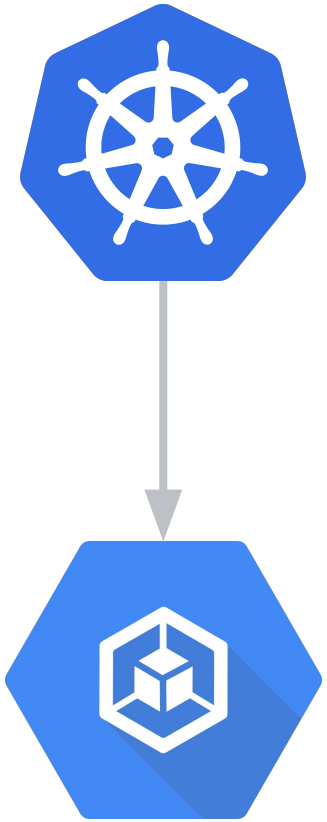
How Does Google Release Kubernetes in GKE

KubeCon Barcelona
May 2019



Google Cloud

Josh Hoak

Senior Software Engineer,
Google Cloud

Kobi Magnezi

Product Manager - Google Kubernetes Engine,
Google

Google Cloud

KubeCon

Agenda

1. An Intro to Google Kubernetes Engine
2. GKE Release Process
3. Component Based Releases
4. Managing Risks & Controlling Disruption

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An Intro to Google Kubernetes Engine

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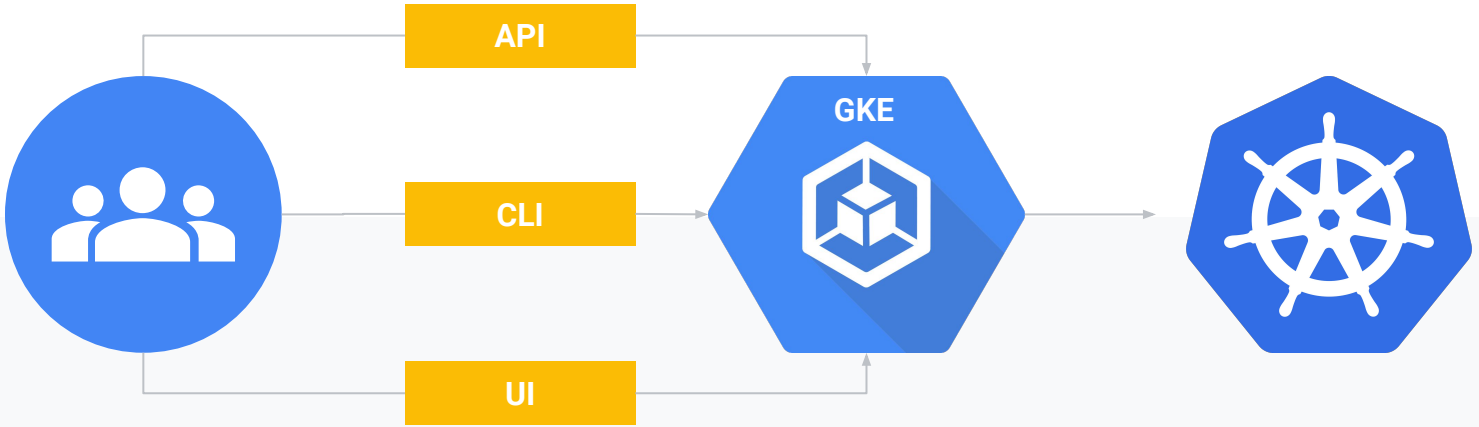
Google Kubernetes Engine Overview



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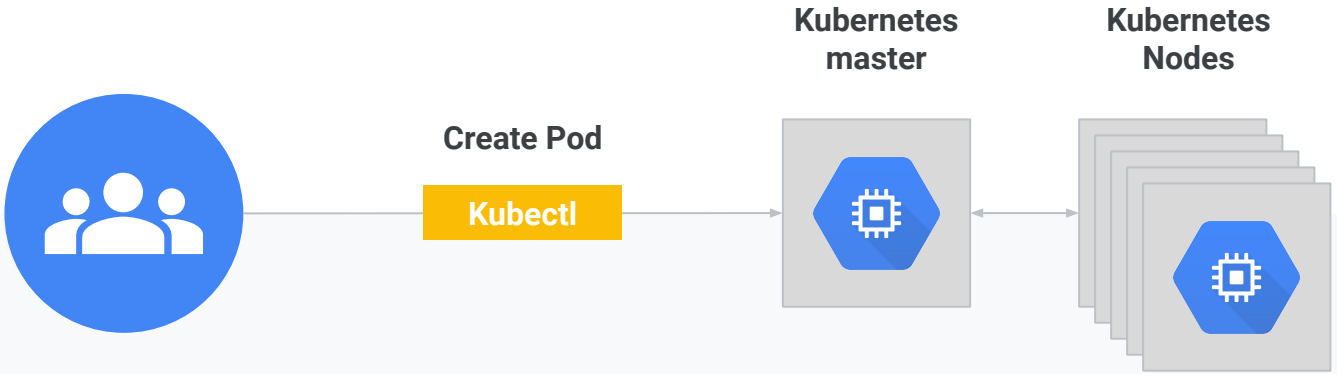
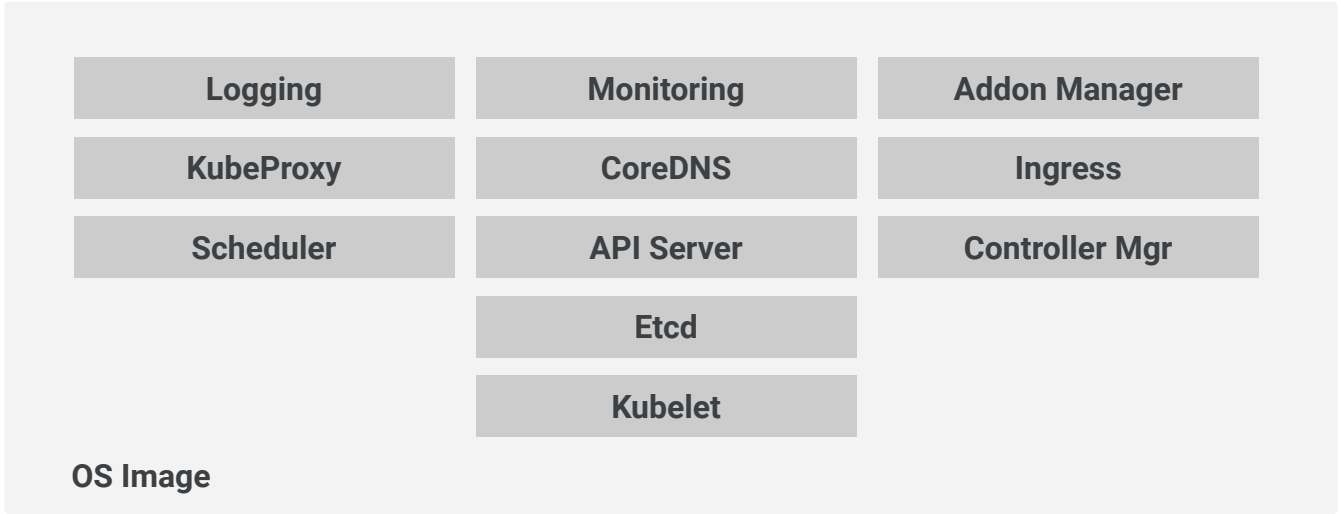
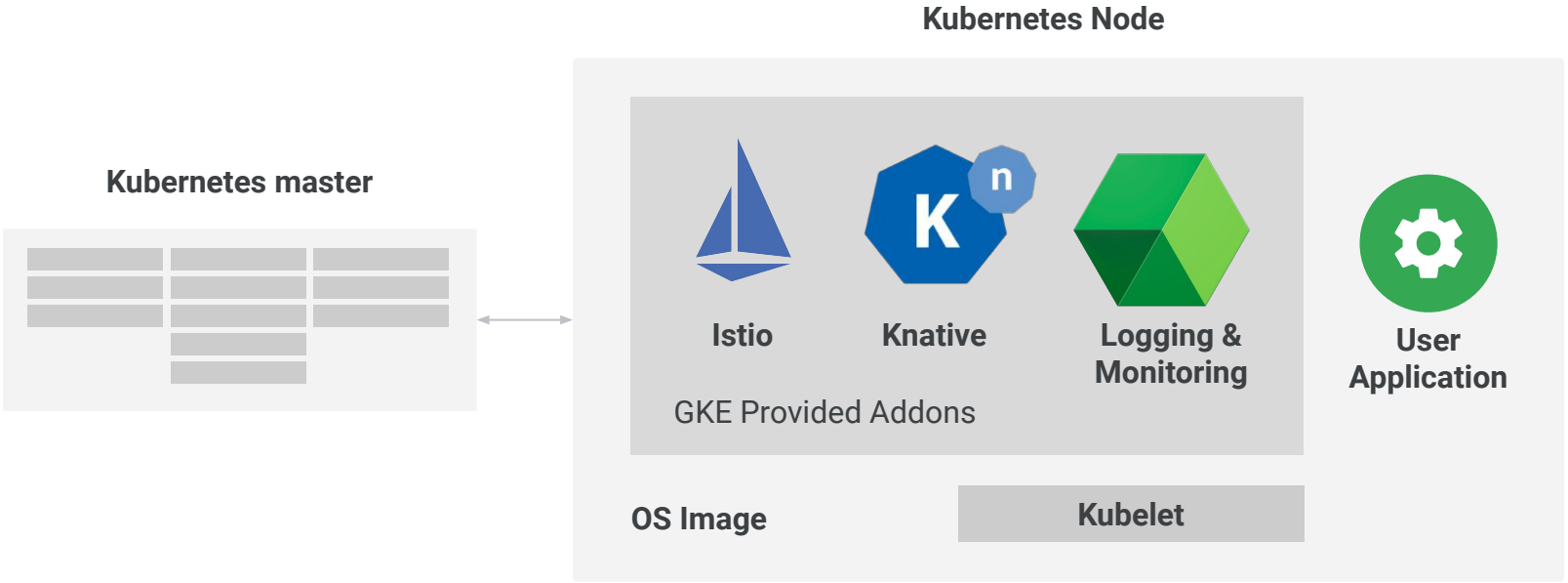
After Cluster Creation



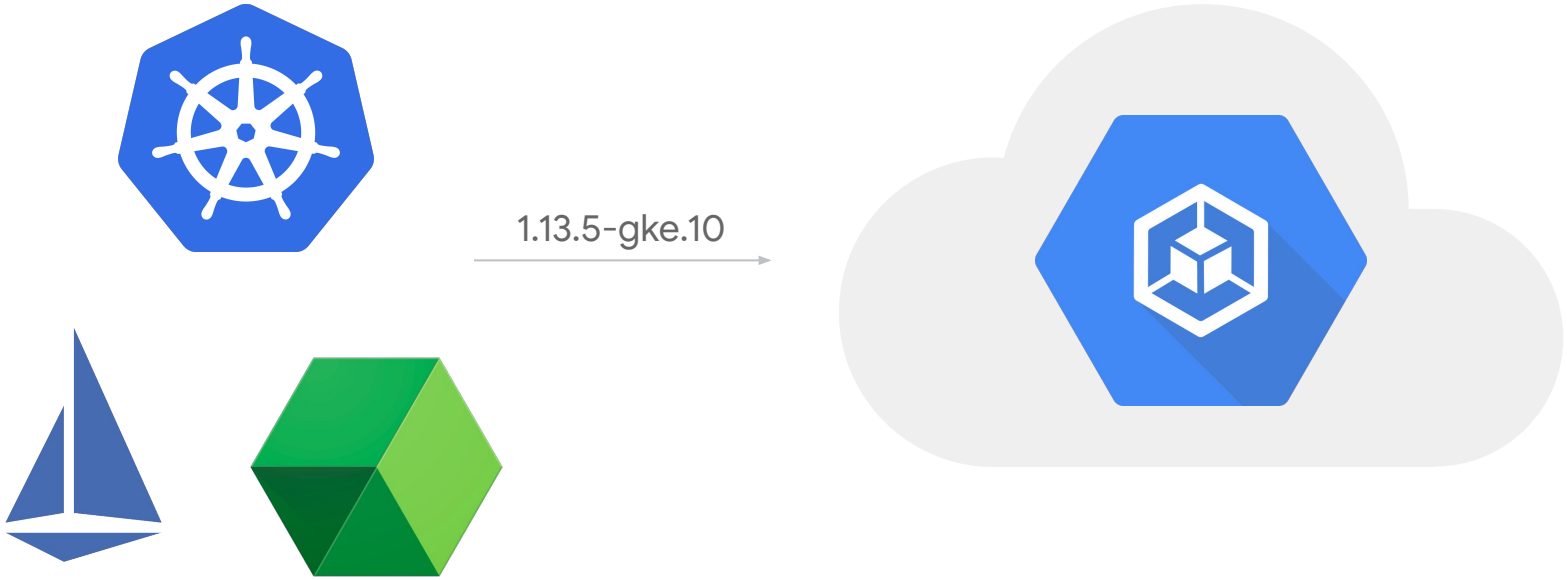
Master Components



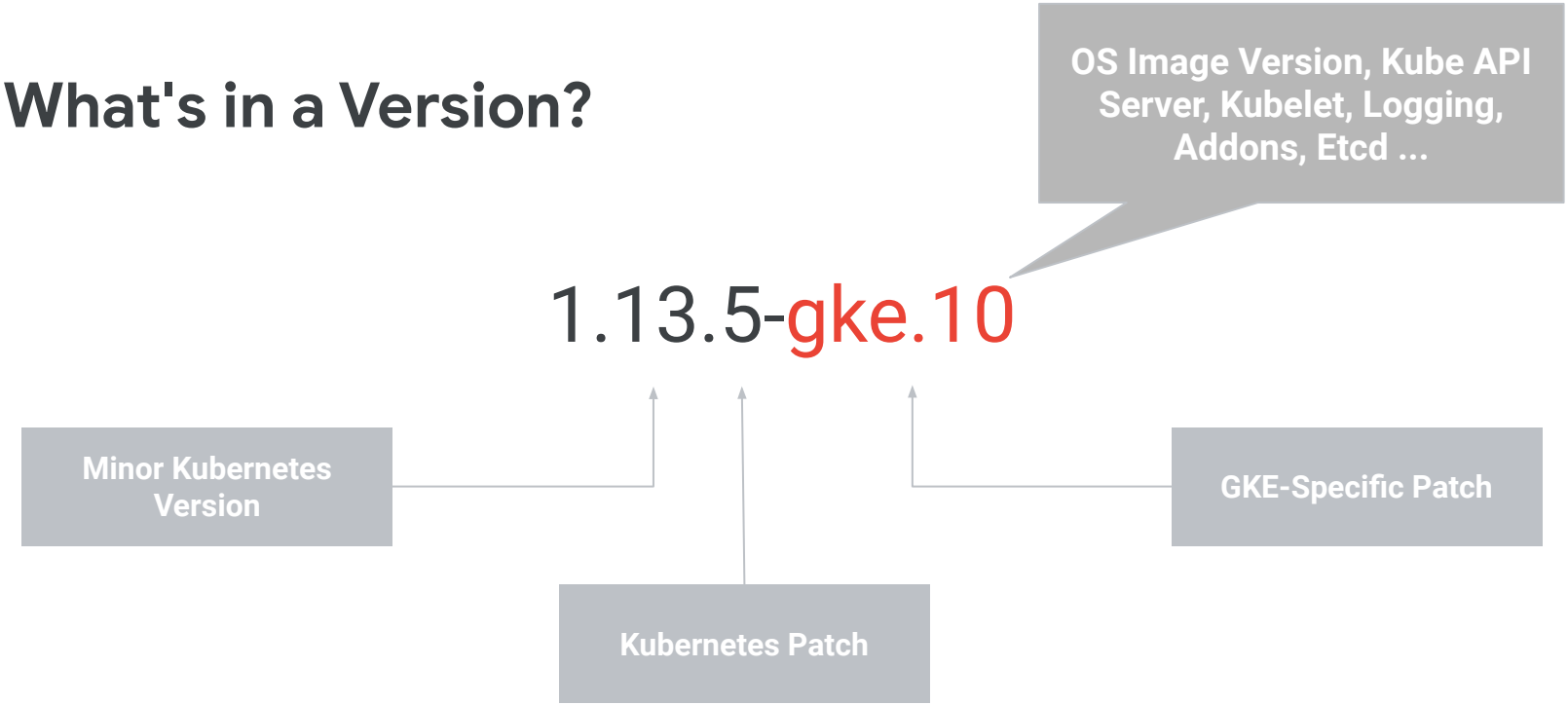
Node Components



Open Source to Google



What's in a Version?



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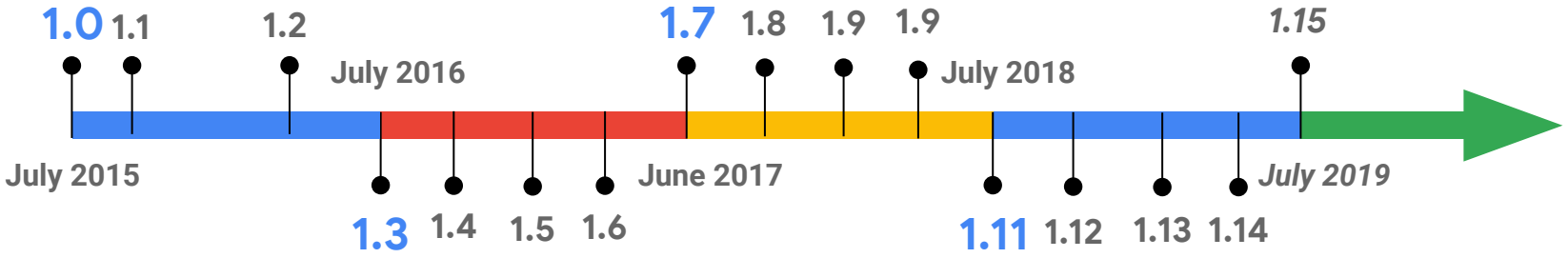
A Timeline of Kubernetes Releases
2015-2019



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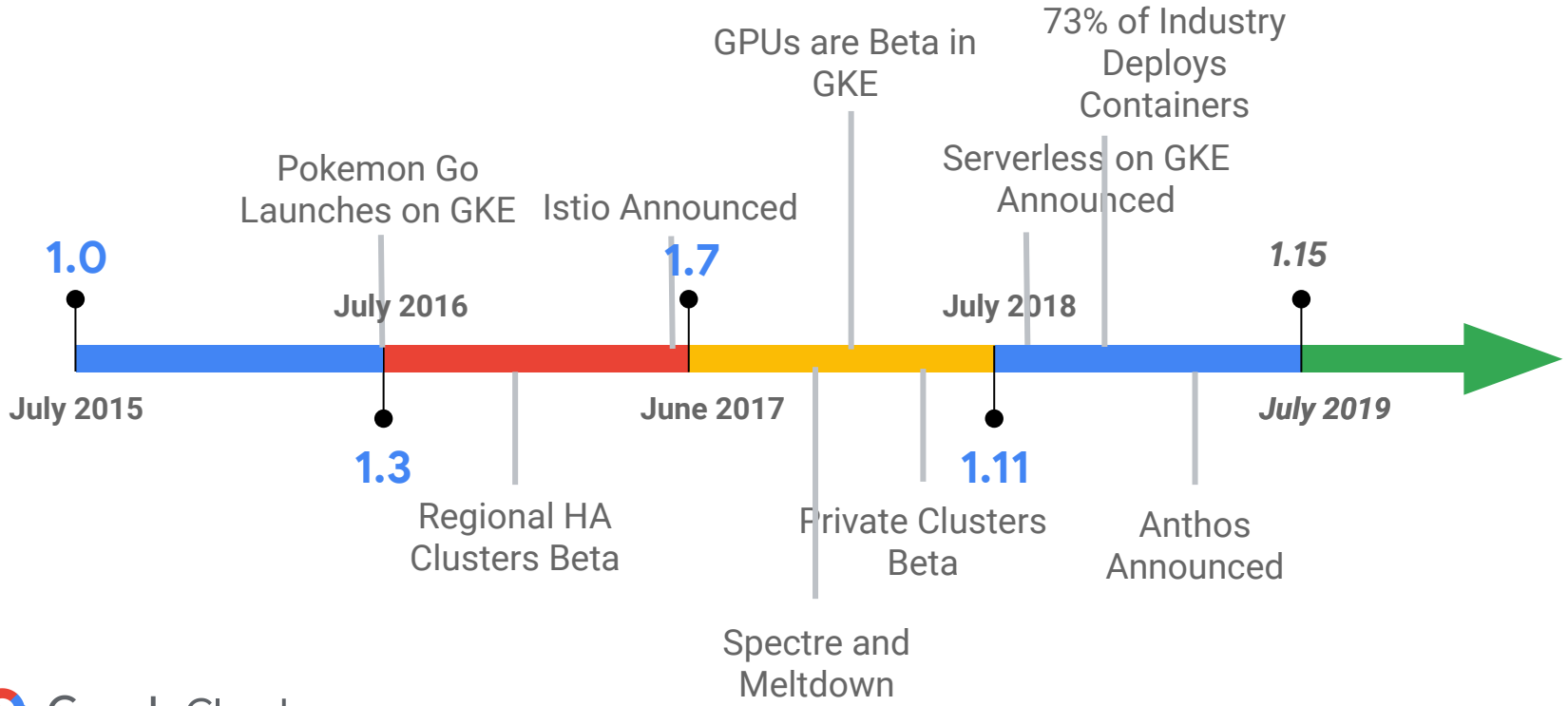

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Source: *CNCF Survey: Use of Cloud Native Technologies in Production Has Grown Over 200%, August 29, 2018*

Themes impacting release strategy

01

Market adoption

Vasrious market segments.

Variety of applications.

02

Growing ecosystem

More add-ons

More partners

03

Infrastructure

GPU, TPU

Networking features

GKE Release Process

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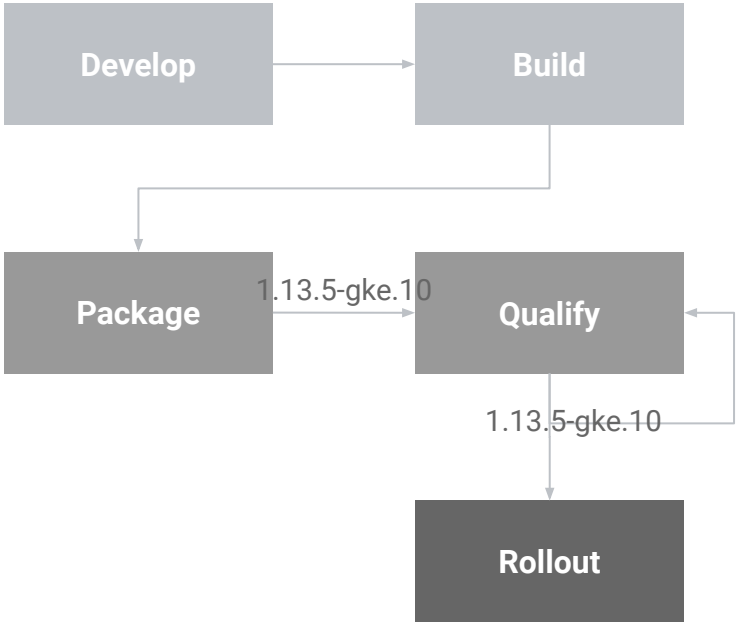
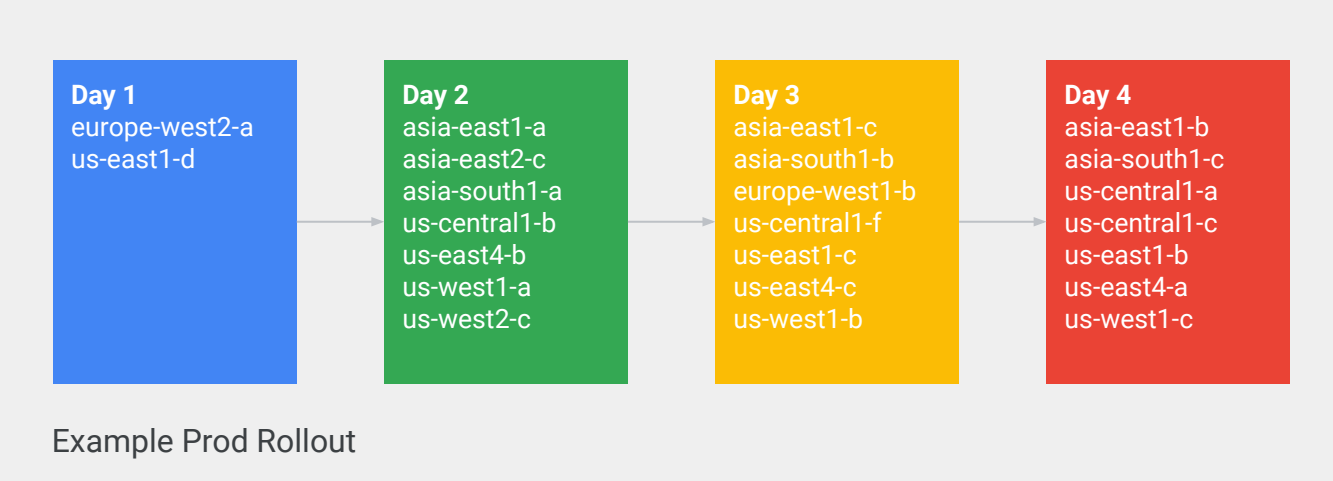
Release Lifecycle



Prod Rollout

https://cloud.google.com/kubernetes-engine/docs/release-notes



Example Prod Rollout

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Cluster Version

GKE Clusters have two versions

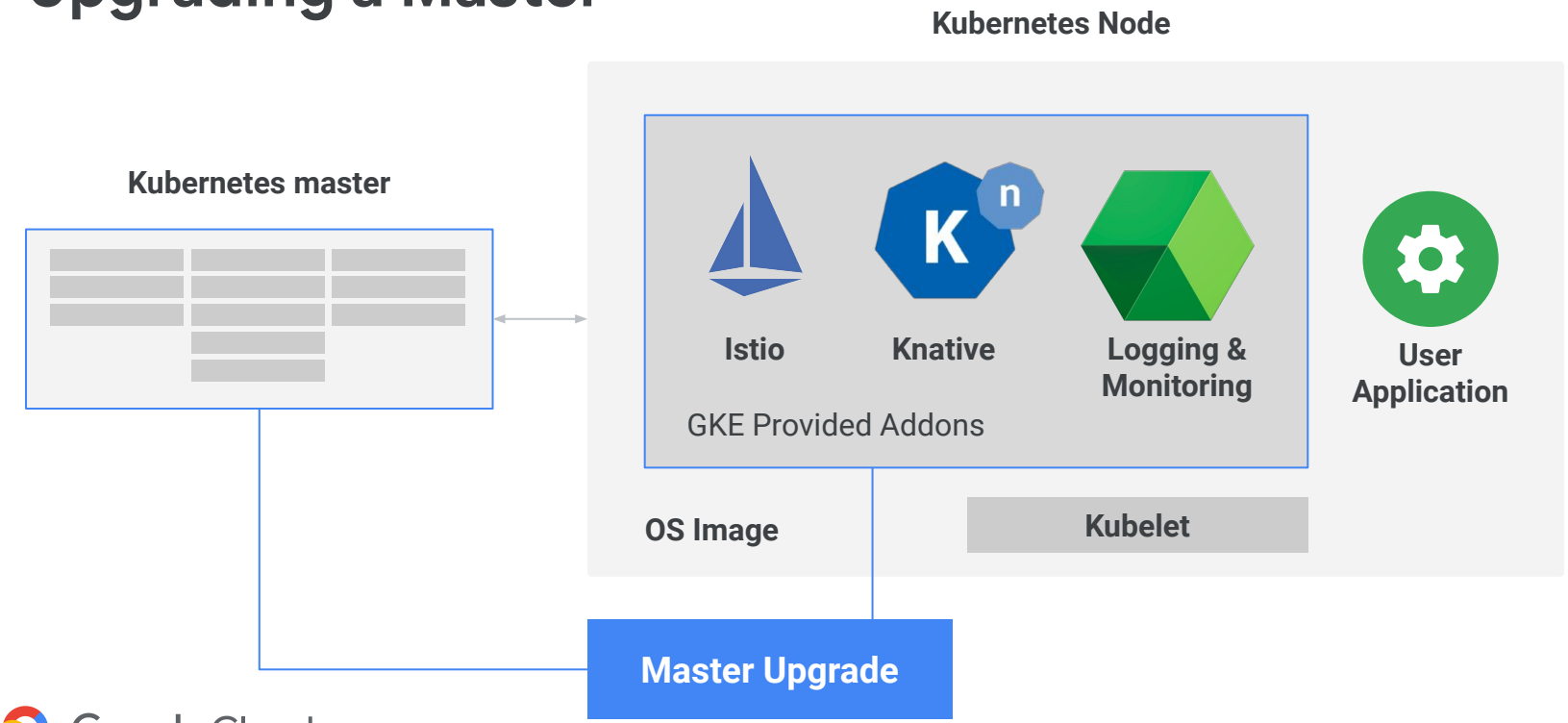
Master Version

The version of the Kubernetes on the Master. This encapsulates most of the Kubernetes software.

Node Version

The version of Kubernetes on the Node. In practice, this is mostly the version of the OS Image and the version of the Kubelet.

Upgrading a Master



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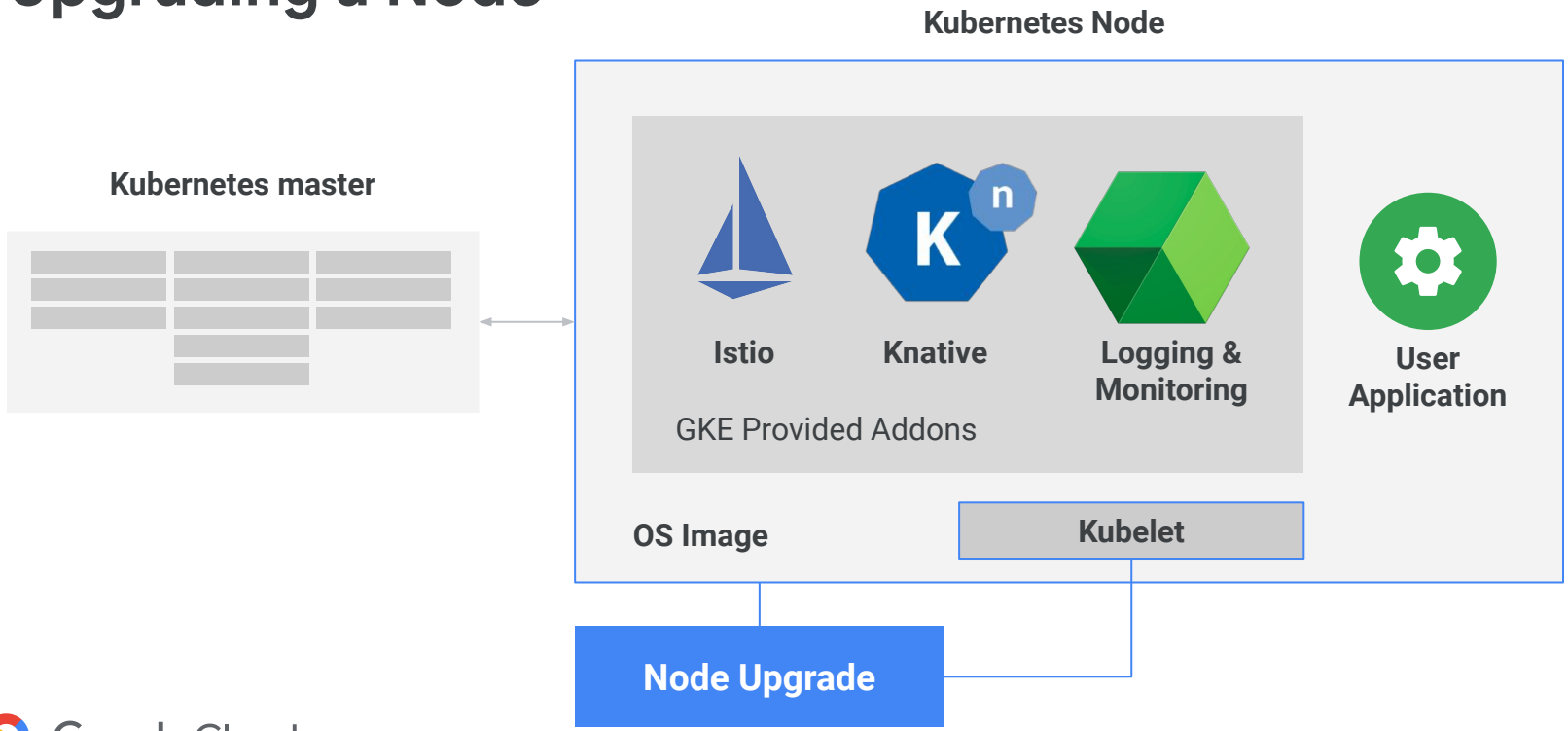
Upgrading a Node



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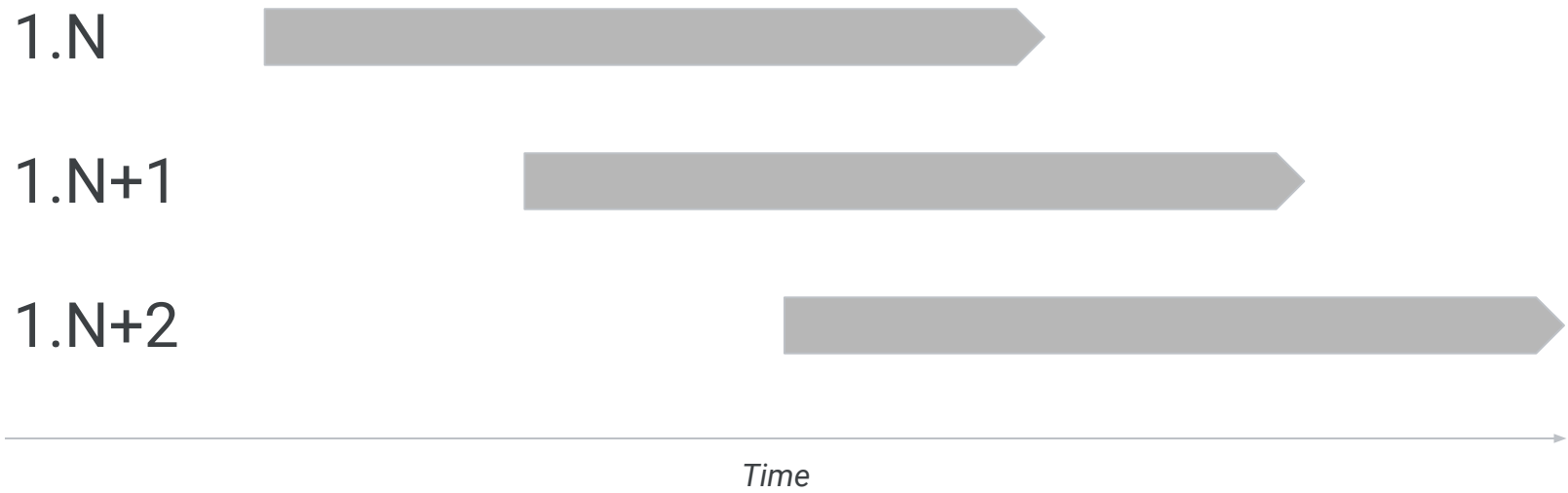
Version Lifecycle



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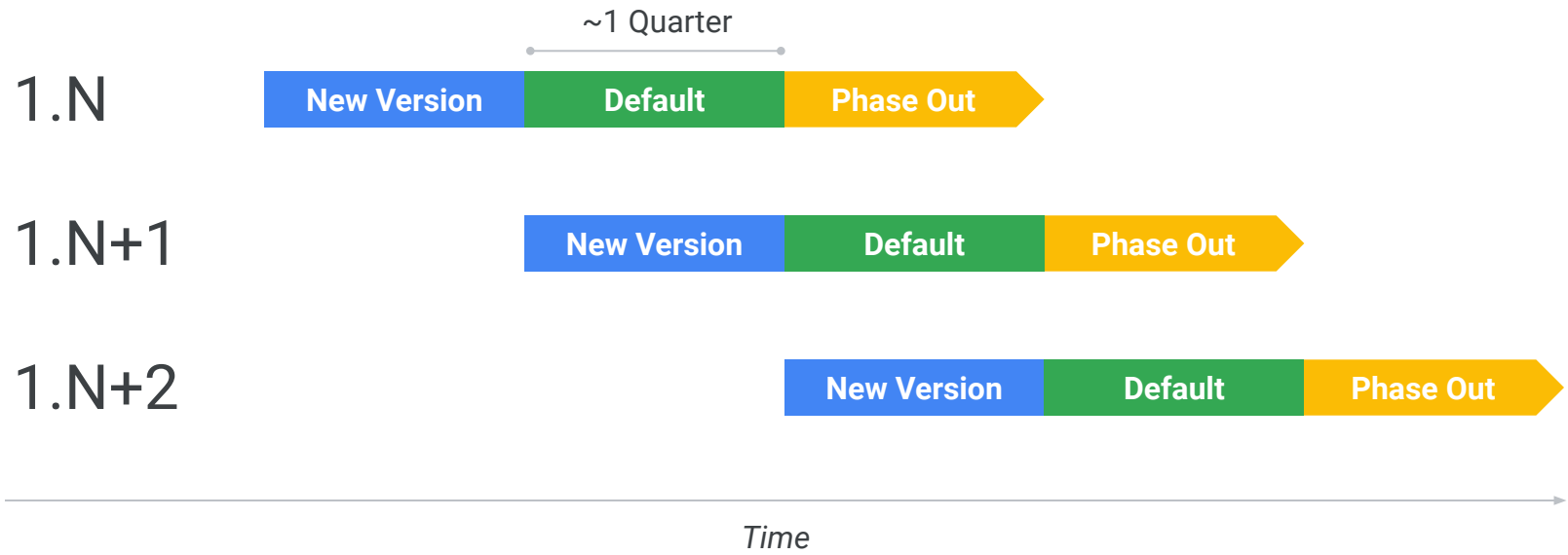
Version Lifecycle



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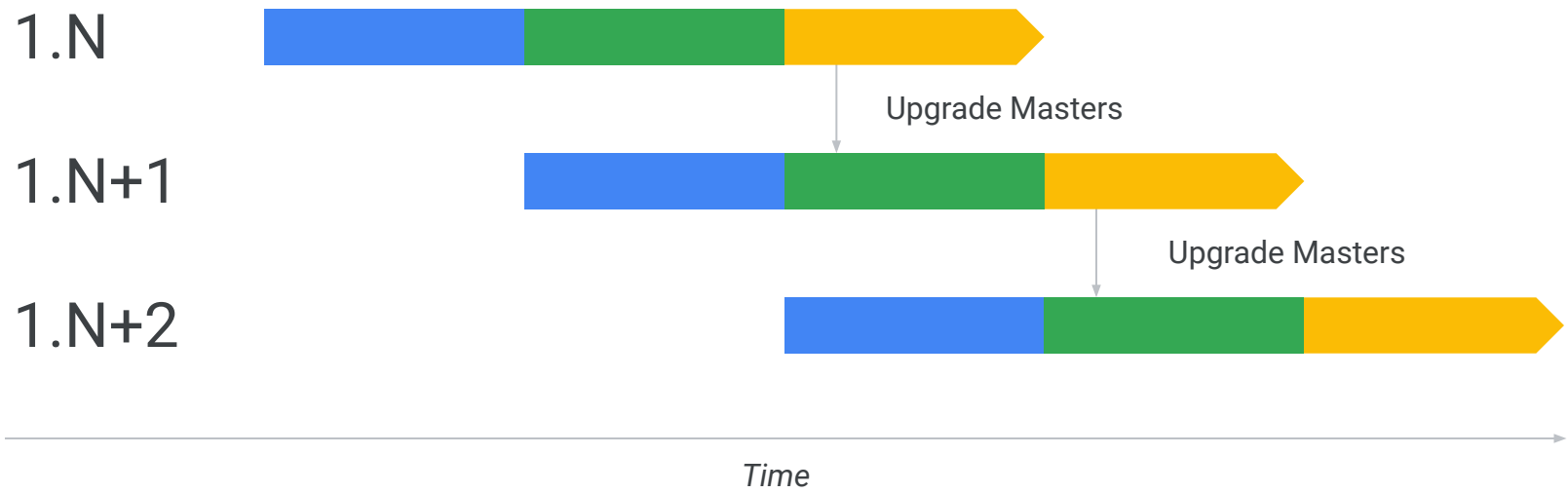
Upgrade Schedule: Masters



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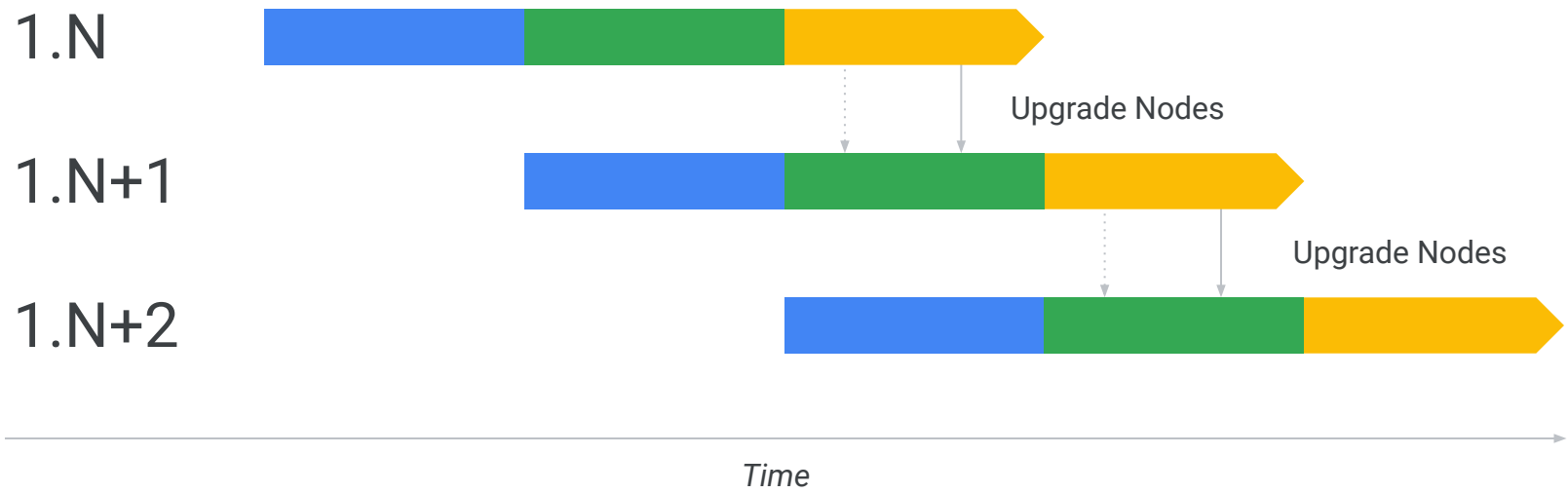
Upgrade Schedule: Nodes



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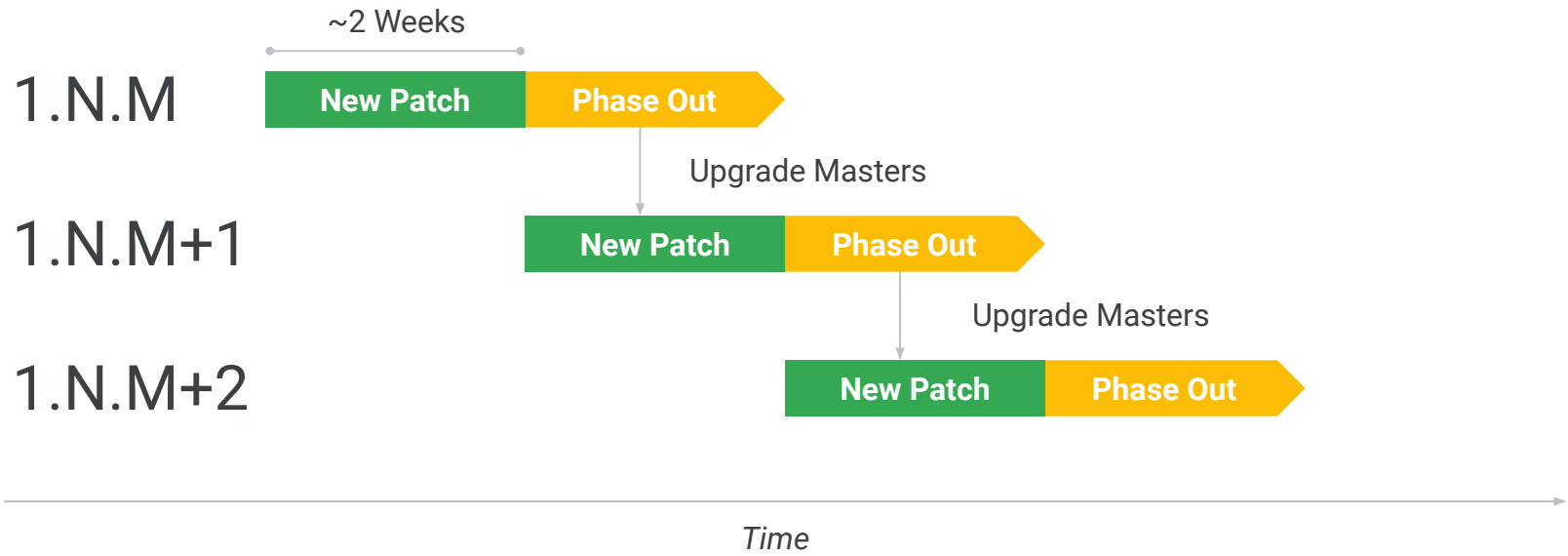
Version Lifecycle: Patches



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Component Based Releases

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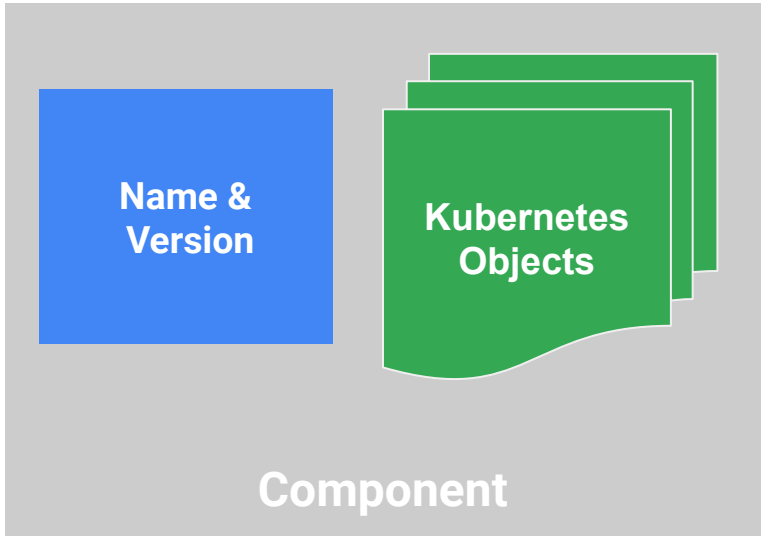
Enter: Component Based Releases

The **Cluster Bundle** is an open source project developed by the GKE team to provide tooling and infrastructure for building better GKE Releases for components. We are currently using the project for both **GKE on GCP** and **Anthos.**

See more at https://github.com/GoogleCloudPlatform/k8s-cluster-bundle

Components

A Flexible Packaging Solution



Under the Covers

```
apiVersion: bundle.gke.io/v1alpha1
kind: Component
spec:
  componentName: etcd-component
  version: 5.6.7
  objects:
  - apiVersion: v1
    kind: Pod
    metadata:
      name: etcd-server
    spec:
     ...
```

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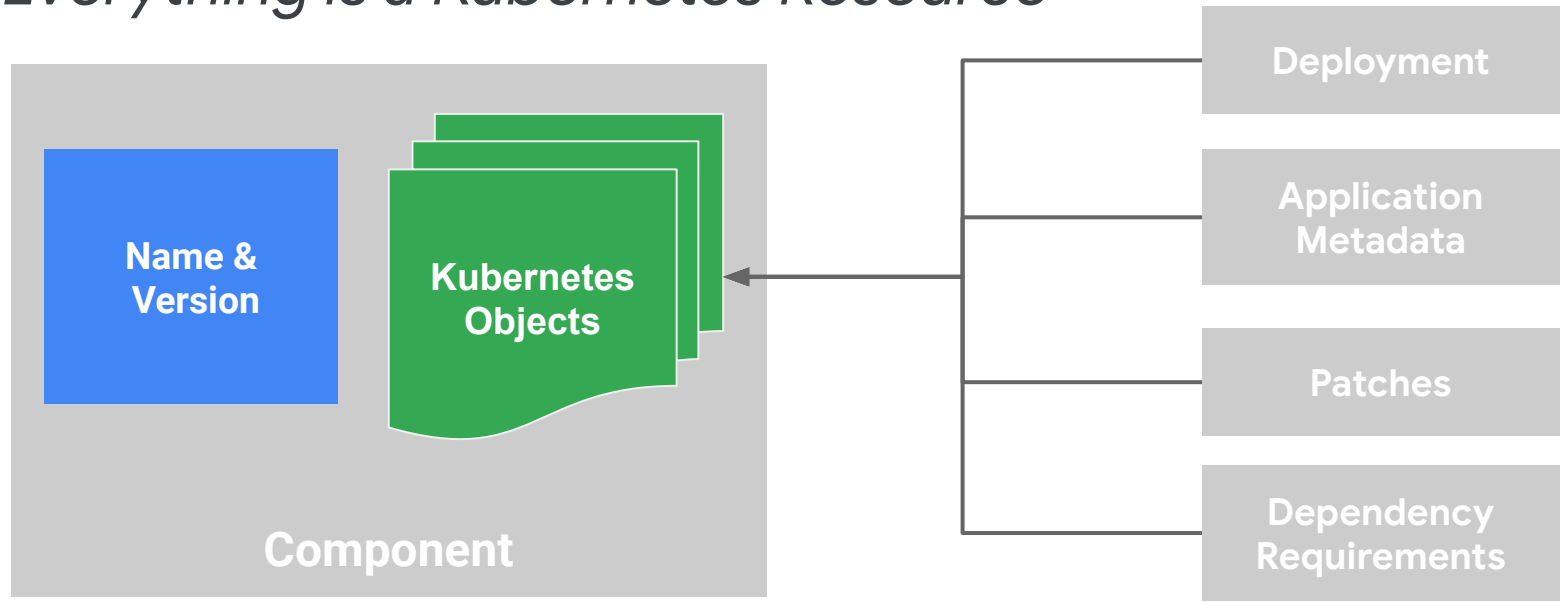
Components

Everything is a Kubernetes Resource



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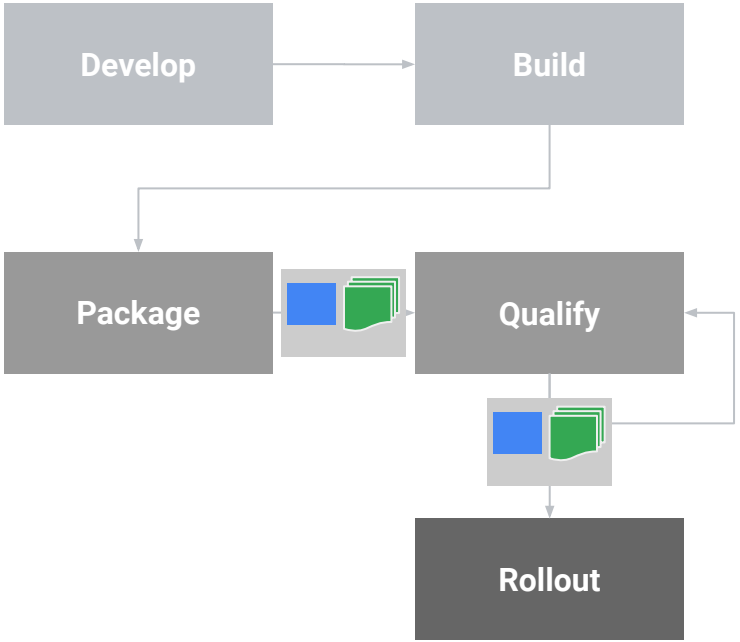
Release Lifecycle: Revisited



Component Based Releases

What does that mean practically?

Granular qualification

Improved release velocity for components

Common release infrastructure

https://github.com/GoogleCloudPlatform/k8s-cluster-bundle

Managing Risks & Controlling Disruption

ENTERTAINMENT \ TV SHOWS \ GAME OF THRONES

HBO confirms that Game of Thrones' Starbucks coffee cameo was a mistake

55

'We're sorry!'

By Chaim Gartenberg | @cgartenberg | May 6, 2019, 3:44pm EDT

SHARE

Customer Personas - One size doesn't fit all

Customer A have a multi-weeks certification cycles for every release. They are looking to align their internal certification process with GKE releases.

Customer B upgrade manually today for better control on what they get in every release. They're excited about the ability to test early versions of K8s and get a better time-to-market with new capabilities.

Customer C know how to operate Kubernetes, and want to adopt new features quickly, but roll them out to multiple clusters carefully. They rather validate upgrade on staging environment and control the roll out to different clusters targeting different users.

Source: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis non erat sem

Release Channels

We now offer ways for customers to opt-into **release channels**, which are streams of Chrome-like, automated updates. Release channels enable customers to choose a release cadence and feature set to match their risk preference.

```
gcloud alpha container clusters create [CLUSTER_NAME] --release-channel rapid
```

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Release Notes

We maintain extensive release notes on both the Kubernetes release page and on the GKE release page. This is your best ally in learning about new features, bugs, breaking changes, rollout schedule, and deprecated versions.

New versions available for upgrades and new clusters

The following Kubernetes versions are now available for new clusters and for opt-in master upgrades and node upgrades for existing clusters:

V1.11.X | V1.12.X | V1.13.X | RAPID CHANNEL

v1.11.9-gke.13

- Improvements to Vertical Pod Autoscaler
- Improvements to Cluster Autoscaler
- Cloud Run for GKE now uses the default Istio sidecar injection behavior
- Fix an issue that prevented the kubelet from seeing all GPUs available to nodes using the Ubuntu node image.

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Node Auto Upgrades

Node Auto Upgrades allow GKE to auto-upgrade customer nodes

Strategy: We recommend turning on **node auto upgrades** for most clusters.

```
gcloud container clusters create [NAME] --zone [ZONE] --enable-autoupgrade
```

More at https://cloud.google.com/kubernetes-engine/docs/how-to/node-auto-upgrades

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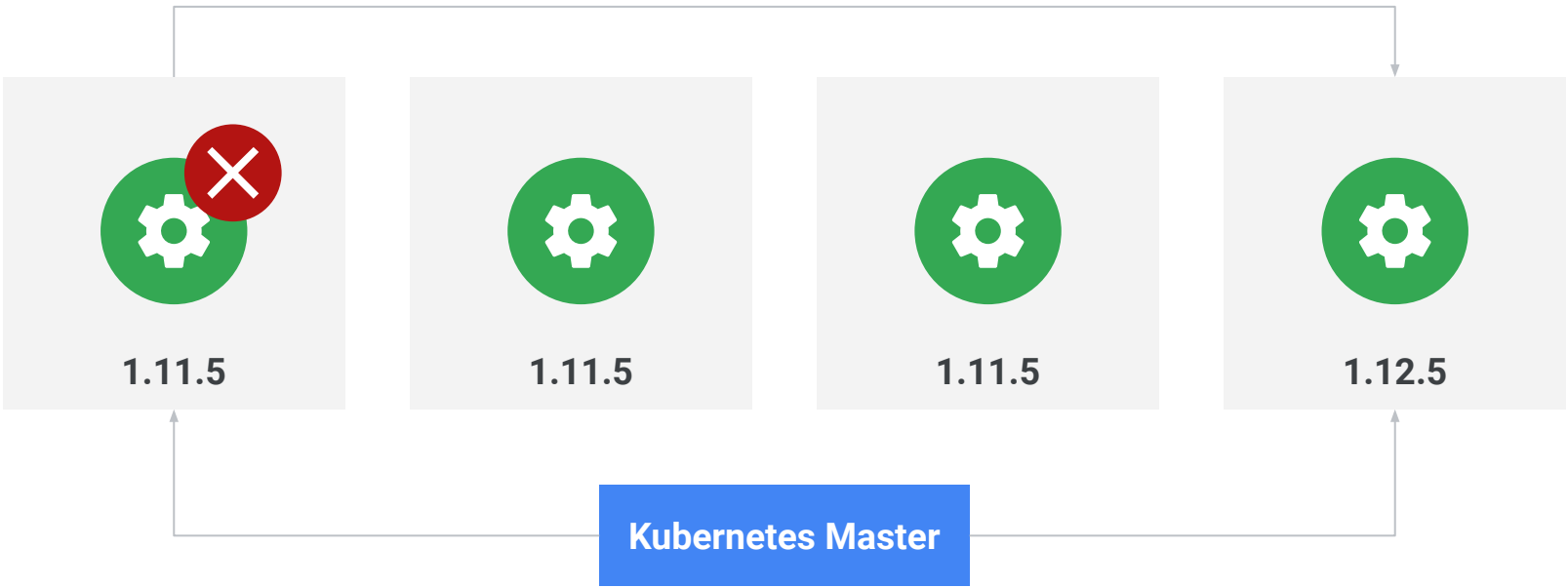
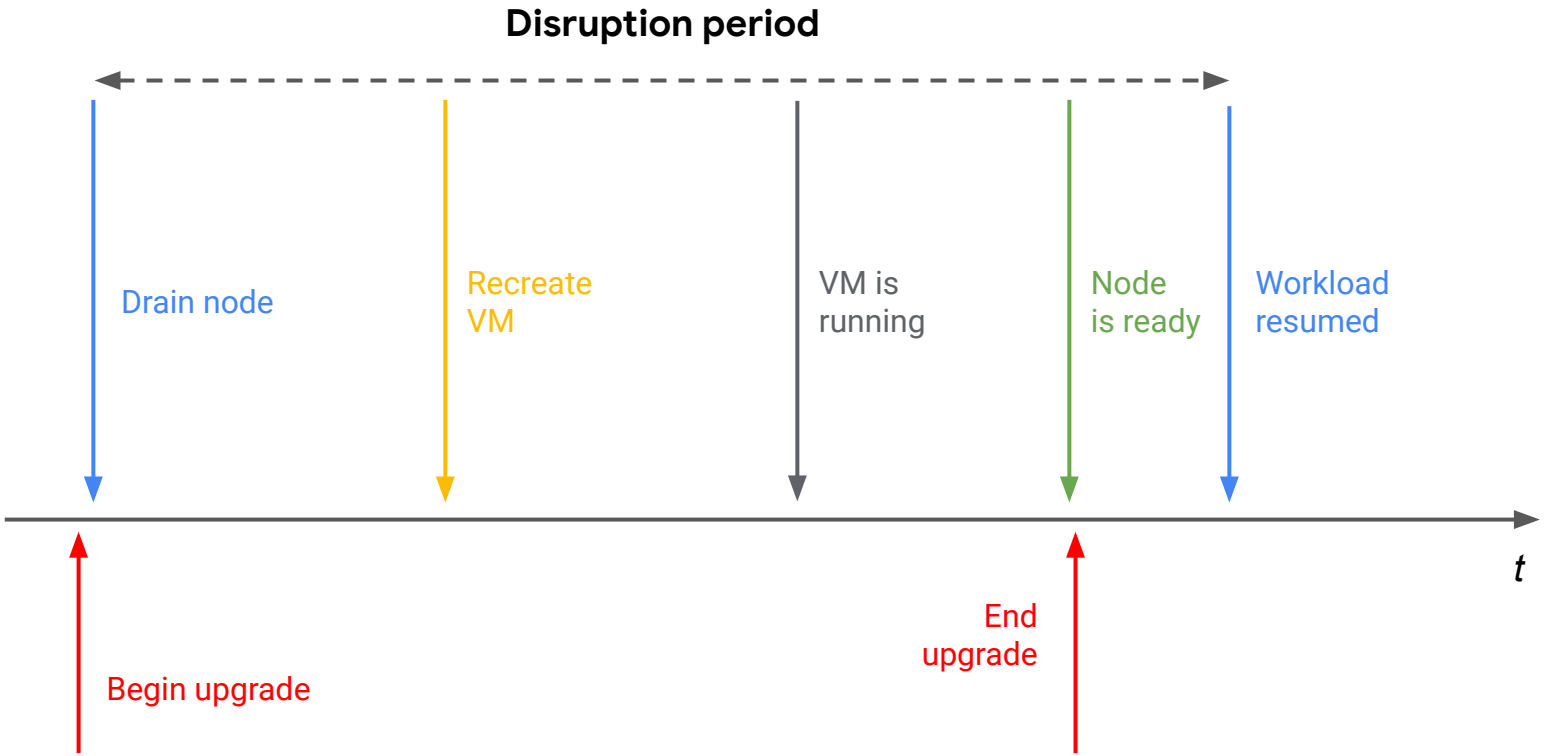
Node Surge Upgrade





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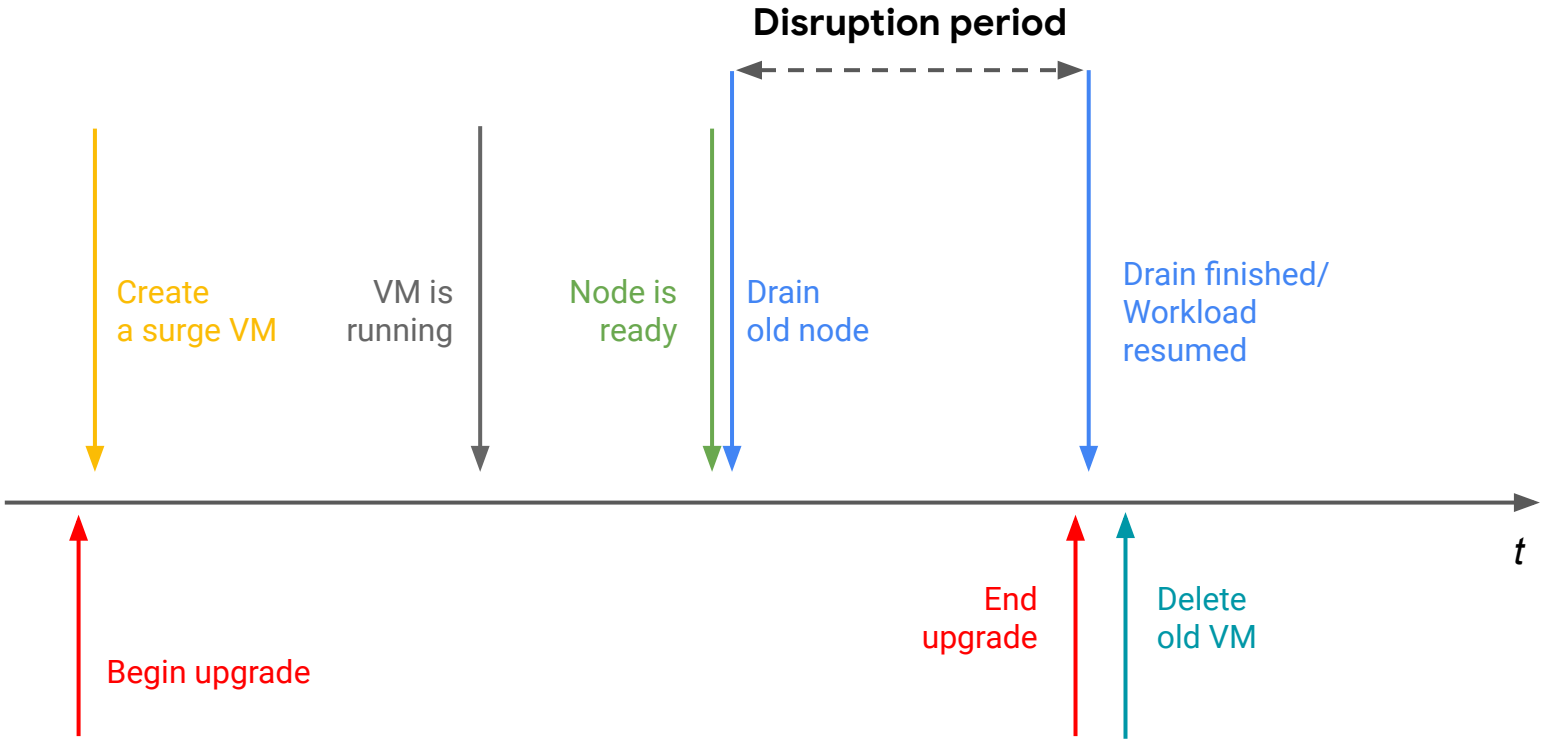

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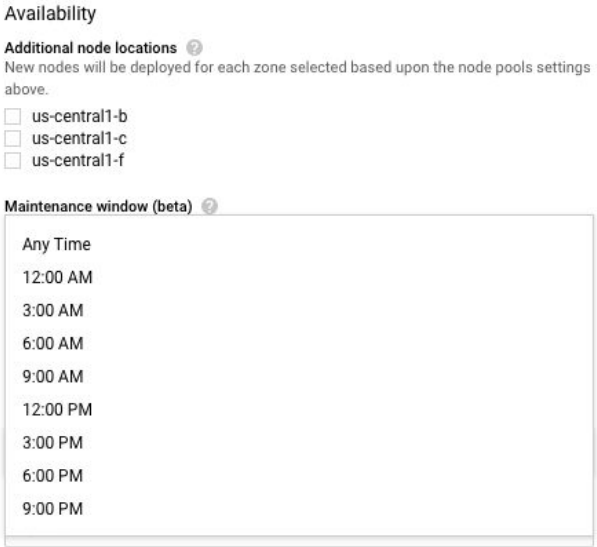
Maintenance Windows

Maintenance windows allow customers to indicate to GKE when master and node upgrades should occur during the day, within a 4-hour window.

Enhanced Maintenance windows addresses other use cases:

1. If you prefer to avoid upgrades during weekends.
2. You're a retailer, and prefer to avoid upgrades during specific dates (e.g. Black Friday / Cyber Monday)
3. You need to postpone (snooze) a schedule upgrade for a short period of time.



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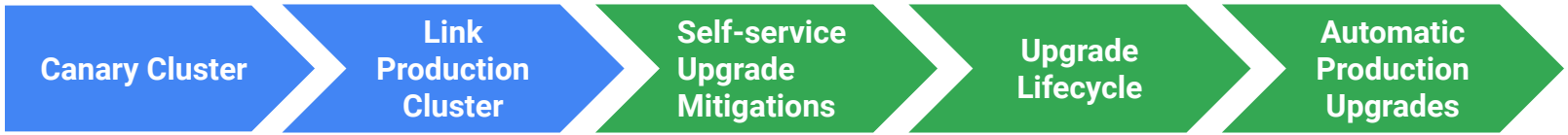
Canary Clusters

Canary clusters enable customers to create a **canary cluster** and link it with their respective **production cluster(s).** GKE will roll out new versions to canary clusters first, allowing customers to run automated tests on the new version. Roll out to production clusters will be conditioned on the successful pass of the automated test.

The Goal: Mitigate risk of rolling our new versions to existing clusters.



* Details TBD. Subject to change

Bringing it all together

With the growing market adoption, ecosystem, and evolving infrastructure, we strive to continuously improve our release strategy in a way that optimizes for both **velocity** and **low-disruption**.

Thank you

Keep the conversation going!

Josh Hoak jhoak@google.com

Kobi Magnezi kobim@google.com

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