Understanding GitOps Architecture and Tooling

Kien Bui
DevOps & Platform Engineer

Overview

Understanding GitOps Tooling

Understanding a GitOps Architecture

Understanding GitOps Architectural Decision Points

Demo: Deploy New Application Using ArgoCD GitOps Tool

Understanding GitOps Tooling

GitOps Tooling

Kubernetes	Defacto for cloud native apps. Handles 3 major infra pillars compute, network, & storage
Docker	A runtime for containers. More & more cloud native apps containerized
Container/Helm Registry	Used to host & manage container images / Helm Charts
Git	Version control, i.e. Bit Bucket, Azure DevOps, GitHub, GitLab – GitOps source of truth
Helm	Package manager for Kubernetes used for creating, installing, & managing packages
Flagger	Delivery operator that automates the promotion of canary deployments with GitOps
Prometheus	Monitoring & alerting system – the heart of GitOps alerting
Terraform	Provision any infrastructure. Often used to deploy Kubernetes clusters in GitOps
Flux	GitOps operator for Kubernetes
Argo CD	GitOps operator for Kubernetes with a visual approach
Jenkins X	CI/CD platform for Kubernetes used to manage GitOps pipelines
Git-Secret	Encrypts secrets & stores them in Git. Automatically encrypts & decrypts in GitOps workflow
Git-backup / Kube Backup	Kubernetes & Git repos are critical, back them up. Automate backup of git repos & cluster config

GitOps Operators

Flux

Kubernetes GitOps Operator

https://fluxcd.io

Argo CD

Kubernetes GitOps Operator with visual approach

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

Kubestack

Terraform GitOps Framework for building Kubernetes on any platform

https://www.kubestack.com

Jenkins X

Kubernetes pipeline automation with built-in GitOps

https://jenkins-x.io

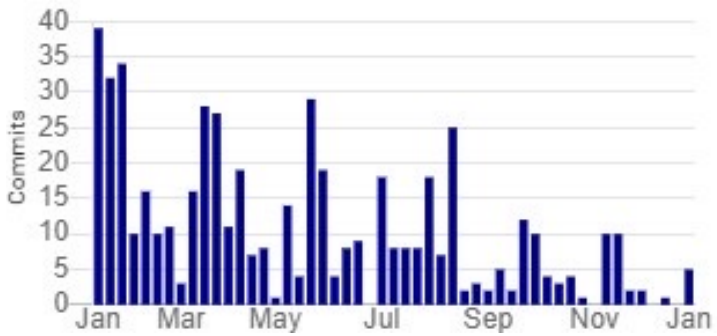
Flux

The GitOps Kubernetes operator

Cloud Native Computing Foundation (CNCF)

App Definition and Development · Continuous Integration & Delivery

Website	docs.fluxcd.io/en/latest
Repository	github.com/fluxcd/flux ★5,921
Crunchbase	crunchbase.com/organization/cloud-native-computing-foundation
LinkedIn	linkedin.com/company/cloud-native-computing-foundation
Twitter	@CloudNativeFdn
Latest Tweet	this week
First Commit	5 years ago
Latest Commit	this week
Contributors	282
Latest Release	this week
Headquarters	San Francisco, California
Headcount	11-50
Funding	$3M



Argo

Argo Workflows: Get stuff done with Kubernetes.

Cloud Native Computing Foundation (CNCF)

App Definition and Development · Continuous Integration & Delivery

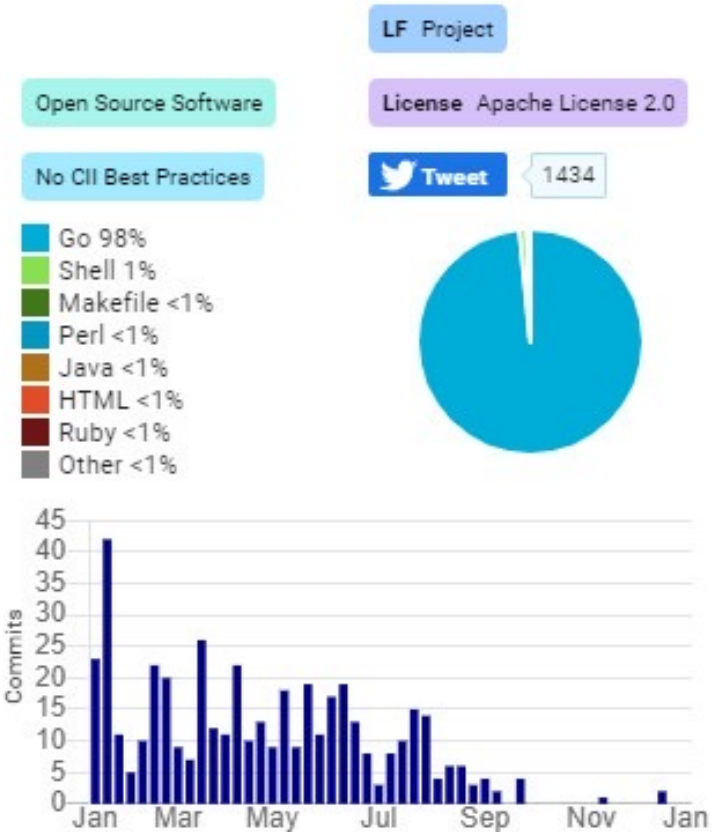
Website	argoproj.github.io
Repository	github.com/argoproj/argo ★7,252
Crunchbase	crunchbase.com/organization/cloud-native-computing-foundation
LinkedIn	linkedin.com/company/cloud-native-computing-foundation
Twitter	@argoproj
Latest Tweet	about a month
First Commit	3 years ago
Latest Commit	this week
Contributors	339
Latest Release	this week
Headquarters	San Francisco, California
Headcount	11-50
Funding	$3M

JenkinsX

Jenkins X provides automated CI+CD for Kubernetes with Preview Environments on Pull Requests using Tekton, Knative, Lighthouse, Skaffold and Helm

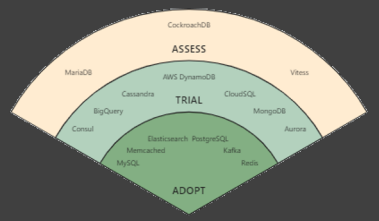
Continuous Delivery Foundation (CDF)

App Definition and Development · Continuous Integration & Delivery

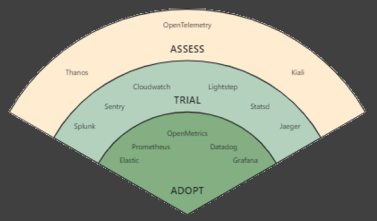


Website	jenkins-x.io
Repository	github.com/jenkins-x/jx ★3,772
Crunchbase	crunchbase.com/organization/continuous-delivery-foundation-cdf
Twitter	@jenkinsxio
Latest Tweet	this week
First Commit	3 years ago
Latest Commit	3 weeks ago
Contributors	213
Latest Release	3 weeks ago
Headquarters	San Francisco, California
Headcount	1-10

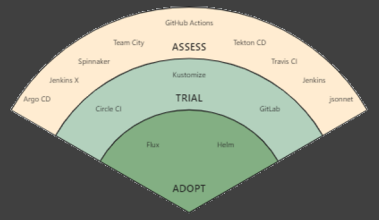
Cloud Native Computing Foundation (CNCF) Technology Radar



Database Storage, November 2020



Observability, September 2020



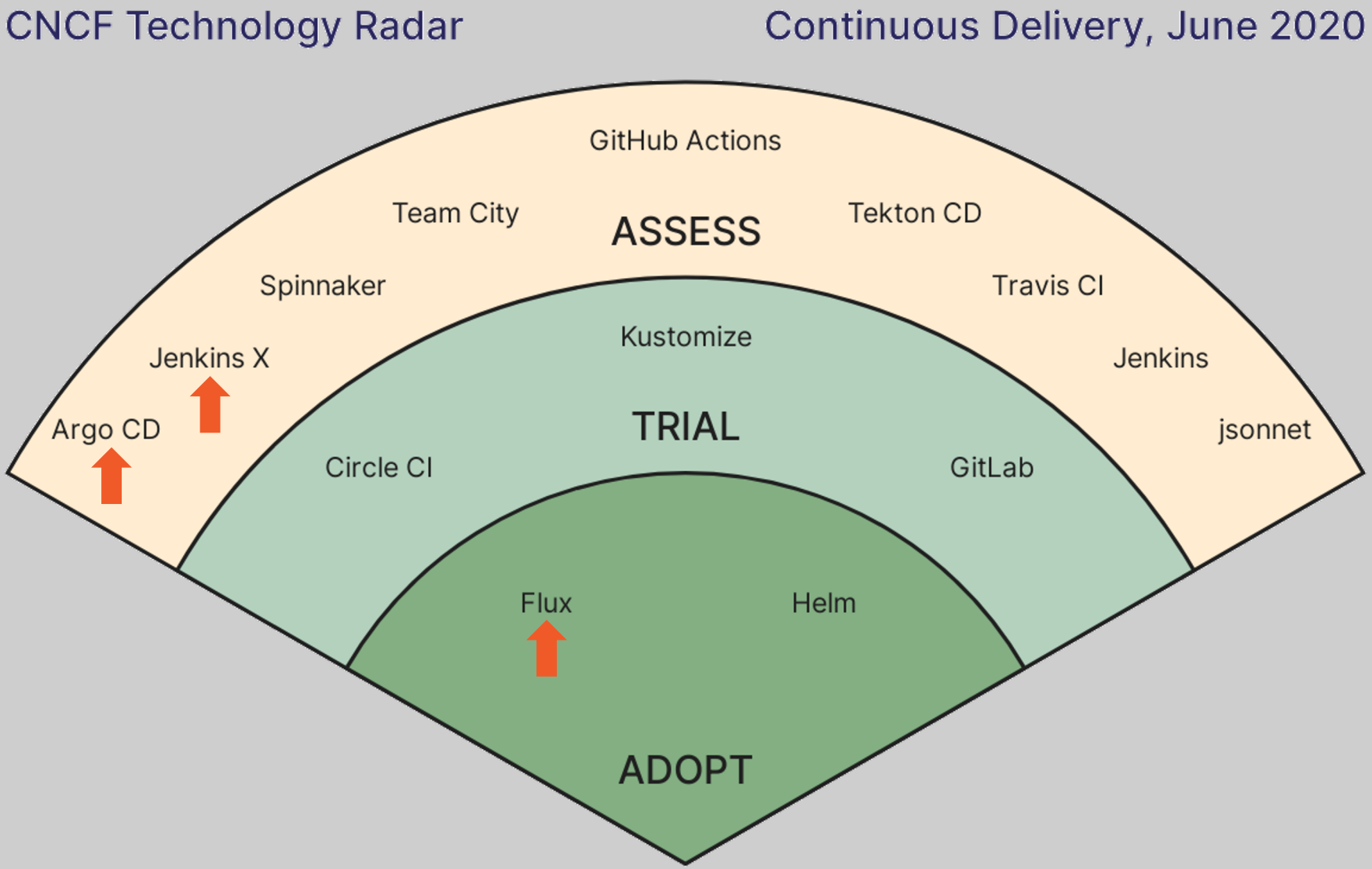
Continuous Delivery, June 2020

A technology radar is an opinionated guide to a set of emerging technologies from the CNCF End User Community.

Adopt	Used it for long periods of time in many teams, and it has proven to be stable and useful.
Trial	Have used it with success, and we recommend you have a closer look at the technology.
Assess	Tried it out, and find it promising. Recommend having a look when there is a specific need.

https://radar.cncf.io/overview

Adoption of Flux/Argo CD/Jenkins X - CNCF Technology Radar



https://radar.cncf.io/2020-06-continuous-delivery

Understanding a GitOps Architecture

GitOps Architecture Components

Source Control System

(i.e. ADO, GitHub, GitLab, Bit Bucket)

Git Repository

Container/Helm Registry

Operator

(i.e. Flux, ArgoCD, Kubectl apply, Terraform K8s provider etc)

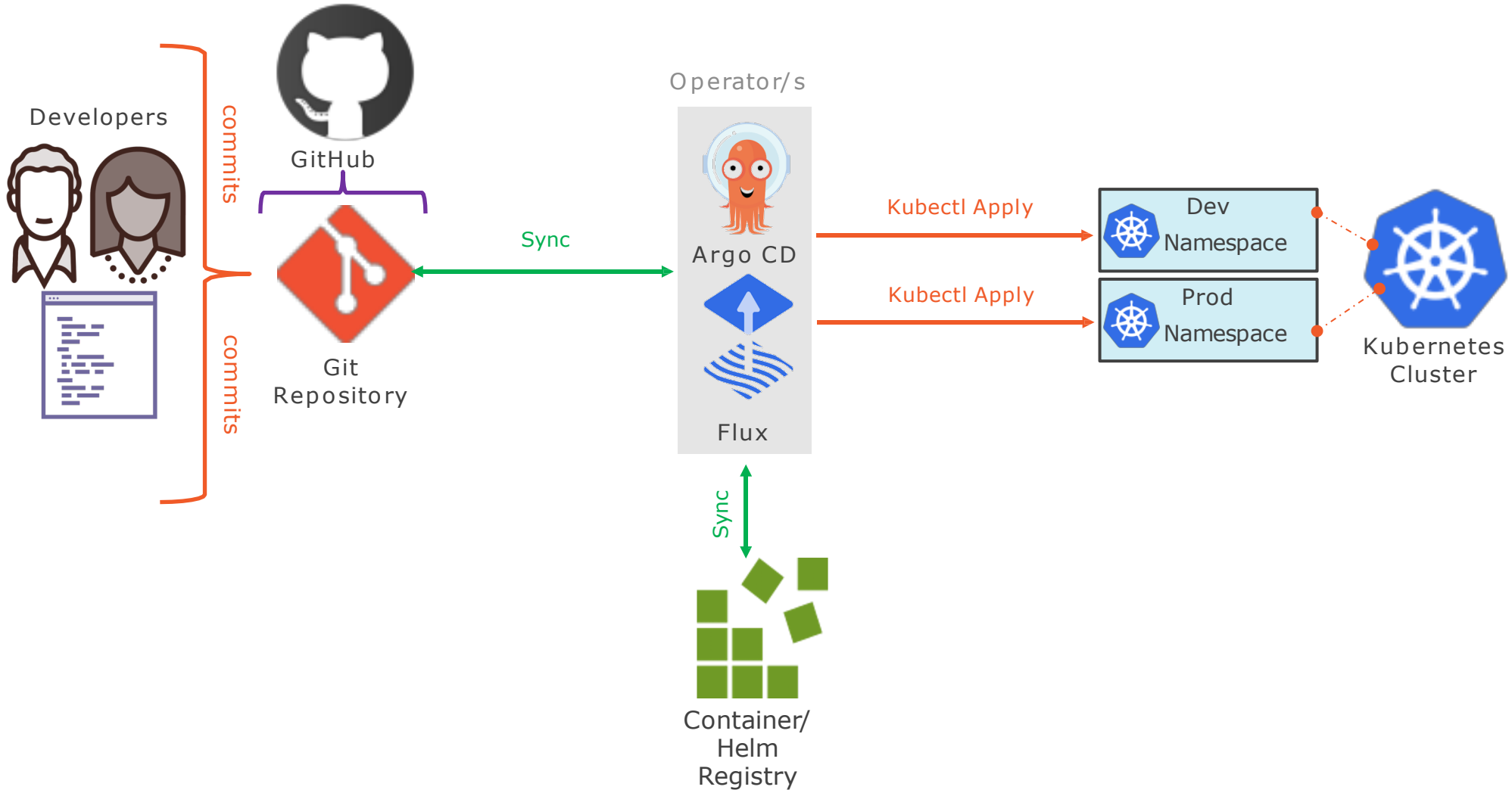
Runtime Environment

(i.e. 1K8s cluster multiple namespaces or 1K8s cluster per environment i.e. dev, stage, prod)

Namespaces

(namespace per environment, per app, service, per engineer, per build ect)

GitOps Architecture

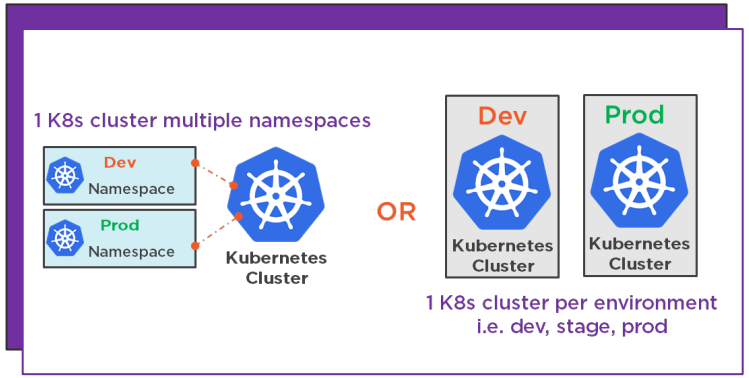


Understanding GitOps Architectural Decision Points

GitOps Architectural Decision Points

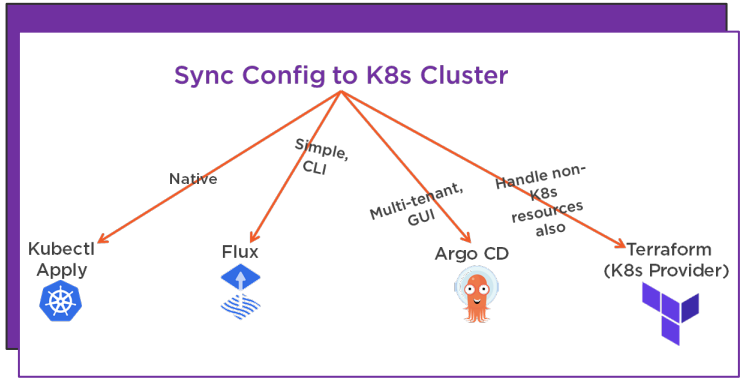
Azure DevOps, GitHub, GitLab, Bit Bucket etc.

i.e. App and Config separate repos, a repo per team, repo per environment etc.



Namespace - per environment (dev/prod), per app, service, per engineer, per build, ect.

Flux, ArgoCD, Kubectl apply, Terraform K8s provider, Jenkins X, etc.



Summary

In this module we covered:

- Gained an understanding of the GitOps tool ecosystem
- Explored what a GitOps architecture looks like
- Talked through what GitOps Architectural Decision Points will be when adopting GitOps
- We looked at GitOps in action using Argo CD

Why this is important:?

- When embarking on GitOps it is critical to know what tools are available to support it
- The knowledge in this module will help when you making GitOps architecture decisions