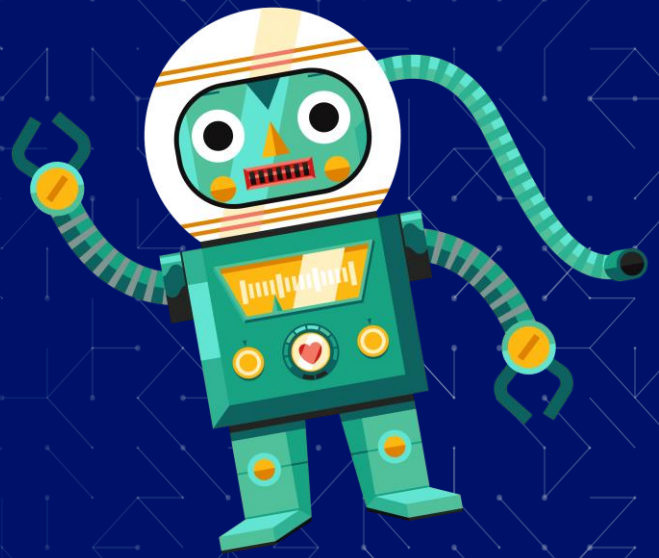


TECHORAMA

Geert Baeke
@geertbaeke

TECHORAMA

GitOps on AKS and Arc-enabled Kubernetes

Who Am I?

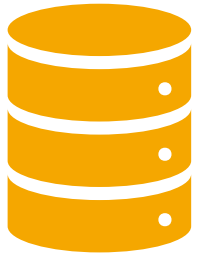
- Geert Baeke
  - Microsoft Incubation @ Cronos
  - Cloud-native architect
  - Technical Lead
- Follow me on:

@geertbaeke

https://www.linkedin.com/in/geertbaeke/

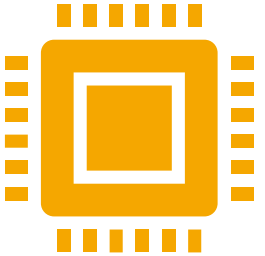
https://www.youtube.com/geertbaeke

GitOps with Kubernetes



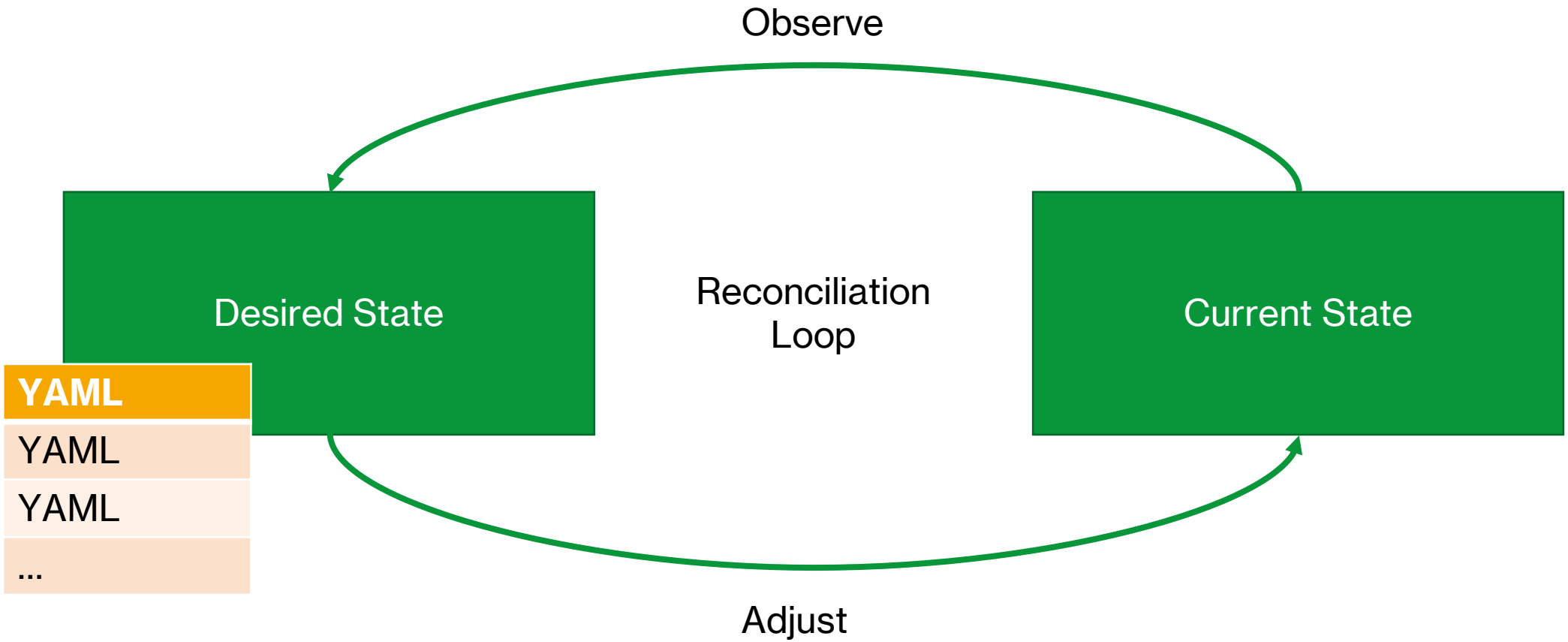
Kubernetes

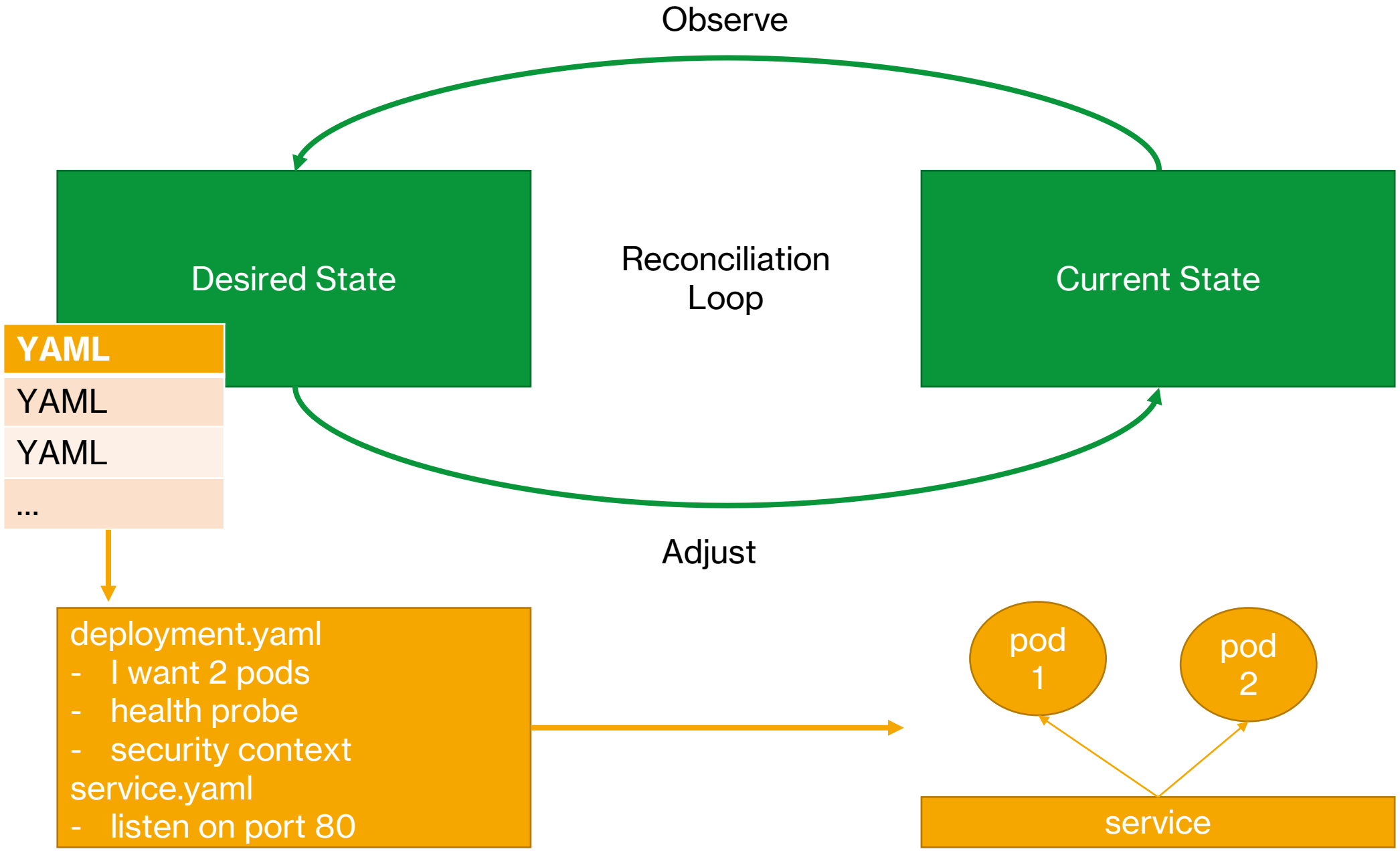
Open-source platform to orchestrate container operations

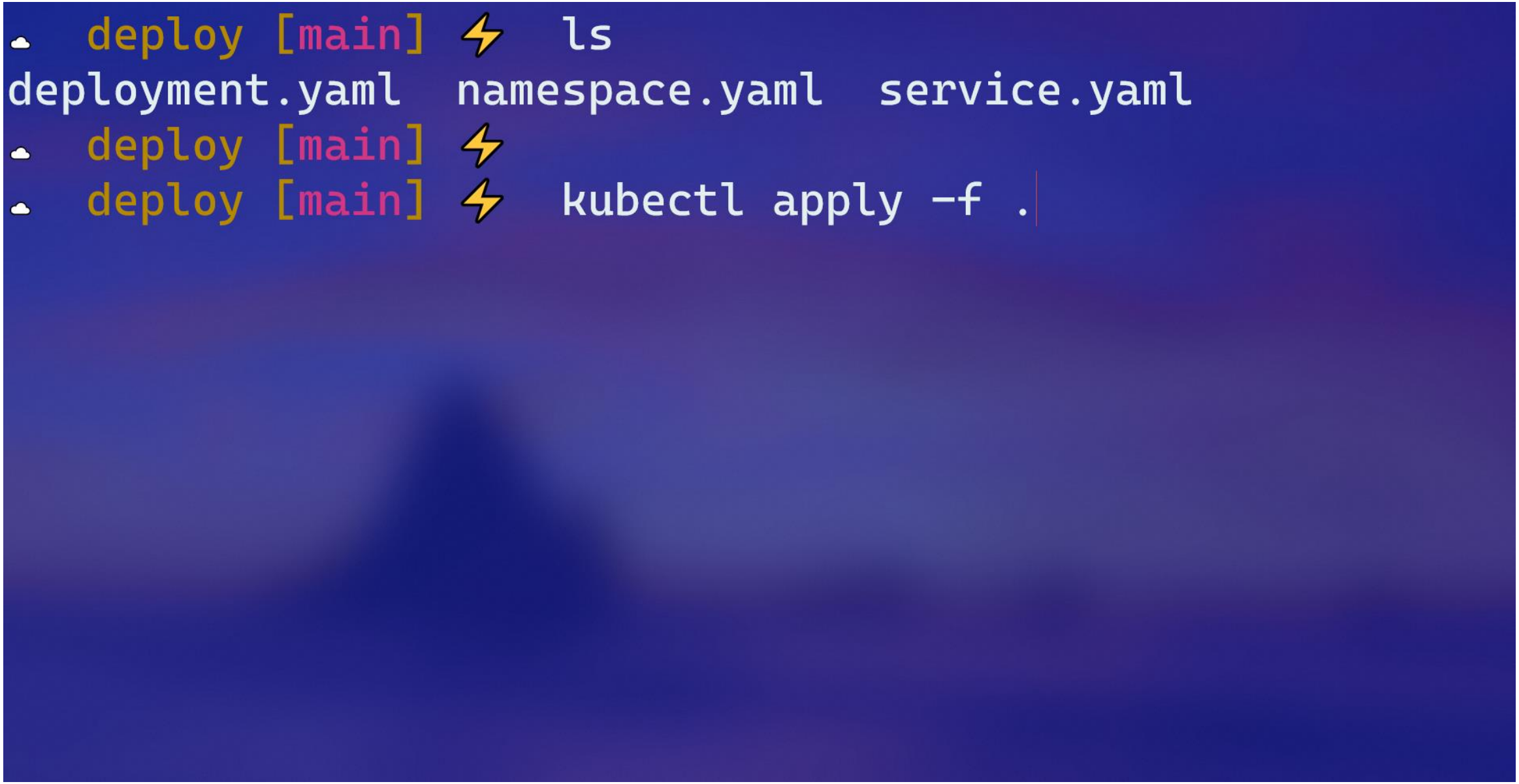


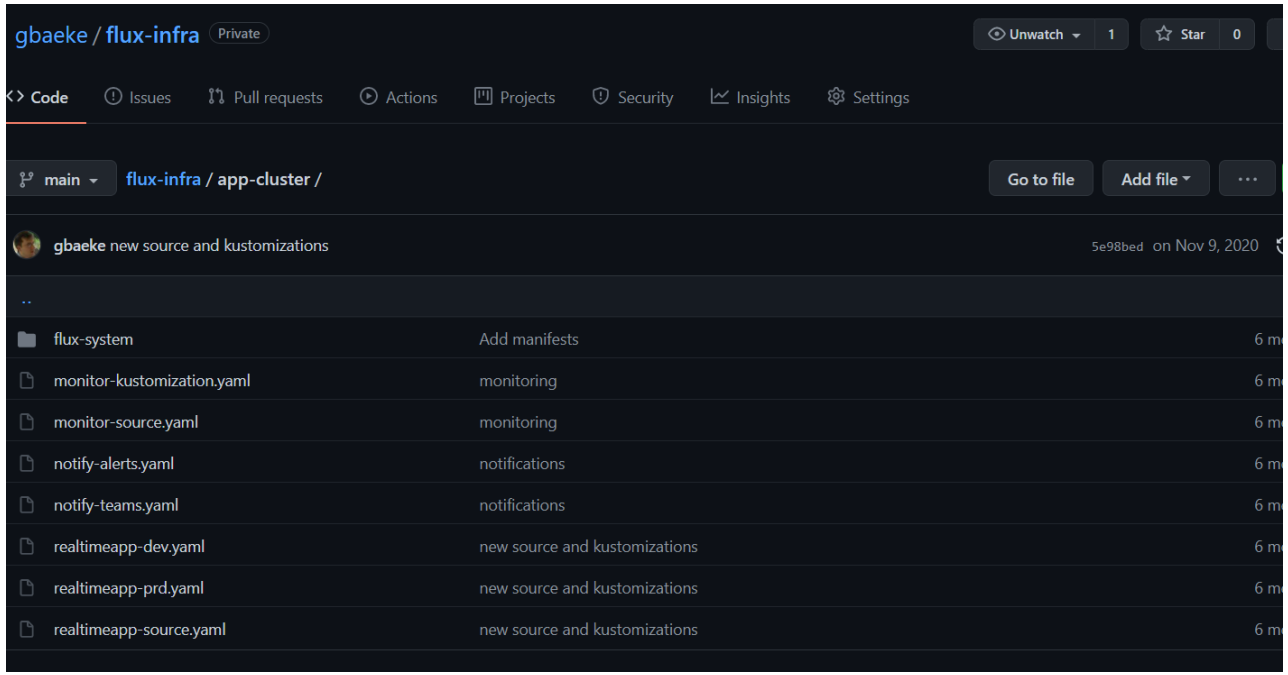
Git

Version control system originally developed by Linus Torvalds

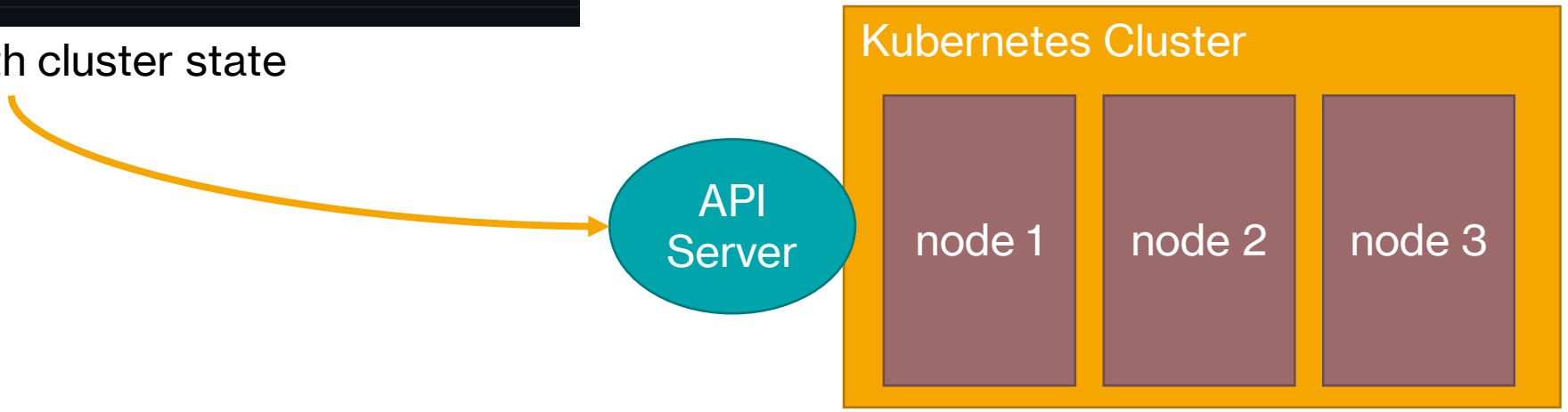

Observe
Desired State
Reconciliation
Loop
Current State
YAML
YAML
YAML
...
Adjust


Observe
Desired State
Reconciliation Loop
Current State
YAML
YAML
YAML
...
Adjust
deployment.yaml
- I want 2 pods
- health probe
- security context
service.yaml
- listen on port 80
pod 1
pod 2
service

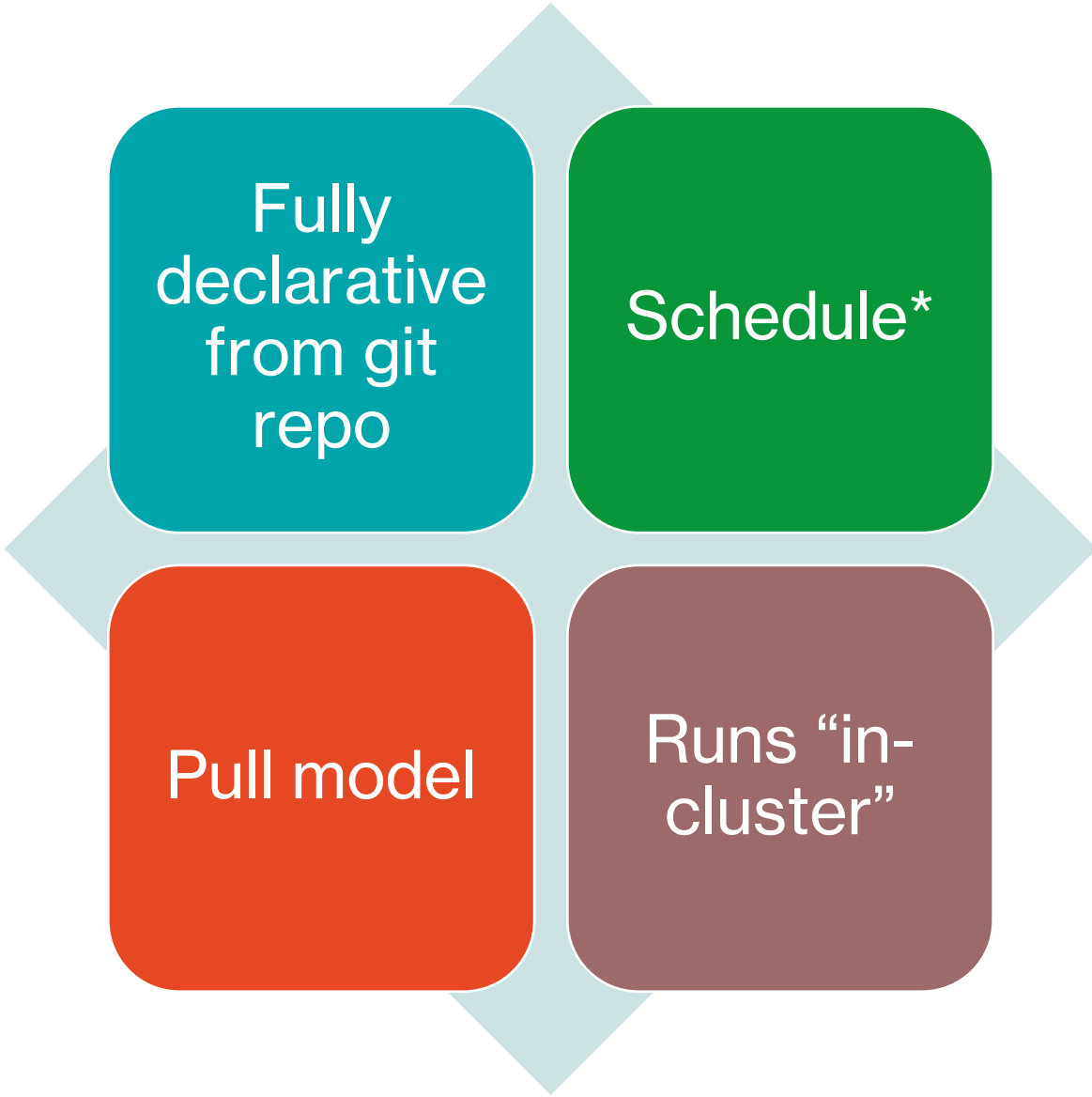

deploy [main]
ls
deployment.yaml namespace.yaml service.yaml
deploy [main]
deploy [main]
kubectl apply -f .



repository with cluster state

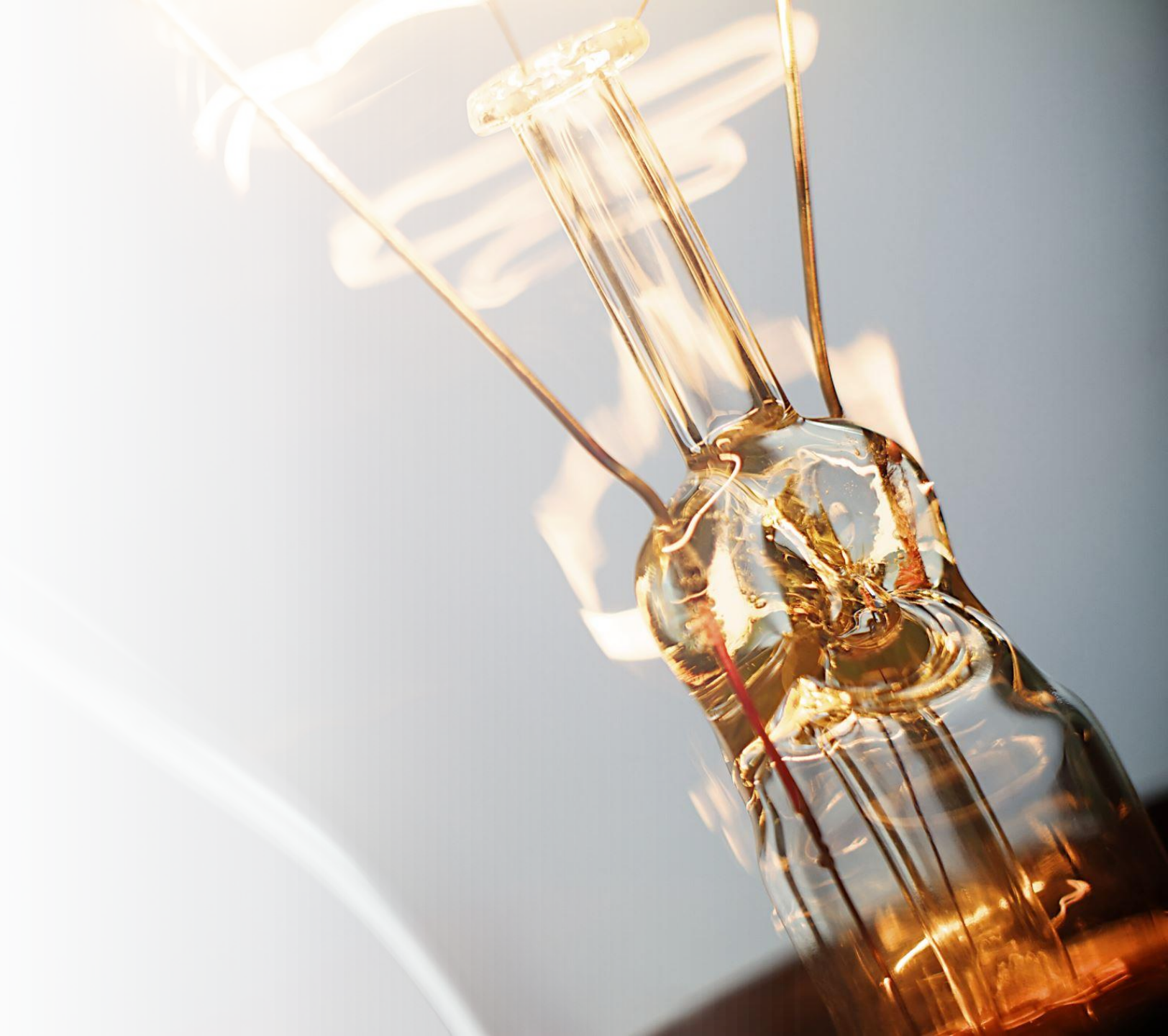


Deployment with GitOps



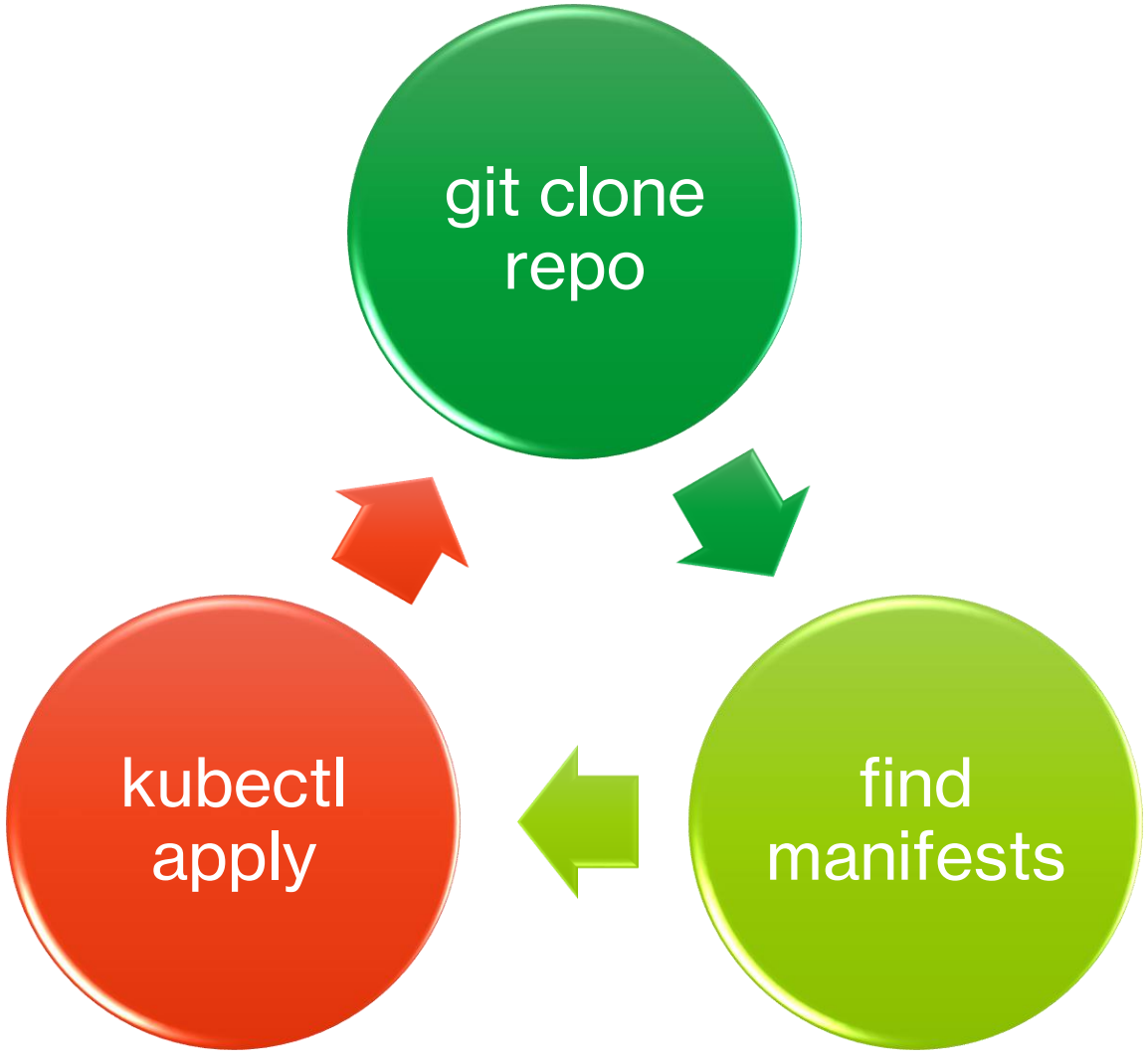
Use the full power of Git

- Pull requests
- Code reviews and approvals
- Static code analysis
- Policy verification
- Rollbacks



```yaml
- name: Validate yaml
  uses: stefanprodan/kube-tools@v1
  with:
    command: |
      kustomize build ./deploy | kubeval --strict

# run kyverno cli and use v1 instead of v1.0.0
- name: Validate policies
  uses: gbaeke/kyverno-action@v1
  with:
    command: |
      kyverno apply ./policies --resource=./deploy/deployment.yaml
```


git clone
repo
find
manifests
kubectl
apply

We’re missing a few things here!

Pruning

Dependency management

Helm support

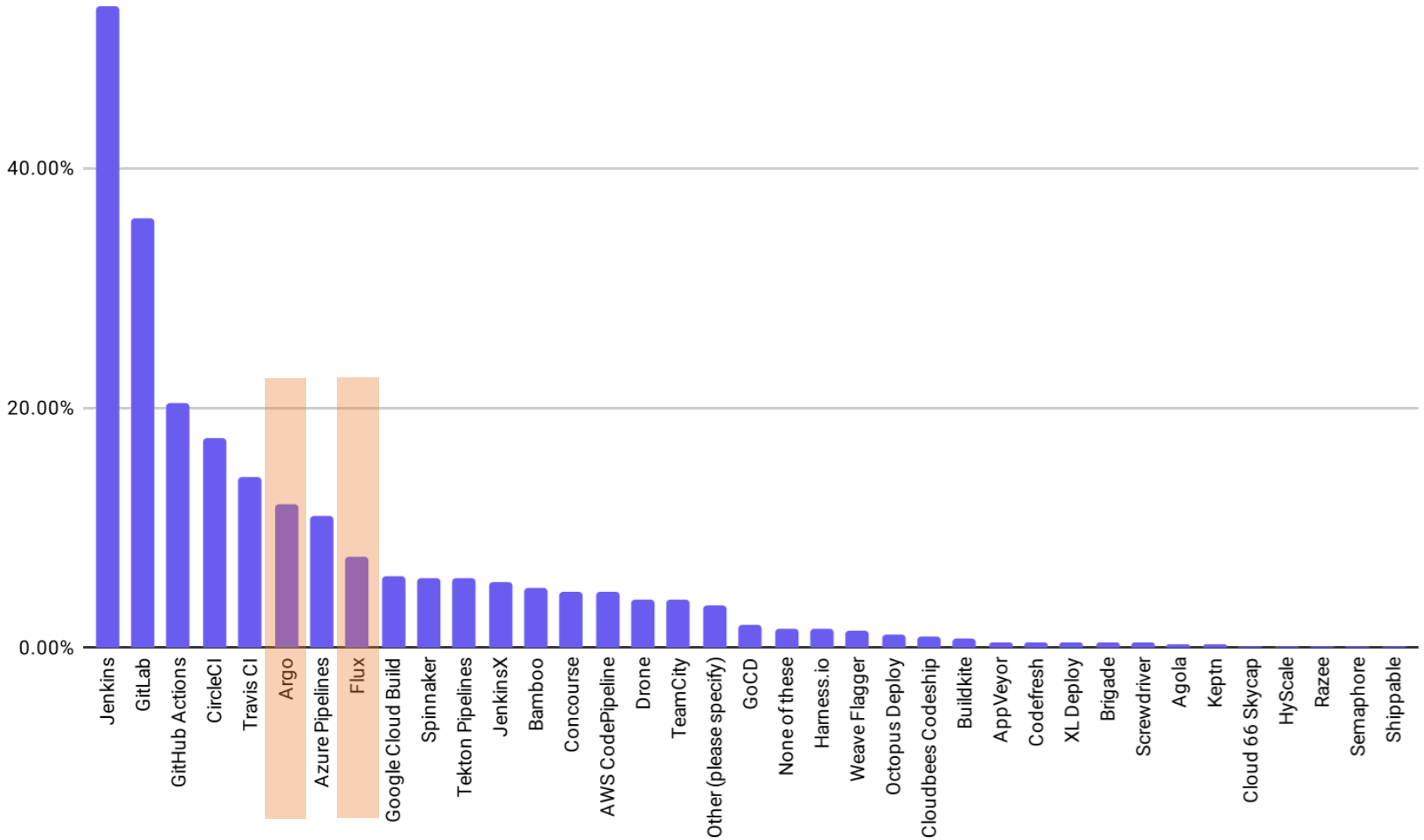
Logging, alerts and notifications

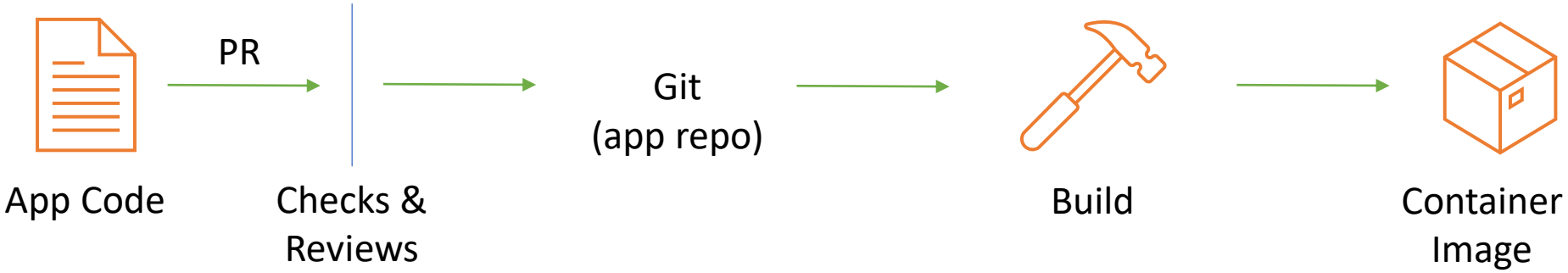
Automatic image updates

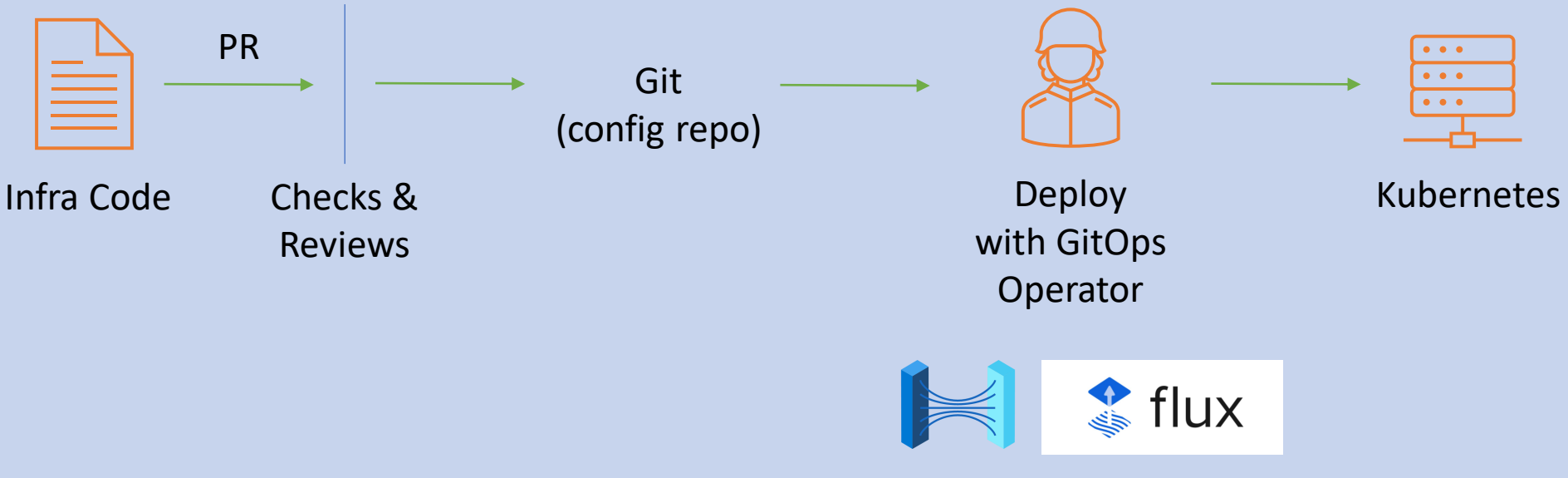
flux

GitOps Operators

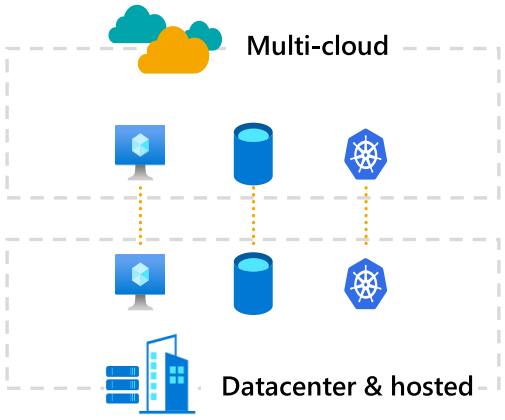
- Purpose-built
- Continuously running in your cluster
- Pull on schedule or triggered


40.00%
20.00%
0.00%
Jenkins
GitLab
GitHub Actions
CircleCI
Travis CI
Argo
Azure Pipelines
Flux
Google Cloud Build
Spinnaker
Tekton Pipelines
JenkinsX
Bamboo
Concourse
AWS CodePipeline
Drone
TeamCity
Other (please specify)
GoCD
None of these
Harness.io
Weave Flagger
Octopus Deploy
Cloudbees Codeship
Buildkite
AppVeyor
Codefresh
XL Deploy
Brigade
Screwdriver
Agola
Keptn
Cloud 66 Skycap
HyScale
Razee
Semaphore
Shippable


PR
App Code
Checks &
Reviews
Git
(app repo)
Build
Container
Image

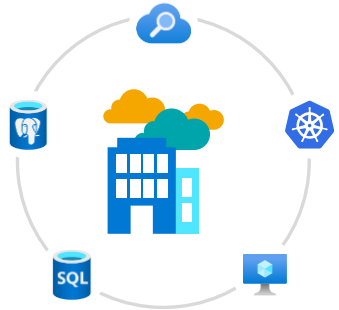

PR
Infra Code
Checks &
Reviews
Git
(config repo)
Deploy
with GitOps
Operator
Kubernetes
flux

Azure Arc



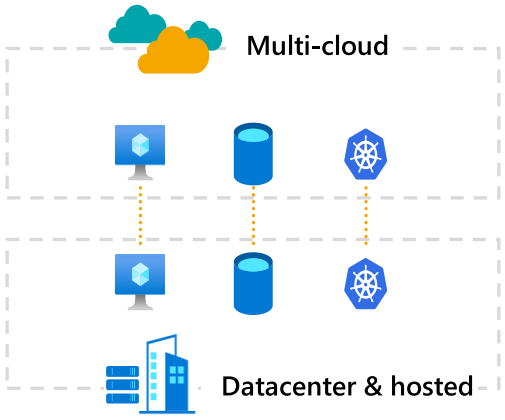
Organize and manage across environments

At-scale Kubernetes app management



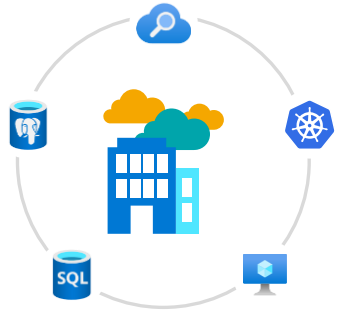
Run data services anywhere

Azure ~~Are~~ Everywhere 😊

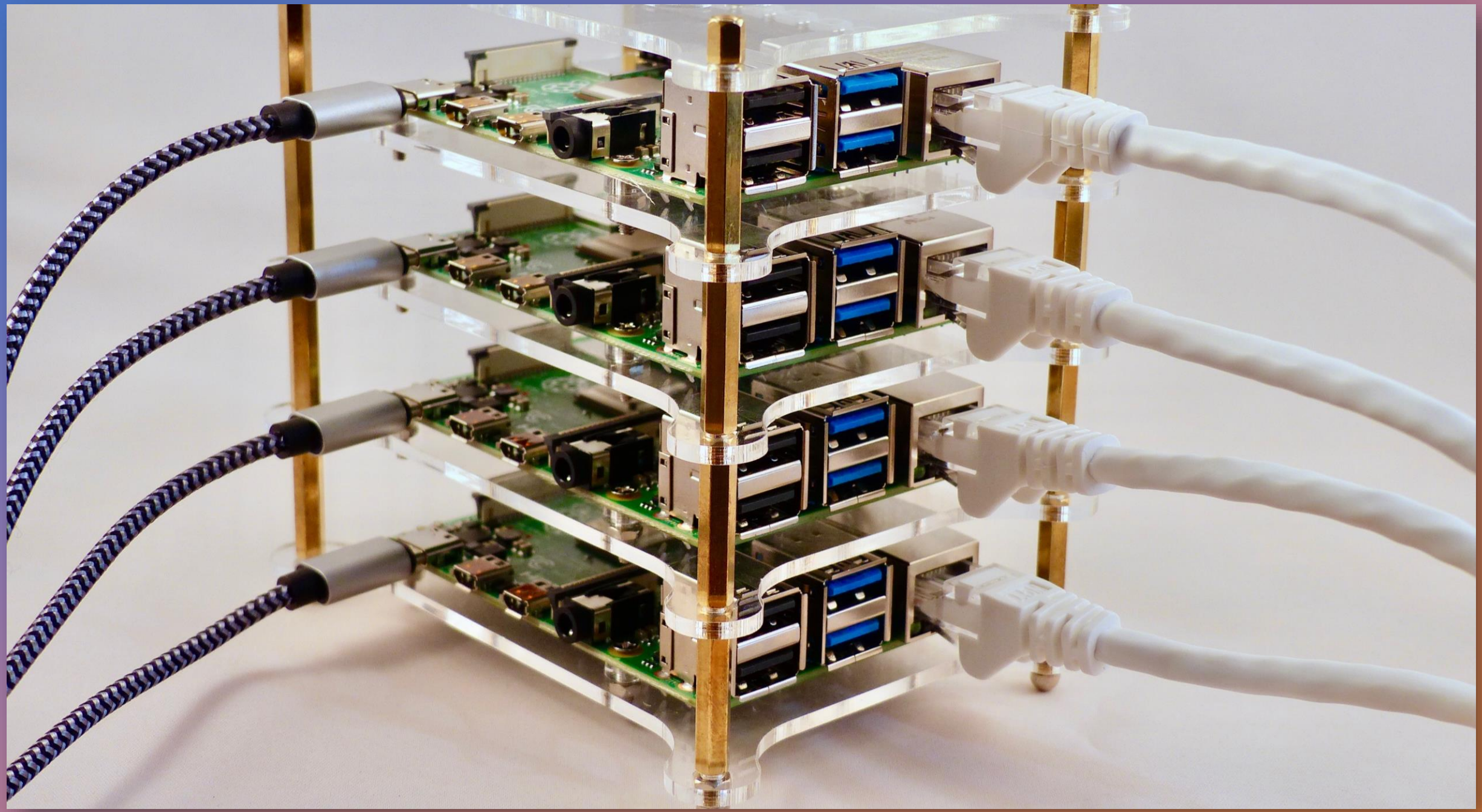


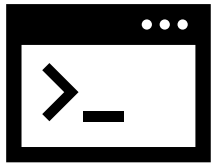
Organize and manage across environments

At-scale Kubernetes app management



Run data services anywhere





```
az connectedk8s connect --name arc-demo
--resource-group arc-demo --location westeurope
```

arc-demo-k3s | Insights (preview)

Kubernetes - Azure Arc

Search (Ctrl+/)

Refresh | View All Clusters | Recommended alerts (Preview) | View Workbooks | Help | Feedback

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Security (preview)

Settings

- Extensions (preview)
- GitOps
- Policies
- Properties
- Locks

Monitoring

- Insights (preview)
- Alerts
- Metrics
- Logs (preview)
- Workbooks (preview)

Automation

- Tasks (preview)
- Export template

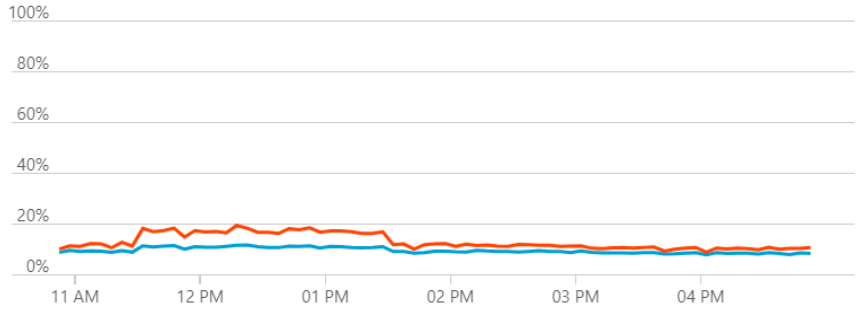
Time range = **Last 6 hours** | Add Filter

What's new | **Cluster** | Reports | Nodes | Controllers | Containers

Node CPU utilization %

5m granularity

Avg | Min | 50th | 90th | 95th | Max



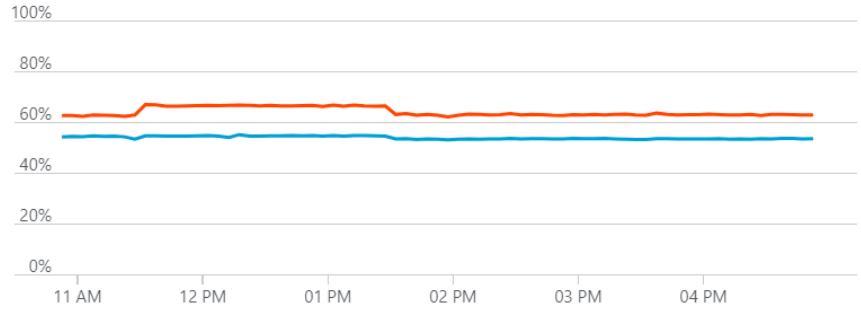
Average
arc-demo-k3s
9.62 %

Maximum
arc-demo-k3s
19.46 %

Node memory utilization %

5m granularity

Avg | Min | 50th | 90th | 95th | Max



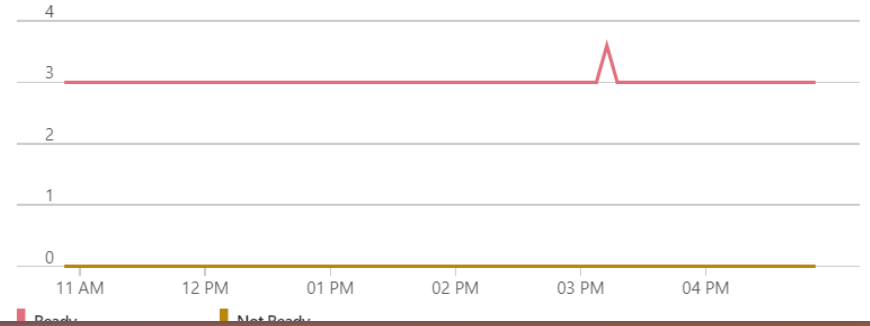
Average
arc-demo-k3s
54.04 %

Maximum
arc-demo-k3s
67.06 %

Node count

5m granularity

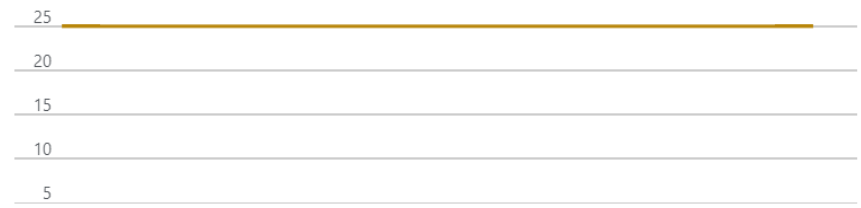
Total | Ready | Not Ready



Active pod count

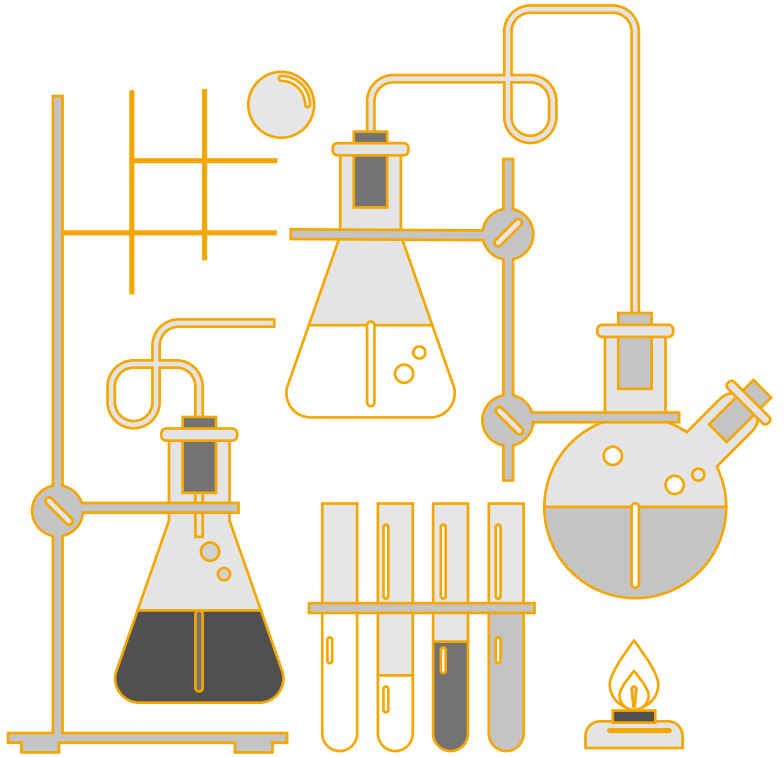
5m granularity

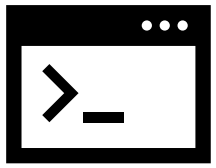
Total | Pending | Running | Unknown | Succeeded | Failed | Terminating



GitOps Configurations

- Configurations are ARM resources
- Deploys Flux operator
- Connection details to git repo
- Multiple configuration resources per cluster (one per namespace)

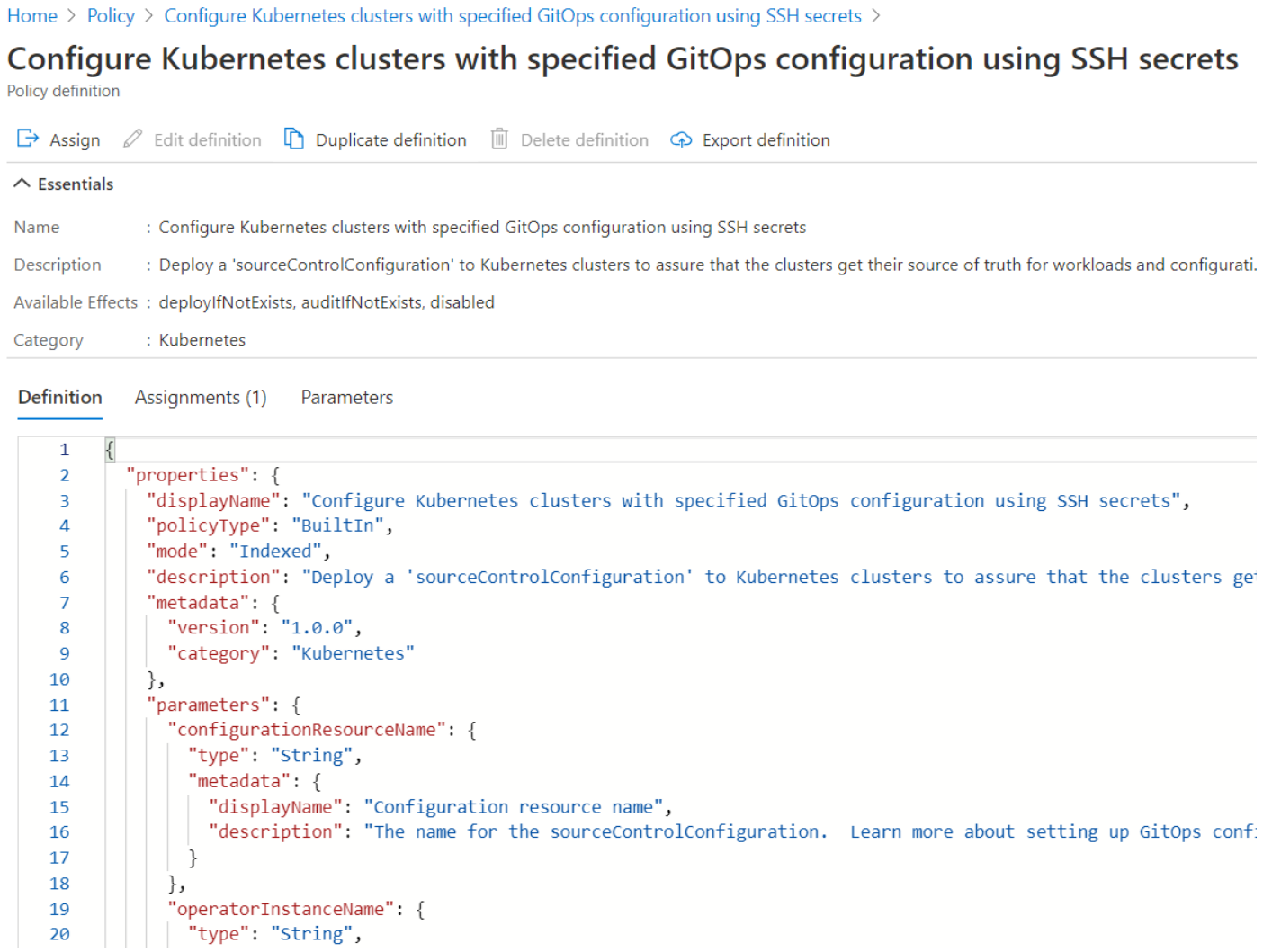




```
az k8s-configuration create --name cluster-config --cluster-name arc-demo-k3s --resource-group arc-demo --operator-instance-name flux …
```

Configurations and Azure Policy

- Apply configurations at scale
- Use HTTPS, SSH or no secrets
- Secrets retrieved from Key Vault



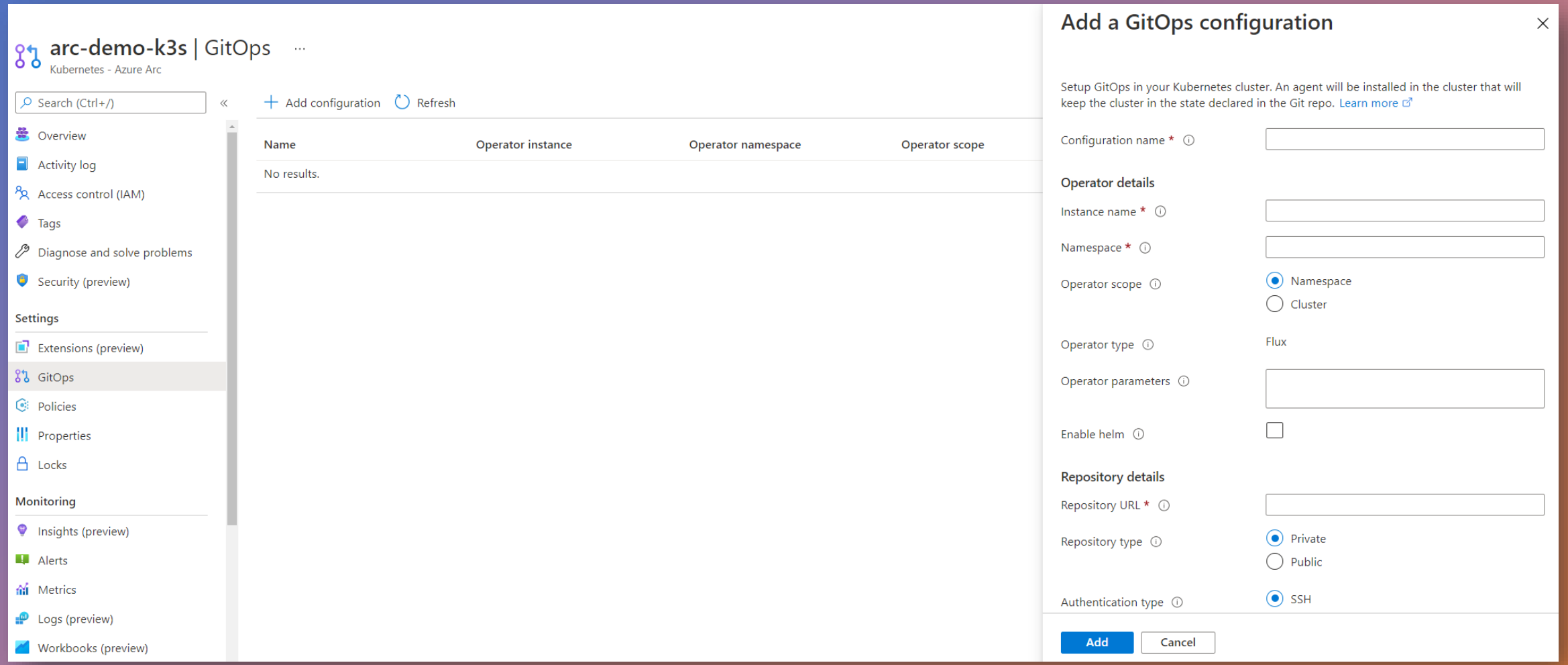
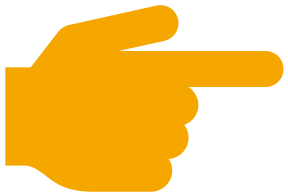

arc-demo-k3s | GitOps
Kubernetes - Azure Arc
Search (Ctrl+/)
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Security (preview)
Settings
Extensions (preview)
GitOps
Policies
Properties
Locks
Monitoring
Insights (preview)
Alerts
Metrics
Logs (preview)
Workbooks (preview)
Add configuration
Refresh
Name
Operator instance
Operator namespace
Operator scope
No results.
Add a GitOps configuration
Setup GitOps in your Kubernetes cluster. An agent will be installed in the cluster that will keep the cluster in the state declared in the Git repo. Learn more
Configuration name *
Operator details
Instance name *
Namespace *
Operator scope
Namespace
Cluster
Operator type
Flux
Operator parameters
Enable helm
Repository details
Repository URL *
Repository type
Private
Public
Authentication type
SSH
Add
Cancel

Image Updates



Update image in repo

Manual

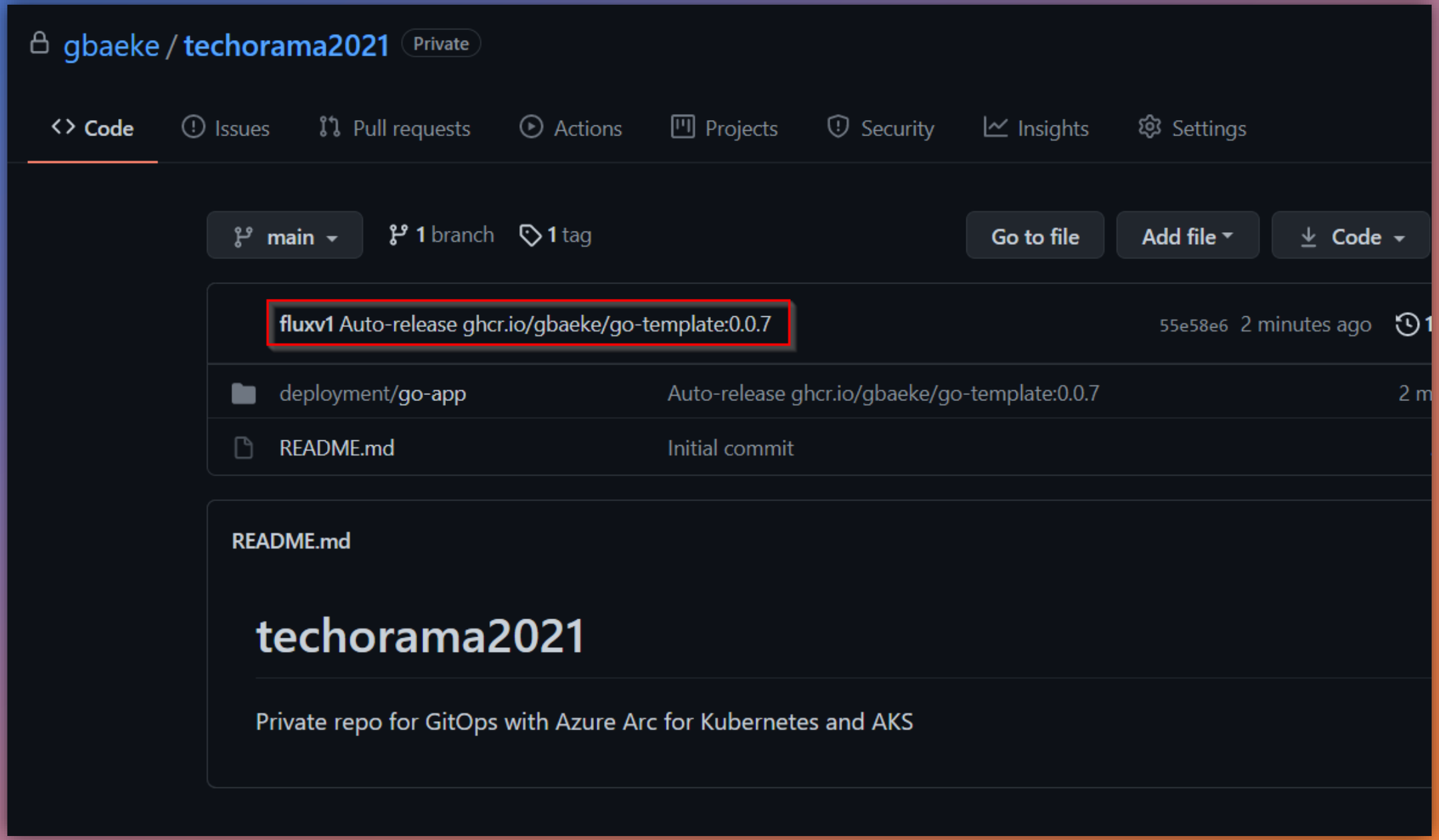
Automatic

Automatic image updating

Flux checks for new versions

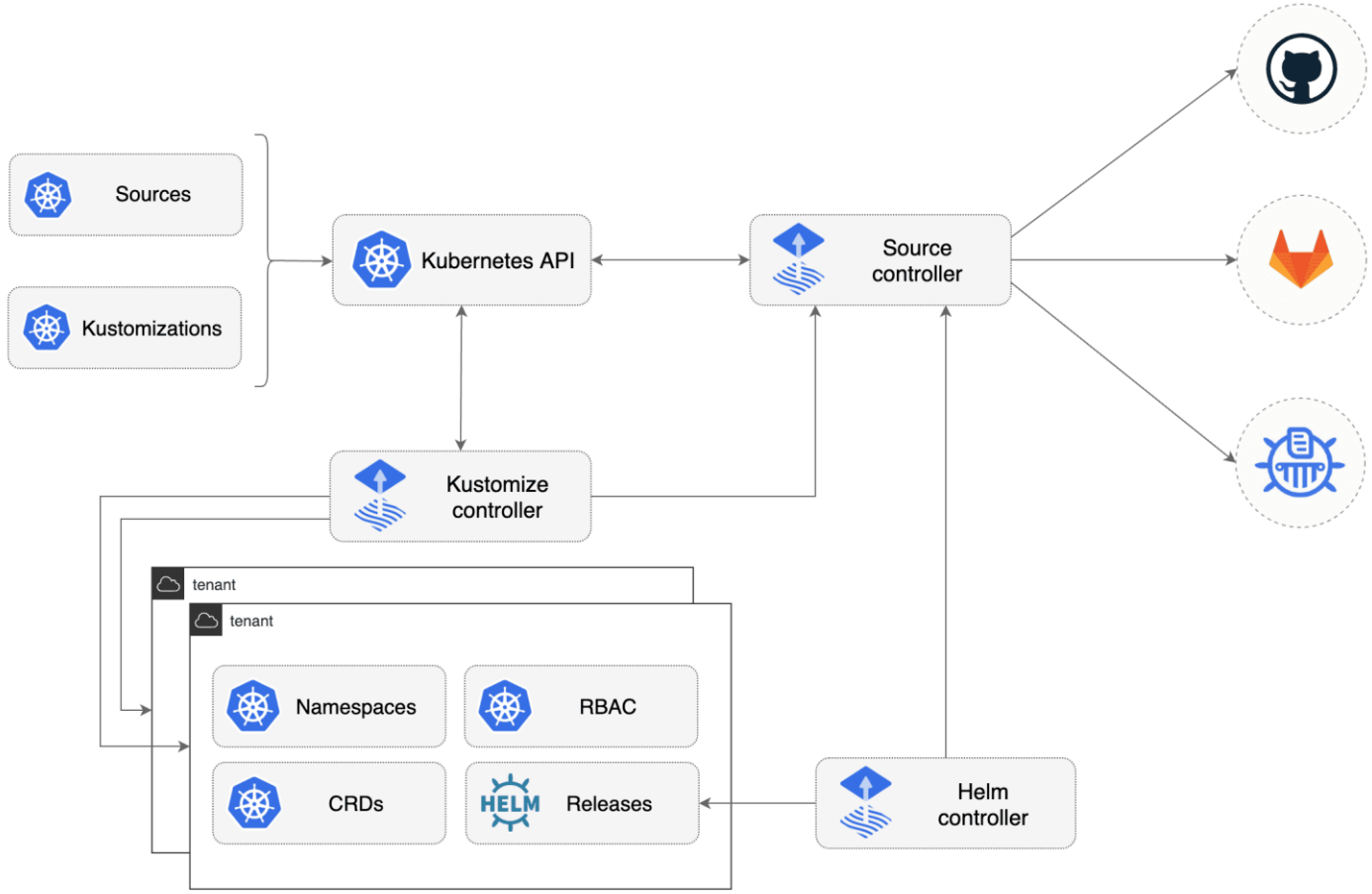
Flux modifies the version in the repository

Image update at next interval


gbaeke / techorama2021
Private
Code
Issues
Pull requests
Actions
Projects
Security
Insights
Settings
main
1 branch
1 tag
Go to file
Add file
Code
fluxv1 Auto-release ghcr.io/gbaeke/go-template:0.0.7
55e58e6 2 minutes ago
deployment/go-app
Auto-release ghcr.io/gbaeke/go-template:0.0.7
README.md
Initial commit
README.md
techorama2021
Private repo for GitOps with Azure Arc for Kubernetes and AKS

Flux v1

- Microsoft uses Flux v1 **currently**
- Flux v1 is in maintenance mode
- Newest version is Flux v2
- Flux v2 image automation in prerelease



Additional resources

- Flux v1 documentation: https://docs.fluxcd.io/en/1.22.2
- Flux v2 documentation: https://fluxcd.io/docs
- Flux v2 roadmap: https://fluxcd.io/docs/roadmap
- Weaveworks on YouTube: https://www.youtube.com/c/WeaveWorksInc

Geert Baeke
@geertbaeke

Thank You!!!