Making an Internal Kubernetes Offering Generally Available

James Wen - jameswen@spotify.com
@rochesterinnyc

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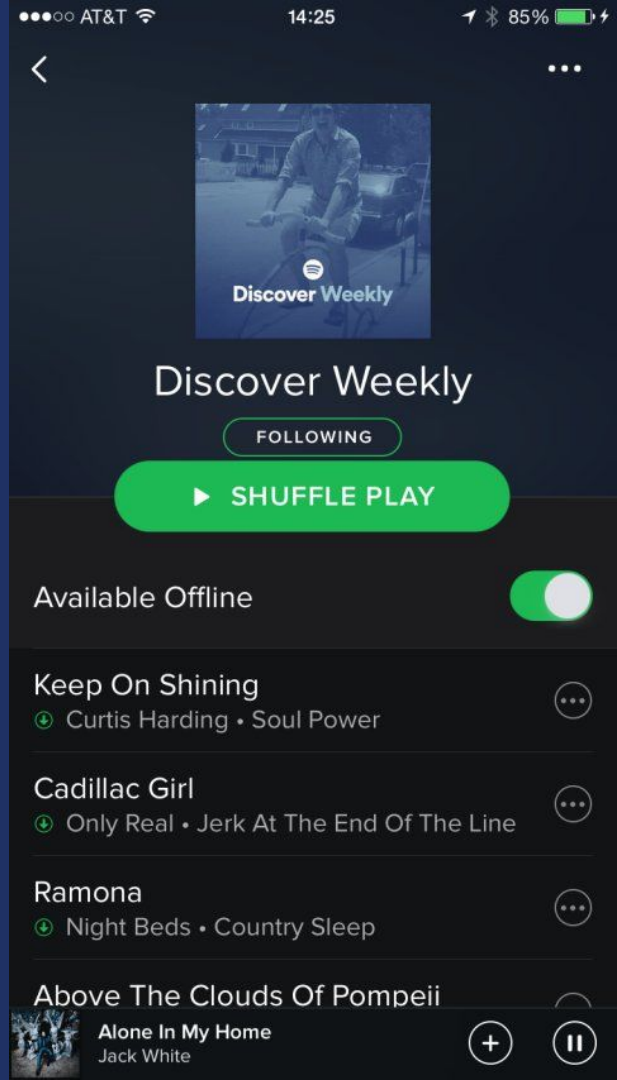
About Me

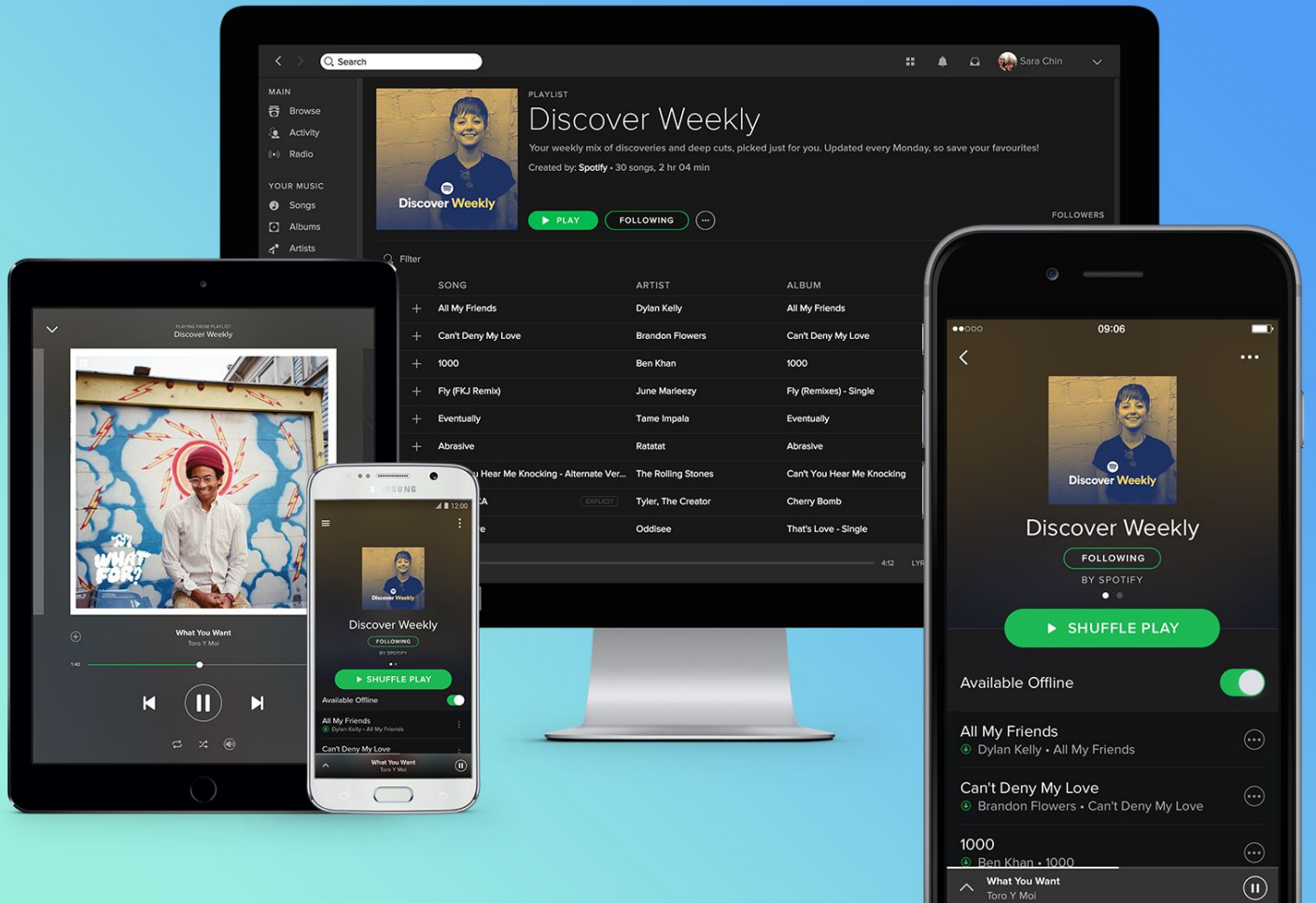
- Senior Site Reliability Engineer
- Once Provisioning + DNS
- Core Infra: Deployment + Kubernetes Migration



Agenda

- Intro Spotify/Ops/Runtime
- GA Journey
- Learnings/Takeaways

Spotify


Search
Sara Chin
MAIN
Browse
Activity
Radio
YOUR MUSIC
Songs
Albums
Artists
PLAYLIST
Discover Weekly
Your weekly mix of discoveries and deep cuts, picked just for you. Updated every Monday, so save your favourites!
Created by: Spotify • 30 songs, 2 hr 04 min
PLAY
FOLLOWING
FOLLOWERS
Filter
SONG
ARTIST
ALBUM
All My Friends
Dylan Kelly
All My Friends
Can't Deny My Love
Brandon Flowers
Can't Deny My Love
1000
Ben Khan
1000
Fly (FKJ Remix)
June Marieezy
Fly (Remixes) - Single
Eventually
Tame Impala
Eventually
Abrasive
Ratatat
Abrasive
Tyler, The Creator
Cherry Bomb
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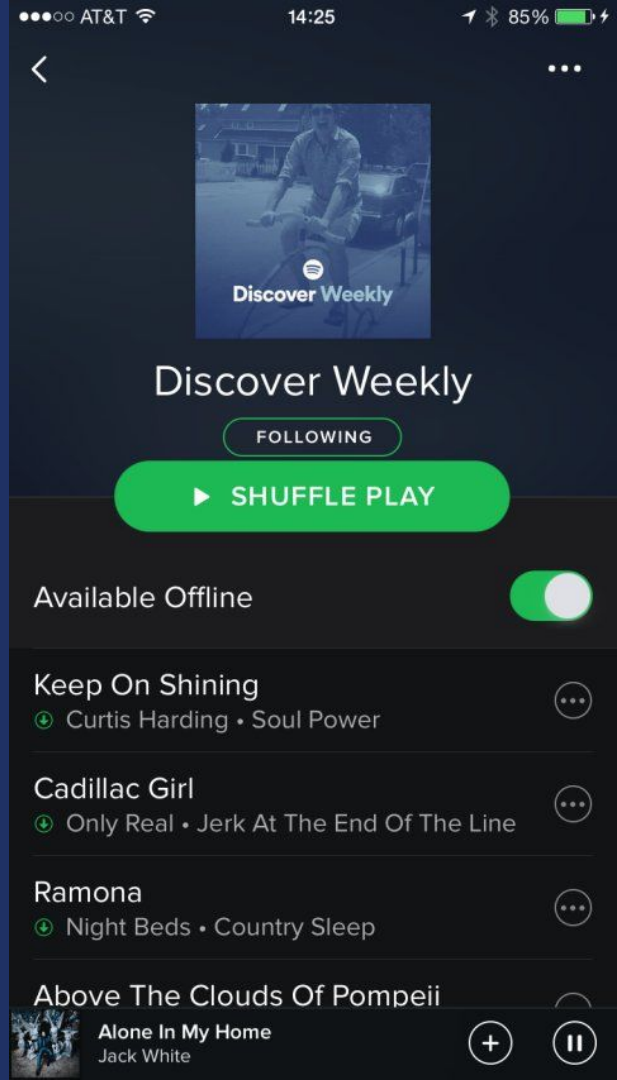
That's Love - Single
09:06
Discover Weekly
FOLLOWING
BY SPOTIFY
SHUFFLE PLAY
Available Offline
All My Friends
Dylan Kelly • All My Friends
Can't Deny My Love
Brandon Flowers • Can't Deny My Love
1000
Ben Khan • 1000
What You Want
Toro Y Moi

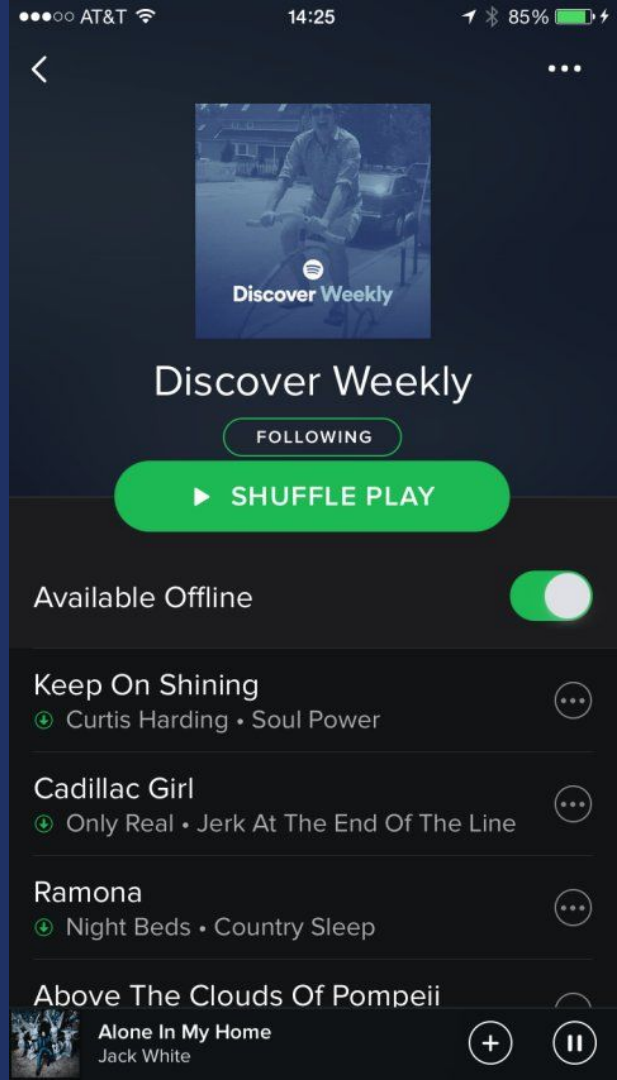
About Us

- 248M+ active users
- 113M+ subscribers
- 50M+ songs
- 500K+ podcasts
- 3B+ playlists



About R&D

- 280+ teams
- 1500+ engineers
- 1200+ microservices
- 8M+ client requests/s
- Half trillion events captured per day



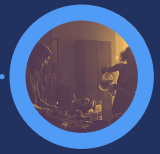
Operations at Spotify

Complete Team Autonomy

Ops in Teams

Core Infrastructure Org

Golden Path



Centralized Ops

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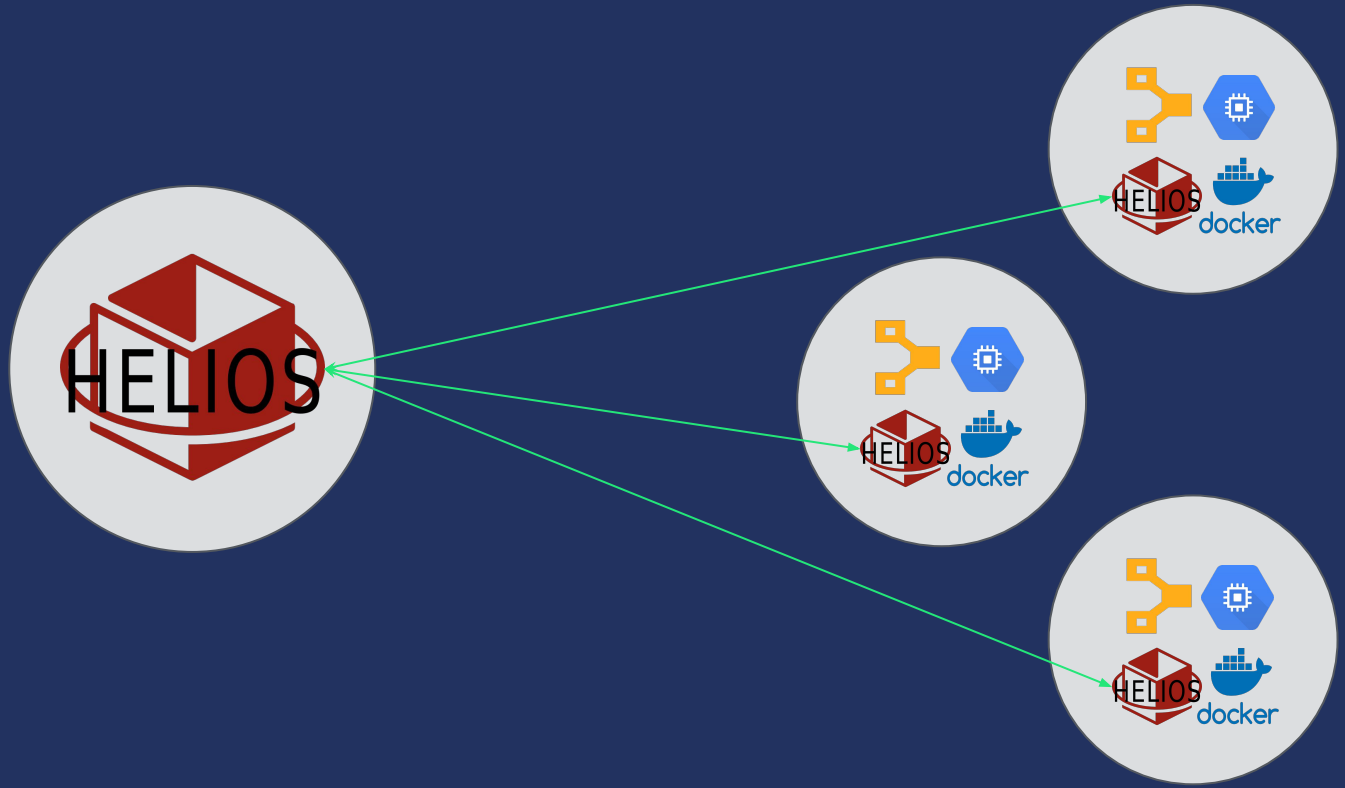
Old Runtime



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New Runtime

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New Runtime*

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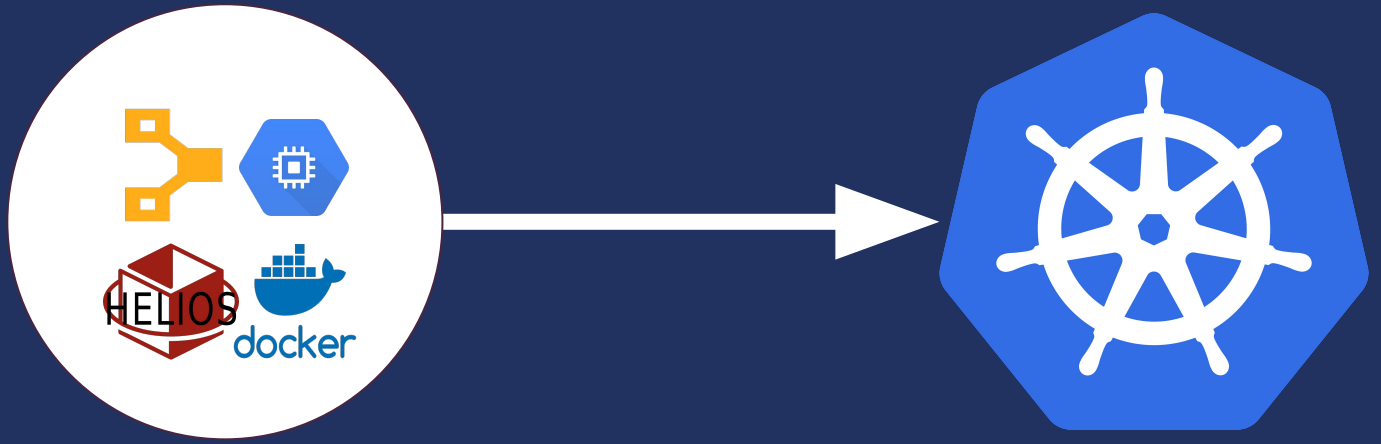
Kubernetes: How We're Migrating



Goal/Scope: Run all stateless backend services at Spotify on Kubernetes.
Migrating Spotify's Runtime to Kubernetes: https://www.youtube.com/watch?v=US4ttqOO-V4

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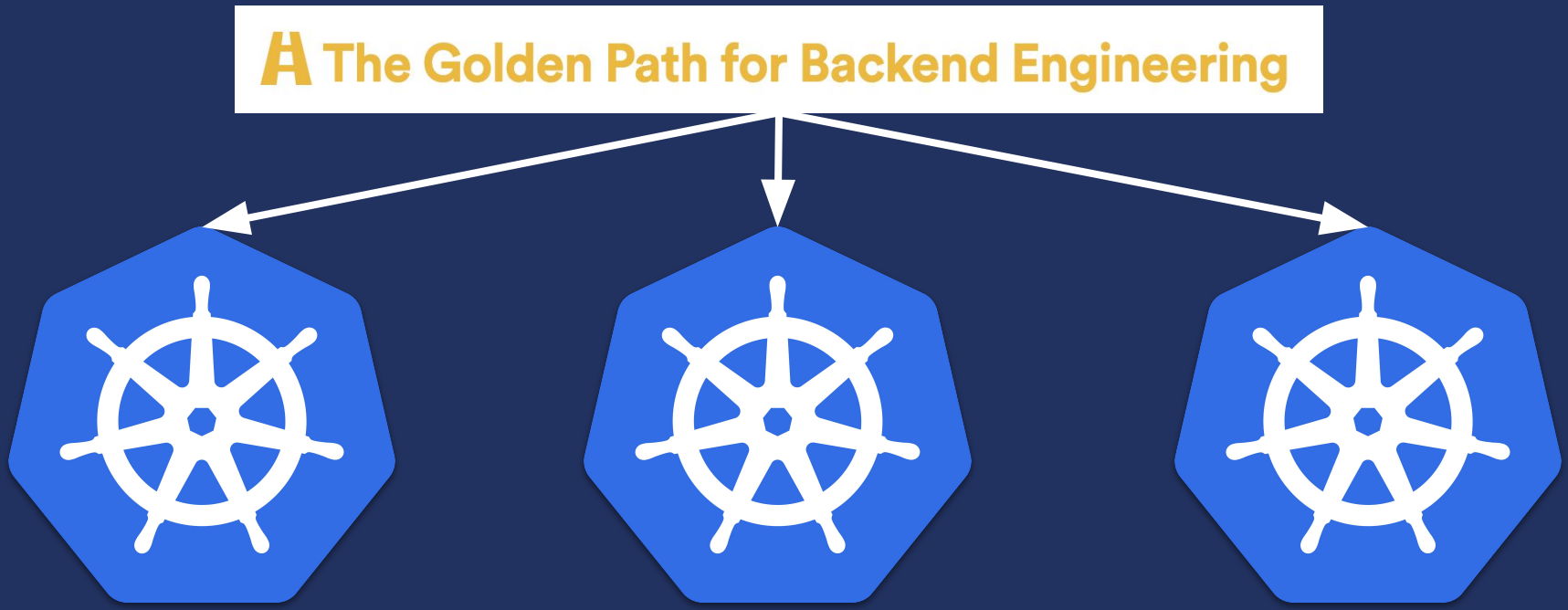
GA Phase: Golden Path



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Operational Observability and Reliability

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Multicluster Strategy: Management

- Automated scripts → Declarative
- Terraform
- How Spotify Accidentally Deleted All its Kube Clusters with No User Impact - David Xia: https://kccnceu19.sched.com/event/MQbb/keynote-how-spotify-accidentally-deleted-all-its-kube-clusters-with-no-user-impact-david-xia-infrastructure-engineer-spotify

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Multicluster Strategy: Management

Offload cluster management if possible.

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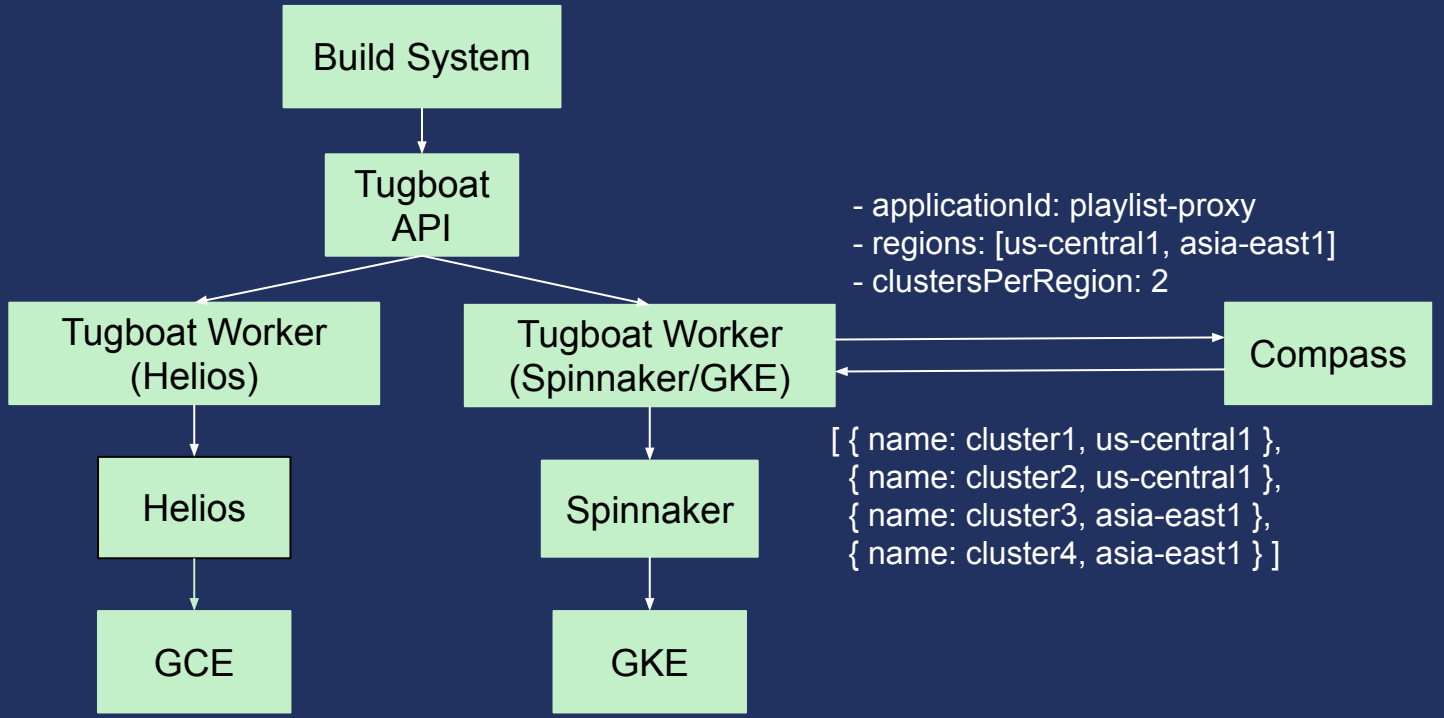
Multicluster Strategy: Deployment

Tugboat + Compass (deployment layer):



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Multicluster Strategy: Compass

- Sticky assignment of apps —> clusters

- Main Milestones:
  1. Selection of clusters randomly
  2. Selection of clusters based on available capacity
  3. Ability to deploy an app to N clusters per region

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Multicluster Strategy: Deployment

Keep it simple for developers to reason about.

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Multicluster: Other Talks

To Infinite Scale and Beyond: Operating Kubernetes Past the Steady State

- Austin Lamon, Spotify & Jago Macleod, Google
- Wednesday (Nov 20) from 3:20pm - 3:55pm
  https://kccncna19.sched.com/event/UaYk/to-infinite-scale-and-beyond-operating-kubernetes-past-the-steady-state-austin-lamon-spotify-jago-macleod-google

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Operational Metrics/Alerts

- Monitoring on integration components
  - error
  - latency
  - saturation
- Smoke test —> periodic deploys
- Metrics for:
  - available cluster capacity
  - status of backups
  - scheduling

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Operational Metrics/Alerts

Establish trust through monitoring.

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DiRTing

- Disaster Recovery Testing

- Planned and executed DiRTs
  - Cluster deletions
  - Master being down

- Validation and improvement of:
  - Metrics + Alerting
  - Playbooks
  - Backups

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DiRTing

Plan for and simulate failures.

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Business Impact

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Metrics Tracking

- Metrics/Dashboard to track for us:
  - Resource Utilization
  - Cost
  - % apps migrated
  - Developer productivity

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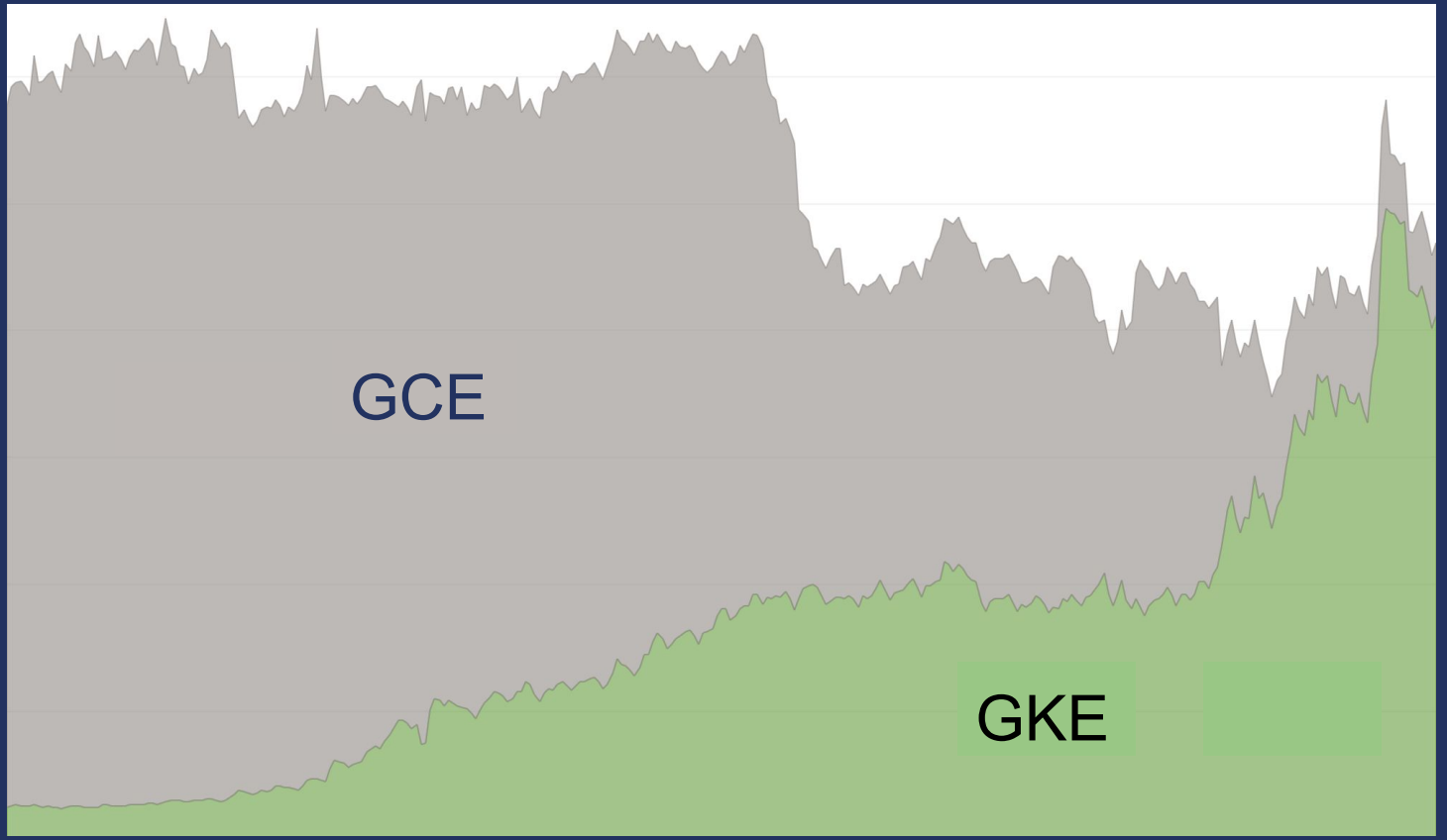
Cost Tracking



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Business Impact

Track enough data to answer questions.

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Self Service

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Self-Service Experience: Namespaces

- Checkout the `system-resource-manifests` monorepo
  - Config that is present on every cluster
- Run a docker image locally with some args
  - Namespace and related resources setup
  - CODEOWNERS setup

```
# generate namespace manifests and supplementary resources
$ docker pull gcr.io/[redacted]/gke-onboard
$ docker run -v $(pwd):/generated gcr.io/[redacted]/gke-onboard \
  --namespace <namespace> \
  -l <logging_gcp_project> \
  --team <team-name>      \
```

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Self-Service Experience: Namespaces

Take complexity for your developers.

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Self-Service Experience: Apps

```
---
version: 1
components:
- componentId: myservice
  tugboat:
    backends:
    - backend: helios
    - backend: kubernetes
```

```
version=$(tugboat version create)
tugboat set-target-version --target-version=$version
```

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Self-Service Experience: Apps

Use existing tools/abstractions.

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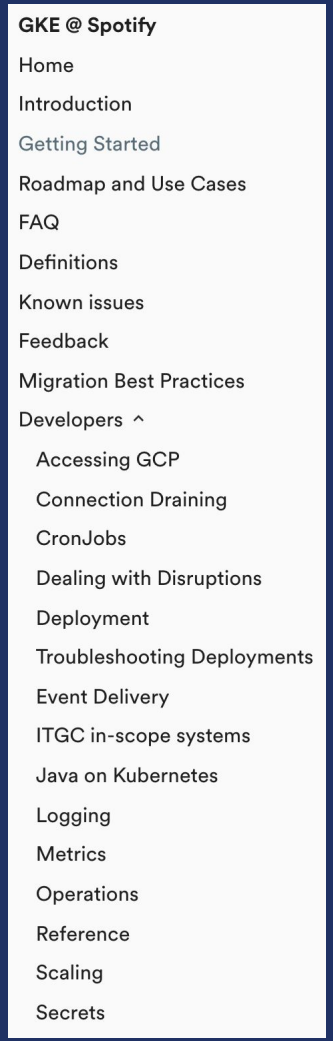
Documentation

- Internal Documentation
- Stackoverflow Enterprise (vast majority of questions on there)
- Backend Golden Path



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Documentation

You as owners are not the audience.

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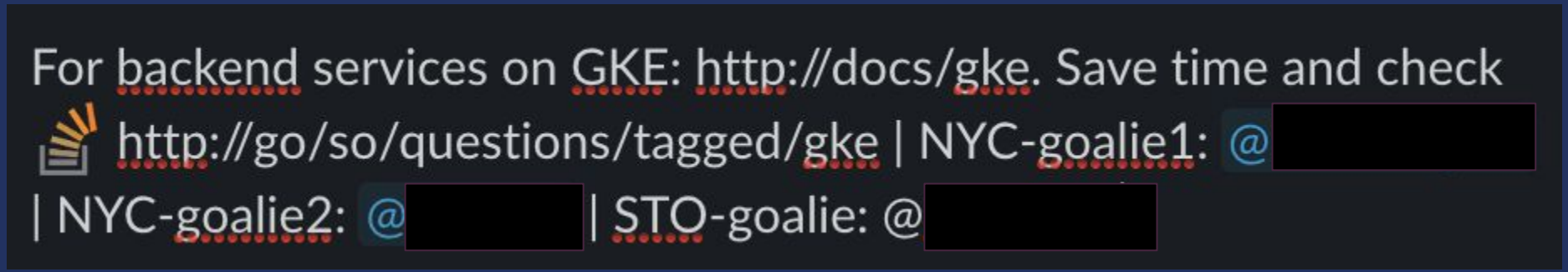
Shared Support

- Developers will always have questions
- US East Coast + Europe
- Shifts covering both
- Ex. Topic for support Slack channel:



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Shared Support

Support can be mutually beneficial.

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Feature Parity

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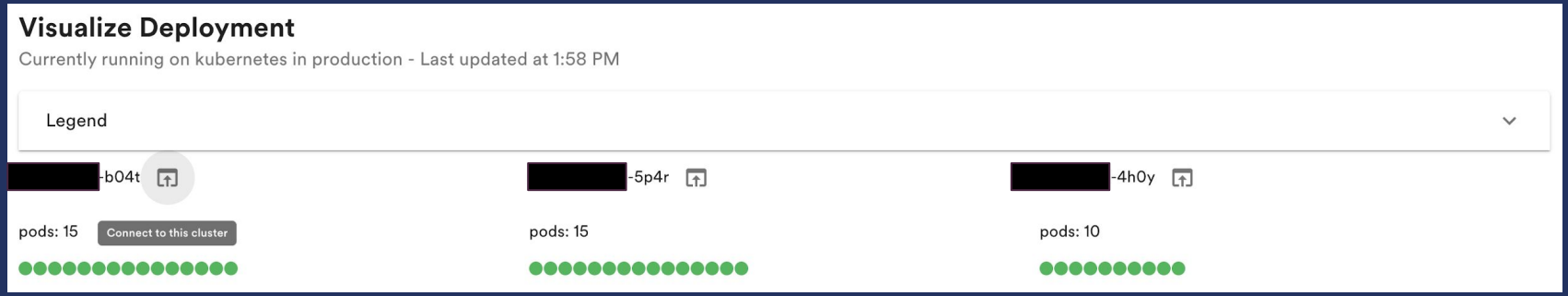
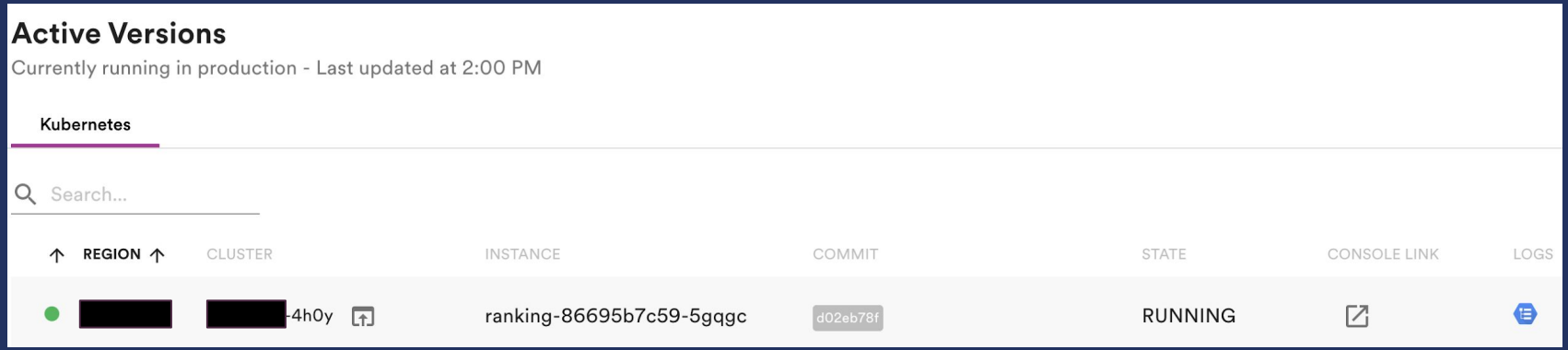
Internal Portal Integration





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Deployment (Canaries)

- Existing canary feature in Tugboat for Helios
- Similar feature on K8s (basically suffix where appropriate with -canary)

NAME	DESIRED	CURRENT	UP-TO-DATE	AVAILABLE	AGE
compass	2	2	2	2	276d
hoth	2	2	2	2	175d
tugboatapi	2	2	2	2	94d
tugboatapi-canary	1	1	1	1	80d
tugboatheliosmonitor	1	1	1	1	272d
tugboatheliosmonitor-canary	1	1	1	1	80d
tugboatheliosworker	3	3	3	3	272d
tugboatheliosworker-canary	1	1	1	1	80d
tugboatnotifications	1	1	1	1	272d
tugboatspinnakerworker	2	2	2	2	354d
tugboatspinnakerworker-canary	1	1	1	1	80d

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Feature Parity

Developers need feature parity or better.

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ITGC Support

Delve into the 20 of the 80/20.

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GA General Requirements

- Operational Solidity
- Business Impact
- Self Service Experience
- Important Feature Parity or better

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Future Plans

- Stateful services?
- Data jobs Consolidation
- CronJobs as first class citizens
- Internal Education
- Higher level abstractions

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Migration & GA Learnings

- Be mindful and deliberate in dictating terminology.
- Migrate in stages/series of goals that increase in scope.
- Devs will adopt and/or migrate to your Kubernetes offering if it is easy, complete, and compelling.
- Talk to other companies about how they do infrastructure/solve infrastructure problems.

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Thanks for listening!

We're hiring!
spotifyjobs.com

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