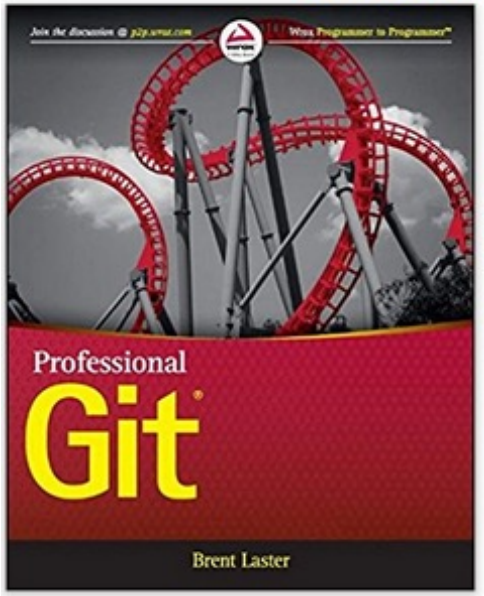
- Extensive Git reference, explanations,
- and examples
- First part for non-technical
- Beginner and advanced reference
- Hands-on labs

Professional Git 1st Edition

by Brent Laster (Author)

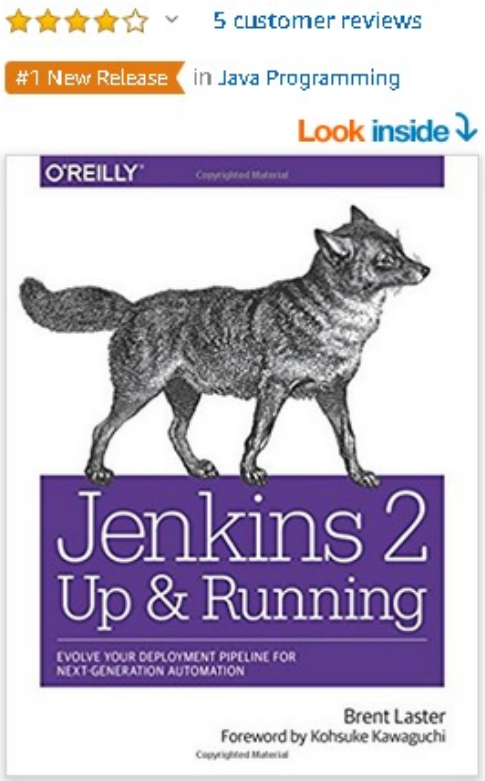
7 customer reviews

Look inside



Jenkins 2 Book

- Jenkins 2 – Up and Running
- “It’s an ideal book for those who are new to CI/CD, as well as those who have been using Jenkins for many years. This book will help you discover and rediscover Jenkins.” ***By Kohsuke Kawaguchi, Creator of Jenkins***



O'Reilly Training

April 26 & 27, 2021

Git Fundamentals

Join Brent Laster to gain the knowledge and skills you need to leverage Git to greatly simplify and speed up managing all of the changes in your source code. Once you ...

June 3, 10, 17 & 24, 2021

Git in 4 Weeks

Join author, trainer, and DevOps director Brent Laster to learn how Git works—and discover all the things you can do with it. Over four sessions, Brent walks you through everything you ...

LIVE ONLINE TRAINING

Git Troubleshooting

How to solve practically any problem that comes your way

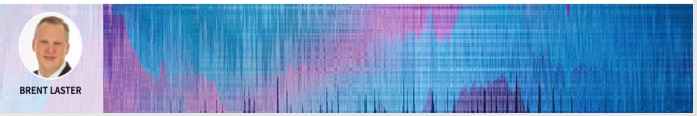
Topic: Software Development

LIVE ONLINE TRAINING

Next Level Git - Master your content

Use powerful tools in Git to simplify merges, rewrite history, and perform automatic updates

Topic: Software Development

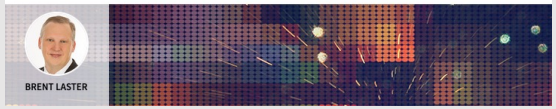


LIVE ONLINE TRAINING

Next Level Git - Master your workflow

Use Git to find problems, simplify working with multiple branches and repositories, and customize behavior with hooks

Topic: Software Development



LIVE ONLINE TRAINING

Getting started with continuous delivery (CD)

Move beyond CI to build, manage, and deploy a working pipeline

Topic: System Administration

LIVE ONLINE TRAINING

Building a deployment pipeline with Jenkins 2

Manage continuous integration and continuous delivery to release software

Topic: System Administration

June 28, 2021

Troubleshooting Kubernetes

In this 3-hour course, global trainer, author, and DevOps director Brent Laster will show you how to respond to the most common problem situations you may encounter with Kubernetes. You'll learn ...

LIVE ONLINE TRAINING

Helm Fundamentals

Deploying, upgrading, and rolling back applications in Kubernetes

Topic: System Administration

LIVE ONLINE TRAINING

Containers A-Z

An overview of containers, Docker, Kubernetes, Istio, Helm, Kubernetes Operators, and GitOps

Topic: System Administration

May 24, 2021

Continuous Delivery in Kubernetes with ArgoCD

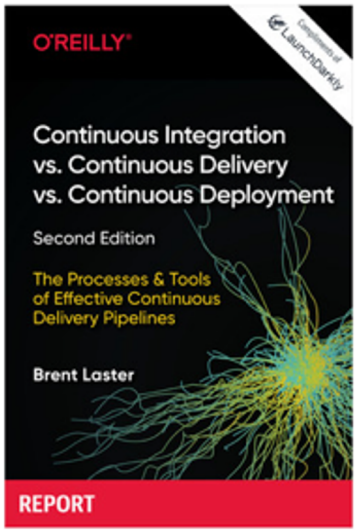
Join expert Brent Laster to explore GitOps and learn how to use Argo CD to implement GitOps in your Kubernetes deployments. APAC time friendly - You're a Kubernetes admin who wants ...

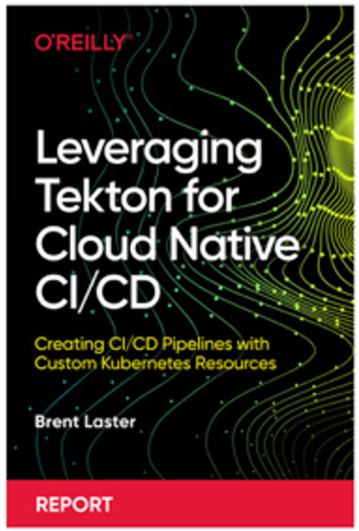
May 17, 2021

Building a Kubernetes Operator

Join expert Brent Laster to learn how the Operator pattern helps address these kinds of situations by allowing you to create custom controllers that extend the functionality of the Kubernetes API ...

O'Reilly Reports





Agenda

- Introduction to GitOps
- Introduction to Argo CD
- Argo CD Workflow and Usage
- Integrating GitOps with Argo CD and Helm
- Integrating GitOps into a CI/CD pipeline
- Overall entire workflow - from source change to cluster deployment

What is GitOps?

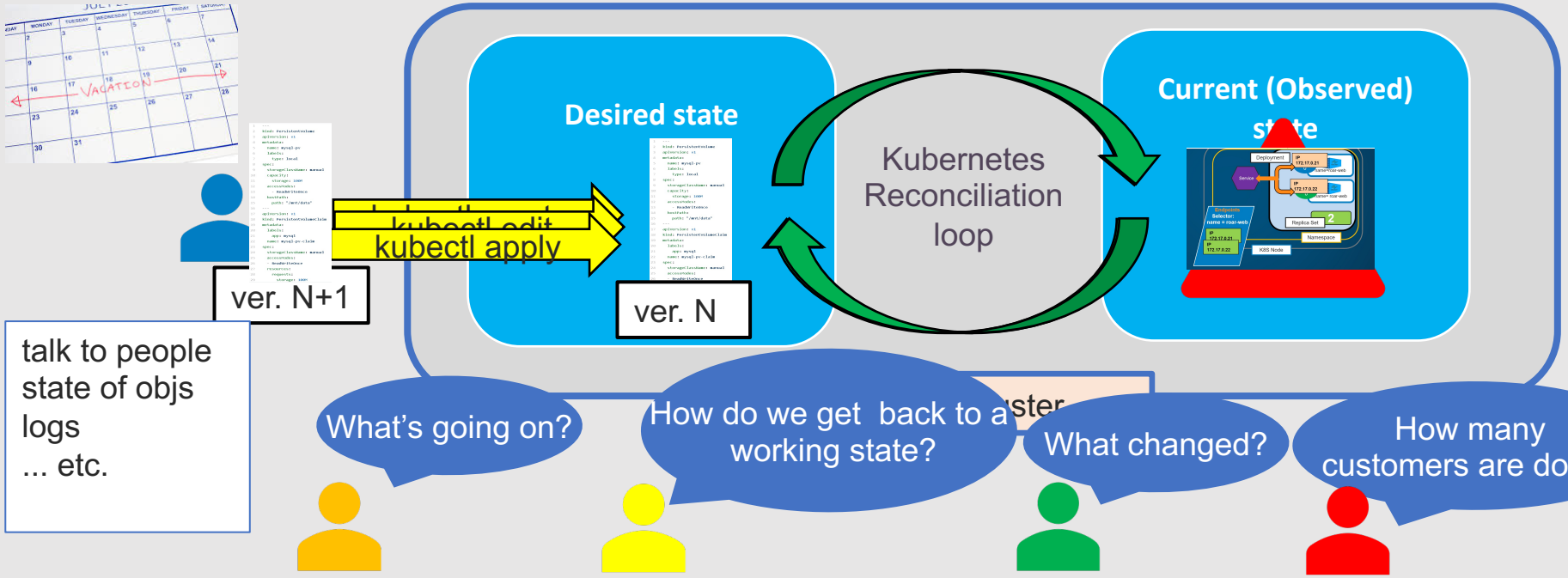
- An approach to Continuous Delivery for infrastructure and workloads
- Works by using Git as source of truth
- Per k8s, this means using pushes/pull requests instead of “kubectl create/apply” or “helm install/upgrade” when ready to add/change spec
- In traditional CI/CD pipeline, CD (per CI process) creates build artifacts and promotes them to production
- In GitOps pipeline model, ANY change to production must be made in source control prior to being applied to cluster
  - Should ideally be done through pull request/merge request
- Advantages - same as for traditional source control
  - Code review for changes
  - Tracking of who did what
  - Rollback is via Git
  - Whole infrastructure can be recreated from source control

Advantages of GitOps

- Declarative - app definitions, environments, and configurations
- Version-controlled - trackable, declarative, reviewable, etc.
- Automated - no human interaction required after spec
- Repeatable - same inputs result in same target state
- Single source of the truth defining the application state
- Generally faster
- Less opportunity for error
- How does GitOps manage this?

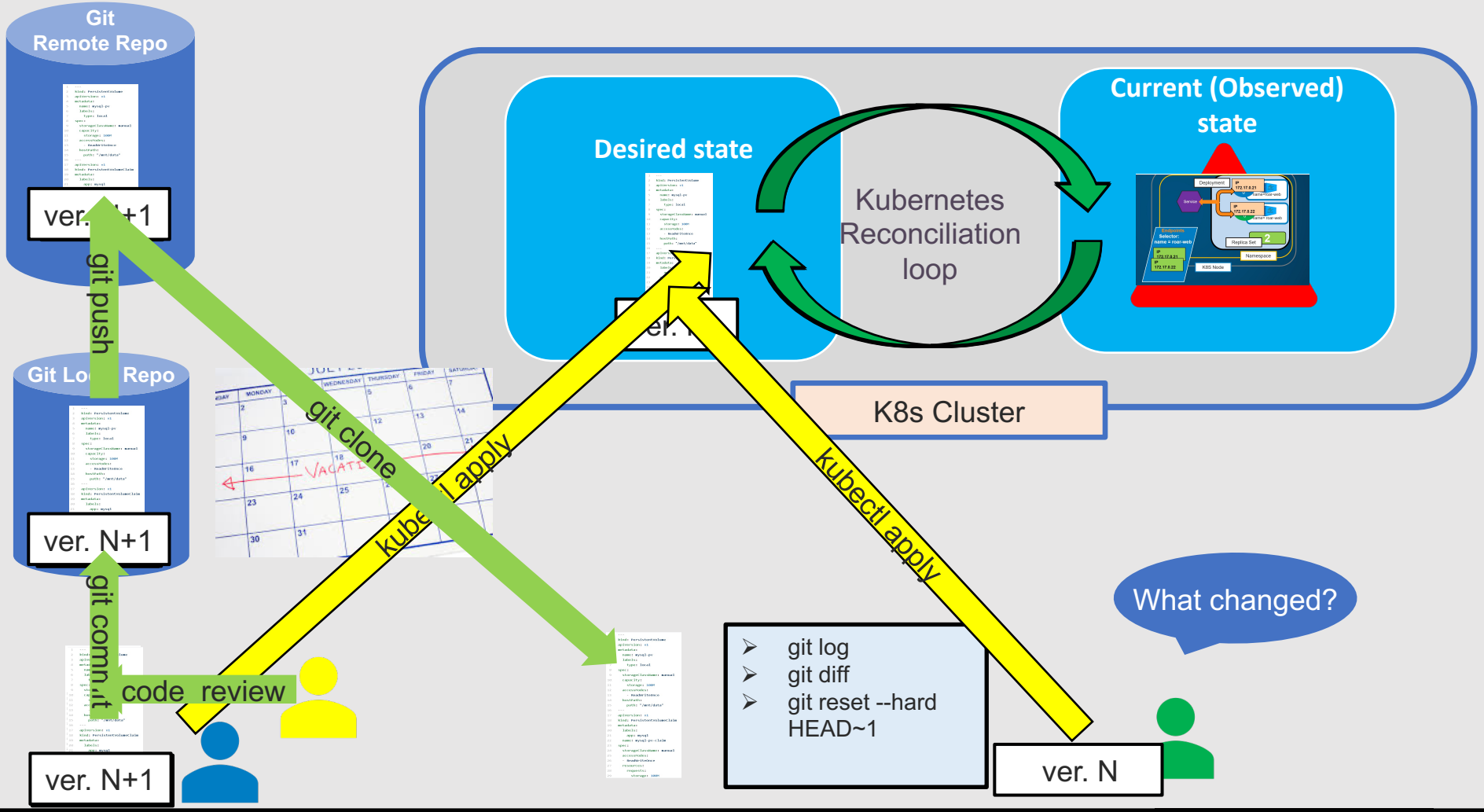
K8s Management w/o GitOps

- User supplies desired state via declaring it in manifests and/or interactive commands
- Kubernetes works to balance the current state and the desired state
  - Desired state – what you want your production environment to be
  - Current (observed) state – current status of your production environment



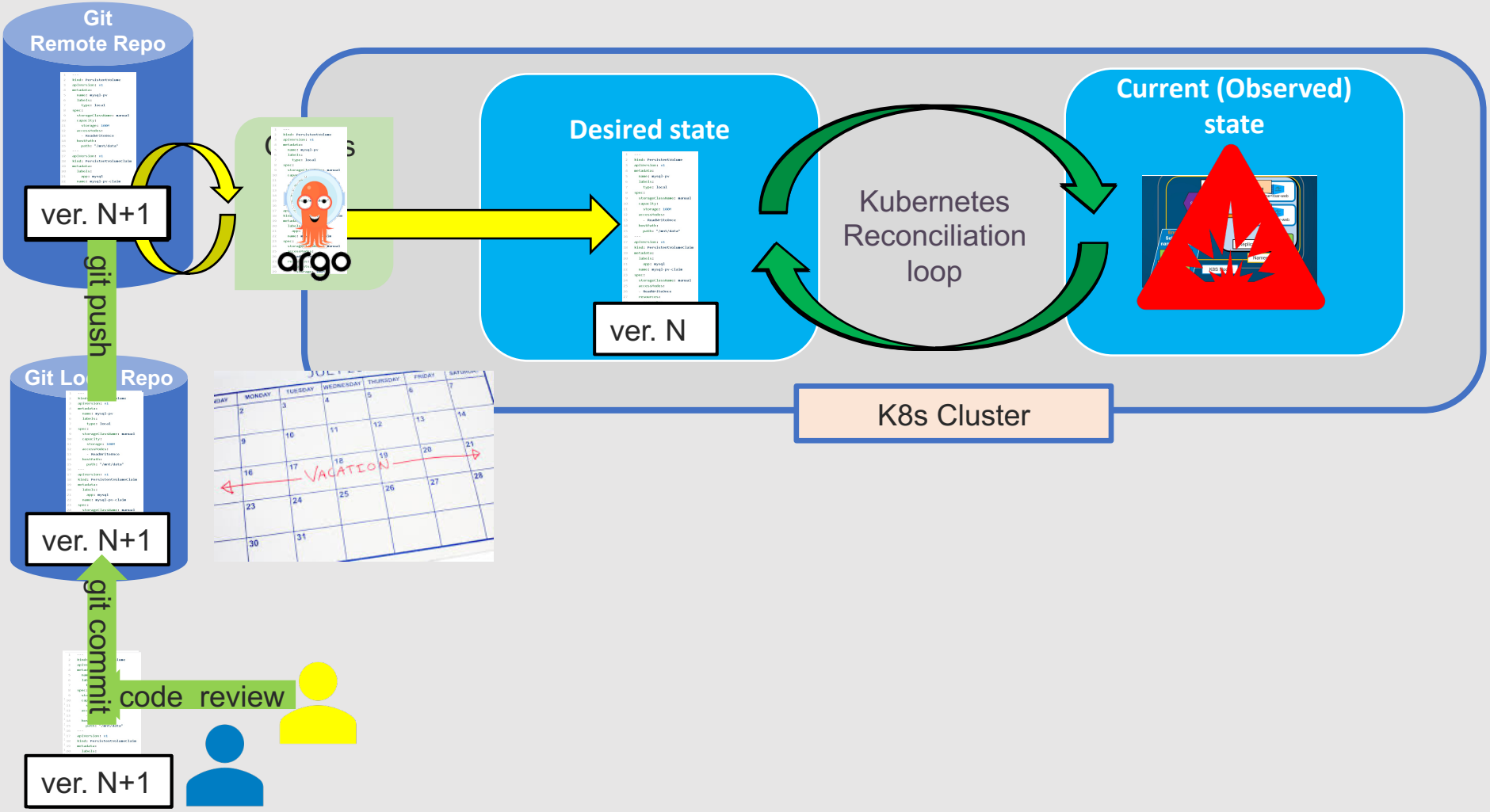
Adding in Git

- Managing manifests (specs) in Git repositories



Automating Deployment with GitOps

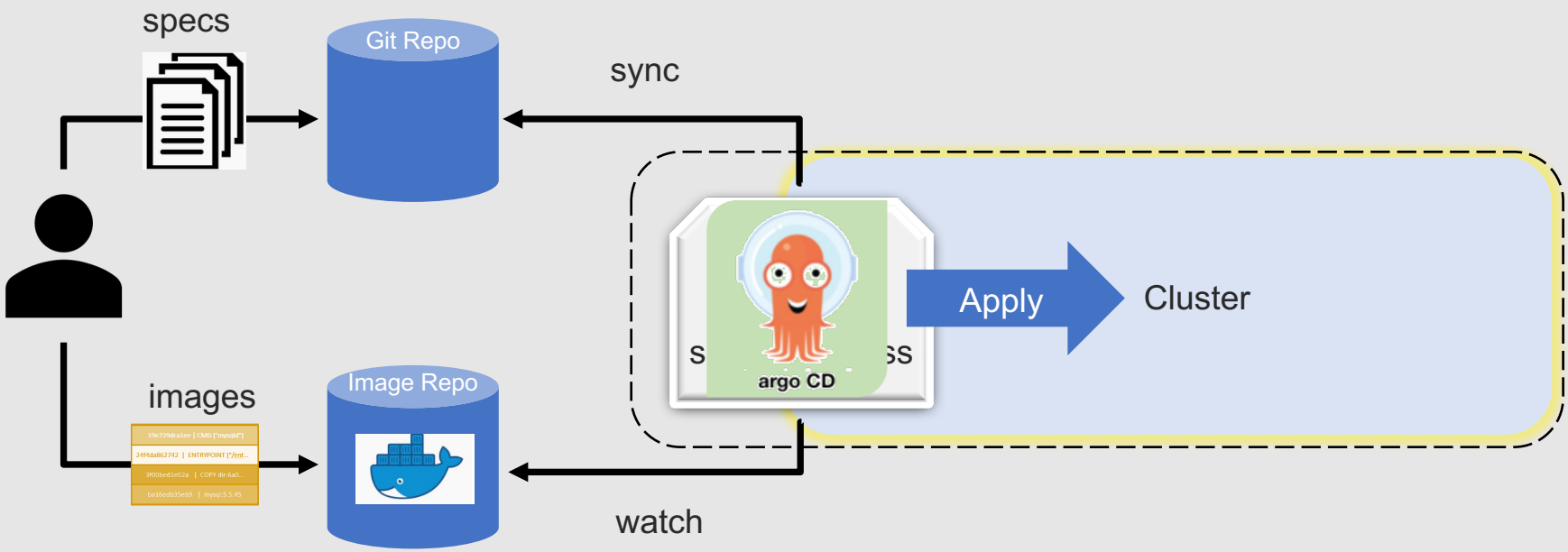
- GitOps tools such as Argo CD automatically update the cluster from Git



GitOps with Kubernetes – what do you need?

- a Git repository with your workloads definitions in YAML format, Helm charts and any other Kubernetes custom resource that defines your cluster desired state (*config* repository)
- a container registry where your CI system pushes immutable images (no *latest* tags, use *semantic versioning* or git *commit sha*)
- a controller, operator, or other process that runs in your cluster and does a two-way synchronization:
- watches the registry for new image releases
  - based on deployment policies
    - » updates the workload definitions with the new image tag
    - » commits the changes to the config repository
- watches for changes in the config repository and applies them to your cluster

GitOps Basic Model



What is ArgoCD?

- Declarative GitOps tool used to deploy applications to K8s
- Easy to configure, lightweight
- Intended only for K8s
- Designed with GitOps workflow built-in
- How it works...
  - Spins up its own controller in the cluster
  - Watches for changes in a repository
  - Compares against resources deployed in cluster
  - Synchronizes states

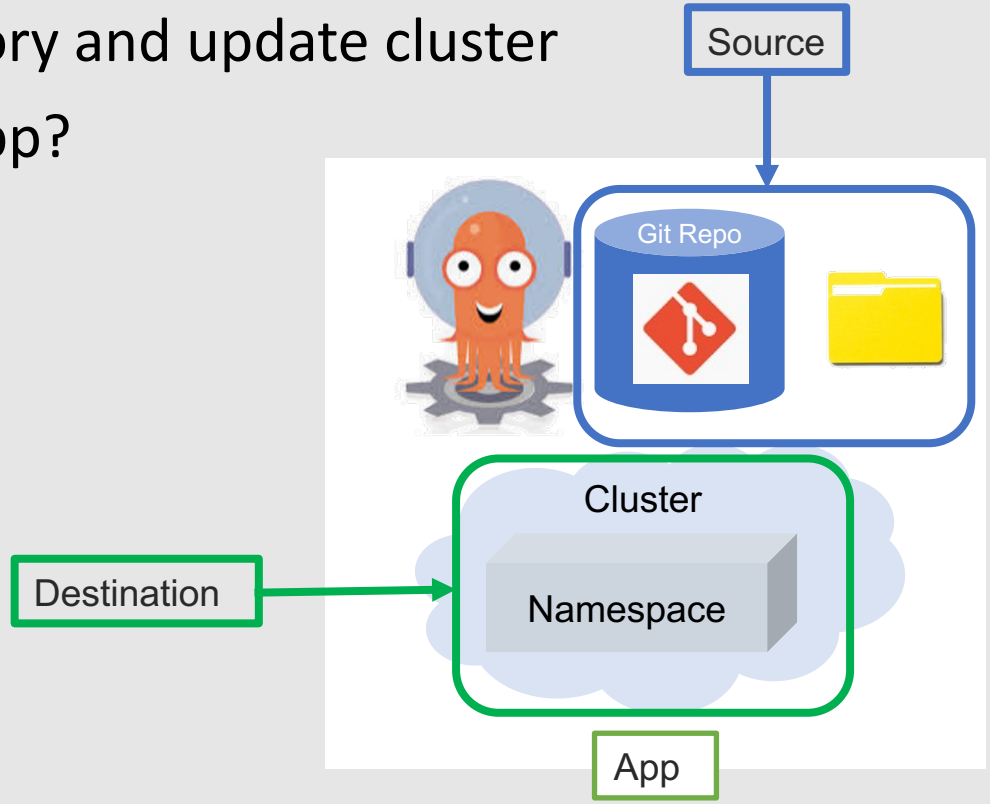
Key Concepts

- **App/Application** - group of K8s resources defined by a manifest - CRD
- **Application source type** - which build tool is used to build the app
- **Live state** - current state of application in the cluster
- **Target state** - desired state of application - as stored in Git
- **Sync status** - is live the same as target?
- **Sync** - updating app to the target state
- **Sync operation status** - success/failure of sync
- **Refresh** - comparison of code in Git with live state
- **Health** - is app running correctly? Serving requests?
- **Tool/Configuration management tool** - tool to create manifests from files in directory (Kustomize or Ksonnet for example)
- **Configuration management plugin** - custom tool

From: https://argoproj.github.io/argo-cd/core_concepts/

Argo CD Apps

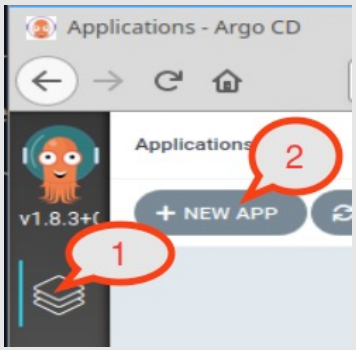
- aka Application – K8s CRD – a group of resources defined by a manifest
- Used to monitor repository and update cluster
- What's specified in an App?
  - Argo CD project
  - source repo
  - revision
  - path
  - cluster
  - namespace

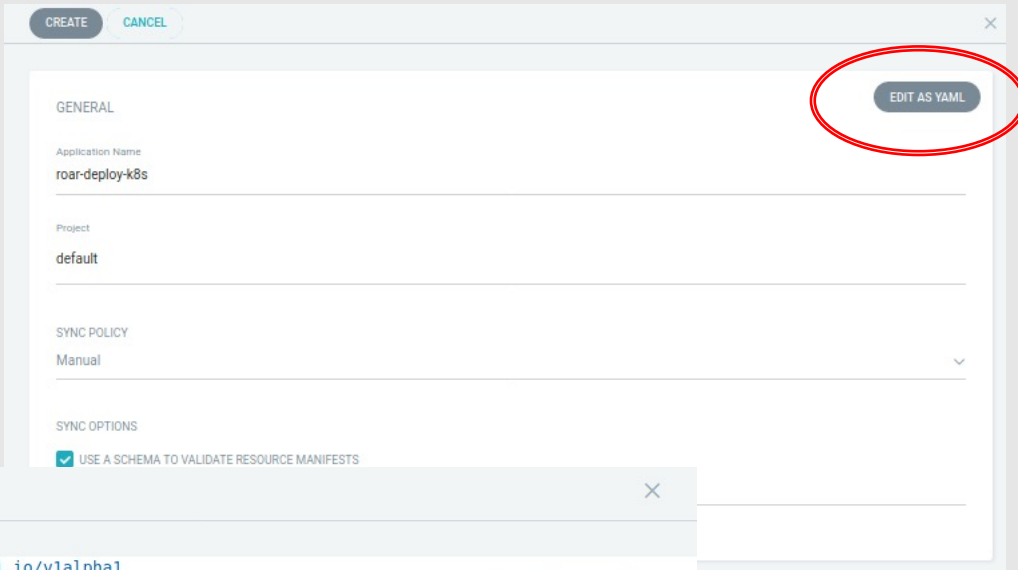


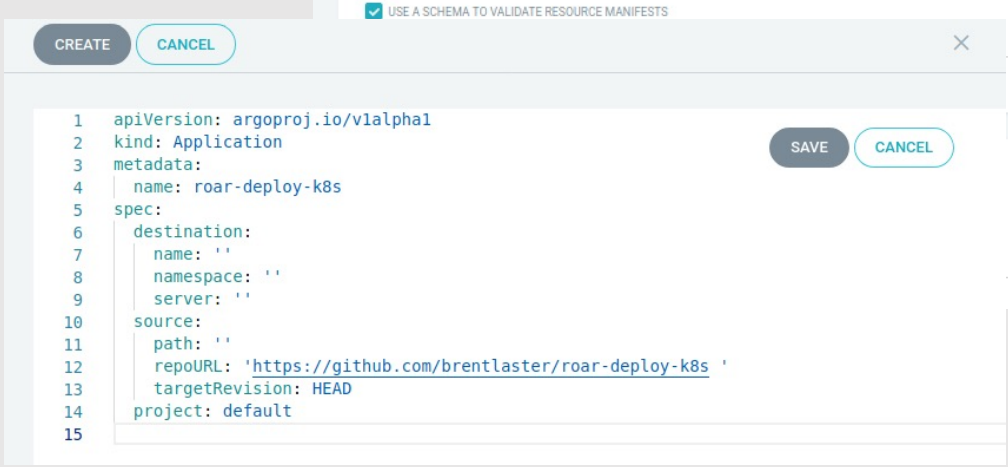
Adding Argo CD Apps

- Can create via:
  - command line
  - web interface
  - yaml in web
  - k8s manifest (CRD)
- Can be specified in several ways:
  - kustomize
  - helm
  - ksonnet
  - jsonnet
  - plain yaml collection
  - custom config mgmt. tool setup as config mgmt. plugin
- argocd app create - pull in files from repo and deploy on K8s
- argocd list - list apps and see status and configuration

```
$ argocd app create roar-deploy-k8s --repo
https://github.com/brentlaster/roar-deploy-k8s --path . --dest-server
$CLUSTER_IP --dest-namespace roar
```







Our Example App

- R.O.A.R. (Registry of Animal Responders)
  - **Simple app with two pieces**
    - **Webapp on the front**
    - **Mysql database on the backend**
  - **Written in Java**
  - **Simple REST API**
  - **War file is produced for webapp**
  - **Managed in Tomcat**

Argo CD Command Line

Usage:

argocd [flags]

argocd [command]

Available Commands:

account Manage account settings

app Manage applications

cert Manage repository certificates and SSH known hosts entries

cluster Manage cluster credentials

completion output shell completion code for the specified shell (bash or zsh)

context Switch between contexts

gpg Manage GPG keys used for signature verification

help Help about any command

login Log in to Argo CD

logout Log out from Argo CD

proj Manage projects

relogin Refresh an expired authenticate token

repo Manage repository connection parameters

repocreds Manage repository connection parameters

version Print version information

Flags:

--auth-token string Authentication token

--client-crt string Client certificate file

--client-crt-key string Client certificate key file

--config string Path to Argo CD config (default "/home/diyuser3/.argocd/config")

--grpc-web Enables gRPC-web protocol. Useful if Argo CD server is behind proxy which does not support HTTP2.

--grpc-web-root-path string Enables gRPC-web protocol. Useful if Argo CD server is behind proxy which does not support HTTP2. Set web root.

-H, --header strings Sets additional header to all requests made by Argo CD CLI. (Can be repeated multiple times to add multiple headers, also supports comma separated headers)

-h, --help help for argocd

--insecure Skip server certificate and domain verification

--logformat string Set the logging format. One of: text|json (default "text")

--loglevel string Set the logging level. One of: debug|info|warn|error (default "info")

--plaintext Disable TLS

--port-forward Connect to a random argocd-server port using port forwarding

--port-forward-namespace string Namespace name which should be used for port forwarding

--server string Argo CD server address

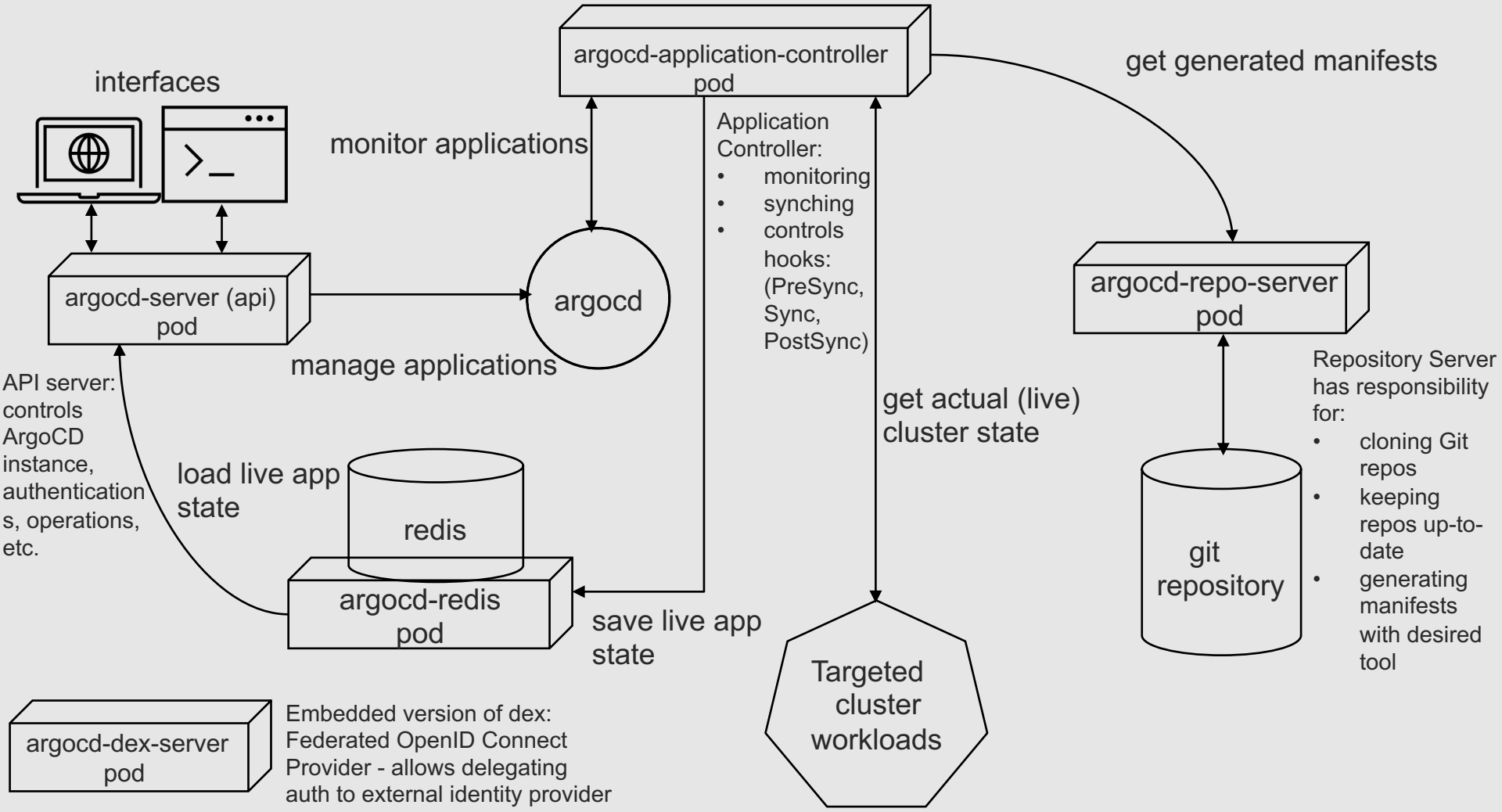
--server-crt string Server certificate file

Use "argocd [command] --help" for more information about a command.

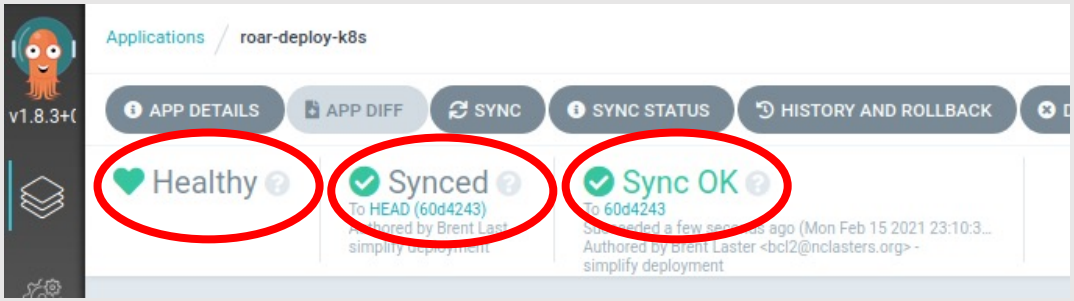
Lab 1 - Getting Started with Argo CD

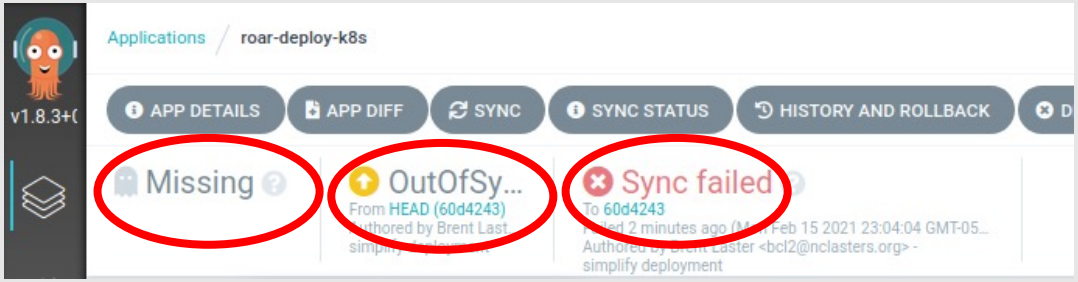
ArgoCD Components and Flow

- Rectangular boxes represent argocd pods running in argocd namespace



ArgoCD Health and Sync Statuses

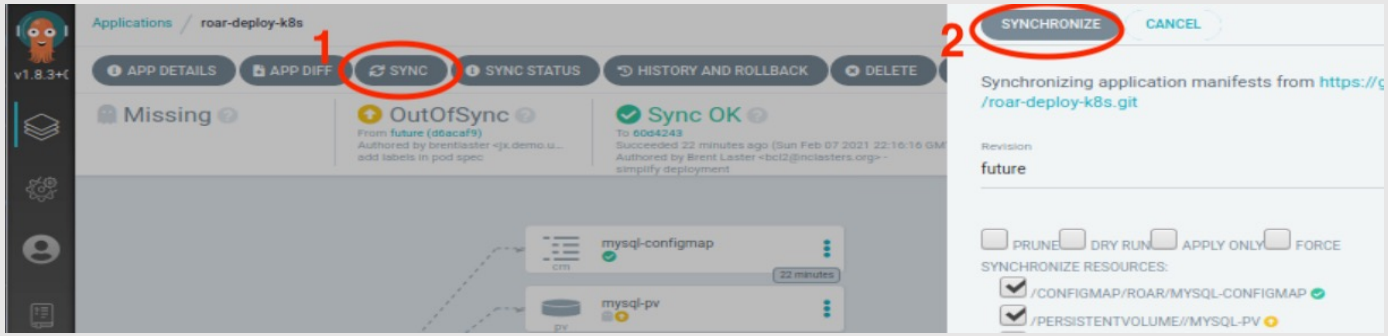


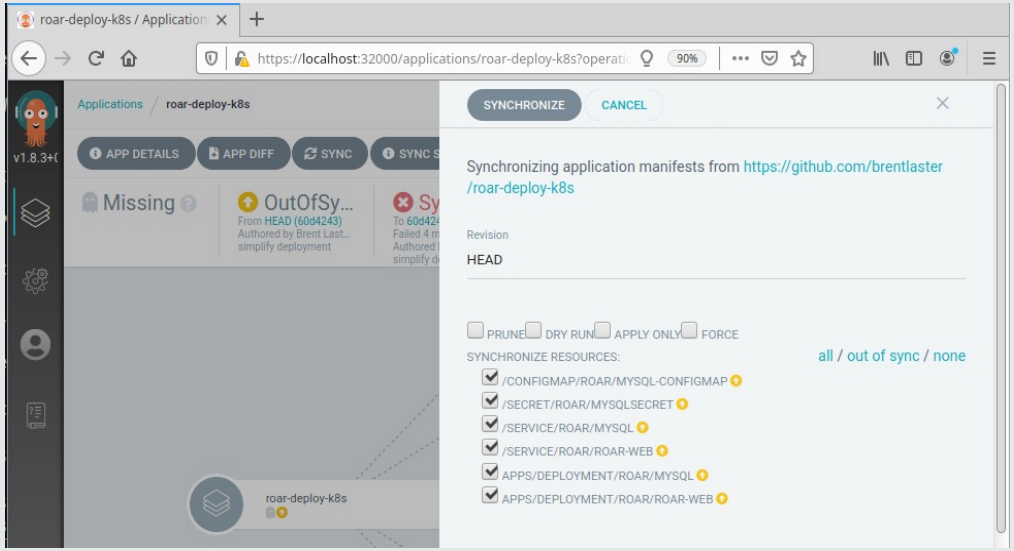


- Built-in Resource Health Checks
  - Deployment, ReplicaSet, StatefulSet, DaemonSet
    - Observed = Desired
    - # of updated replicas = # of desired replicas
  - Service
    - If type=LoadBalancer, ingress list is non-empty and has 1 or more values for hostname or IP
  - Ingress
    - ingress list is non-empty and has a hostname or IP
  - PersistentVolumeClaim
    - status.phase = Bound
- Custom Health Checks
  - can be added - written in LUA - added to argocd-cm or bundled

- **Health Status**
  - health status of app running in cluster
    - » **Progressing** – waiting for rollout to be completed and observable
    - » **Healthy** – health checks indicate items are present and working as expected
    - » **Degraded** – the rollout is invalid
    - » **Suspended** – the rollout is paused
    - » **Missing** – the rollout hasn't occurred
- **Sync Status**
  - whether or not the version of your app is up to date with your cluster deployment
- **Last Sync Status**
  - whether or not your last app sync was successful (to the cluster)
  - not necessarily the same as sync status
  - example: something may have disappeared in cluster – synch status = out of sync, but this is still OK

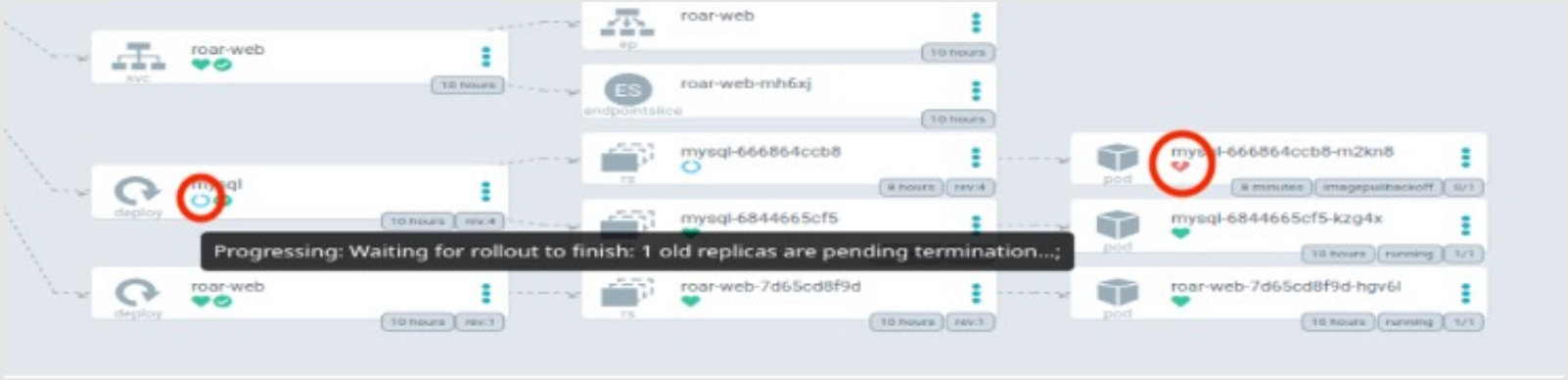
Manual Sync





- **Prune** - allow deleting resources that are unexpected / no longer tracked in git
- **Dry Run** - preview what an apply operation would do without affecting the cluster
  - performs a 'kubectl apply --dry-run' w/o actually doing the sync
- **Apply Only** - skip pre/post sync hooks
- **Force** – use a force apply ('kubectl apply --force)
  - --force flag deletes and re-creates resource(s) when patch encounters conflict after 5 retries

Sync: Understanding what's happening



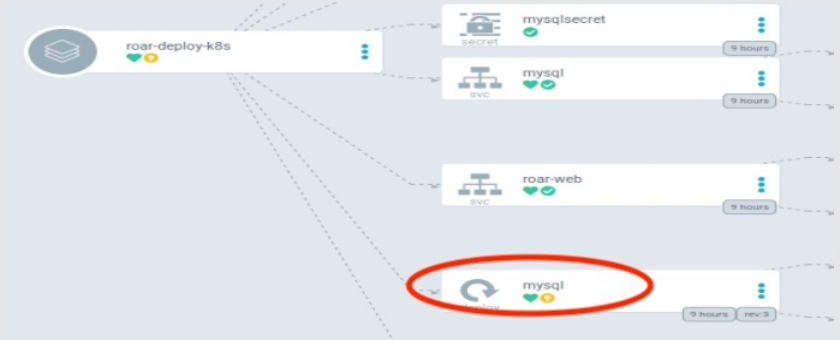
- In "Progressing" or "Degraded" state
- Items out of sync indicated by broken heart
- Click on item to see Summary, Events, Logs

SUMMARY | EVENTS 53 | LOGS

REASON	MESSAGE	COUNT	FIRST OCCURRED	LAST OCCURRED
Scheduled	Successfully assigned roar/mysql-666864ccb8-m2kn8 to training1			
Pulling	Pulling image "quay.io/bclaster/roar-db:1.2.3"	4	2021-01-20T12:26:55Z	2021-01-20T12:28:22Z
Failed	Failed to pull image "quay.io/bclaster/roar-db:1.2.3": rpc error: code = Unknown desc = Error response from daemon: manifest for quay.io/bclaster /roar-db:1.2.3 not found	4	2021-01-20T12:26:55Z	2021-01-20T12:28:23Z
Failed	Error: ErrImagePull	4	2021-01-20T12:26:55Z	2021-01-20T12:28:23Z
BackOff	Back-off pulling image "quay.io/bclaster/roar-db:1.2.3"	6	2021-01-20T12:26:56Z	2021-01-20T12:28:09Z
Failed	Error: ImagePullBackOff	45	2021-01-20T12:26:56Z	2021-01-20T12:37:06Z

Comparing Live vs Desired State

- Select desired item
- Can look at Live Manifest from cluster
- Can look at Desired Manifest from Git
- Can look at Diff of the 2



LIVE MANIFEST | DIFF | DESIRED MANIFEST

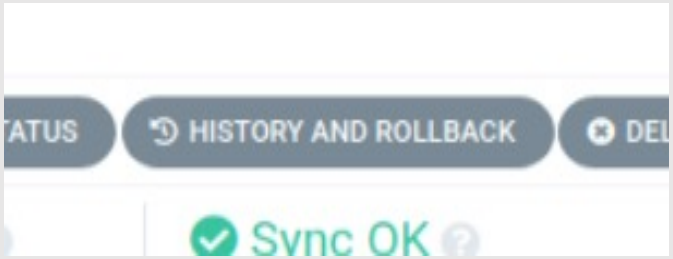
```
196                configMapKeyRef:
197                  key: mysql.user
198                  name: mysql-configmap
199              image: 'quay.io/bclaster/roar-db:1.0.2'
```

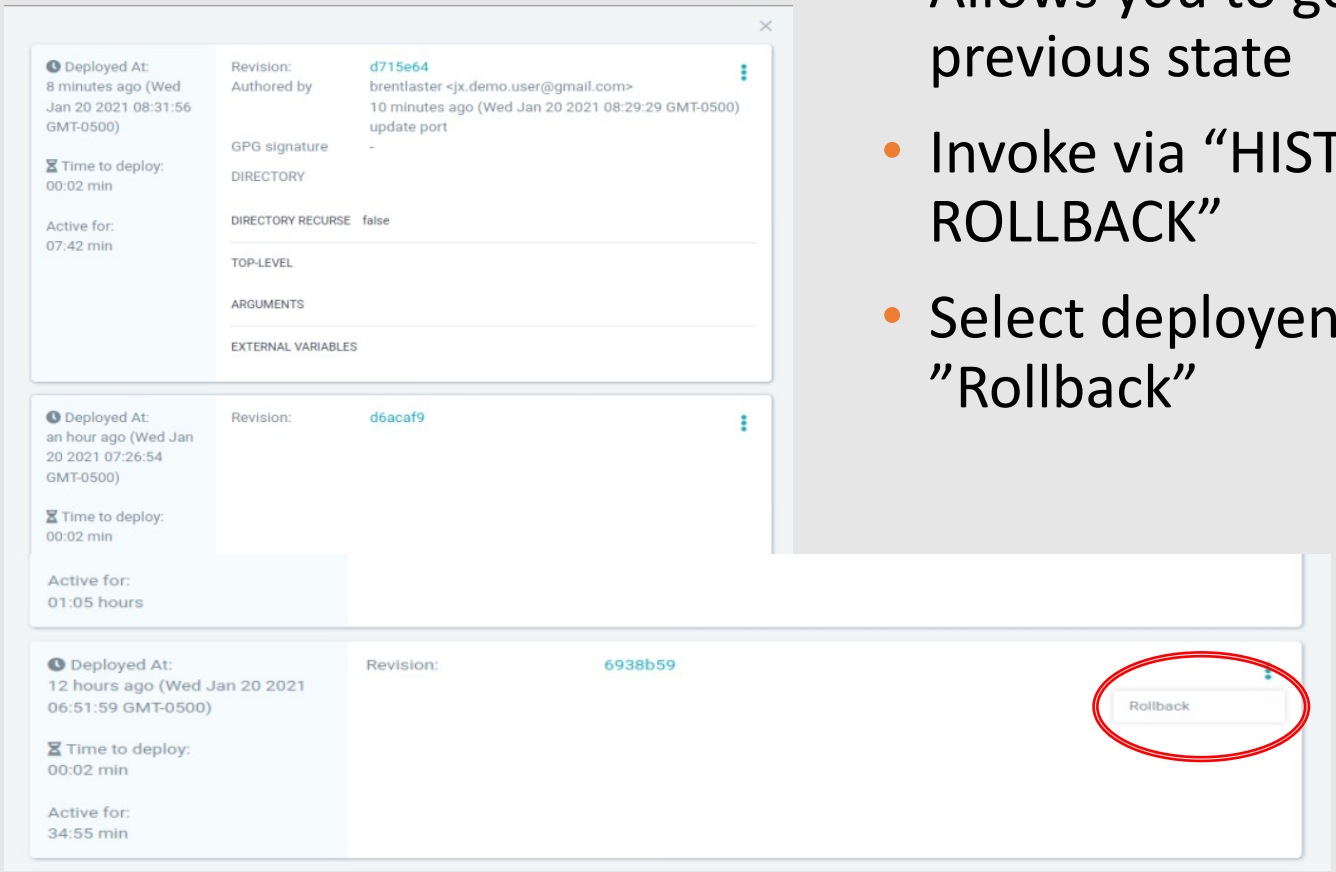
LIVE MANIFEST | DIFF | DESIRED MANIFEST

Compact diff | Inline Diff

```
186  186                 key: mysql.user
187  187                 name: mysql-configmap
188                  image: 'quay.io/bclaster/roar-db:1.0.2'
     188             image: 'quay.io/bclaster/roar-db:1.2.3'
189  189             imagePullPolicy: IfNotPresent
190  190             name: mysql
```

History and Rollback





- Argo CD keeps track of the various versions deployed
- Allows you to go back to a previous state
- Invoke via “HISTORY AND ROLLBACK”
- Select deployent, 3 dots, and ”Rollback”

Lab 2 - Dealing with Failed Deployments and Rollback

Automated Sync

- ArgoCD creates manual triggers by default
- Has the ability to automatically sync application
  - sync happens when differences are detected
    - » between intended manifests in Git and live state in the cluster
  - allows CI/CD pipelines to not need direct access to API server to do deployment
  - pipeline just does commit and pushes to Git repo with manifest changes
  - To turn on automated sync
    - » command line: argocd app set <APPNAME> --sync-policy automated
    - » application manifest:

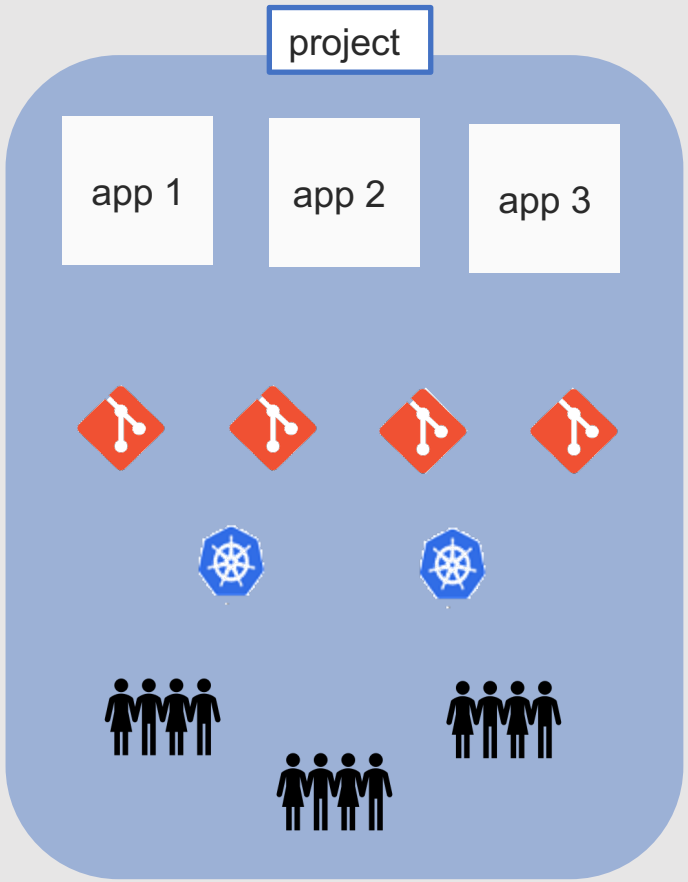
```
spec:
  syncPolicy:
    automated: { }
```


Automated Sync Behavior

- Only occurs if application is “OutOfSync”
- Only attempts one sync per unique combination of commit SHA1 and parameters of the app
  - If most recent sync was successful and was against the same commit SHA1 and app parameters, won’t do 2nd sync - unless ”selfHeal” flag is true
  - If selfHeal flag is true, sync will be attempted again after self heal timeout
    - 5 second default
    - can be set via --self-heal-timeout-seconds flag in argocd-application-controller deployment
- Not attempted if previous sync against same SHA1 and parameters failed
- Rollback can’t be used on app if automatic sync enabled

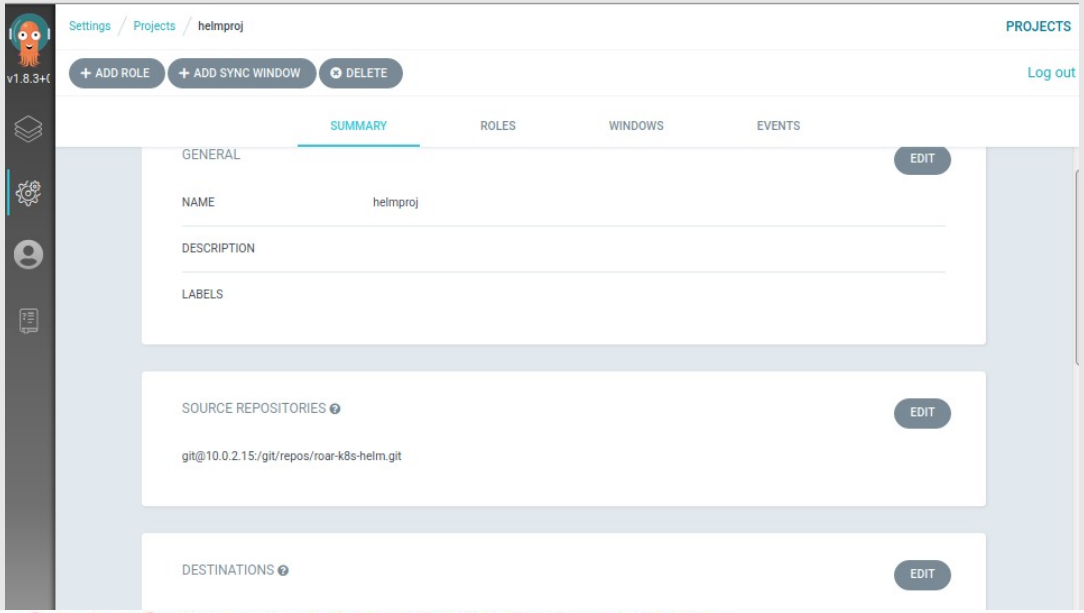
ArgoCD Projects

- Functions
  - Logical group of applications
  - Helpful for organization by teams
    - » isolates teams from each other
  - Defines resources available to apps
- Features
  - Defines restrictions (limited set to choose from)
    - » which repos can be used for applications source
    - » where things can be deployed to (clusters, namespaces)
    - » kinds that can be deployed (CRDs, RBAC, NetworkPolicy, etc.)
    - » which teams of users have access to apps in project
  - Roles
    - » provide app RBAC
- Each app belongs to one project
- Default project is “default”
- Others can be added



ArgoCD Projects Creation

- create via:
  - argocd proj create –f <filename>
  - k apply –f <filename> -n argocd
- Can also create via manifest
  - apiVersion = argoproj.io/v1alpha1
  - kind = AppProject
- Add Source
  - git repository
  - argocd proj add-source
  - must be added to argocd first
    - » via argocd repo add
- Add Destination
  - cluster
  - argocd proj add-destination
  - must be added to argocd first
    - » via argocd cluster add
- Add certificates for auth
  - argocd cert list
  - argocd cert add-<type>




```yaml
apiVersion: argoproj.io/v1alpha1
kind: AppProject
metadata:
  name: helmproj
  namespace: argocd
spec:
  destinations:
  - namespace: helm-demo
    server: https://10.0.2.15:8443
  sourceRepos:
  - git@10.0.2.15:/git/repos/roar-k8s-helm.git
```

App Types

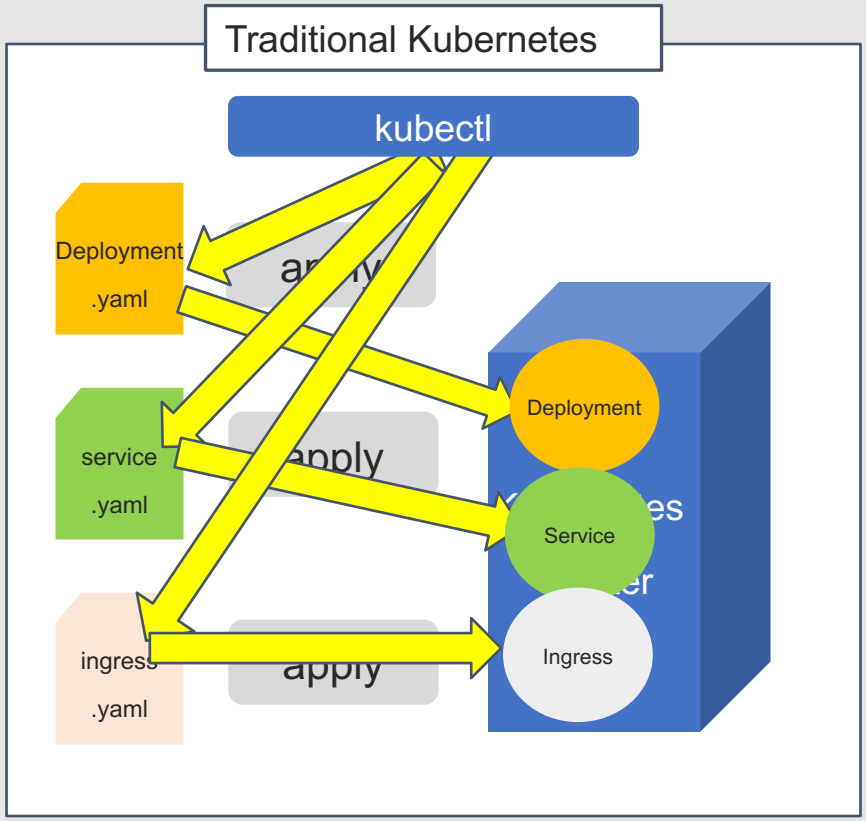
```
$ argocd app create -h
Create an application
Usage:
  argocd app create APPNAME [flags]

Examples:
            # Create a directory app
            argocd app create guestbook --repo https://github.com/argoproj/argocd-example-apps.git --path
guestbook --dest-namespace default --dest-server https://kubernetes.default.svc --directory-recurse

            # Create a Jsonnet app
            argocd app create jsonnet-guestbook --repo https://github.com/argoproj/argocd-example-apps.git --path
jsonnet-guestbook --dest-namespace default --dest-server https://kubernetes.default.svc --jsonnet-ext-str
replicas=2

            # Create a Helm app
            argocd app create helm-guestbook --repo https://github.com/argoproj/argocd-example-apps.git --path
helm-guestbook --dest-namespace default --dest-server https://kubernetes.default.svc --helm-set replicaCount=2

            # Create a Helm app from a Helm repo
            argocd app create nginx-ingress --repo https://kubernetes-charts.storage.googleapis.com --helm-chart
nginx-ingress --revision 1.24.3 --dest-namespace default --dest-server https://kubernetes.default.svc

            # Create a Kustomize app
            argocd app create kustomize-guestbook --repo https://github.com/argoproj/argocd-example-apps.git --
path kustomize-guestbook --dest-namespace default --dest-server https://kubernetes.default.svc --kustomize-image
gcr.io/heptio-images/ks-guestbook-demo:0.1

            # Create a app using a custom tool:
            argocd app create ksane --repo https://github.com/argoproj/argocd-example-apps.git --path
plugins/kasane --dest-namespace default --dest-server https://kubernetes.default.svc --config-management-plugin
kasane
```

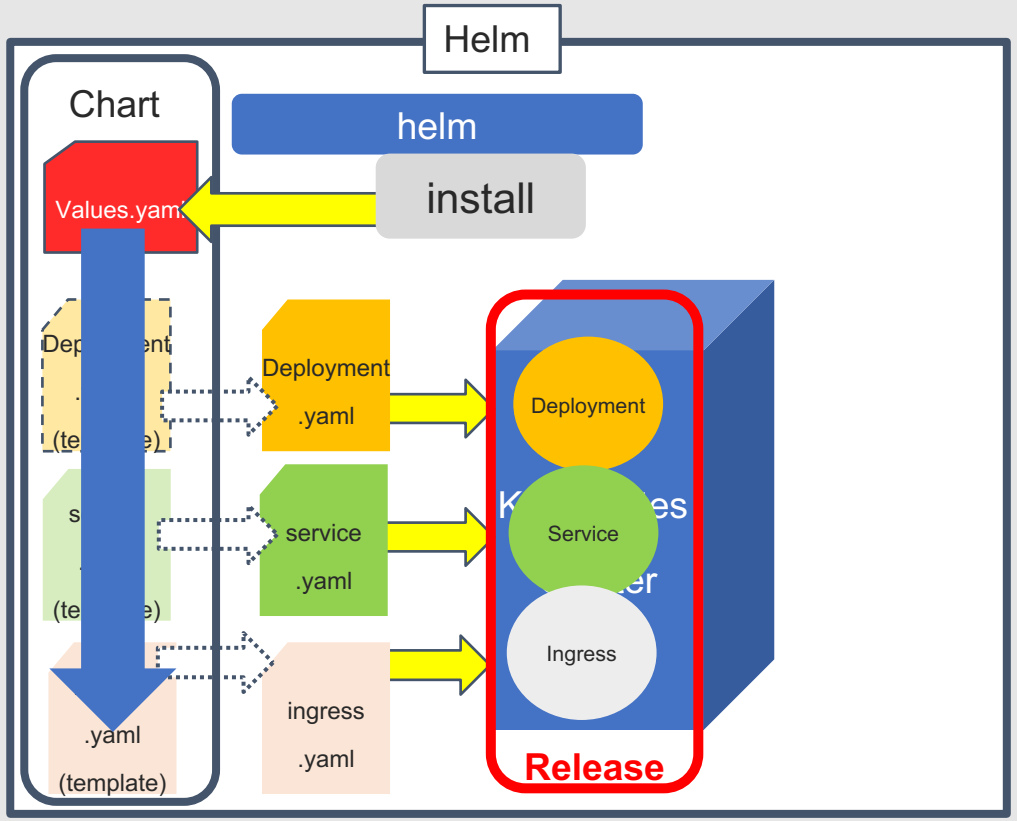

What is Helm?

- Package Manager and Lifecycle Manager for K8s
  - Like yum, apt but for K8s
  - Bundles related manifests (such as deployment.yaml, sevice.yaml, etc.) into a “chart”
  - When installing chart, Helm creates a “release”
  - Lifecycle management
    - Create, Install, Upgrade, Rollback, Delete, Status, Versioning
  - Benefits
    - Templating, Repeatability, Reliability, Multiple Environment, Ease of collaboration

How does Helm simplify things?

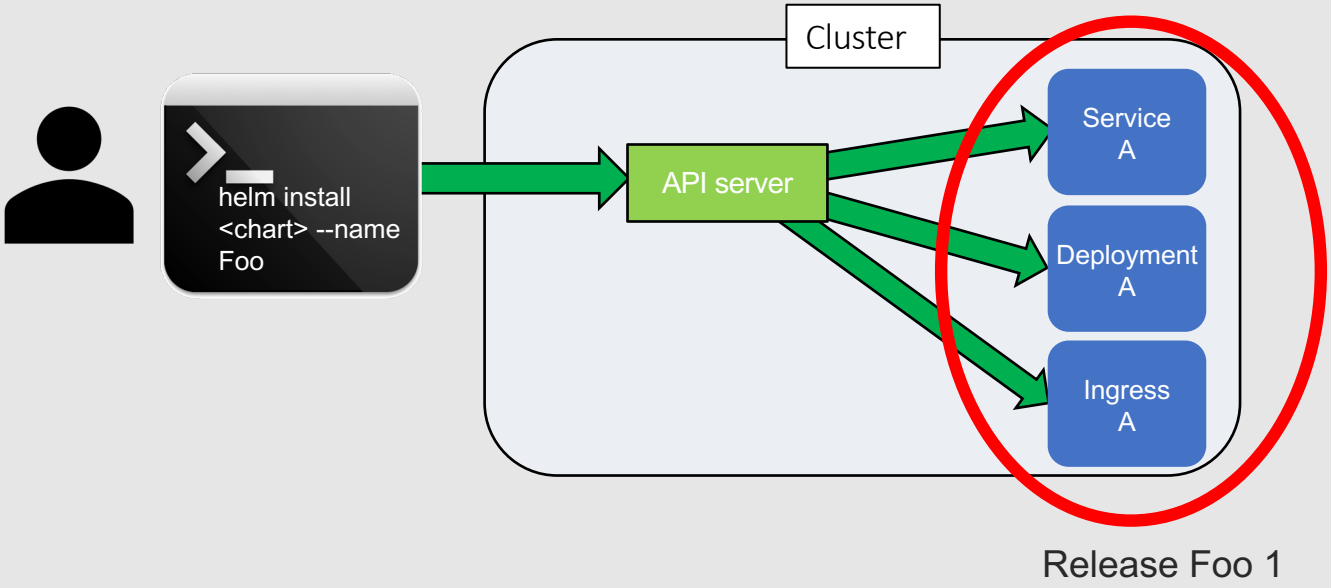
- Traditional deployment in Kubernetes is done with kubectl across files into separately managed items
- Helm deploys units called charts as managed releases





Helm Install a Chart

- helm install <chart>



How Values are resolved in Helm

templates/deployment.yaml

```
spec:
    containers:
    - name: {{ .Chart.Name }}
      image: bclaster/roar-db-image:v1
      imagePullPolicy: Always
      ports:
      - name: {{ .Values.deployment.ports.name }}
        containerPort: {{ .Values.deployment.ports.containerPort }}
      env:
        {{- include "roar-db.environment.values" . | indent 10 }}
```

values.yaml

```
# Default values for roar-db-chart.
# This is a YAML-formatted file.
# Declare variables to be passed
# into your templates.
replicaCount: 1
nameOverride: mysql
deployment:
  ports:
    name: mysql
    containerPort: 3306
```

deployment.yaml

```
…

containerPort: 3306
```

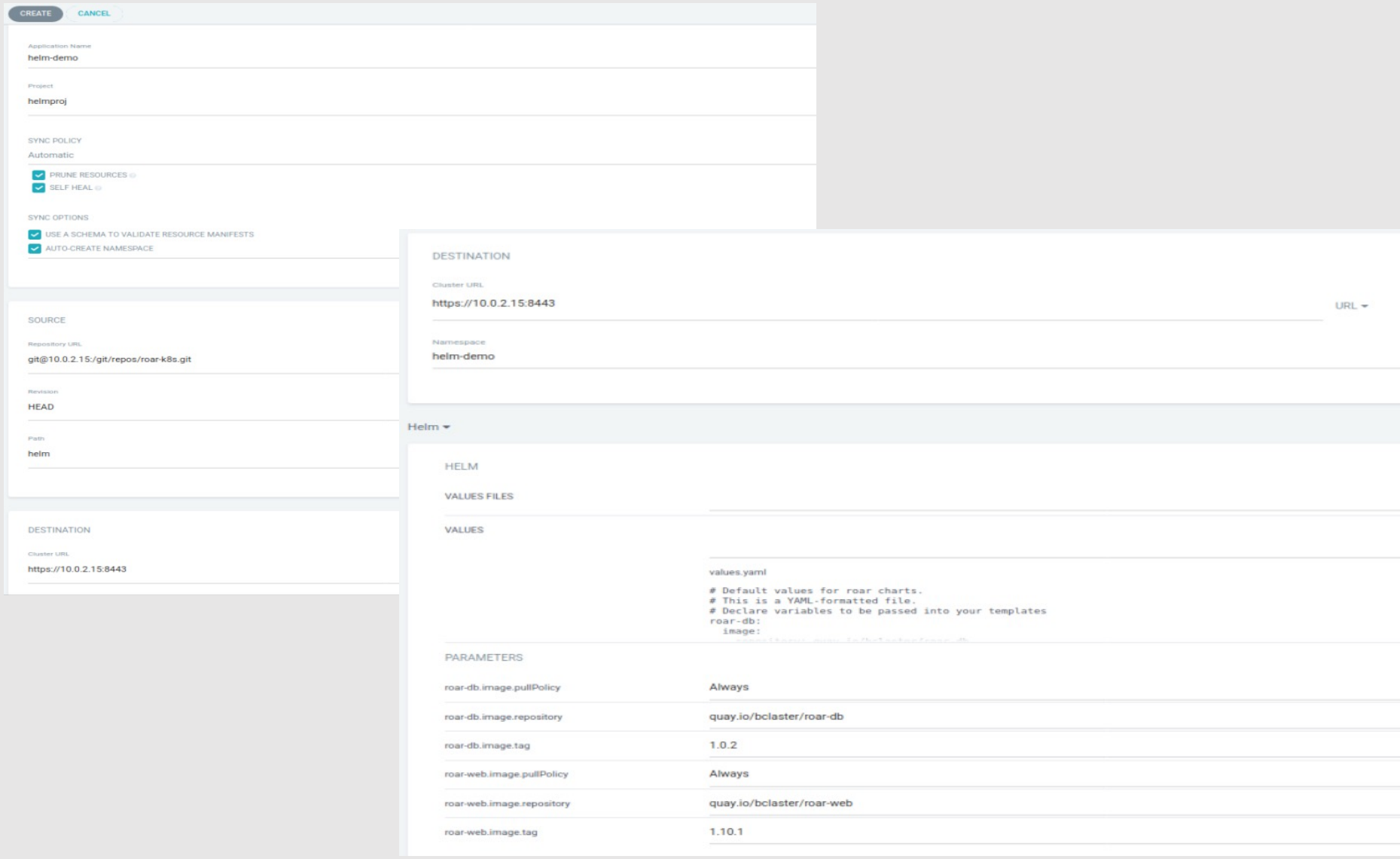
- string indicates hierarchial path
- dot notation separates levels
- .Values refers to top-level values from values.yaml

Traditional K8s yaml vs Helm template

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: roar-web
  labels:
    app: roar-web
  namespace: roar
spec:
  replicas: 1
  template:
    metadata:
      labels:
        app: roar-web
    spec:
      containers:
      - name: roar-web
        image: localhost:5000/roar-web-v1
        ports:
        - name: web
          containerPort: 8080
```

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: {{ template "roar-web.name" . }}
  labels:
    app: {{ template "roar-web.name" . }}
    chart: {{ .Chart.Name }}-{{ .Chart.Version | replace "+" "_" }}
    release: {{ .Release.Name }}
  namespace: {{ .Values.namespace }}
spec:
  replicas: {{ .Values.replicaCount }}
  template:
    metadata:
      labels:
        app: {{ template "roar-web.name" . }}
    spec:
      containers:
      - name: {{ .Chart.Name }}
        image: "{{ .Values.image.repository }}:{{ .Values.image.tag }}"
      {{- if .Values.image.pullPolicy }}
        imagePullPolicy: {{ toYaml .Values.image.pullPolicy }}
      {{- end }}
        ports:
        - name: {{ .Values.deployment.ports.name }}
          containerPort: {{ .Values.deployment.ports.containerPort }}
```


Adding a Helm project in Argo CD



Lab3 - Helm Projects and Automated Sync

Tools to Create Manifest

- Different tools can be used to create K8s manifests in ArgoCD
  - Helm charts
  - Kustomize applications
  - Ksonnet applications
  - Directory of YAML/JSON/Jsonnet manifests
  - A custom config management tool configured as a plugin*
    - plugin configuration
      - add required binaries in argocd-repo-server pod
        - can be via volume mounts or custom image
      - register plugin in argocd-cm ConfigMap
- For development only – upload local manifests
  - example: $argocd app sync AppName --local /path/to/directory
  - requires user with override permission
- Useful in constructing Continuous Delivery (CD) pipelines

Continuous Delivery
Practice

- Theme is automation of software production process
- Combines 3 core practices/disciplines
  - Continuous Integration
  - Continuous Testing
  - Continuous Deployment (if desired)
- Includes Configuration Management
- May also include other areas, such as metrics.

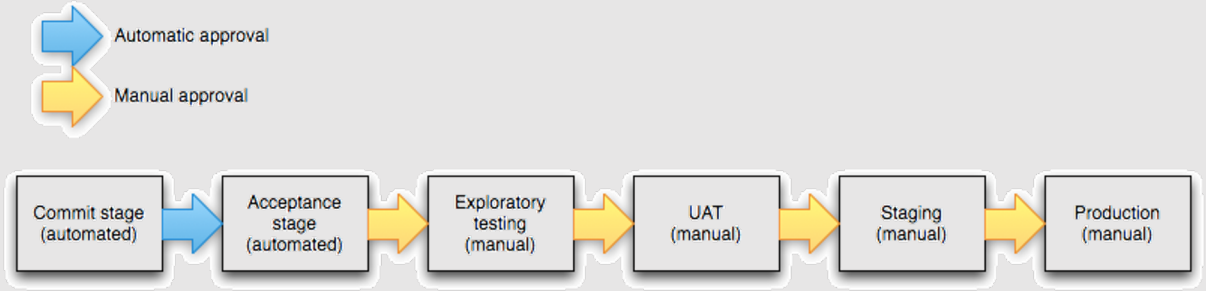
Carl Caum *published on* 30 August 2013

Continuous Delivery doesn't mean every change is deployed to production ASAP. It means every change is proven to be deployable at any time

— Carl Caum (@ccaum) August 28, 2013

Deployment Pipeline

- "… an automated implementation of your application's build, deploy, test, and release process.



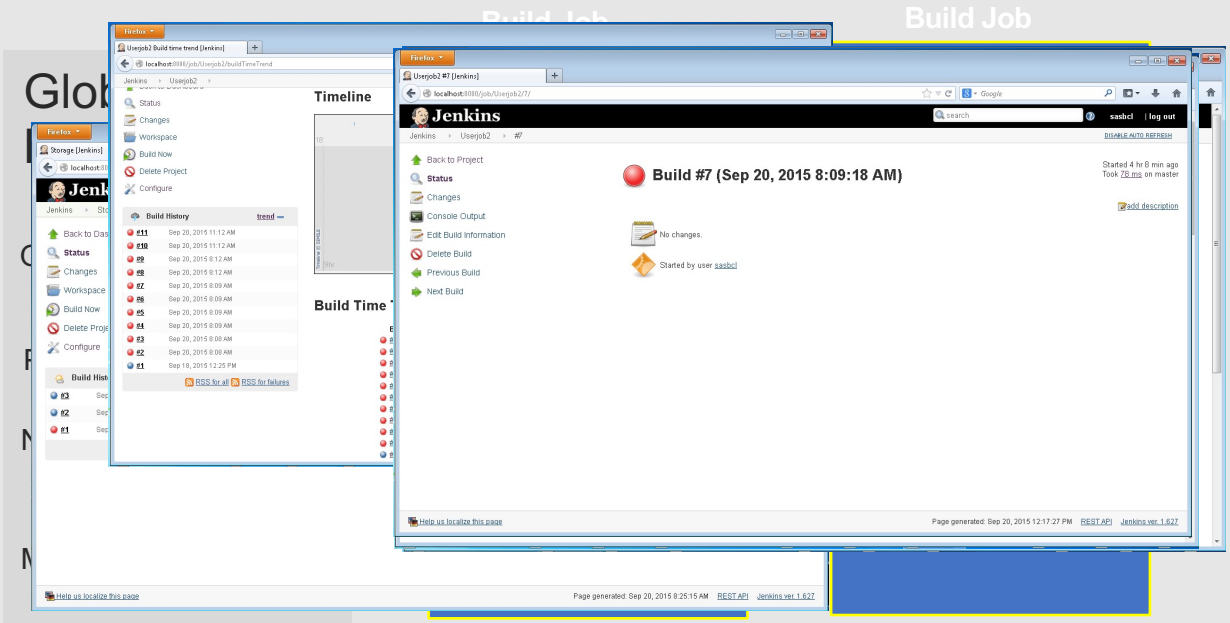
- Every change made to configuration, source code, environment or data triggers a new instance of the pipeline.
- Change motivates production of binaries and then a series of tests are done to prove it is releasable.
- Levels of testing provide successive levels of confidence.
- Typically implemented using CI/CD or orchestration tooling such as Jenkins.

Jenkins – What is it?

- Open-source framework for CI, CD, creating pipelines
- Monitors execution of repeated jobs, provides notifications, records results, distributes workloads across systems
- Generally used for:
  - **Creating Continuous Delivery Pipelines**
  - **Building/testing software projects continuously**
  - **Monitoring executions of externally-run jobs, such as cron jobs**
- Created by Kohsuke Kawaguchi
- Over 1000 plug-ins
- Maintained by Jenkins Community
- Enterprise support by CloudBees

The Jenkins “Object Model”

Jenkins Dashboard (Latest Build Jobs Statuses)



What is Jenkins 2 (2.0+)?

- Features
  - Next evolution of Jenkins
  - Includes more integrated support for pipelines-as-code
  - Provides DSL - pipeline "programming language"
  - Support for pipeline scripts stored in source control - Jenkinsfiles
  - Automatic project creation based on Jenkinsfile presence in branches
  - Improved DSL structure and processing via Declarative Pipelines
  - Advanced interface - Blue Ocean
- Motivations
  - Treat pipelines as a first class citizen
  - Build support around them as a construct
  - Allow to express in coding
  - Use programming logic
  - Treat like code
    - » Store in SCM
    - » Reviewable
  - Easy to test
  - Text-based
  - Handle exceptional cases
  - Restarts

The Jenkinsfile

- Pipeline script stored in SCM
- Can develop in the job and then transfer to Jenkinsfile
- Granularity is per branch, per project
- Used as marker for Jenkins to identify branches (including creation and deletion) in multibranch and organization projects

projects / gradle-greetings.git / blob

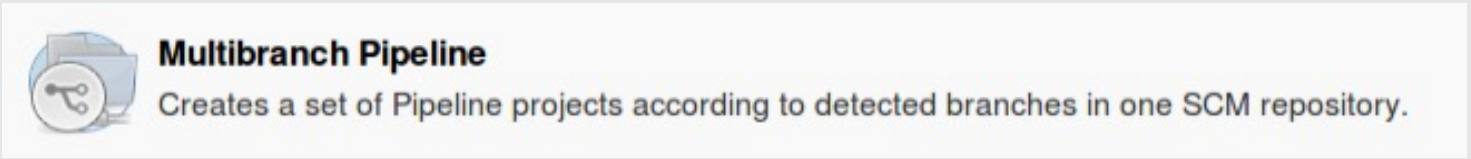
summary | shortlog | log | commit | commitdiff | tree
history | raw | HEAD

add new test files

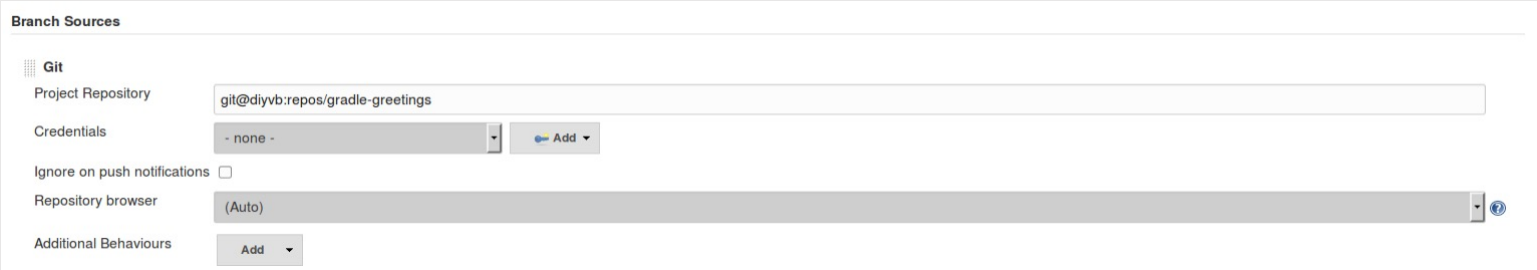
[gradle-greetings.git] / Jenkinsfile

```
#!groovy
import static org.foo.Utilities.*
node ('worker_node1') {
   // always run with a new workspace
   step([$class: 'WsCleanup'])
   try {
      stage('Source') {
         checkout scm
         stash name: 'test-sources', includes: 'build.gradle,src/test/'
      }
      stage('Build') {
         // Run the gradle build
         gbuild this, 'clean build -x test'
      }
      stage ('Test') {
      // execute required unit tests in parallel

         parallel (
           .master: { node ('master'){
               // always run with a new workspace
               step([$class: 'WsCleanup'])
               unstash 'test-sources'
               gbuild this, '-D test.single=TestExample1 test'
            }},
           worker2: { node ('worker_node2'){
               // always run with a new workspace
               step([$class: 'WsCleanup'])
               unstash 'test-sources'
               gbuild this, '-D test.single=TestExample2 test'
            }},
         )
      }
   }
   catch (err) {
      echo "Caught: ${err}"
   }
   stage ('Notify') {
     // mailUser('<your email address>', "Finished")
   }

}

```

Multibranch Pipeline



- This type of job scans branches in a Git repository, and looks for Jenkinsfiles.



- Configured to look for Jenkinsfiles, which are expected to have a pipeline script.

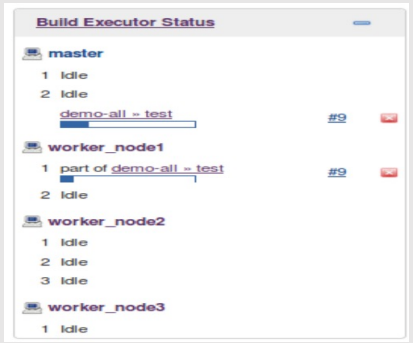
- If a Jenkinsfile is found in a branch in the designated repository, then Jenkins will create a "read-only" sub-job (with the branch name) to do the build processing outlined in the Jenkinsfile.

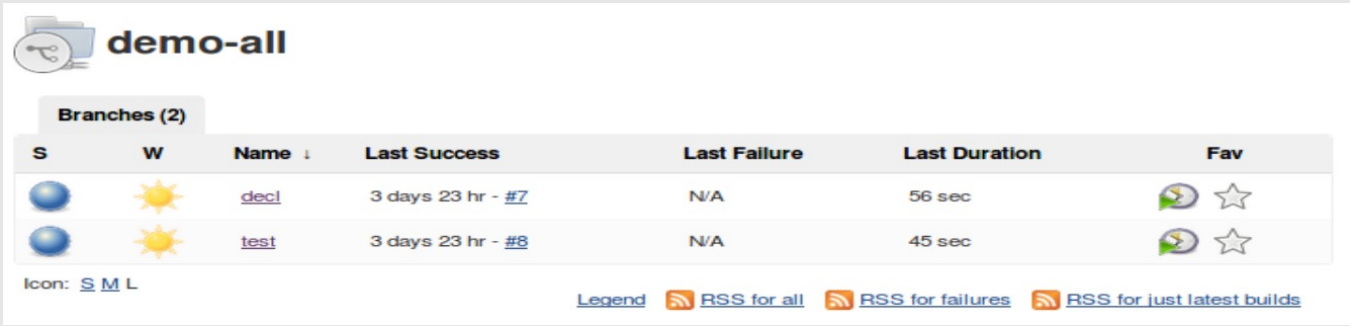
Multibranch Pipeline processing

- “Scan Multibranch (branch indexing) function initiated and detects any branch with Jenkinsfile
- Pipeline job automatically created in folder for branch and build started
- Branch job configuration is read-only (can be viewed but not changed)

Scan Multibranch Pipeline Log

```
Started by user Jenkins Admin
[Sun Mar 26 19:32:46 EDT 2017] Starting branch indexing...
 > git rev-parse --is-inside-work-tree # timeout=10
Setting origin to git@diyvb2:/opt/git/gradle-demo
 > git config remote.origin.url git@diyvb2:/opt/git/gradle-demo # timeout=10
Fetching & pruning origin...
Fetching upstream changes from origin
 > git --version # timeout=10
 > git fetch --tags --progress origin +refs/heads/*:refs/remotes/origin/* --prune
Getting remote branches...
Seen branch in repository origin/decl
Seen branch in repository origin/master
Seen branch in repository origin/test
Seen 3 remote branches
Checking branch decl
      'Jenkinsfile' found
Met criteria
Scheduled build for branch: decl
Checking branch test
      'Jenkinsfile' found
Met criteria
Changes detected: test (2ef42dd5d23e29942fffecd9e4e58a0faf41d855 →
c0ef4193e327528941ccc701e96f7a16b531e1c8)
Scheduled build for branch: test
Checking branch master
      'Jenkinsfile' not found
Does not meet criteria
Done.
[Sun Mar 26 19:32:47 EDT 2017] Finished branch indexing. Indexing took 1.1 sec
Finished: SUCCESS
```





Lab 4 - Working with CI/CD Pipelines and Jenkins

Kustomize

- Kustomize creates modified Kubernetes manifests by “overlaying” declarative specifications on top of existing Kubernetes manifests
- Changes to make/overlay are stored in a separate file called *kustomization.yaml*
- Kustomize reads the kustomization.yaml file and the Kubernetes spec files (manifests) and dumps out completed resources to stdout with the changes from kustomization.yaml applied “on top of” the standard Kubernetes files
- *kustomize build* command causes files to be processed and output created
- Kustomize leverages the idea of “transformers”
- Transformers are functionality built into Kustomize that “transforms” your Kubernetes manifests given a simple set of declarative rules

Simple Example

Directory

roar-web-deploy.yaml
roar-web-svc.yaml
kustomization.yaml

```yaml
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  labels:
    app: roar-web
  name: roar-web
spec:
  replicas: 1
  template:
    metadata:
      labels:
```

```yaml
apiVersion: v1
kind: Service
metadata:
  labels:
    app: roar-web
  name: roar-web
spec:
  ports:
  - name: frontend
```

```yaml
# common label to apply
commonLabels:
  level: test

# List of resource files that
# kustomize reads, modifies
# and emits as a YAML string
resources:
- roar-web-deploy.yaml
- roar-web-svc.yaml
```

kustomize build .

```yaml
apiVersion: v1
kind: Service
metadata:
  labels:
    app: roar-web
    level: test
  name: roar-web
spec:
  ports:
  - name: frontend
    port: 8089
    targetPort: 8080
  selector:
    app: roar-web
    level: test
  type: NodePort
---
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  labels:
    app: roar-web
    level: test
  name: roar-web
spec:
  replicas: 1
  selector:
    matchLabels:
      level: test
  template:
```

Variants

- Common use case is needing multiple variations (variants) of a set of common resources (i.e. dev, stage, prod)
- To do this, Kustomize has concept of “overlay” and “base”
  - Both represented via kustomization.yaml file (includes resources + customizations)
  - Base – declares things variants have in common
  - Overlays – declare the differences
- Variants can also apply “patches”
  - Patch – partial deployment spec – used to update some existing spec as opposed to adding new information

Jenkinsfile – Part 1

```
pipeline {
    agent { label 'worker_node1' }
    environment {
        STAGE_VERSION = "0.0.${BUILD_NUMBER}"
        RC_VERSION = "1.0.${BUILD_NUMBER}"
    }
    stages {
        stage('Source') {
            steps {
               cleanWs()
               checkout scm
               // sh "git clone -b main git@localhost:/git/repos/roar-min"
            }
        }
        stage('Compile') {
            tools {
                gradle 'gradle5'
            }
            steps {
                sh 'gradle -PSTAGE_VERSION=$STAGE_VERSION clean compileJava assemble'
                stash includes: '**/web*.war', name: 'roar'
            }
        }
        stage('Package-Test') {
            steps {
                unstash 'roar'
                git branch: 'test', url: 'https://github.com/brentlaster/roar-min-docker'
                sh "docker build -f Dockerfile_roar_db_image -t localhost:5000/roar-db:${STAGE_VERSION} ."
                sh "docker build -f Dockerfile_roar_web_image --build-arg warFile=web/build/libs/web-${STAGE_VERSION}*.war -t localhost:5000/roar-web:${STAGE_VERSION} . "
                sh "docker push localhost:5000/roar-db:${STAGE_VERSION}"
                sh "docker push localhost:5000/roar-web:${STAGE_VERSION}"
            }
        }
```

Jenkinsfile – Part 2

```
34          stage('Package-Prod') {
35              steps {
36                  unstash 'roar'
37                  sh "mv web/build/libs/web-${STAGE_VERSION}*.war web/build/libs/web-${RC_VERSION}*.war"
38                  git branch: 'main', url: 'https://github.com/brentlaster/roar-min-docker'
39                  sh "docker build -f Dockerfile_roar_db_image -t localhost:5000/roar-db:${RC_VERSION} ."
40                  sh "docker build -f Dockerfile_roar_web_image --build-arg warFile=web/build/libs/web-${RC_VERSION}*.war -t localhost:5000/roar-web:${RC_VERSION} . "
41                  sh "docker push localhost:5000/roar-db:${RC_VERSION}"
42                  sh "docker push localhost:5000/roar-web:${RC_VERSION}"
43              }
44          }
45          stage('Deploy STAGE') {
46              steps {
47                  git branch: 'main', url: 'git@localhost:/git/repos/roar-min-deploy'
48                  sh "git config --global user.email 'argocd@ci.com' && git config --global user.name 'argocd_user'"
49                  sh "git checkout main"
50                  sh "cd ./overlays/stage/db && kustomize edit set image localhost:5000/roar-db:${STAGE_VERSION}"
51                  sh "cd ./overlays/stage/web && kustomize edit set image localhost:5000/roar-web:${STAGE_VERSION}"
52                  sh "git commit -am 'Publish new staging release' && git push origin main:main || echo 'no change'"
53              }
54          }
55          stage('Deploy RC') {
56              steps {
57                  sh "git checkout main"
58                  sh "cd ./overlays/prod/db && kustomize edit set image localhost:5000/roar-db:${RC_VERSION}"
59                  sh "cd ./overlays/prod/web && kustomize edit set image localhost:5000/roar-web:${RC_VERSION}"
60                  sh "git commit -am 'Publish new release candidate' && git push origin main:main || echo 'no change'"
61              }
62          }
```

Lab 5 - Deploying to Production

Project Repositories

- Set of source code for example app

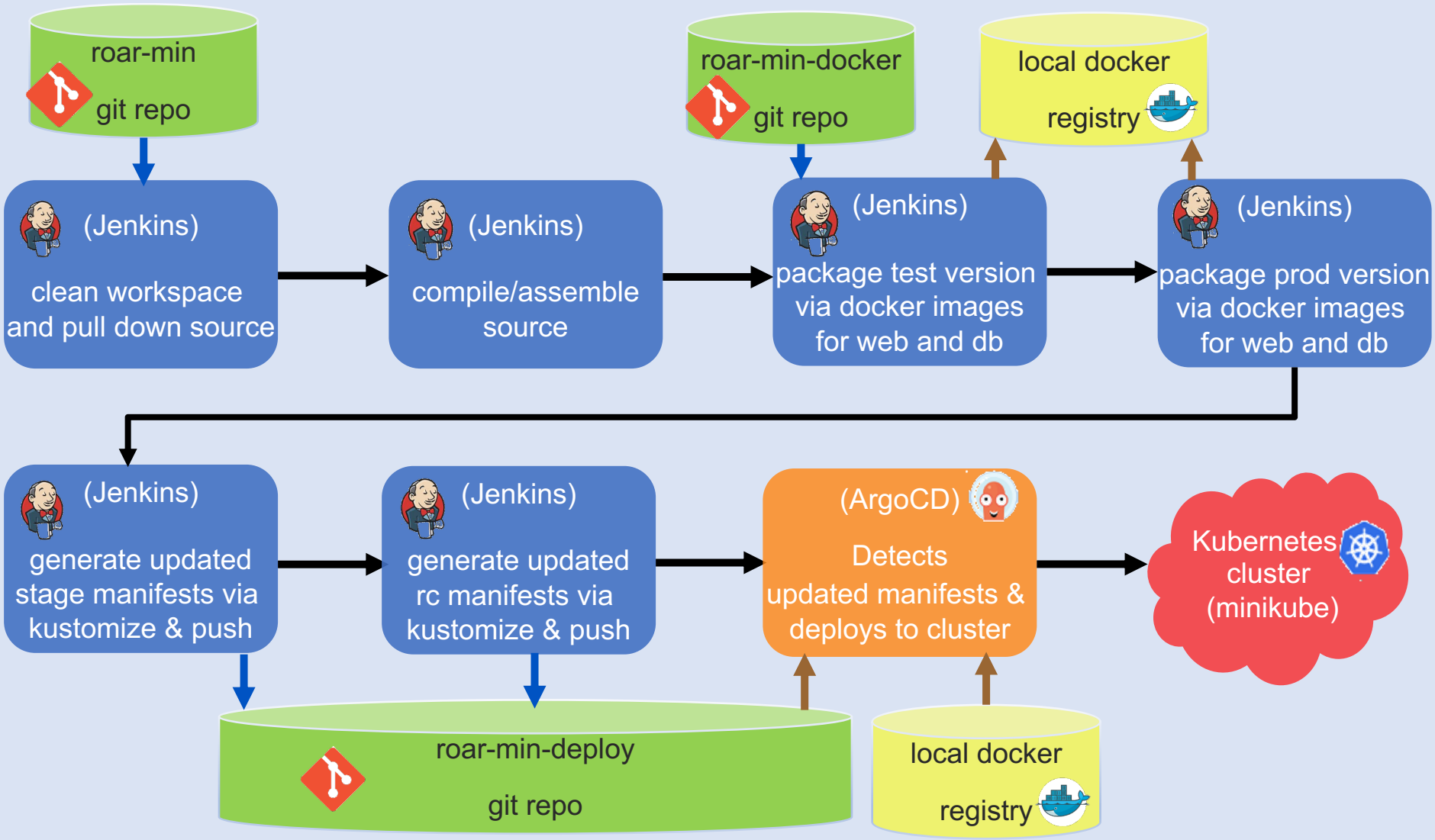
- Docker files for packaging webapp and database pieces as Docker images

- Local registry to hold built images from above and serve to Kubernetes

- Kustomize files for updating versions numbers in app images

- Version of sample app managed via Helm

CI/CD Pipeline with ArgoCD



Environment Variables for Builds

- Used by Helm, custom tools, Jsonnet
- KUBE_API_VERSIONS - version of Kubernetes API
- KUBE_VERSION - version of Kubernetes
- ARGOCD_APP_SOURCE_TARGET_REVISION - target revision from spec, such as “master”
- ARGOCD_APP_SOURCE_REPO_URL - repo’s URL
- ARGOCD_APP_SOURCE_PATH - app path within repo
- ARGOCD_APP_REVISION - resolved revision such as Git SHA
- ARGOCD_APP_NAMESPACE - application namespace destination
- ARGOCD_APP_NAME - application name

Additional Topics: Resource Hooks

- Allows running scripts before, after, or during a Sync operation
- Can also be run if Sync operation fails
- Implemented as K8s manifests in source repository of App
  - annotated with argocd.argoproj.io/hook
- Use cases
  - PreSync hook - validate schema or such before deploying a new version
  - Sync hook - orchestrate complex deployment
  - PostSync hook - validation checks after deployment
  - SyncFail hook - clean-up/finalizer if operation fails
  - Skip hook - tells ArgoCD to skip application of the manifest

```
apiVersion: batch/v1
kind: Job
metadata:
  generateName: schema-validate-
  annotations:
    argocd.argoproj.io/hook: PreSync
```


Additional Topics: Notifications

- Not part of Argo CD
- Provided by integrations with 3rd-party pieces
  - Prometheus, Grafana – monitoring performance & health of applications

    https://argoproj.github.io/argo-cd/operator-manual/metrics/
  - ArgoCD Notifications – continuously monitors Argo CD applications; integrates with SMTP, Slack, Discord, etc.

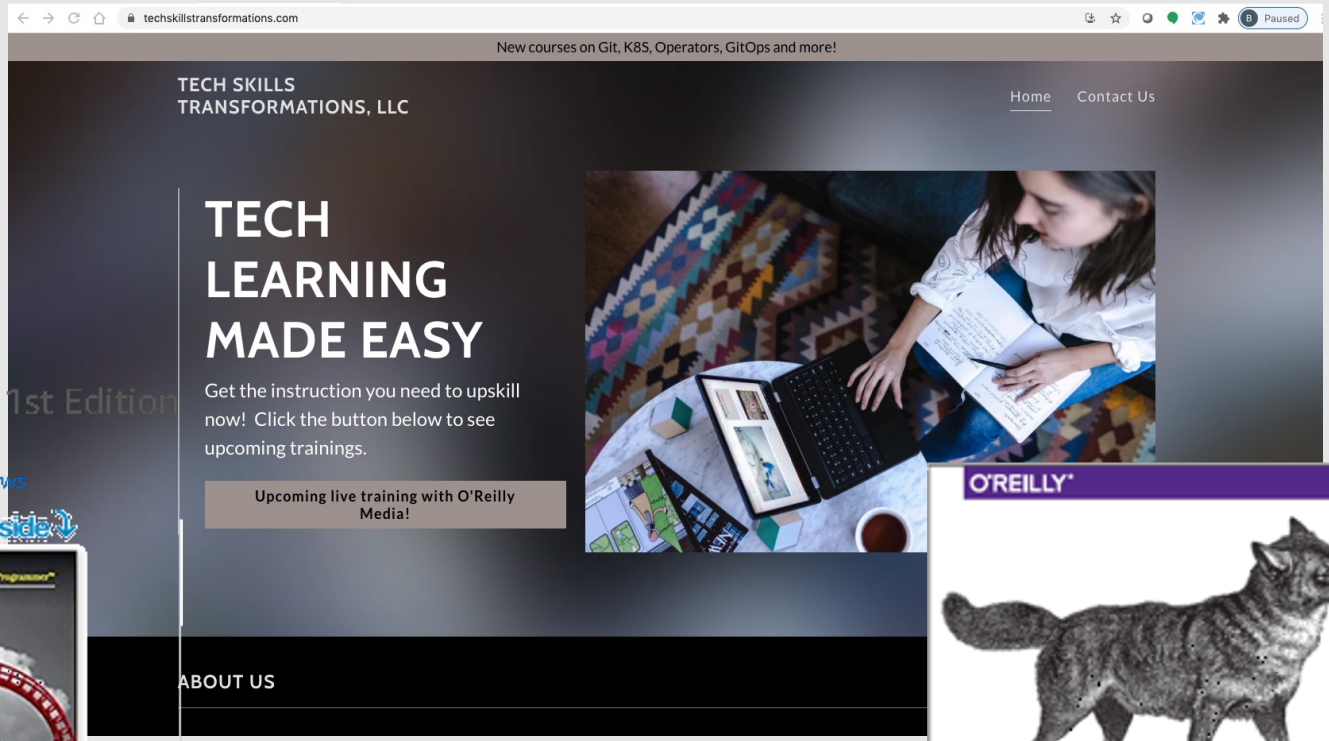
    https://github.com/argoproj-labs/argocd-notifications
  - ArgoCD Kube Notifier – generic K8s resource controller for monitoring any resource and sending notification when a configured rule is met

    https://github.com/argoproj-labs/argo-kube-notifier
  - Kube Watch – watches cluster for resource changes and sends notifications to Slack, mattermost, etc. via webhooks

    https://github.com/bitnami-labs/kubewatch

Lab 6 - Seeing the entire workflow

That's all - thanks!



techskillstransformations.com
getskillsnow.com