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CloudNativeCon

Europe 2021

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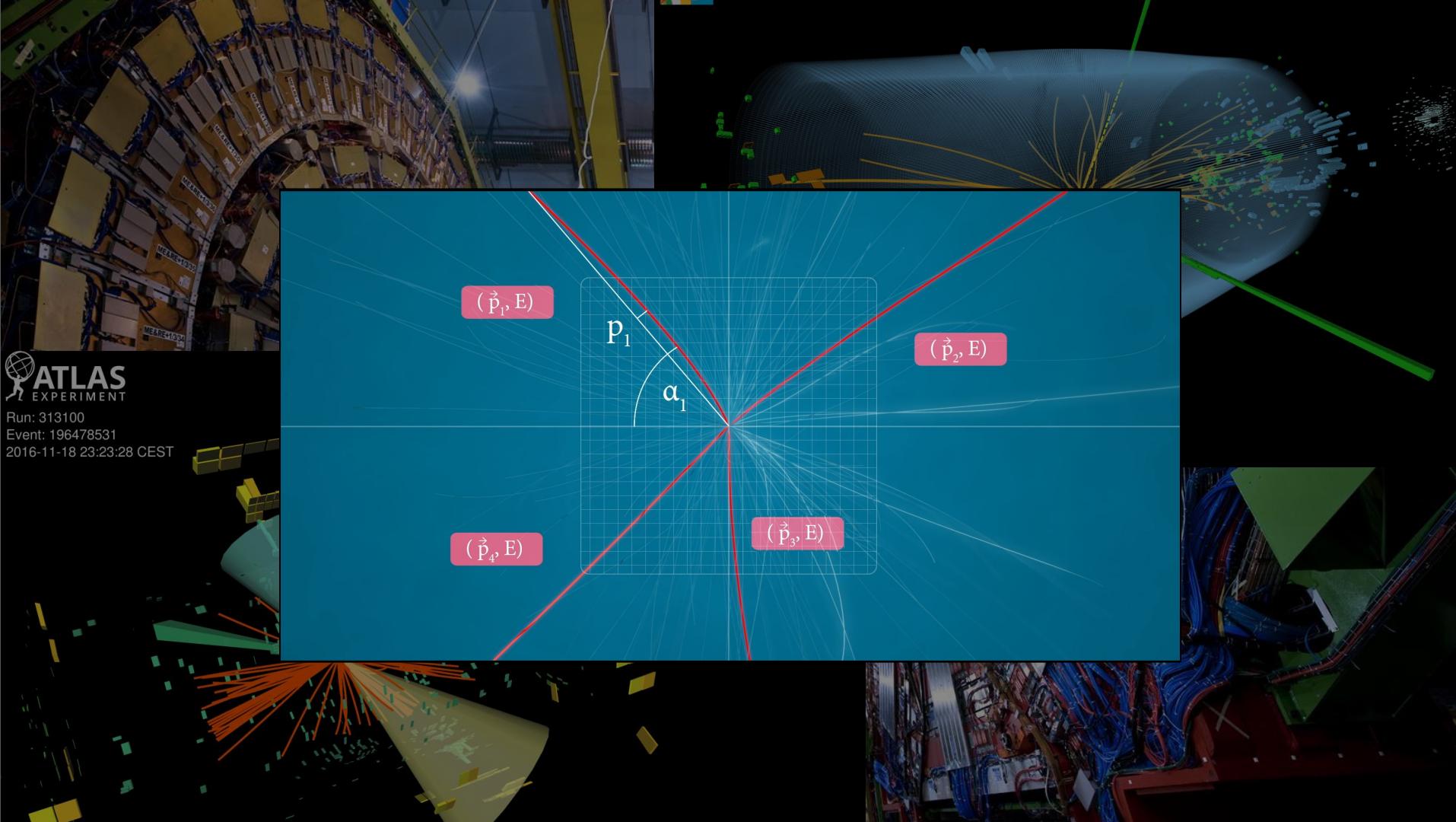
CERN's 1500 Drupal Sites on K8s

Sailing With Operators

Konstantinos Samaras-Tsakiris

Rajula Vineet Reddy





Charting the waters...



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- What kind of infrastructure are we building?
- **Operators** and how we use them
- Demo: upgrading websites with the operator
- What have we learnt?

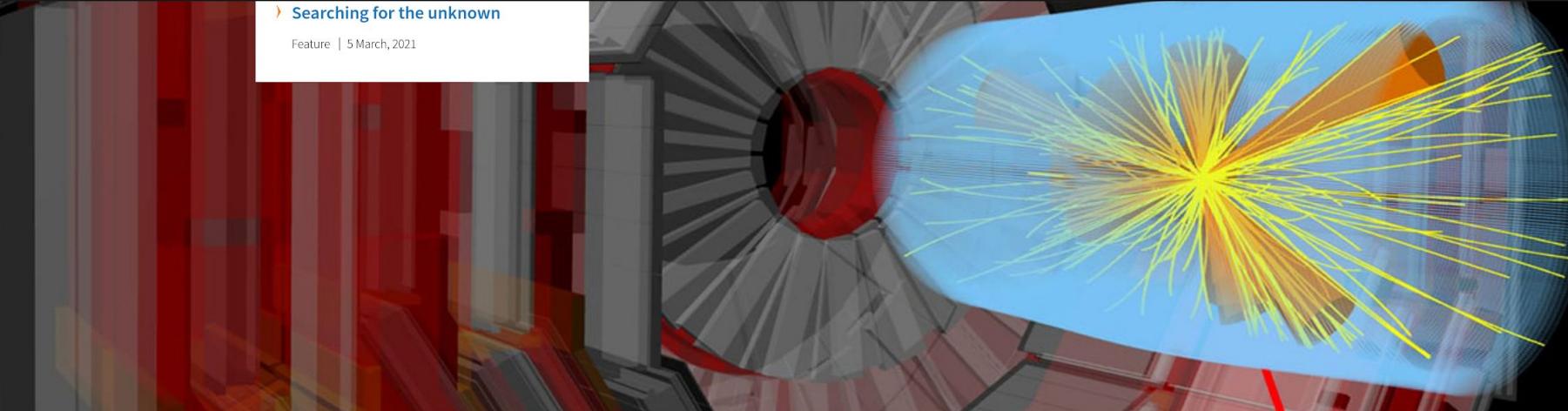
What infrastructure are we building?



CERN

Searching for the unknown

Feature | 5 March, 2021



LATEST NEWS



ALPHA cools antimatter using laser light for ...
Experiments | Press release | 31 March, 2021



ATLAS EXPERIMENT
ATLAS searches for pairs of Higgs bosons in a...
Physics | News | 30 March, 2021



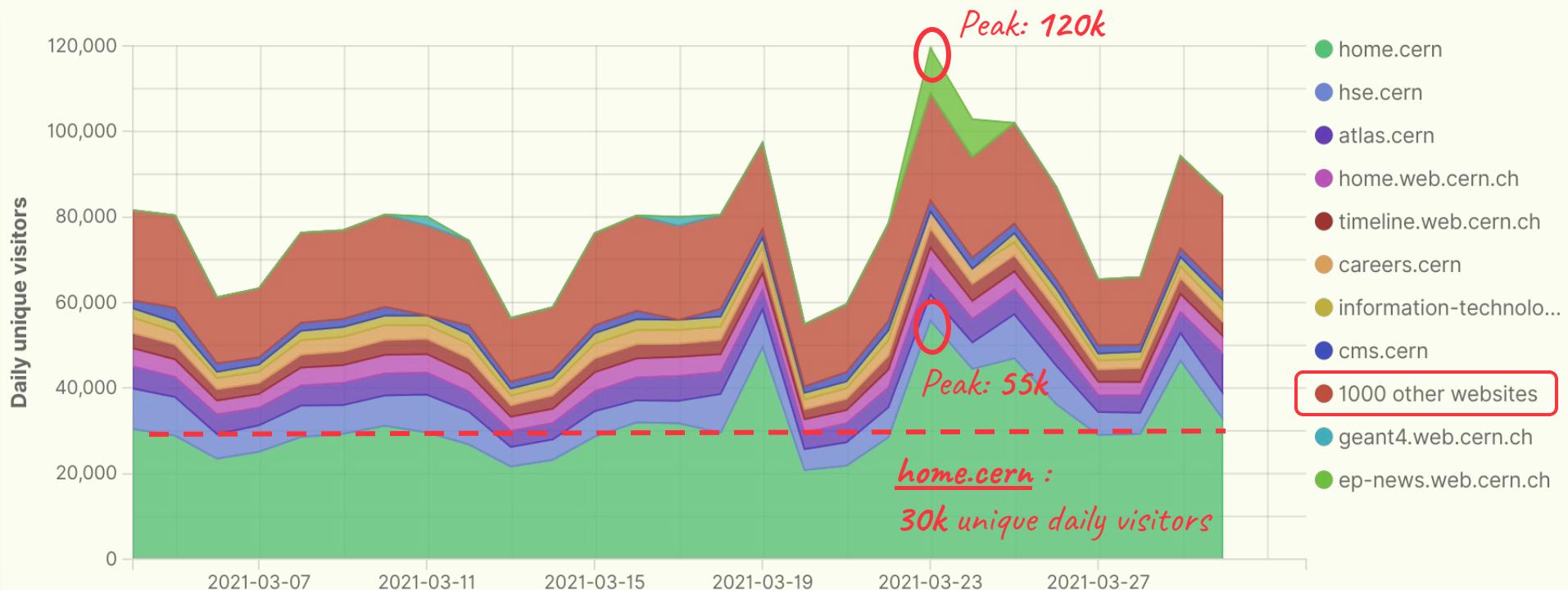
CERN approves two new experiments to transport...
Physics | News | 26 March, 2021

[View all news \)](#)

The goal is Public Outreach



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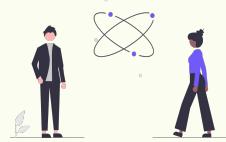


Drupal @ CERN



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Physicists



Administration



Drupal expert



Comms expert



Reliable hosting



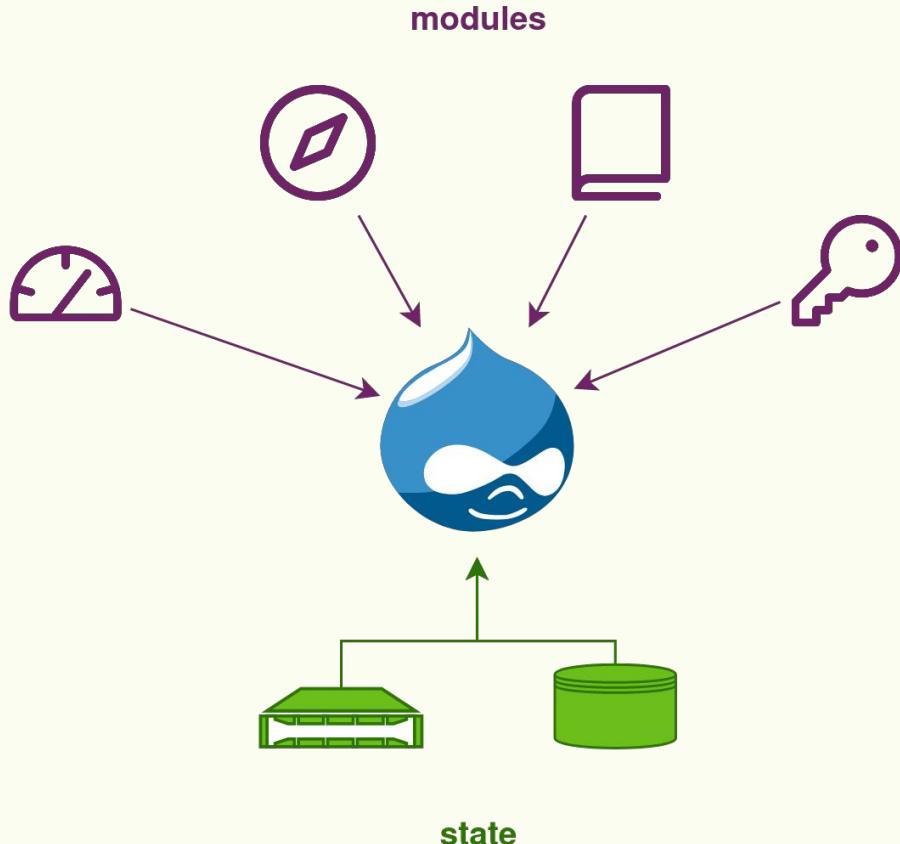
Custom modules & themes



Upgrades
Failure recovery

Not just hosting, but fully managed
Software as a Service

Parts of a Drupal site



Drupal SaaS is tough



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- Take **1500** instances of a complicated thing
- Automate business/operational logic
- Let users **self-provision** websites
- All this with a very small team!



Drupal sites on K8s!

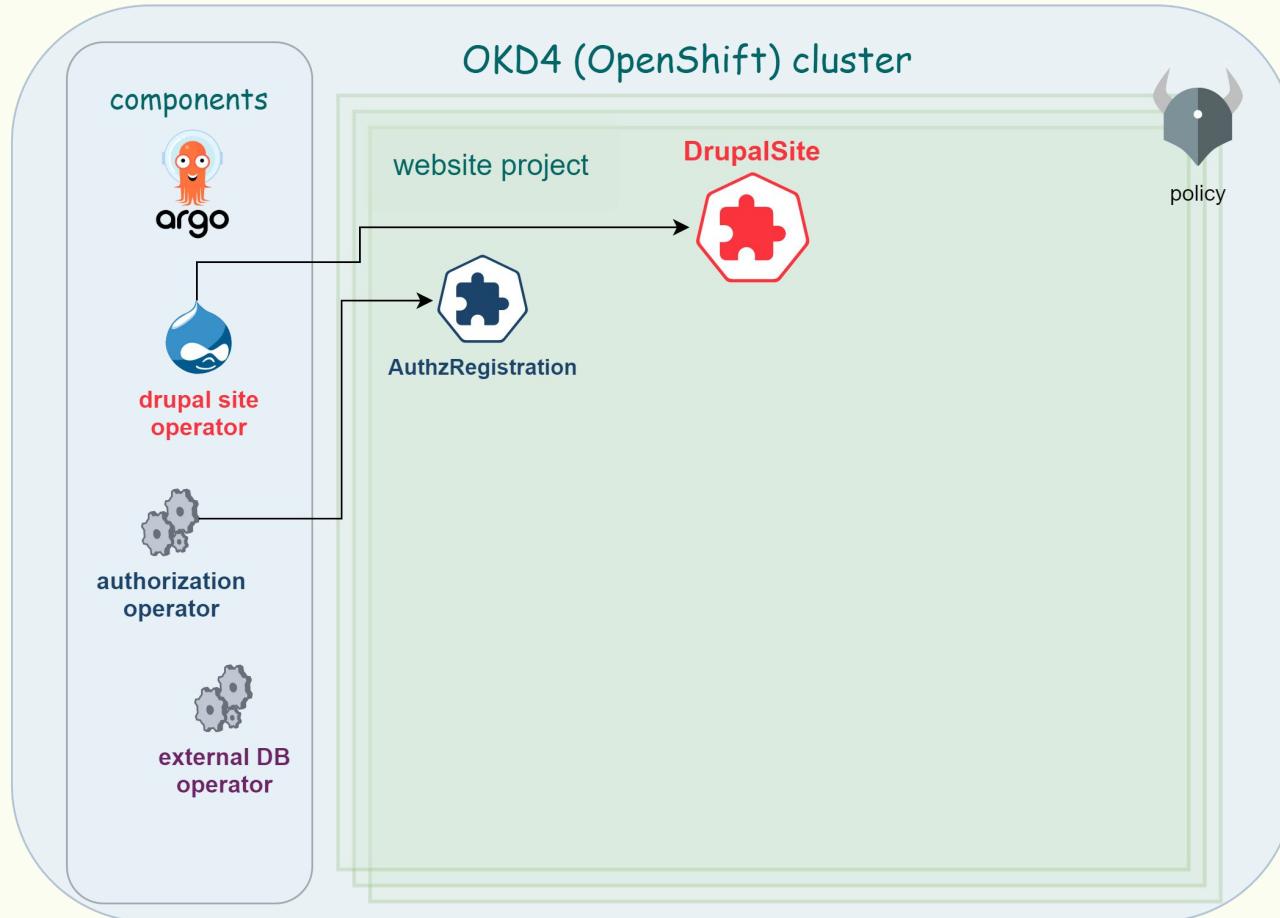


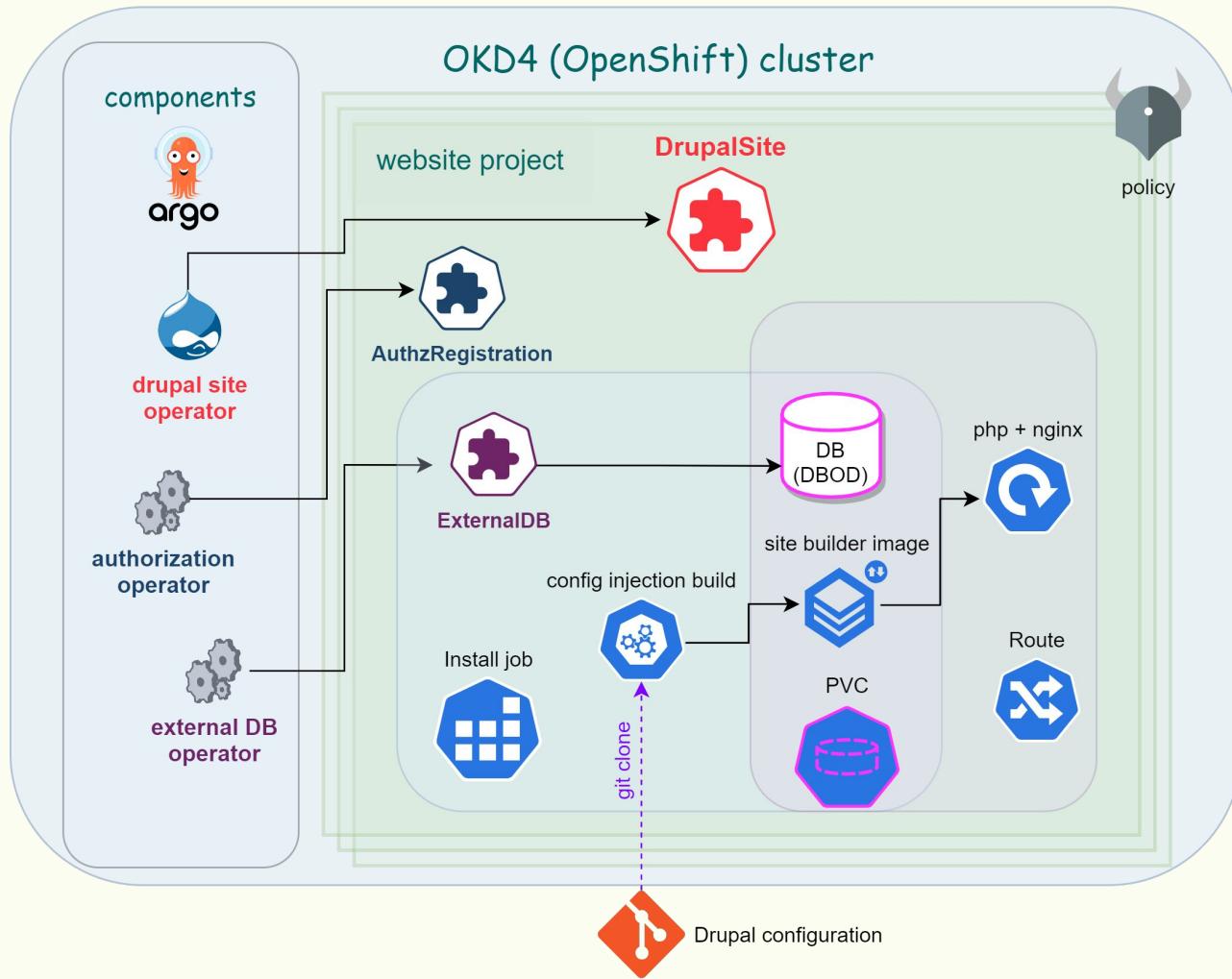
OKD4 (OpenShift) cluster

website project

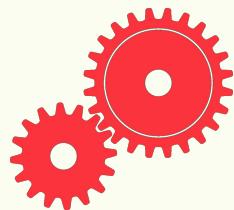
DrupalSite

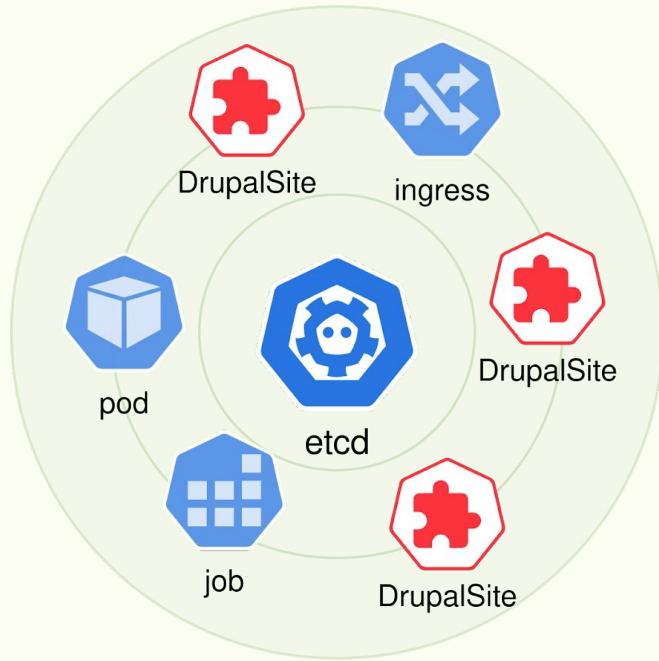




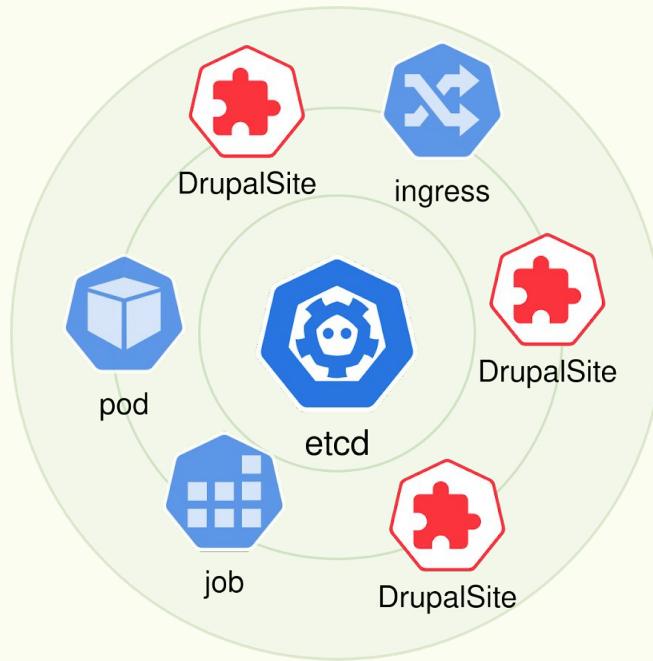


Operator Pattern

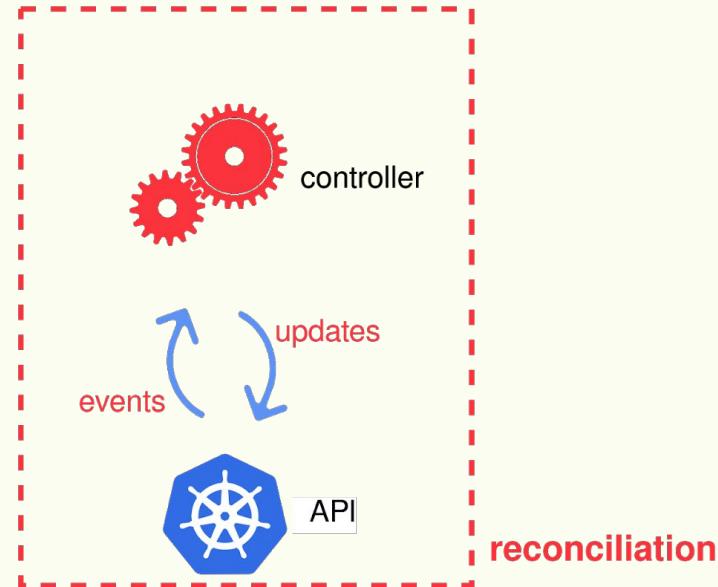


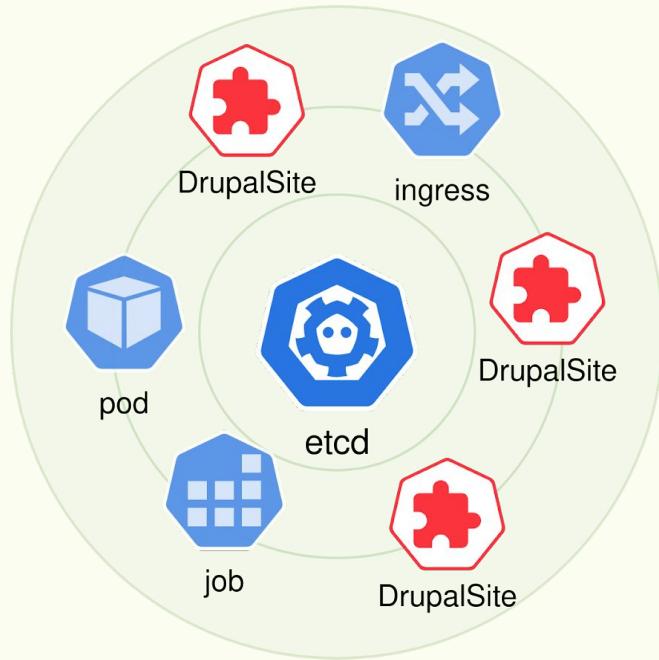


What *should* be in the cluster

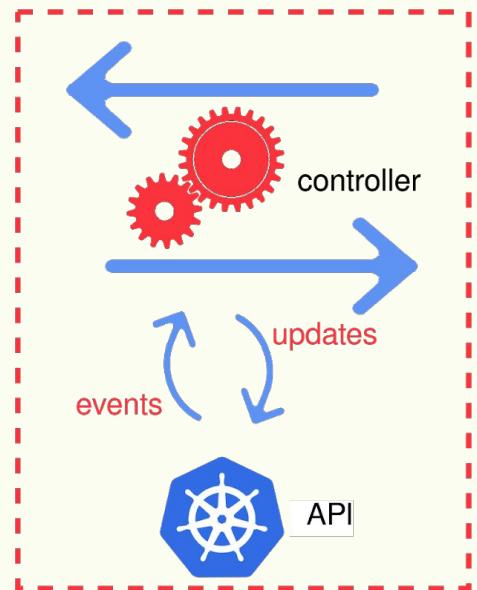


What *should* be in the cluster



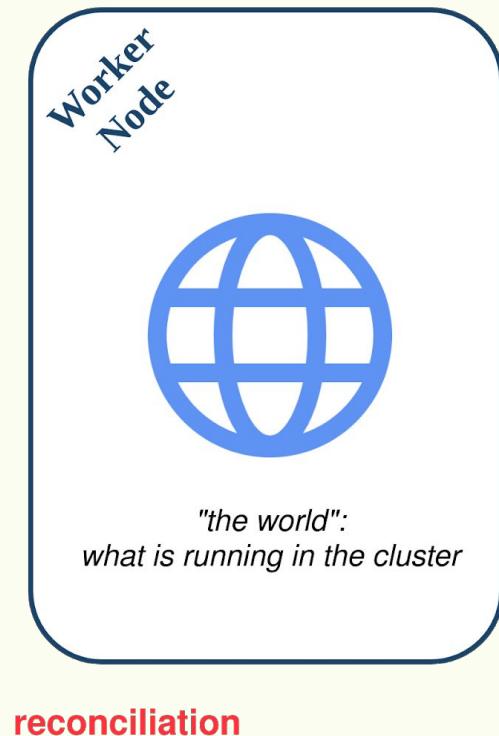
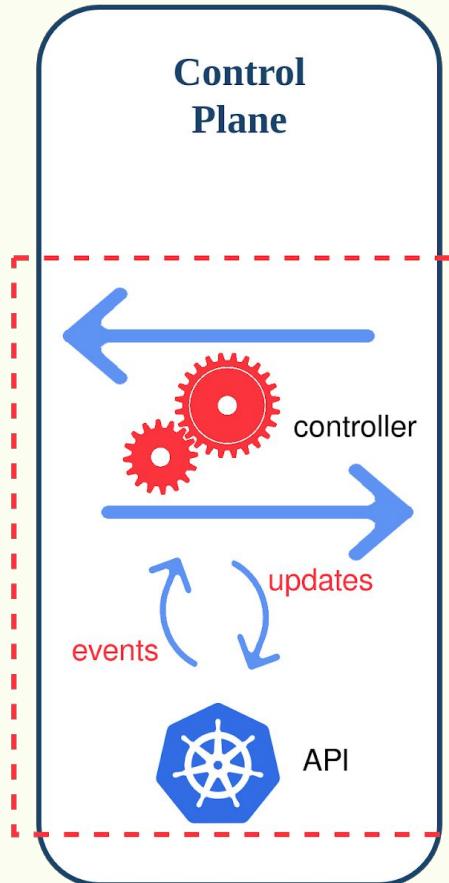
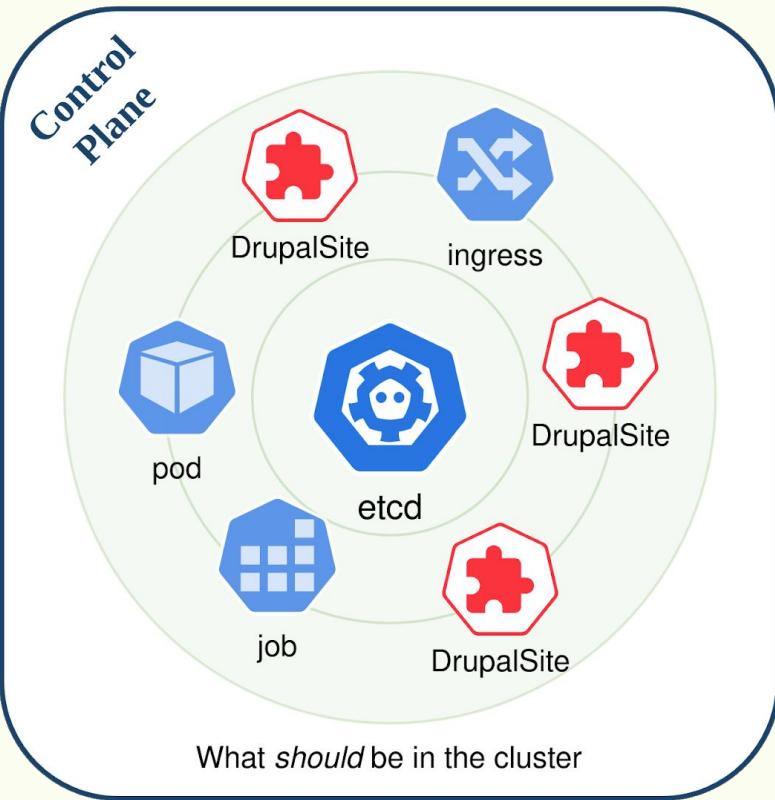


What *should* be in the cluster

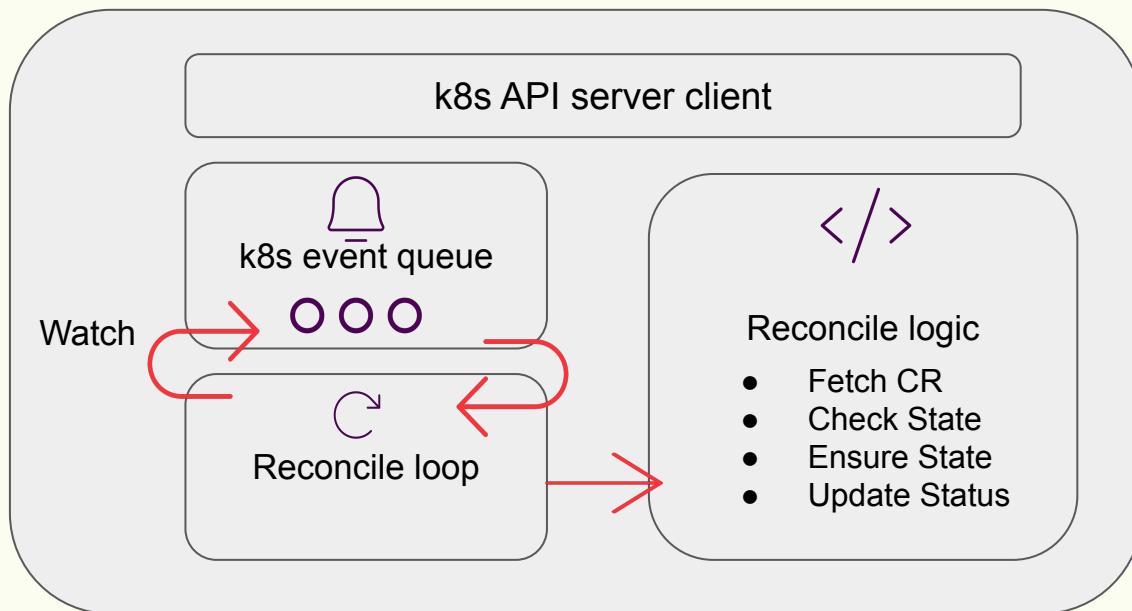


*"the world":
what is running in the cluster*

reconciliation



Making operators



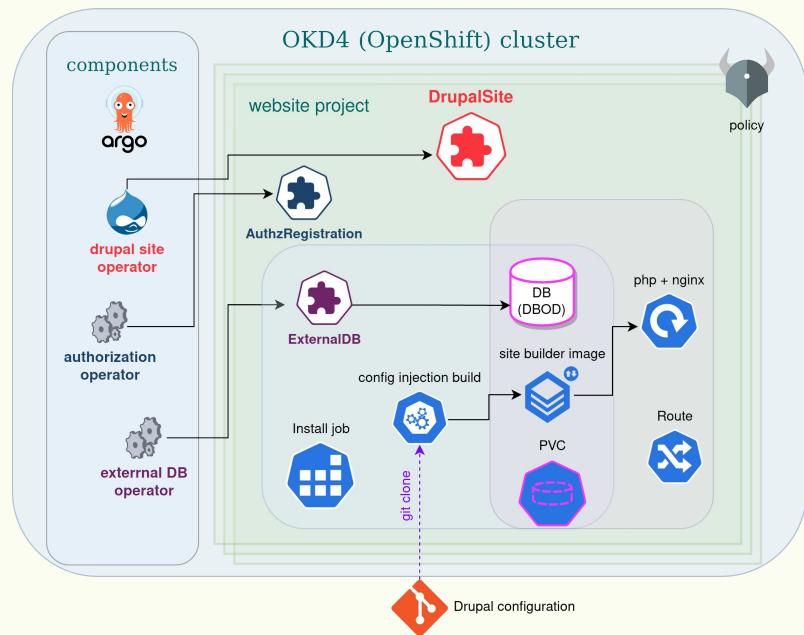
ANSIBLE

Diving into our operators



The DrupalSite operator

```
apiVersion: drupal.kubecon.cern.ch/eu2021
kind: DrupalSite
metadata:
  name: kubecon
spec:
  drupalVersion: "9.1.x"
  publish: true
  siteUrl: kubecon.webtest.cern.ch
  environment:
    name: "dev"
    qosClass: "standard"
    dbodClass: "test"
  diskSize: "1Gi"
```



The DrupalSite operator



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```
apiVersion: drupal.kubecon.cern.ch/eu2021
kind: DrupalSite
metadata:
  name: kubecon
spec:
  drupalVersion: "9.1.x"
  publish: true
  siteUrl: kubecon.webtest.cern.ch
  environment:
    name: "dev"
    qosClass: "standard"
    dbodClass: "test"
  diskSize: "1Gi"
```

```
status:
  conditions:
    - type: Installed
      status: "False"
    - type: Ready
      status: "False"
      reason: DB0DError
    - type: UpdateNeeded
      status: Unknown
      reason: k8sAPIClientError
      message: 'k8sAPIClientError:
Deployment.apps "kubecon" not found'
  lastRunningDrupalVersion: 8.9.13
```

Operator Capabilities



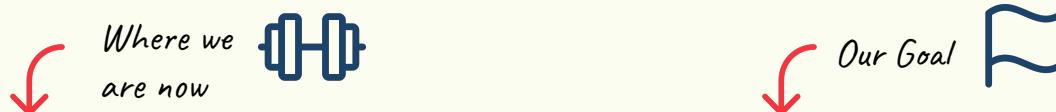
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Level I

Basic Install

Automated application provisioning and configuration management

Level II

Seamless Upgrades

Patch and minor version upgrades supported

Level III

Full Lifecycle

App lifecycle, storage lifecycle (backup, failure recovery)

Level IV

Deep Insights

Metrics, alerts, log processing and workload analysis

Level V

Auto Pilot

Horizontal/vertical scaling, auto config tuning, abnormal detection, scheduling tuning

Composing Operators



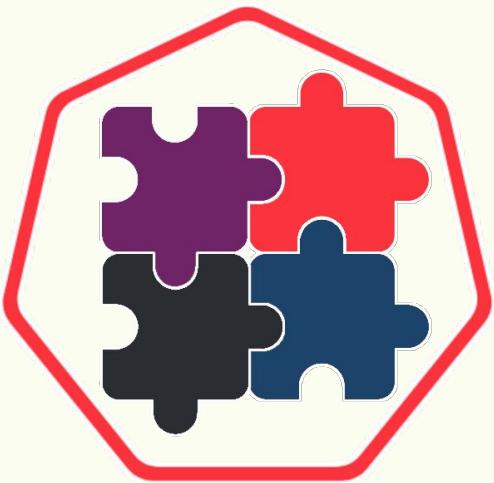
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components



drupal site
operator



authorization
operator



external DB
operator

Not only DrupalSites need to integrate with external services

- CRDs make operators composable

Demo: Upgrading Drupal sites



Update workflow



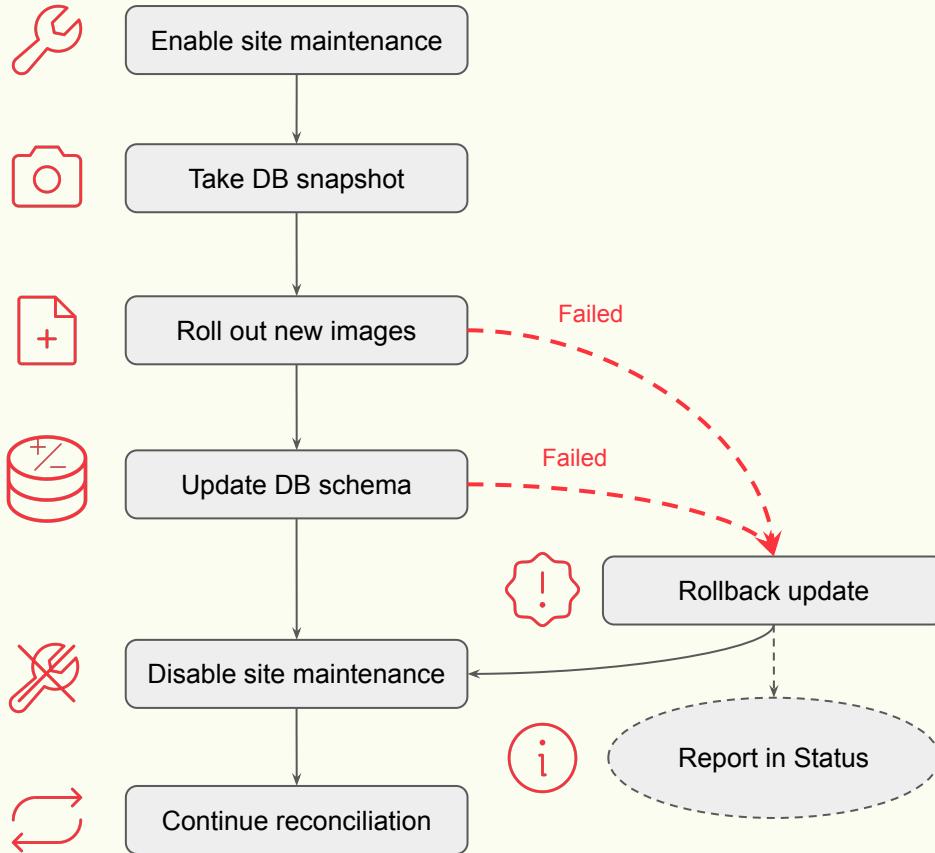
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What have we discovered?



Development practices



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- GitOps
 - Cluster configuration with Helm charts
 - Maintain with ArgoCD Applications
 - Validation with e2e tests
- Auto-provisioning development clusters
 - Almost same configuration as production clusters
- Operator Framework
 - Kubebuilder book



Conclusions



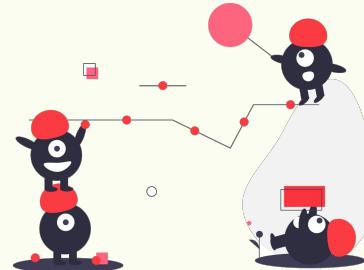
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- We can provision a highly **automated** infrastructure to solve a complex problem with a **very small team** → 
- We used the **operator** model as a critical part of our design.
- Kubernetes as a **common API** to control many kinds of resources.
 - gitlab.cern.ch/drupal/paas/drupsite-operator



That's all Folks!