



The Story of why we migrate to gRPC and how we go about it



KubeCon



CloudNativeCon

Europe 2019

@mattgruter

2019-05-22

**“Developers
don’t care
about new
RPC technologies”**

-- someone at KubeCon 2018



Why?

Why are we doing this?

How?

How do we get there?

Why?

Spotify's Infrastructure



200M active monthly users

8M QPS at ingress

1k developers

2.5k services

Java, Python, ...

Hermes



Not this Hermes!

Hermes



But this

Hermes

- Written in 2012
- Based on ZeroMQ
- JSON or Protobuf payload
- Not a RPC framework

Hermes works!

Why Change?

Hermes Ecosystem

404 Not Found

From DIY to FOSS

Why gRPC?

The Proto



Code Generation

Java, GoLang, Python, Ruby,
Dart, PHP, Node.js,
Objective-C, C#, C++

Schema Management

1. Embrace the **proto**



Schema Management

2. Shared repo for all **protos**

Schema Management

3. Version on the **proto** package

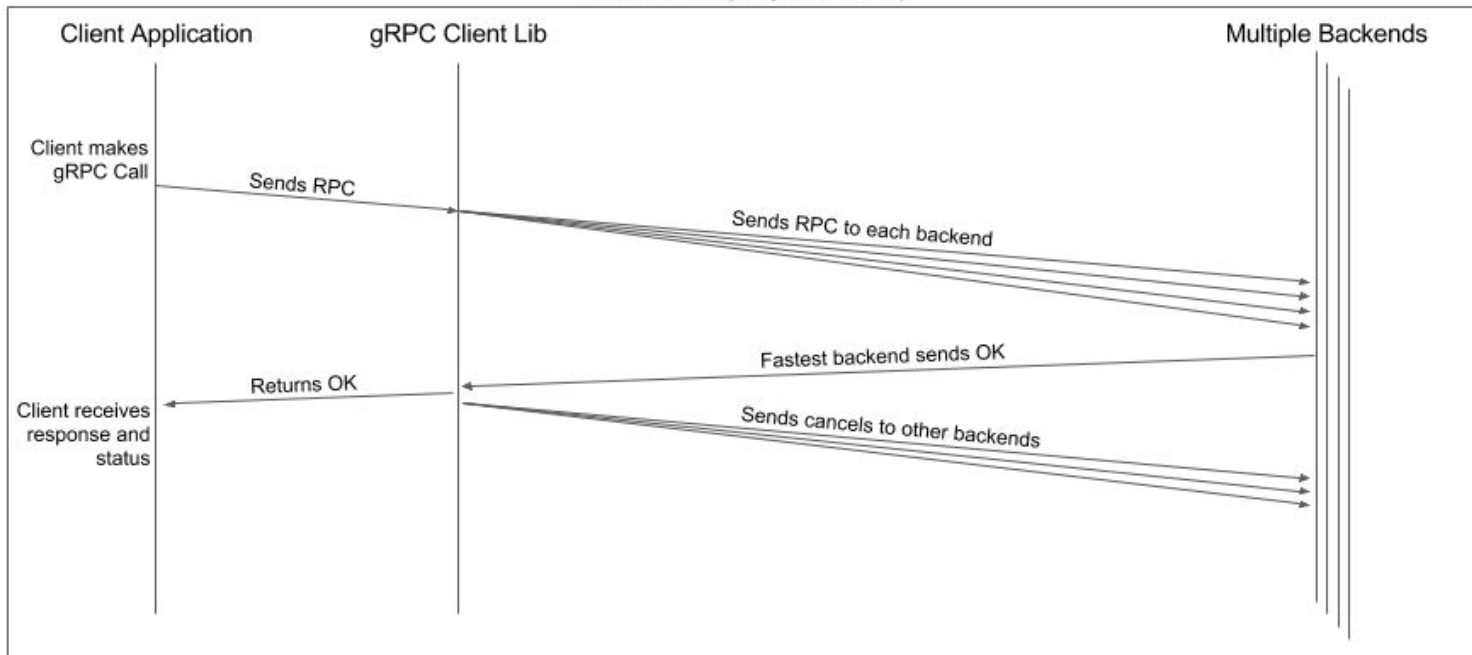
```
package spotify.playlist.v1;  
package spotify.playlist.v2beta1;
```

Resiliency

Resiliency: Retries

Retry Hedging

Basic Hedging Pathway



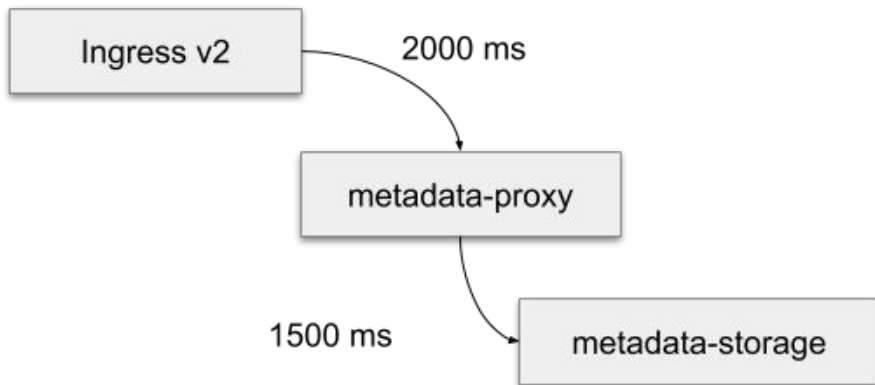
Thundering Herd



Resiliency: Retry Throttling & Pushback

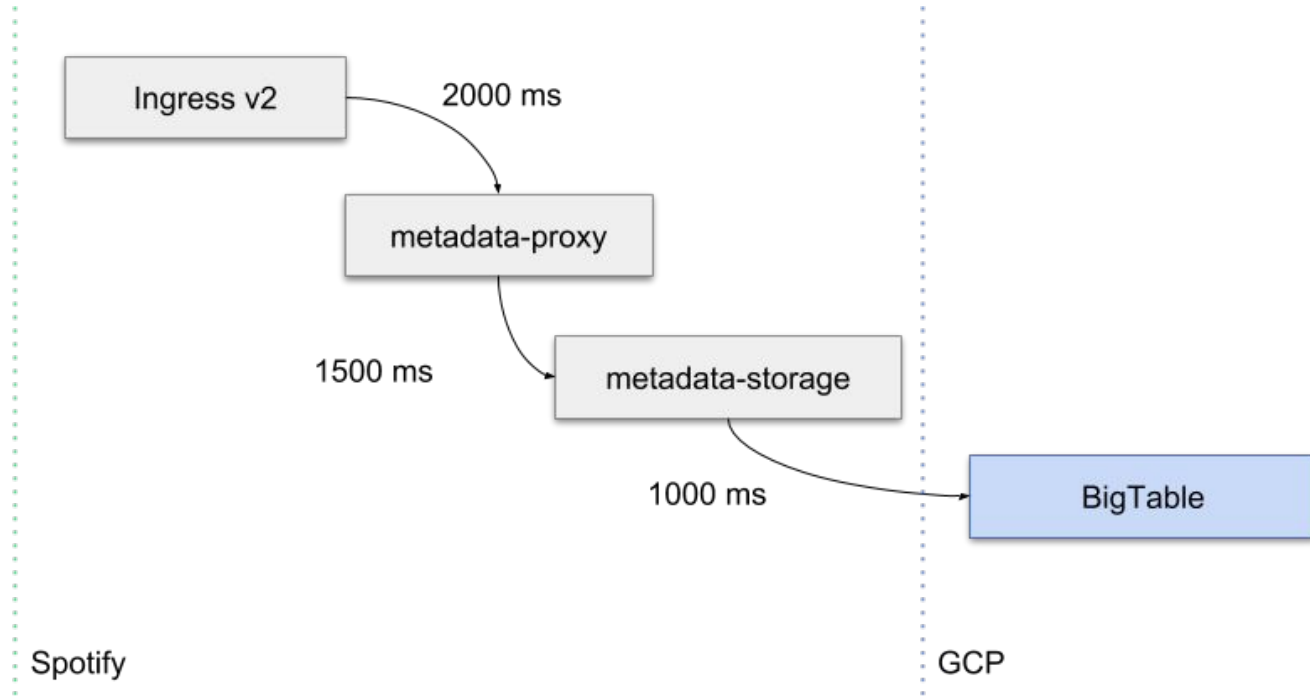
Resiliency: Deadlines

Deadlines



Spotify

Deadlines



Load Balancing & Routing

Load Balancing

Server-side

Client-side

proxy

no proxy

dumb client

complex client

extra hop

low latency

Load Balancing

Server-side

proxy

dumb client

extra hop

Client-side

no proxy

complex client

low latency

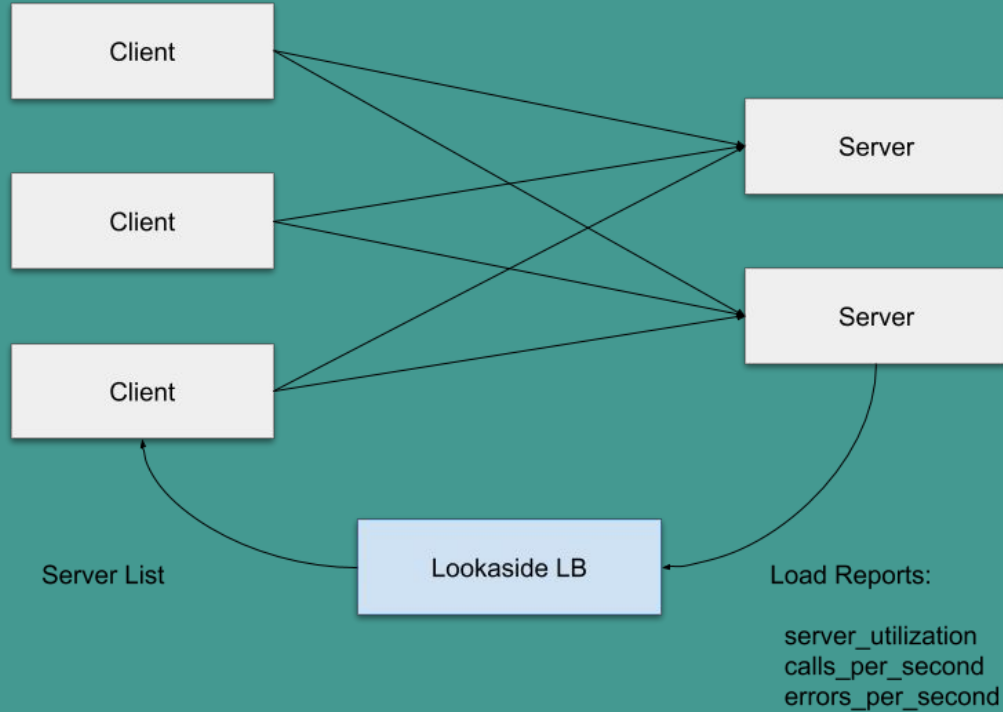
Lookaside

no proxy

thinner client

low latency

Lookaside Load Balancing



Proxyless RPC mesh

Why gRPC?

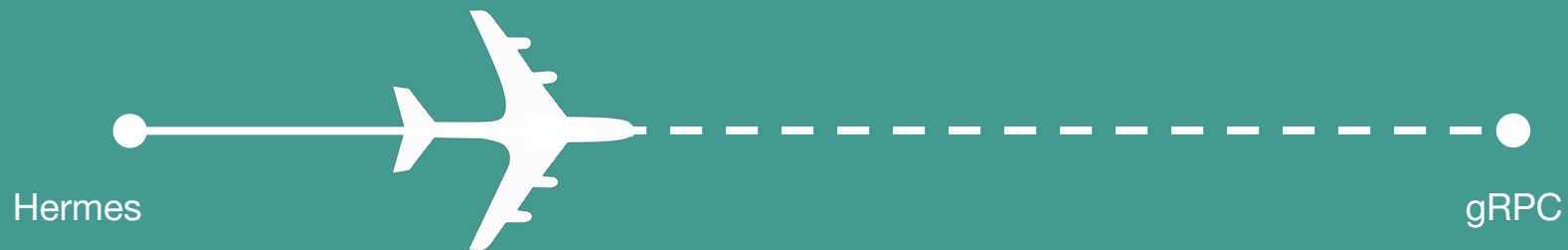






How?

Our Journey



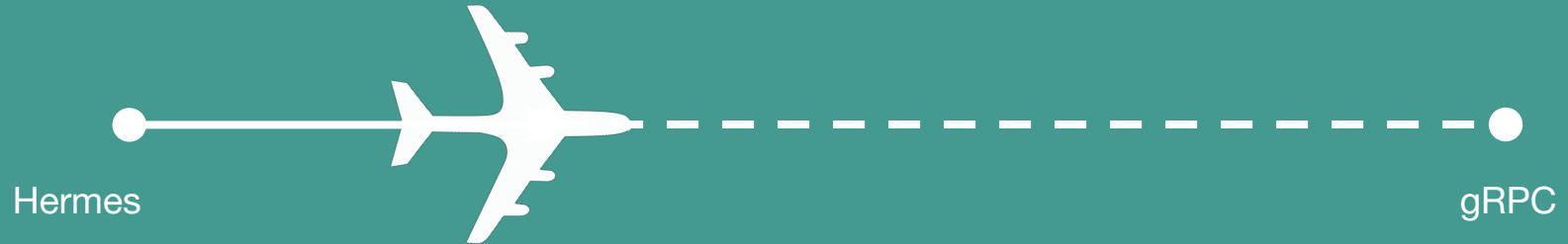
Our Journey

10%

Distance Travelled

90%

Remaining Distance to Destination



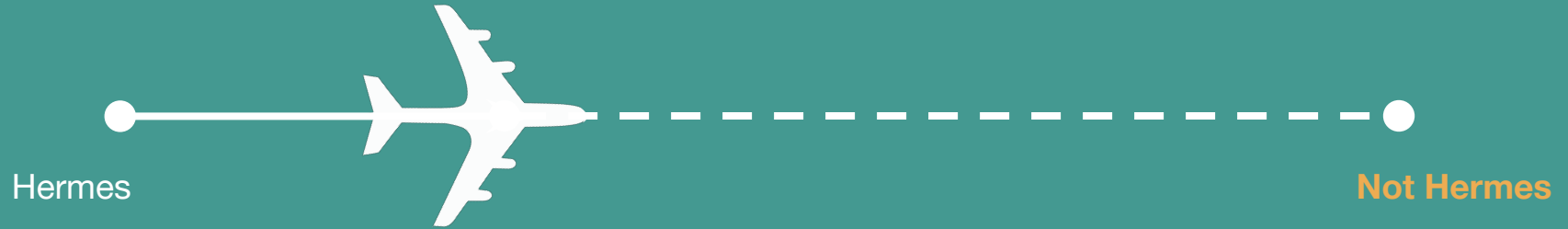
Our Journey

10%

Distance Travelled

90%

Remaining Distance to Destination



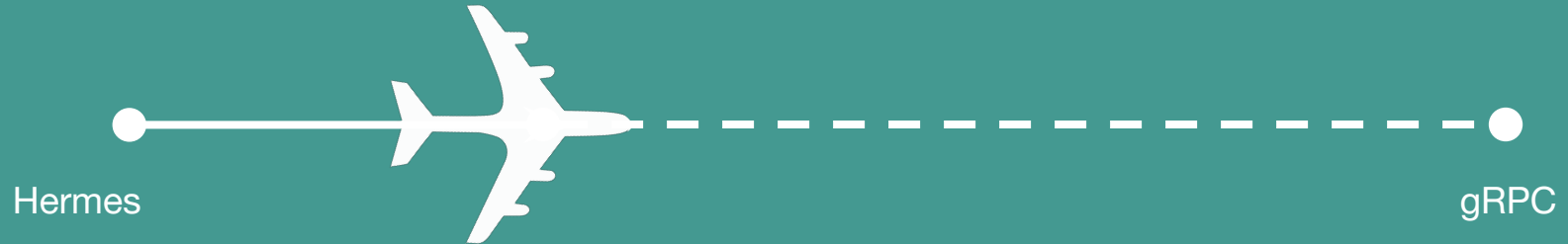
Our Journey

10%

Distance Travelled

90%

Remaining Distance to Destination



Main Challenge

Change is hard

**“This is not the protocol
you’re looking for”**

Main Challenge

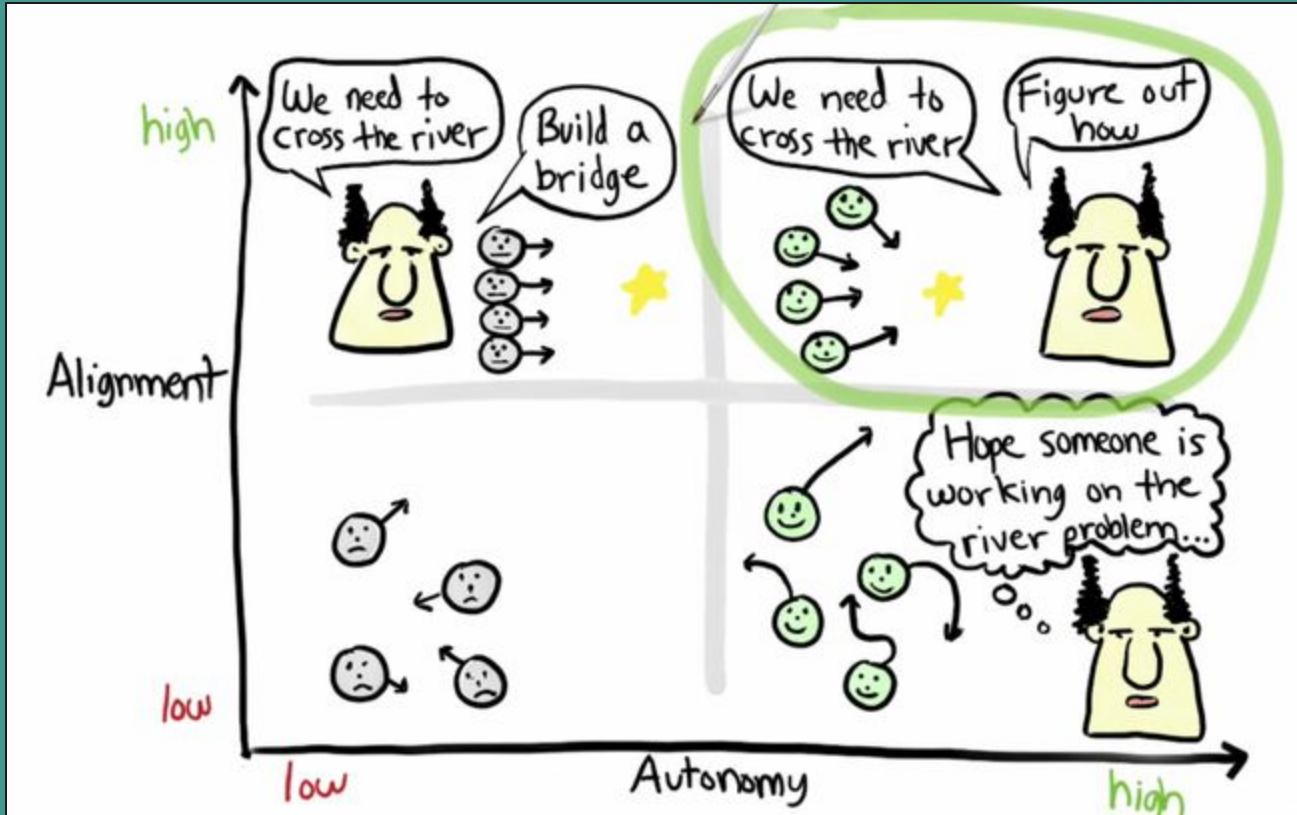
Change is hard

Autonomous Teams

Trust

Autonomous Teams

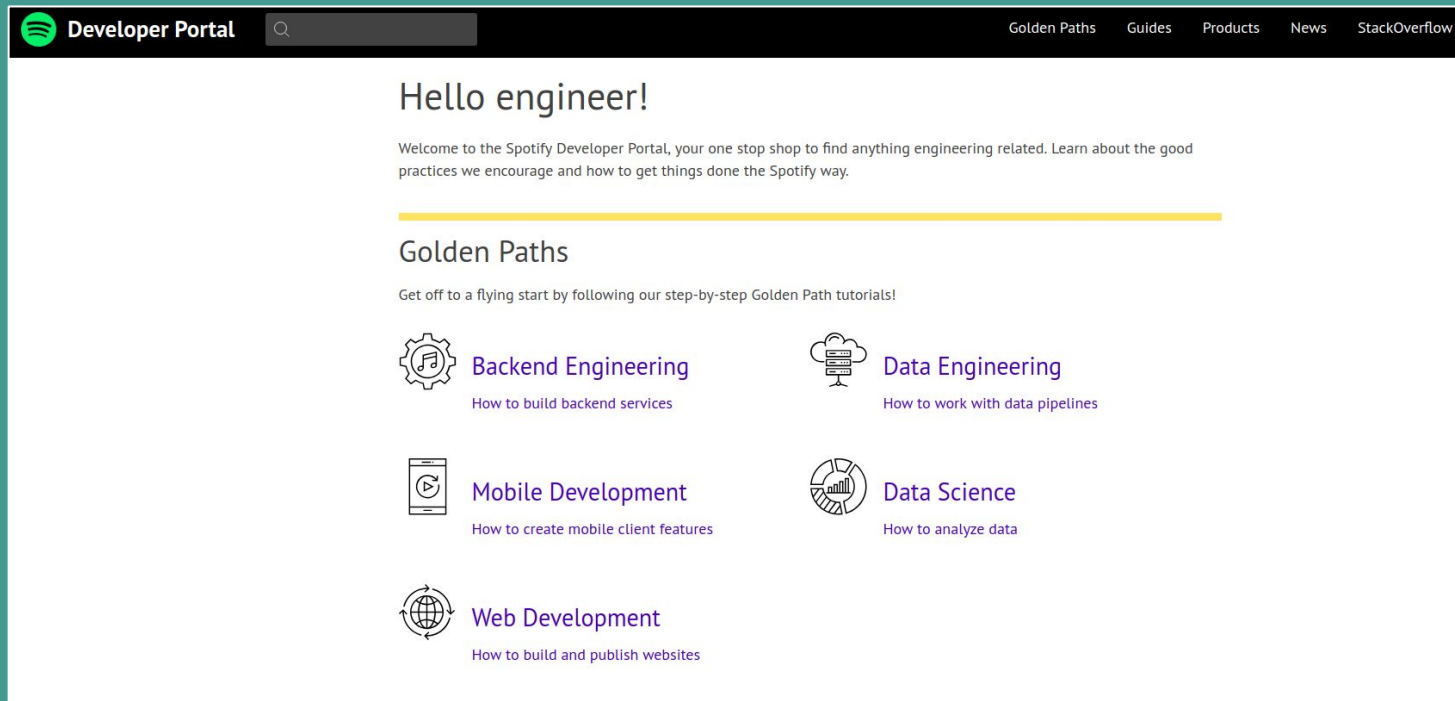
Autonomy != Freedom



Henrik Kniberg / Spotify—Aligned Autonomy

Aligned Autonomy

Spotify's Golden Path



The screenshot shows the Spotify Developer Portal interface. At the top, there is a navigation bar with the Spotify logo, the text "Developer Portal", a search bar, and links for "Golden Paths", "Guides", "Products", "News", and "StackOverflow". The main content area features a "Hello engineer!" greeting, a welcome message, and a "Golden Paths" section. This section includes a sub-header "Get off to a flying start by following our step-by-step Golden Path tutorials!" and five cards representing different development paths: Backend Engineering, Data Engineering, Mobile Development, Data Science, and Web Development. Each card contains an icon, a title, and a brief description.

Developer Portal






[Golden Paths](#) [Guides](#) [Products](#) [News](#) [StackOverflow](#)

Hello engineer!

Welcome to the Spotify Developer Portal, your one stop shop to find anything engineering related. Learn about the good practices we encourage and how to get things done the Spotify way.

Golden Paths

Get off to a flying start by following our step-by-step Golden Path tutorials!

-  **Backend Engineering**
How to build backend services
-  **Data Engineering**
How to work with data pipelines
-  **Mobile Development**
How to create mobile client features
-  **Data Science**
How to analyze data
-  **Web Development**
How to build and publish websites

Align by making
the **right** choice
the **easy** choice.

2. Don't force it!



2. Don't force it!



Code generation

2. Don't force it!



Resiliency
patterns

Code generation

2. Don't force it!

Tracing

Resiliency
patterns

Code generation



2. Don't force it!

Tracing

Resiliency
patterns



Code generation

<Fancy Tool X>

In case of emergency

aka. never-ending migration
aka. yet another protocol



gRPC



3. Force it!



```
$ sudo migrate
```

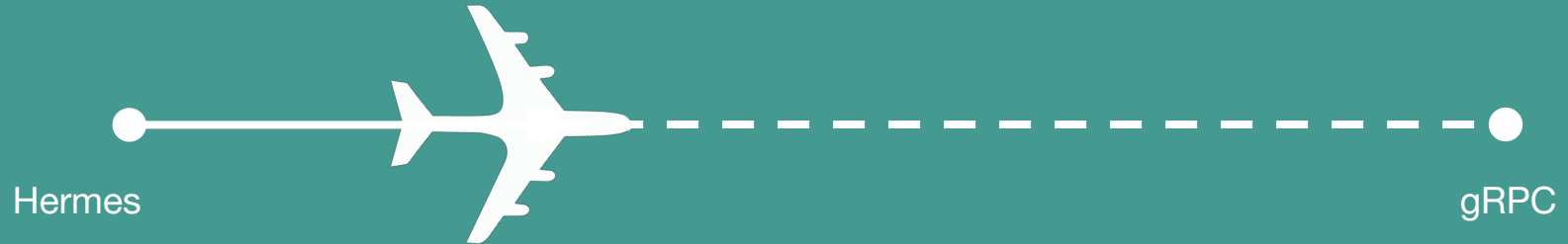
Our Journey

10%

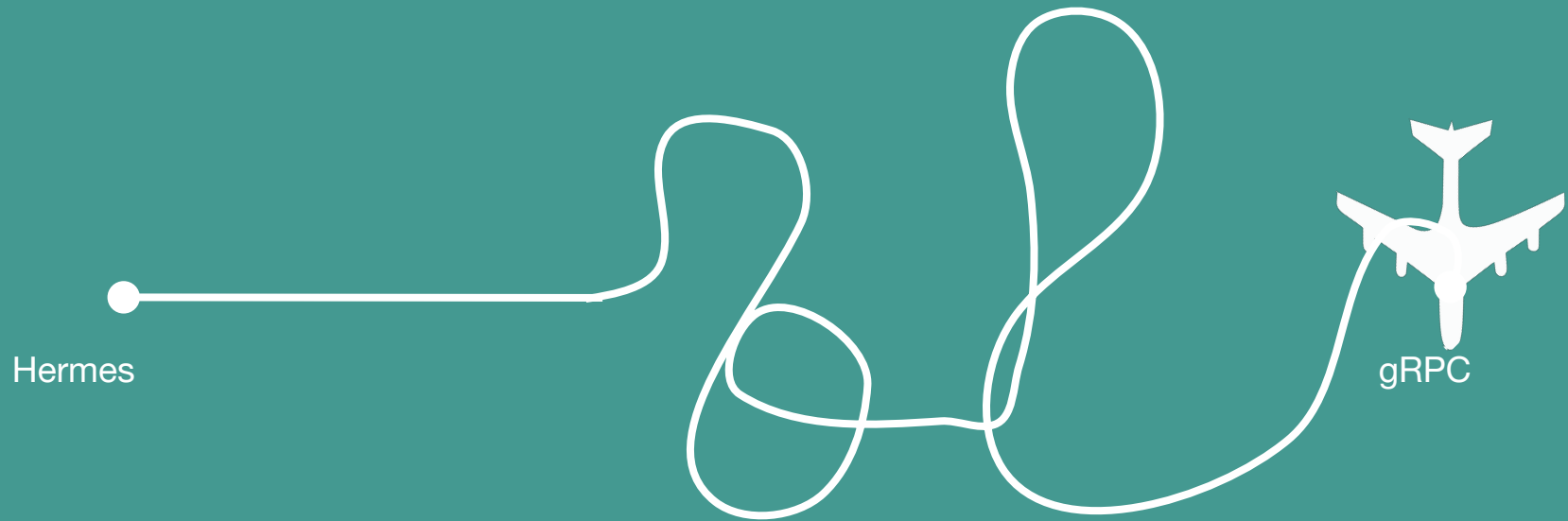
Distance Travelled

90%

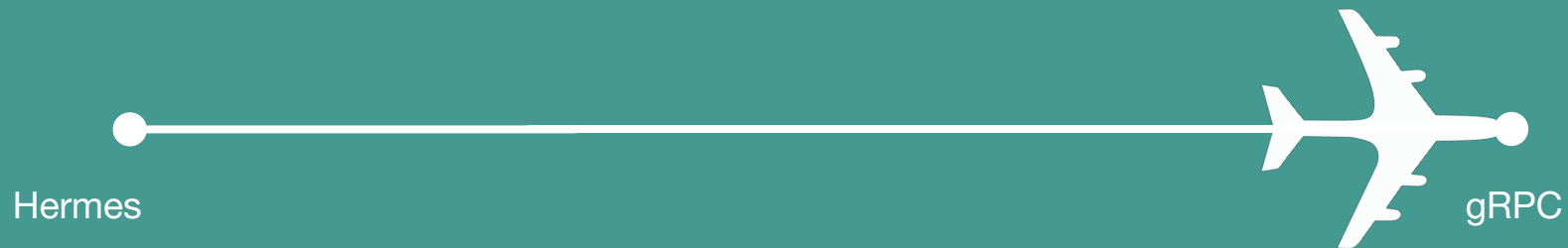
Remaining Distance to Destination



Our Journey



Our Journey



**“Developers
don’t care
about new
RPC technologies”**

-- overheard at KubeCon 2018 Seattle

**“Developers
don’t have to care
about new
RPC technologies”**

-- “overheard” at KubeCon 2019 Barcelona



Thank You

Matthias Grüter
@mattgruter