KubeCon | CloudNativeCon

North America 2024

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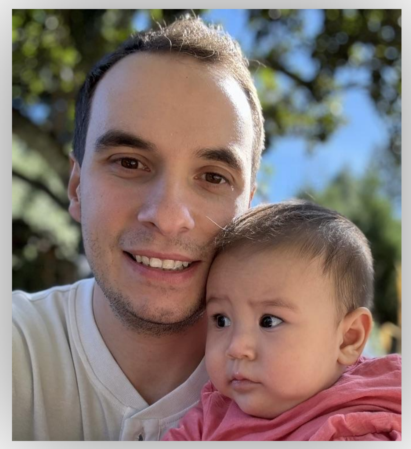
Cluster API

Introduction, Deep Dive, and Future

Who we are

Christian Schlotter

Cluster API Maintainer
Software Engineer @ Broadcom

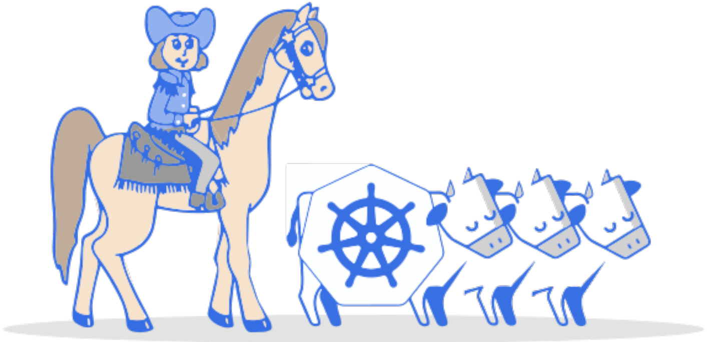


Vince Prignano

SIG Cluster Lifecycle co-chair
Software Engineer @ Apple, Inc.

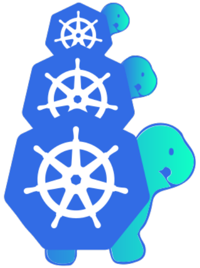
Vision

- Develop the tools to build a meta-cloud
  - Declarative, API-driven deployments
  - Make managing clusters as easy as possible
- Make the 80% use case simple, and the 20% possible
  - Sane and expected defaults
- Clear, well-defined extension points



What's Cluster API?

Cluster API uses Kubernetes-style APIs and patterns to automate cluster **creation**, **configuration** and **management** for platform operators.



What’s Cluster API?

Making cluster lifecycle **boring**.

What's Cluster API?

Extensibility is key.

What’s Cluster API?

Batteries included but swappable.

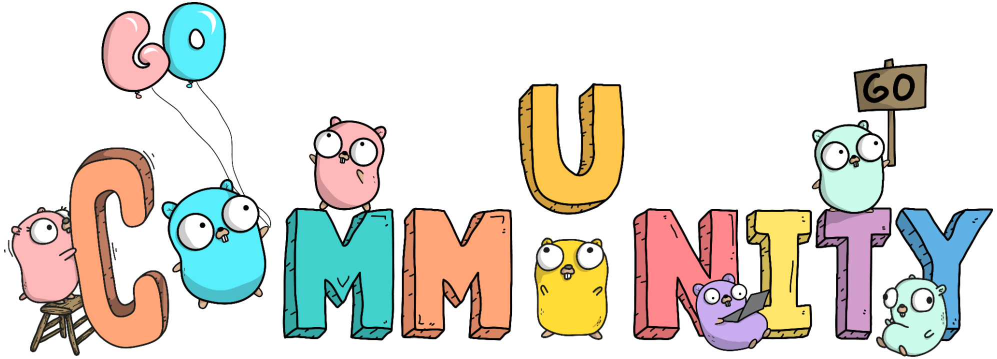
What’s Cluster API?

Cluster API is **production** ready.

What's Cluster API?

The best feature is the **community**.

Community



24000 Contributions

350 Committers

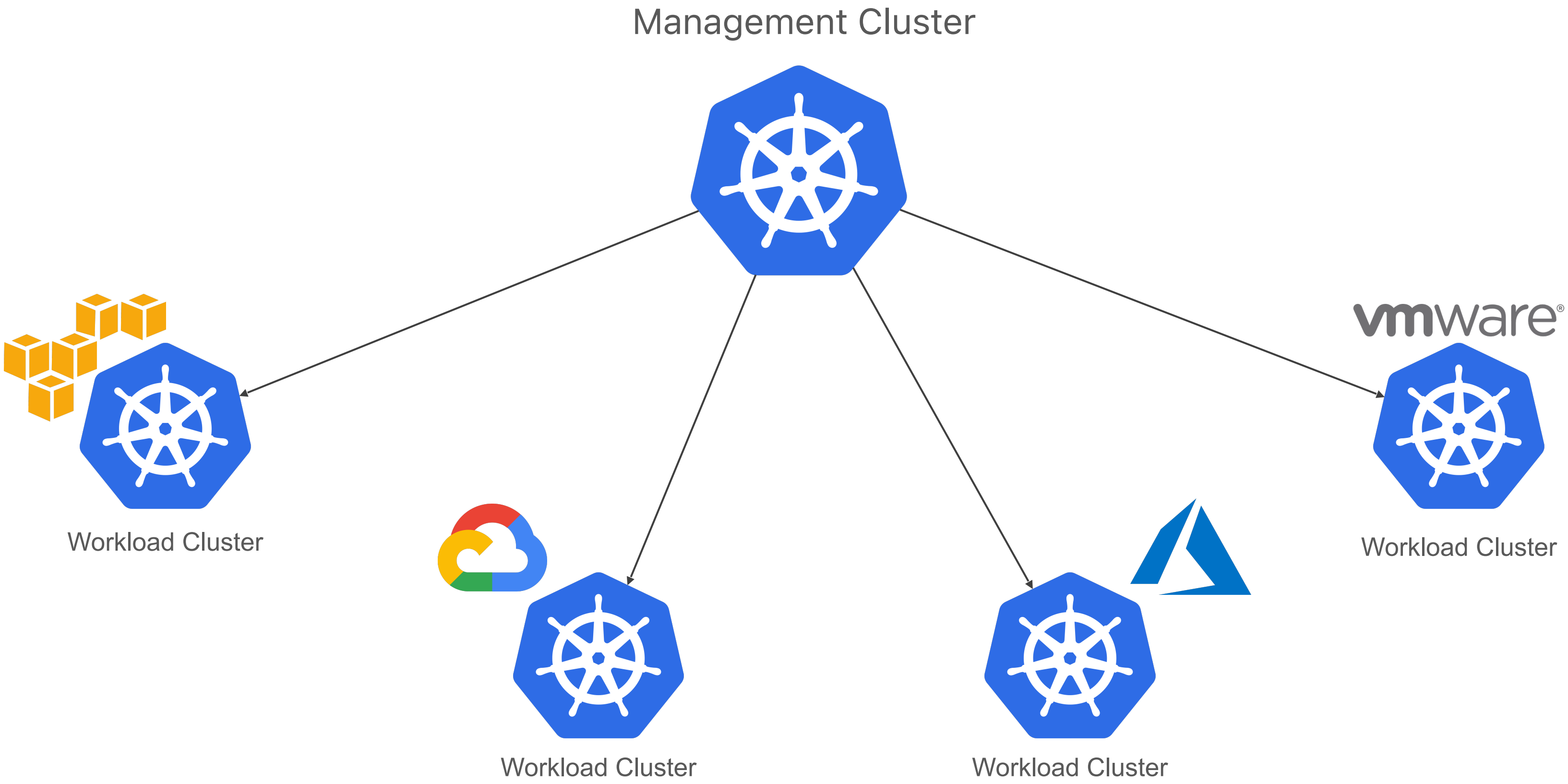
⭐ **4.5k** Stargazers

Source https://k8s.devstats.cncf.io/

(*) last 1y

How does it work?

How does it work?



Management Cluster

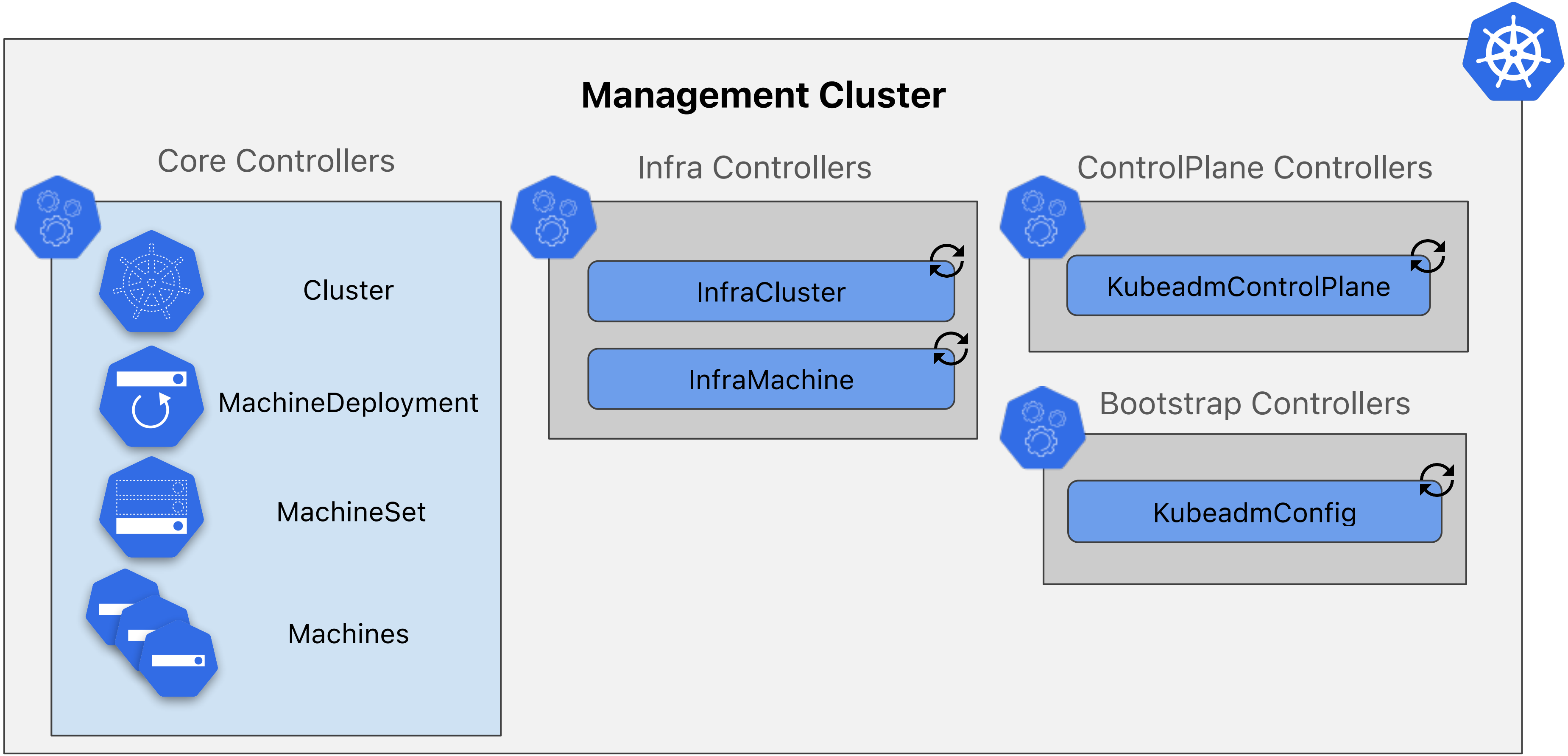
Workload Cluster

Workload Cluster

Workload Cluster

Workload Cluster

How does it work?



Transition to v1beta2 API

Transition to v1beta2 API: Why?

> To manage the lifecycle [...] using a declarative API. [0]

Github issue #10852: "Umbrella issue: API changes"

[0]: https://cluster-api.sigs.k8s.io/#goals

Transition to v1beta2 API: Improving status

Main Goal: improve status of Cluster API resources.

Proposal

Transition to v1beta2 API: Improving status

Multi-Step approach

1. Add to v1beta1 → 2. Introduce v1beta2 → 3. Drop in v1beta2

1. Add to v1beta1

As
`.status.v1beta2`

~ Dec 2024

2. Introduce v1beta2

Has
`.status.deprecated`

~ April 2025

3. Drop in v1beta2

Drop
`.status.deprecated`

~ April 2026

Proposal

Transition to v1beta2 API

What about the other improvements?

Github issue #10852: "Umbrella issue: API changes"

Changes in CAPI v1.9

Improved Drain

✨ Refactored node drain #11074

MachineDrainRules

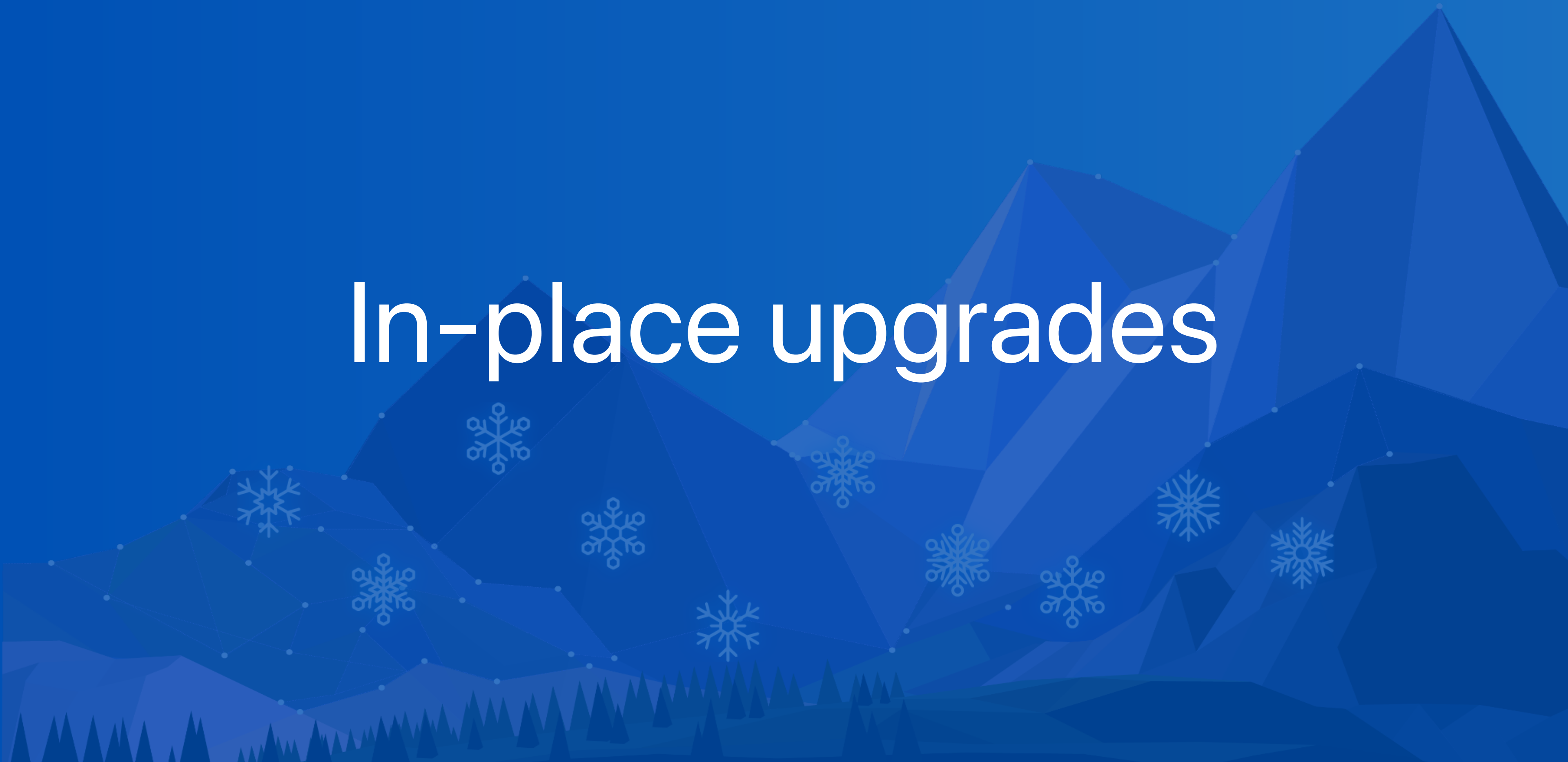
📖 Proposal: MachineDrainRules #11241

✨ Implement MachineDrainRules #11353

MachineDrainRules

```yaml
apiVersion: cluster.x-k8s.io/v1beta1
kind: MachineDrainRule
metadata:
  name: example-rule
  namespace: default
spec:
  drain:
    behavior: Drain / Skip
    order: 100
  machines:
  - selector:
      ...
    clusterSelector:
      ...
  pods:
  - selector:
      ...
    namespaceSelector:
      ...
```

In-place upgrades



We love immutability!

Immutable infrastructure is simple to explain, predictable, consistent and easy to reason about.

It is especially preventing each Cluster API Machine to become a snowflake.

We already do some in-place

Propagation of changes affecting Kubernetes objects only, thus avoiding unnecessary rollouts.

E.g. taint nodes with PreferNoSchedule during rollouts, thus reducing Pod churn.

But...

There are and there will always be some remaining use cases where it is complex for users to perform immutable rollouts.

Disclaimer

📖 Add In-place updates proposal #11029

WIP, feedback and contributions are more than welcome.

Thank you!

Q&A