Please

Ask questions through the app

Rate Session

Thank you!

@GOTOber

gotober.com

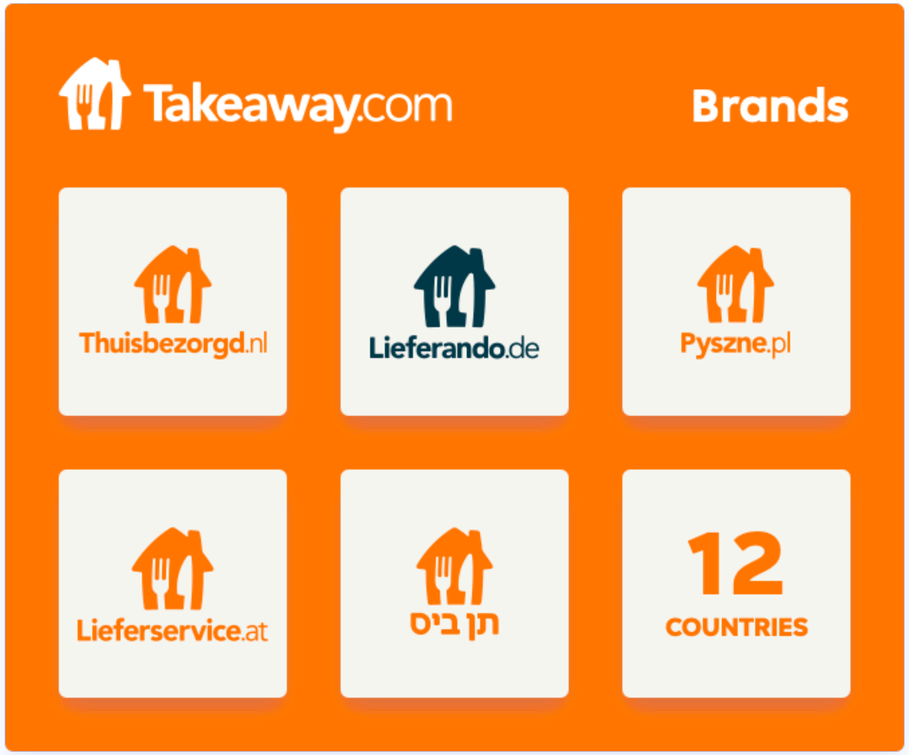
Takeaway.com

Designing APIs for 150 Million Orders

Matt Fewer
Senior Software Developer
@mattyfew

Michele Angioni
Senior Software Developer
@MicheleAngioni

Key numbers for Takeaway.com



Key numbers for Takeaway.com

- Q3 2019
  - 41.6 million orders processed
  - 44k online restaurants
  - 87% growth in the number of orders from Q3 2018 to 2019
    - Germany up by 136%
- Key Acquisition: Delivery Hero Germany

- **113+ million orders to date this year**

What we will cover

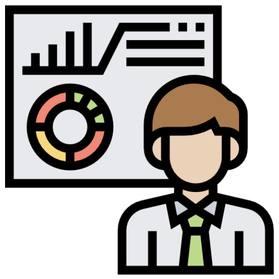
- **Scoober** - Logistics team of Takeaway
  - Managing our delivery drivers
  - Domain Driven Design

- **Frontend** - Migration team
  - Redesigning the Frontend architecture
  - Old vs new stack
  - Backend for Frontend
  - Design System

Scoober


Takeaway.com
Takeaway.com
Takeaway.com

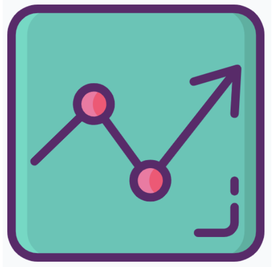
The Scoober Challenge



Forecasting
number of Drivers

Creating Driver
Shifts

Managing Leaves



Getting customer
orders in real time

The Scoober Challenge

Assigning jobs to drivers

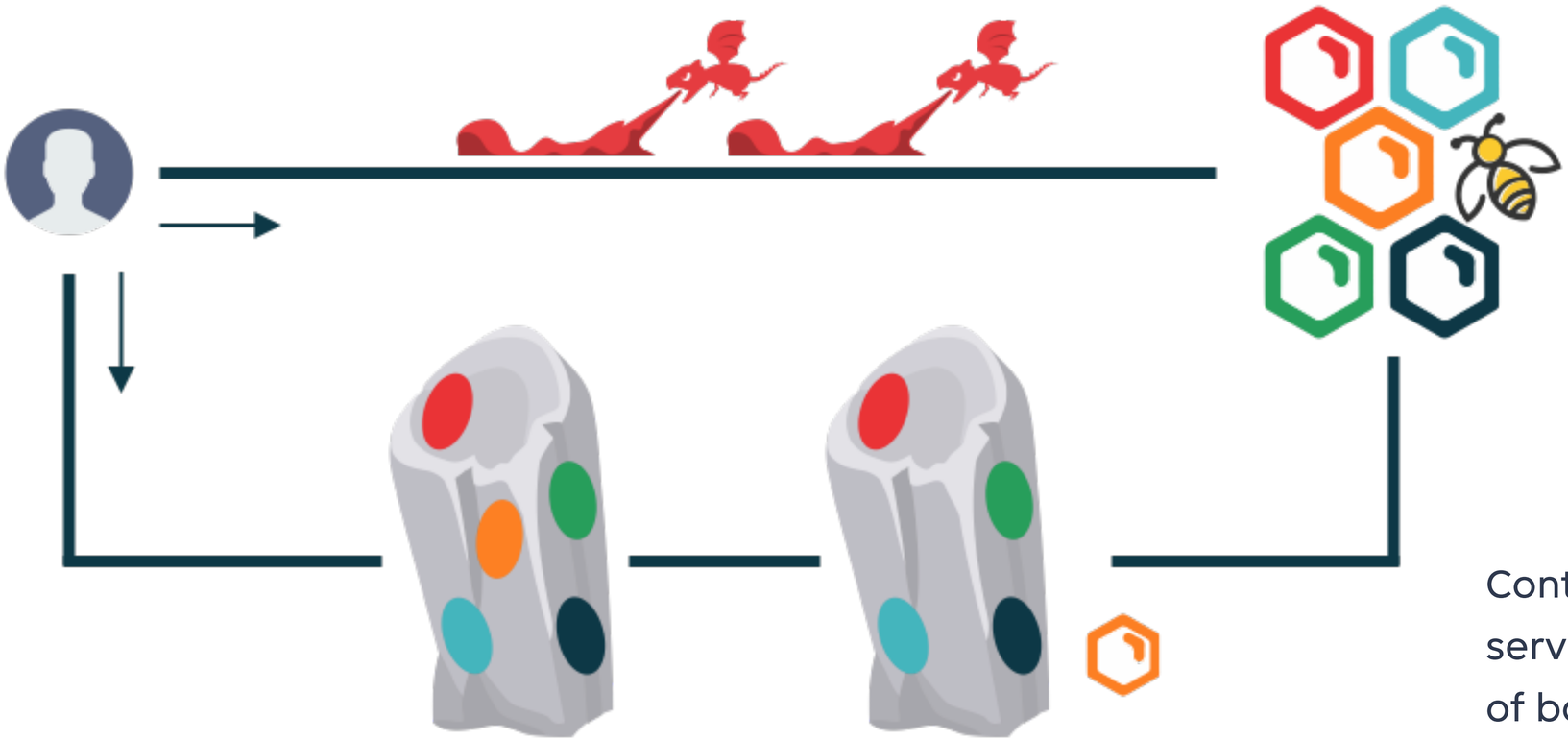
Guiding the driver throughout the city

Providing a food tracker to customers

Paying the drivers

The Scoober Challenge

How to start designing such an infrastructure with limited resources?



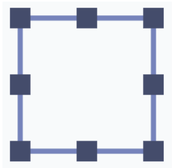
- Business requirements change fast
- Service boundaries are still not clear
- Limited budget for DevOps

A Monolith allows to explore the complexity of a system and its component boundaries

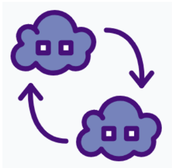
As complexity rises start breaking out some microservices

Continue breaking out services as your knowledge of boundaries and service management increases

The Scoober Challenge



Separation of Concerns

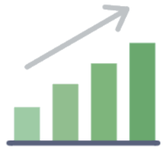


Loose Coupling

Better Maintainability

Modularity

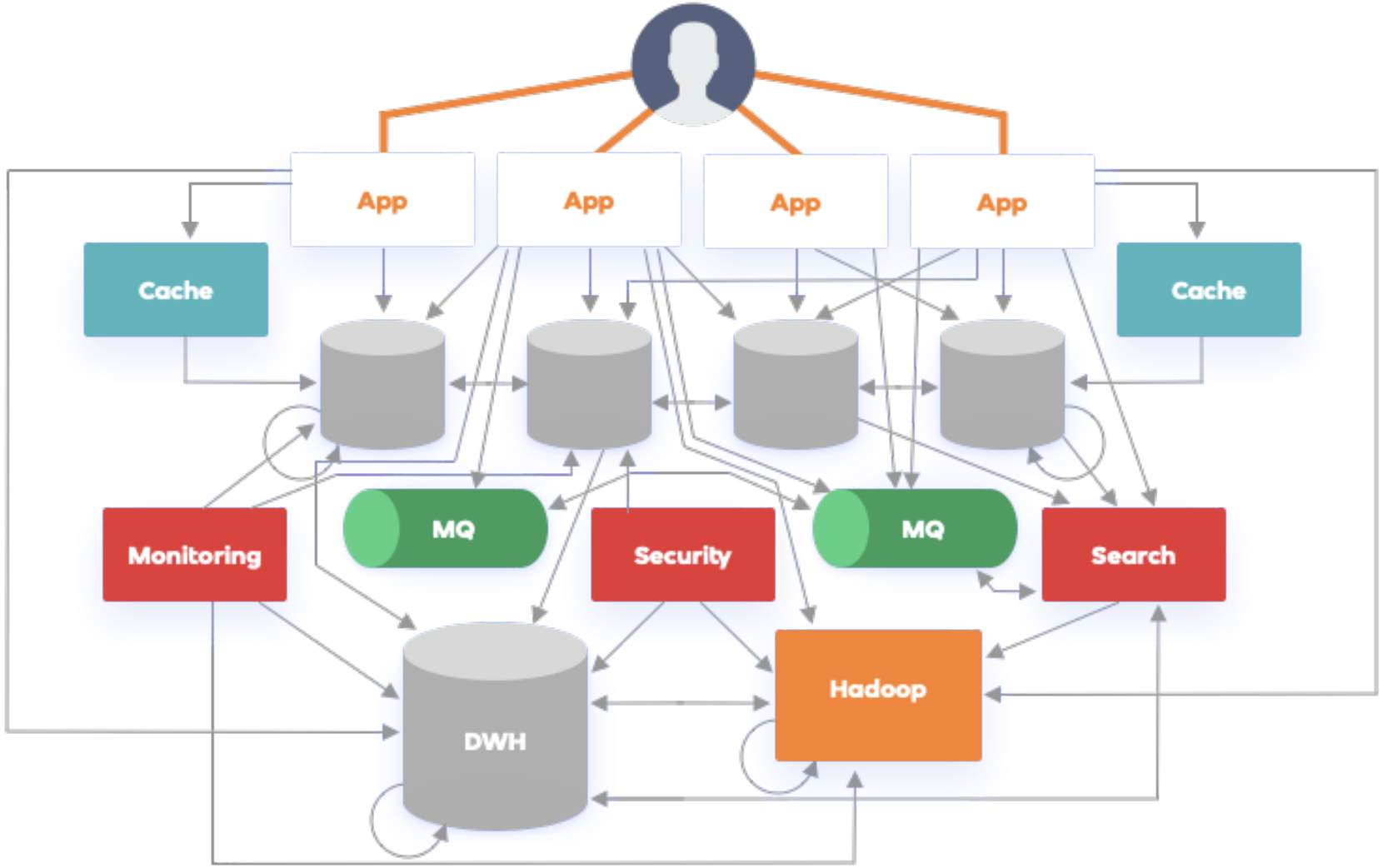
Experimentation



Better Scaling

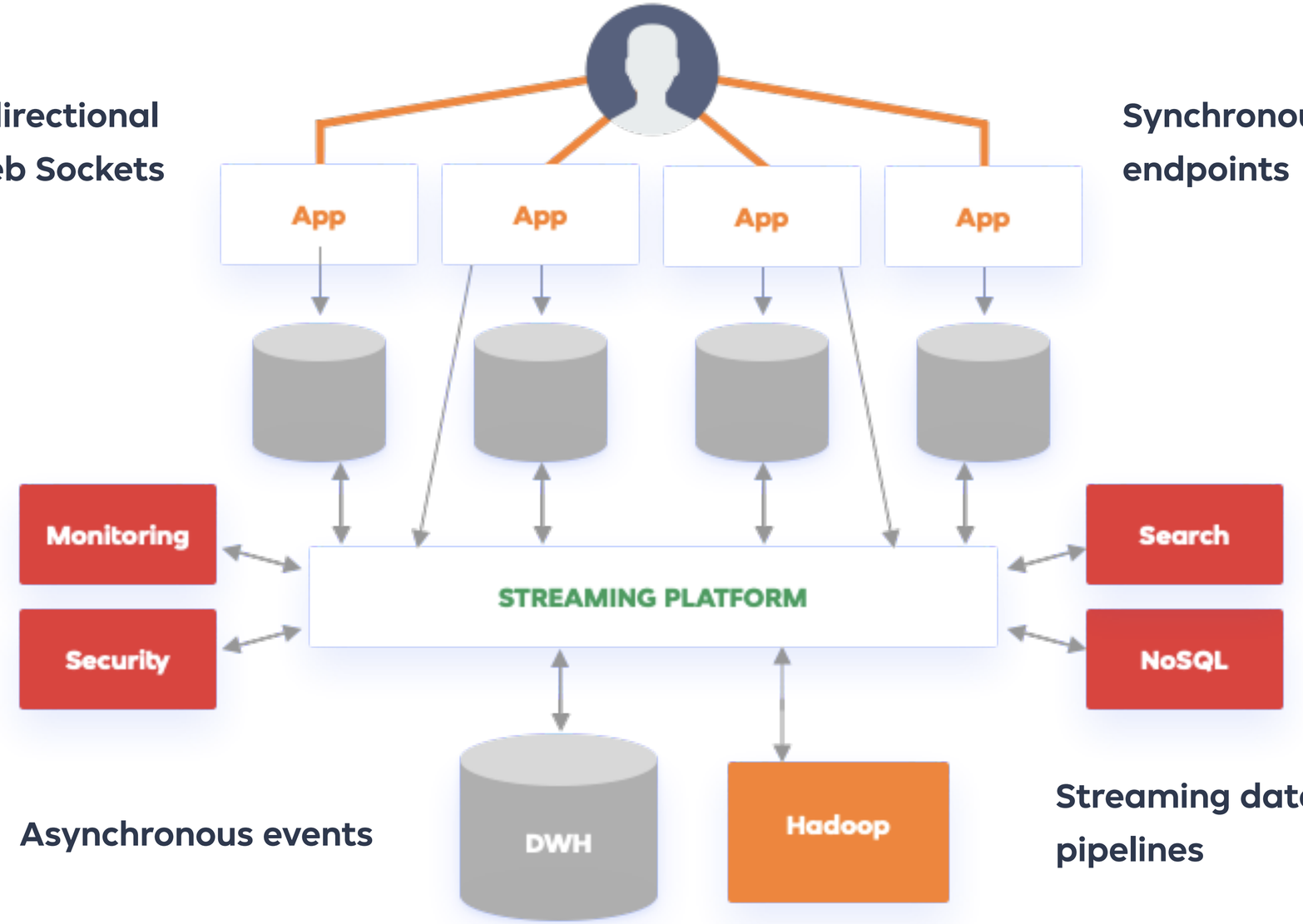
Resilience to Failures

Communication in the microservices era



Communication in the microservices era

Bidirectional
Web Sockets



Synchronous REST / GraphQL
endpoints

Asynchronous events

Streaming data
pipelines

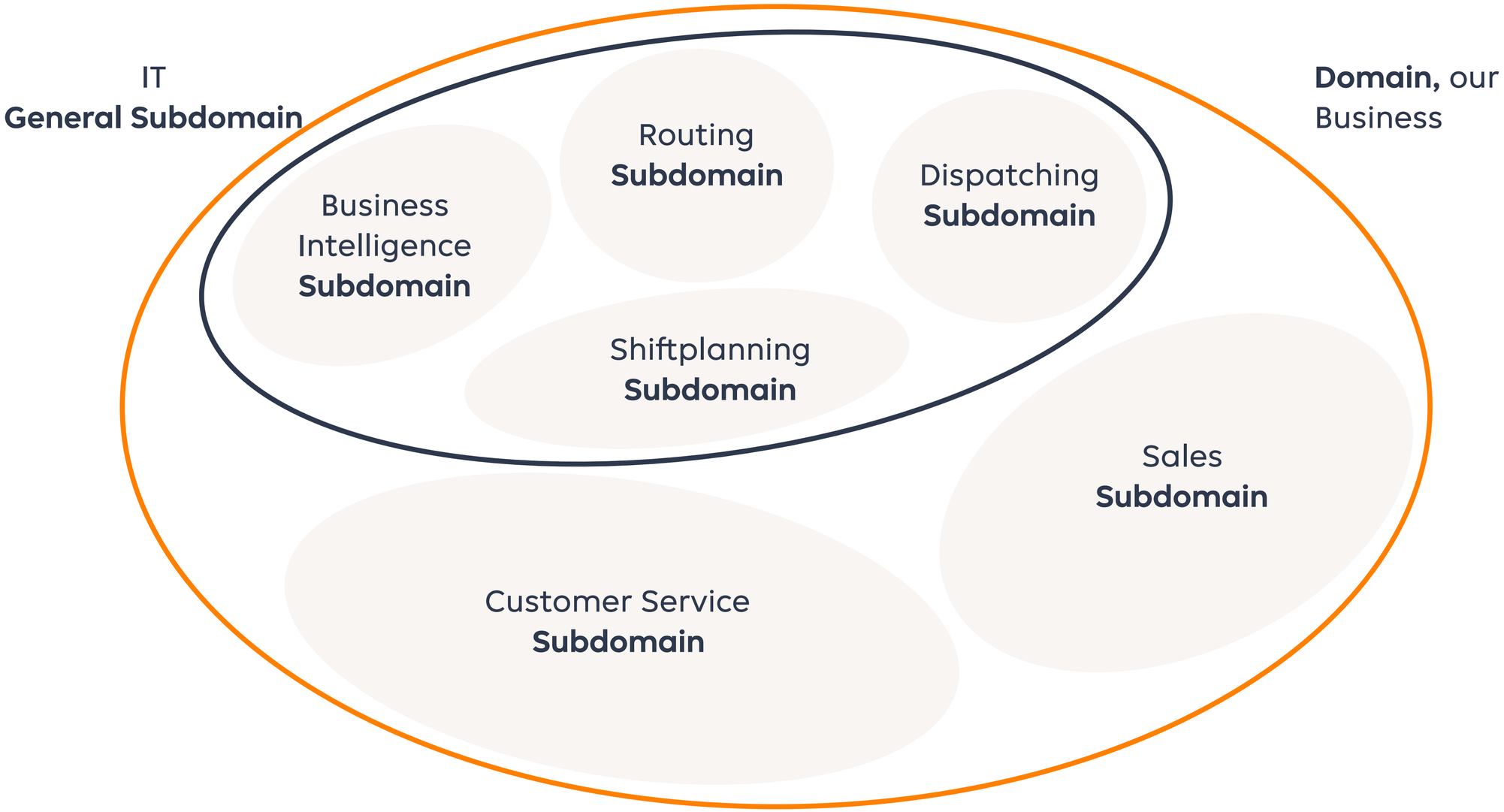
... but how ?

Domain Driven Design

Domain-driven design (DDD) is an approach to software development for complex needs by connecting the implementation to an evolving model.

Wikipedia

Domain Driven Design - Terms



DDD - Ubiquitous Language

Ubiquitous language: all stakeholders (developers, PMs / POs, QAs...) should use the same naming conventions

Definition

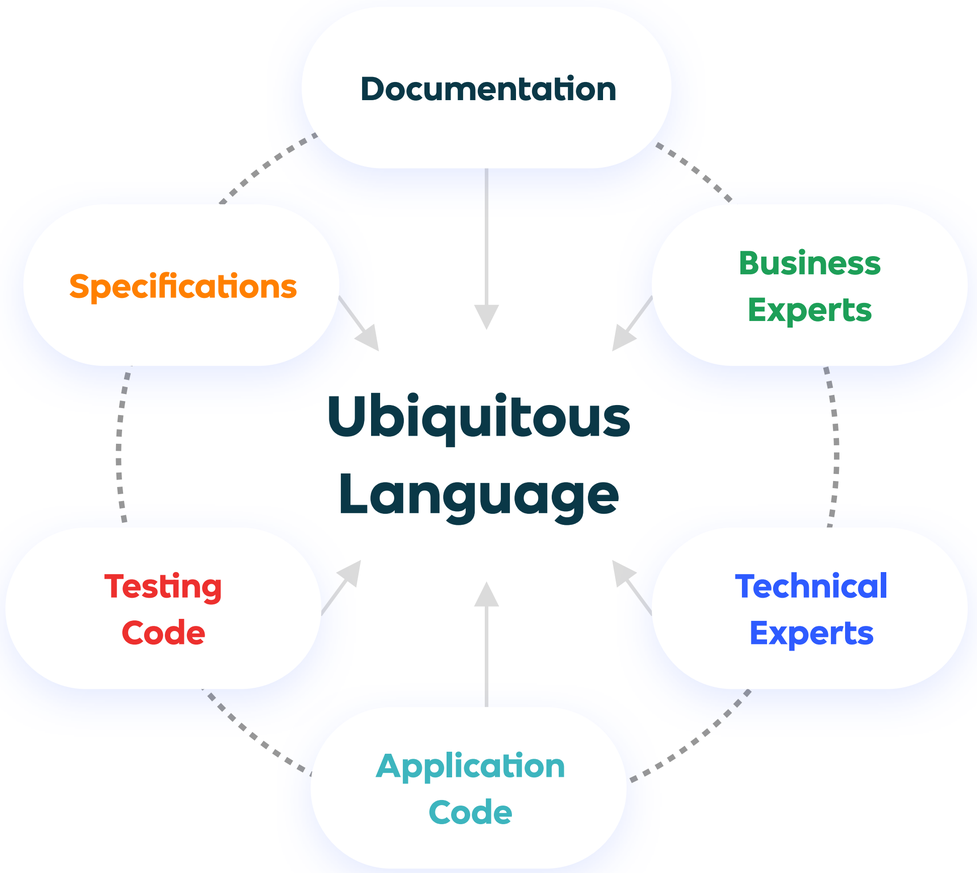
An **Ubiquitous Language** is a shared set of concepts, terms and definitions between the business stakeholders and the technical staff.

Use the language to drive the design of the system.

DDD - Ubiquitous Language

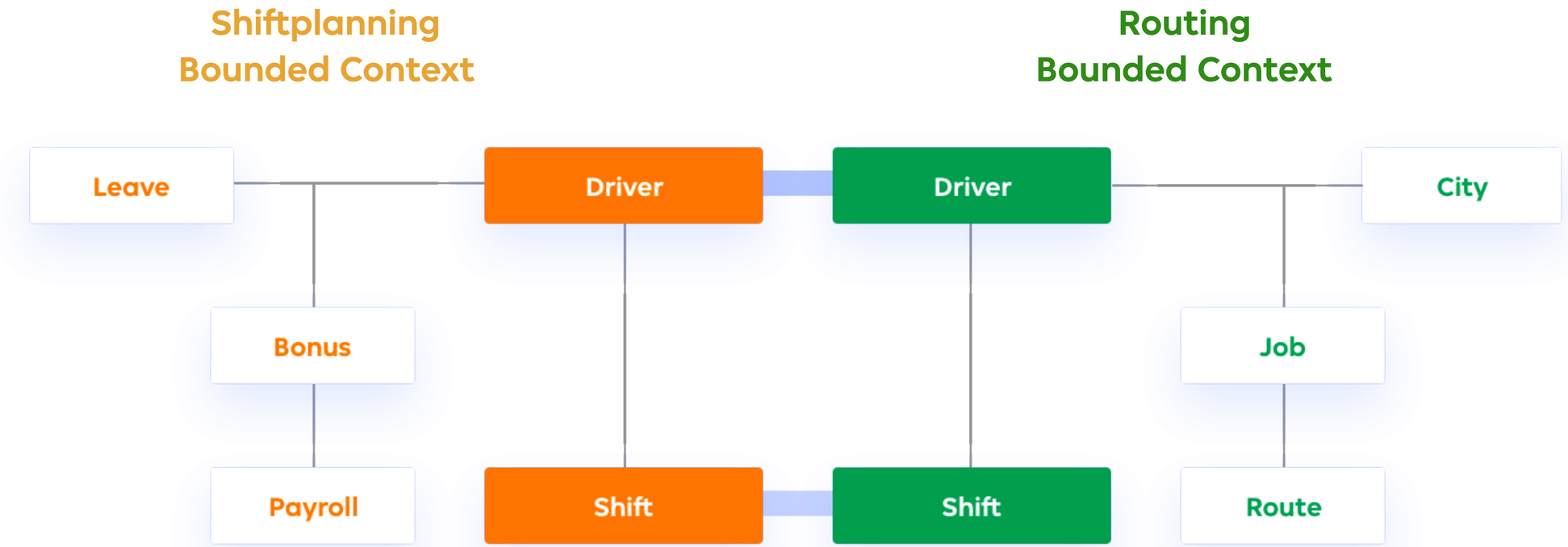
Glossary

- **Leave**: authorised absence from work. Vacation leaves and sick leaves are paid. Unpaid leaves are not.
- **Driver**: an employed driver who picks up the food and brings it to the customers
- **Job**: A confirmed food order placed by a Customer
- ...

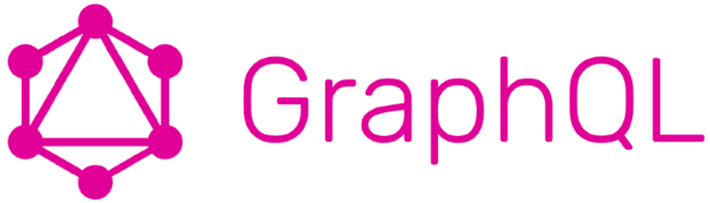


DDD - Context Mapping

Understanding the business processes and identifying the Bounded Contexts of our domain (Context Mapping)



Good Practices for API design



Good Practices: Authentication

No Home Made Solutions

Use Industry Standards

Adopt Cloud Solutions

Auth0

Amazon Cognito

Firebase

okta

KEYCLOAK

FORGEROCK

onelogin

Good Practices: Authorization

Authentication

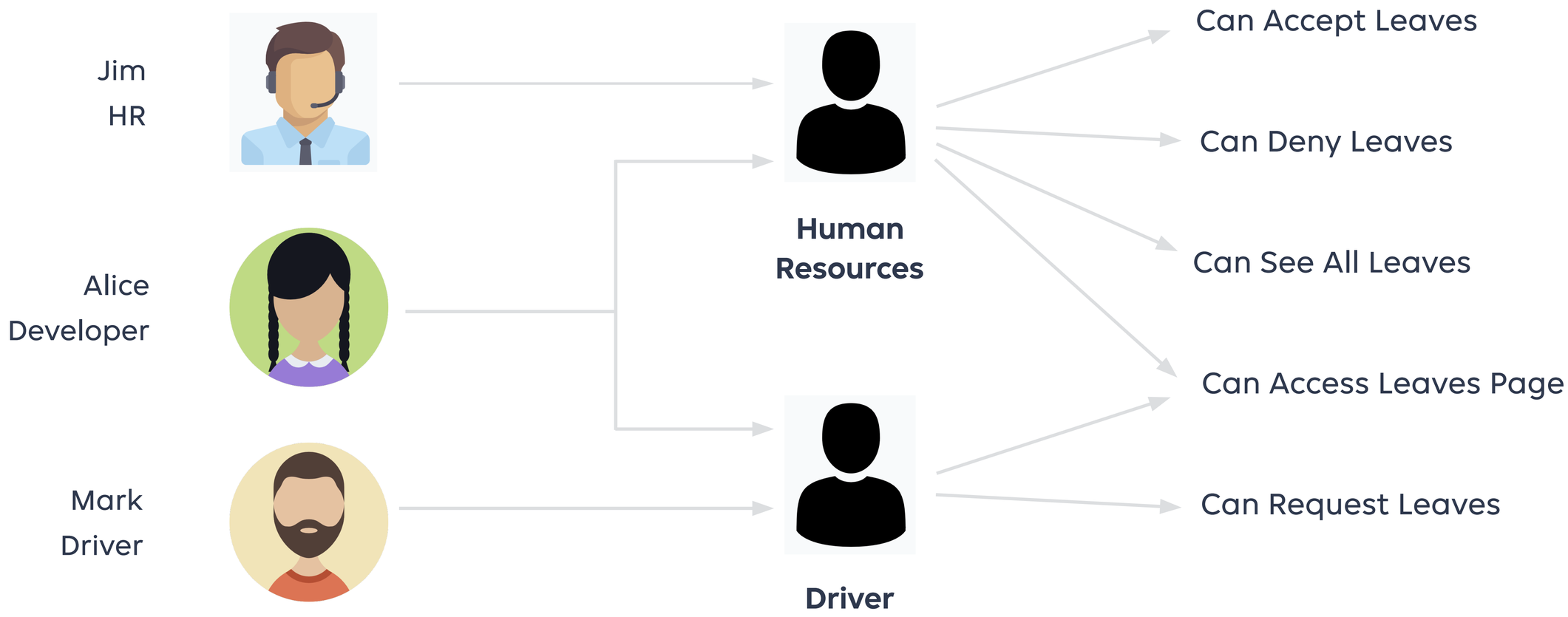
Who you are

Authorization

What you can do

Good Practices: Authorization

Role Based Access Control (RBAC)



Good Practices: Errors

The HTTP Status Code is **NOT** enough or not always usable (GraphQL). Include the ErrorCode in the error response

Unauthorised / Forbidden / NotFound ...

InternalError

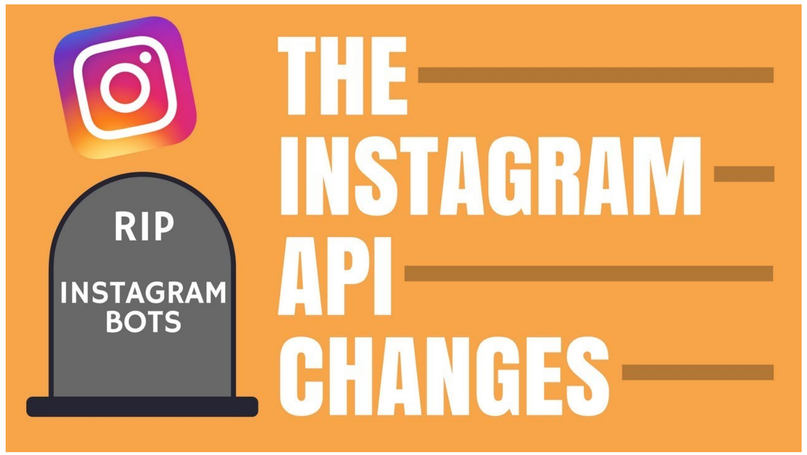
Define a format for your error messages

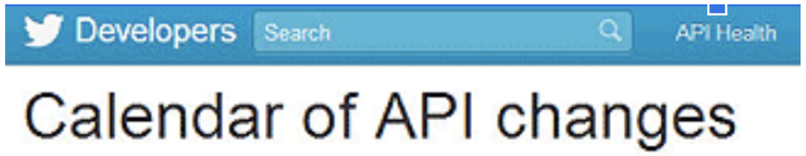
Log all internal errors to cloud and specialised solutions

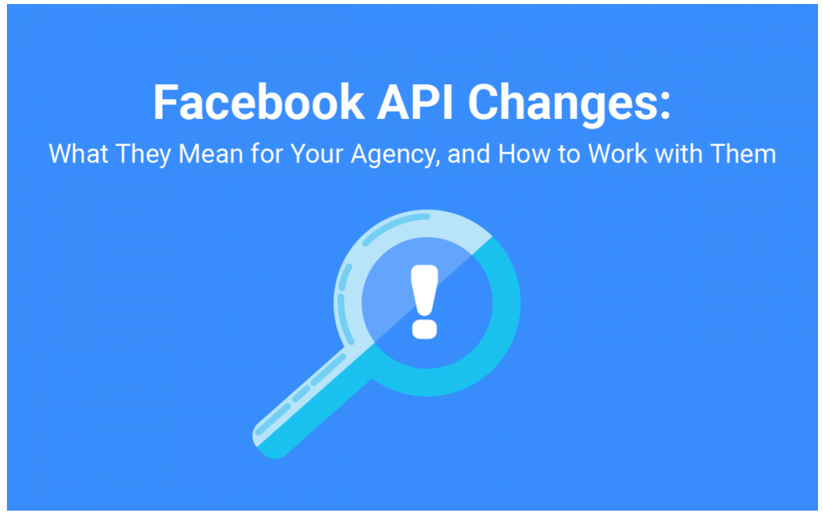
Adopt an alerting strategy based on log levels

Good Practices: Versioning

Problem: Your API is gonna change







Good Practices: Versioning

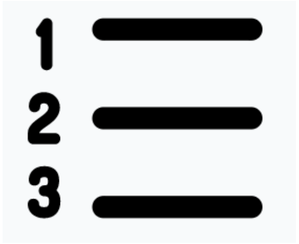
- **Version directly in the url after the domain:**
  https://myapi.com/**v1**/coolthings/12301

- Semantic versioning or timestamp in the request (query string or header):
  https://myapi.com/coolthings/12301**?v=2.1**
  https://myapi.com/coolthings/12301**?v=2019-05-12**

- Version your asynchronous events as well,
  either the **topic / queue** name or put the **version** in the **event payload**

Good Practices: Documentation

Clear and up-to-date documentation

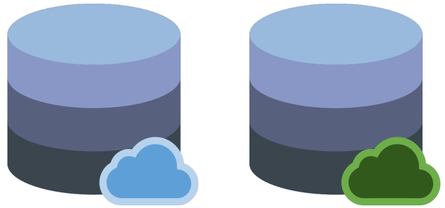


Keep documentation of all versions

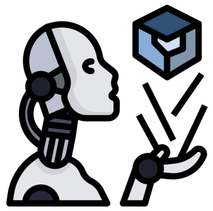
Store docs online and always available

Good Practices: Testing

Use different environments



Blue / Green deployments



Test Automation

Frontend

Lieferservice in Berlin 10785 -

https://www.lieferando.de/lieferservice-berlin-10785

Lieferando.de

Berlin, 10785

Alles auswählen | Italienische Pizza | Sushi | Amerikanisch | Chinesisch | Vegetarisch | Mexikanisch | Italienisch | Indisch | Indonesisch | Gri

Nach Restaurants suchen

Sortieren

Empfehlung

300 Restaurants

Auswählen

Lieferung | Abholen

Mindestbestellwert

- Keine Präferenz
- Weniger als 10,00 €
- Weniger als 15,00 €

Lieferkosten

- Keine Präferenz
- Gratis

Neu

Pizza und Burger Bulls

Italienisch, Italienische Pizza, Amerikanisch

(6)

ca. 50min | GRATIS | Min. 15,00 € | Gesponsert

Neu

Buffalo 2

Mexikanisch, Amerikanische Pizza, Burger

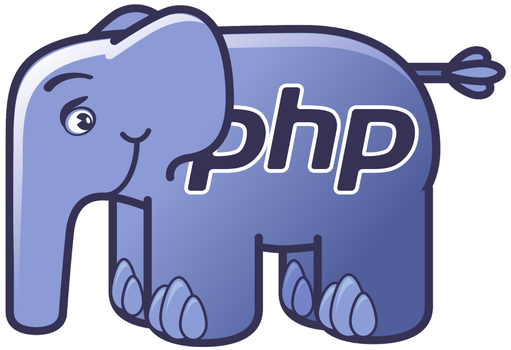
(41)

ca. 45min | 1,00 € | Min. 15,00 €

Izumi Restaurant Sushi Bar

Sushi

Our Current Stack



Monolithic Problems...

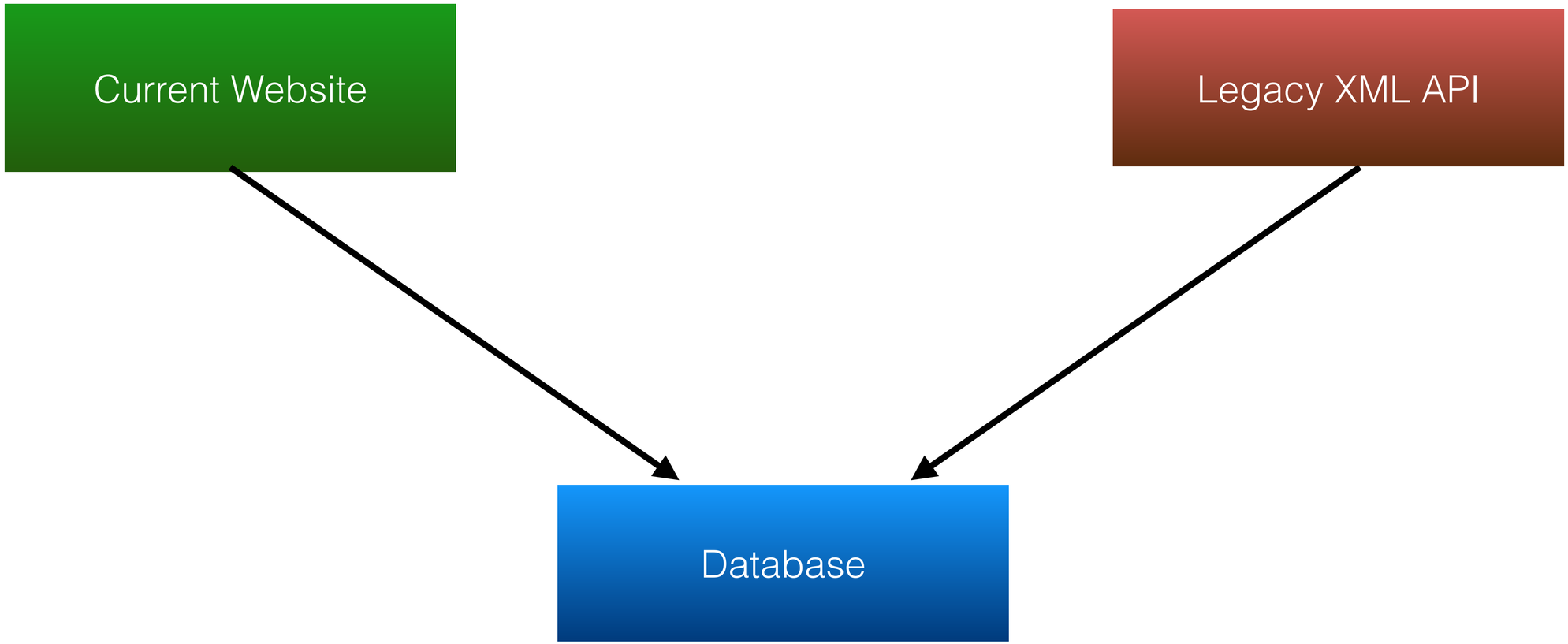
- Scaling
- No framework
- Hard to make releases
- Dev environments configs inconsistent
- Reliance on babel to use ES6
- Frontend teams in Germany 🇩🇪
  and the Netherlands 🇳🇱
- No clear separation between the Frontend and
  Backend in codebase

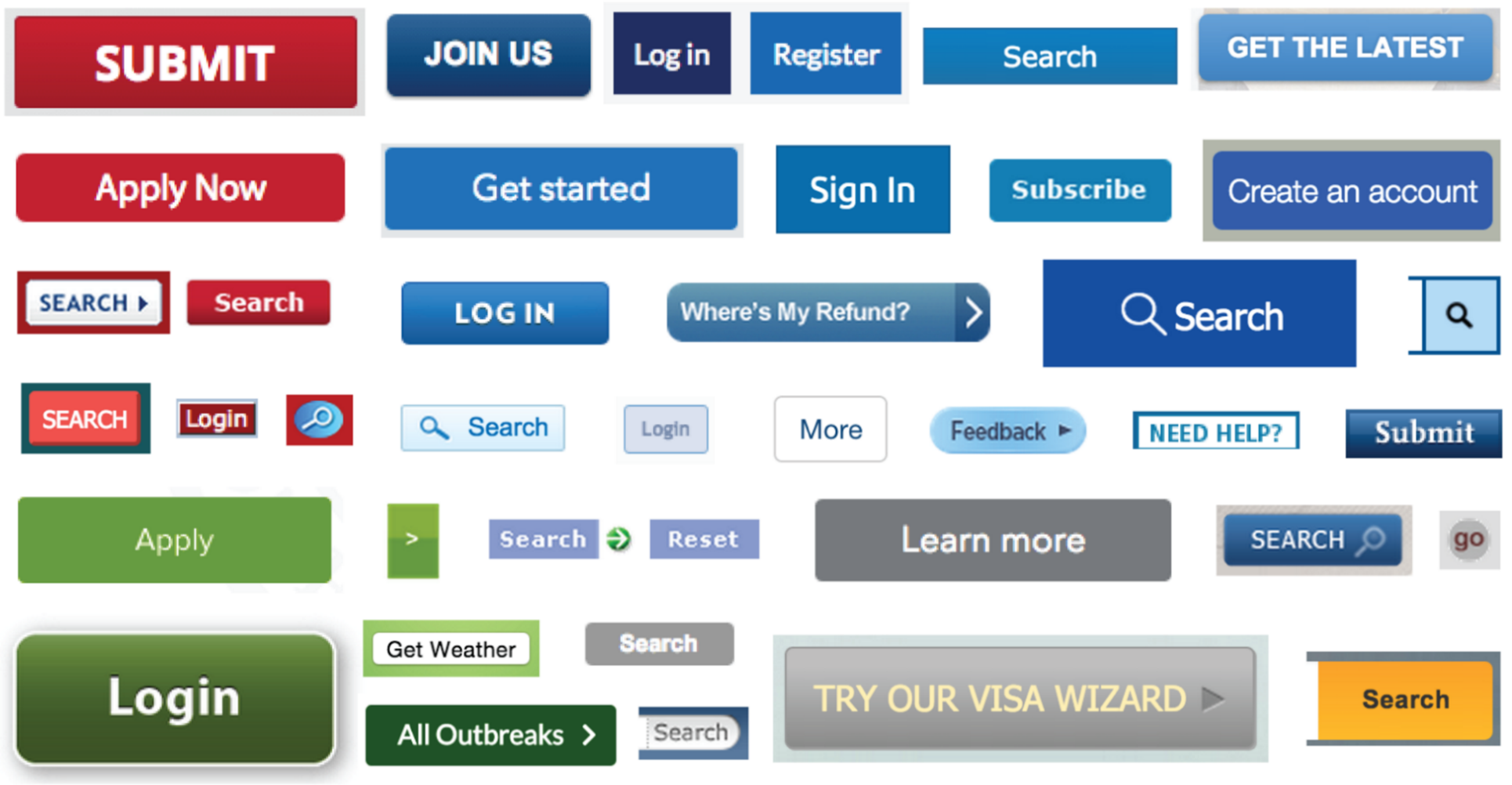
Src: https://www.deviantart.com/bagan-akatsuki/

Tightly coupled logic

Developer Wack-a-mole

Legacy system





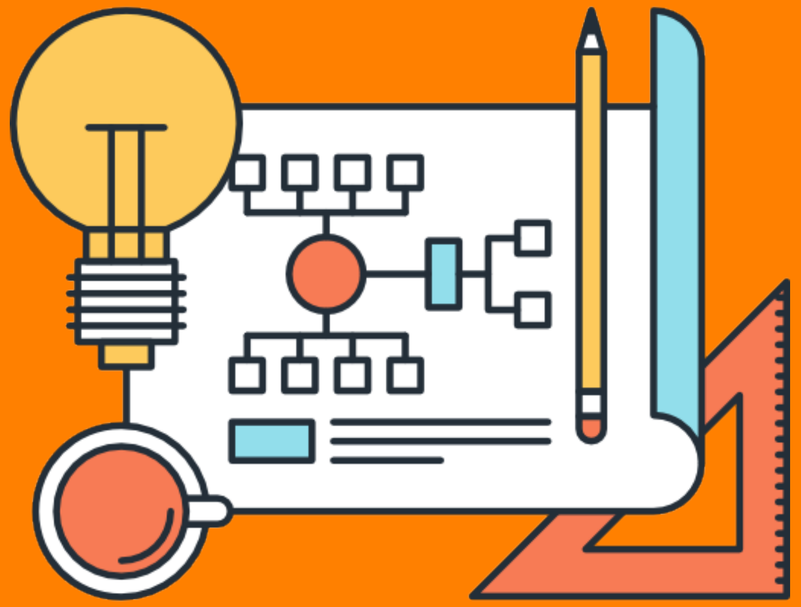
src: 18f.gsa.gov/assets/blog/web-design-standards/library/6-interface-inventory.png

Consumer Web:
The Great Migration


Consumer Web:
The Great Migration
src: https://www.zastavki.com

Goal

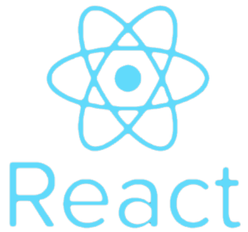
Create a new frontend application with **modern technologies** which will enable it to scale, be data-driven, and create small and efficient teams focused on specific business domains.



Areas to Improve

- Time to market
- Performance
- Security and stability
- A/B testing
- Decoupling services
- Scale with clear separation of business domains

The Stack

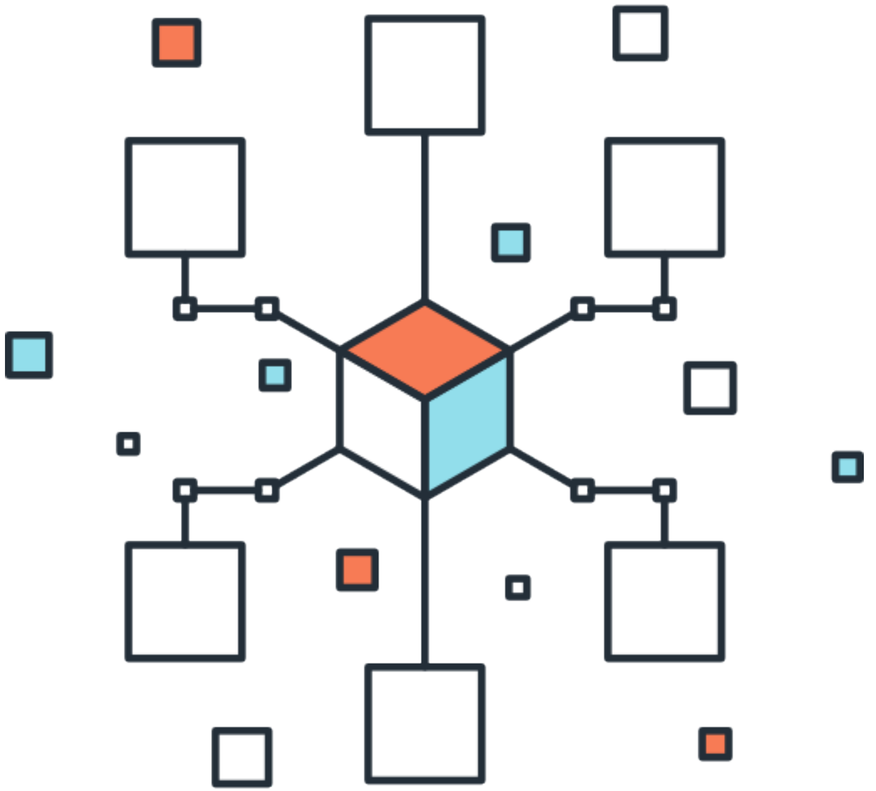


What about the Legacy XML API?

Backend for Frontend (BFF)

“One backend per user interface. The BFF team fine-tunes the behavior and performance of each backend to best match the needs of the frontend environment, without worrying about affecting other frontend experiences.”

- docs.microsoft.com

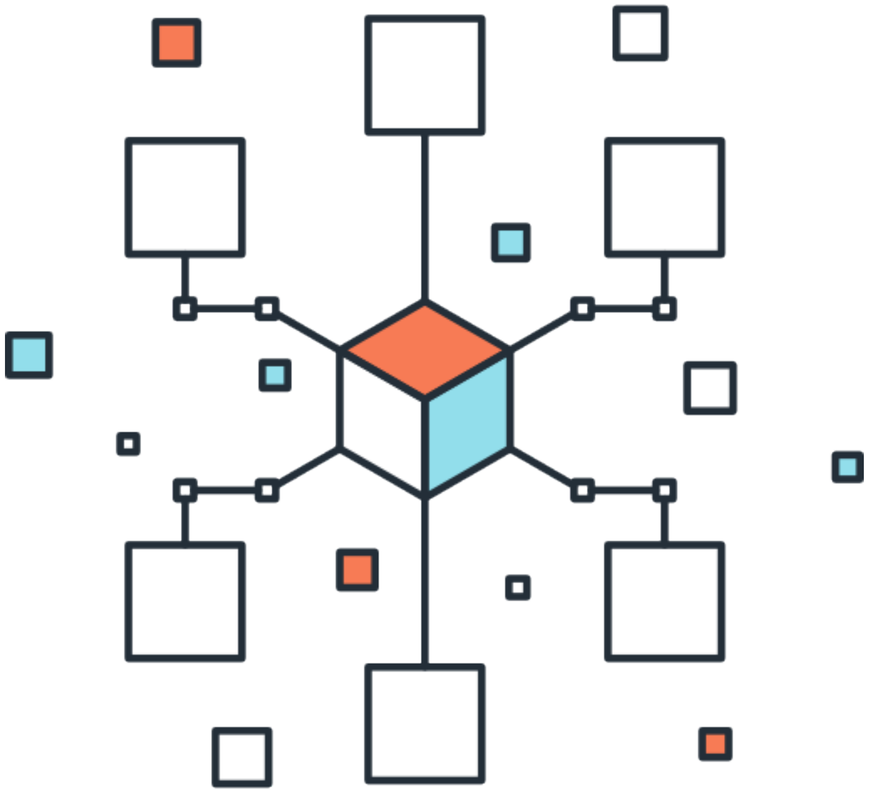


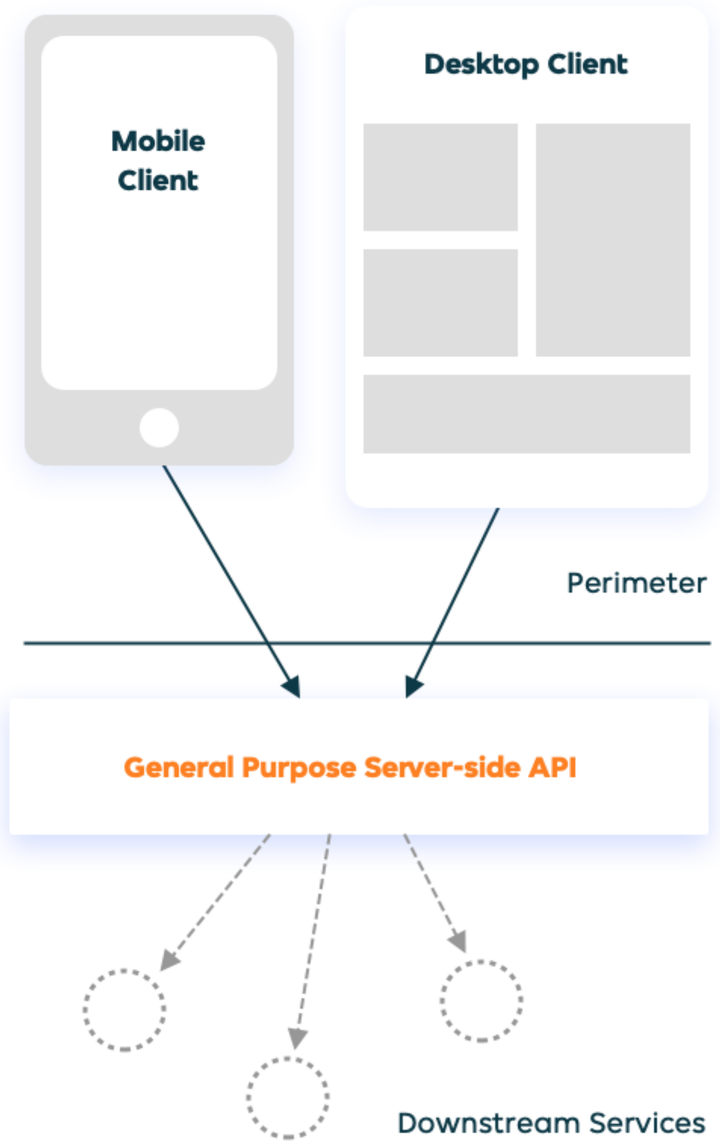
Backend for Frontend (BFF)

- Separate BE service for a specific FE interface
  - We can avoid customizing a BE for multiple interfaces
    - Web, iOS, Android

- Only contains client-side logic

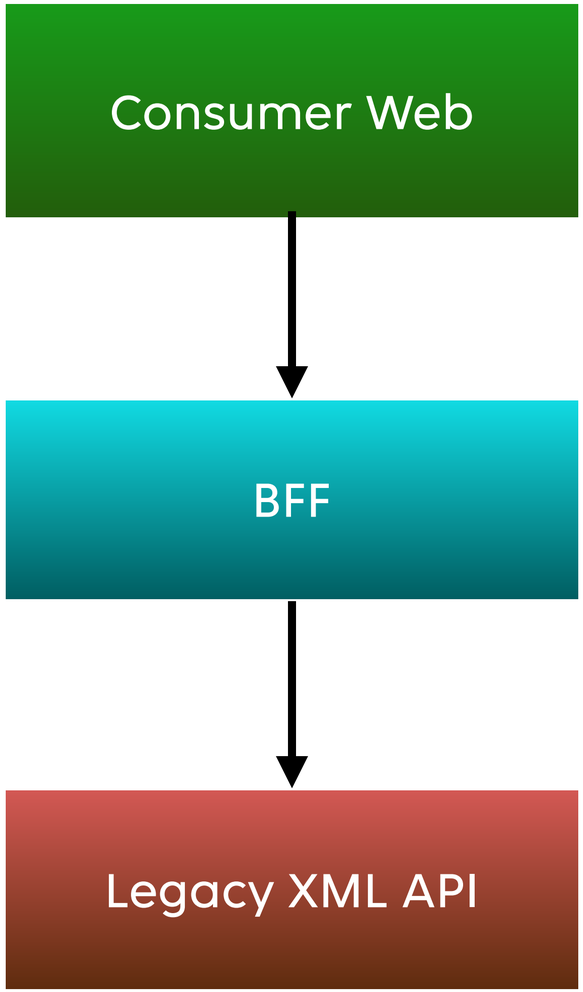
- Problems solved 👍
  - Provide separate functionality for mobile and web apps
  - Shield BE and FE from each other’s change requests
    - Translation layer
    - No conflicting update requirements

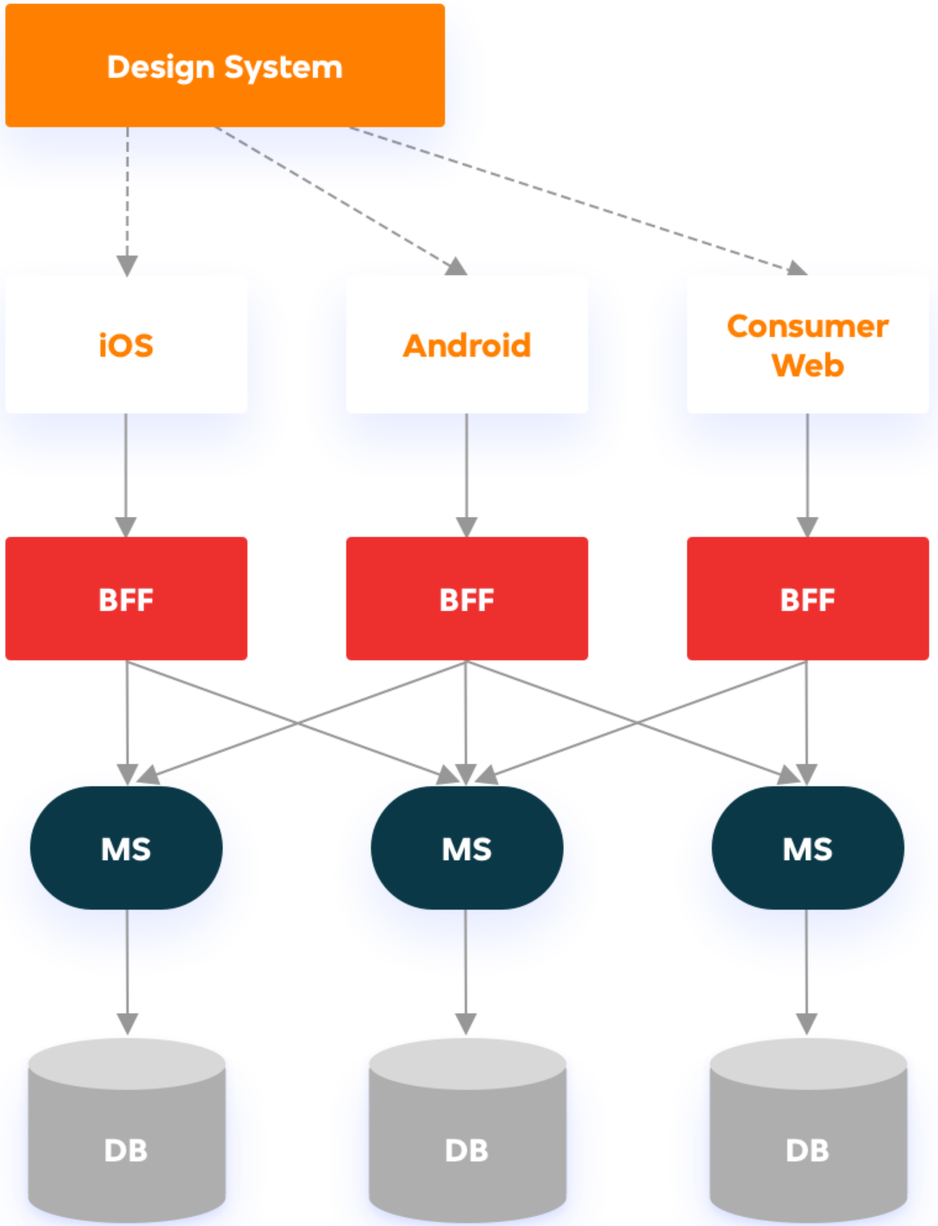




src: Sam Newman - https://samnewman.io

Legacy system



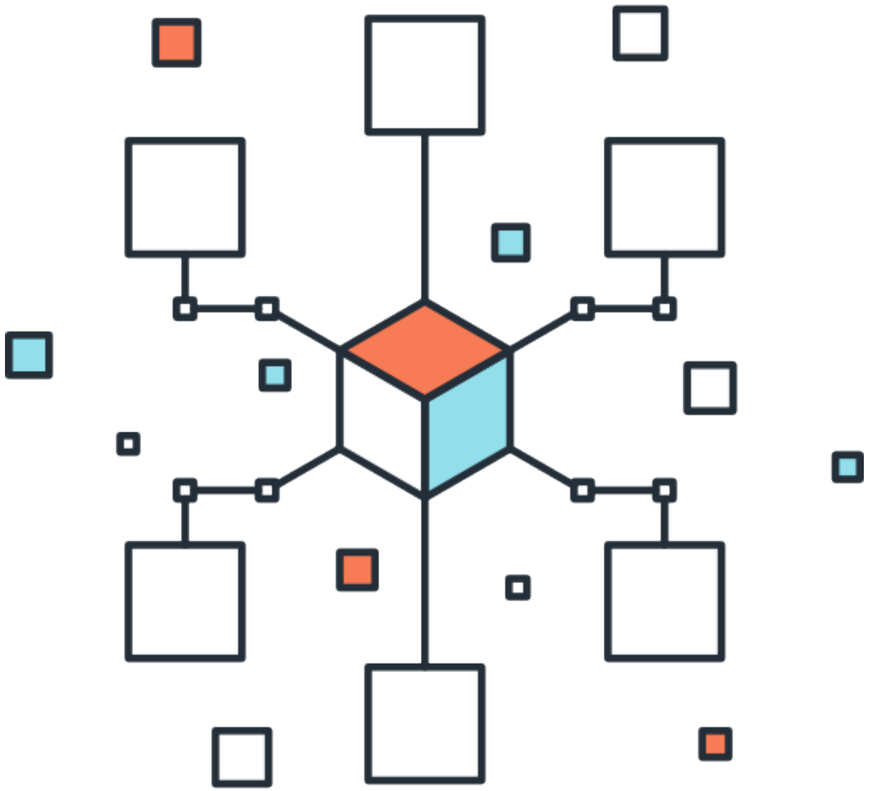

Design System
iOS
Android
Consumer Web
BFF
BFF
BFF
MS
MS
MS
DB
DB
DB

Challenges for BFF

- Having to do status-quo discovery in parallel with anticipating changes in the backend, as we also intend to move towards a service based architecture

- Have to reevaluate and possibly reengineer our dependencies

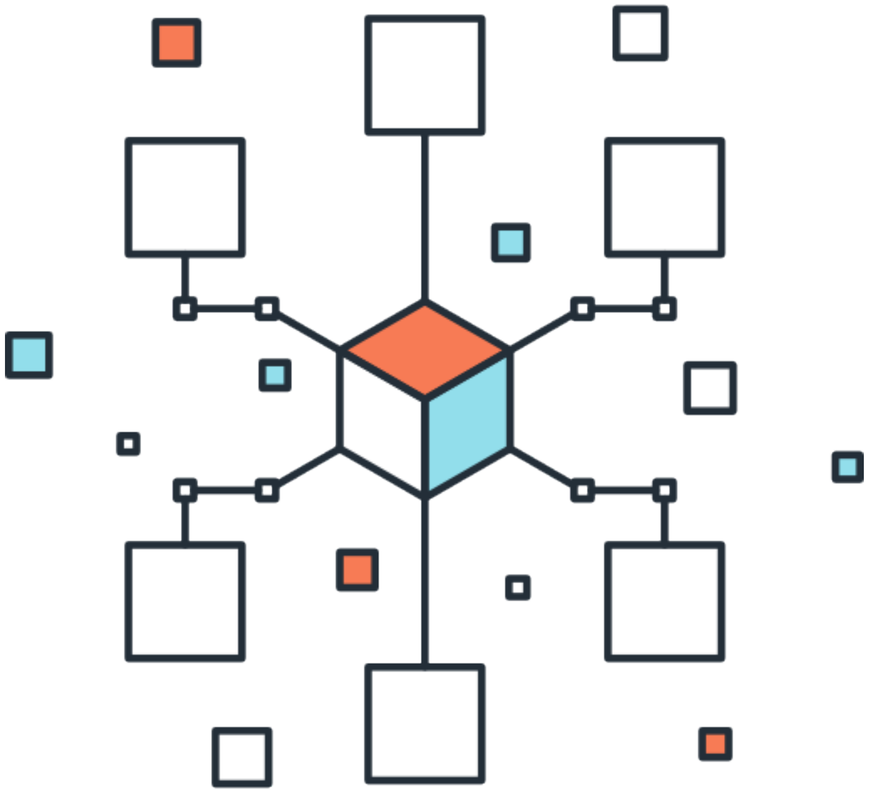
- To drive API development, we have to accept that we will have to iterate a lot - sometimes meaning rework!

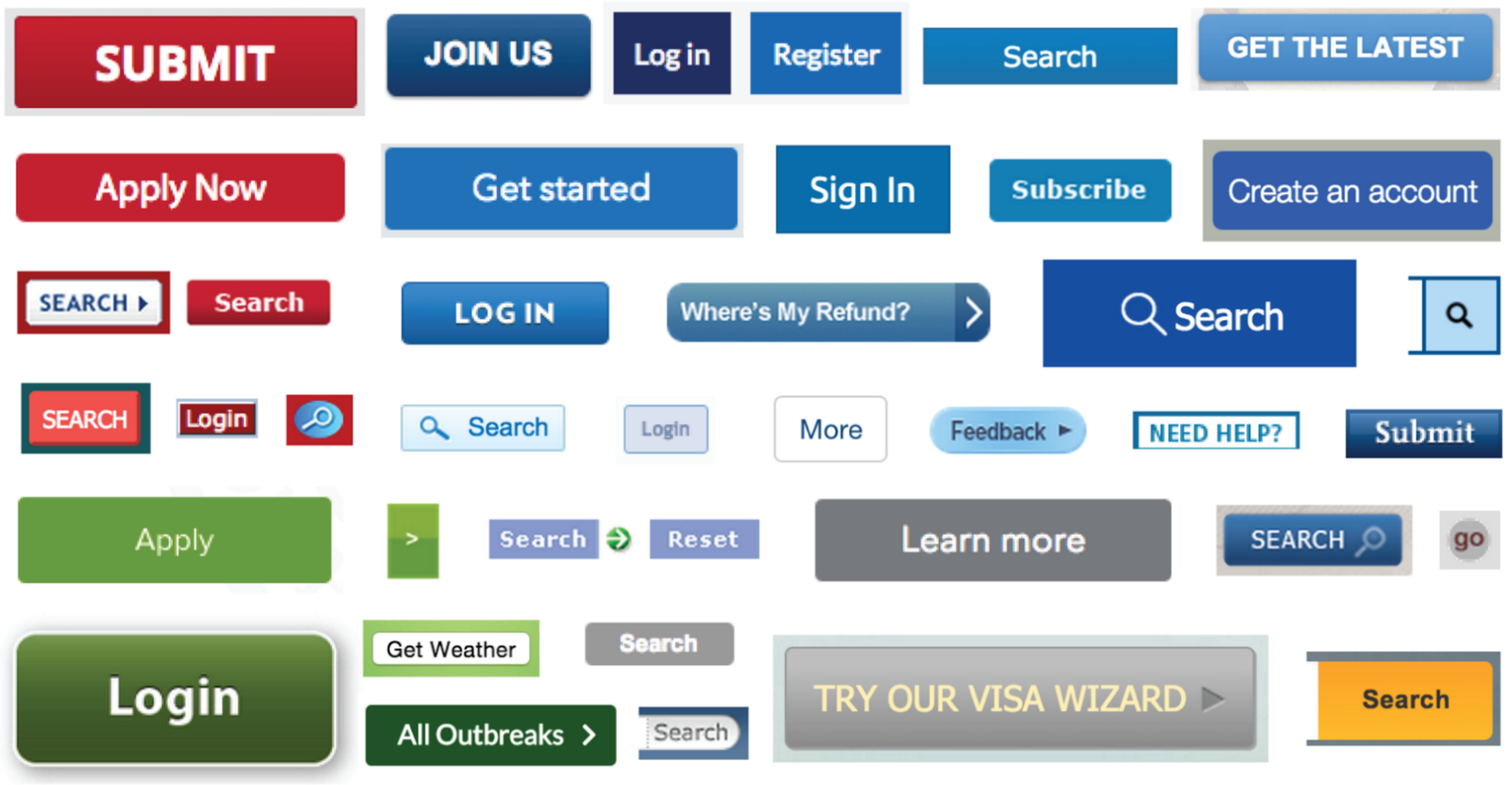


Wins for BFF

- Despite working on a major migration project, BFF can work without worrying about breaking existing functionality, and enable the FE overhaul without creating significant workload on BE.

- Human readable JSON! - better for debugging, discovery, and practicality





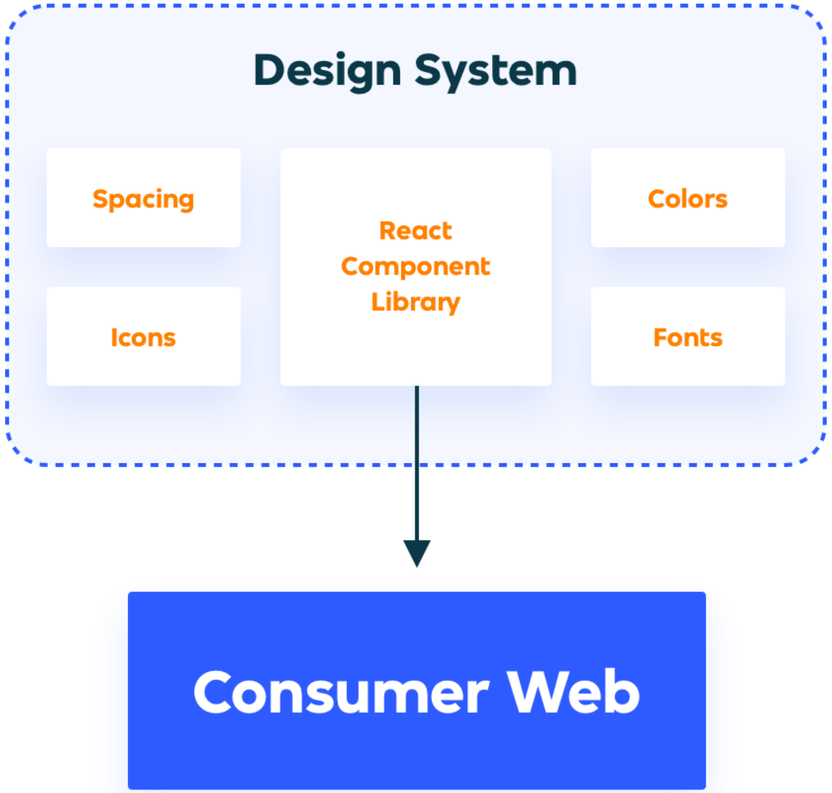
src: 18f.gsa.gov/assets/blog/web-design-standards/library/6-interface-inventory.png

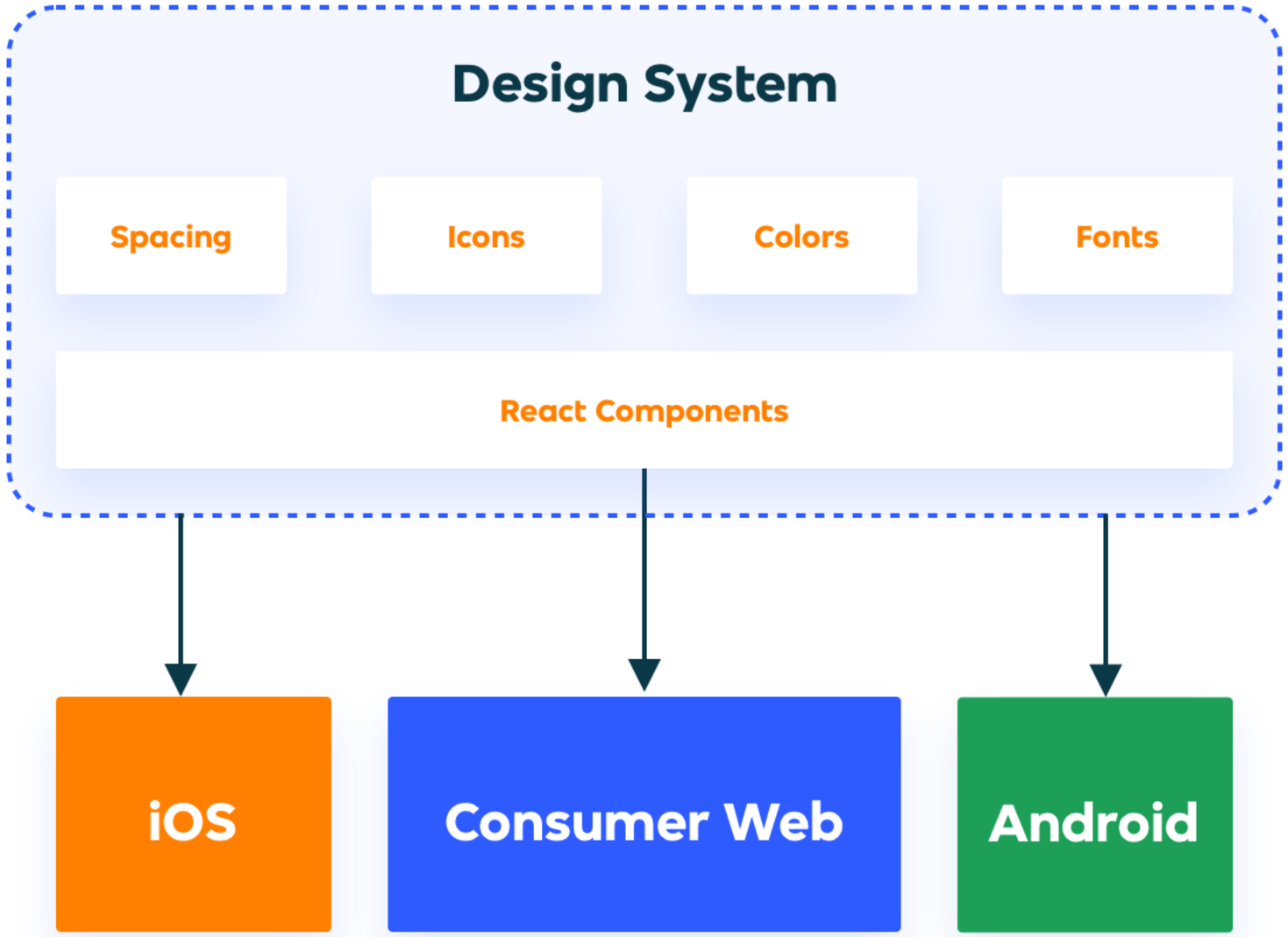
Design System

The complete set of design standards, documentation, UI patterns, and components. Design systems allow you to manage design at scale.

Included in our design system:

- Typography
- Layouts and grids
- Colors
- Icons
- Components
- Coding Conventions
- Documentation



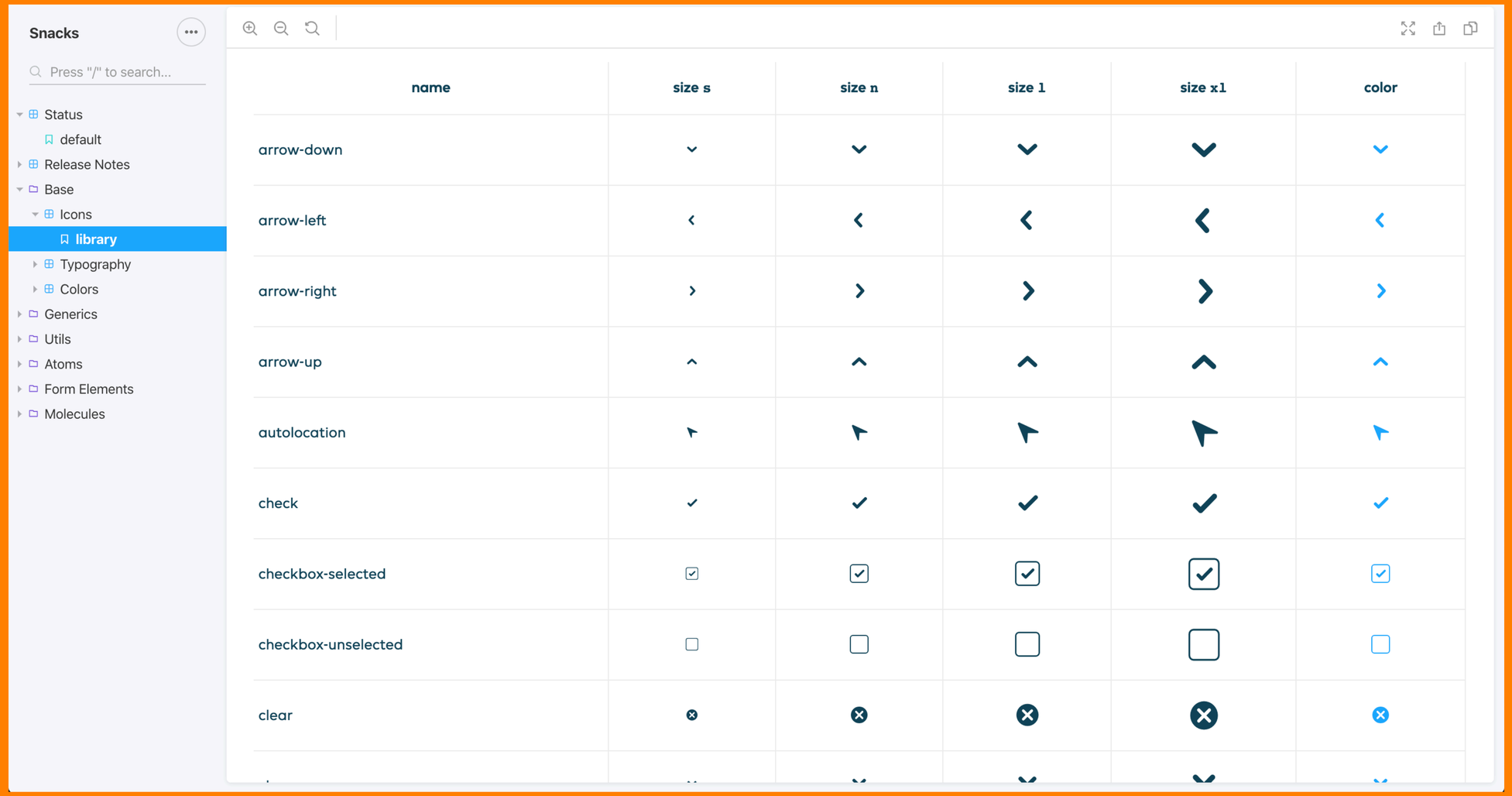

Design System
Spacing
Icons
Colors
Fonts
React Components
iOS
Consumer Web
Android

Snacks Design System

Storybook

Frontify

ZEPLIN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Press "/" to search...
Status
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Release Notes
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Molecules
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size s
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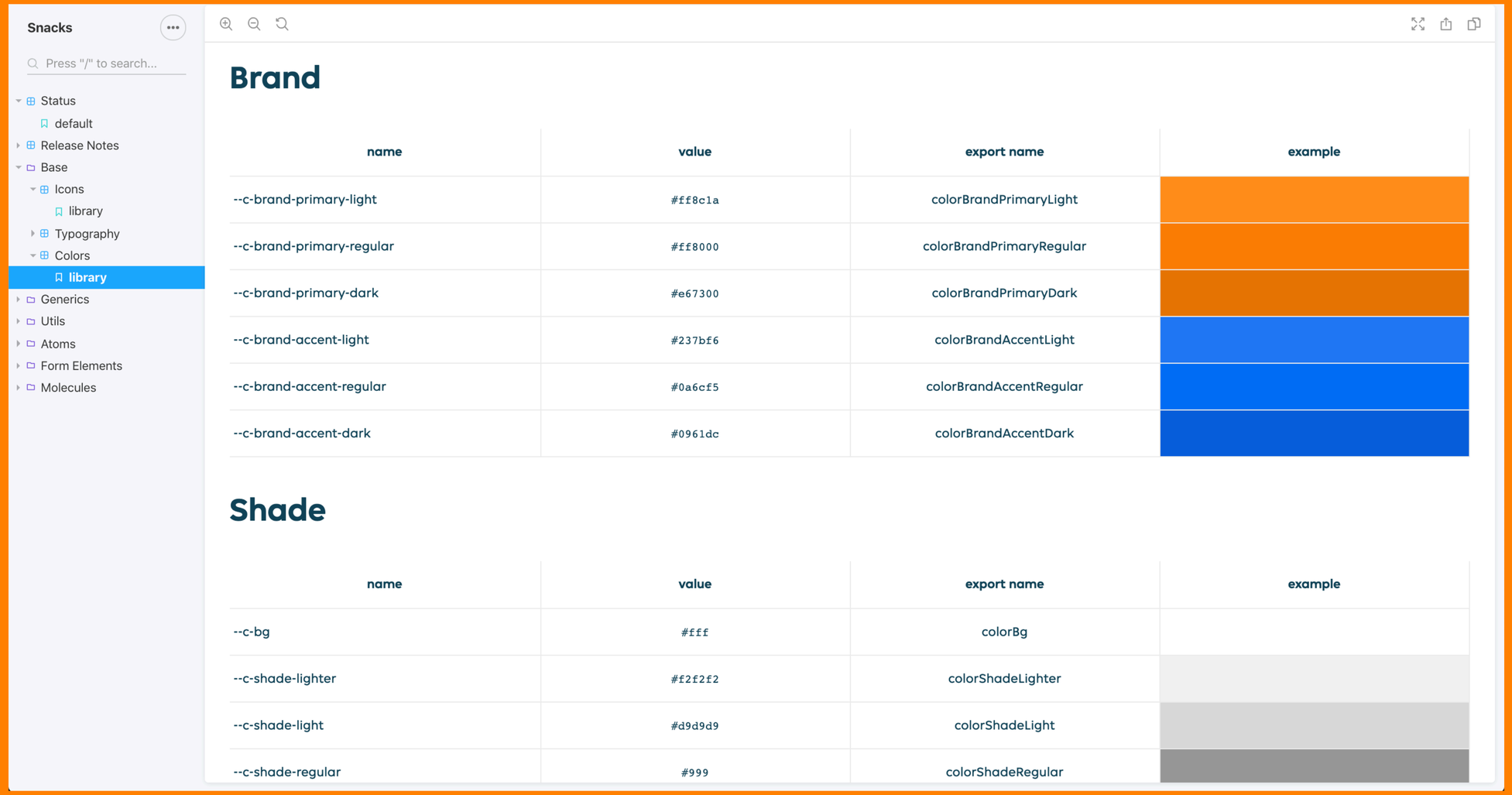
arrow-down
arrow-left
arrow-right
arrow-up
autolocation
check
checkbox-selected
checkbox-unselected
clear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Status
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Release Notes
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Generics
Utils
Atoms
Form Elements
Molecules
Brand
name
value
export name
example
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#ff8c1a
colorBrandPrimaryLight
--c-brand-primary-regular
#ff8000
colorBrandPrimaryRegular
--c-brand-primary-dark
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--c-brand-accent-light
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--c-brand-accent-regular
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--c-brand-accent-dark
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colorBrandAccentDark
Shade
name
value
export name
example
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colorBg
--c-shade-lighter
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--c-shade-light
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--c-shade-regular
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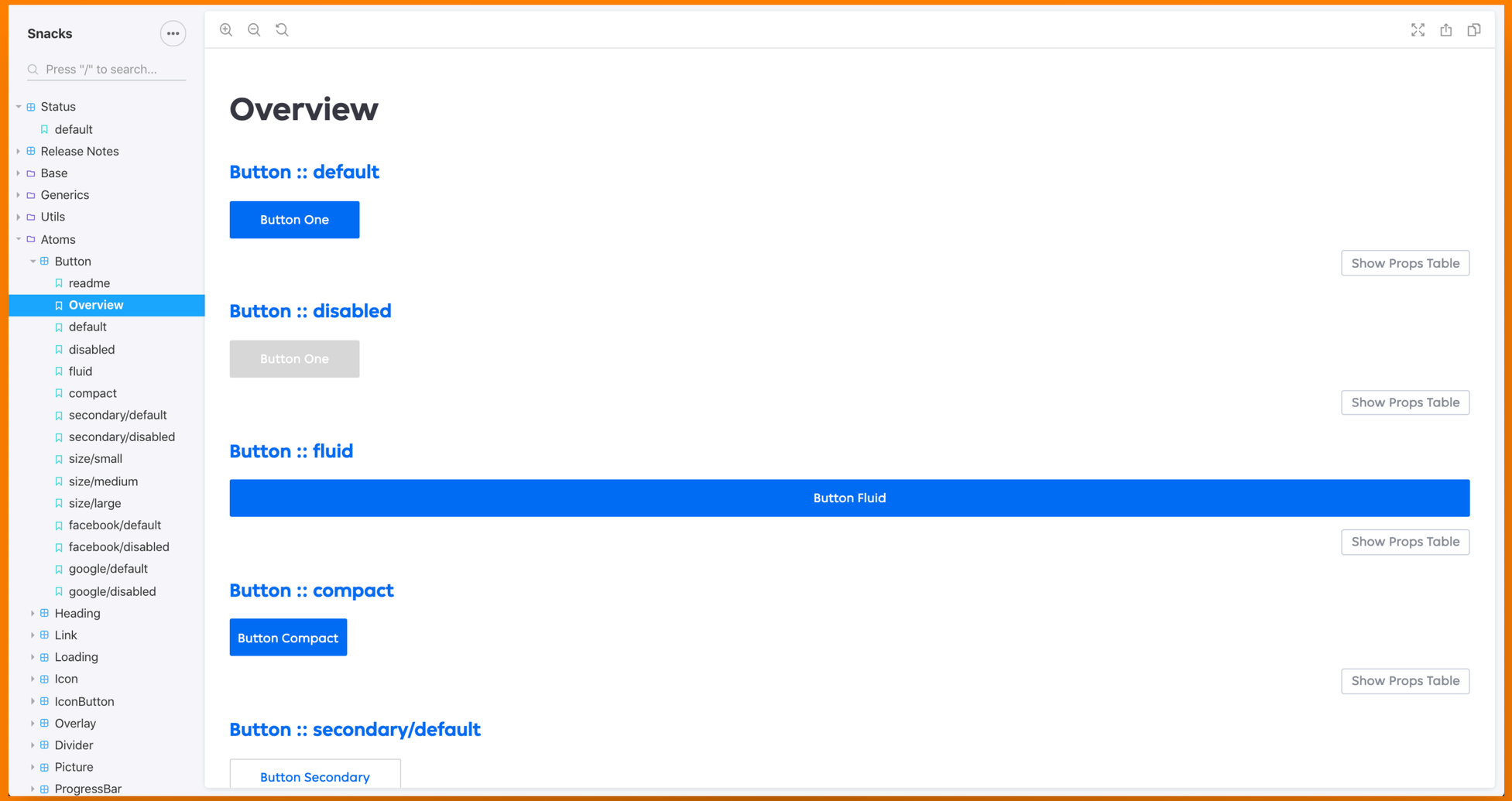
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facebook/disabled
google/default
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Heading
Link
Loading
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IconButton
Overlay
Divider
Picture
ProgressBar
Overview
Button :: default
Button One
Show Props Table
Button :: disabled
Button One
Show Props Table
Button :: fluid
Button Fluid
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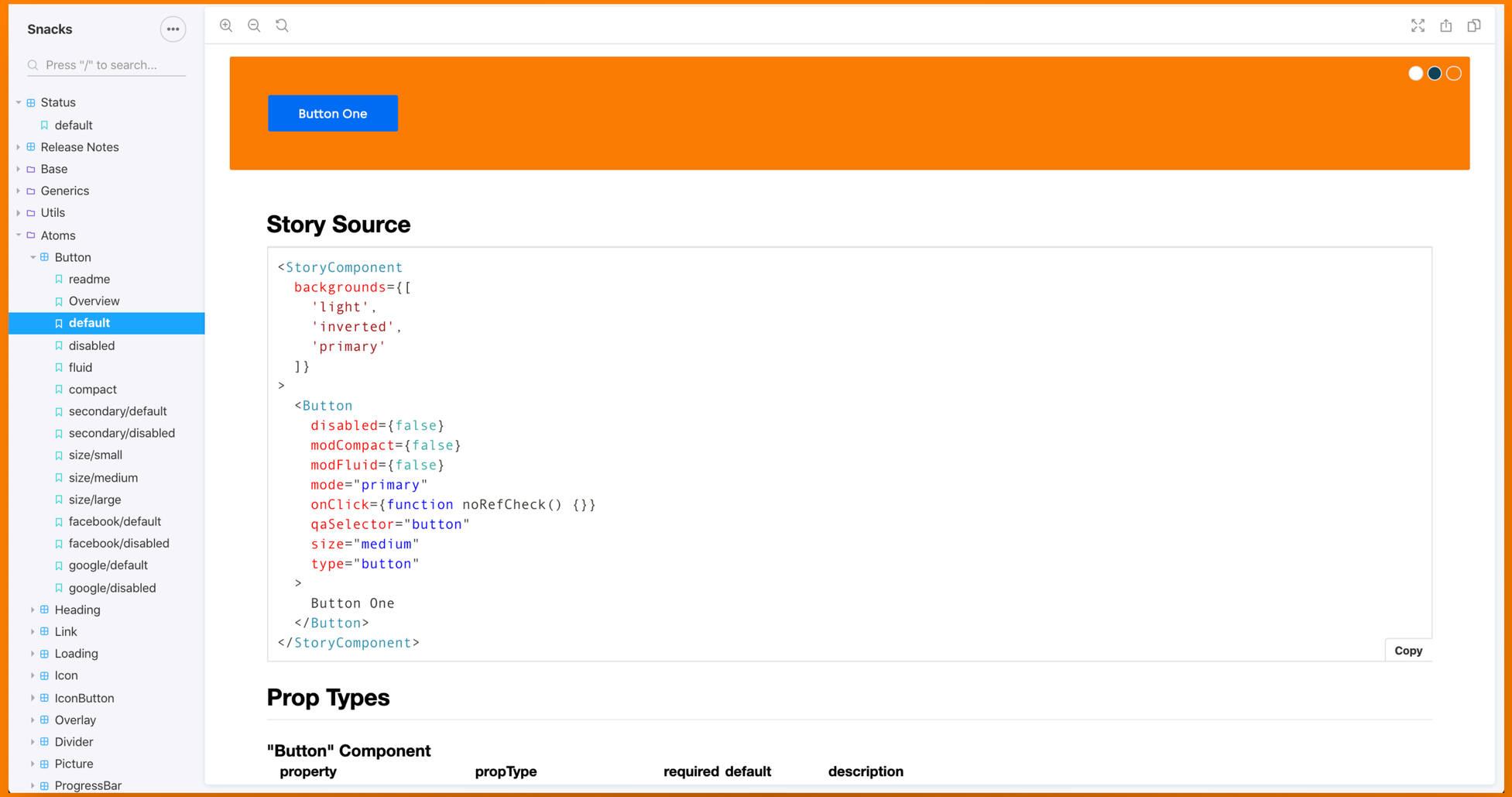
Button :: compact
Button Compact
Show Props Table
Button :: secondary/default
Button Secondary


Snacks
Press "/" to search...
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Release Notes
Base
Generics
Utils
Atoms
Button
readme
Overview
default
disabled
fluid
compact
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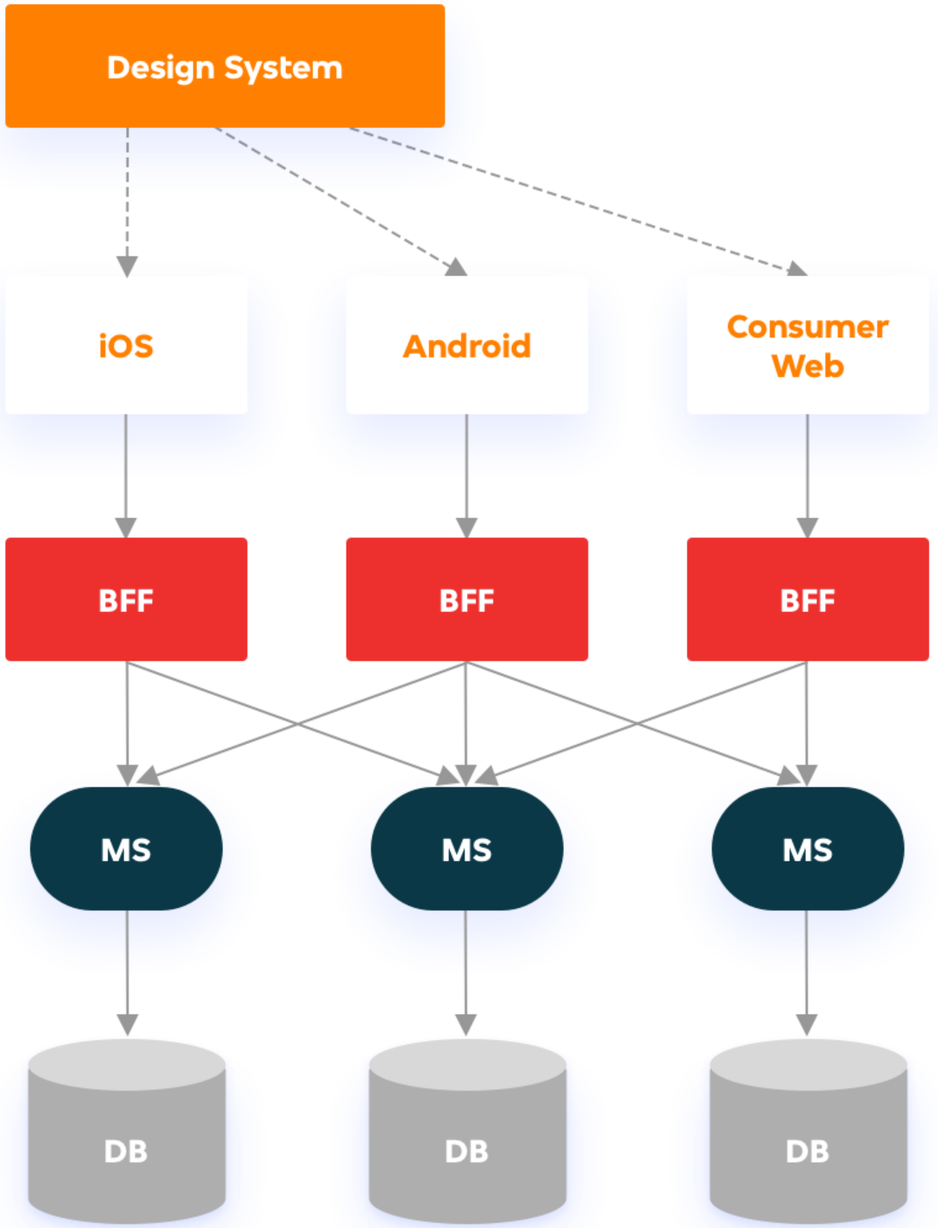
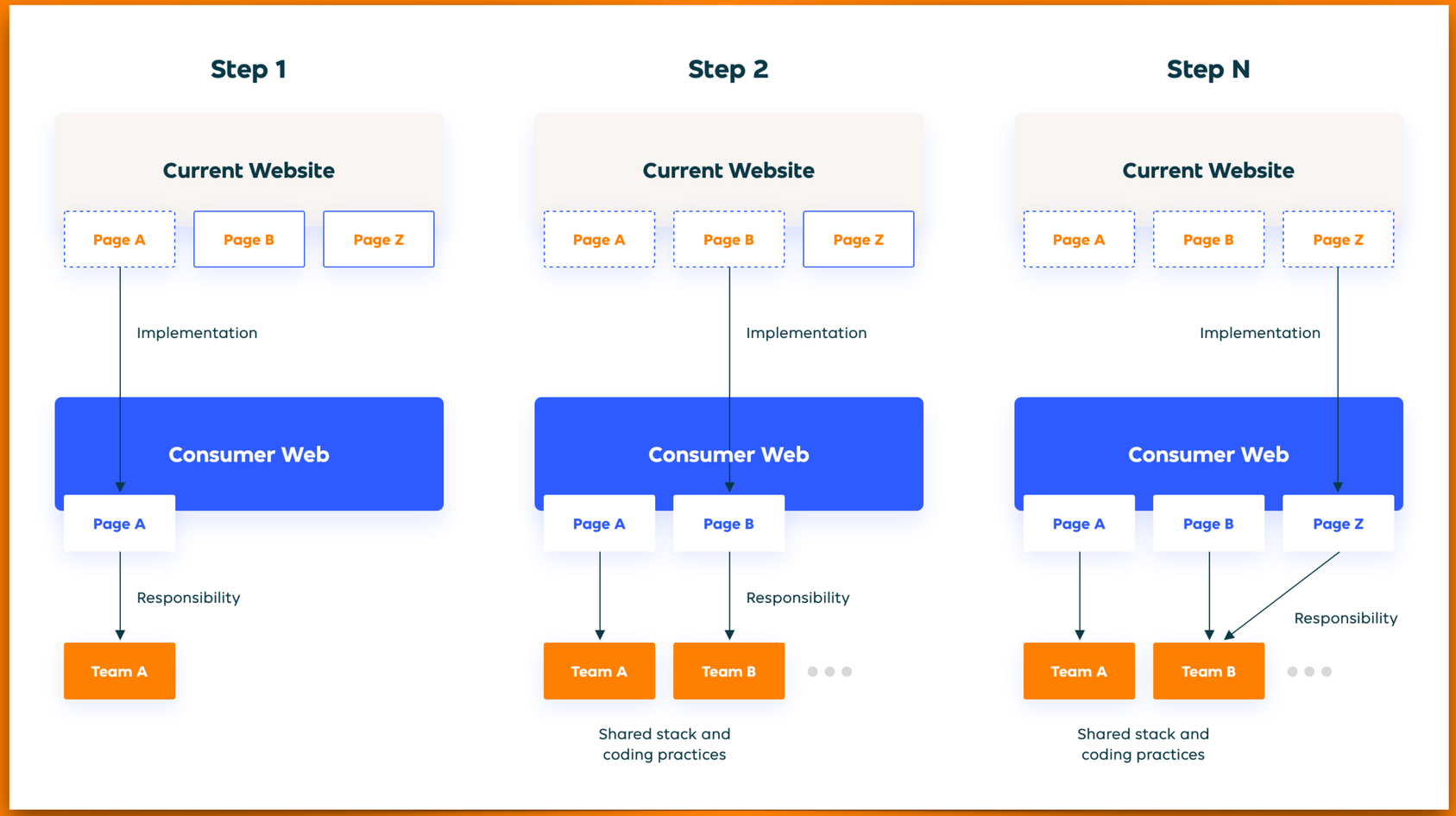
secondary/disabled
size/small
size/medium
size/large
facebook/default
facebook/disabled
google/default
google/disabled
Heading
Link
Loading
Icon
IconButton
Overlay
Divider
Picture
ProgressBar
Button One
Story Source
<StoryComponent
backgrounds={[
'light',
'inverted',
'primary'
]}
>
<Button
disabled={false}
modCompact={false}
modFluid={false}
mode="primary"
onClick={function noRefCheck() {}}
qaSelector="button"
size="medium"
type="button"
>
Button One
</Button>
</StoryComponent>
Copy
Prop Types
"Button" Component
property
propType
required
default
description


Design System
iOS
Android
Consumer Web
BFF
BFF
BFF
MS
MS
MS
DB
DB
DB

Approach


Step 1
Current Website
Page A
Page B
Page Z
Implementation
Consumer Web
Page A
Responsibility
Team A
Step 2
Current Website
Page A
Page B
Page Z
Implementation
Consumer Web
Page A
Page B
Responsibility
Team A
Team B
Shared stack and coding practices
Step N
Current Website
Page A
Page B
Page Z
Implementation
Consumer Web
Page A
Page B
Page Z
Responsibility
Team A
Team B
Shared stack and coding practices

Pros

- Staged rollout
  - low risk to business
- Modern stack easier for hiring
- Business domain separation
  - Scale development by domain
  - Weak dependencies between business domains
- Backend for Frontend (BFF)
- Design System

Cons

- Not all engineers will be part of the first migration step
- Full site migration will take time
- Need to maintain both platforms


SMEG

Thank you

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Q&A

References

- **“Software Architecture: Domain-Driven Design”** by Allen Holub
- **“Domain-Driven Design Distilled”** by Vaughn Vernon
- **“Domain-Driven Design”** by Eric Evans
- Anything by Brad Frost
- Context mapping: https://www.infoq.com/articles/ddd-contextmapping/
- Attribute Based Access Control: https://www.axiomatics.com/blog/attribute-based-access-control-beyond-roles-1/
- Amazing project documentation example: https://vuejs.org/v2/guide/
- Free platform to host documentation: https://readthedocs.org

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Thank you!

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