Привет

linkedin.com/in/sam-kruglov

Monese

Банковские услуги

Reactive никуда не денется

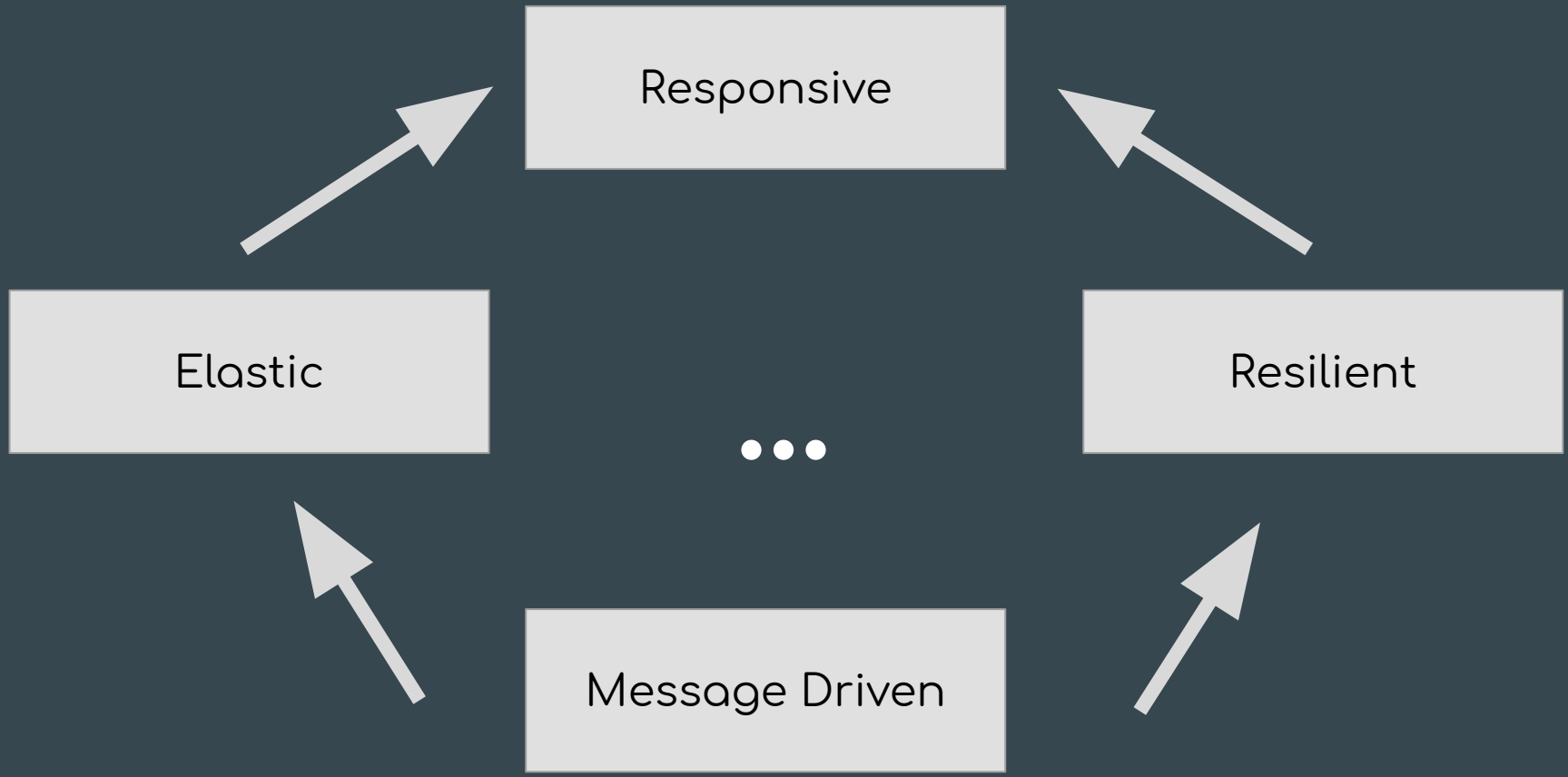
...

@sam_kruglov

reactivemanifesto.org

The Reactive Manifesto

Published on September 16 2014. (v2.0)

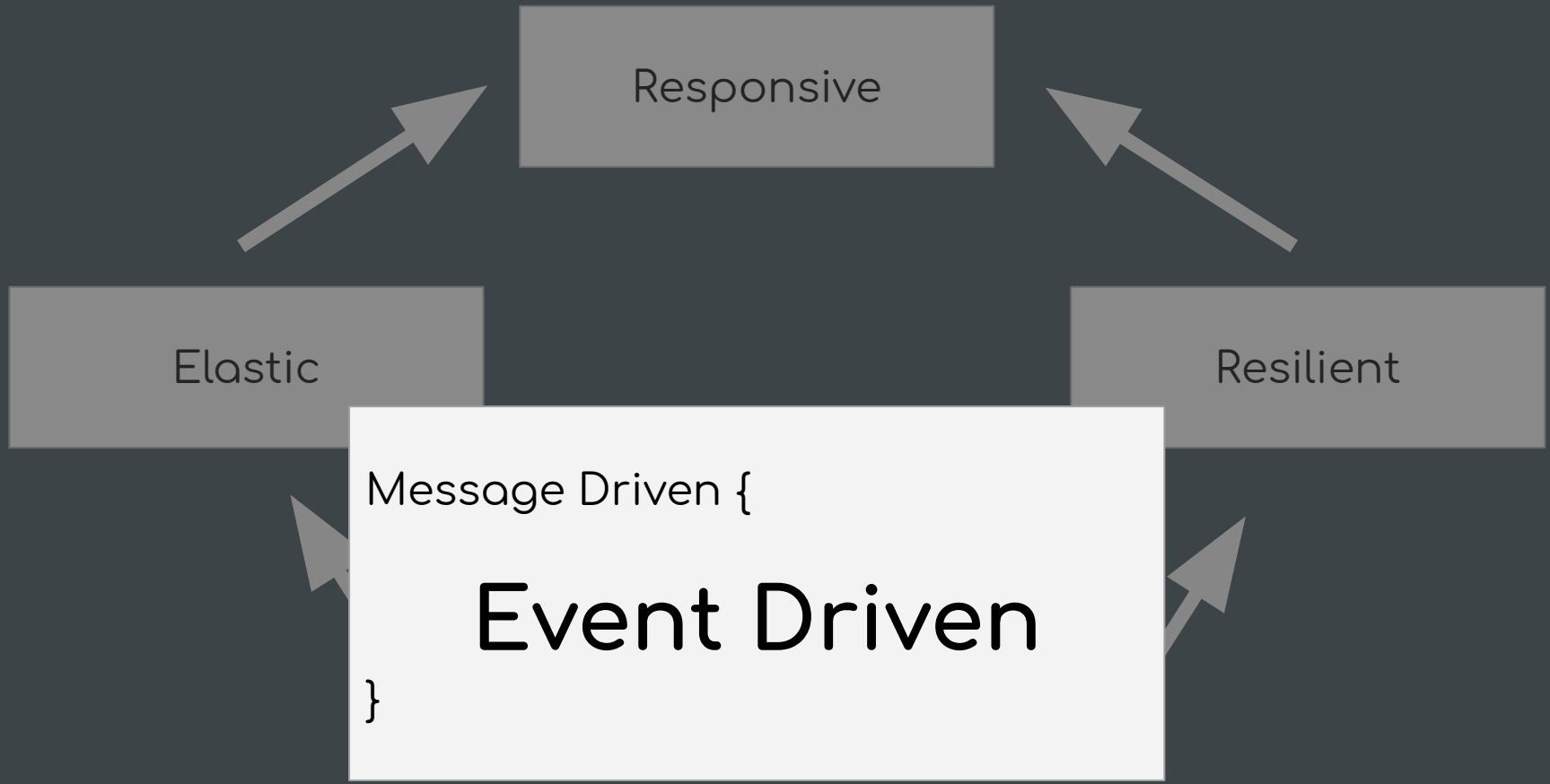

Responsive
Elastic
Resilient
Message Driven

lightbend.com/learn/lightbend-reactive-architecture

Простой MVC сервис для экспериментов

•••

Демо

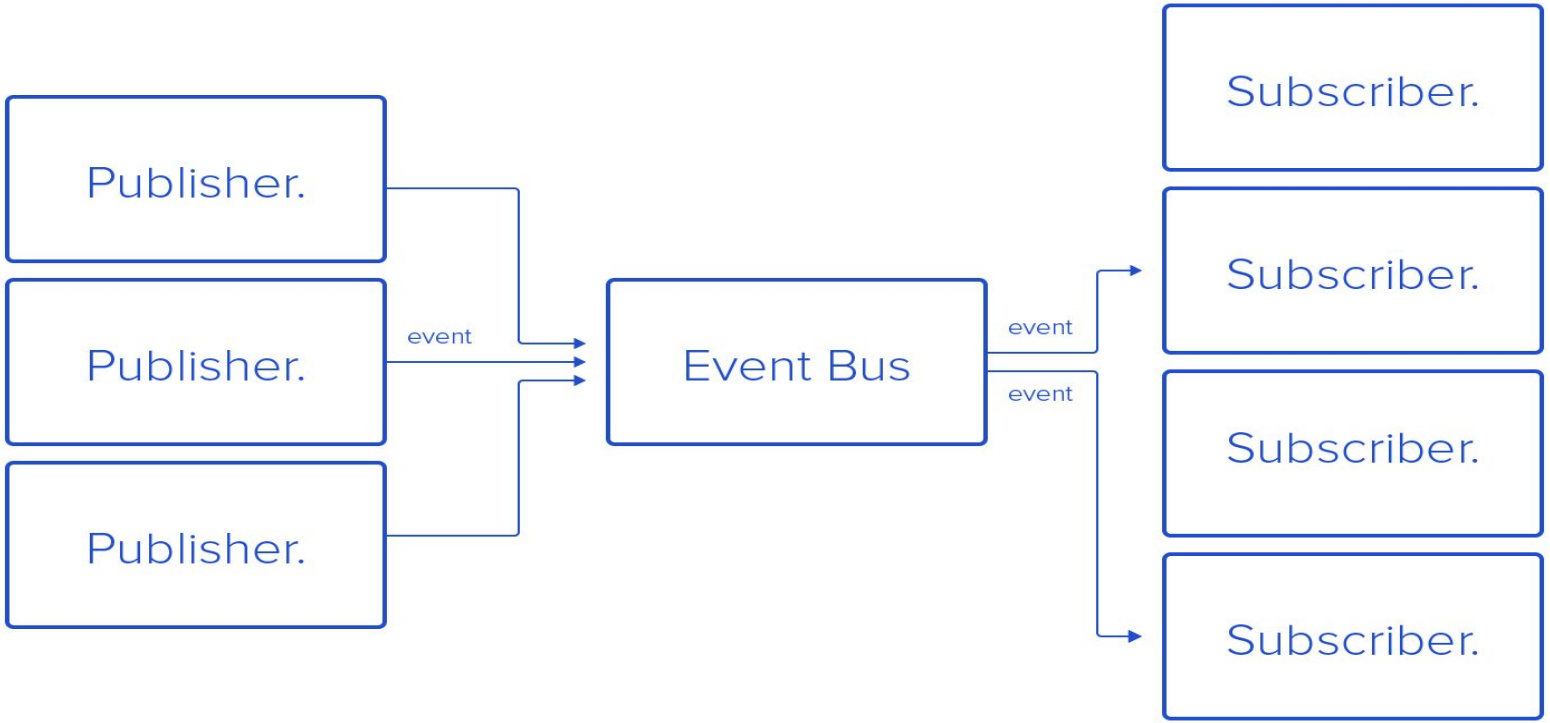

Responsive
Elastic
Resilient
Message Driven {
Event Driven
}

Event - это факт

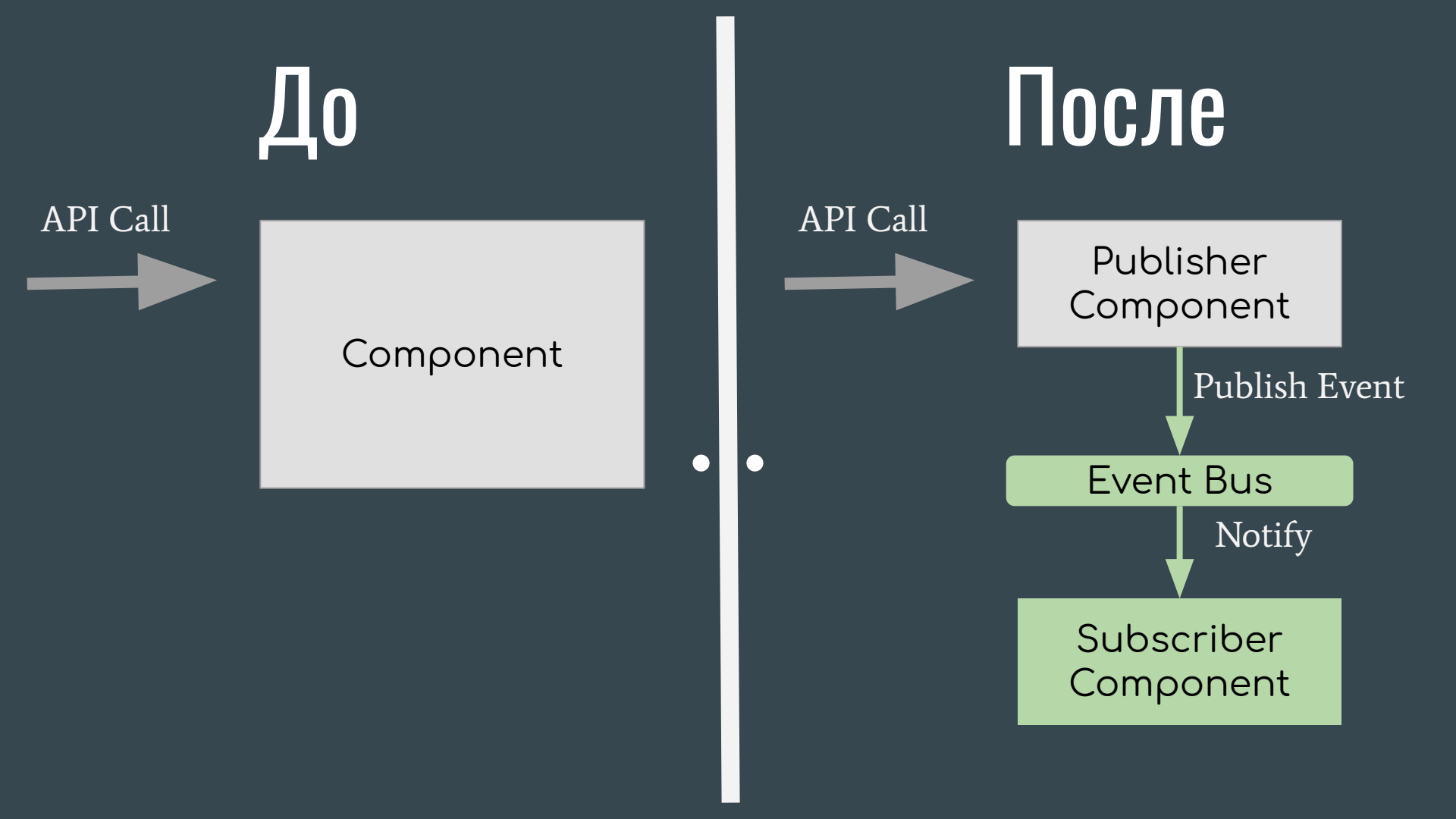
...

Карта Выпущена, Аккаунт Закрыт, и т.д.

Publish - Subscribe



(c) toptal.com/ruby-on-rails/the-publish-subscribe-pattern-on-rails


До
API Call
Component
После
API Call
Publisher Component
Publish Event
Event Bus
Notify
Subscriber Component

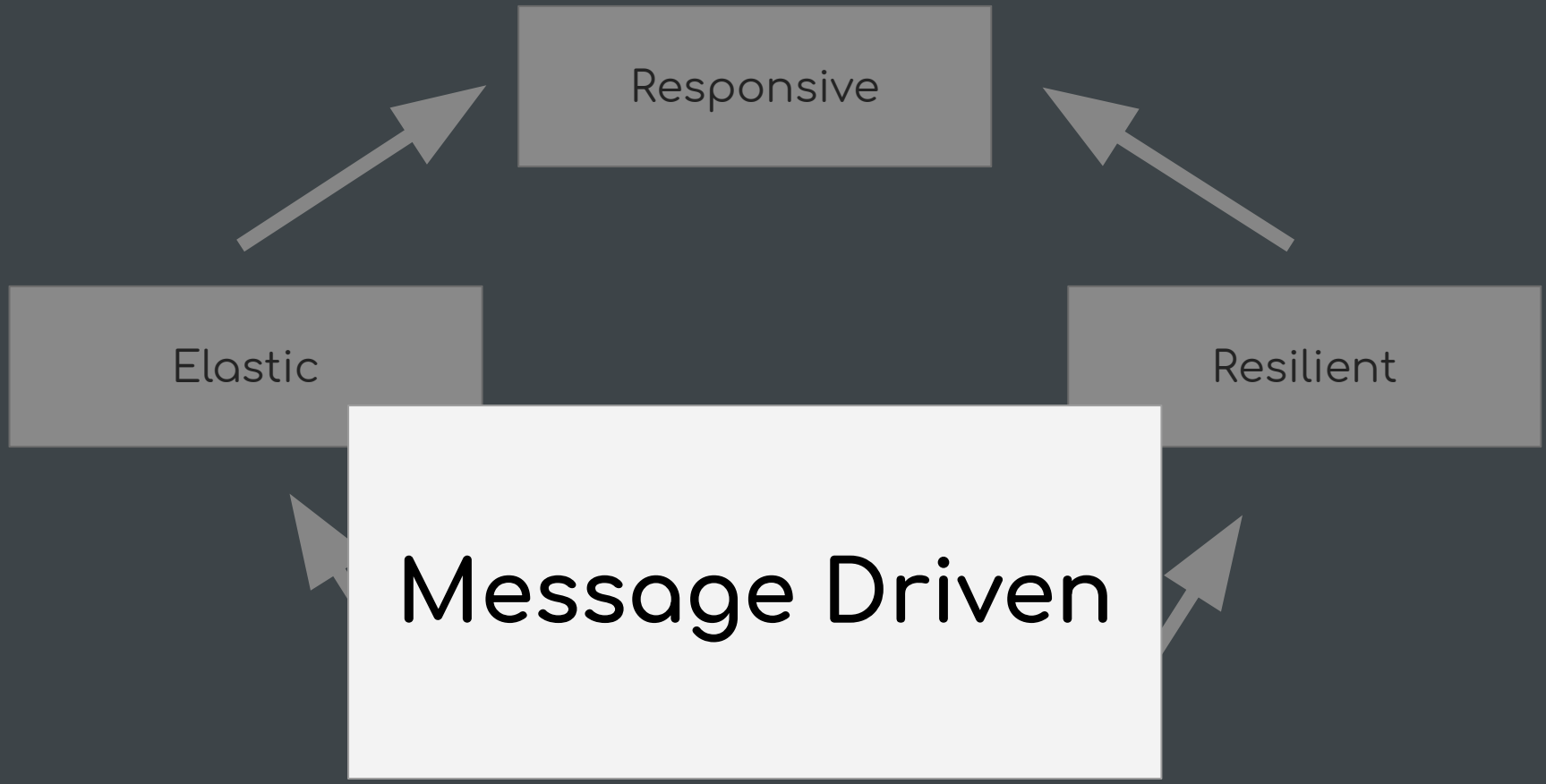
Что если бы мы логировали все “events”?

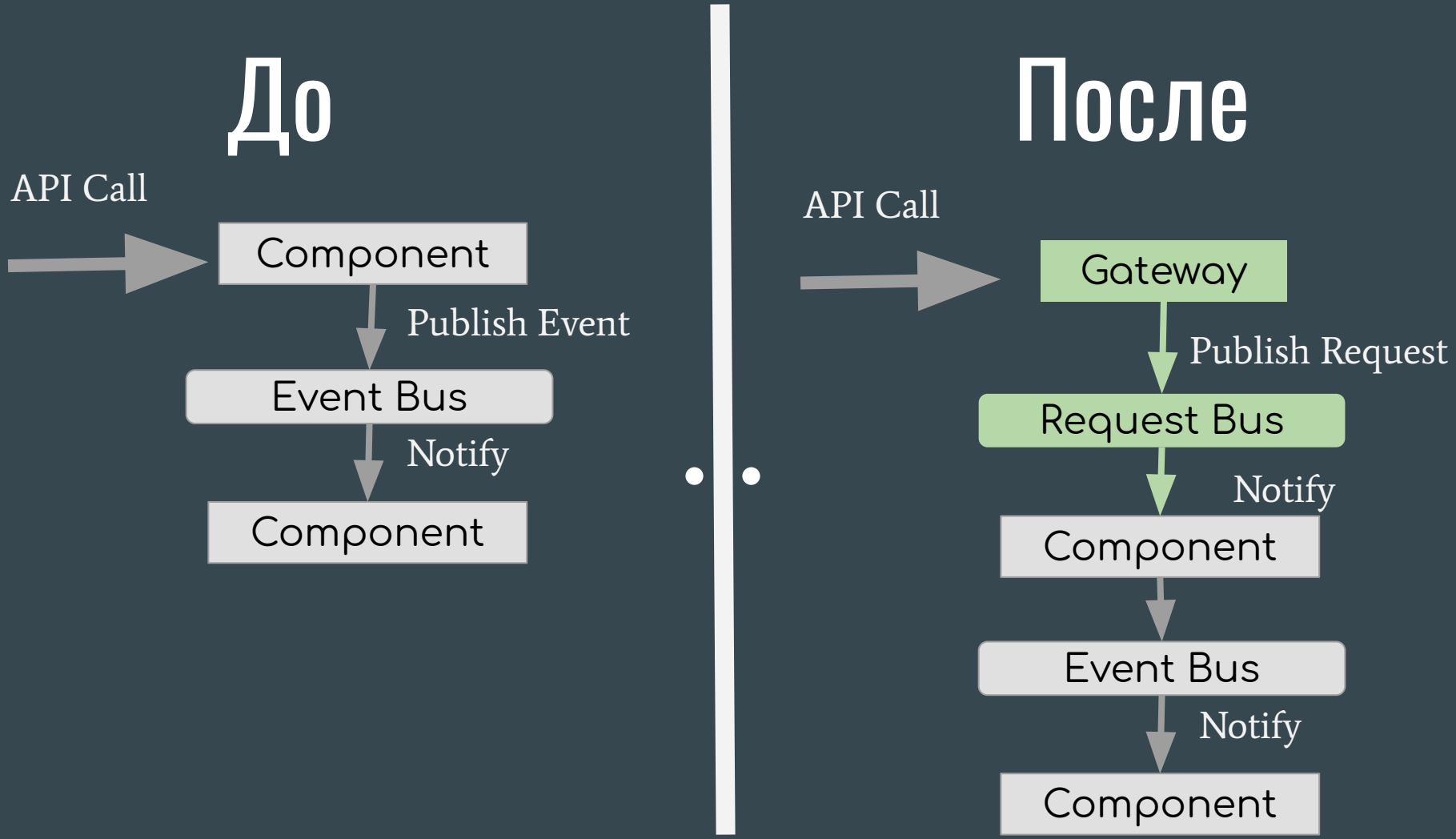
…

Демо

...

Добавим events в сервис

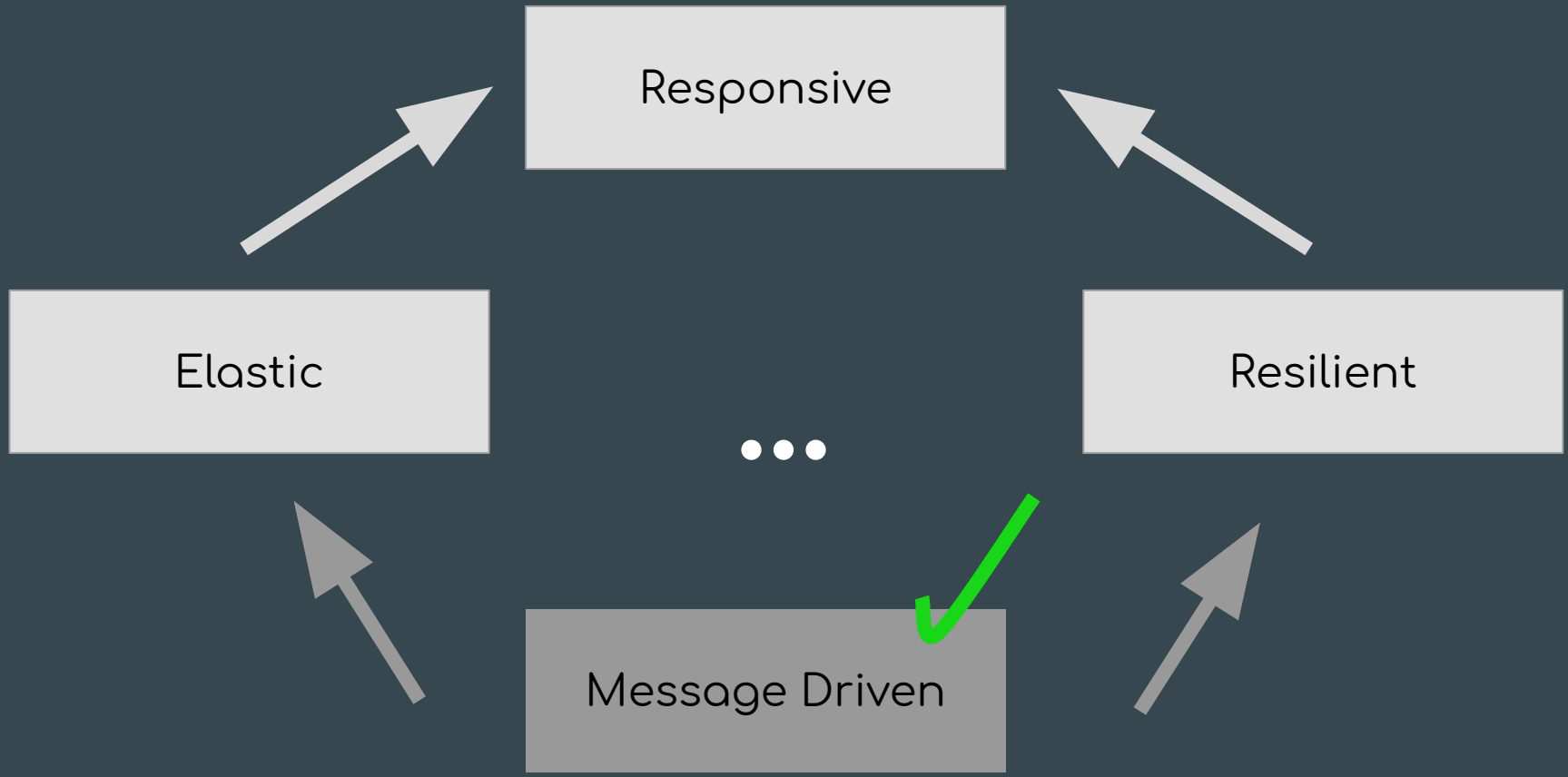

Responsive
Elastic
Resilient
Message Driven


До
API Call
Component
Publish Event
Event Bus
Notify
Component
После
API Call
Gateway
Publish Request
Request Bus
Notify
Component
Event Bus
Notify
Component

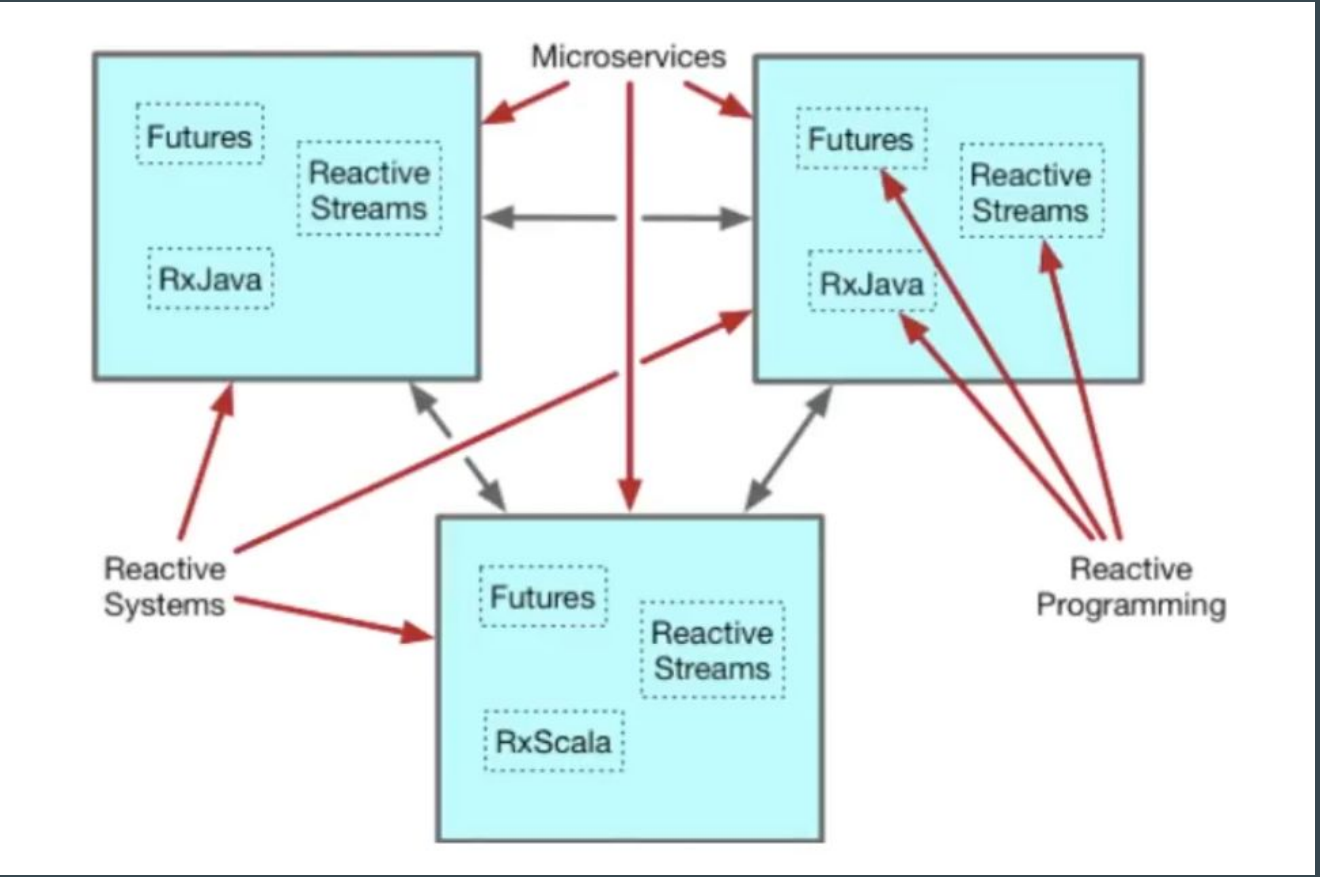
Демо

...

Добавим messaging в сервис


Responsive
Elastic
Resilient
Message Driven

Reactive System vs Reactive Programming

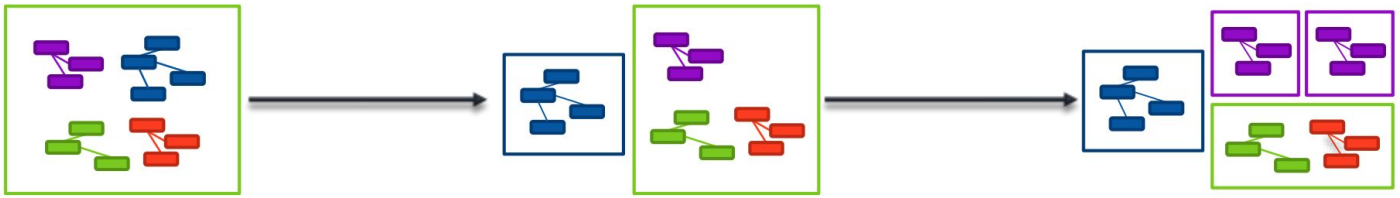


reactive-streams.org

Reactive Streams

Reactive Streams is an initiative to provide a standard for asynchronous stream processing with non-blocking back pressure. This encompasses efforts aimed at runtime environments (JVM and JavaScript) as well as network protocols.

Location Transparency



Компонент не должен ни знать, ни предполагать где находятся остальные остальные компоненты, с которыми он общается.

Location Transparency начинается с хорошего дизайна
(но на этом не останавливается)

Демо

...

Разделить сервис на 3 микросервиса

Accidental Complexity

...

Accidental Complexity: бизнес логика

```
fun returnAt(location: String) {
    if (this.renter == null) {
        throw IllegalStateException("Bike was already returned")
    }
    this.renter = null
    this.location = location
}
```

```
constructor(id: String, location: String) {
    this.id = id
    this.location = location
}
```

```
fun rent(renter: String) {
    if (this.renter != null) {
        throw IllegalStateException("Bike is already rented")
    }
    this.renter = renter
}
```

Accidental Complexity: the view model


```
{
 "id": "1234",
 "location": "Vilnius",
 "renter": "Steven"
}
```

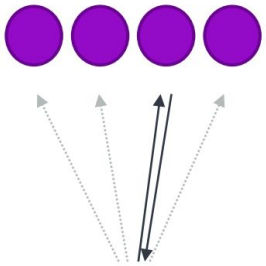
Write Operation = Command

Read Operation = Query

Command Query Responsibility Segregation

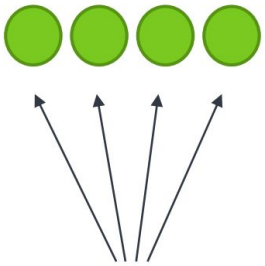
Message types

Commands



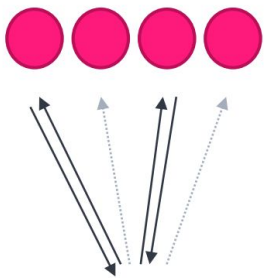
Обрабатывается один раз.
Consistent hashing.
Возвращает результат.

Events



Обрабатывается всеми подписчиками.
Ничего не возвращает результат.

Queries



Обрабатывается один раз.
Load Balancing.
Возвращает результат.

CQRS

RentBikeRequest
GetBikeByIdRequest

→

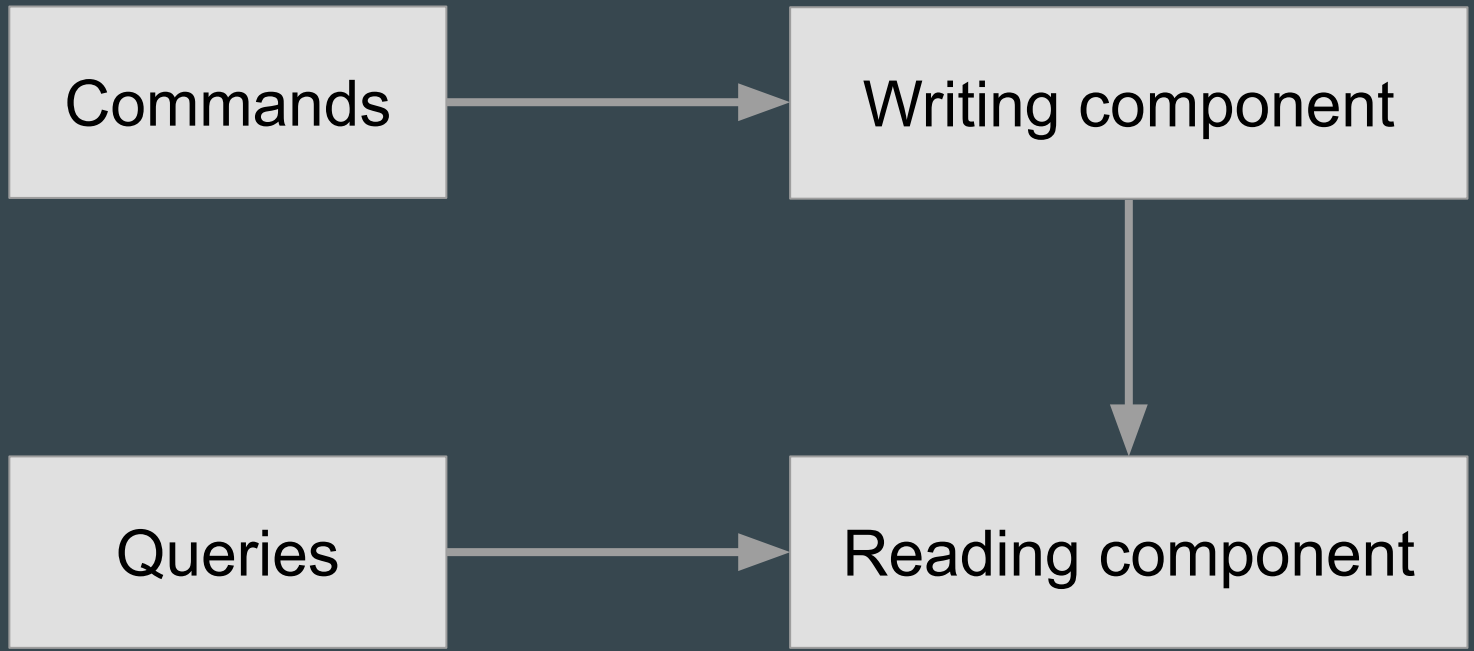
RentBikeCommand
GetBikeByIdQuery

```
class Bike {
   id: String
   available: Boolean
}
```

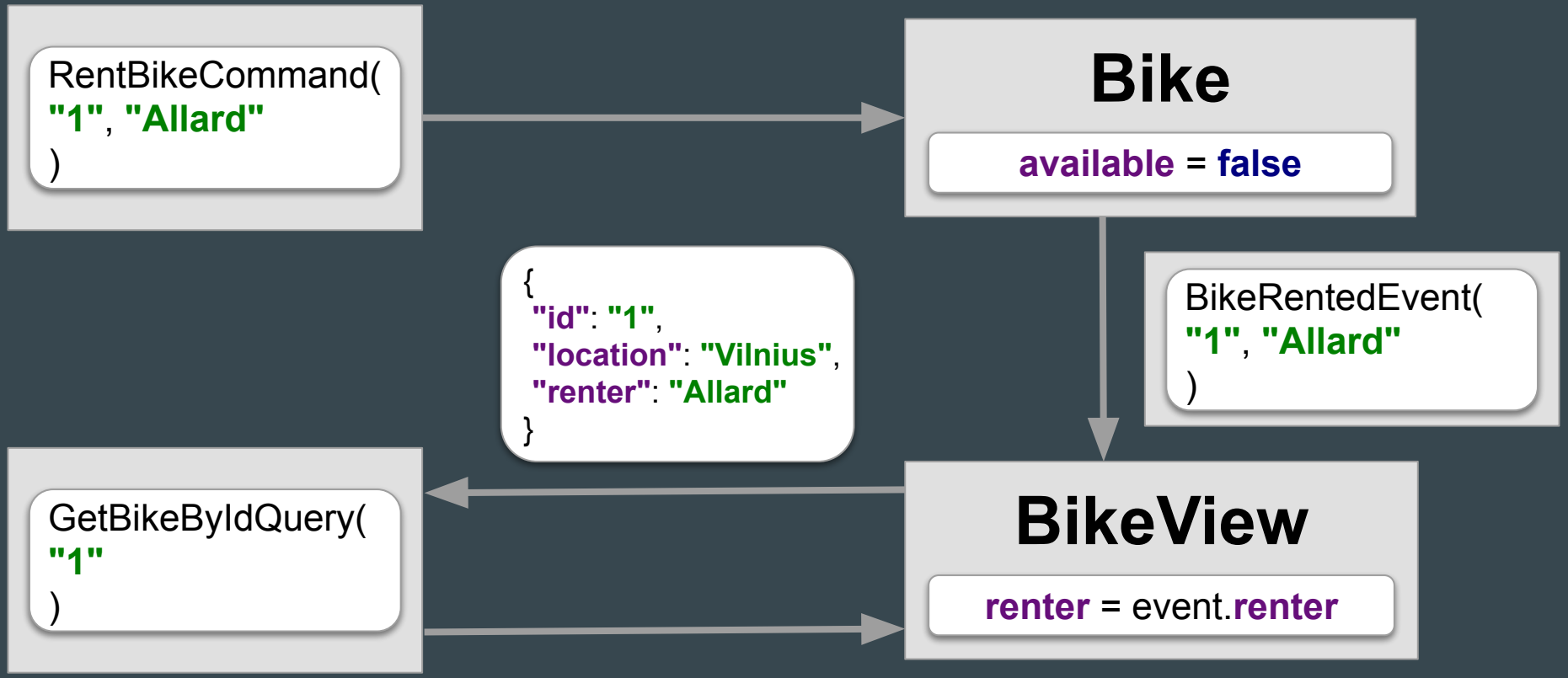
•••

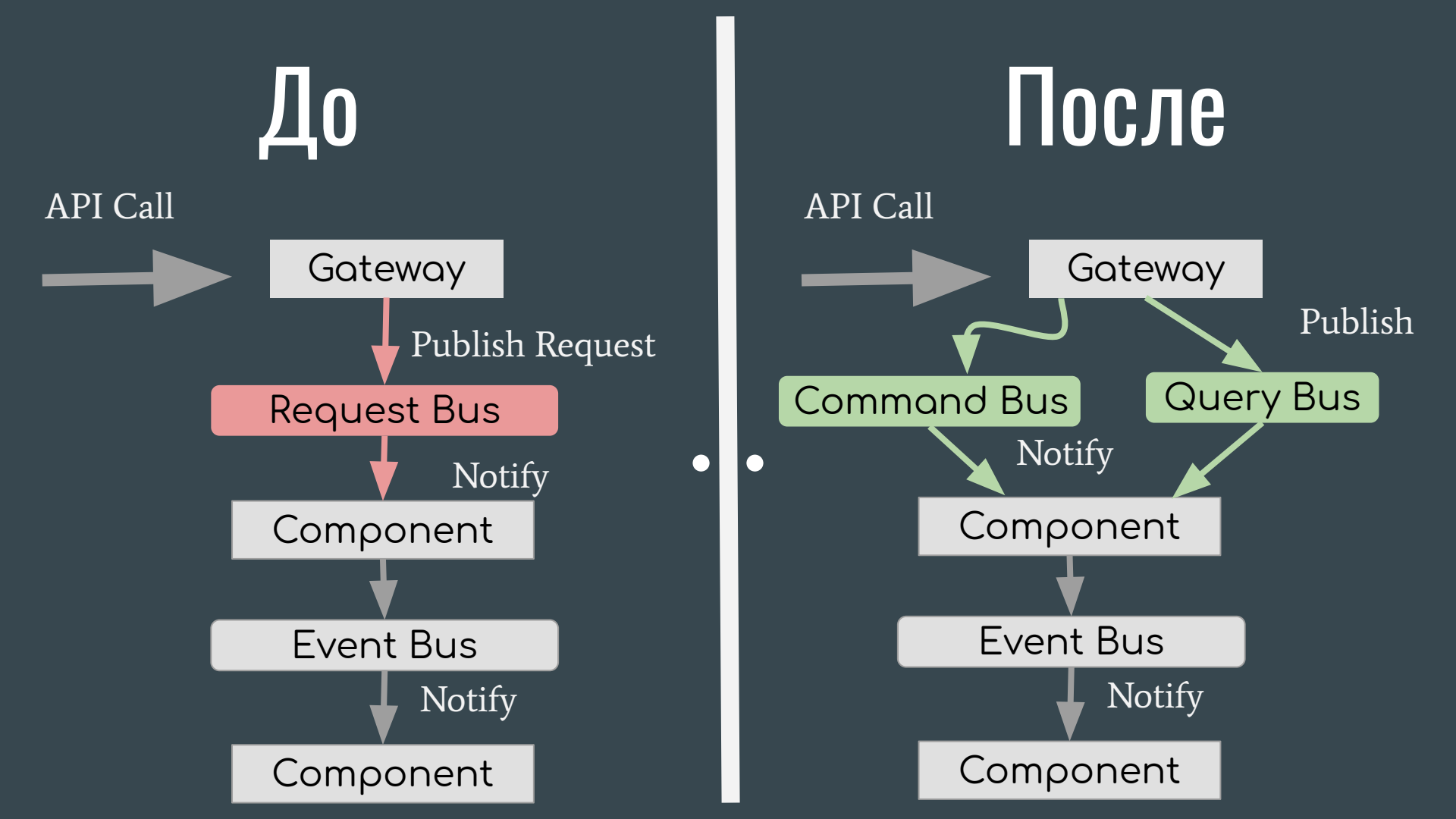
```
class BikeView {
   id: String
   location: String
   renter: String?
}
```

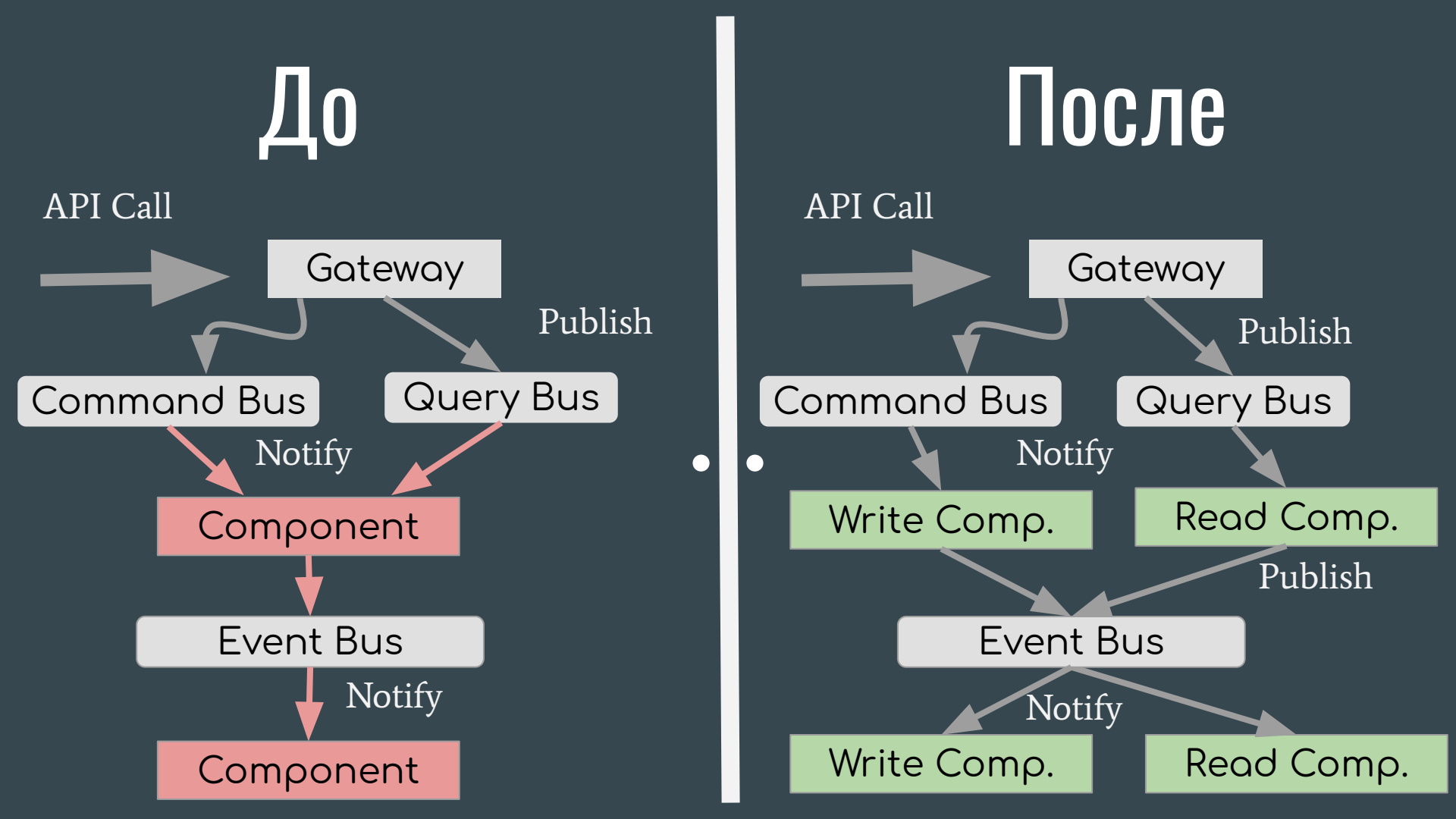
CQRS



CQRS


RentBikeCommand(
"1", "Allard"
)
Bike
available = false
BikeRentedEvent(
"1", "Allard"
)
{
"id": "1",
"location": "Vilnius",
"renter": "Allard"
}
GetBikeByIdQuery(
"1"
)
BikeView
renter = event.renter


До
API Call
Gateway
Publish Request
Request Bus
Notify
Component
Event Bus
Notify
Component
После
API Call
Gateway
Publish
Command Bus
Query Bus
Notify
Component
Event Bus
Notify
Component


До
API Call
Gateway
Publish
Command Bus
Query Bus
Notify
Component
Event Bus
Notify
Component
После
API Call
Gateway
Publish
Command Bus
Query Bus
Notify
Write Comp.
Read Comp.
Publish
Event Bus
Notify
Write Comp.
Read Comp.

Демо

...

Разделим сервис на WRITE и READ части.

Ещё демо

...

Axon Framework может лучше

Event Sourcing

...

Что если бы мы хранили все events?

Демо

...

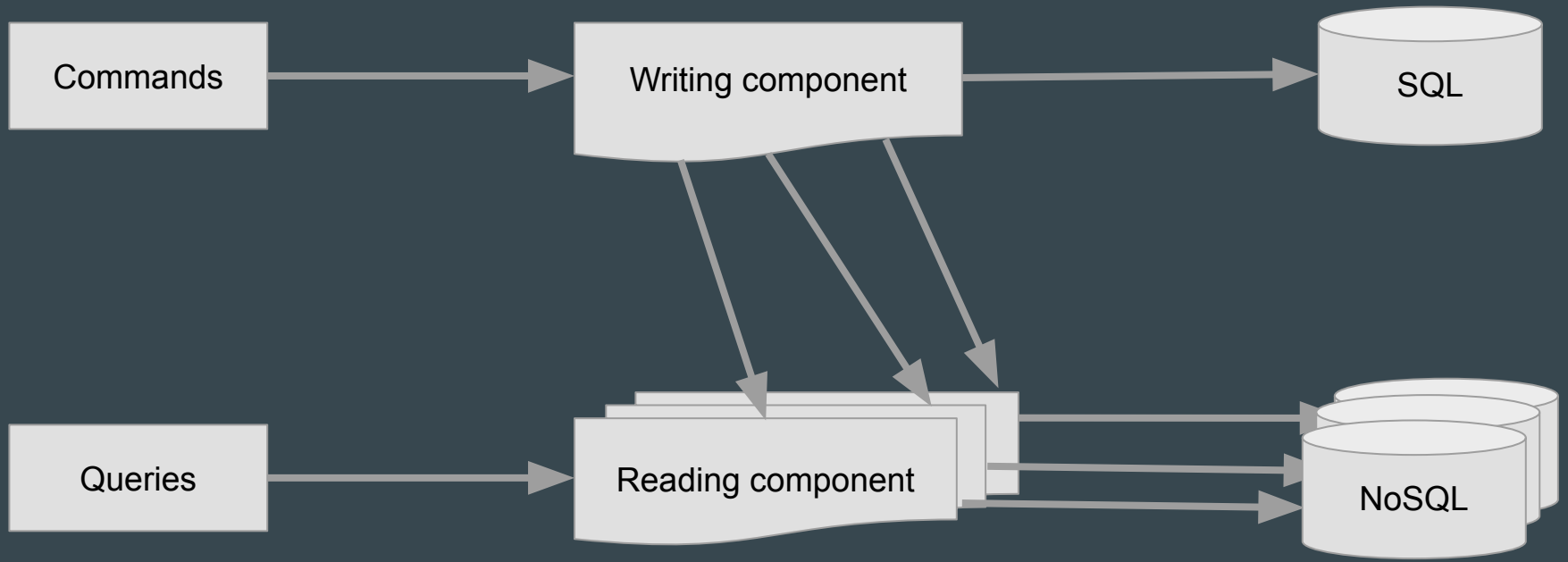
Начнём хранить events.

“Большинству систем требуется несколько “read” моделей для оптимальной работы.”

...

(c) Greg Young

CQRS: multiple projections



Демо

...

Создадим проекцию “Bike History”

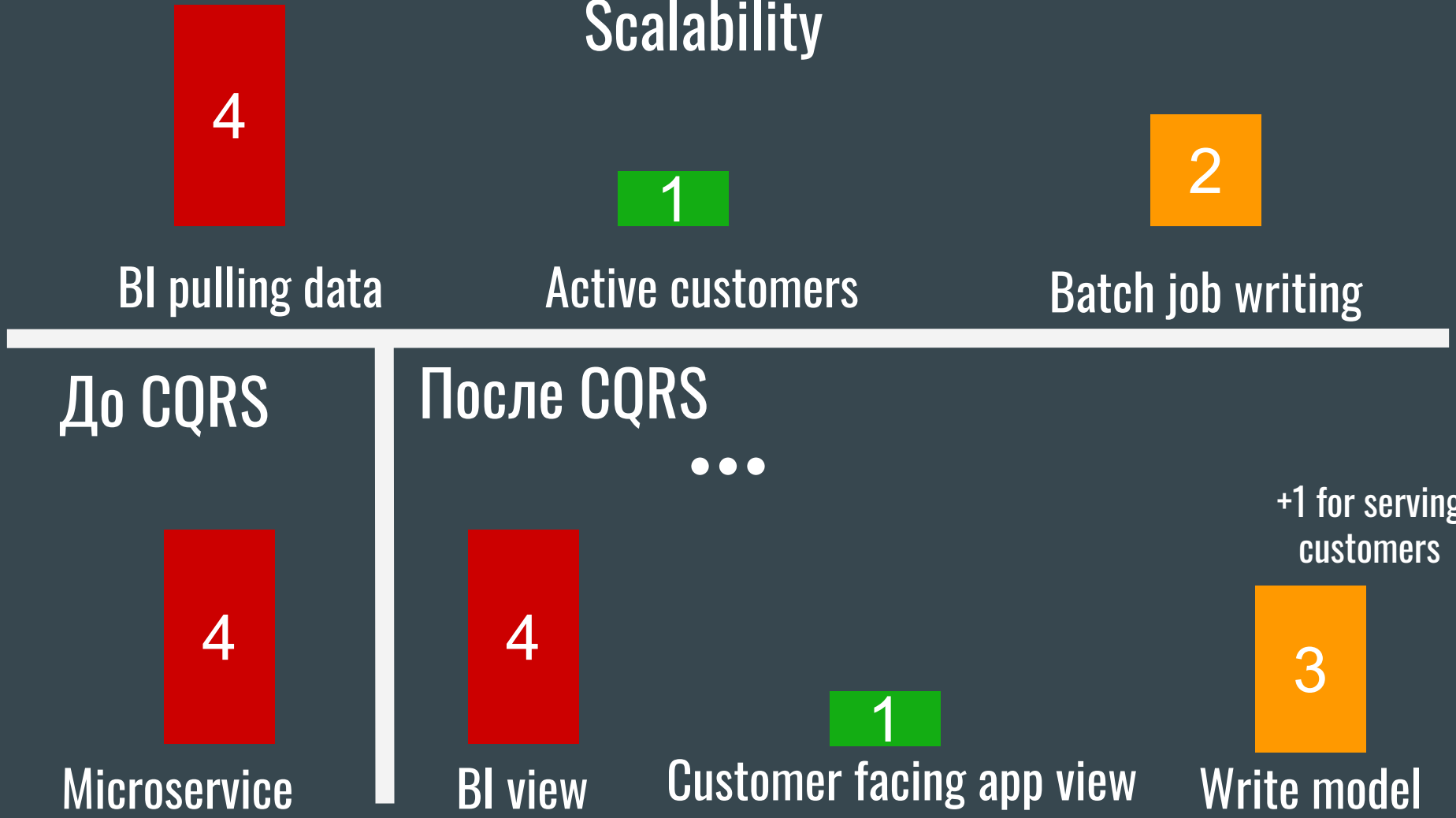
Можно не спешить

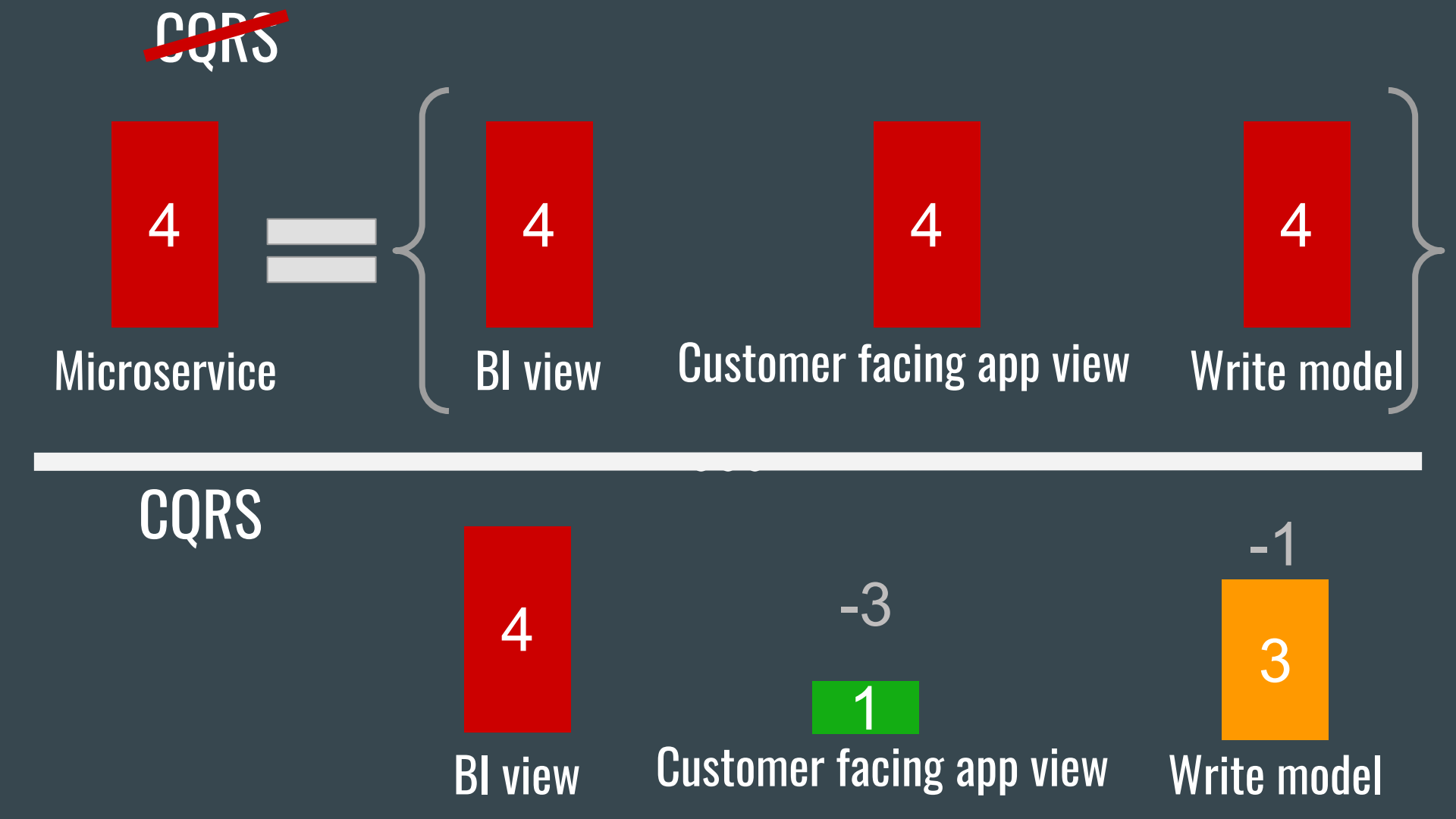
...

“Хорошая архитектура позволяет откладывать критичные решения”

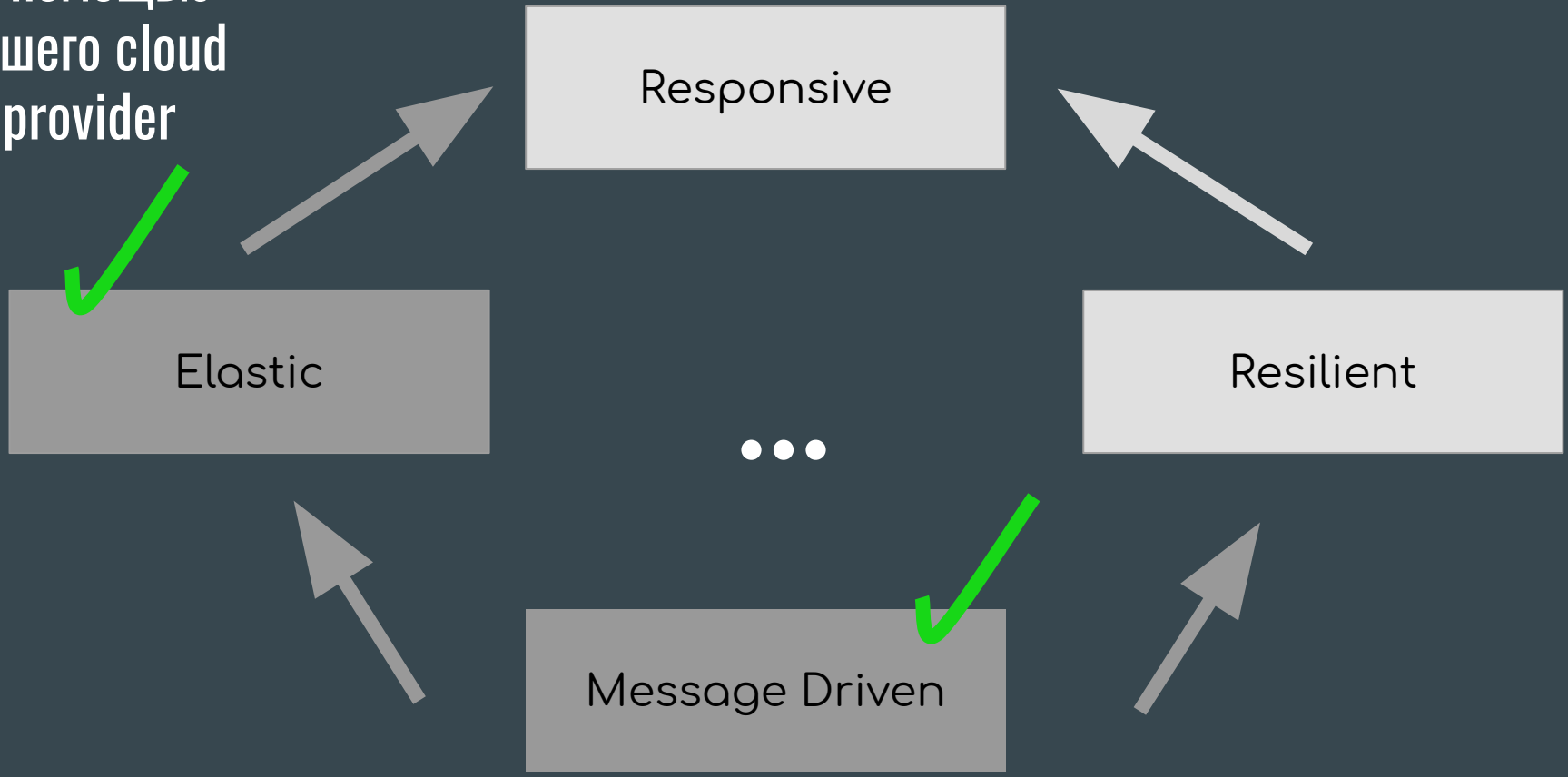
(c) Uncle Bob

Scalability




CQRS
4
4
4
4
Microservice
BI view
Customer facing app view
Write model
CQRS
4
-3
1
-1
3
BI view
Customer facing app view
Write model

С помощью вашего cloud provider



Event - это не побочный эффект

...

Если это произошло - это записано в “source”.
Если это не произошло - это не записано.

(c) Allard Buijze

Что насчёт “write” модели?

…

Демо

...

Используем Event Sourcing во WRITE части

Event is immutable

...

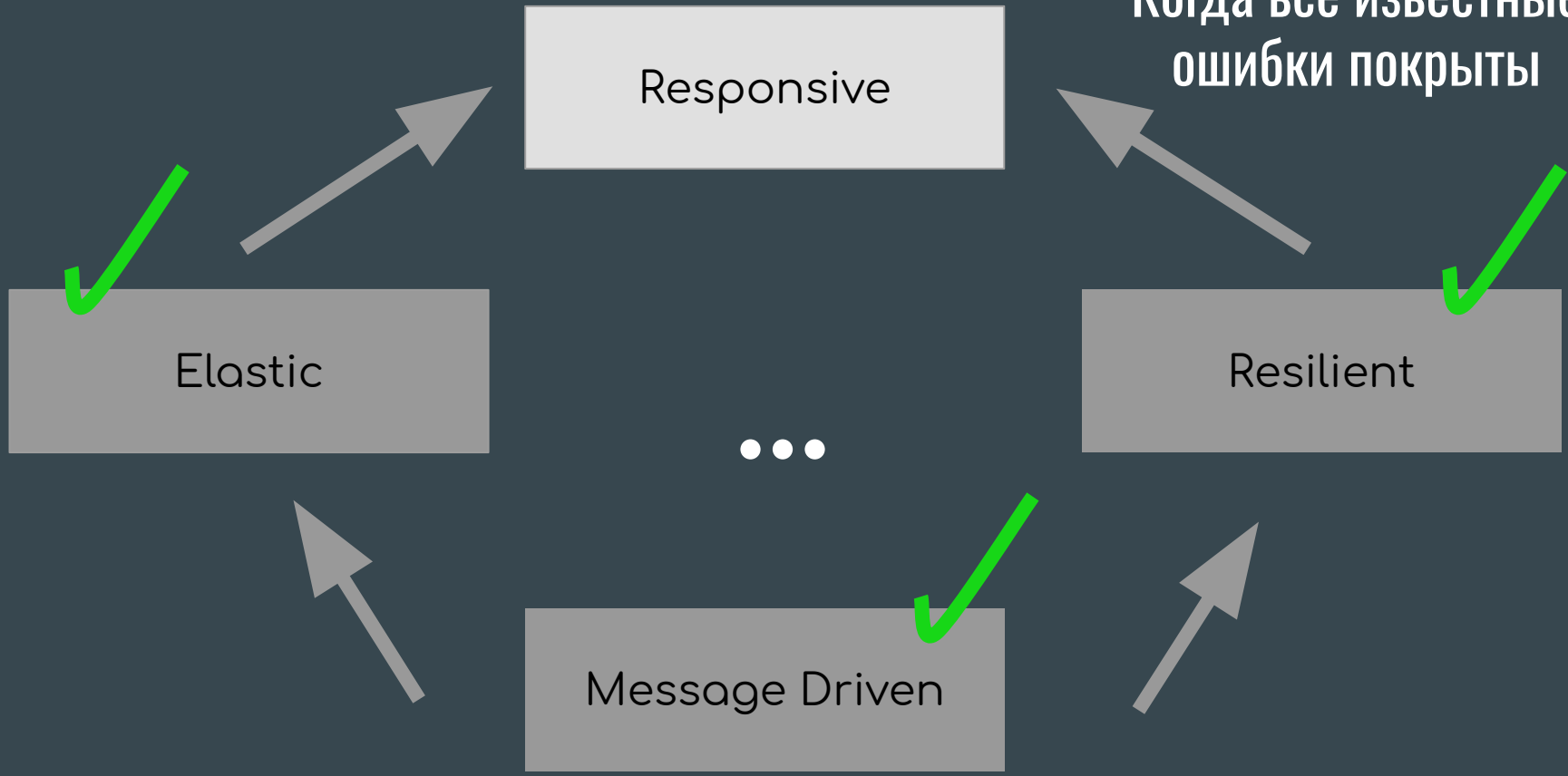
Git

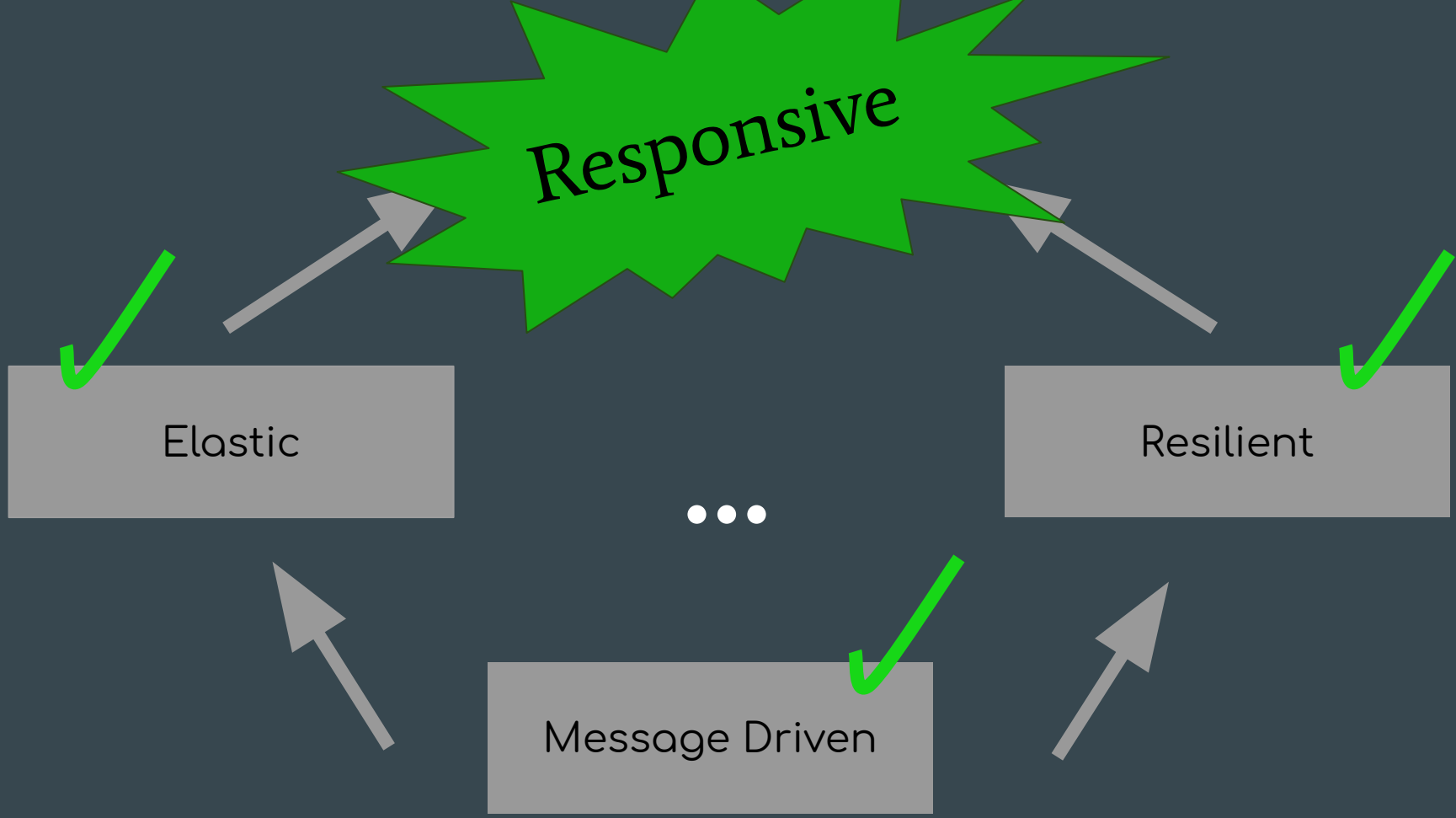
...

Можем ли мы использовать логи в суде?

...

Когда все известные ошибки покрыты




Responsive
Elastic
Resilient
Message Driven

Базы данных можно не мигрировать

...

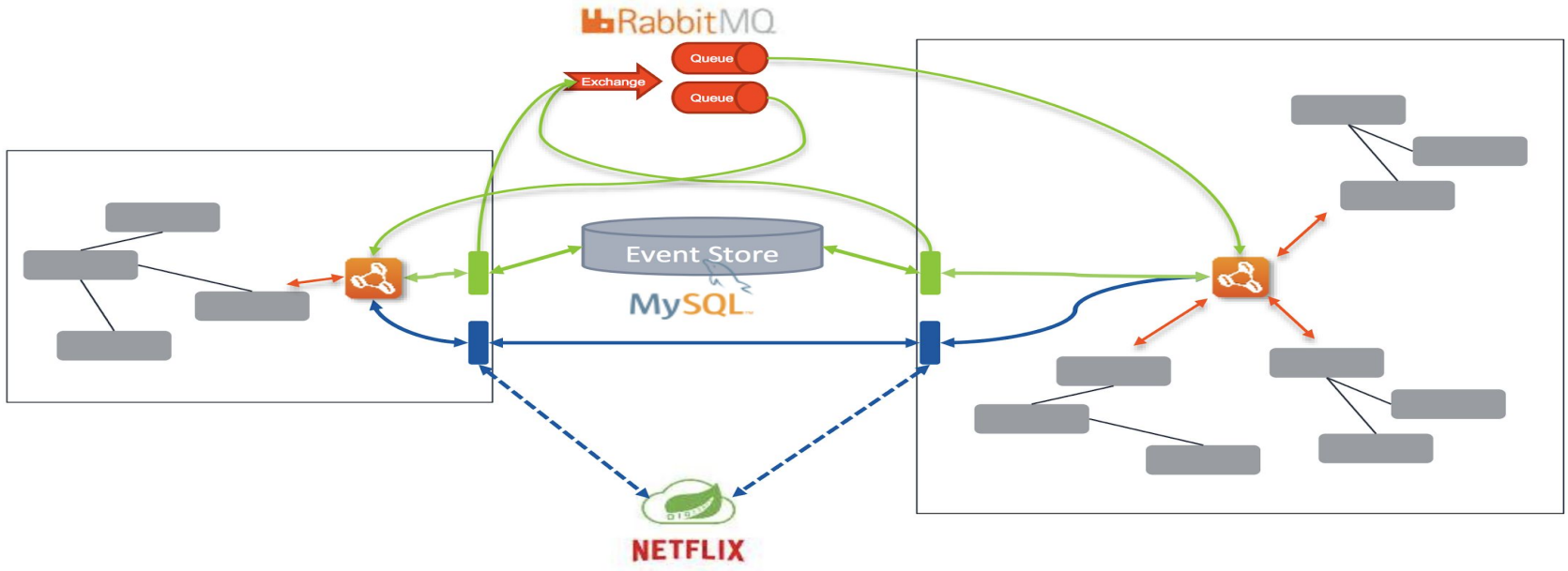
Каков результат?

- Location Transparency
- Improved modeling
- Audit trail
- Analytics
- Given-when-testing
- Smoke testing

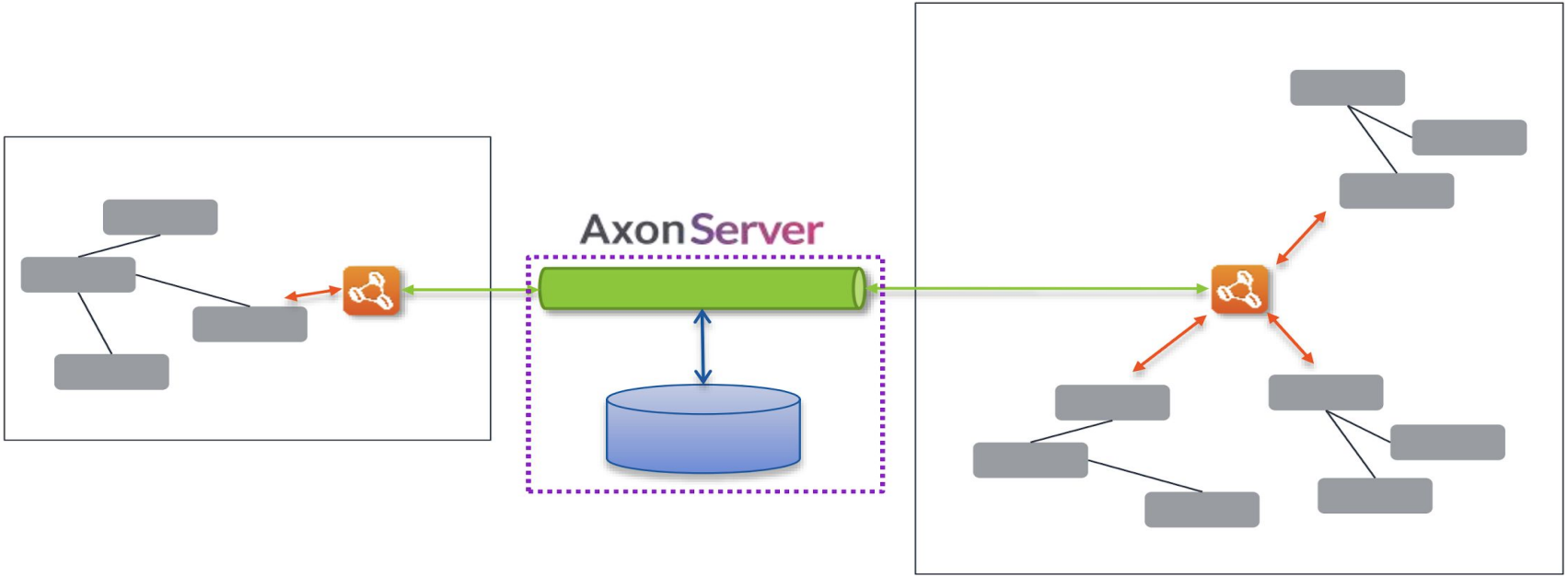
Axon Framework

...

Location Transparency



Location Transparency



Tracing

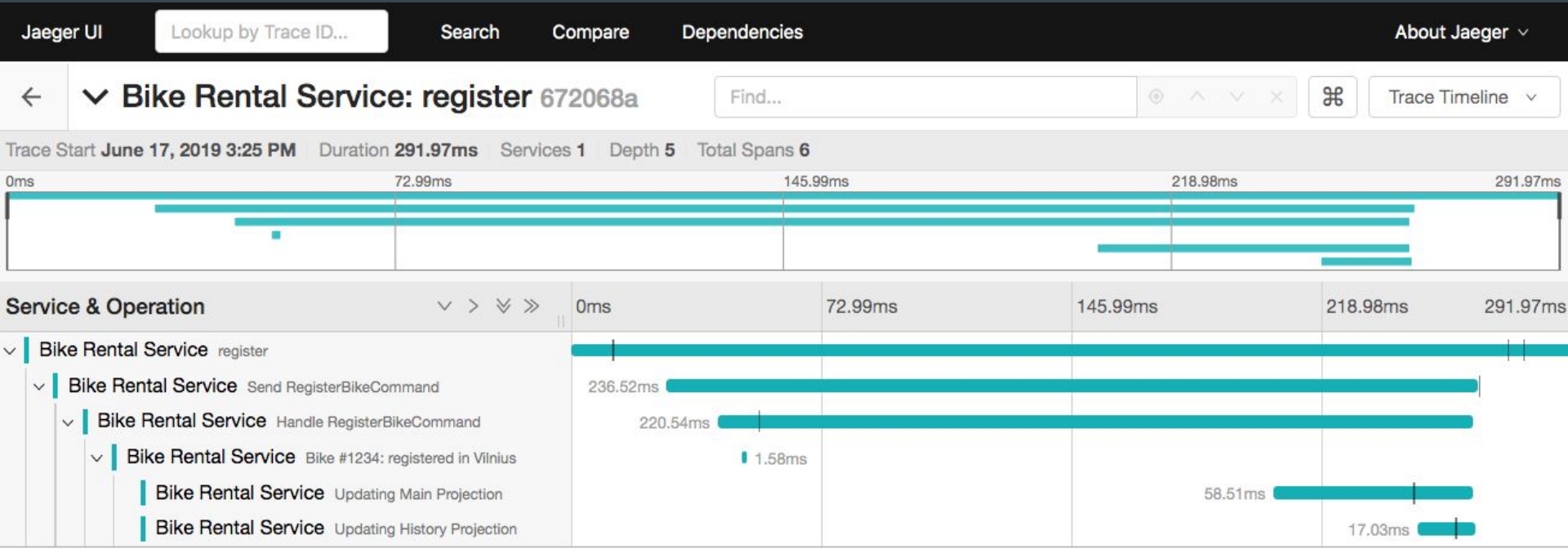
...

Демо

...

Используем Open Tracing

Tracing


Jaeger UI
Lookup by Trace ID...
Search
Compare
Dependencies
About Jaeger
Bike Rental Service: register 672068a
Find...
Trace Timeline
Trace Start June 17, 2019 3:25 PM
Duration 291.97ms
Services 1
Depth 5
Total Spans 6
0ms
72.99ms
145.99ms
218.98ms
291.97ms
Service & Operation
Bike Rental Service register
Bike Rental Service Send RegisterBikeCommand
236.52ms
Bike Rental Service Handle RegisterBikeCommand
220.54ms
Bike Rental Service Bike #1234: registered in Vilnius
1.58ms
Bike Rental Service Updating Main Projection
58.51ms
Bike Rental Service Updating History Projection
17.03ms

Рекомендации

- Greg Young CQRS & ES talks (adds to this presentation) on YouTube, e.g. 2014, 2016
- Versioning Events free online book by Greg Young (~100 pages)

- More on Reactive Systems: Lightbend & IBM free courses
- More on Reactive Programming: Reactive Streams by Ben Hale @ Spring I/O 2019

- More on Axon at axoniq.io
  YouTube: Event Storage in Axon Server How does it work
  Axon Server competitor - Event Store at eventstore.org

- Код из демо github.com/Sam-Kruglov/bike-rental-demo

Спасибо за внимание!

•••

@sam_kruglov