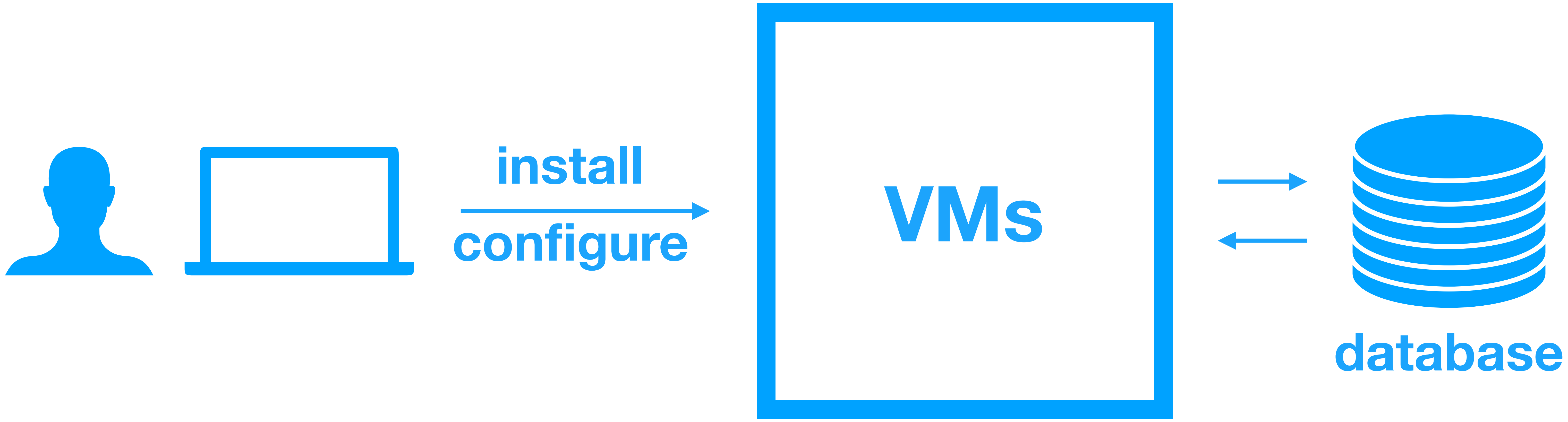
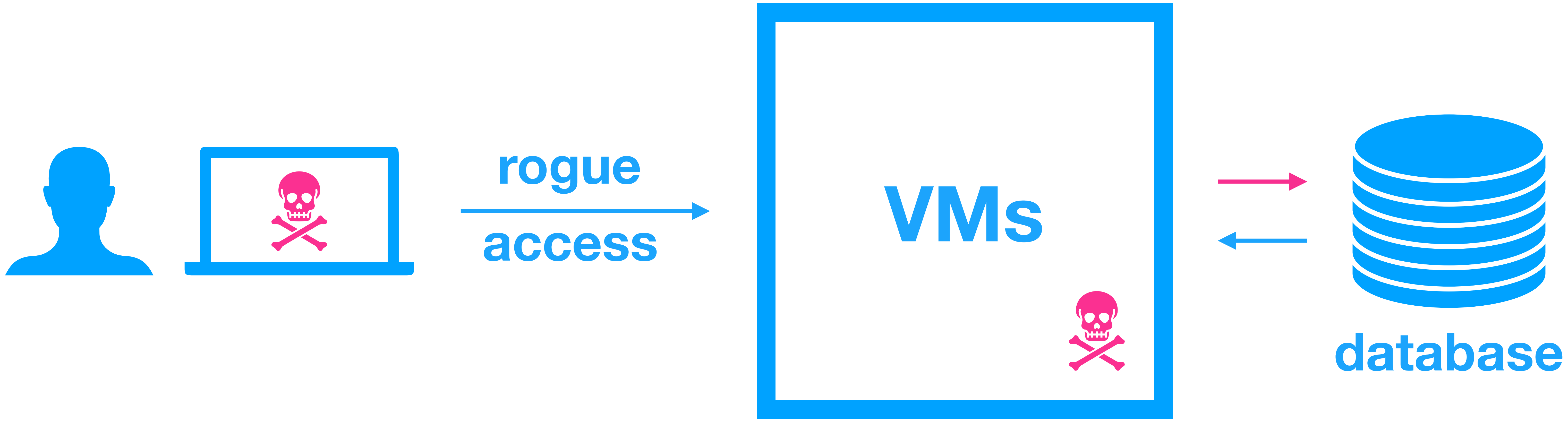
Securing the ☸ Deploy Pipeline

Felix Glaser
Production Security Engineer
shopify

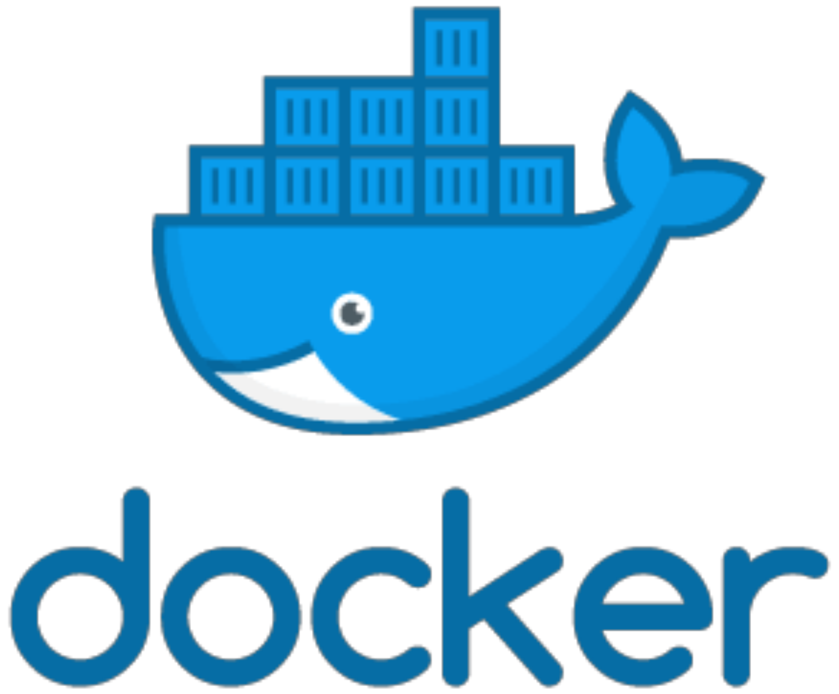
```
curl | sudo bash
```


install
configure
VMs
database

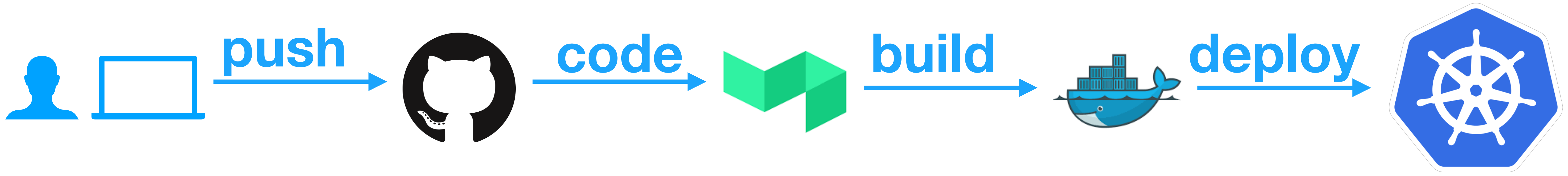
Mutability is the enemy.



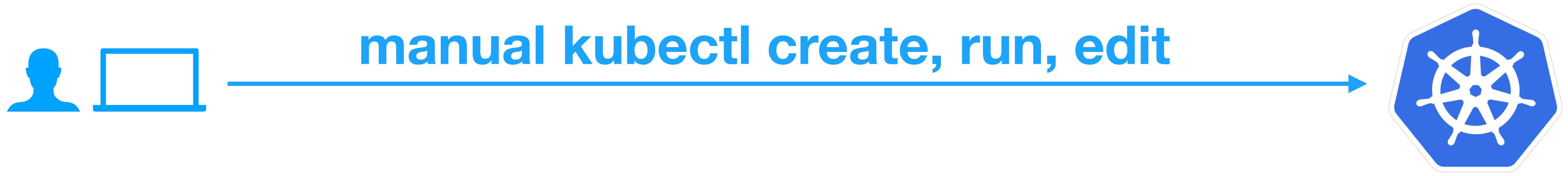
Mutability is no more!



Containerized infrastructure

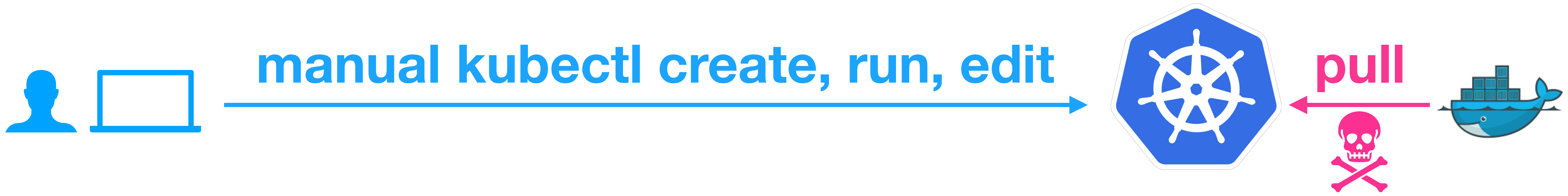


Still allows manual changes



manual kubectl create, run, edit

Runs containers outside your org



The new curl | sudo bash

```
FROM Ubuntu:14.04
COPY executable /usr/bin
CMD [“/usr/bin/executable"]
```

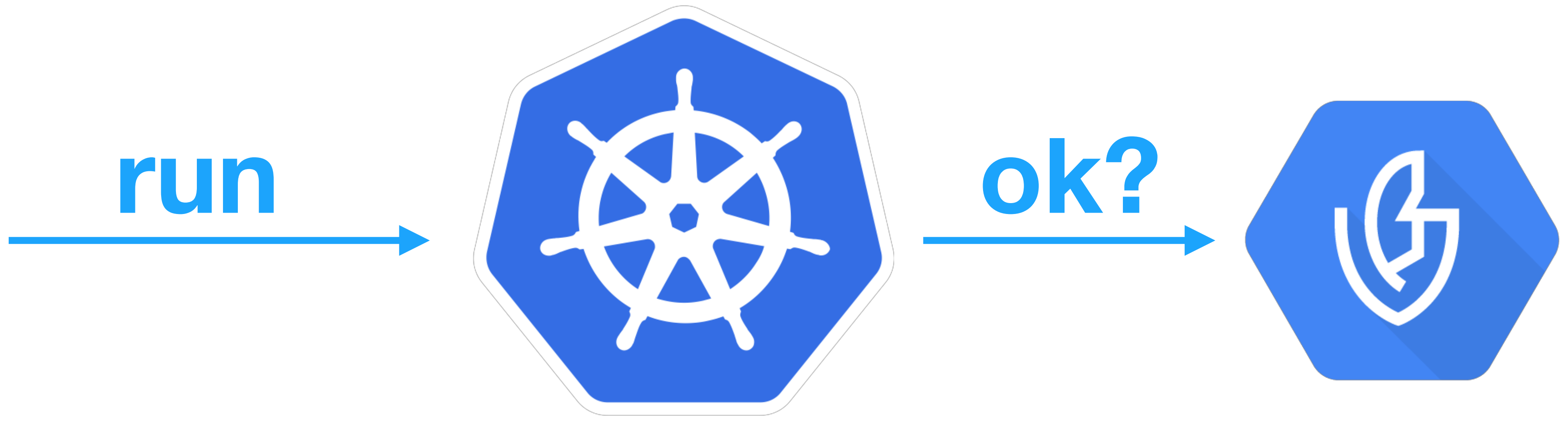
The new curl | sudo bash

```
FROM Ubuntu:14.04
COPY executable /usr/bin
CMD [“/usr/bin/executable"]
```

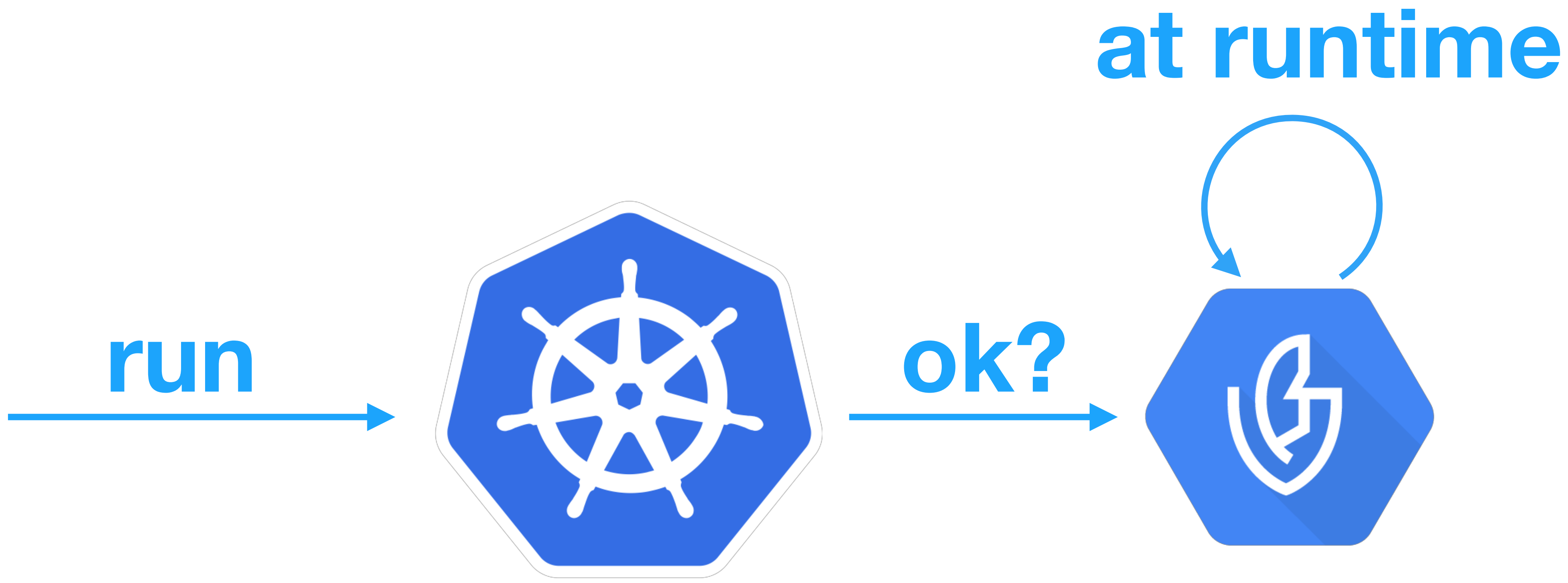
~~apt-get install unattended-upgrades~~

How do we fix this?

Gate which images can run



When to make the decision

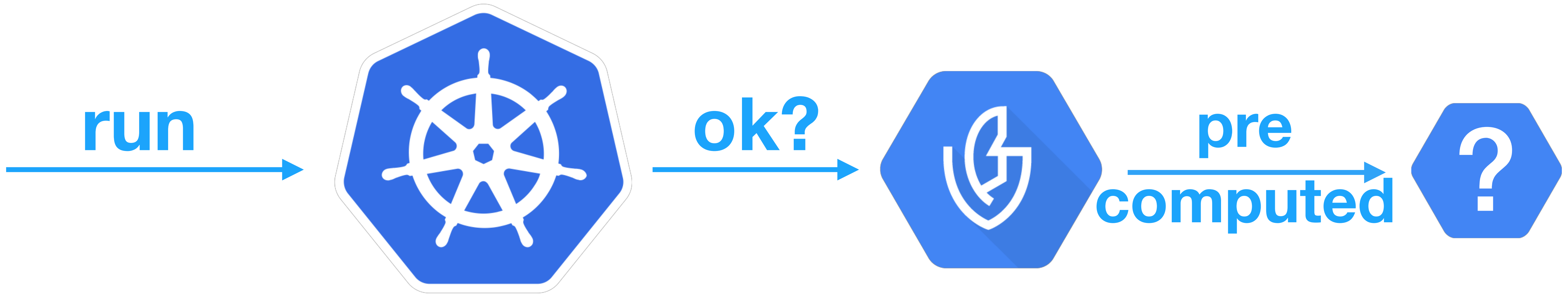


at runtime

run

ok?

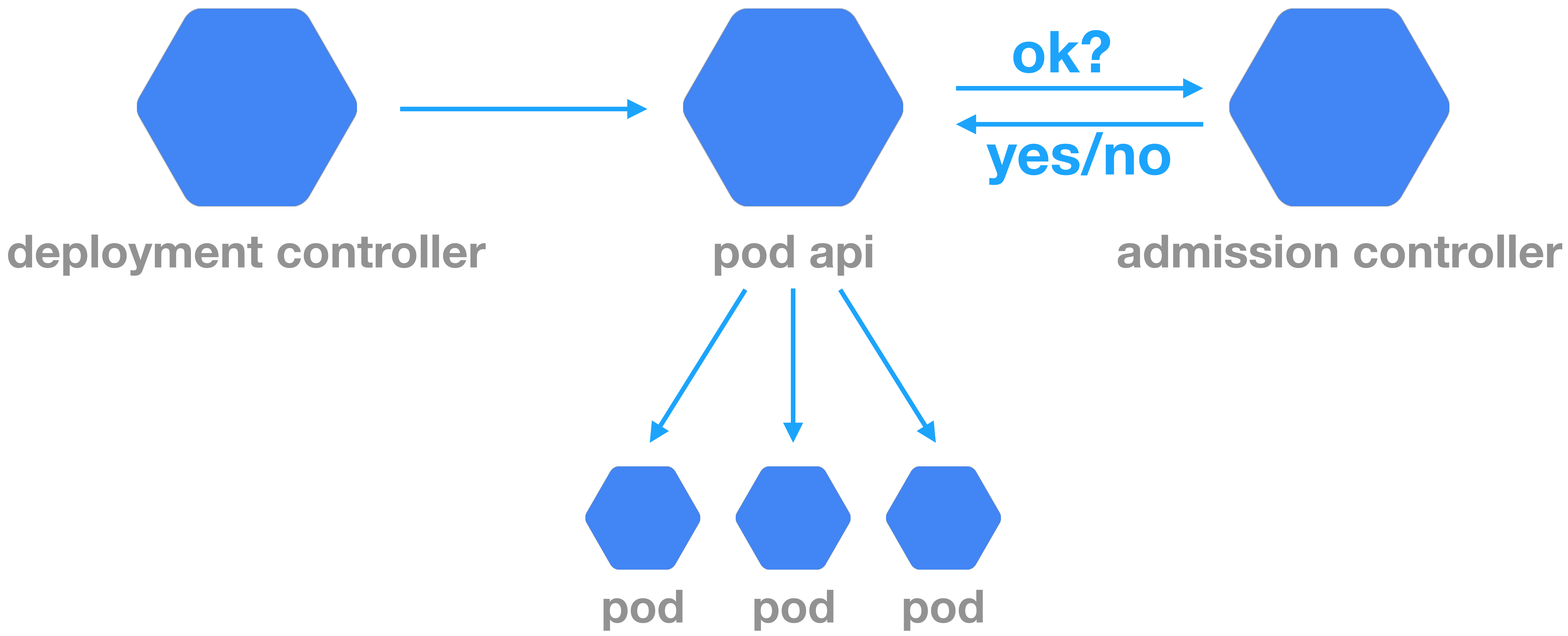
When to make the decision



Pre-computed signatures

```
PGP.sign({
  "critical": {
    "identity": {
      "docker-reference": "gcr.io/some/where"
    },
    "image": {
      "docker-manifest-digest": “sha256:462205…28c9fd945a”
    },
    "type": "Google cloud binauthz container signature"
  }
})
```

Admission controller



deployment controller

pod api

ok?

yes/no

admission controller

pod

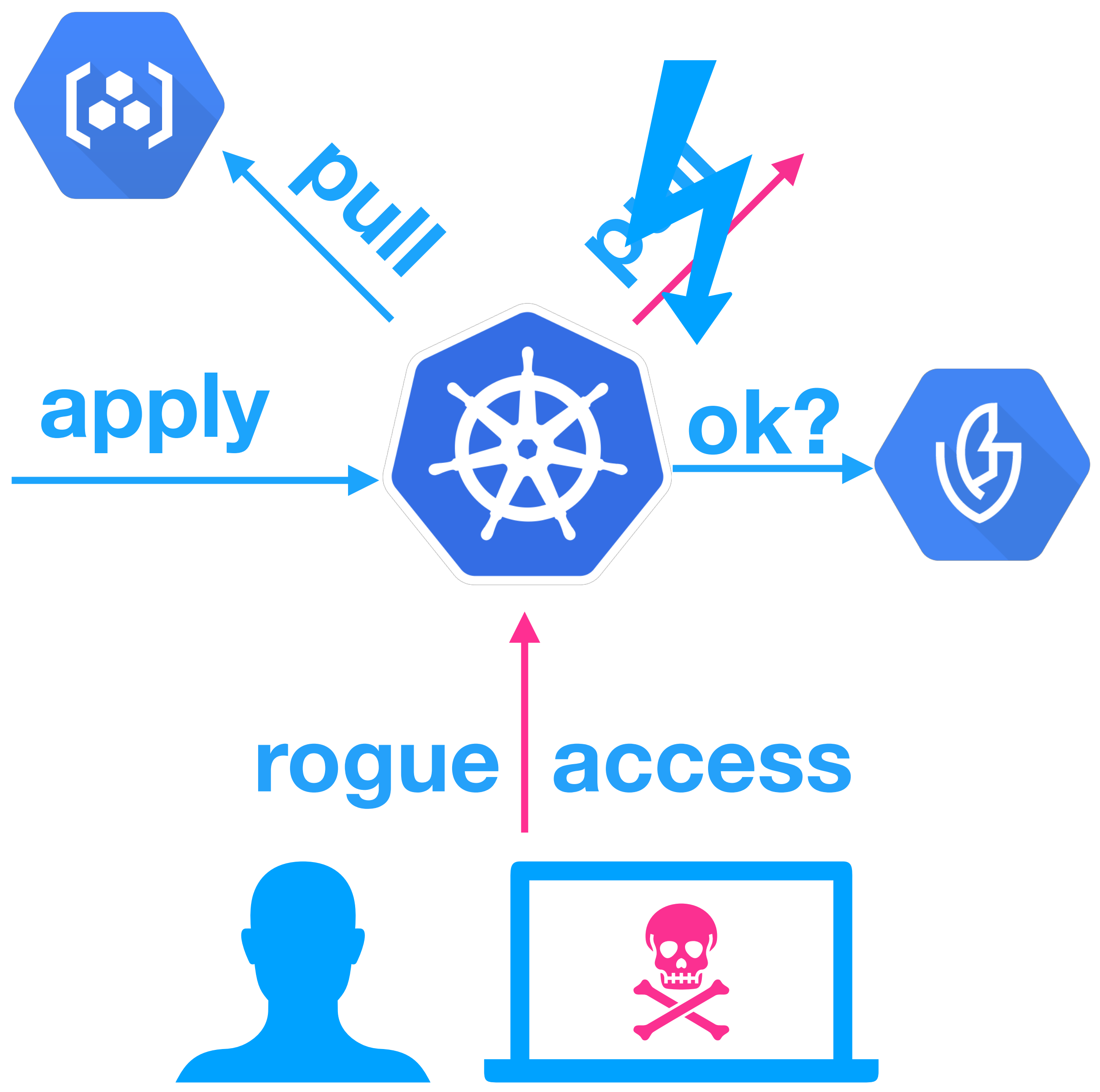
pod

pod

Kritis

github.com/grafeas/kritis

Kritis gating deploys



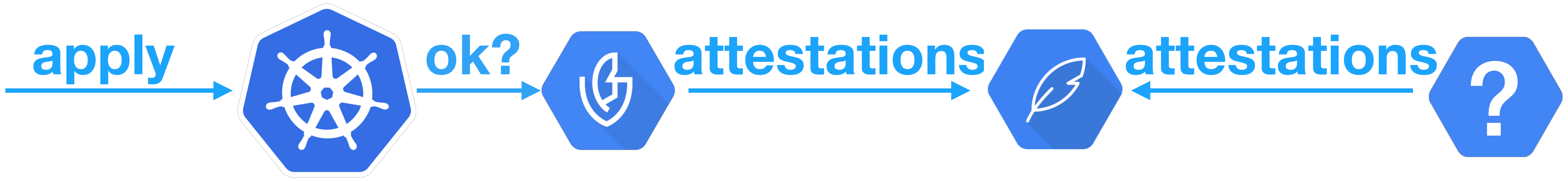
Grafeas

github.com/grafeas/grafeas

Kind, note and occurrence

Kind	Note Summary	Occurrence Summary
ATTESTATION	A logical attestation role or authority, used as an anchor for specific attestations	An attestation by an authority for a specific property and resource
PACKAGE	Package descriptions	Filesystem locations detailing where the package is installed in a specific resource
VULNERABILITY	CVE or vulnerability description and details including severity, versions	Affected packages/versions in a specific resource

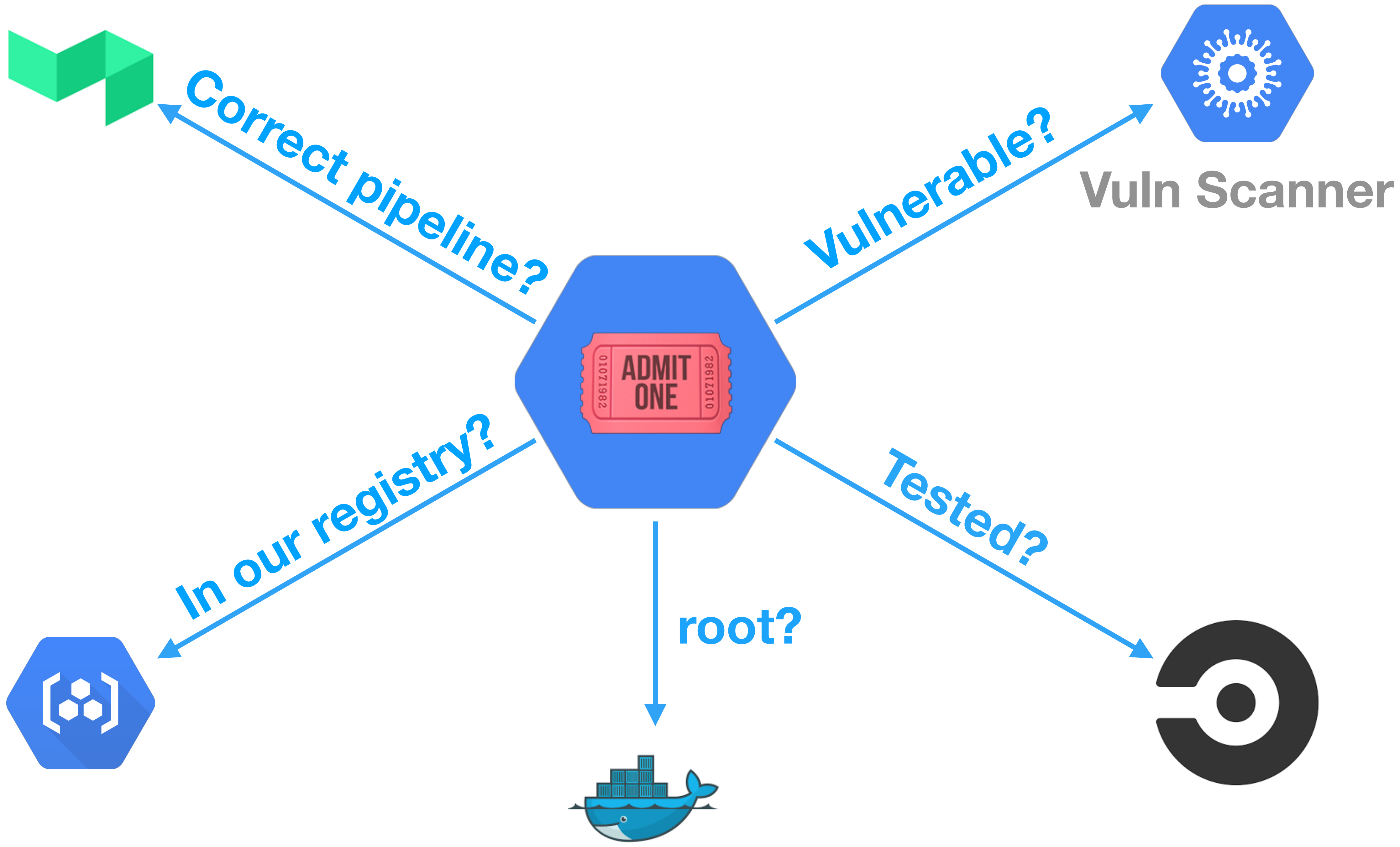
Who creates the attestations?



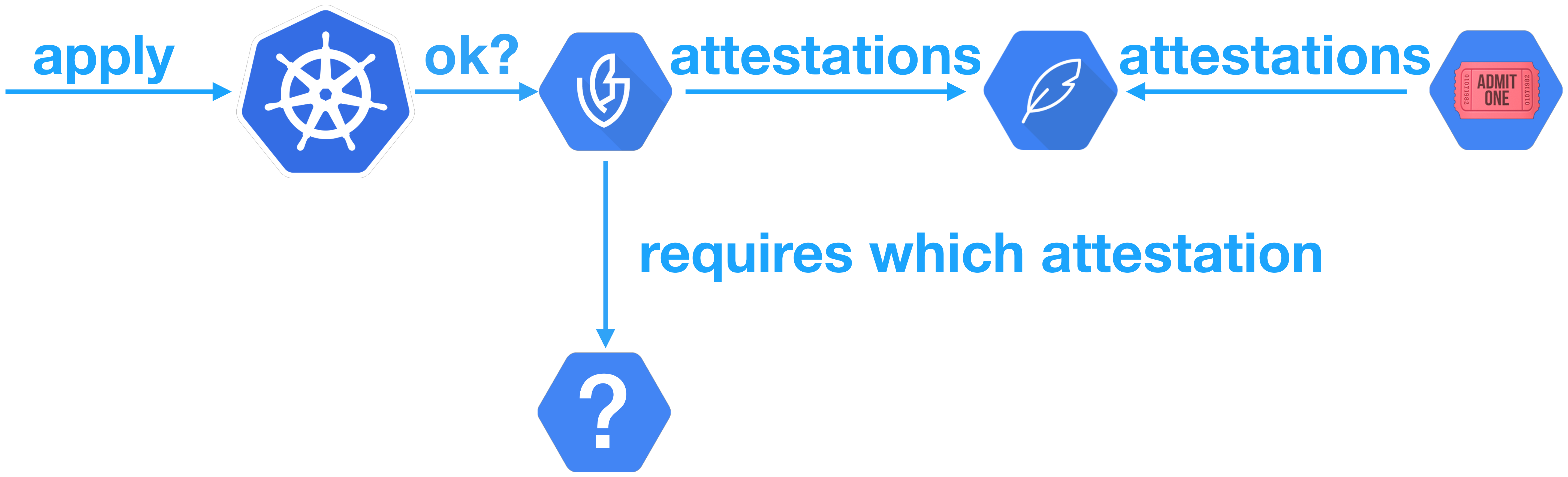
🎟️Voucher

github.com/shopify/voucher

Voucher runs checks



Which attestations are required?



Policies

```
admissionWhitelistPatterns:
- namePattern: nginx/image:sha256…
defaultAdmissionRule:
  enforcementMode: ENFORCED_BLOCK_AND_AUDIT_LOG
  evaluationMode: REQUIRE_ATTESTATION
  requireAttestationsBy:
  - projects/binauthz/attestors/name
name: projects/shopify-security/policy
```

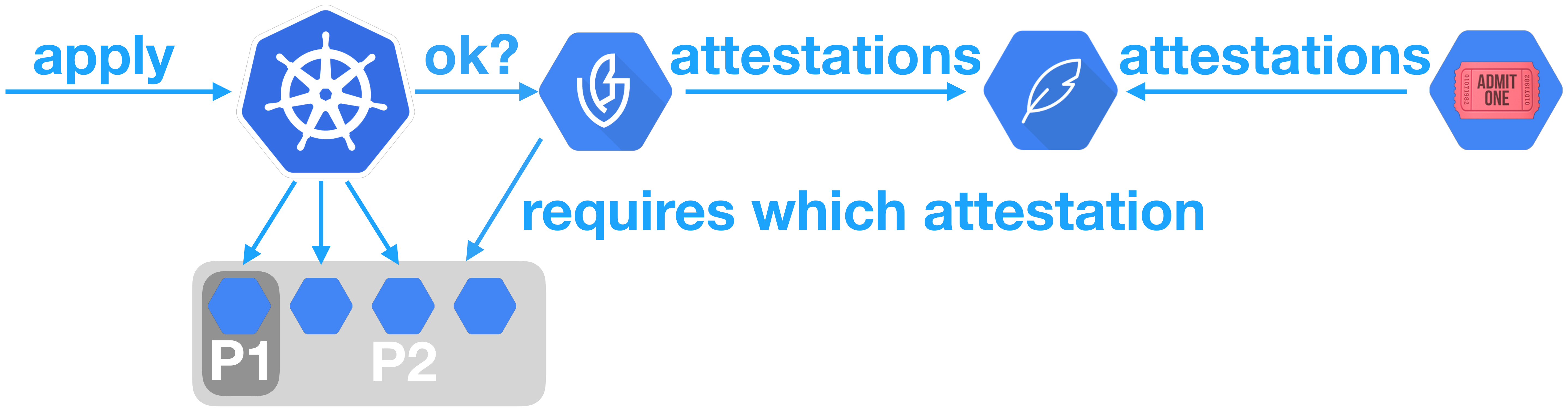
Policies per cluster

```
admissionWhitelistPatterns:
-namePattern: nginx/image:sha256…
clusterAdmissionRules:
  us-east1-a.cluster:
    evaluationMode: REQUIRE_ATTESTATION
    enforcementMode: ENFORCED_BLOCK_AND_AUDIT_LOG
    requireAttestationsBy:
    - projects/name/attestors/name
defaultAdmissionRule: …
```

Package vulnerability policy

```
packageVulnerabilityPolicy:
  maximumSeverity: HIGH
  whitelistCVEs:
    providers/vulnz/notes/CVE-2017-1000082
    providers/vulnz/notes/CVE-2017-1000082
```

Policies per project/cluster



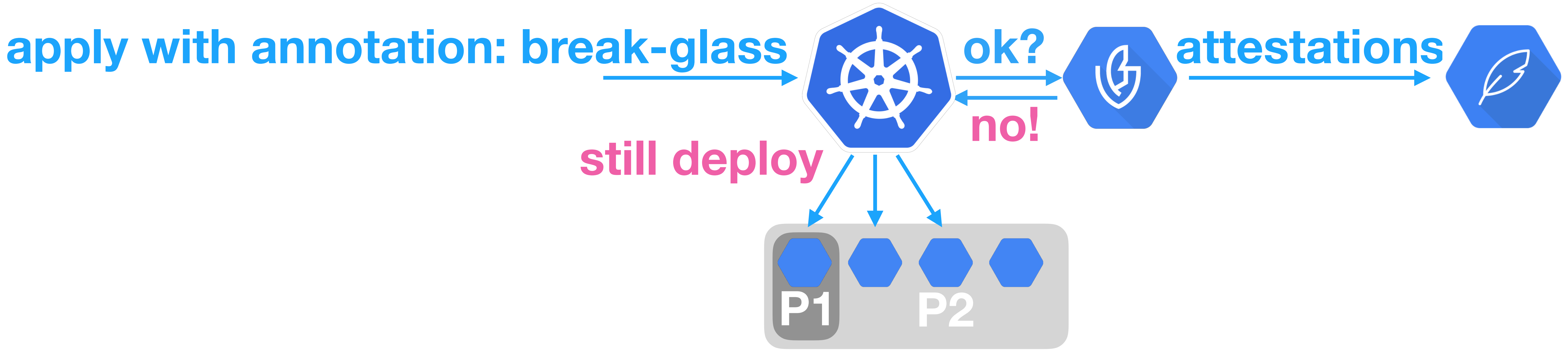
But what about emergencies?

That require changes right now!

Break glass

```yaml
apiVersion: v1
kind: ReplicationController
spec:
  template:
    metadata:
      annotations:
        alpha.image-policy.k8s.io/break-glass: "true"
    spec:
      containers:
      - name: binary-authorization
        image: gcr.io/somewhere/image@sha256:digest
```

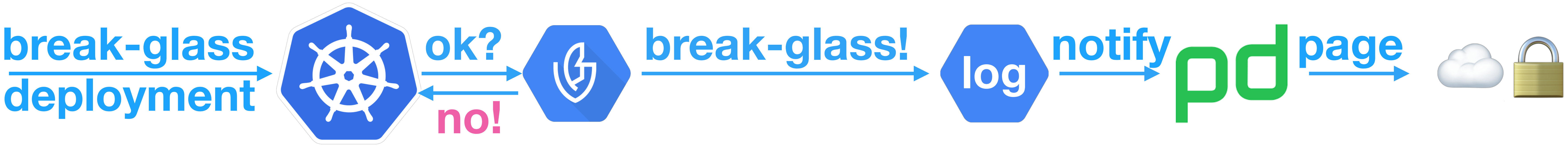
Break glass


apply with annotation: break-glass
ok?
no!
attestations
still deploy
P1
P2

If everyone can just add break-glass…

… what is it good for?!

Page @cloudsec



break-glass deployment

ok?

no!

break-glass!

log

notify

pd

page

☁️🔒

Rollout hints

```
PGP.sign({
  "identity": {
    "docker-reference": "gcr.io/some/where"
  },
  "image": {
    "docker-manifest-digest": “sha256:462205…28c9fd945a”
  }
})
```

Rollout hints

```
admissionWhitelistPatterns:
  - namePattern: gcr.io/project/*
  - namePattern: gcr.io/project/helloworld
  - namePattern: gcr.io/project/helloworld:tag
  - namePattern: gcr.io/project/helloworld:v1.*
  - namePattern: gcr.io/project/helloworld@sha256:123...abc
```

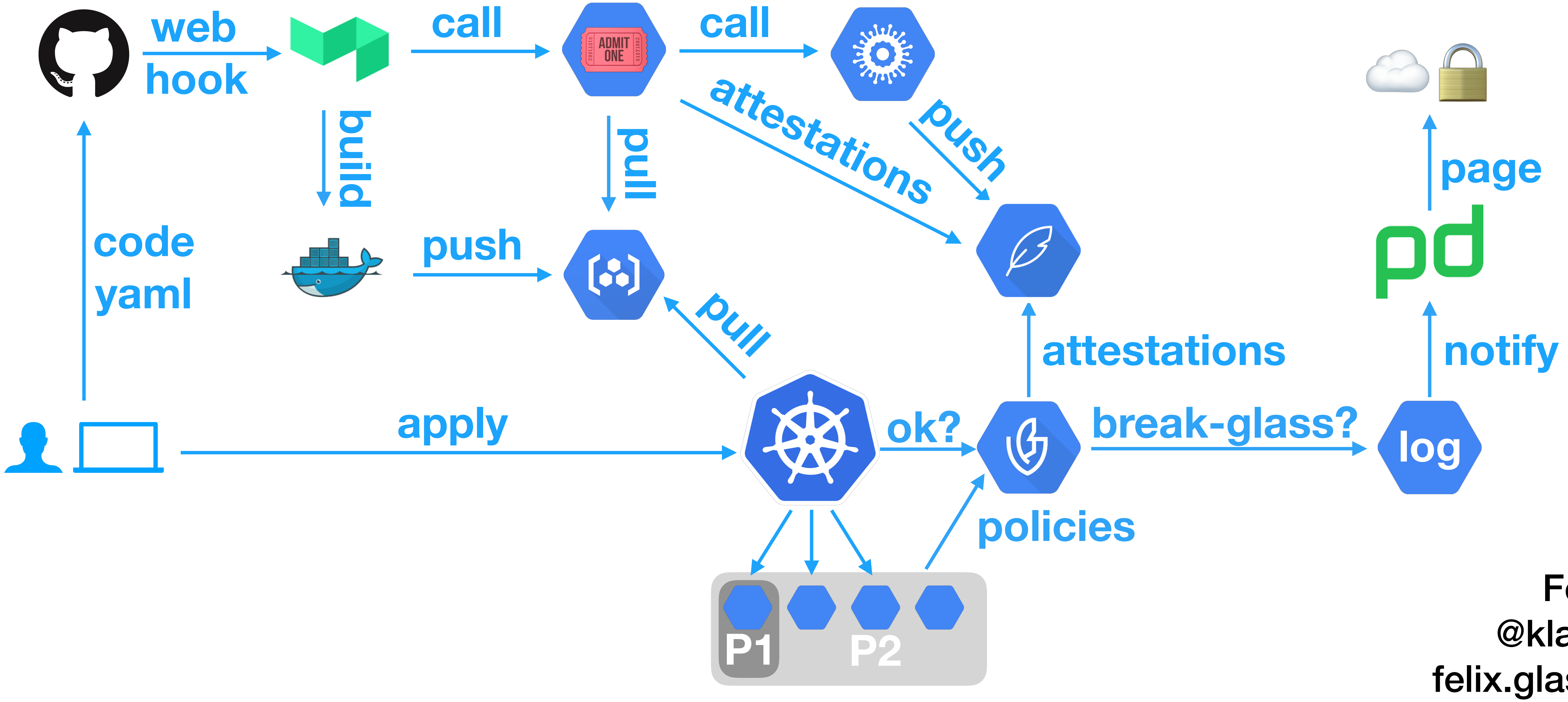
Rollout hints

```
kubectl plugin resolve-tags -f <file with tags> --apply true
```

What have we achieved?

And what’s left to do!

Do you have any questions?



Felix Glaser
@klautcomputing
felix.glaser@shopify.com

Resources:

- https://github.com/Shopify/voucher
- https://github.com/grafeas/grafeas
- https://github.com/grafeas/kritis
- https://cloud.google.com/binary-authorization/docs/
- https://codelabs.developers.google.com/codelabs/cloud-binauthz-intro/index.html#0
- https://cloud.google.com/blog/products/identity-security/deploy-only-what-you-trust-introducing-binary-authorization-for-google-kubernetes-engine
- https://github.com/grafeas/kritis/tree/master/cmd/kritis/kubectl/plugins/resolve