Stop reading changelogs

Safer Kubernetes upgrades with simulation

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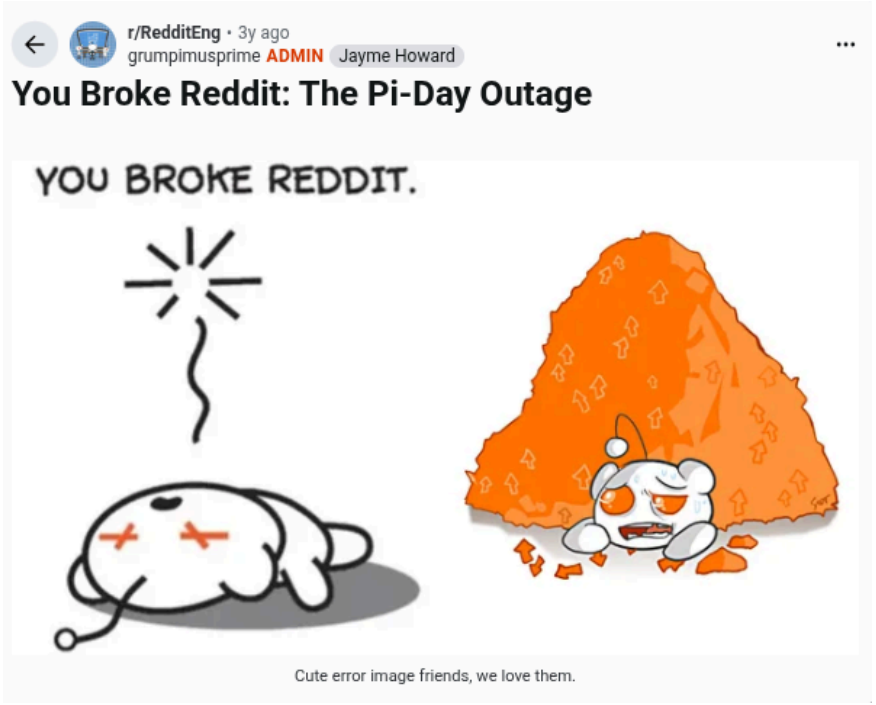
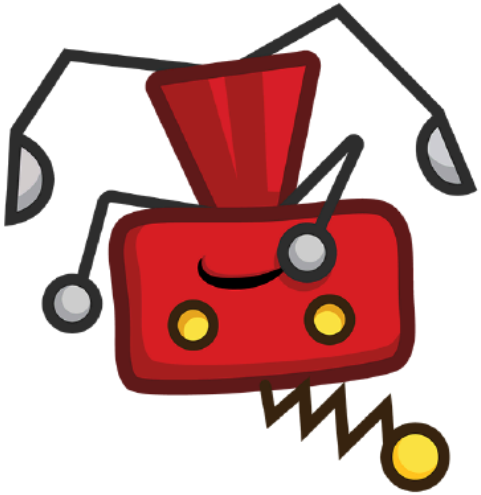
25 March 2026

What happened to Reddit?



You Broke Reddit: The Pi-Day Outage

Who is drmorr?

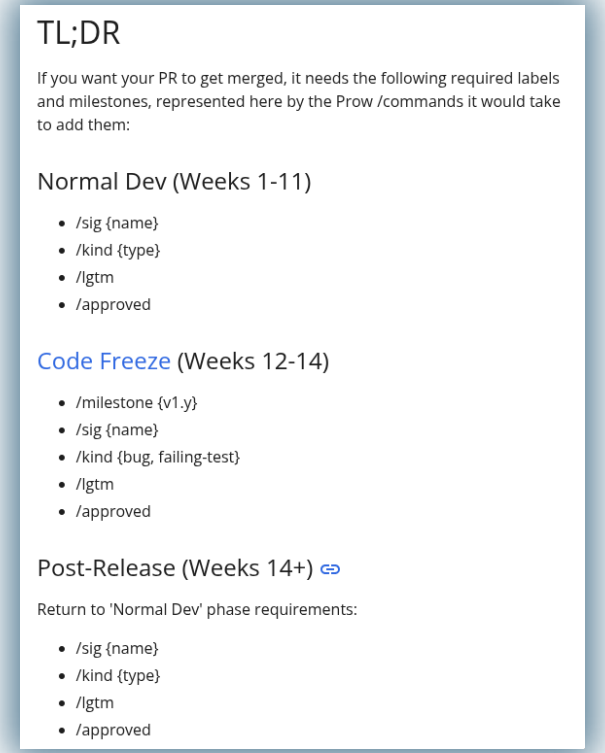


- PhD Computer Science, UIUC
- Compute teams at Yelp and Airbnb
- Founder of ACRL: open-source research and development in distributed systems

For hot takes, click here: https://hachyderm.io/@drmorr

Why are Kubernetes upgrades hard?

- Managed K8s Cluster Upgrades are a total nightmare
- Need to upgrade n independent control loops in an correct-but-unknown order
- In-place upgrades vs. lift-and-shift?



TL;DR

If you want your PR to get merged, it needs the following required labels and milestones, represented here by the Prow /commands it would take to add them:

Normal Dev (Weeks 1-11)

- /sig {name}
- /kind {type}
- /lgtm
- /approved

Code Freeze (Weeks 12-14)

- /milestone {v1.y}
- /sig {name}
- /kind {bug, failing-test}
- /lgtm
- /approved

Post-Release (Weeks 14+)

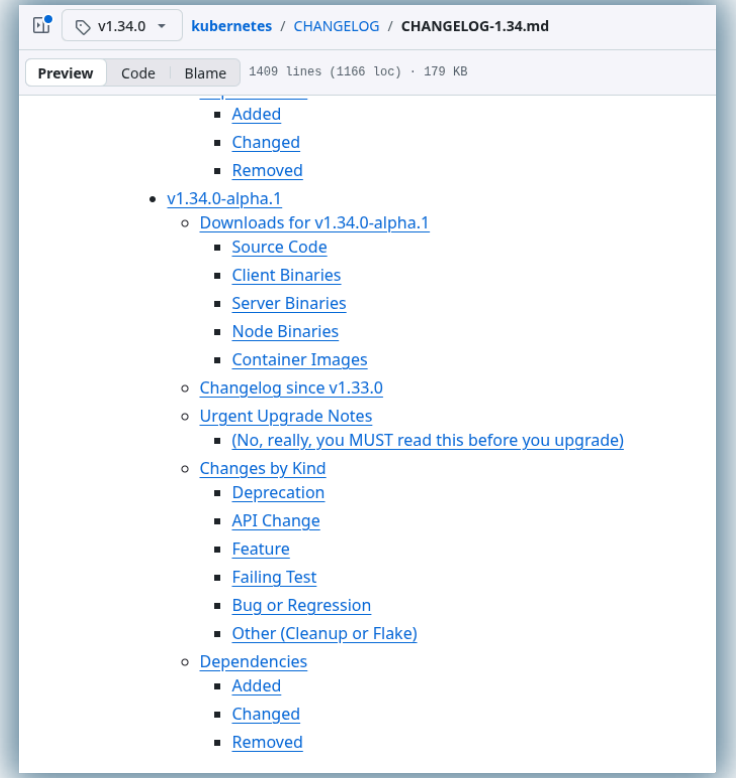
Return to 'Normal Dev' phase requirements:

- /sig {name}
- /kind {type}
- /lgtm
- /approved

Kubernetes Release Cycle

What's a typical upgrade process for Kubernetes?

0. Someone tells you to upgrade
1. Read the changelogs of every component in your cluster
2. Play whack-a-mole with issues in a test cluster
3. Upgrade in prod
4. Whoops, missed one! Hope you have PagerDuty turned on.



Kubernetes 1.34.0-alpha1 CHANGELOG

Test clusters sound great, why don't we do more of those?

Provisioning a new test cluster is **hard**.

Test clusters sound great, why don't we do more of those?

Running tests on real clusters is **expensive**.

Test clusters sound great, why don't we do more of those?

Replicating your production environment is **impossible**.


Introducing SimKube
A better way to test Kubernetes upgrades

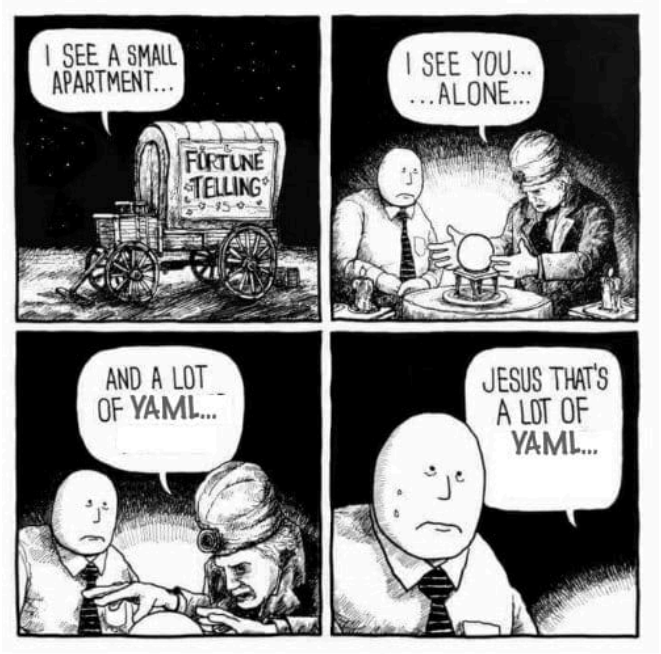
Simulation sounds hard! How do you do it?

1. Declarative nature of Kubernetes

Simulation sounds hard! How do you do it?

~~1. Declarative nature of Kubernetes~~

YAML



Original image by Jake Likes Onions, meme by @bibryam

Simulation sounds hard! How do you do it?

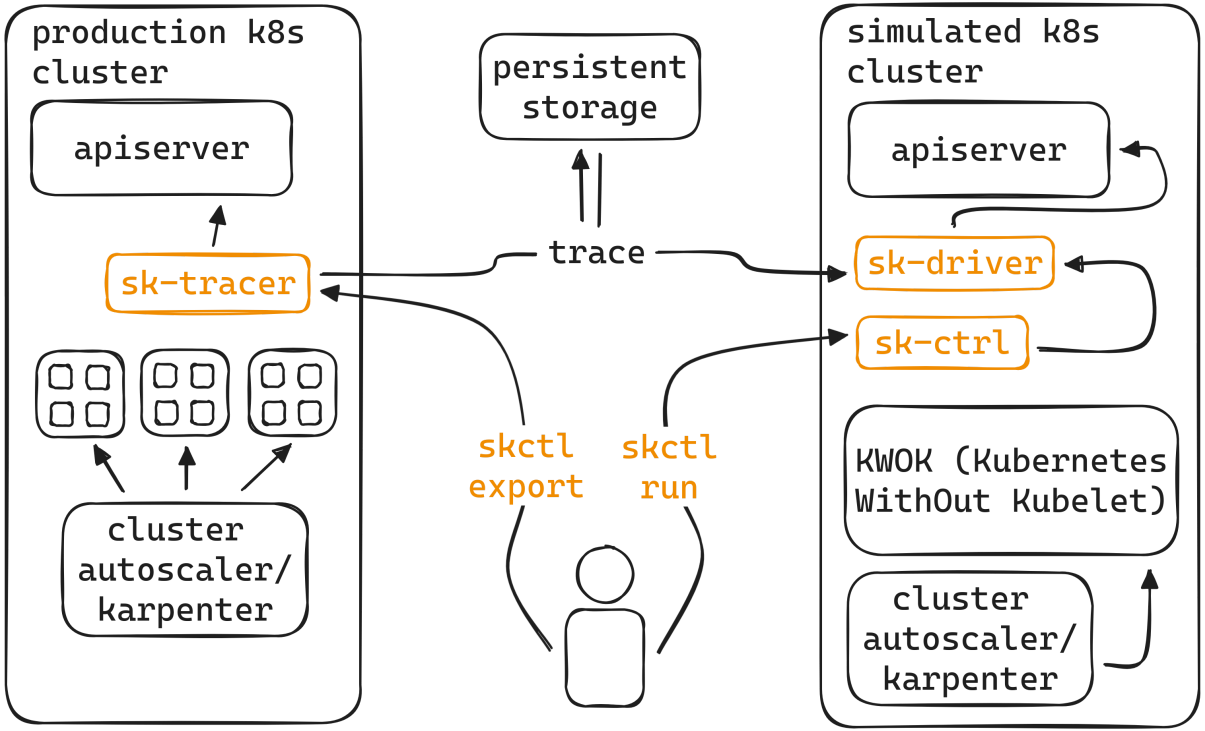
2. Extensible API and controller pattern [KWOK]

Simulation sounds hard! How do you do it?

~~2. Extensible API and controller pattern (KWOK)~~

YAML

How does SimKube work?

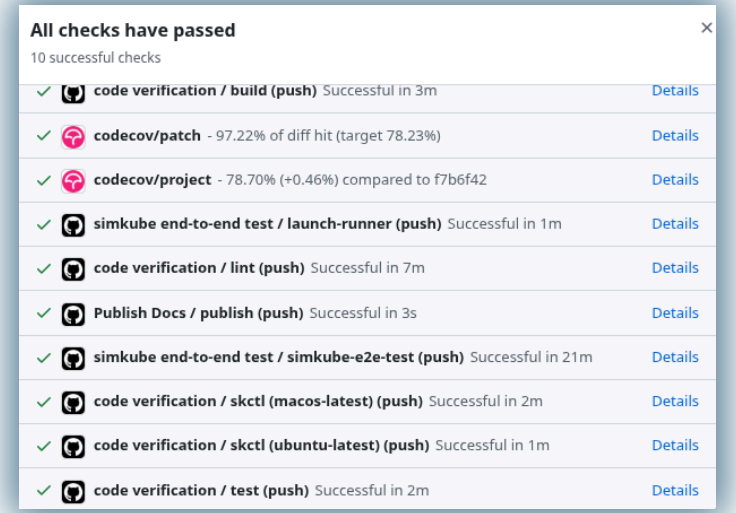


Demo Time!

Automate the whole thing

What if you could:

- Run a suite of simulations in CI based on your own production data
- Then when you need to upgrade you just click a button?



SimKube CI Action

How can SimKube help with upgrades?

Provisioning a simulation environment is **easy**.

How can SimKube help with upgrades?

Running tests in a simulation environment is **free**.

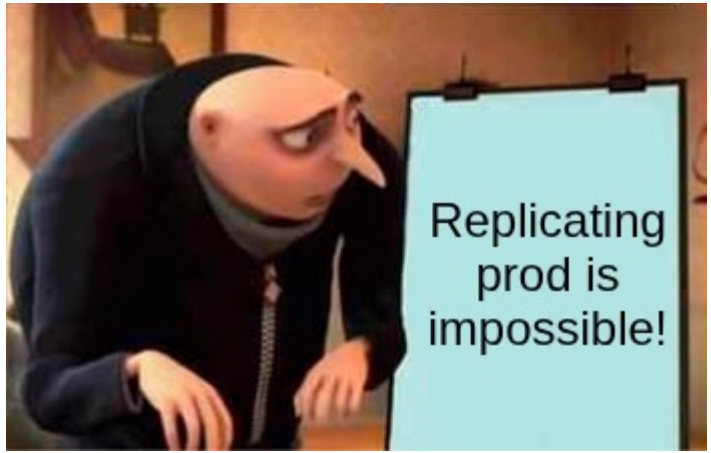
How can SimKube help with upgrades?

Replicating your production environment is **impossible**.

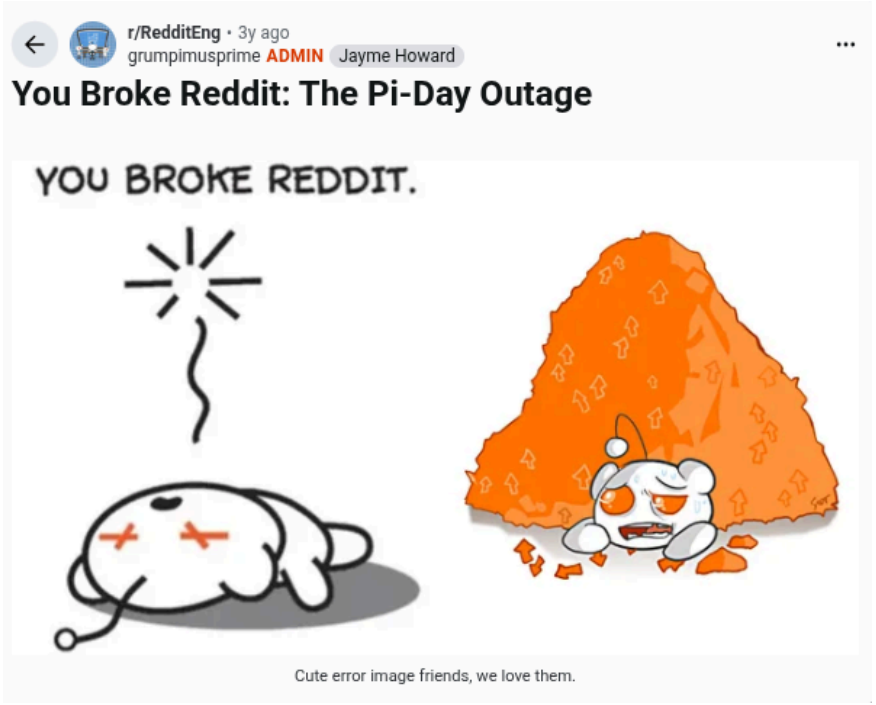
How can SimKube help with upgrades?

Replicating your production environment is **impossible**:

- Networking is right out
- Anything that relies on metrics isn't supported (yet)
- Interactions with cloud providers gets tricky



Revisiting Reddit: can you simulate it?



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Getting Started with SimKube

Slides and demo materials: https://github.com/acrlabs/srecon2026-simkube-slides

Run your first simulation

Read a case study

Contact me