



# Slaying the Goliath

Lessons learned from a full system rewrite

Contact: @BrianGenisio

Date: 10.17.23



Who am I?

---

@BrianGenisio

Technical Engineering Manager

@ Khan Academy



What was “Goliath”?

---

A complete backend rewrite



What was “Goliath”?

---

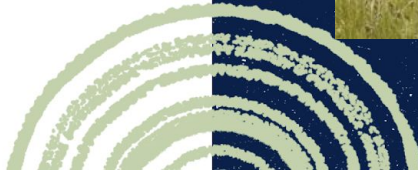
A Client-side re-architecture

A very large project



## Some Stats

- 3.5 calendar years to complete
- 40 person\*years
- 1,038,733 lines of Python
- 1,151,473 lines of Go
- >3000 Jira tasks
- Over 100 engineers
- Completed 4 days before our contractual deadline
- It's a pun!



Good stuff!

## What went well?

- Up-front planning
- Socialization
- It didn't kill us!



[Image by Freepik](#)

Difficult stuff

## Things that didn't go so well

- Product work stalled
- Some major hits to SEO
- PM and Design did not stay
- Lots of attrition during this time

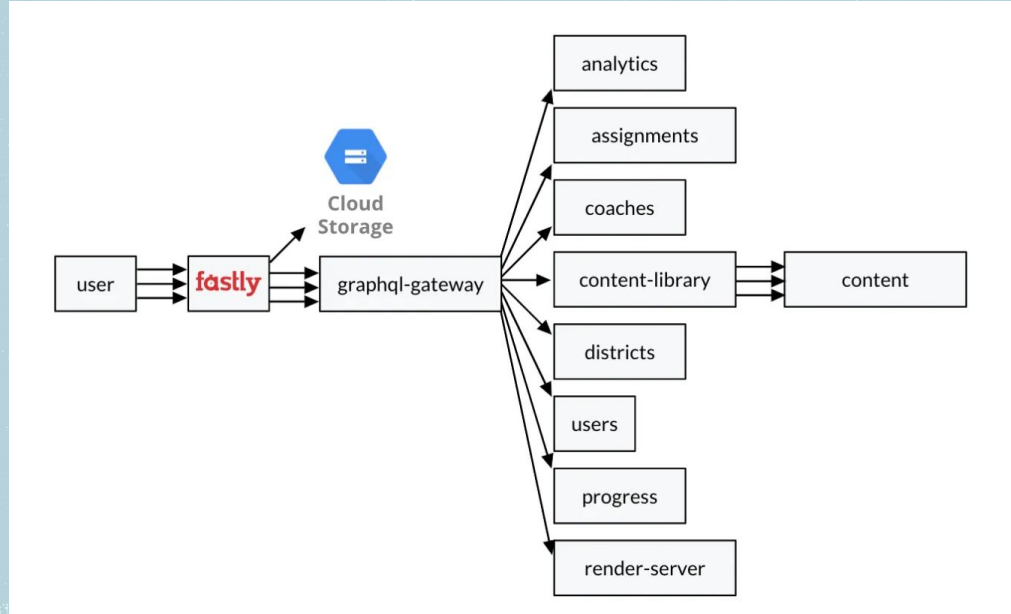
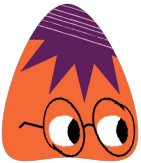


[Image by jcomp on Freepik](#)

Good stuff!

## What went well?

- Go ended up being a good choice!
- Good Architecture

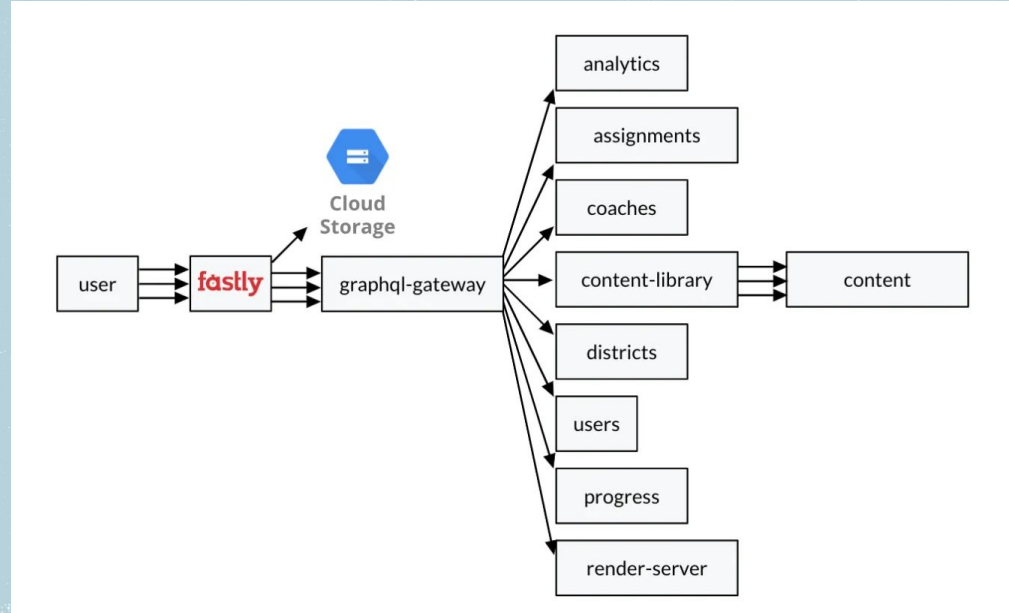
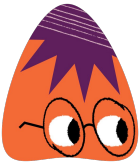




Good stuff!

## What went well?

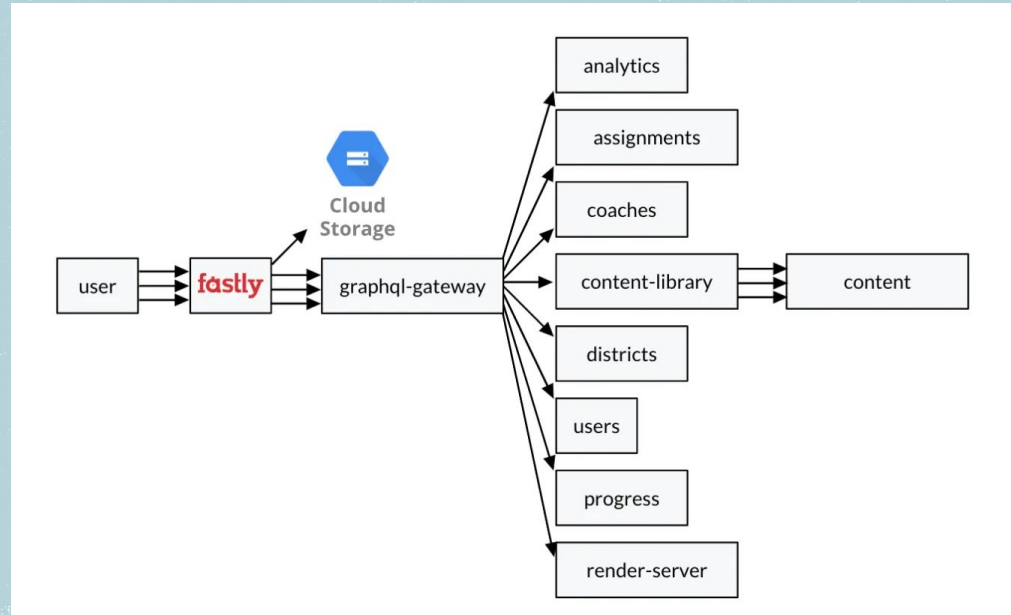
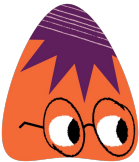
- Go ended up being a good choice!
- Good Architecture
- GraphQL Federation



Good stuff!

## What went well?

- Go ended up being a good choice!
- Good Architecture
- GraphQL Federation
- Side-by-side testing



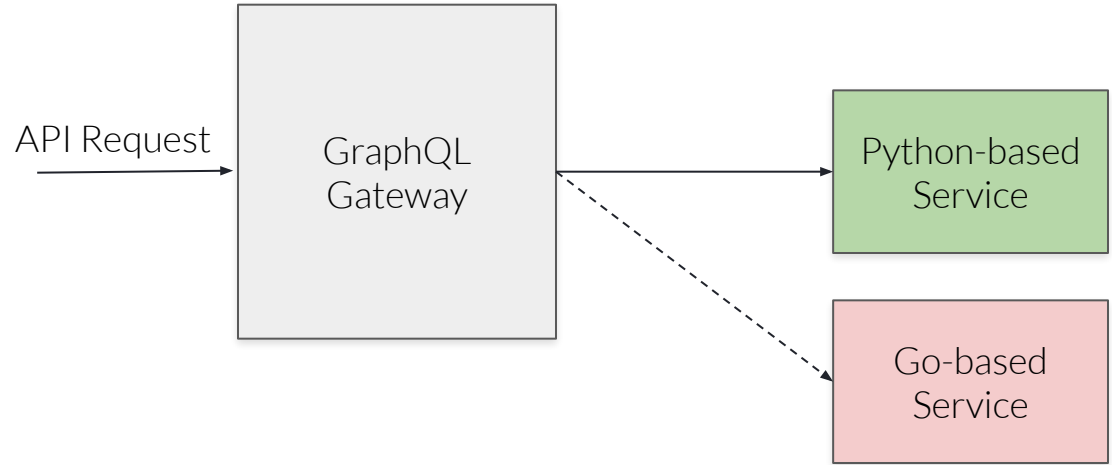
# Side by Side testing

## 1. Python Only



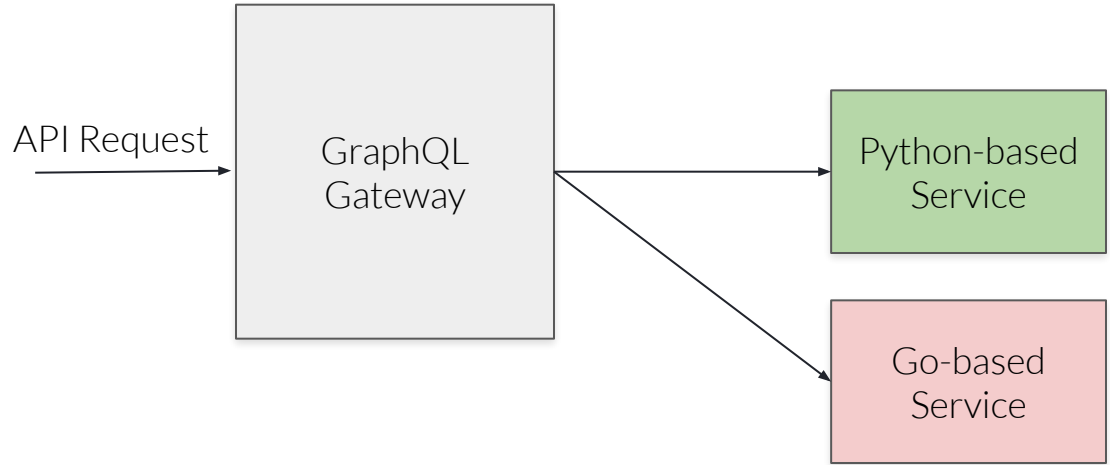
# Side by Side testing

## 2. Go in Preview



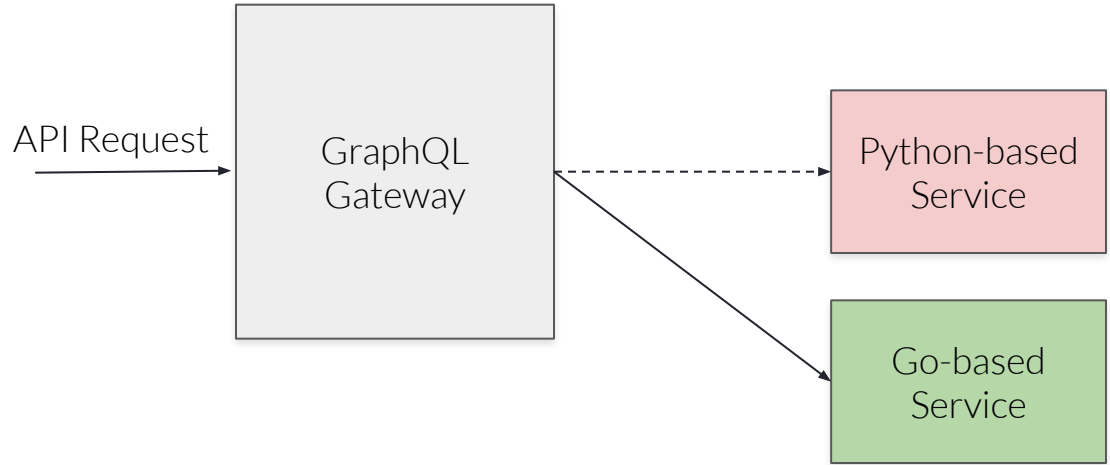
# Side by Side testing

## 3. Side-by-side



# Side by Side testing

## 4. Go is live!



# Side by Side testing

## 5. Python is deleted



Difficult stuff

## Things that didn't go so well

- Node-based gateway was slow
- Bottlenecks and latency
- We wrote our own federation gateway in Go
- Slowed us down



[Image by jcomp on Freepik](#)





Let's talk about planning

Less Agile, More Waterfall



Let's talk about planning

Less Agile, More Waterfall

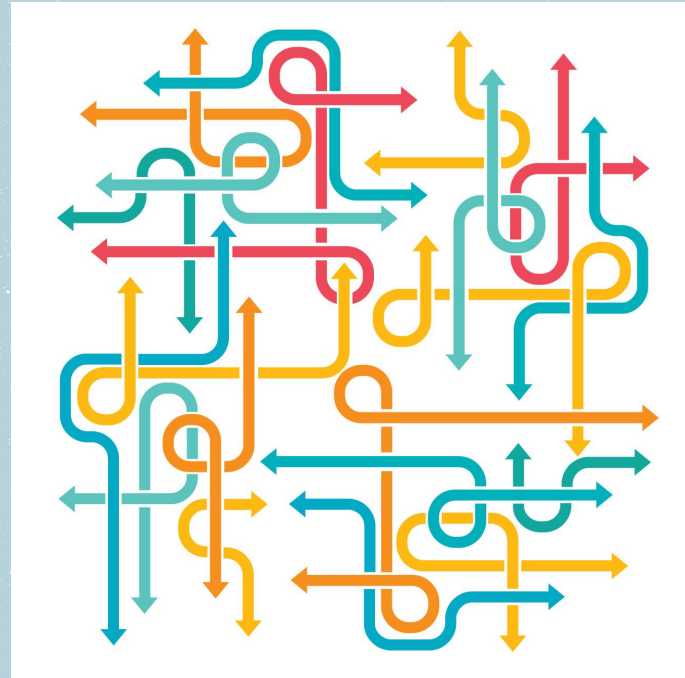
## MVE Burndown

- Early modeling changes to reflect reality
- Mid-stream prioritization changes



## Stick the landing

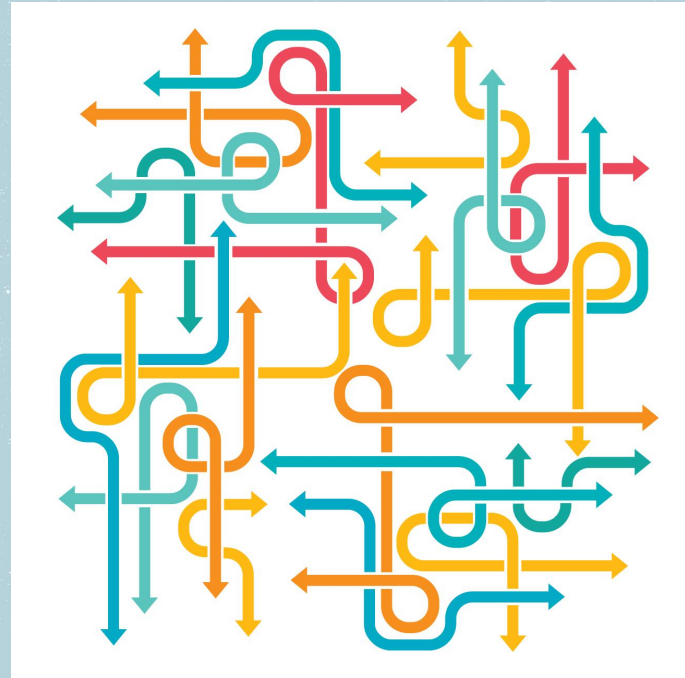
- Multiple teams
- All with the same deadline
- Mind the critical path!



[Image by alvaro\\_cabrera on Freepik](#)

## Stick the landing

- Multiple teams
- All with the same deadline
- Mind the critical path!



[Image by alvaro\\_cabrera on Freepik](#)



Celebrate!

---

More to come...

TABLE OF CONTENTS

**Item 1**

**Item 2**

**Item 3**

**Item 4**

**Item 5**

**Item 6**



## Big image slide

Say something about this design/image here. You don't need to provide every single piece of context.

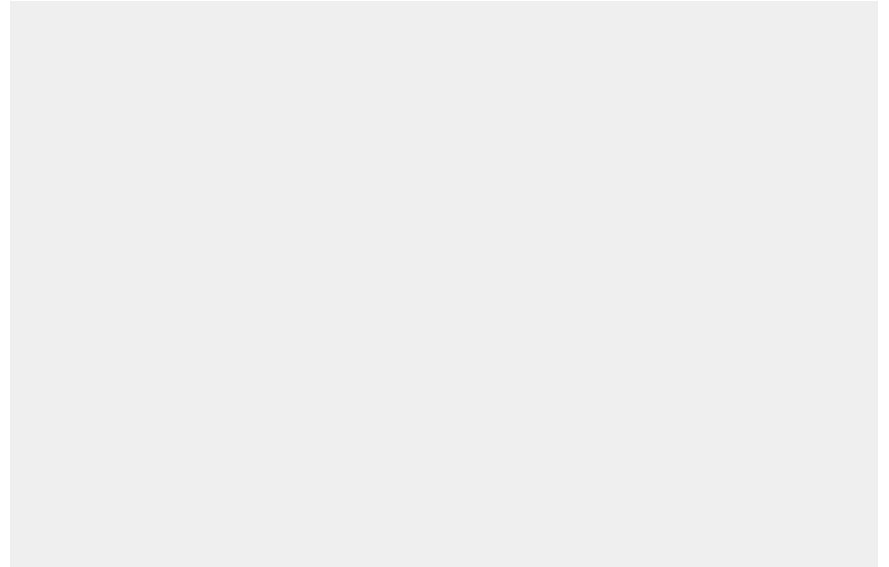
Replace the image on the right with your own image!

## Impactful image slide without background

Suitable for slides that incorporate images that need to be on a white background, like charts, or other types of artwork.

Say something about this design/image here. You don't need to provide every single piece of context.

Replace the image on the right with your own image!



## **Bullet list slide**

- Here's a bullet point
- Here's a bullet point
- Here's a bullet point
- Here's a bullet point
- Here's a bullet point
- Onward!

## Image with arrows slide

Say something about this design/image here. You don't need to provide every single piece of context.

Replace the image on the right with your own image!

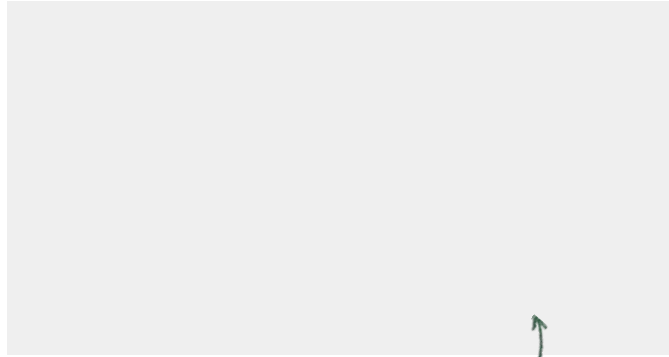
*A little blurb you want to add to this image*



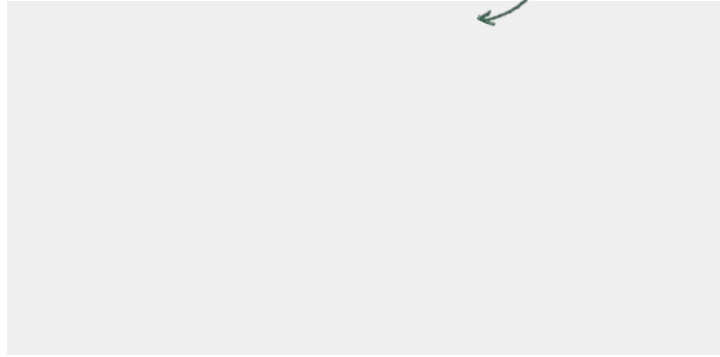
*Replace this image to preserve the shadow settings*



## Full image slide with arrows



*A little blurb you want to  
add to this image*



*Another blurb here, don't  
make it too long*



# This is a two column text slide

## **Subhead**

- Here's a bullet point
- Here's a bullet point
- Here's a bullet point

## **Subhead**

1. Here's a numbered point
2. Here's a numbered point
3. Here's a numbered point

# This is a three column text slide

## **Subhead**

- Here's a bullet point
- Here's a bullet point
- Here's a bullet point

## **Subhead**

- Here's a bullet point
- Here's a bullet point
- Here's a bullet point

## **Subhead**

- Here's a bullet point
- Here's a bullet point
- Here's a bullet point

## This is a question and answer slide, it is a very important question, right?

Here is the answer to that question. Look, I know it might not seem like this Q+A template would be super useful at first glance, but I've found myself using some version of it in my last 3 presentations, so here you go. Sometimes this answer might be long, but don't let it get too long!



This is an area for impactful text. Sometimes lists don't work and you need to talk like a human. Do your best to keep this at 3-4 lines maximum. [Links](#) work too.

This is an area for impactful text, but at a smaller font size. You might have a paragraph you'd like to analyze or emphasize, this slide would be good for that.

If you want to, you can also highlight important text **like this**. You can also use **arrows** provided on the graphics slide [here](#) to call out certain things.

*Like this!*

For highlights, use color HEX #bfe6dd, and try not to exceed more than 500-700 words on this section.

“This is where we’d show a user testimonial. Testimonials are super exciting and the slides should be also. Try not exceed more than 300 words for this paragraph. Note the ‘hung’ quotation mark on the left!”

ERICA  
*San Francisco*



# Table Slide

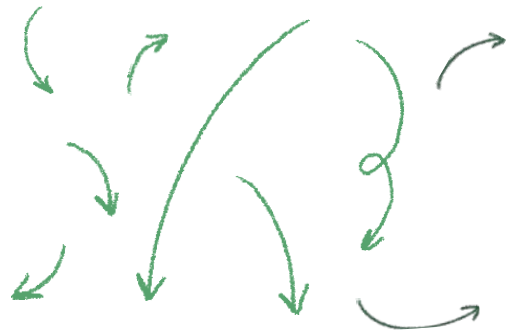
Header 1	Header 2	Header 3	Header 4	Header 5	Header 6
Here's some text. Adjust size & columns as needed.					



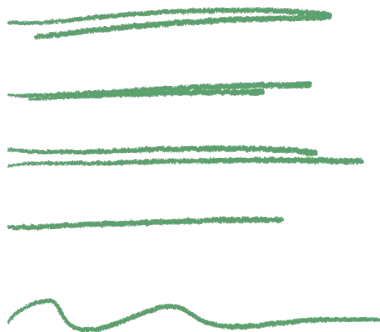
# Thank you!

This is a subhead

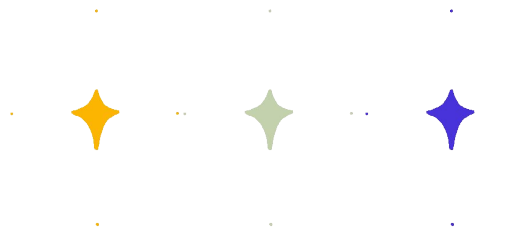
## Arrows



## Underline



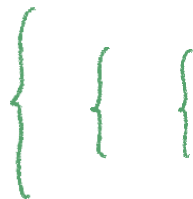
Use the “highlight color tool to Highlight



## Circles



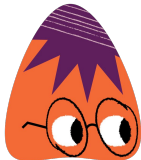
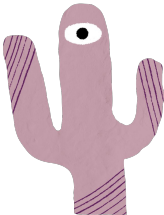
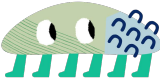
## Brackets



# Illustrations



# Avatars



Icons

