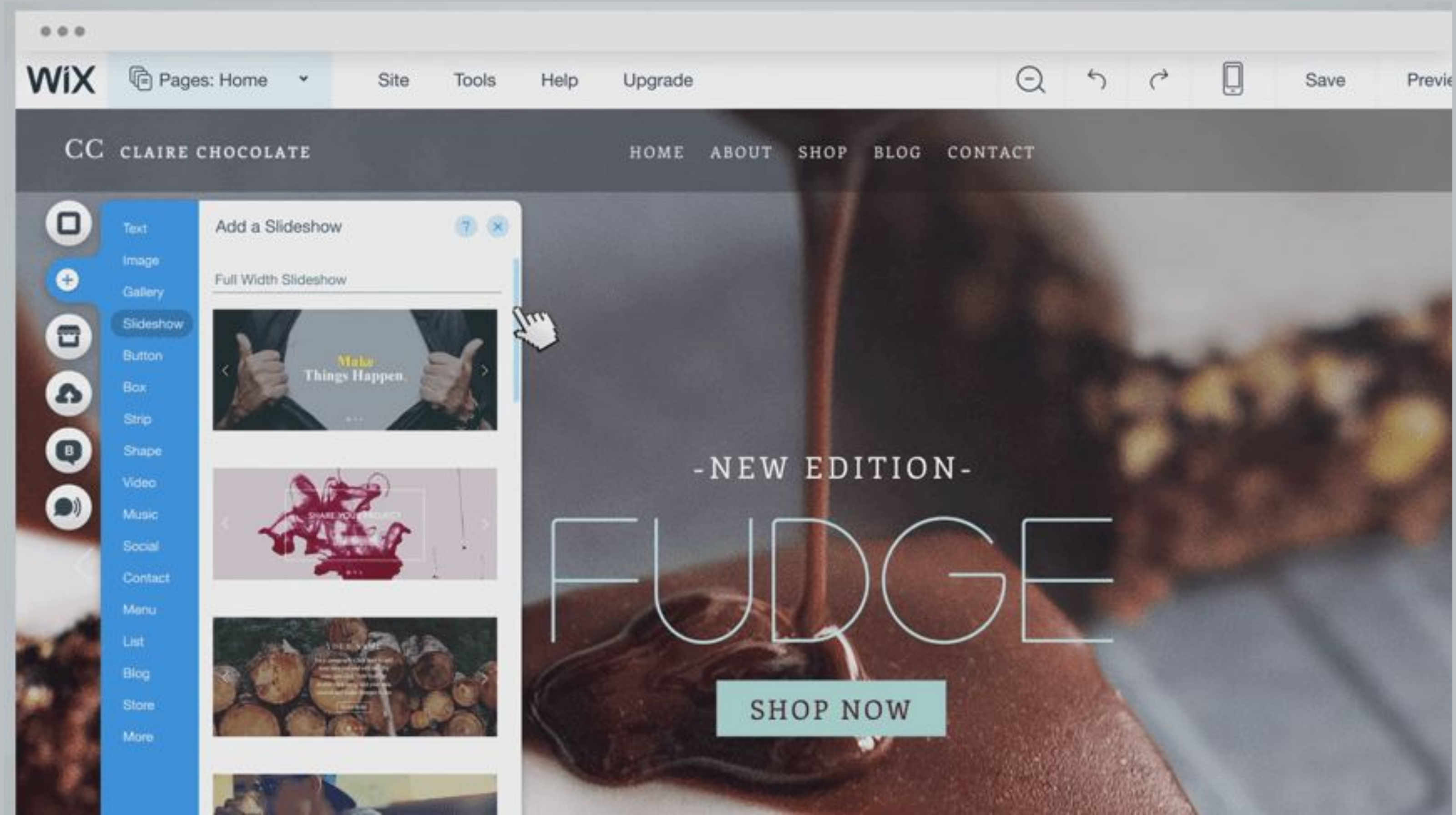
# Kafka-based Global Data Mesh at Wix

**Natan Silnitsky** **Backend Infra TL, Wix.com**

*natansil.com twitter@NSilnitsky linkedin/natansilnitsky github.com/natansil*


WiX
Pages: Home
Site
Tools
Help
Upgrade
Save
Previe
CC CLAIRE CHOCOLATE
HOME
ABOUT
SHOP
BLOG
CONTACT
Text
Image
Gallery
Slideshow
Button
Box
Strip
Shape
Video
Music
Social
Contact
Menu
List
Blog
Store
More
Add a Slideshow
Full Width Slideshow
Make Things Happen.
-NEW EDITION-
FUDGE
SHOP NOW

*Our mission*

Enable any business, community or person on earth to make their **online dream come true.**

## At Wix

**±1B**

**Unique visitors**

use Wix

platform

every month

**>100M**

**Websites**

Published by

Wix users

(5-7% of the

entire internet

websites)

**±5000**

**People**

Work at Wix

# Scaling out

**500B**
Daily HTTP Transactions

**>600**
GAs Per Day

**~1500**
Developers

**18**
Data Centers & Pops

**2**
Cloud Providers
[Google/AWS]

# Wix has over 2200 microservices in production

15B daily business **Events**

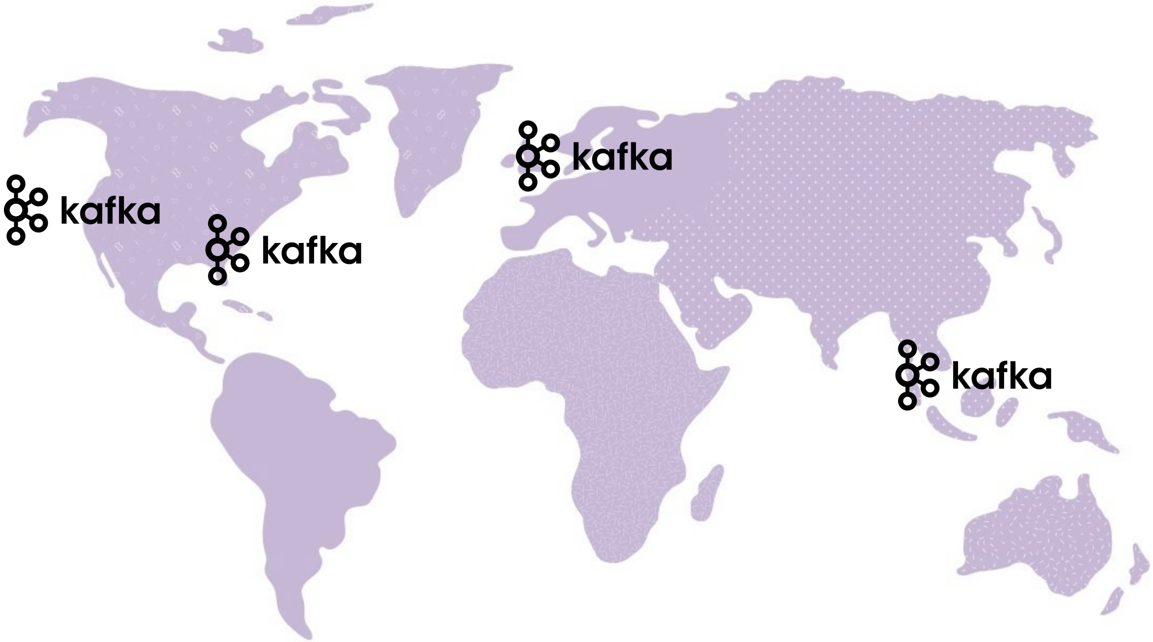
4 **Regions** @ GCP/AWS

~50k **Topics**

> 500k **Partitions**

45% of the data is **replicated**

+ We assume **x10 scale factor during 12-24 next months**



# A Fully Distributed Environment

# Growing Pains

Event-driven architecture

Large scale traffic

Cluster overload

Hundreds of developers

DC awareness

Diverse tech stack

* keep simple even. Migrated, disributed

# Growing Pains

* messaging platform

Event-driven architecture

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DC awareness

# Growing Pains

Event-driven architecture

Large scale traffic

Hundreds of developers

Diverse tech stack

**Cluster overload**

**DC awareness**

* tackled blockers

# Growing Pains

## Kafka

Event-driven architecture

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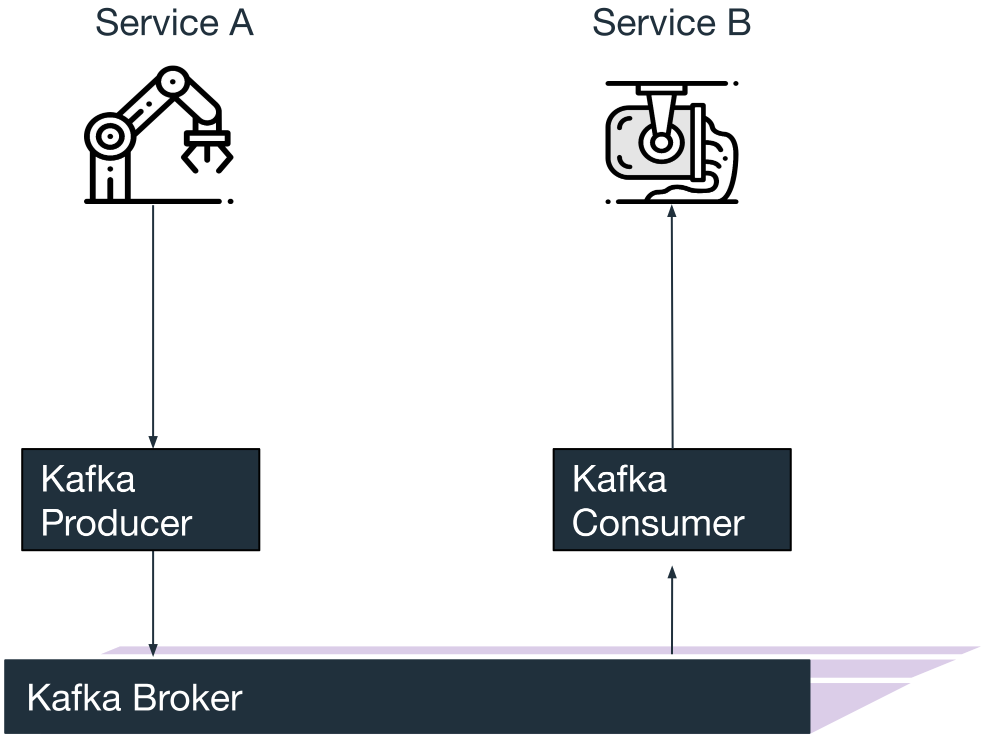
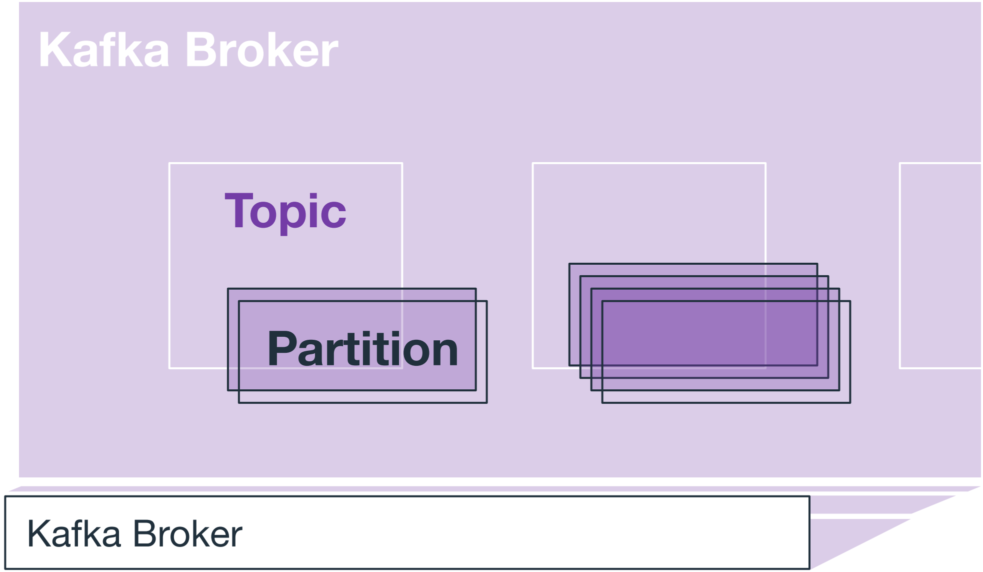
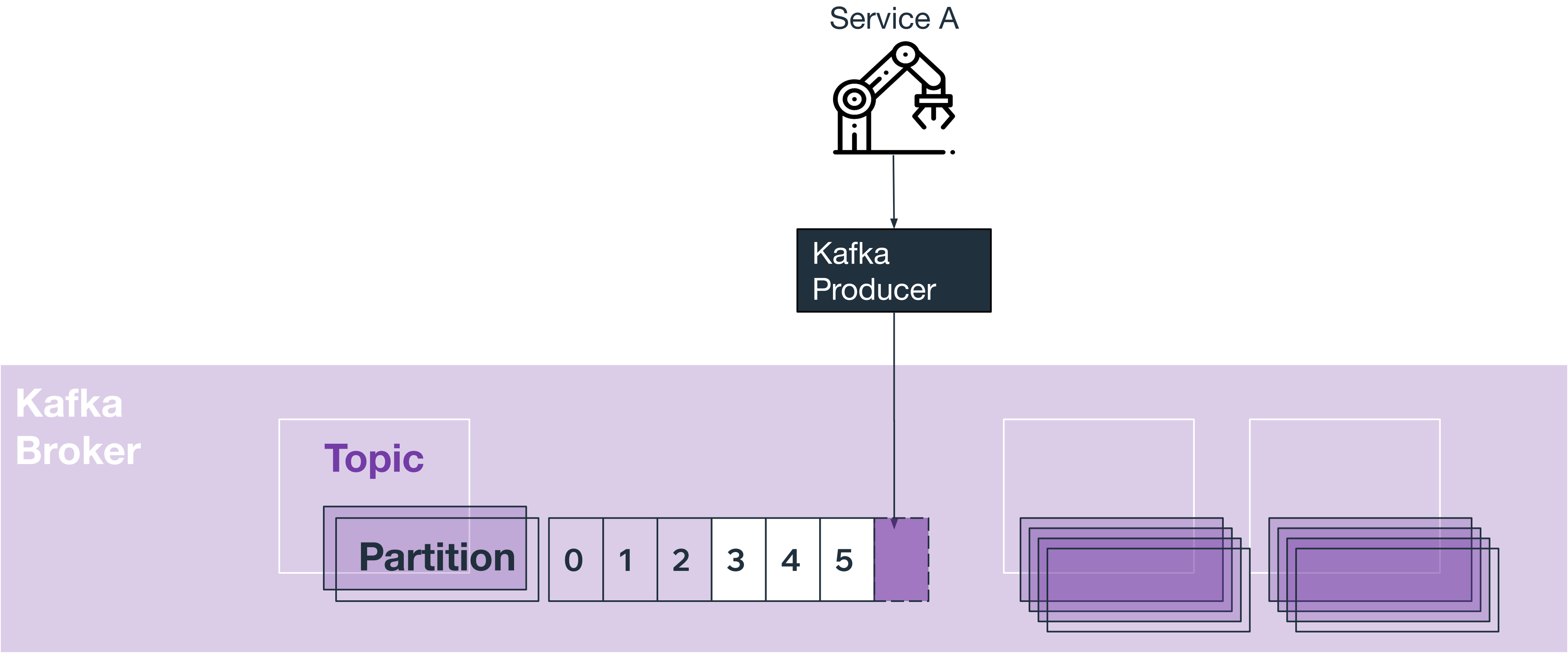
DC awareness

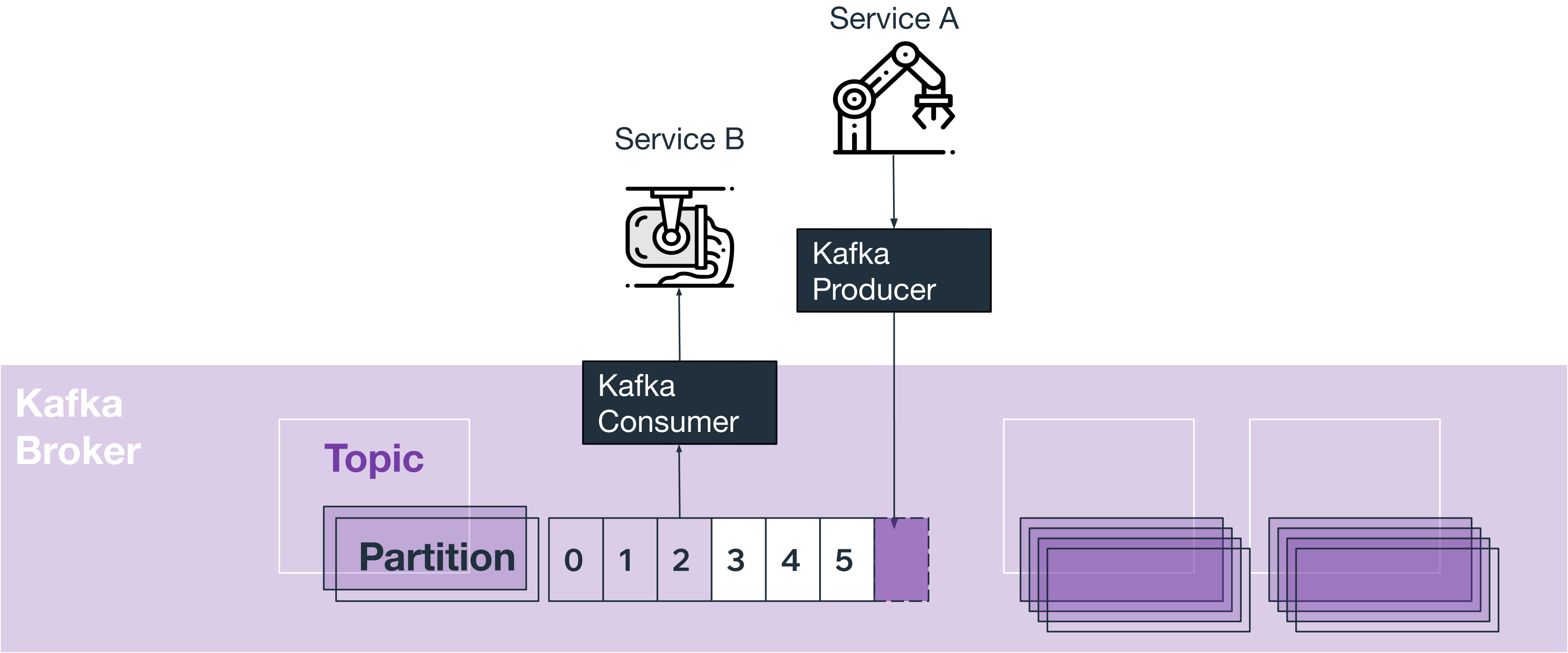
# You Know Kafka



# If You Don't Know Kafka




Service A
Kafka Producer
Kafka Broker
Topic
Partition
0
1
2
3
4
5


Service A
Service B
Kafka Producer
Kafka Consumer
Kafka Broker
Topic
Partition
0
1
2
3
4
5

# Growing Pains

## Kafka

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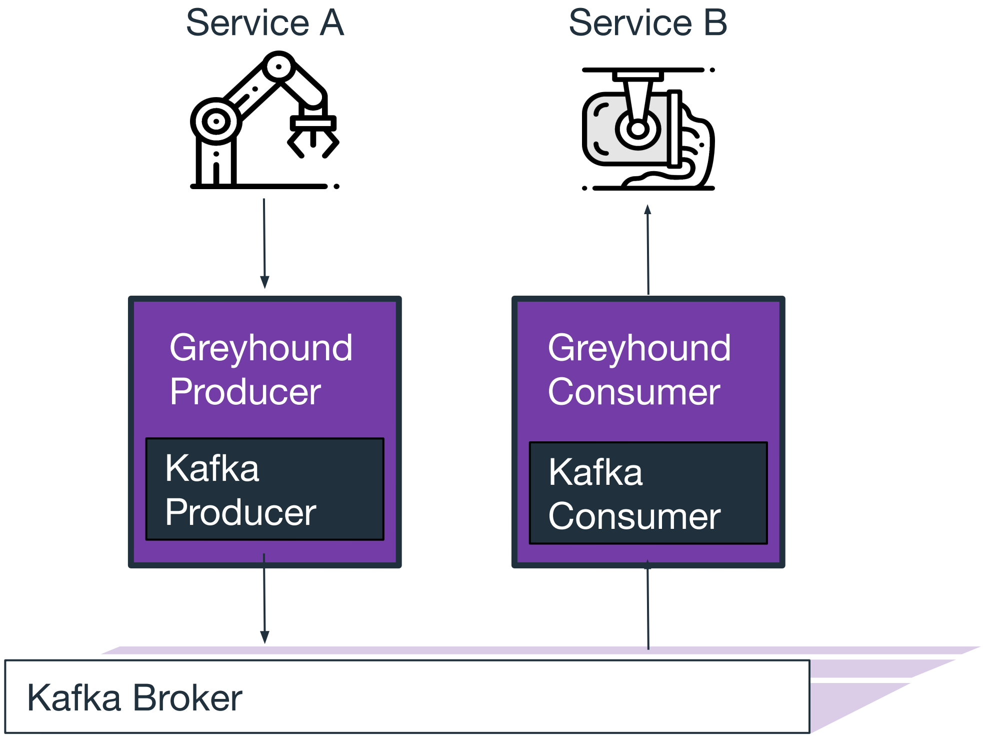
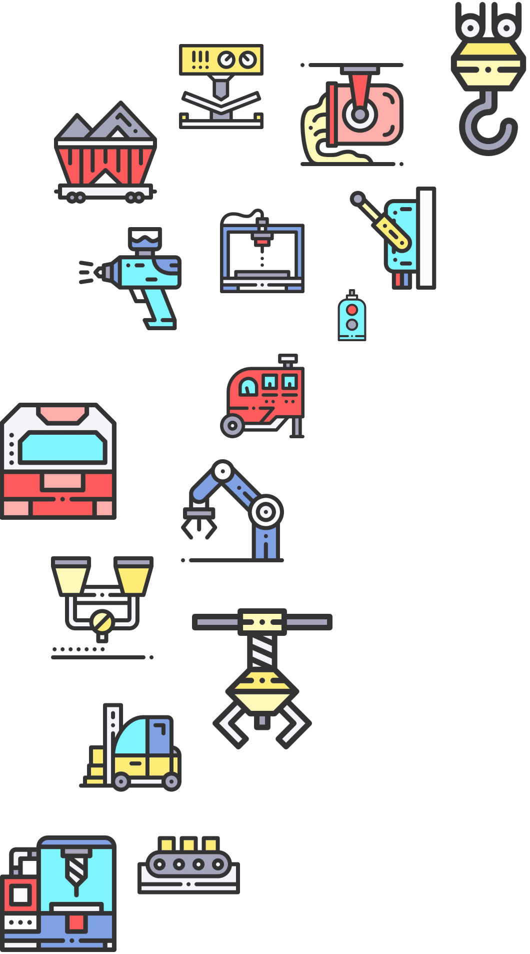
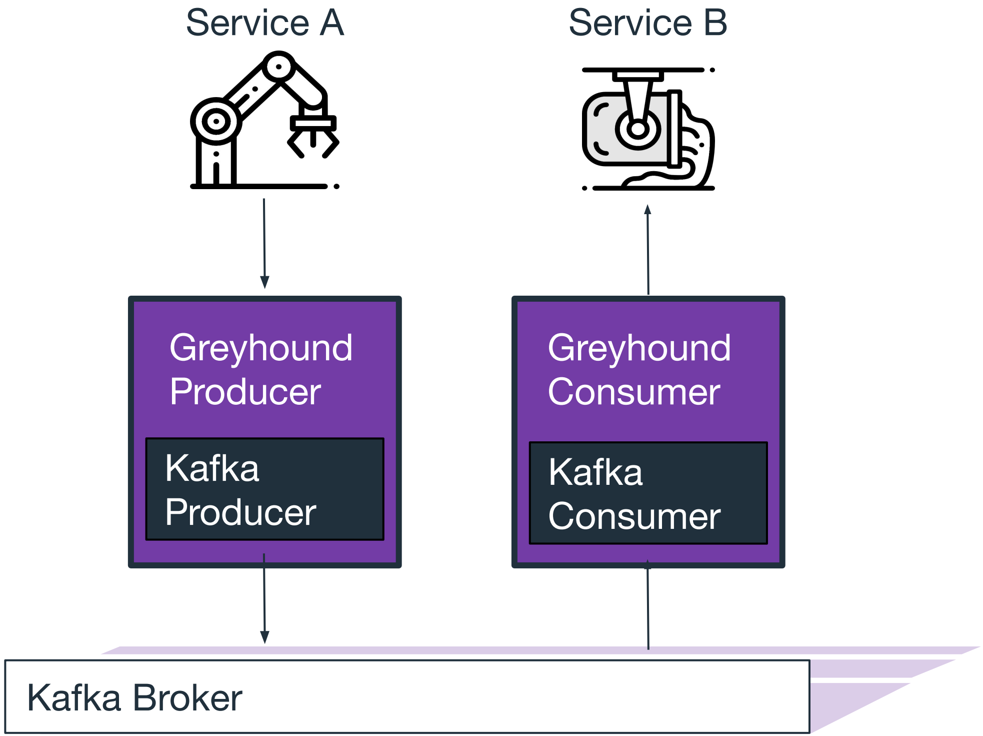
DC awareness

# Greyhound* Wraps Kafka



* open source software





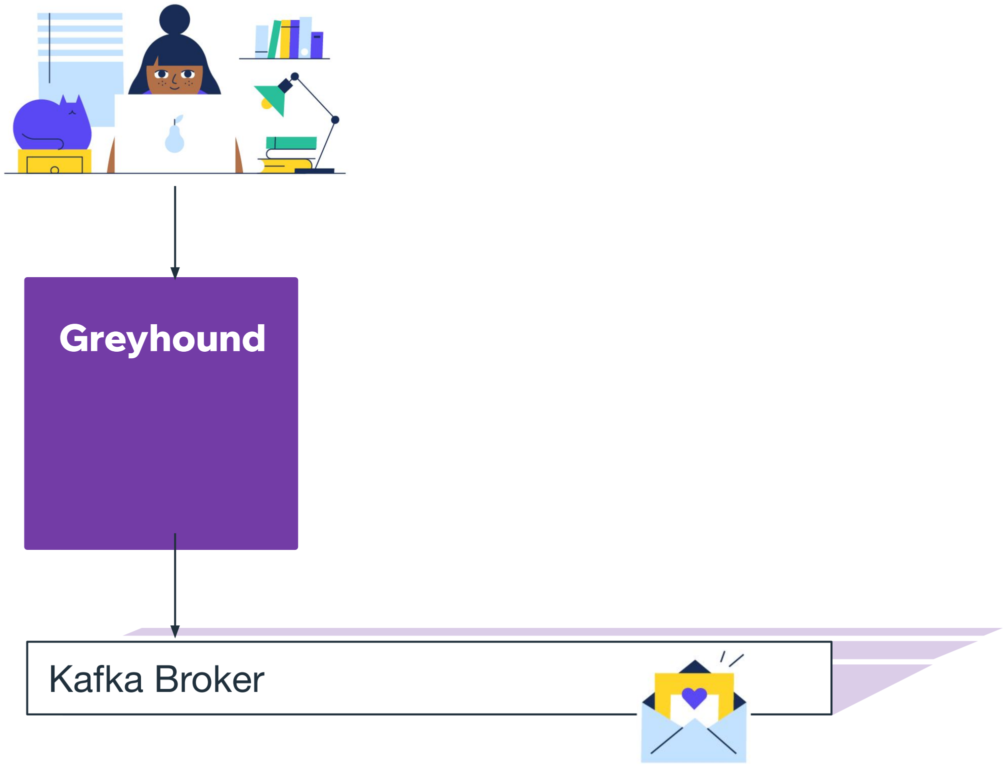
Service A
Service B
Greyhound Producer
Kafka Producer
Greyhound Consumer
Kafka Consumer
Kafka Broker

```
aGreyhoundConsumerSpec(groupName, messageHandler, topicName)

val producer = GreyhoundBuilder.resilientProducer(topicName)
```

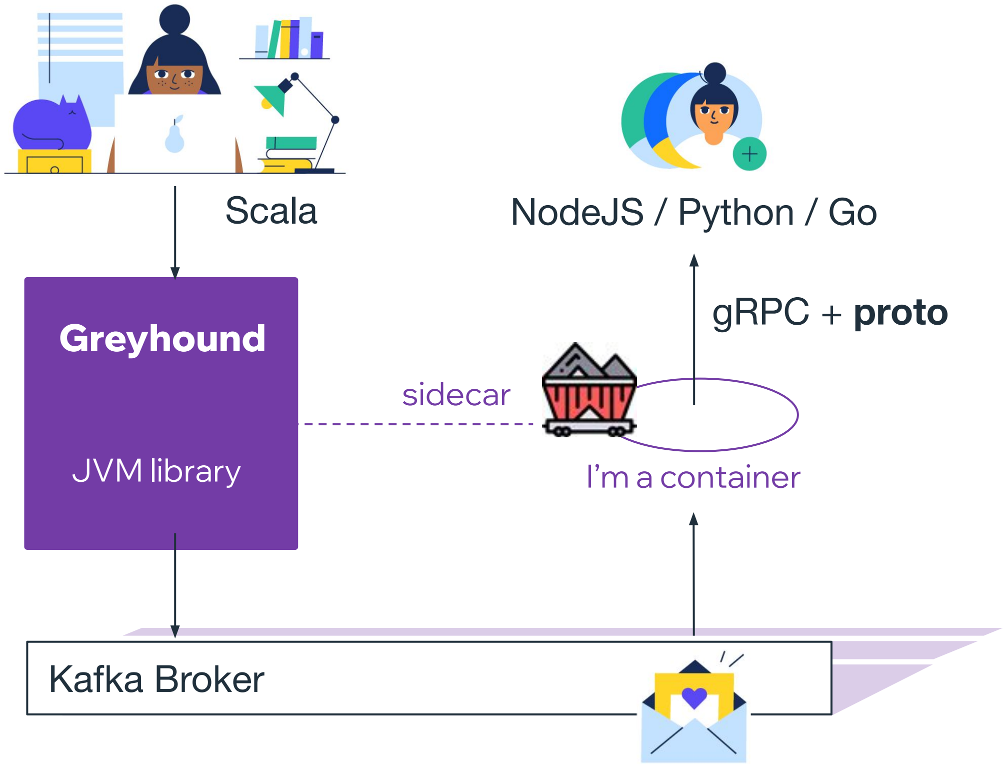
# Self Service □

- ✔ Parallel Consumption
- ✔ Batch Consumer
- ✔ Consumer Retry Strategies
- ✔ Resilient Producer
- ✔ Context Propagation
- ✔ Metrics reporting



Greyhound

Kafka Broker



Scala

NodeJS / Python / Go

Greyhound

JVM library

sidecar

gRPC + **proto**

I’m a container

Kafka Broker

# We use it for...

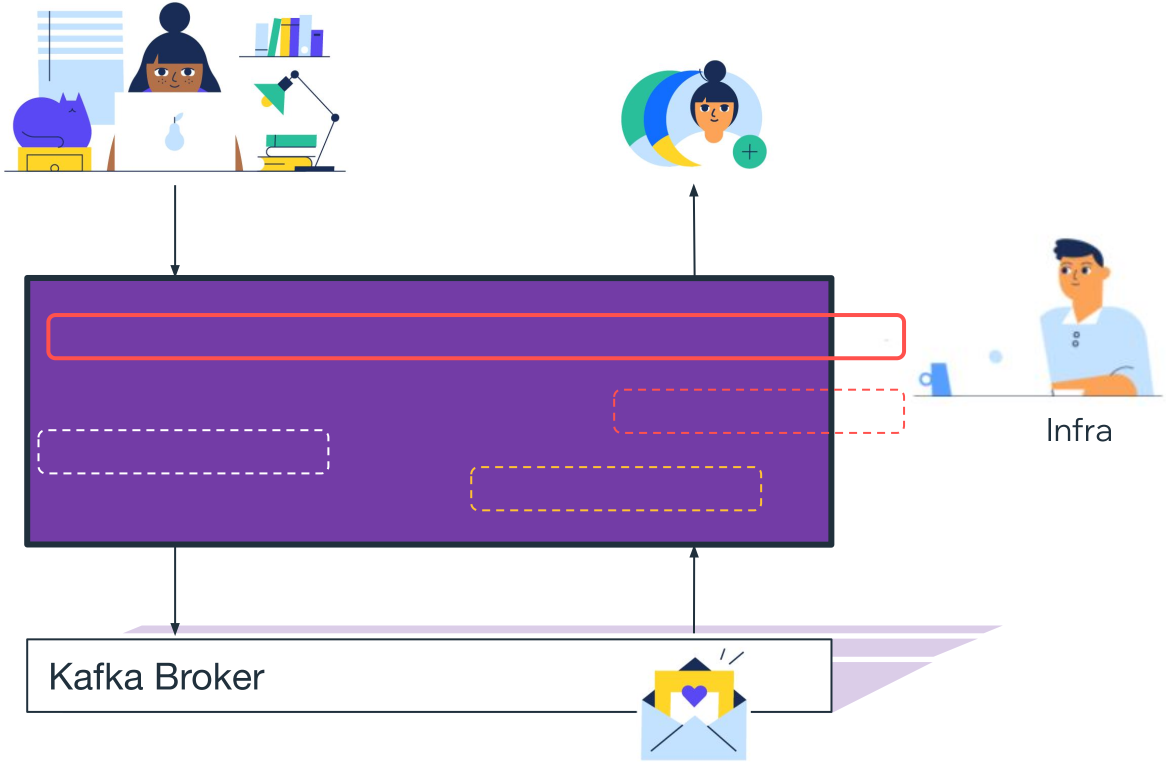
Domain Events

ETL to DWH

Task Scheduling

Async Queue

...



# Growing Pains

## Kafka

Event-driven architecture

## + Greyhound

Large scale traffic

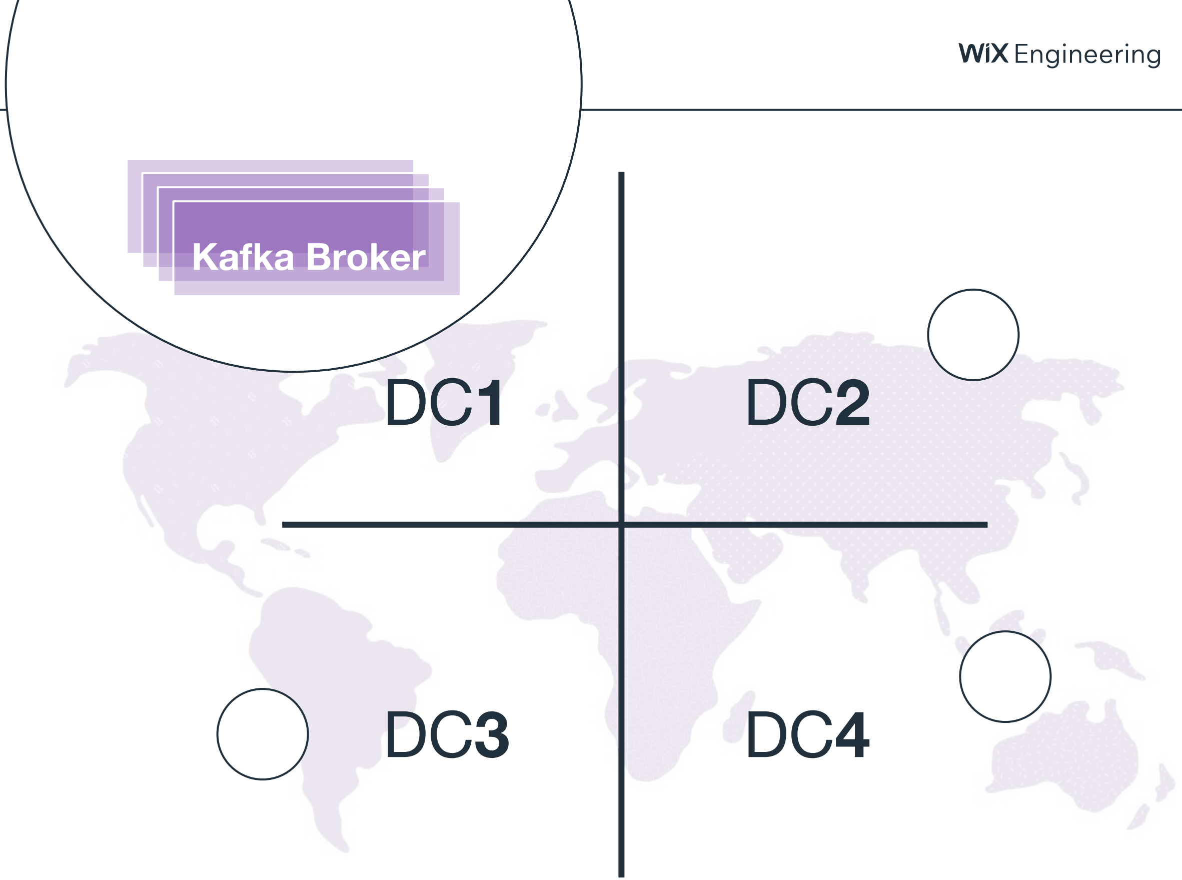
Hundreds of developers

Diverse tech stack

Cluster Overload

DC awareness

# Single Cluster Overload

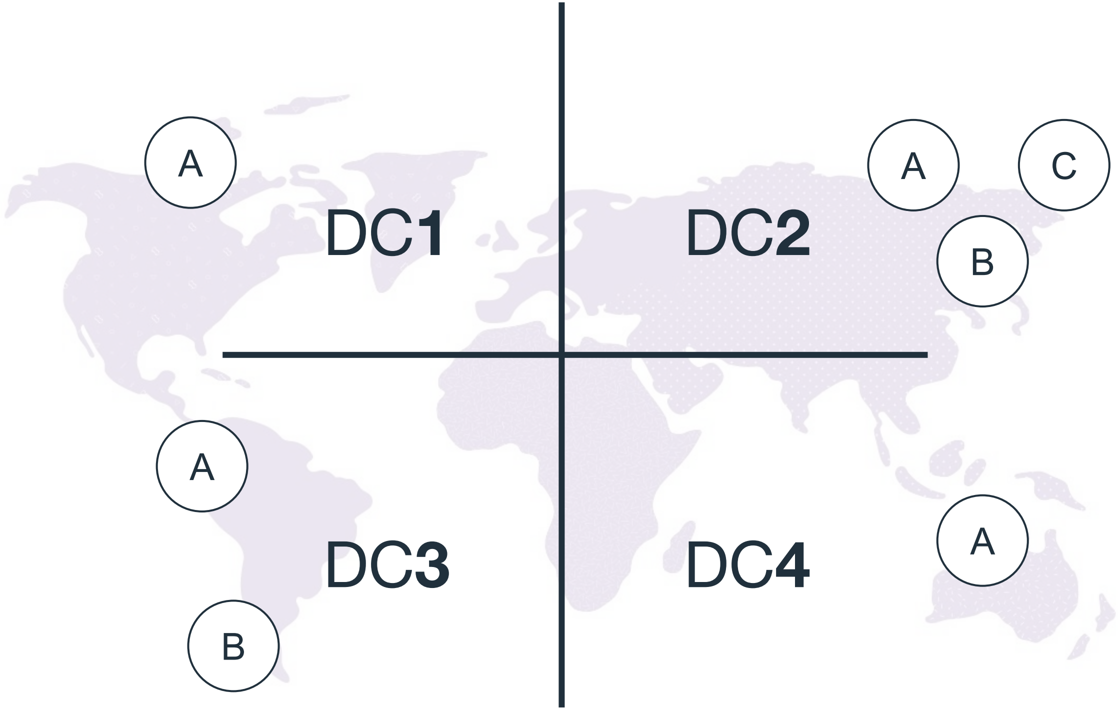


* intra-dc

# Single Cluster Overload

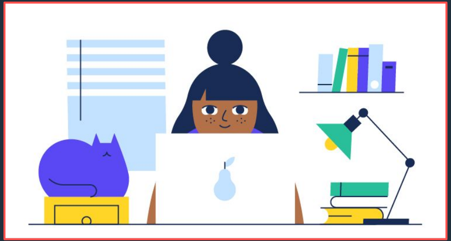
↓

# Multi Cluster

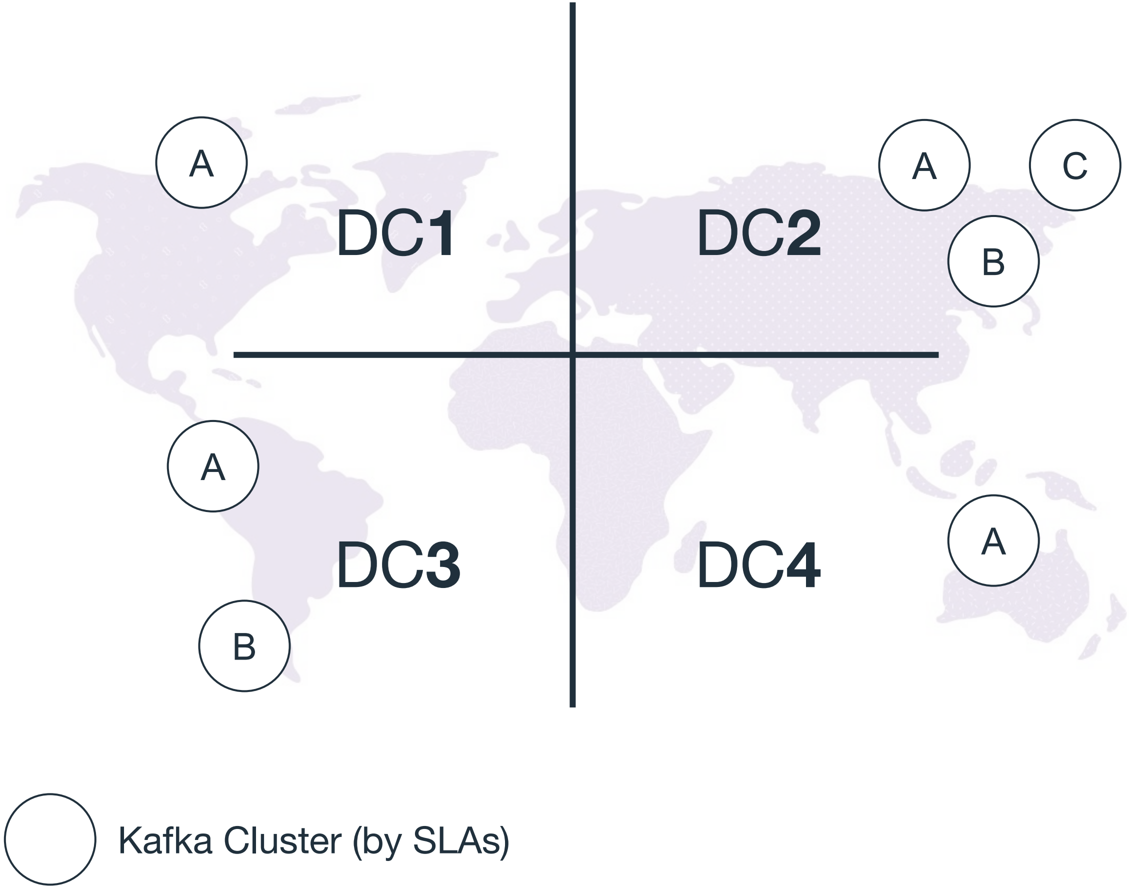


○ Kafka Cluster (by SLAs)

# I want to produce a domain event.



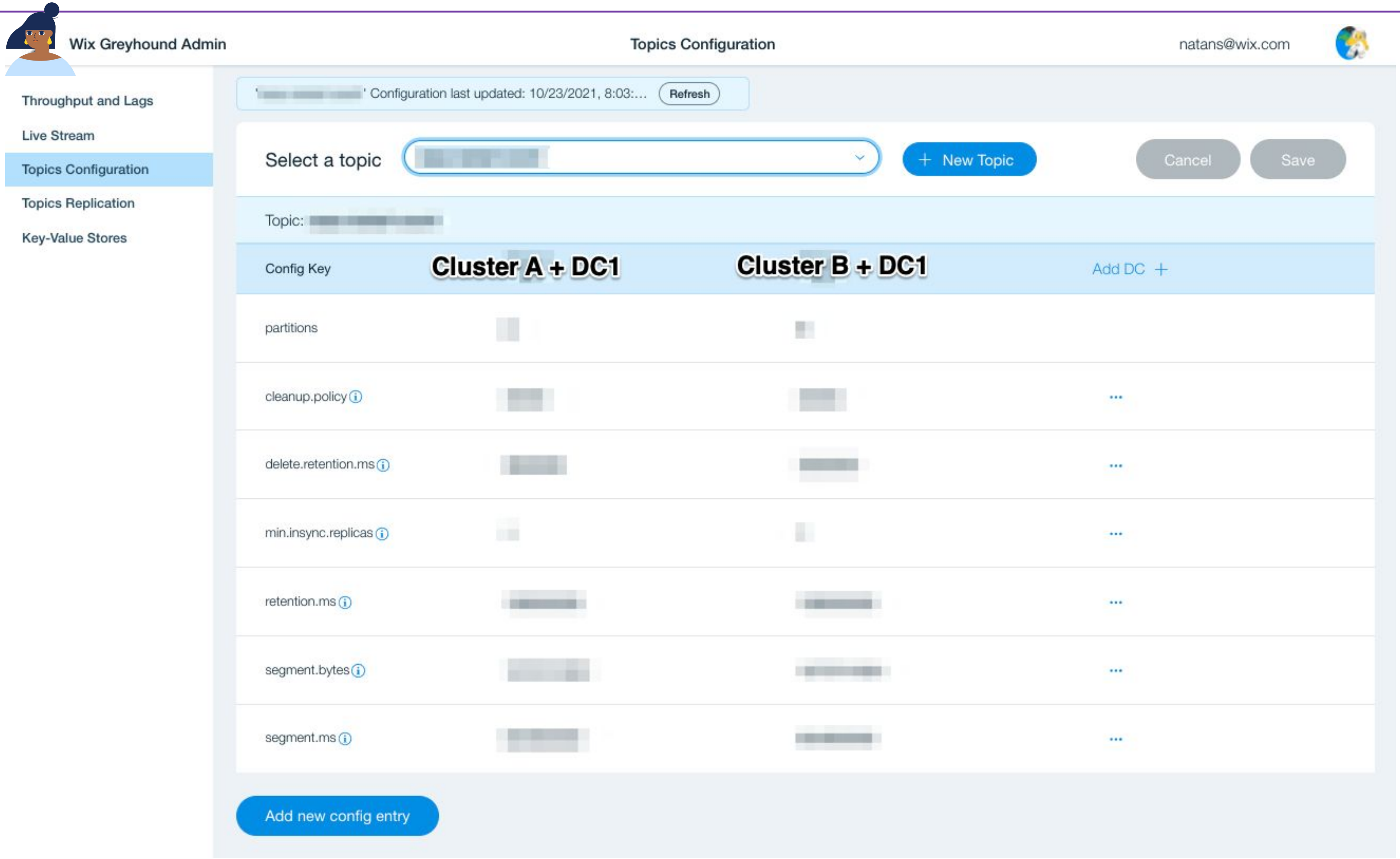
## To which Cluster?



```
aGreyhoundConsumerSpec(groupName, messageHandler, topicName)
.ClusterA


val producer = GreyhoundBuilder.resilientProducer(topicName,
_.ClusterB
```

* wix-layer



Wix Greyhound Admin

Topics Configuration

natans@wix.com

- Throughput and Lags
- Live Stream
- Topics Configuration
- Topics Replication
- Key-Value Stores

'[redacted]' Configuration last updated: 10/23/2021, 8:03:... Refresh

Select a topic [redacted] + New Topic Cancel Save

Topic: [redacted]

| Config Key | Cluster A + DC1 | Cluster B + DC1 | Add DC + |
|---|---|---|---|
| partitions | [redacted] | [redacted] | |
| cleanup.policy ⓘ | [redacted] | [redacted] | ... |
| delete.retention.ms ⓘ | [redacted] | [redacted] | ... |
| min.insync.replicas ⓘ | [redacted] | [redacted] | ... |
| retention.ms ⓘ | [redacted] | [redacted] | ... |
| segment.bytes ⓘ | [redacted] | [redacted] | ... |
| segment.ms ⓘ | [redacted] | [redacted] | ... |

Add new config entry

# Growing Pains

## Kafka

## + Greyhound

Event-driven architecture

+ Multi Cluster

Large scale traffic

Hundreds of developers

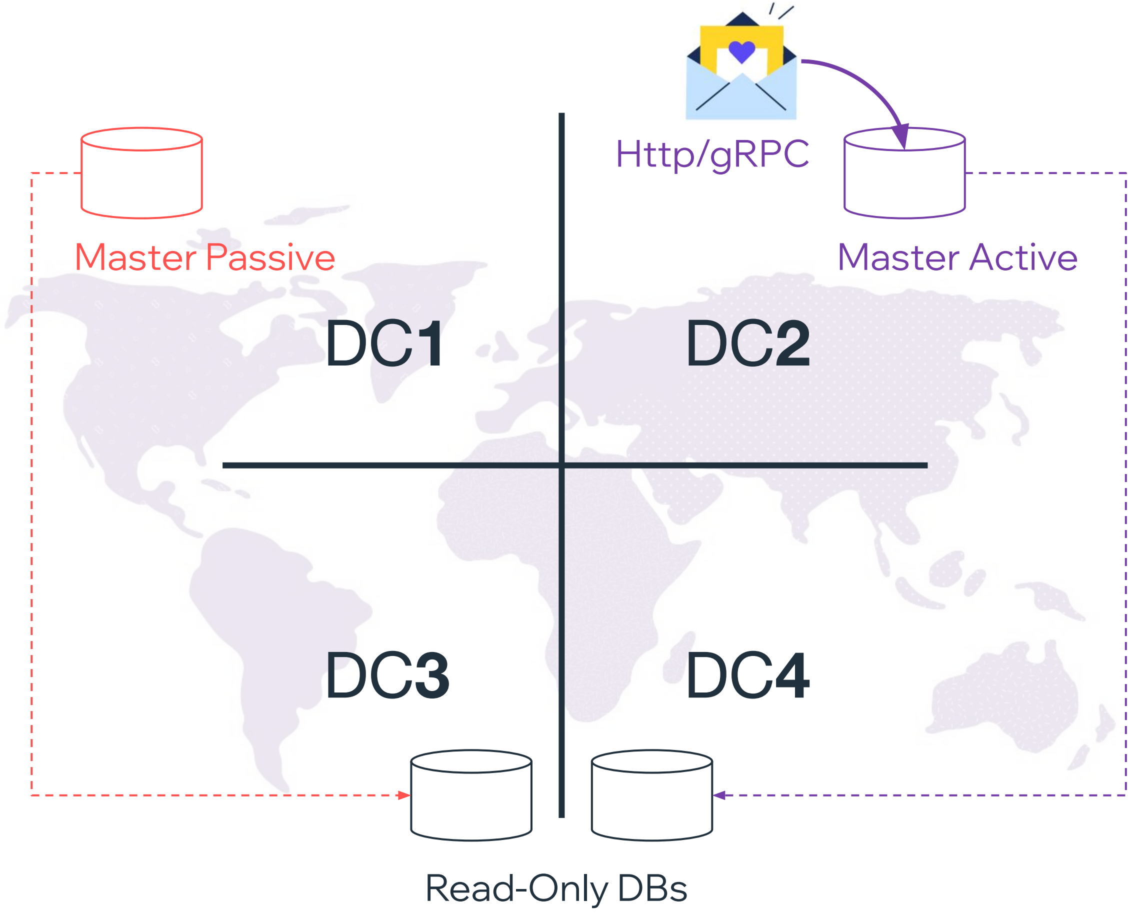
Diverse tech stack

Cluster Overload

DC awareness

I want to process the event and save the data.

To which DC?



# Growing Pains

## Kafka

## + Greyhound

Event-driven architecture

Large scale traffic

Cluster Overload

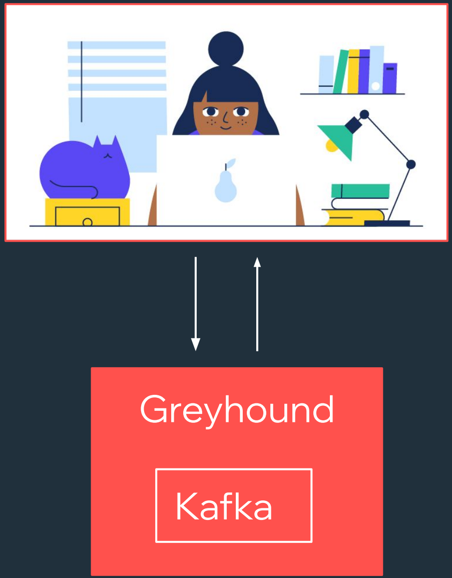
+ Multi Cluster

Hundreds of developers

DC awareness

Diverse tech stack

## + Cross DC services

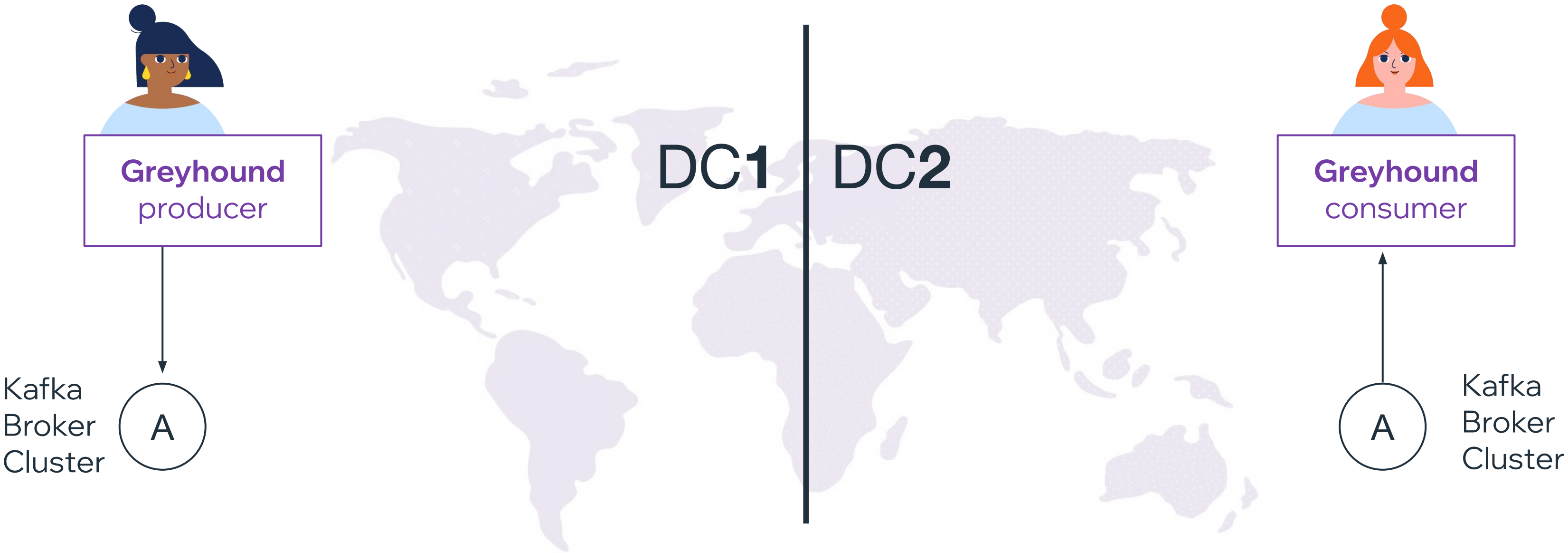


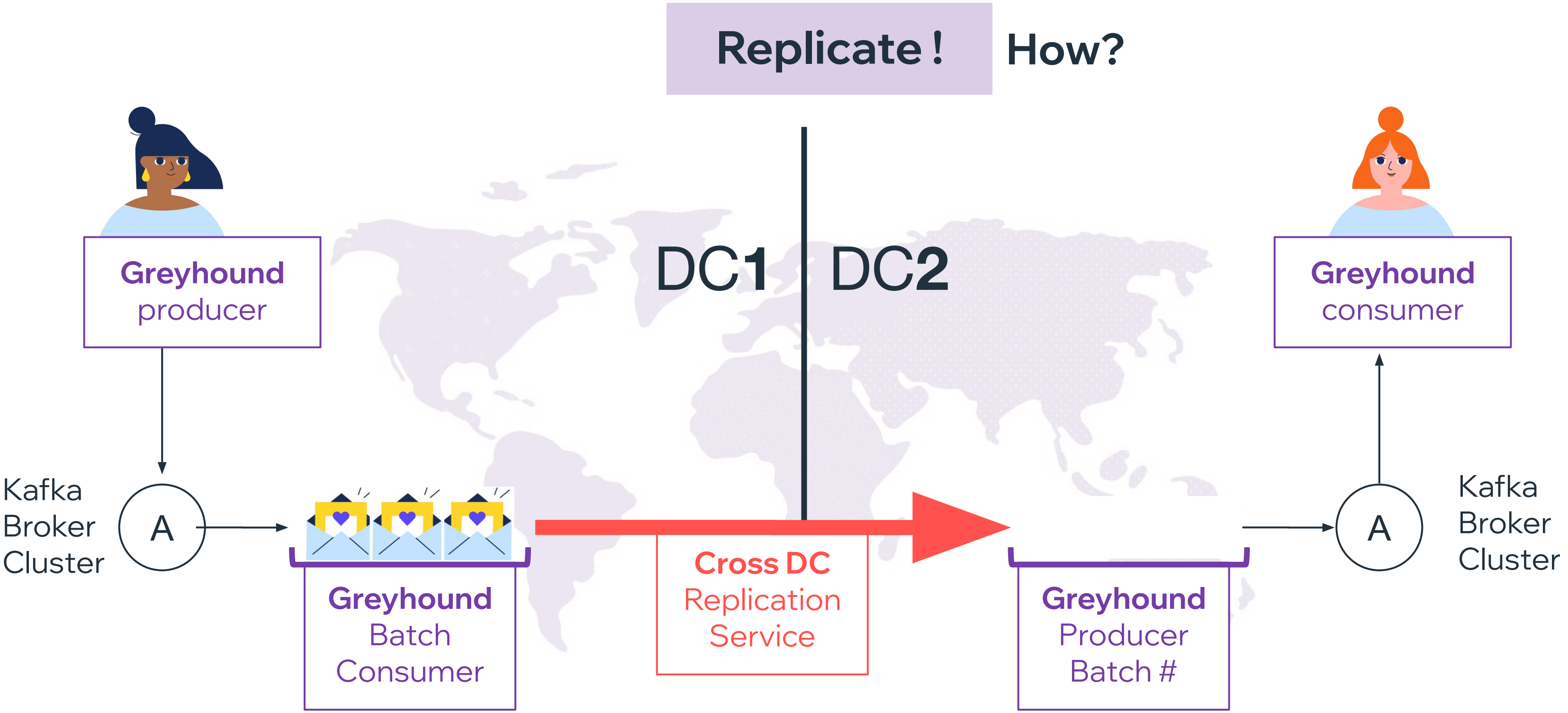
# Cross-DC Self Services □

1. **Replicate across DCs**
2. **Produce to Main DC**

## [WIP] Just Produce ❤

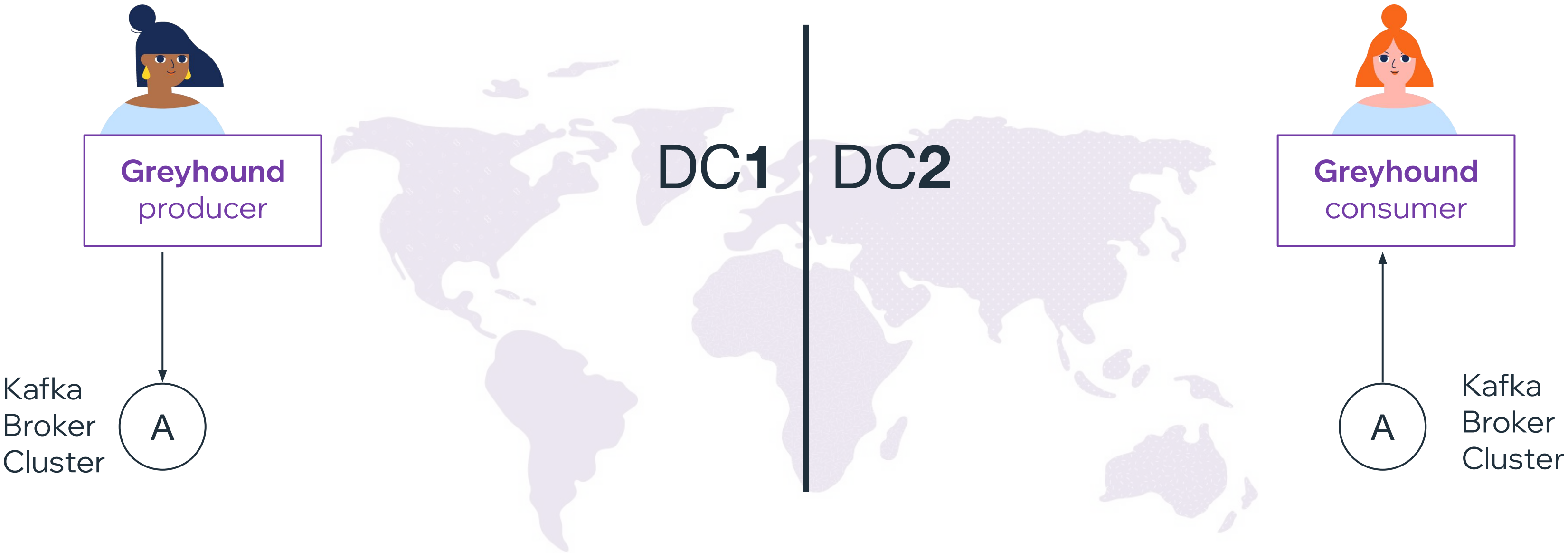
Replicate ! across DCs



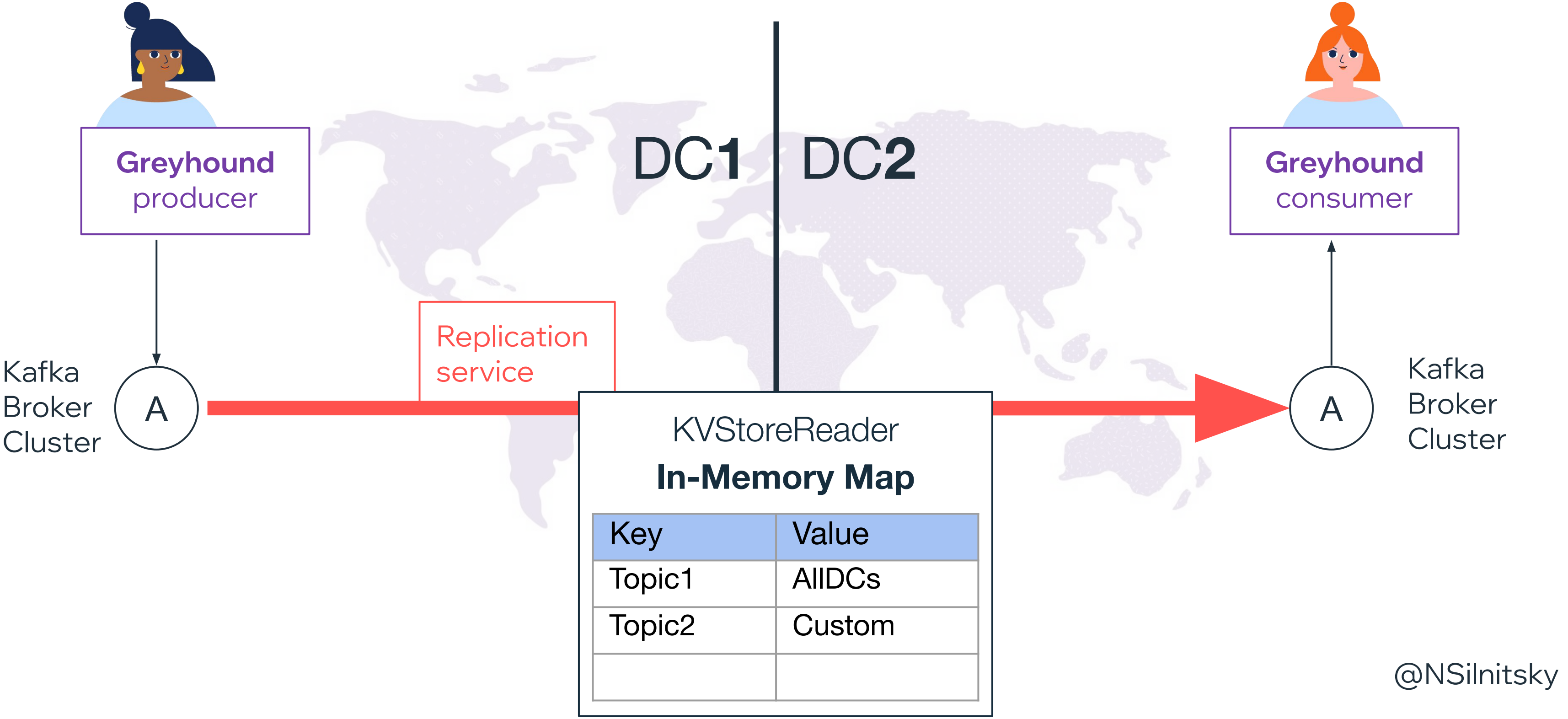

Replicate !
How?
DC1
DC2
Greyhound producer
Kafka Broker Cluster
A
Greyhound Batch Consumer
Cross DC Replication Service
Greyhound Producer Batch #
A
Kafka Broker Cluster
Greyhound consumer

Replicate !

a Compact Topic for Policy



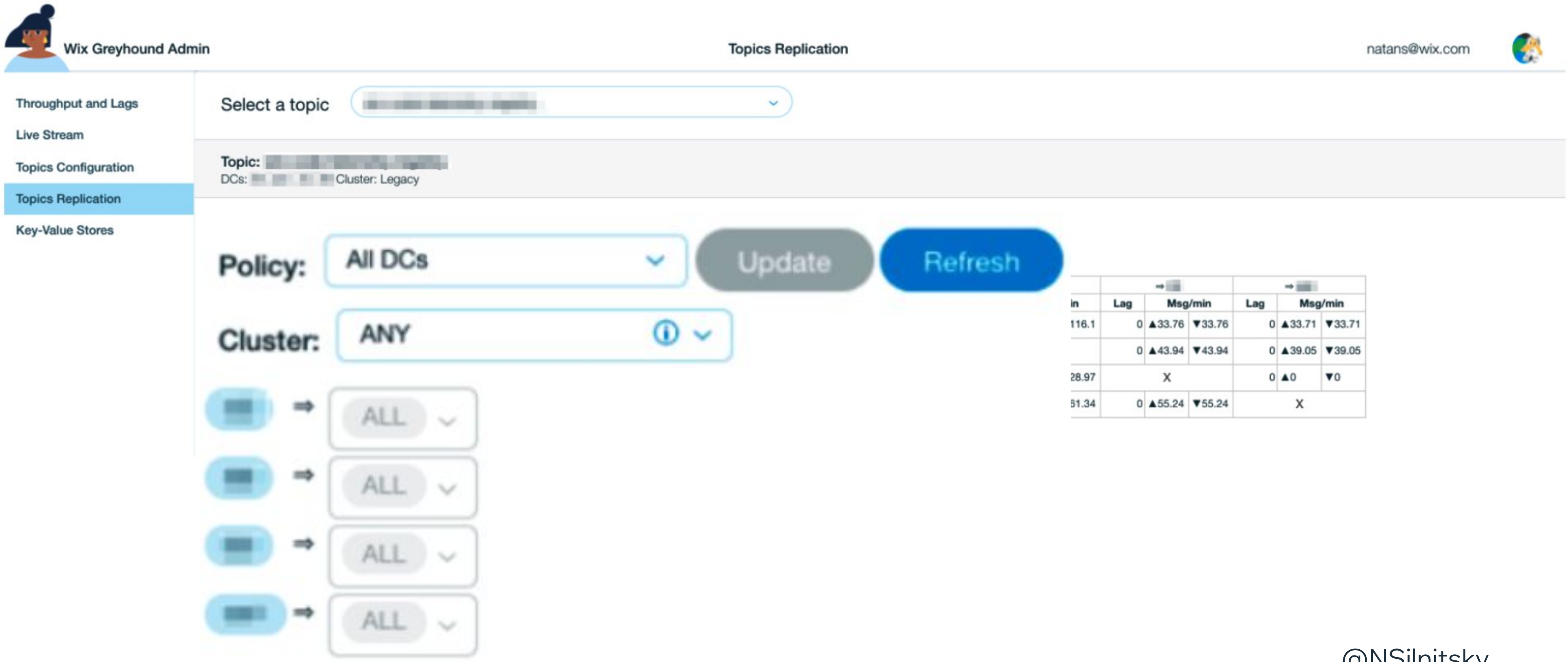
# Replicate ! How?



KVStoreReader

**In-Memory Map**

| Key | Value |
|---|---|
| Topic1 | AllDCs |
| Topic2 | Custom |
| | |



Wix Greyhound Admin

Topics Replication

natans@wix.com

Select a topic [redacted]

Topic: [redacted]
DCs: [redacted] Cluster: Legacy

Policy: All DCs

Cluster: ANY

[redacted] ⇒ ALL

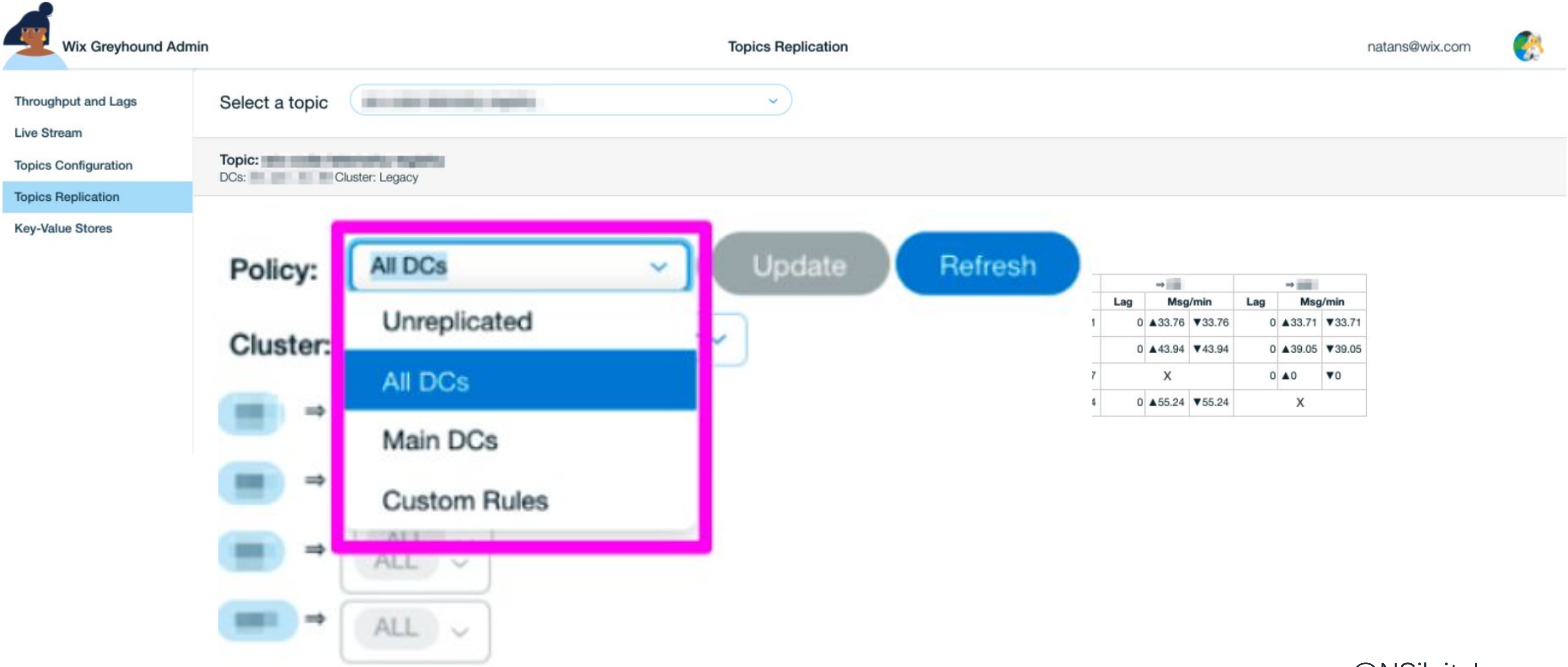
[redacted] ⇒ ALL

[redacted] ⇒ ALL

[redacted] ⇒ ALL

|  | ⇒ [redacted] |  |  | ⇒ [redacted] |  |  |
|---|---|---|---|---|---|---|
| in | Lag | Msg/min |  | Lag | Msg/min |  |
| 116.1 | 0 | ▲33.76 | ▼33.76 | 0 | ▲33.71 | ▼33.71 |
|  | 0 | ▲43.94 | ▼43.94 | 0 | ▲39.05 | ▼39.05 |
| 28.97 | X |  |  | 0 | ▲0 | ▼0 |
| 61.34 | 0 | ▲55.24 | ▼55.24 | X |  |  |

@NSilnitsky



Select a topic [redacted]

Topic: [redacted]
DCs: [redacted] Cluster: Legacy

Policy: All DCs

Cluster:

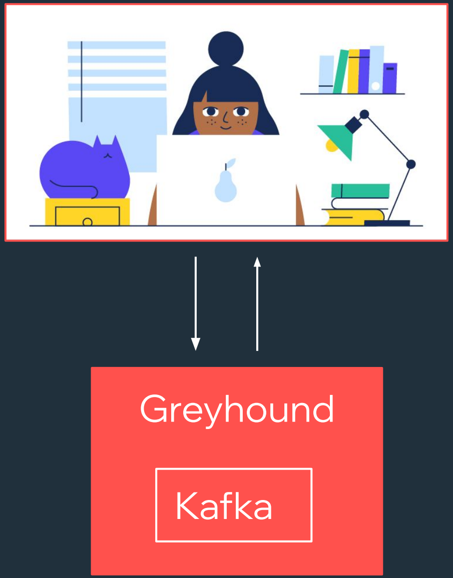
[redacted] ⇒ ALL

[redacted] ⇒ ALL

[redacted] ⇒ ALL

[redacted] ⇒ ALL

| | ⇒ [redacted] | | | ⇒ [redacted] | | |
|---|---|---|---|---|---|---|
| | Lag | Msg/min | | Lag | Msg/min | |
| 1 | 0 | ▲33.76 | ▼33.76 | 0 | ▲33.71 | ▼33.71 |
| | 0 | ▲43.94 | ▼43.94 | 0 | ▲39.05 | ▼39.05 |
| 7 | X | | | 0 | ▲0 | ▼0 |
| 4 | 0 | ▲55.24 | ▼55.24 | X | | |



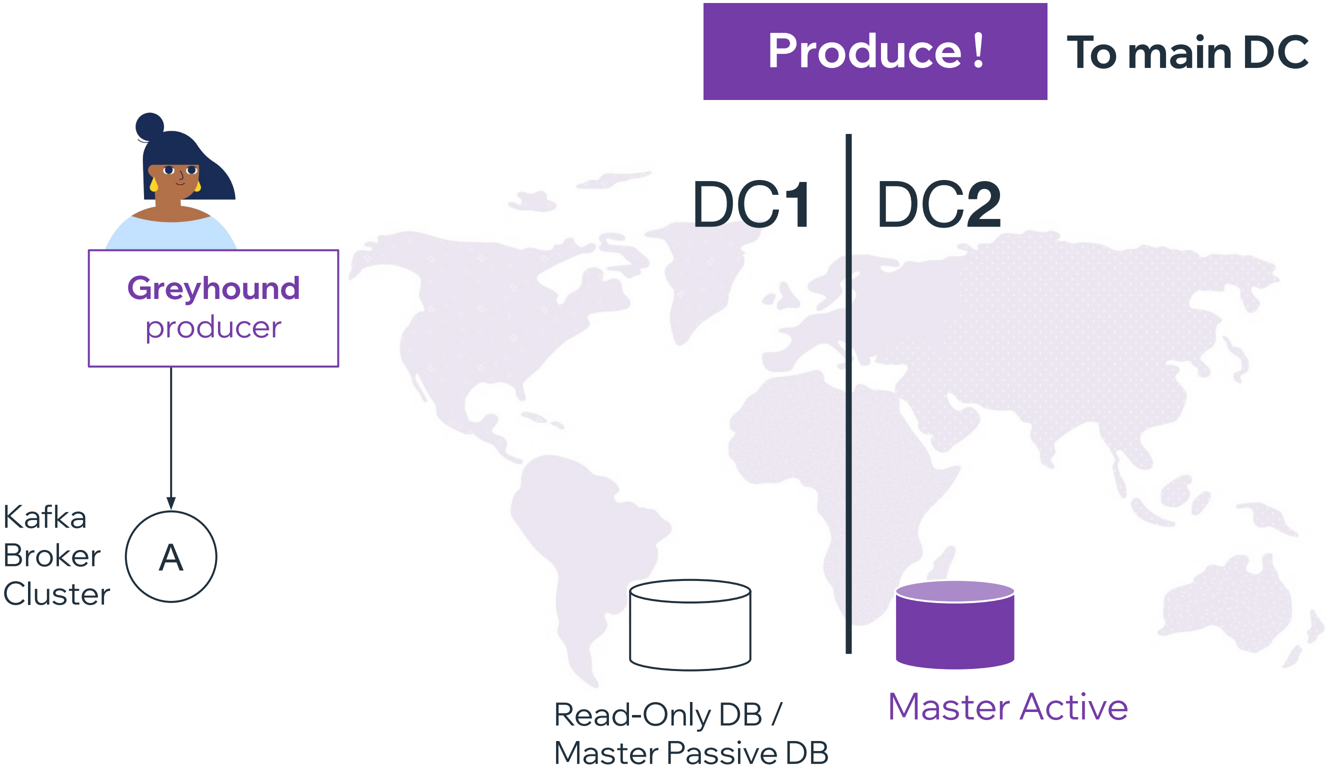
Greyhound

Kafka

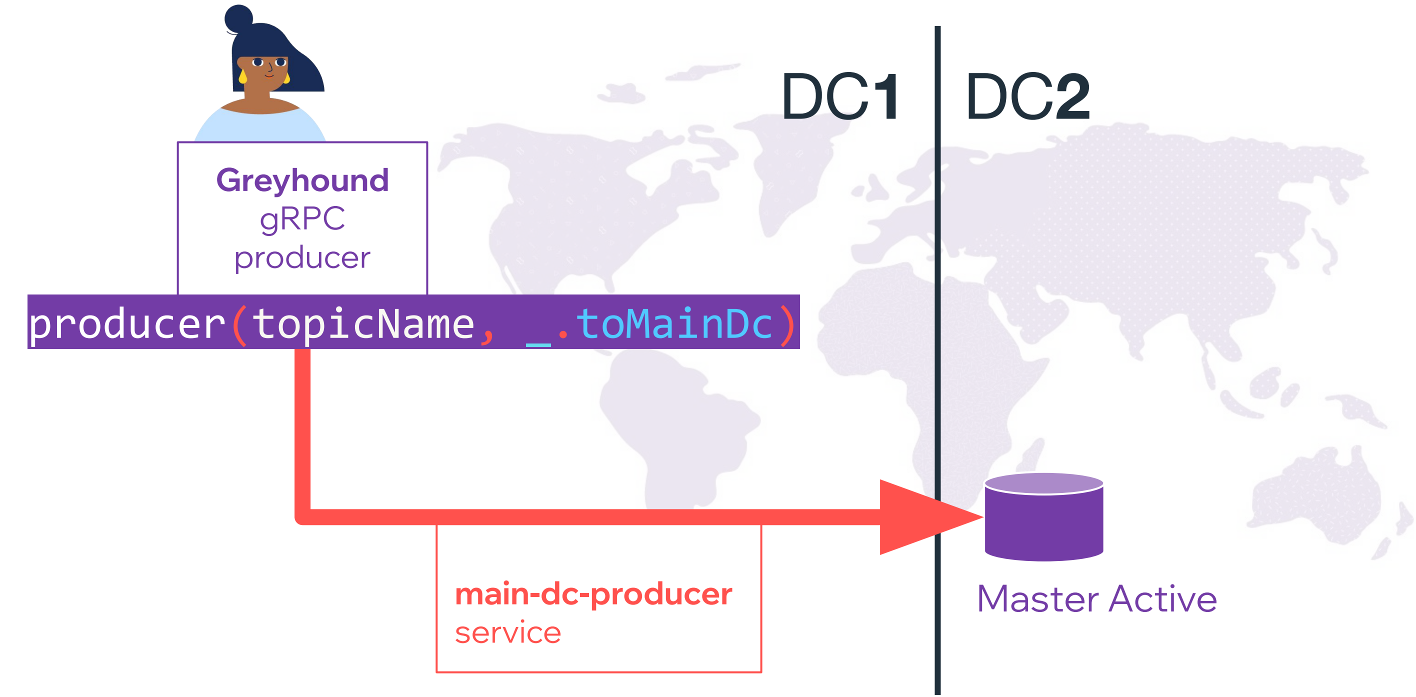
# Cross-DC
# Self Services □

1. ✔ Replicate across DCs
2. **Produce to Main DC**

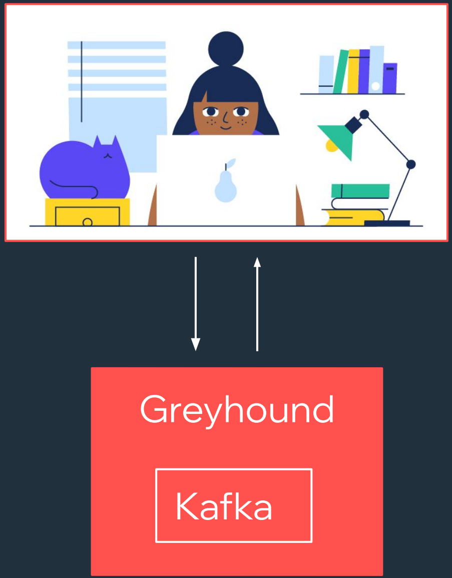
## [WIP] Just Produce ❤


Produce !
To main DC
DC1
DC2
Greyhound
producer
Kafka
Broker
Cluster
A
Read-Only DB /
Master Passive DB
Master Active

Produce ! How?



```
producer(topicName, _.toMainDc)
```



Greyhound

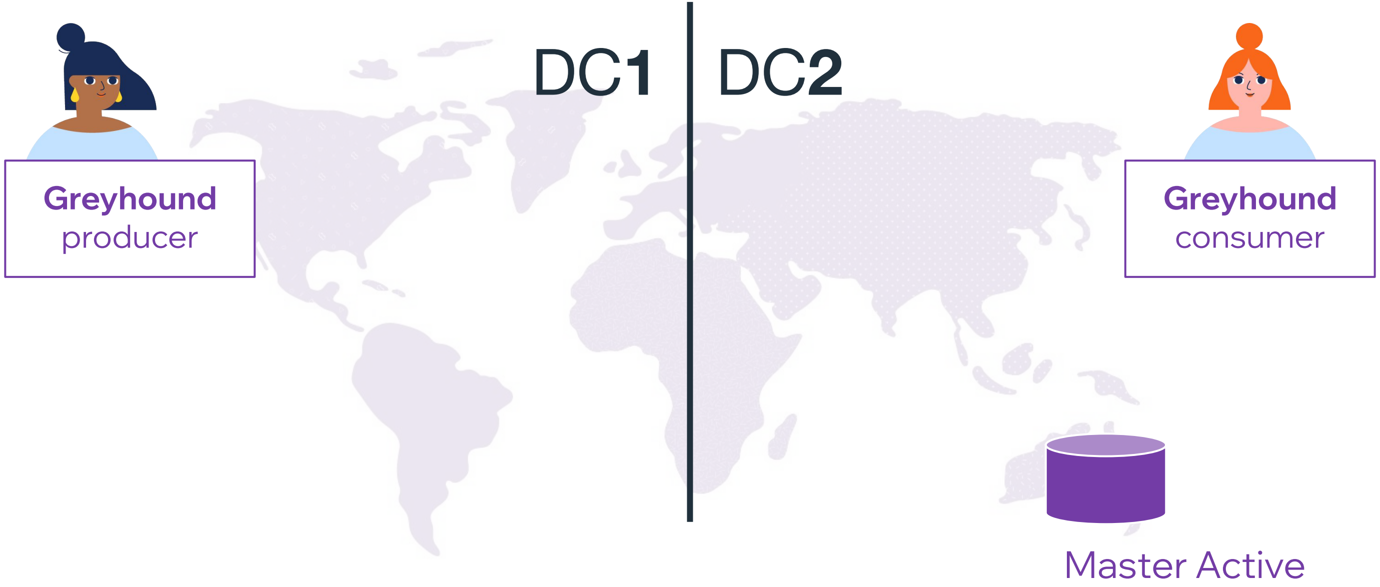
Kafka

# Cross-DC Self Services □

1. ✔ Replicate across DCs
2. ✔ Produce to Main DC

## [WIP] Just Produce ❤

# [WIP] Just Produce ❤ To where needed



DC1

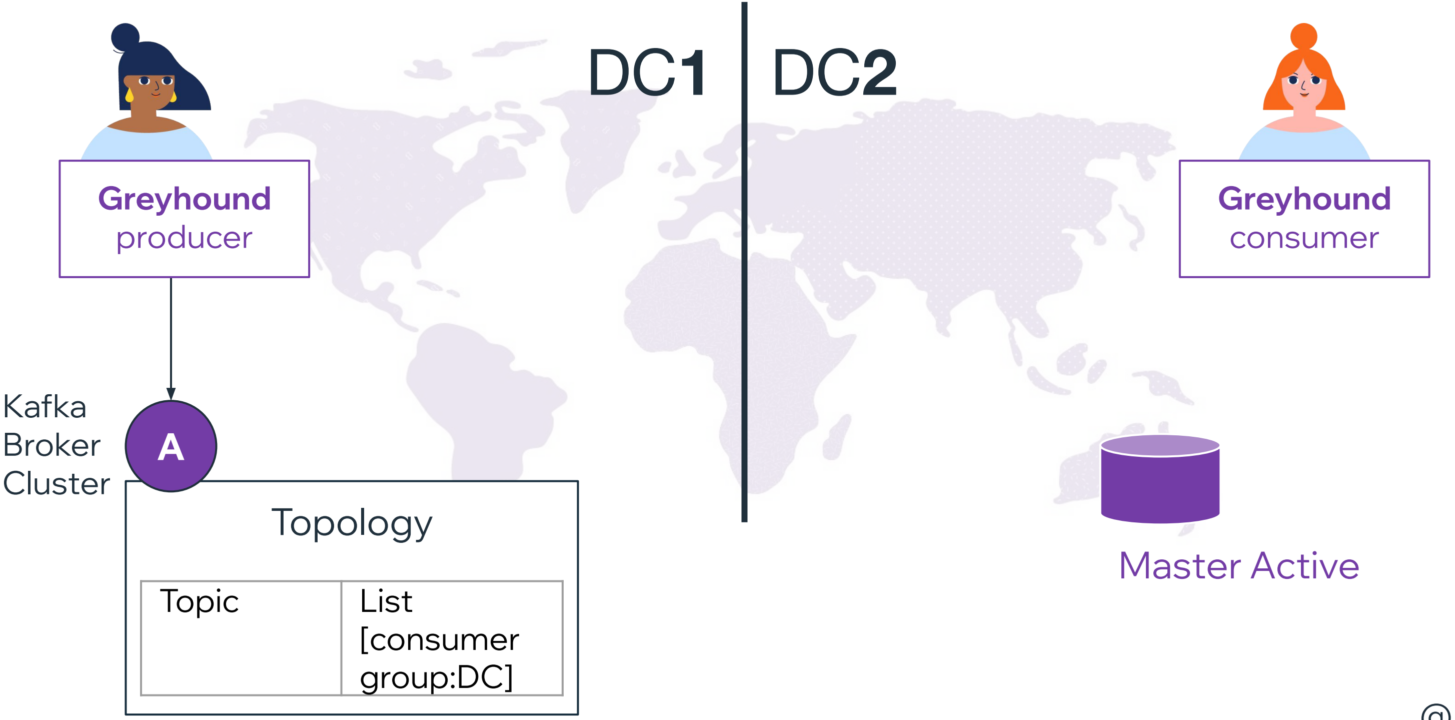
DC2

**Greyhound** producer

**Greyhound** consumer

Master Active

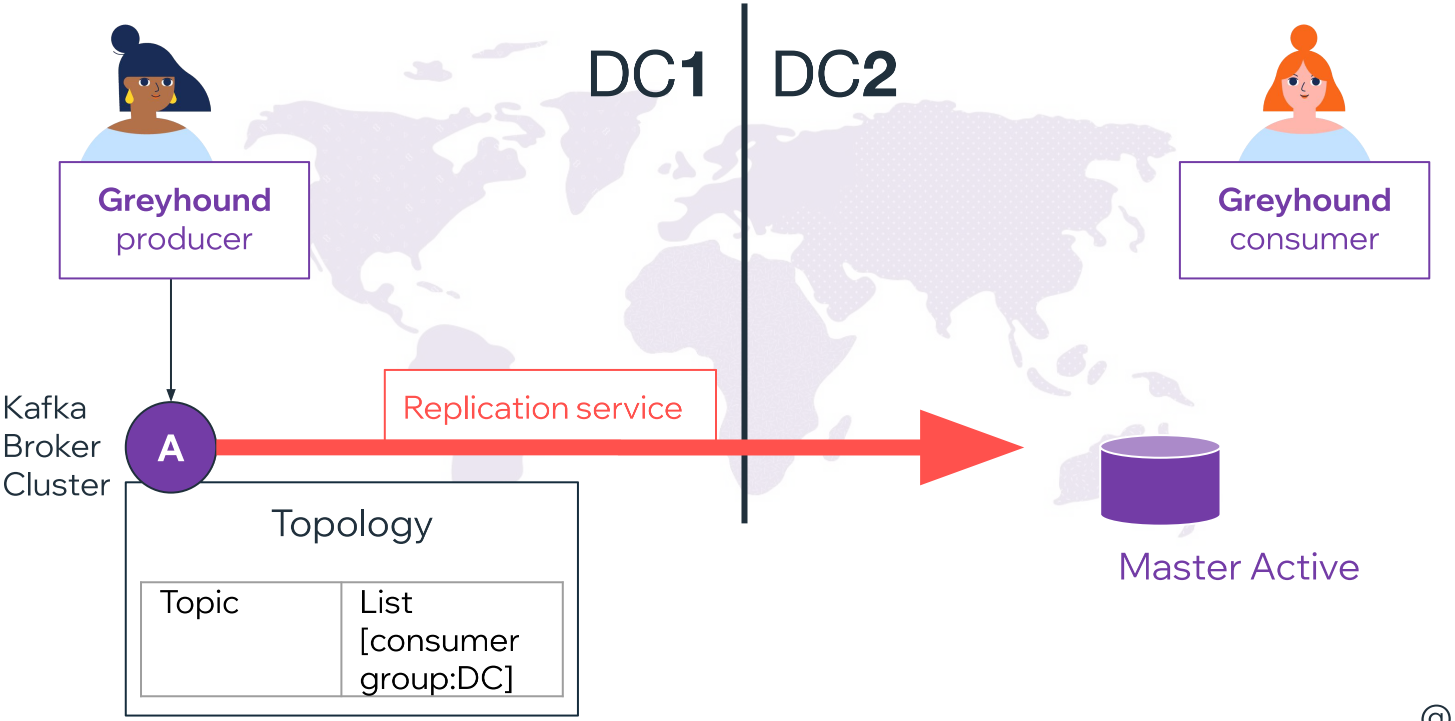
# [WIP] Just Produce ❤ To where needed



Topology

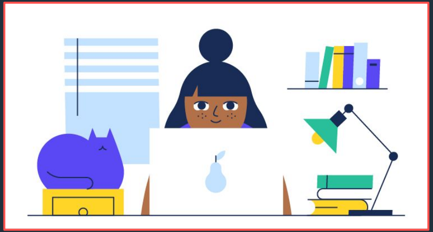
| | |
|---|---|
| Topic | List [consumer group:DC] |

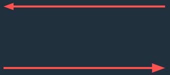
# [WIP] Just Produce ❤ To where needed



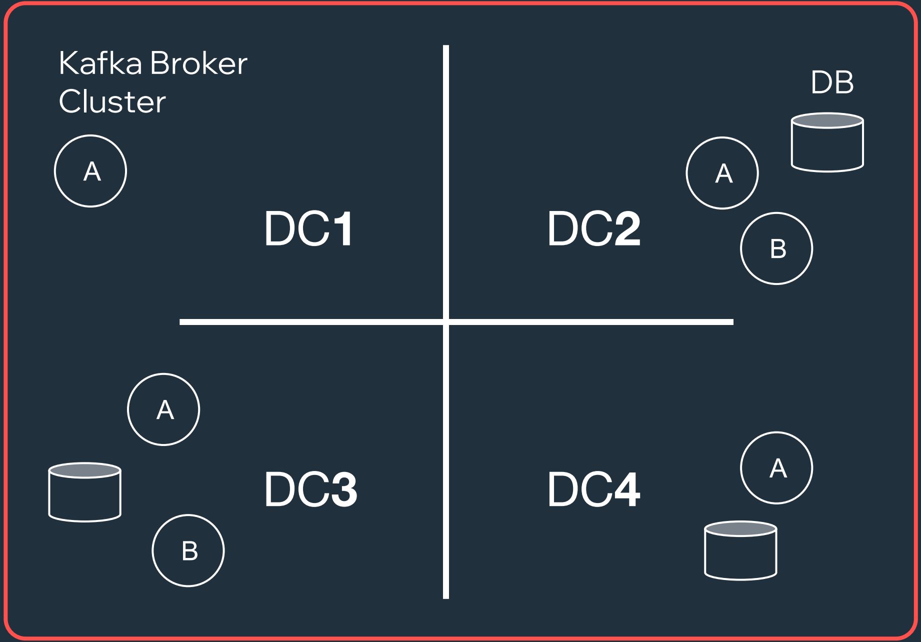
| Topic | List [consumer group:DC] |
|---|---|

* reintroduce decoupling

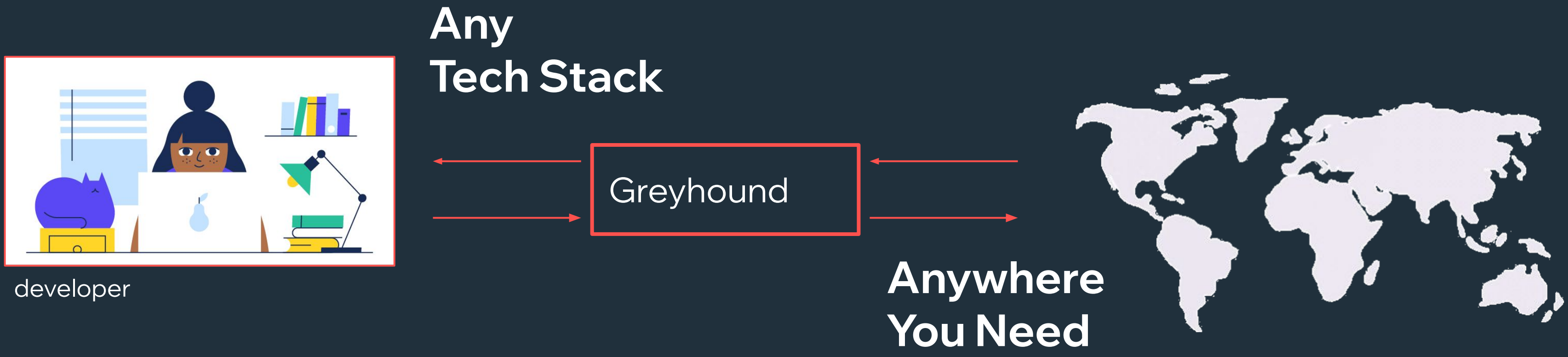




Just Produce ❤



## To a Single Logical Kafka Cluster.



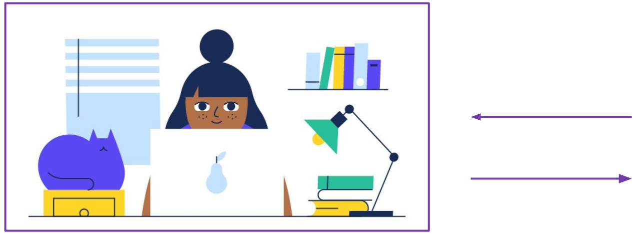
**Any Tech Stack**

developer

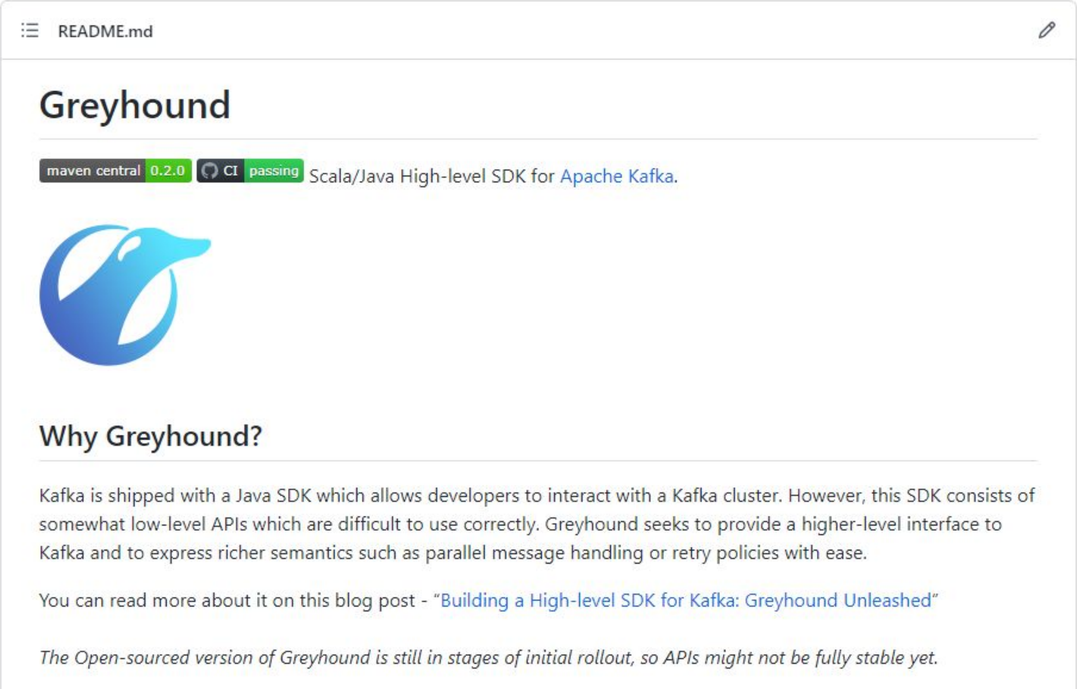
Greyhound

**Anywhere You Need**

# github.com/wix/greyhound



developer



## Greyhound

Scala/Java High-level SDK for Apache Kafka.

## Why Greyhound?

Kafka is shipped with a Java SDK which allows developers to interact with a Kafka cluster. However, this SDK consists of somewhat low-level APIs which are difficult to use correctly. Greyhound seeks to provide a higher-level interface to Kafka and to express richer semantics such as parallel message handling or retry policies with ease.

You can read more about it on this blog post - "Building a High-level SDK for Kafka: Greyhound Unleashed"

*The Open-sourced version of Greyhound is still in stages of initial rollout, so APIs might not be fully stable yet.*

@NSilnitsky

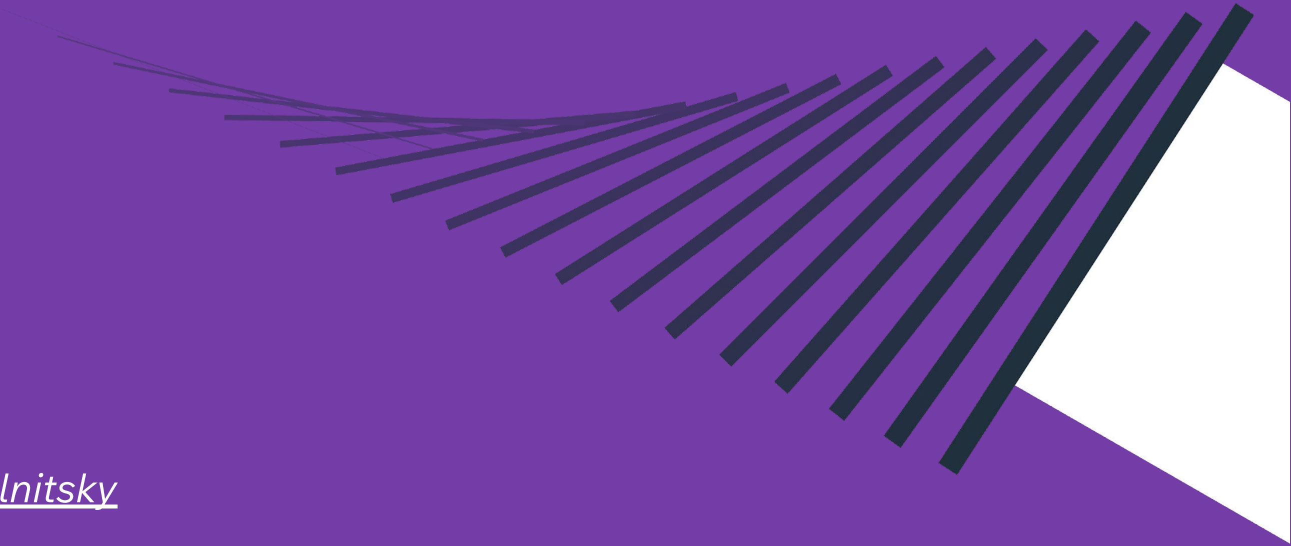
# Thank You!

👉 *slideshare.net/NatanSilnitsky*

*Any questions?*

natansil.com twitter@NSilnitsky linkedin/natansilnitsky github.com/natansil

# Q&A



👉 *slideshare.net/NatanSilnitsky*

*Any questions?*

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