

## A YEAR OF GITOPS

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# IN PRODUCTION

# WHAT IS CURRENTLY RUNNING IN YOUR PRODUCTION?

# ABOUT ME

- ▶ Dmitri Lerko
- ▶ Ask questions <https://www.linkedin.com/in/lerko/>
- ▶ Sometime I blog here <https://deploy.live>
- ▶ GCP, Kubernetes, AWS Certified

# WHAT IS GITOPS?

- ▶ Push > Pull
- ▶ Definition
- ▶ Making changes

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- ▶ Definition
- ▶ Making changes



**Kelsey Hightower** 

@kelseyhightower

Follow



GitOps: versioned CI/CD on top of declarative infrastructure. Stop scripting and start shipping.

# BEFORE CLOUD, KUBERNETES, GITOPS

- ▶ Physical servers

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- ▶ Physical servers
- ▶ KVM VMs

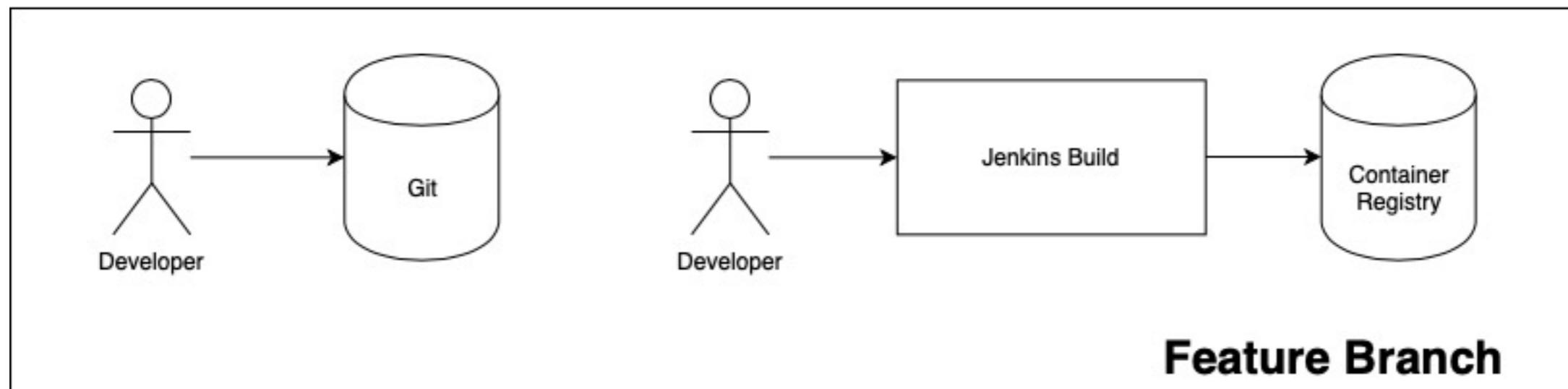
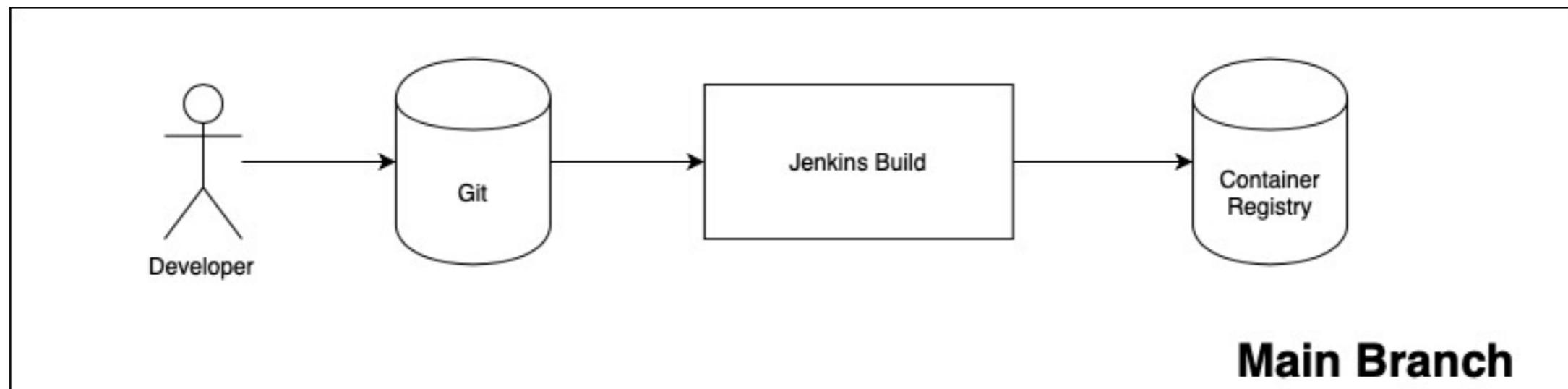
# BEFORE CLOUD, KUBERNETES, GITOPS

- ▶ Physical servers
- ▶ KVM VMs
- ▶ Jenkins

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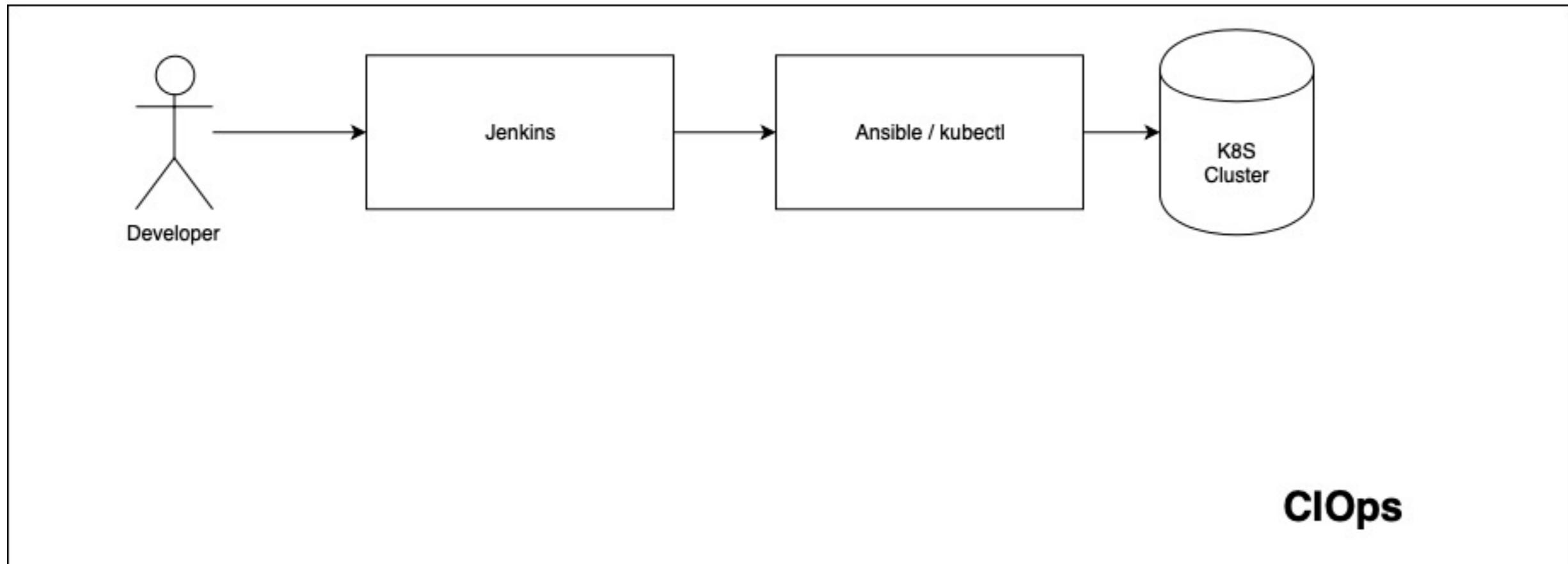
- ▶ Physical servers
- ▶ KVM VMs
- ▶ Jenkins
- ▶ Ansible

# CI WITH JENKINS



# CD WITH JENKINS

- ▶ Also known as CIOps



# DARK SIDE OF JENKINS



# PLUGINS

- JSUnit plugin (jsunit): 1.6  
 LDAP Plugin (ldap): 1.15  
 xUnit plugin (xunit): 1.102  
 Pipeline (workflow-aggregator): 2.5  
 External Monitor Job Type Plugin (external-monitor-job): 1.7  
 Pipeline: Nodes and Processes (workflow-durable-task-step): 2.19  
 Ant Plugin (ant): 1.5  
 Windows Slaves Plugin (windows-slaves): 1.3.1  
 Green Balls (greenballs): 1.15  
 jQuery plugin (jquery): 1.11.2-0  
 Icon Shim Plugin (icon-shim): 2.0.3  
 NodeJS Plugin (nodejs): 1.2.4  
 Pipeline: Step API (workflow-step-api): 2.14  
 OWASP Markup Formatter Plugin (antisamy-markup-formatter): 1.5  
 Translation Assistance plugin (translation): 1.15  
 JUnit Plugin (junit): 1.20  
 SCM API Plugin (scm-api): 2.2.6  
 CVS Plug-in (cvs): 2.13  
 Mailer Plugin (mailer): 1.20  
 Matrix Authorization Strategy Plugin (matrix-auth): 2.1  
 Matrix Project Plugin (matrix-project): 1.12  
 Git plugin (git): 3.6.2  
 SSH Slaves plugin (ssh-slaves): 1.17  
 MapDB API Plugin (mapdb-api): 1.0.9.0  
 Gradle Plugin (gradle): 1.28  
 Subversion Plug-in (subversion): 2.7.2  
 PAM Authentication plugin (pam-auth): 1.3  
 Branch API Plugin (branch-api): 2.0.18  
 Script Security Plugin (script-security): 1.41  
 Pipeline: Job (workflow-job): 2.17  
 SSH Credentials Plugin (ssh-credentials): 1.13  
 Maven Integration plugin (maven-plugin): 3.1  
 Javadoc Plugin (javadoc): 1.4  
 Credentials Plugin (credentials): 2.1.16  
 Pipeline: API (workflow-api): 2.26  
 Pipeline: SCM Step (workflow-scm-step): 2.6  
 Durable Task Plugin (durable-task): 1.19  
 Pipeline: Supporting APIs (workflow-support): 2.18  
 JavaScript GUI Lib: ACE Editor bundle plugin (ace-editor): 1.1  
 JavaScript GUI Lib: jQuery bundles (jQuery and jQuery UI) plugin (jquery-detached): 1.2.1  
 Pipeline: Groovy (workflow-cps): 2.45  
 Git client plugin (git-client): 2.5.0
- Pipeline: Basic Steps (workflow-basic-steps): 2.6  
 Pipeline: Shared Groovy Libraries (workflow-cps-global-lib): 2.9  
 JavaScript GUI Lib: Moment.js bundle plugin (momentjs): 1.1.1  
 Pipeline: Multibranch (workflow-multibranch): 2.17  
 Pipeline: REST API Plugin (pipeline-rest-api): 2.9  
 Token Macro Plugin (token-macro): 2.1  
 Parameterized Trigger plugin (parameterized-trigger): 2.35.2  
 SonarQube Scanner for Jenkins (sonar): 2.6.1  
 Config File Provider Plugin (config-file-provider): 2.16.0  
 GitHub plugin (github): 1.28.1  
 Build Timeout (build-timeout): 1.19  
 Structs Plugin (structs): 1.14  
 Pipeline: Stage View Plugin (pipeline-stage-view): 2.9  
 Google Cloud Backup Plugin (google-cloud-backup): 0.6  
 Role-based Authorization Strategy (role-strategy): 2.6.1  
 Artifactory Plugin (artifactory): 2.14.0  
 user build vars plugin (build-user-vars-plugin): 1.5  
 bouncycastle API Plugin (bouncycastle-api): 2.16.2  
 Rebuilder (rebuild): 1.25  
 Environment Injector Plugin (envinject): 2.1  
 Build Pipeline Plugin (build-pipeline-plugin): 1.5.8  
 Plain Credentials Plugin (plain-credentials): 1.4  
 Folders Plugin (cloudbees-folder): 6.2.1  
 Ivy Plugin (ivy): 1.27.1  
 Dashboard View (dashboard-view): 2.9.10  
 Conditional BuildStep (conditional-buildstep): 1.3.6  
 Workspace Cleanup Plugin (ws-cleanup): 0.34  
 Pipeline: Build Step (pipeline-build-step): 2.7  
 Display URL API (display-url-api): 2.0  
 GIT server Plugin (git-server): 1.7  
 JaCoCo plugin (jacoco): 2.2.1  
 Slack Notification Plugin (slack): 2.3  
 Run Condition Plugin (run-condition): 1.0  
 AnsiColor (ansicolor): 0.5.0  
 Pipeline: Stage Step (pipeline-stage-step): 2.3  
 Pipeline: Input Step (pipeline-input-step): 2.8  
 Hudson global-build-stats plugin (global-build-stats): 1.4  
 Delivery Pipeline Plugin (delivery-pipeline-plugin): 1.1.1  
 Deploy to container Plugin (deploy): 1.10  
 Cobertura Plugin (cobertura): 1.12  
 ThinBackup (thinBackup): 1.9  
 Multiple SCMs plugin (multiple-scms): 0.6  
 Performance Plugin (performance): 3.0

# MORE PLUGINS

Monitoring (monitoring): 1.67.0  
Job Configuration History Plugin (jobConfigHistory): 2.18  
Git Changelog (git-changelog): 1.52  
JavaScript GUI Lib: Handlebars bundle plugin (handlebars): 1.1.1  
Cucumber reports (cucumber-reports): 3.7.0  
SSH Agent Plugin (ssh-agent): 1.15  
Simple Parameterized Builds Report Plugin (simple-parameterized-builds-report): 1.5  
GitHub Pull Request Builder (ghprb): 1.39.0  
Confluence Publisher (confluence-publisher): 2.0.1  
Node and Label parameter plugin (nodelabelparameter): 1.7.2  
Project Build Times (project-build-times): 1.2.1  
Plugin Usage - Plugin (plugin-usage-plugin): 0.3  
Pipeline: Declarative Extension Points API (pipeline-model-extensions): 1.2.2  
Show Build Parameters plugin (show-build-parameters): 1.0  
Pipeline: Milestone Step (pipeline-milestone-step): 1.3.1  
HTML Publisher plugin (htmlpublisher): 1.14  
VncViewer Plugin (vncviewer): 1.5  
BlazeMeter plugin (BlazeMeterJenkinsPlugin): 3.0  
Build Timestamp Plugin (build-timestamp): 1.0.1  
Self-Organizing Swarm Plug-in Modules (swarm): 3.4  
Build Monitor View (build-monitor-plugin): 1.11+build.201701152243  
Docker Slaves Plugin (docker-slaves): 1.0.6  
nvm wrapper (nvm-wrapper): 0.1.2  
Pipeline: Stage Tags Metadata (pipeline-stage-tags-metadata): 1.2.7  
Checkstyle Plug-in (checkstyle): 3.50  
Docker Pipeline (docker-workflow): 1.13  
Variant Plugin (variant): 1.1  
Docker plugin (docker-plugin): 0.16.2  
Allure Jenkins Plugin (allure-jenkins-plugin): 2.18  
BrowserStack (browserstack-integration): 1.0.10  
Pipeline Graph Analysis Plugin (pipeline-graph-analysis): 1.5  
Jackson 2 API Plugin (jackson2-api): 2.7.3  
Lockable Resources plugin (lockable-resources): 2.0  
Xvnc plugin (xvnc): 1.24  
Authentication Tokens API Plugin (authentication-tokens): 1.3  
Docker Commons Plugin (docker-commons): 1.9  
Static Analysis Utilities (analysis-core): 1.95  
Pipeline: Declarative Agent API (pipeline-model-declarative-agent): 1.1.1  
Pipeline: Declarative (pipeline-model-definition): 1.2.2  
Throttle Concurrent Builds Plug-in (throttle-concurrents): 2.0.1  
CloudBees Docker Build and Publish plugin (docker-build-publish): 1.3.2  
CloudBees Docker Custom Build Environment Plugin (docker-custom-build-environment): 1.6.5  
Credentials Binding Plugin (credentials-binding): 1.13  
EnvInject API Plugin (envinject-api): 1.2  
Resource Disposer Plugin (resource-disposer): 0.6  
JSch dependency plugin (jsch): 0.1.54.2  
Pipeline: Model API (pipeline-model-api): 1.2.2  
GitHub API Plugin (github-api): 1.89  
description setter plugin (description-setter): 1.10  
built-on-column (built-on-column): 1.1  
Multijob plugin (jenkins-multijob-plugin): 1.27  
Copy Artifact Plugin (copyartifact): 1.38.1  
Command Agent Launcher Plugin (command-launcher): 1.1  
Pipeline Maven Integration Plugin (pipeline-maven): 3.4.1  
Kubernetes Credentials Plugin (kubernetes-credentials): 0.3.0  
Kubernetes plugin (kubernetes): 1.3.2  
Apache HttpComponents Client 4.x API Plugin (apache-httpcomponents-client-4-api): 4.5.3-2.1

# I LOVE JENKINS

- ▶ 42 Tabs
- ▶ 268 Jobs
- ▶ 142 Plugins

# JENKINS UI ROCKS

Screenshot of the Jenkins Dashboard showing a list of pipelines and their status.

**Pipeline Categories:**

- All
- Pipeline
- 'Pipeline
- Automated-Regression-Tests
- Backend
- Backend-Pipeline-Dev-Int
- Backend-Pipeline-Prod
- Page
- Pipeline
- Docker
- Microservices
- Contracts-Fetcher-Pipeline
- Offers-Generator-Pipeline
- Orchestrator-Pipeline
- Nginx-Pipeline
- Pipeline
- Service-Pipeline
- Pipeline
- Nightly-Jobs
- PROD
- Service-Pipeline
- Pipeline Orchestrator
- Pipeline-Orchestrator-Delivery
- Pipelines
- React
- React-Monitor
- React-Prod-Pipeline
- SEARCH
- SUPPLY
- Dashboard-Pipeline

**Recent Pipeline Activity:**

S	W	Name	Last Success	Last Failure	Last Duration
1		<a href="#">2. React-Deploy-Integration</a>	22 hr - #1028	11 days - #1012	1 min 24 sec
2		<a href="#">3. React-Acceptance-Tests-Integration</a>	22 hr - #1015	1 mo 8 days - #964	15 min
3		<a href="#">5. React-Smoke-Tests-Stage</a>	22 hr - #434	3 days 20 hr - #424	9 min 35 sec
4		<a href="#">Analytics Python</a>	6 mo 10 days - #35	6 mo 16 days - #32	38 sec
5		<a href="#">Analytics-Alan-Release-Development</a>	1 yr 3 mo - #6	1 yr 3 mo - #3	25 sec
6		<a href="#">Branch-Release-Development</a>	N/A	7 mo 6 days - #1	9.2 sec
7		<a href="#">Build-And-Test</a>	2 days 1 hr - #435	17 days - #413	2 min 49 sec
8		<a href="#">Build-Branch</a>	5 mo 27 days - #4	N/A	40 sec
9		<a href="#">Development</a>	2 days 0 hr - #312	1 mo 5 days - #282	8.8 sec
10		<a href="#">Release-To-Production</a>	2 days 0 hr - #200	3 mo 4 days - #149	1 min 0 sec
11		<a href="#">Ansible</a>	17 hr - #1984	18 hr - #1982	1 min 27 sec
12		<a href="#">Ansible-Application</a>	11 hr - #2889	3 days 19 hr - #2854	22 sec
13		<a href="#">Ansible-Skip-Tags</a>	N/A	6 mo 16 days - #2	2 min 27 sec
14		<a href="#">Archaius-Configuration-Cloud</a>	7 mo 16 days - #5	N/A	42 sec
15		<a href="#">Archaius-Configuration-Integration</a>	7 mo 15 days - #2	7 mo 16 days - #1	19 sec
16		<a href="#">Archaius-Configuration-Limited</a>	23 hr - #340	N/A	44 sec
17		<a href="#">Archaius-Configuration-Poll</a>	1 hr 26 min - #588	N/A	2 sec
18		<a href="#">Archaius-Configuration-Production</a>	1 hr 26 min - #671	1 day 22 hr - #662	52 sec
19		<a href="#">Archaius-Configuration-Production-Limited</a>	N/A	N/A	N/A

**Build Queue:** No builds in the queue.

**Build Executor Status:**

master	Idle
1	Idle
2	Idle
3	Idle
4	Idle
5	Idle
6	Idle
7	Idle
8	Idle
9	Idle
10	Idle
11	Idle
12	Idle
13 Ansible	#1992
14 PROD-Search-Sanity-Checks	#95100
15 smart_dockerslave_provisioner	#2148

# ENTROPY FEST



Photo by [Kalle Kortelainen](#) on [Unsplash](#)

# CLOUD NATIVE ERA



Photo by [Samuel Zeller](#) on [Unsplash](#)

# CI/CD GOALS

- ▶ Full audit trail

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# GITOPS IS THE ANSWER

- ▶ Full audit trail
- ▶ Everything as code
- ▶ No cap on concurrency and parallelism
- ▶ Minimise configurational drift
- ▶ Don't give CI/CD a wildcard access to your environments

# POOR MAN'S GITOPS

- ▶ while true
- ▶ git pull flux
- ▶ kubectl apply -f
- ▶ sleep 30

# BETTER GITOPS

<https://github.com/weaveworks/flux>



# CLOUD NATIVE CI

- ▶ Google Cloud Build

# CLOUD NATIVE CI

- ▶ Google Cloud Build
- ▶ Minimalistic

# CLOUD NATIVE CI

- ▶ Google Cloud Build
- ▶ Minimalistic
- ▶ Unlimited parallel builds

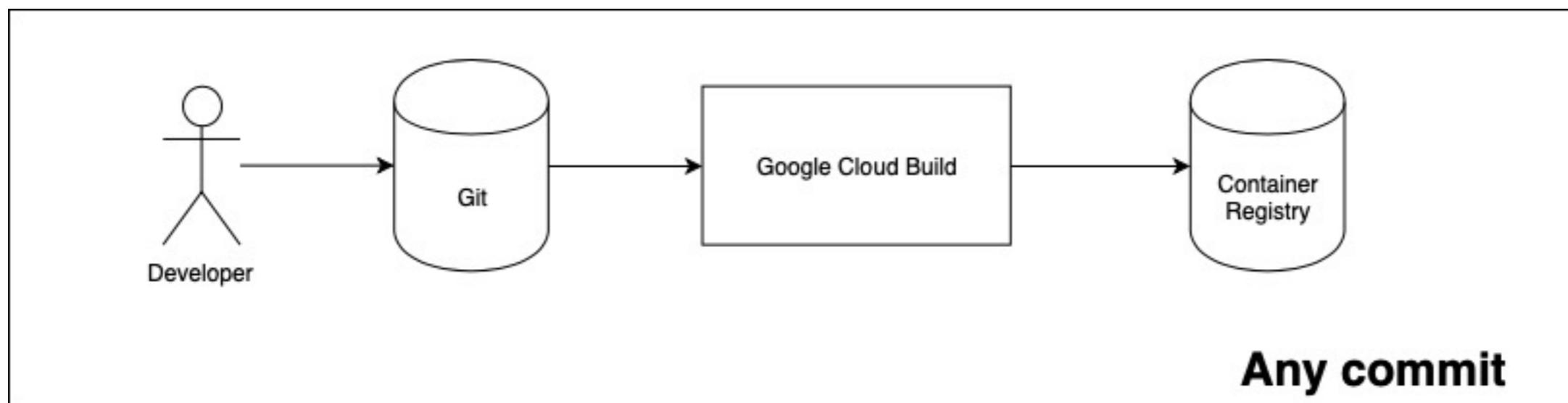
# CLOUD NATIVE CI

- ▶ Google Cloud Build
  - ▶ Minimalistic
  - ▶ Unlimited parallel builds
  - ▶ Declarative

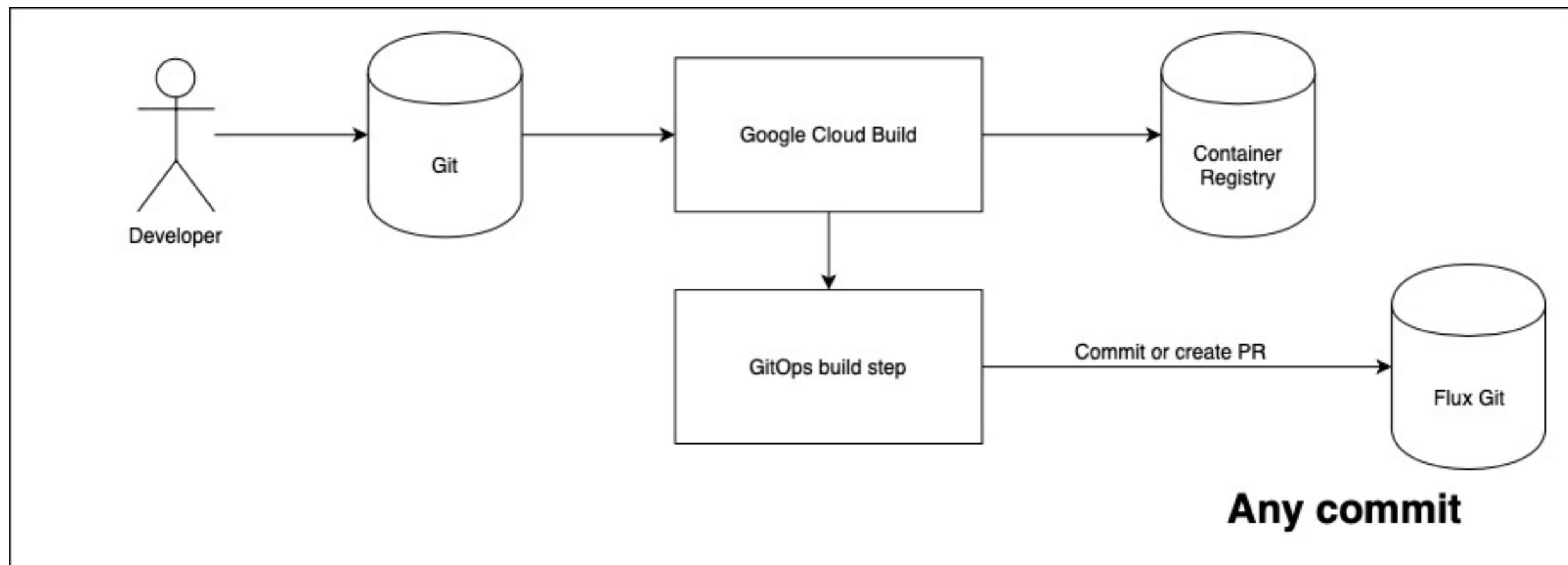
# CLOUD NATIVE CI

```
1 steps:
2   - name: gcr.io/cloud-builders/gradle
3     args: [ './gradlew', 'clean', 'build', 'sonarqube', 'artifactoryPublish' ]
4     secretEnv: [ 'GITHUB_SECRET', 'SONAR_SECRET', 'ARTIFACTORY_SECRET' ]
5     env: [ 'BRANCH_NAME=$BRANCH_NAME', 'SHORT_SHA=$SHORT_SHA' ]
6
7   - name: eu.gcr.io/project-name/gitops:hash
8     args: [ "$BRANCH_NAME", "$SHORT_SHA", "master", "flux", "${_IMAGE}", "${_IMAGE}/deployment.yaml", "0" ]
9     secretEnv: [ 'GITHUB_TOKEN' ]
10
11 tags: [ 'your-best-app' ]
12 substitutions:
13   _IMAGE: your-best-app
```

# CLOUD NATIVE CI - IN THEORY



# CLOUD NATIVE CI - IN PRACTICE



# GITOPS BUILD STEP

2 2 deploy/flux-deployment.yaml 

@@ -64,7 +64,7 @@ spec:

```
64 64      # There are no ":latest" images for flux. Find the most recent
65 65      # release or image version at https://hub.docker.com/r/fluxcd/flux/tags
66 66      # and replace the tag here.
67 -     image: docker.io/fluxcd/flux:1.14.2
67 +     image: docker.io/fluxcd/flux:1.15.0
68 68      imagePullPolicy: IfNotPresent
69 69      resources:
70 70      requests:
```

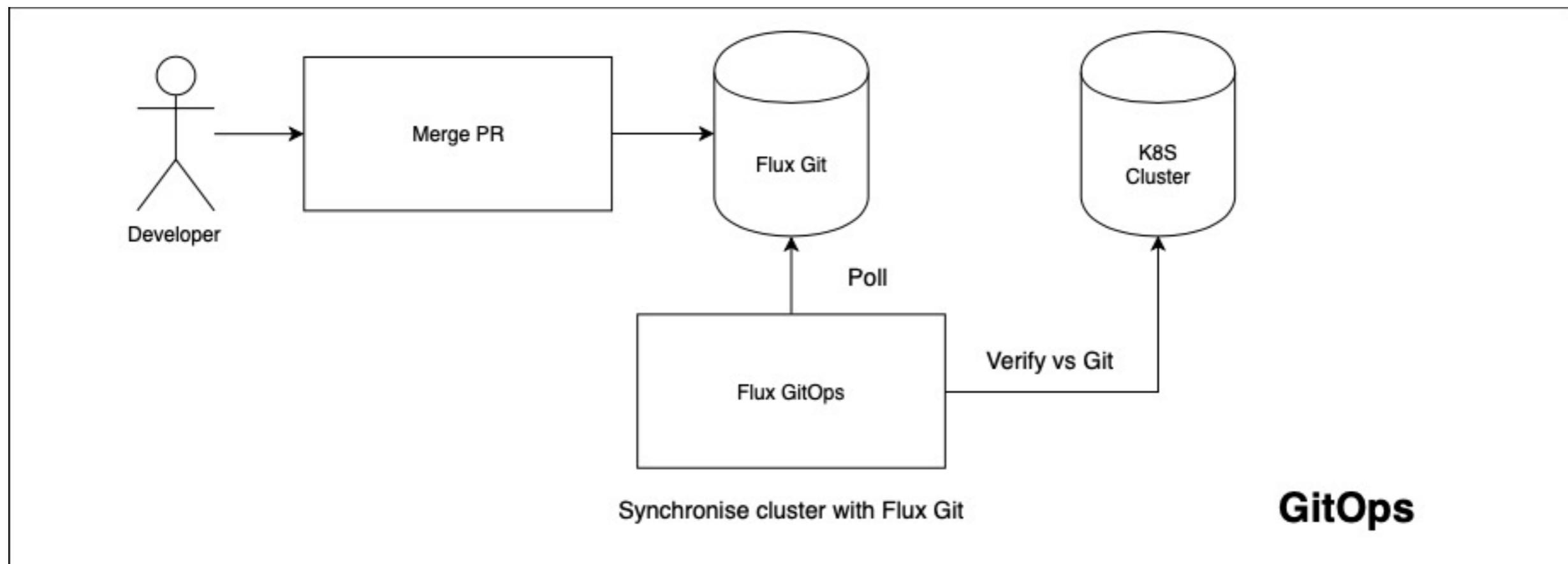


# GITOPS BUILD STEP

- ▶ Use **git**, **hub** (GitHub's CLI), **yq** (jq for YAML)
- ▶ Check out GitOps repo with **git**
- ▶ Make a branch
- ▶ Update image version using **yq**
- ▶ Commit changes
- ▶ Push branch
- ▶ Create a PR with **hub**

<https://github.com/github/hub/releases/>  
<https://github.com/mikefarah/yq/releases/>

# CLOUD NATIVE CD



# GITOPS IS THE ANSWER

- ▶ Full audit trail
- ▶ Everything as code
- ▶ No cap on concurrency and parallelism
- ▶ Minimise configurational drift
- ▶ Don't give CI/CD a wildcard access to your environments

# WHY BOTHER?

- ▶ Best practices

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- ▶ Best practices
- ▶ Developer friendly

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- ▶ Best practices
- ▶ Developer friendly
- ▶ Quick to try

# ANY DOWNSIDES?

- ▶ The incident



# ANY DOWNSIDES?

- ▶ The incident



- ▶ Broken YAML manifests upset GitOps

# LOVEHOLIDAYS + GITOPS

► 25,736

# LOVEHOLIDAYS + GITOPS

- ▶ 25,736
- ▶ GitHub vs kubectl

# FUTURE OF GITOPS AT LOVEHOLIDAYS

- ▶ Istio for canary and continuous deployments

# HOW TO START

<https://github.com/weaveworks/flux>

<https://www.weave.works/blog/gitops-is-cloud-native>

alternatives:

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

<https://razee.io>

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# QUESTIONS?

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