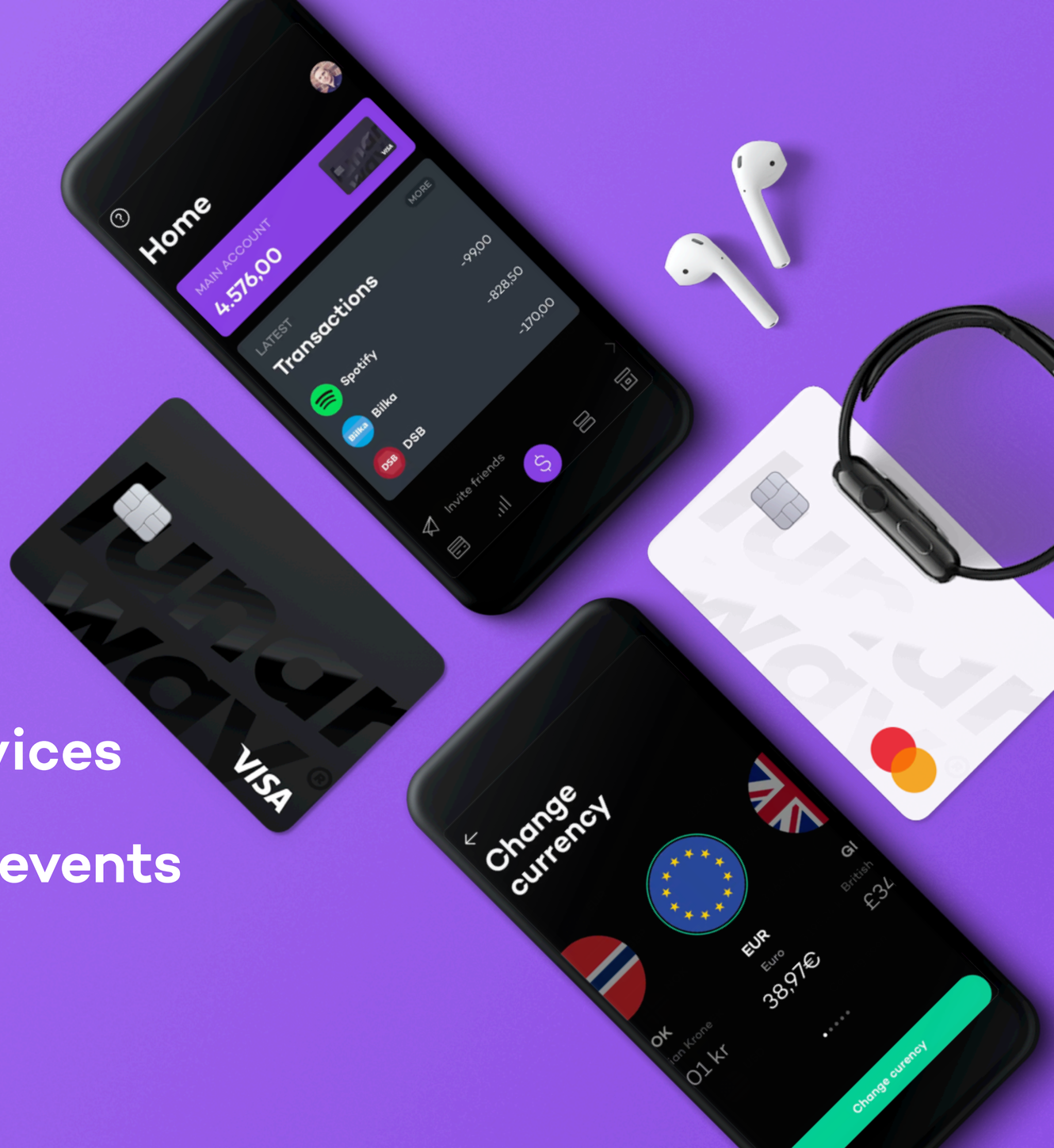
lunar way®

Lunar Way's road to microservices
OR
How we learned to love async events

Cloud Native Aarhus April 2018
Thomas Bøgh Fangel



About me

- Started programming on the C64 and the Amiga back in 80s
- M.Sc. in Maths
- Professional software developer since 2004
- Started my career in Java
- Left Java in favour of Scala and FP
- Now primarily working in Go and Typescript
- Joined Lunar Way in June 2016

Thomas Bøgh Fangel
Web Architect @ Lunar Way
@tbfangel

AGENDA

- Setting the Scene
- Microservices and Inter Service Communication
- Our Road to Microservices
- Use Cases of Async Message Passing


SIMPLE
BANKING
Visa-kort, Konto og App


7-Eleven -67,00
H&M 40,00
Martin W. -9,99
Spotify -130,00
Zalando -18,70
Uber -8,50
McDonald's
ASOS
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MAKE
MONEY
MATTER.


DIRTY
MONEY
lunar way


QZARE


thelunarway


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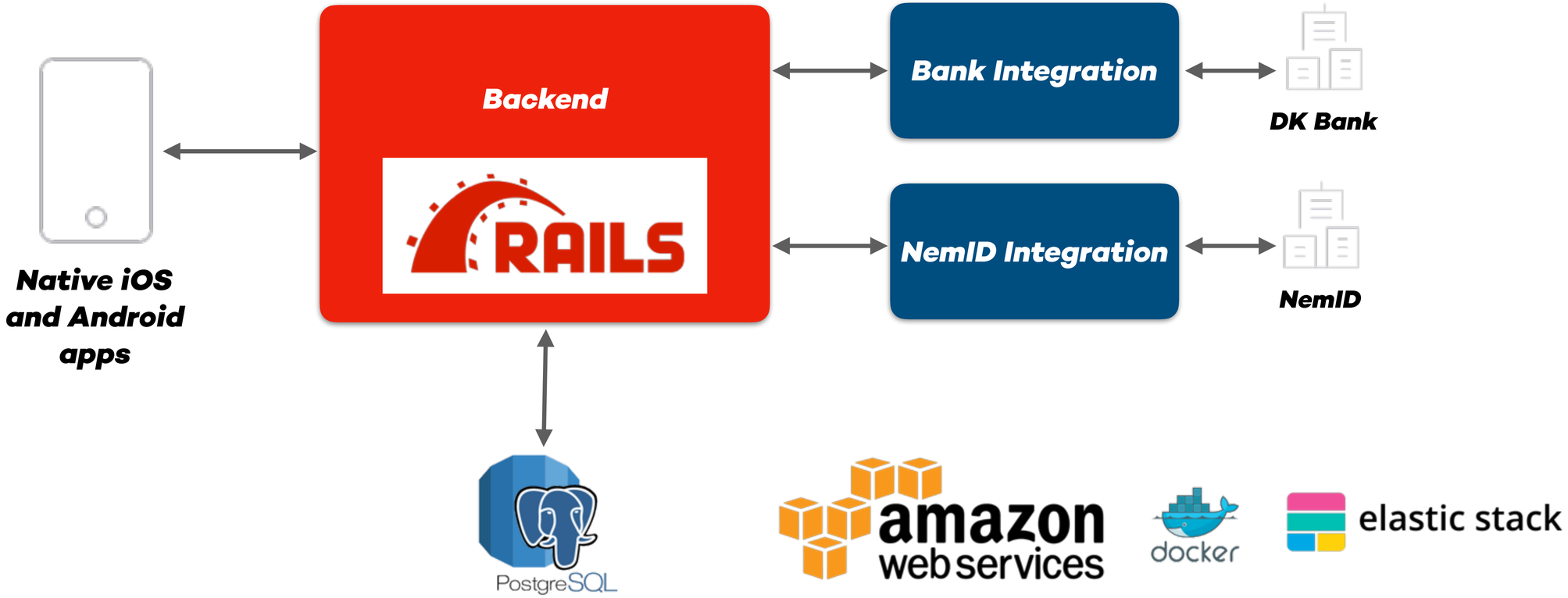
KAPSEJLADS

The Lunar Way platform of Summer 2016


Backend
RAILS
Native iOS and Android apps
Bank Integration
DK Bank
NemID Integration
NemID
PostgreSQL
amazon web services
docker
elastic stack

Platform assessment

The Good

- Well structured REST API for the app

The Bad

- Tightly coupled data model on the backend
- App and backend tightly coupled
- One data entity all over the place
- Big Bang deployments
- Hard to do fast experiments
- Hard to scale

Change required!

Goals

- Scalability
- Resilience
- Autonomy
- Decoupling
- Fast experiments
- Small, independent and fast deployments

Microservices and inter service communication

https://pixabay.com/en/team-motivation-teamwork-together-386673/

So, what is a microservice?

Microservices are small, autonomous services that work together.

– Sam Newman

...a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms...

...services are built around business capabilities and independently deployable by fully automated deployment machinery

– Martin Fowler

Why microservices – or why not?

Benefits

- Modularity
- Coherence and low coupling
- Fault tolerance
- Fast development
- Autonomy
- Independent deployment

Challenges

- Sharing data across services
- Debugging and tracing
- Orchestration
- Deployment
- Increased overall complexity
- Insight across service boundaries

Inter service communication

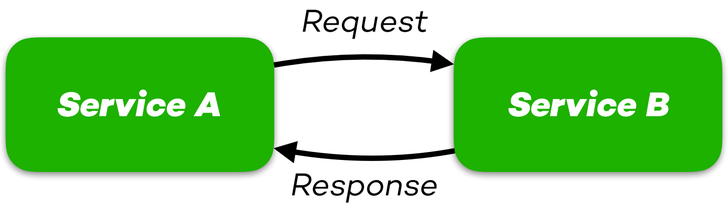
Synchronous req/resp

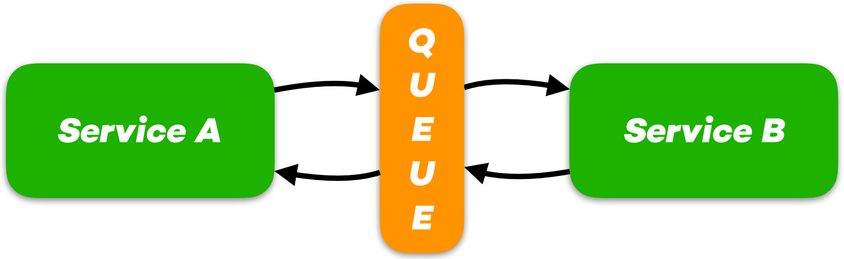
- Closed communication
- Trusted/ “secure”
- High coupling (code/space/time)
- Works good when synchronous app request involved

Async messages

- Open ended communication (pub/sub)
- Low coupling (data only)
- “Insecure” from a dev perspective
  Flow orchestration is complex
- Works bad when synchronous app request involved

Communication shapes coupling





Synchronous req/resp

Temporal coupling

Spatial coupling

Behavioural coupling - Service A commands the behaviour of Service B

Example: Signup commands user service to CreateUser

Async messages

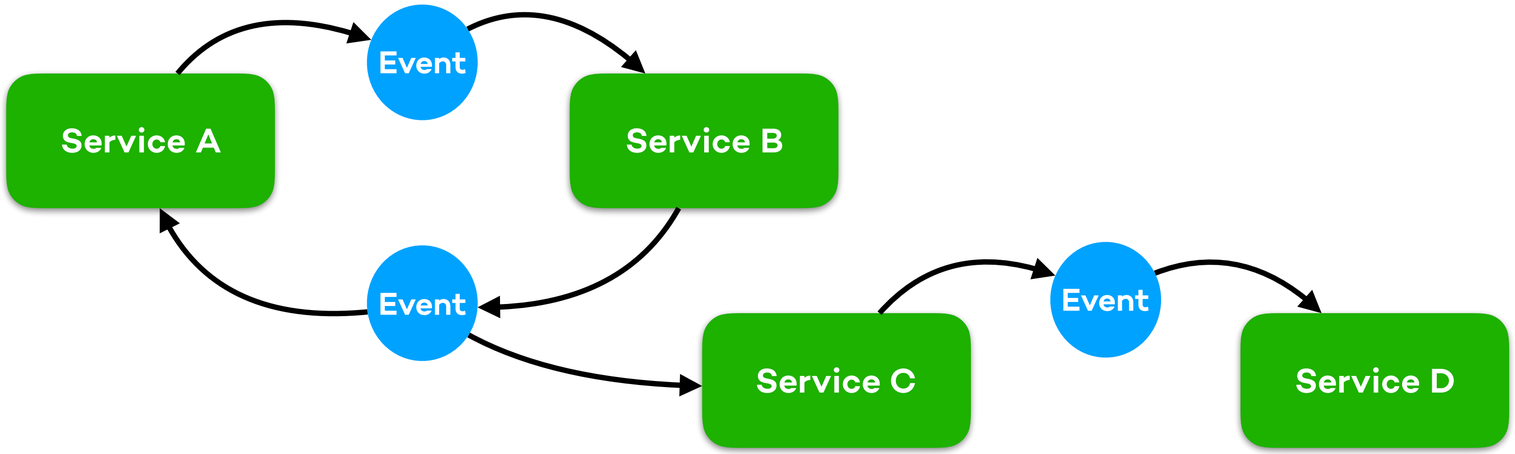
No spatial and temporal coupling

No behavioural coupling - Service B determines its own behaviour based on the behaviour of Service A

Example: Signup publishes UserApplied. User service consumes event, creates user and publishes UserCreated. Signup service consumes and changes state

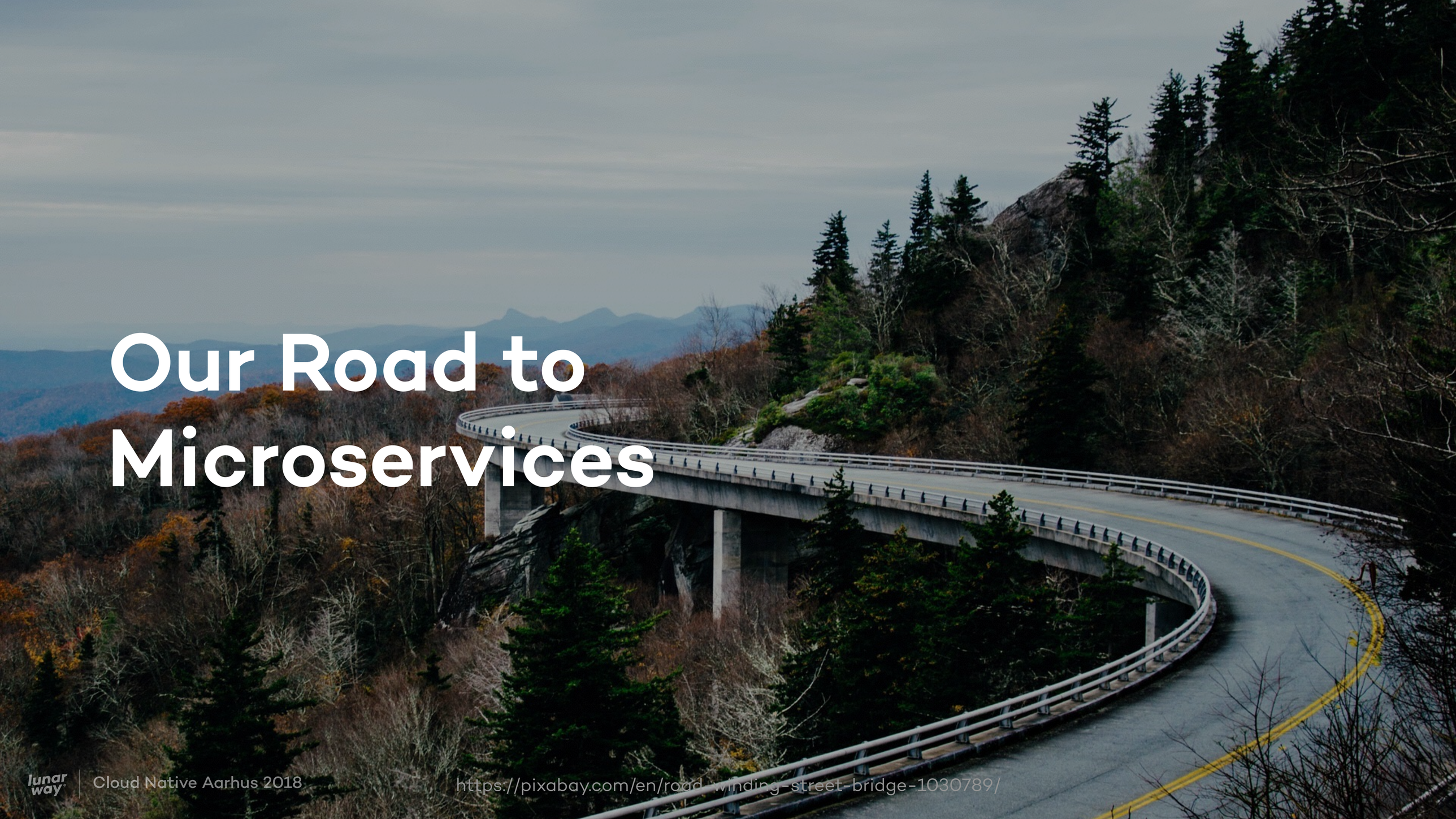
https://iansrobinson.com/2009/04/27/temporal-and-behavioural-coupling/

Event driven systems



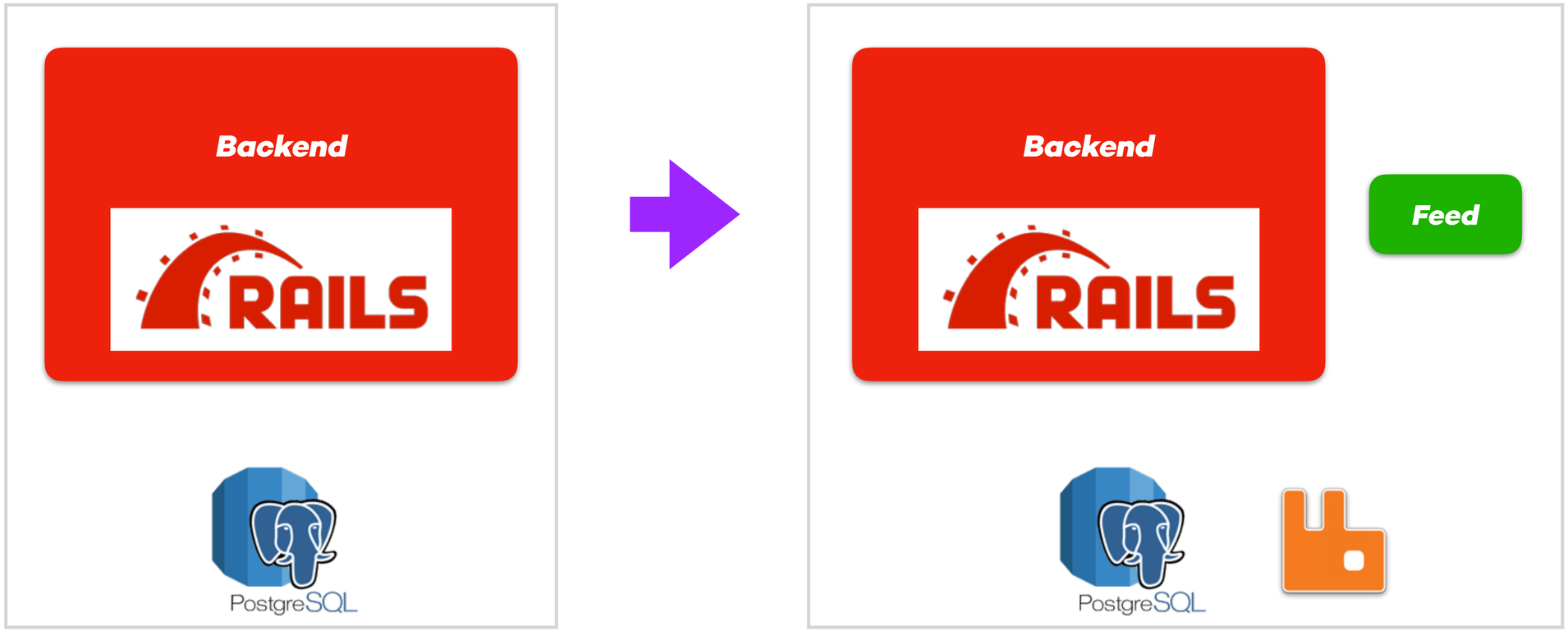
- All changes published as events
- Events drive behaviour
- Traditional system design focus on only the state changes - events disappear after they happen
- Event driven systems complete the picture

https://hackernoon.com/events-as-first-class-citizens-8633e8479493



https://pixabay.com/en/road-winding-street-bridge-1030789/

The first microservice



Learning 1

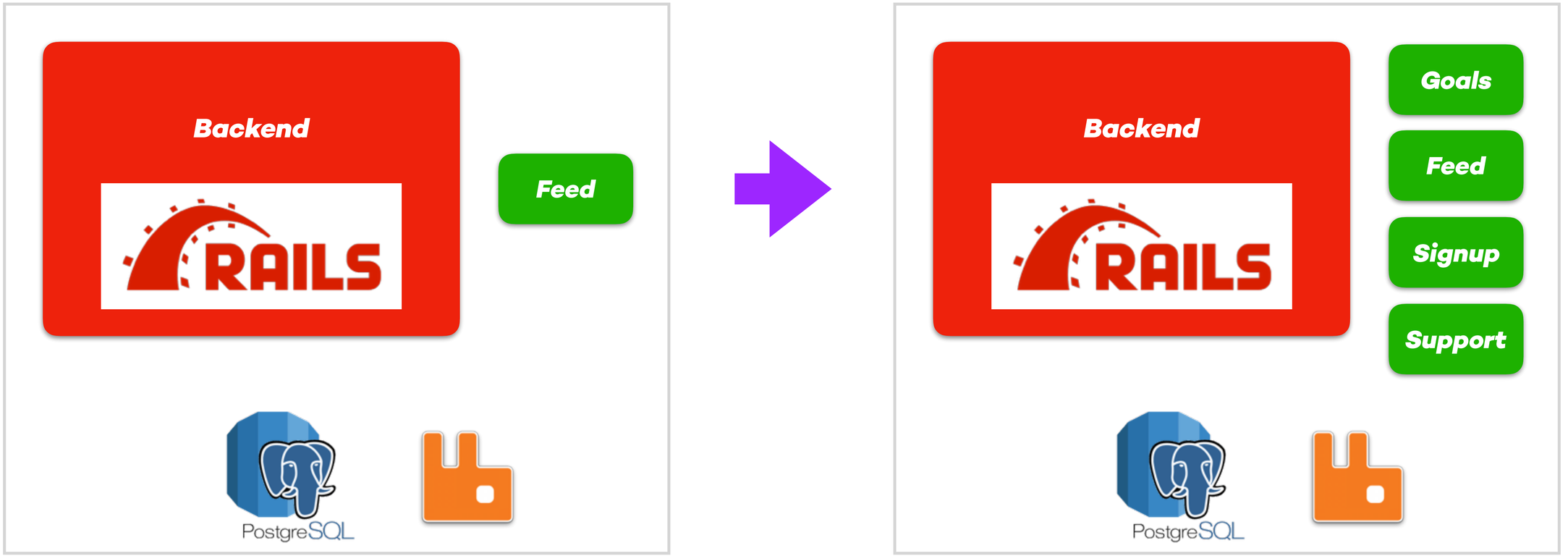
Never allow microservice A to access the data of microservice B directly

Learning 2

Reduce the number of new technologies introduced in one go

http://mcfunley.com/choose-boring-technology

Microservice 2, 3 and 4

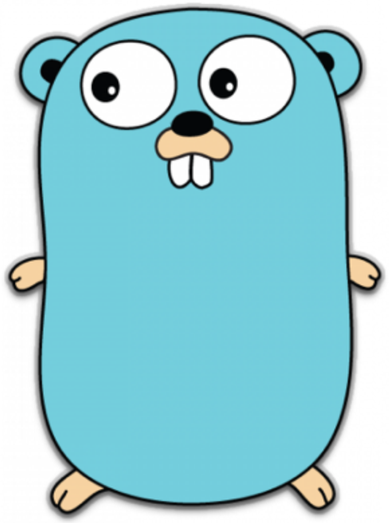


Learning 3

Prioritise your deployment pipeline and runtime platform

Microservice X, Y and Z

VS



Learning 4

Choose your toolbox wisely

Learning 5

Insist on paying
off technical debt

Microservice N,
N+1, N+2...

Beyond
counting...

Learning 6

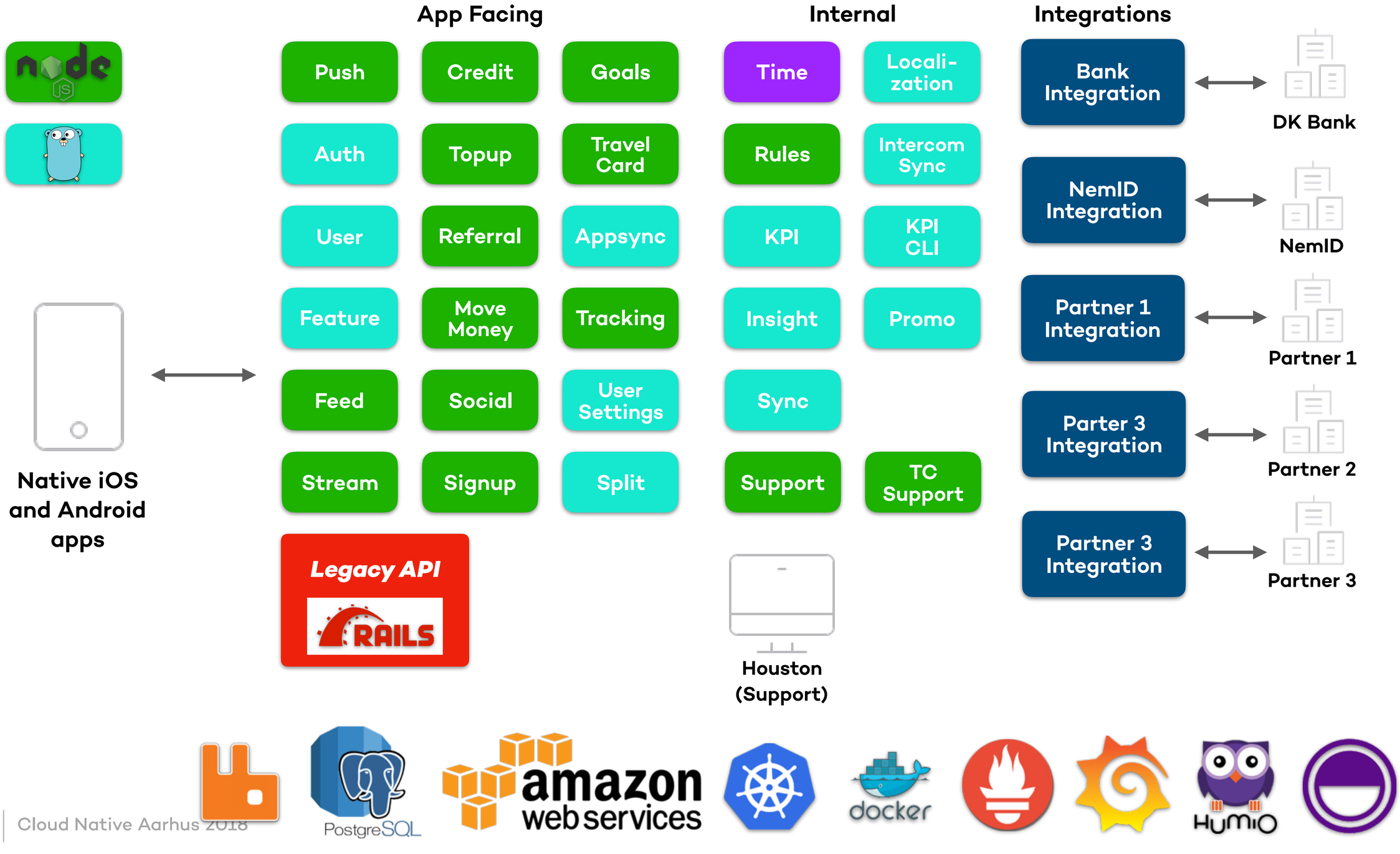
Be systematic!

Learning 7

DRY up your services – factor out common functionality into new services

Learning 8

Appreciate the value of publishing all business model changes as events


App Facing
Internal
Integrations
Push
Credit
Goals
Time
Locali-
zation
Bank
Integration
DK Bank
Auth
Topup
Travel
Card
Rules
Intercom
Sync
NemID
Integration
NemID
User
Referral
Appsync
KPI
KPI
CLI
Partner 1
Integration
Partner 1
Feature
Move
Money
Tracking
Insight
Promo
Parter 3
Integration
Partner 2
Feed
Social
User
Settings
Sync
Partner 3
Integration
Partner 3
Stream
Signup
Split
Support
TC
Support
Native iOS
and Android
apps
Legacy API
RAILS
Houston
(Support)
PostgreSQL
amazon
web services
docker
HUMIO

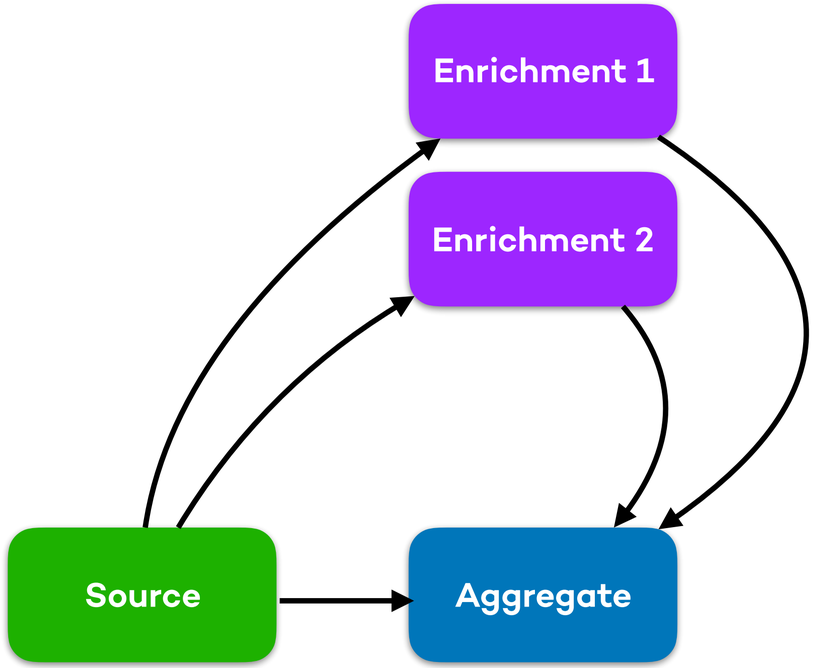
Use Cases of Async Message Passing

https://pixabay.com/en/message-in-a-bottle-bottle-post-1694868/

Data enrichment

One source of data, multiple enrichments

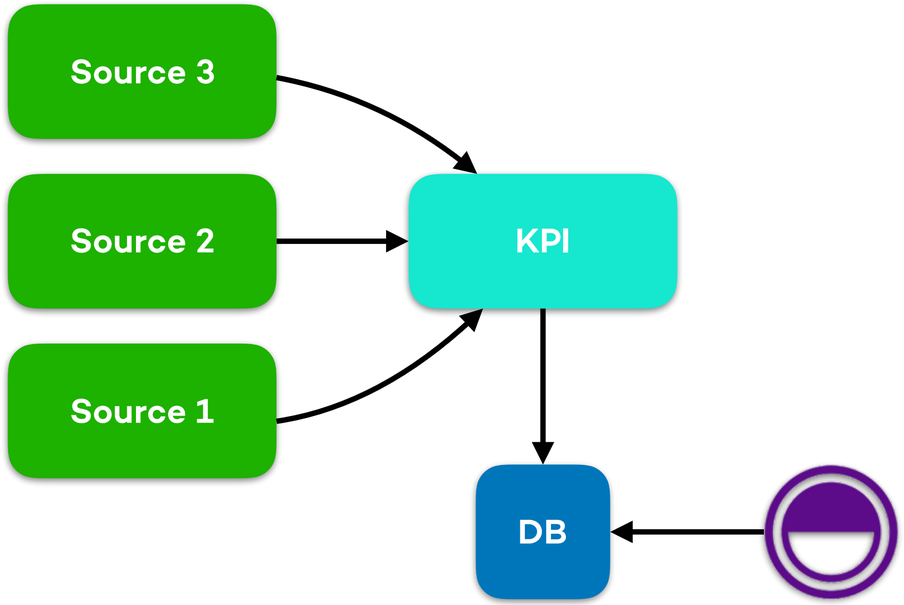
1. Source publishes event
2. Aggregate stores entity
3. Enrichments runs and publishes event
4. Aggregate updates aggregate with enrichment



Business insight

Business requires insight across services

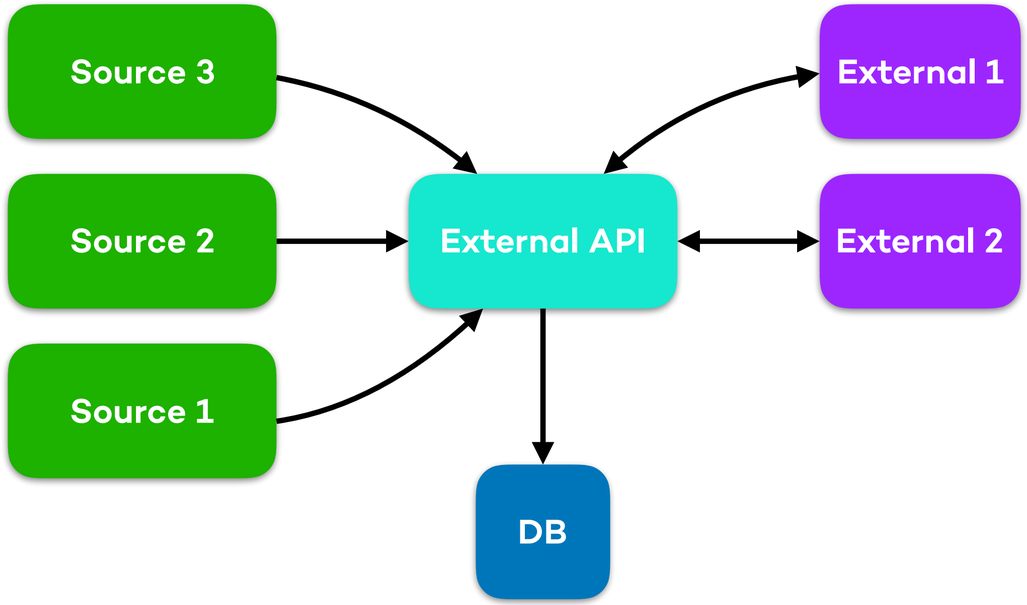
1. Sources publish events
2. KPI subscribes on events and converts to own model
3. Tooling on top to provide insight



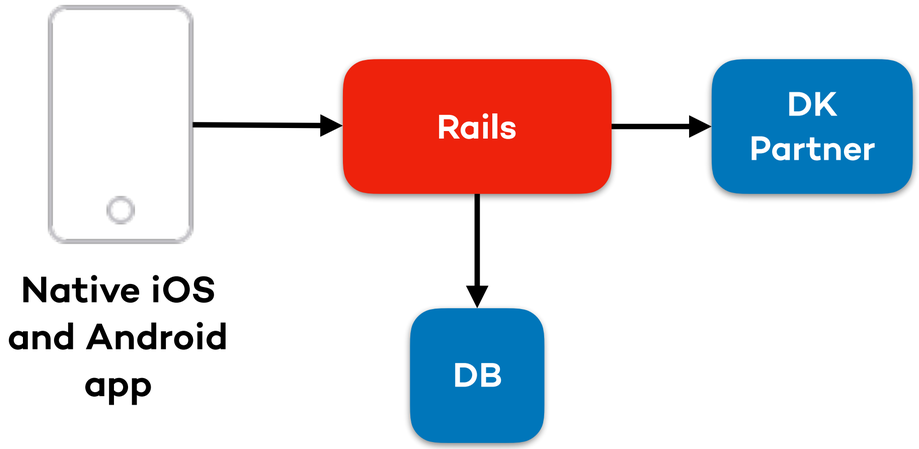
External APIs and web hooks

3rd parties require access to your data

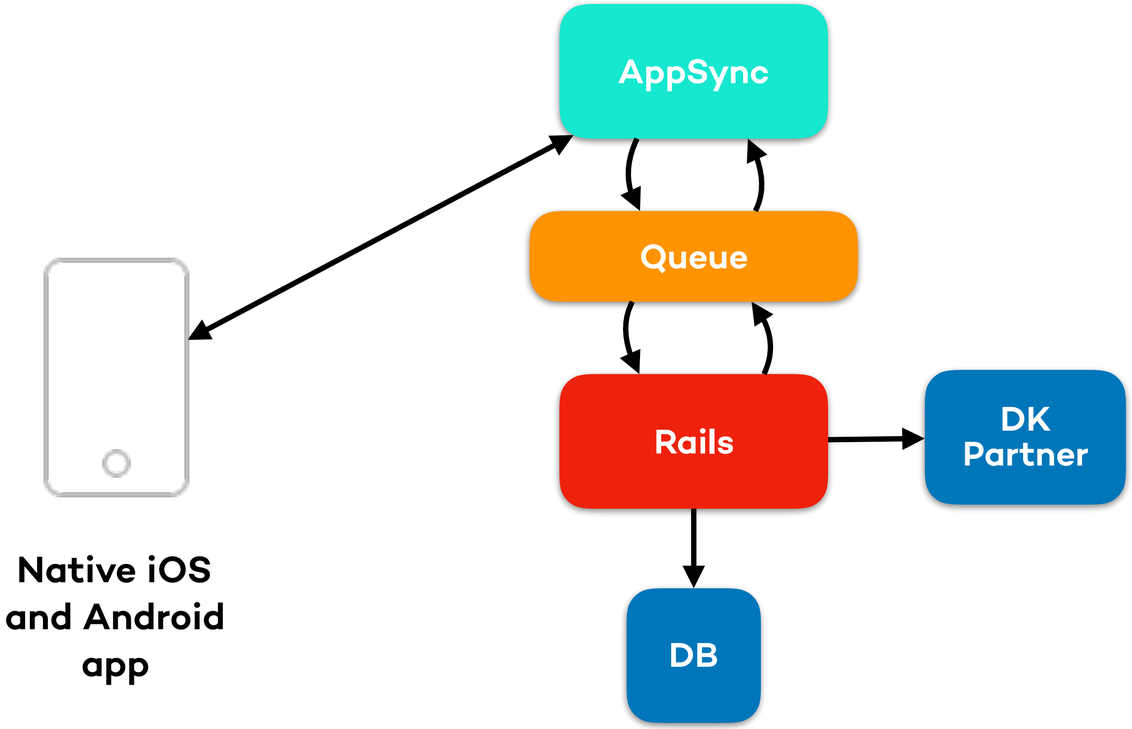
1. Sources publish events
2. External API subscribes on events and converts to own model
3. 3rd parties access external API and may register web hooks



From pull to push



App triggers a pull (3-5 requests ~ 1-2 seconds) from partner bank with a DB transaction open



Never let an app request trigger a sync! Control the sync process and use async events to push data to the app on a web socket

Wrapping up

Key takeaways if entering microservice land

Adapt to the size of your team

Use asynchronous communication between services... preferably event driven

Prioritise your deployment pipeline and runtime platform from the start

Be systematic!

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