

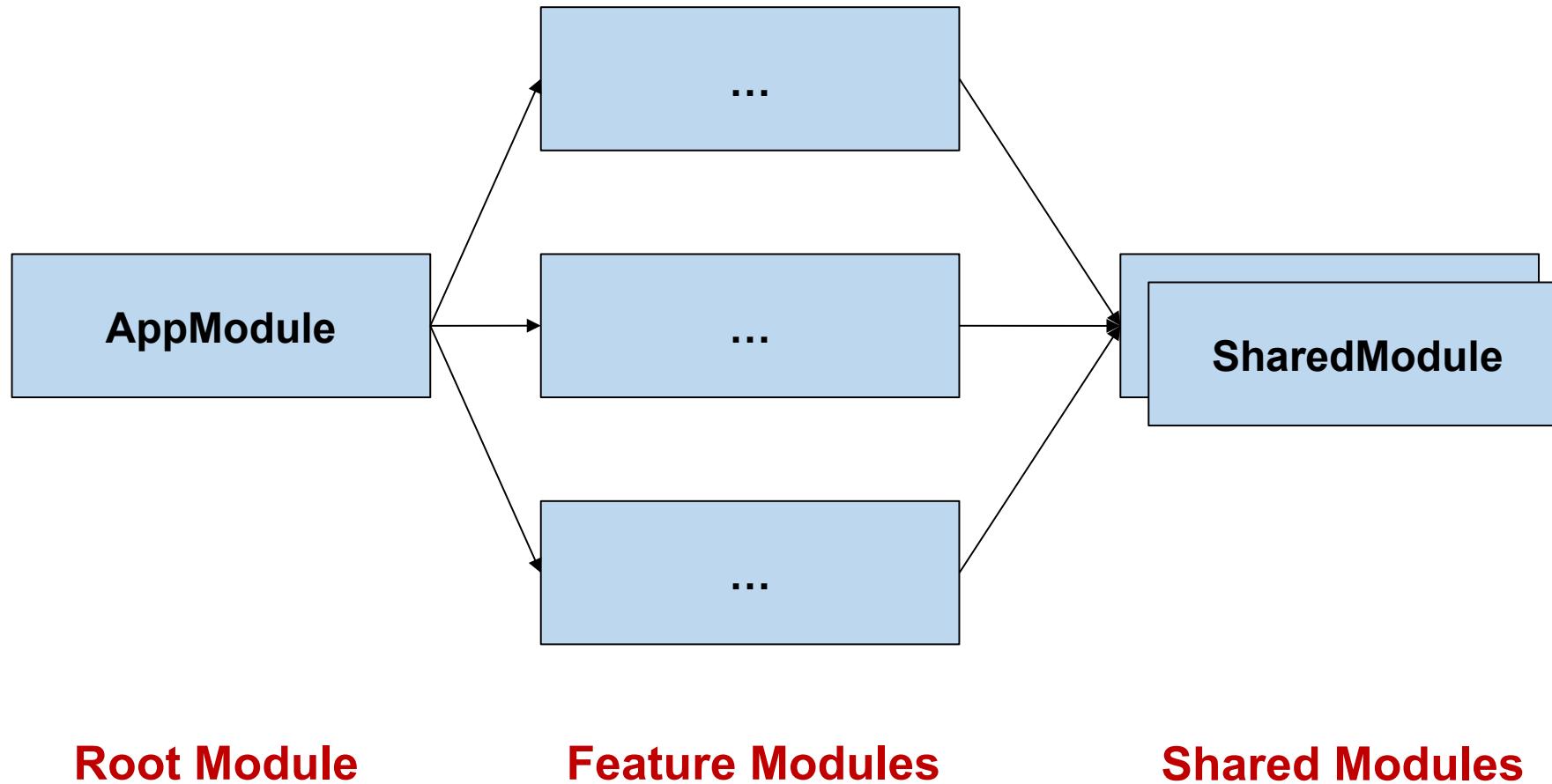


ANGULAR  
**ARCHITECTS**  
INSIDE KNOWLEDGE

# Angular Architektur-Workshop: Strategic Design and Micro Frontends

[ANGULARarchitects.io](https://ANGULARarchitects.io)

# Typical Module Structure



# Contents

- (npm-)Packages
- Nx Monorepos
- Strategic Design and DDD
- Microfrontends



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Monrepos

# Monorepo Structure

```
▶ 📁 node_modules
◀ 📂 projects
  ▶ 📂 flight-admin
  ▶ 📂 flight-api
  ▶ 📂 flight-app
  ▶ 📂 validation
  🔍 .gitignore
  ⚡ angular.json
  📜 package-lock.json
  📜 package.json
```

# Advantages

Everyone uses the latest versions

No version conflicts

No burden with distributing libs



# Two Flavors

## Project Monorepo

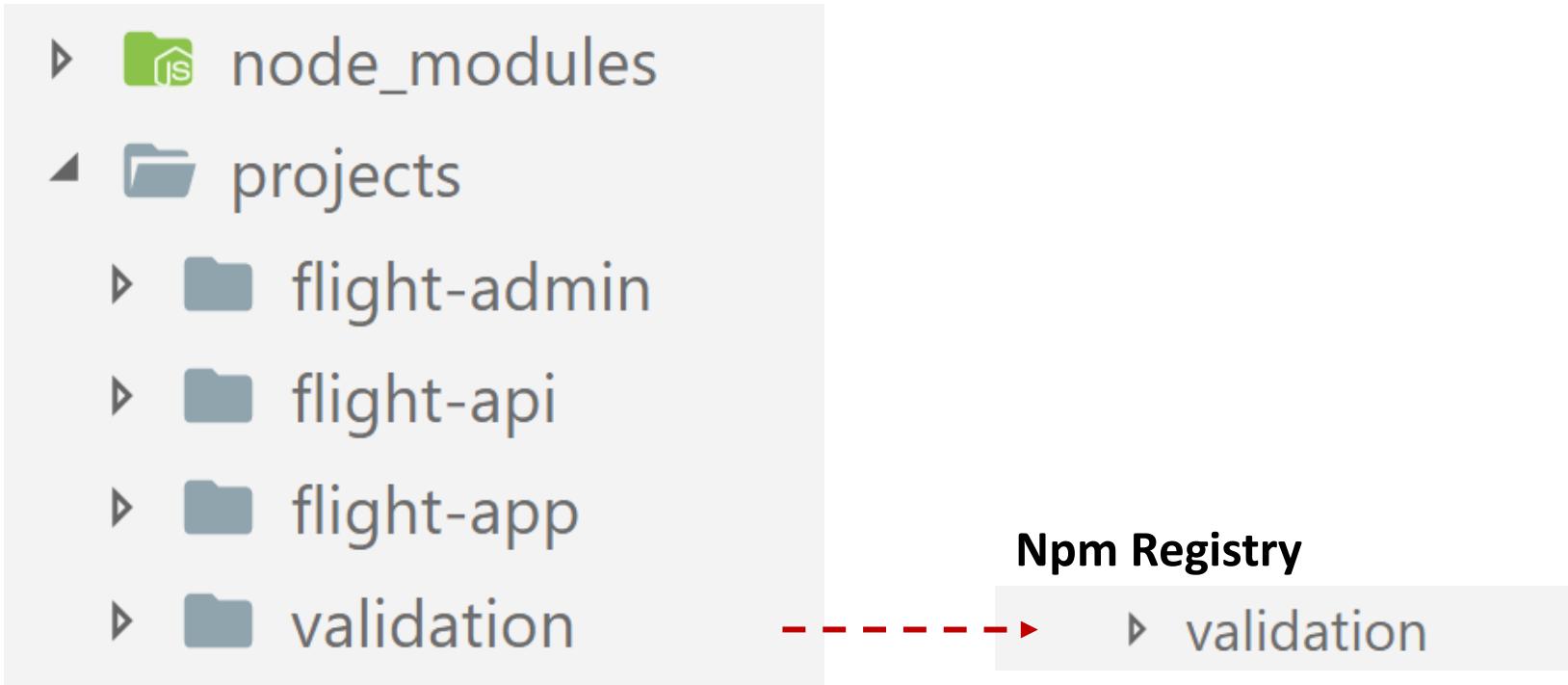
- Like Workspaces/Solutions in different IDEs

## Company-wide Monorepo

- E. g. used at Google or Facebook



# Moving back and forth



# Tooling & Generator

<https://nrwl.io/nx>



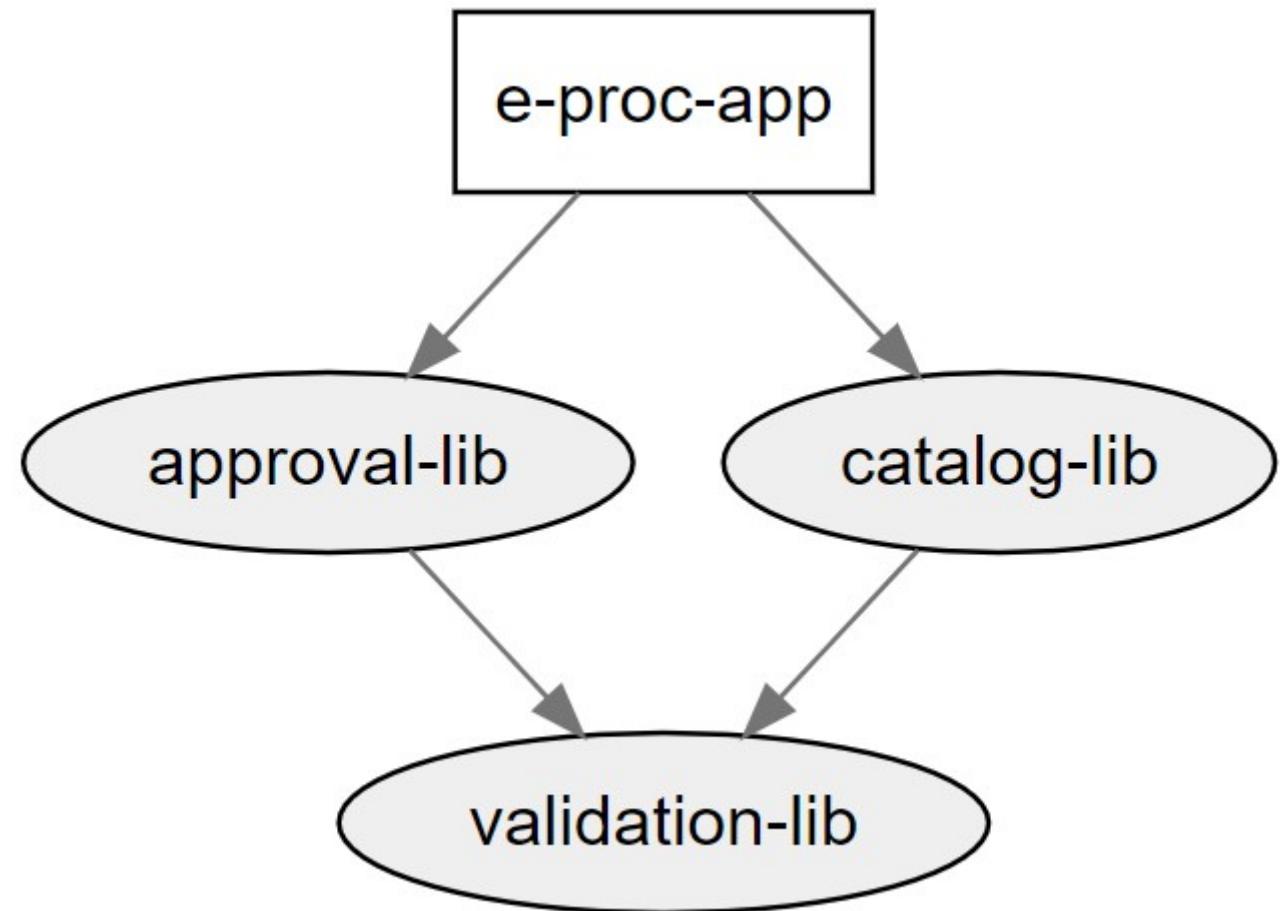
## Nrwl Extensions for Angular

An open source toolkit for enterprise Angular applications.



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Visualize  
Module  
Structure



# Creating a Workspace

```
npm install -g @angular/cli
```

```
ng new workspace
```

```
cd workspace
```

```
ng generate app my-app
```

```
ng generate lib my-lib
```

```
ng serve --project my-app
```

```
ng build --project my-app
```



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# Creating a Workspace

```
npm install -g @angular/cli
```

```
npm init nx-workspace workspace
```

```
cd workspace
```

```
ng generate app my-app
```

```
ng generate lib my-lib --buildable
```

```
ng serve --project my-app
```

```
ng build --project my-app
```



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# DEMO



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DDD

in a nutshell

# Domain-Driven DESIGN

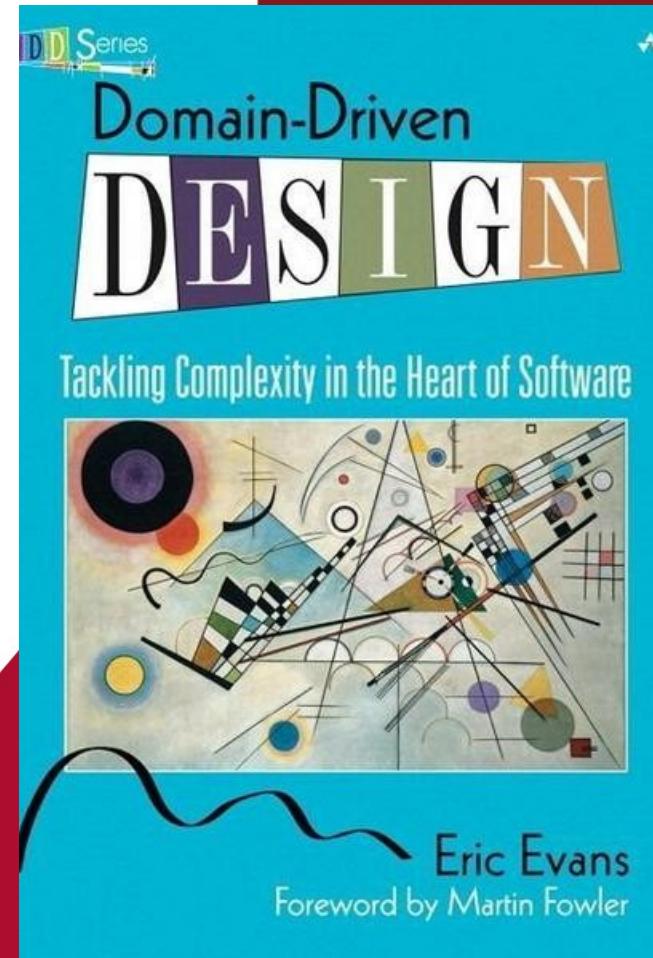
Tackling Complexity in the Heart of Software



Eric Evans  
Foreword by Martin Fowler

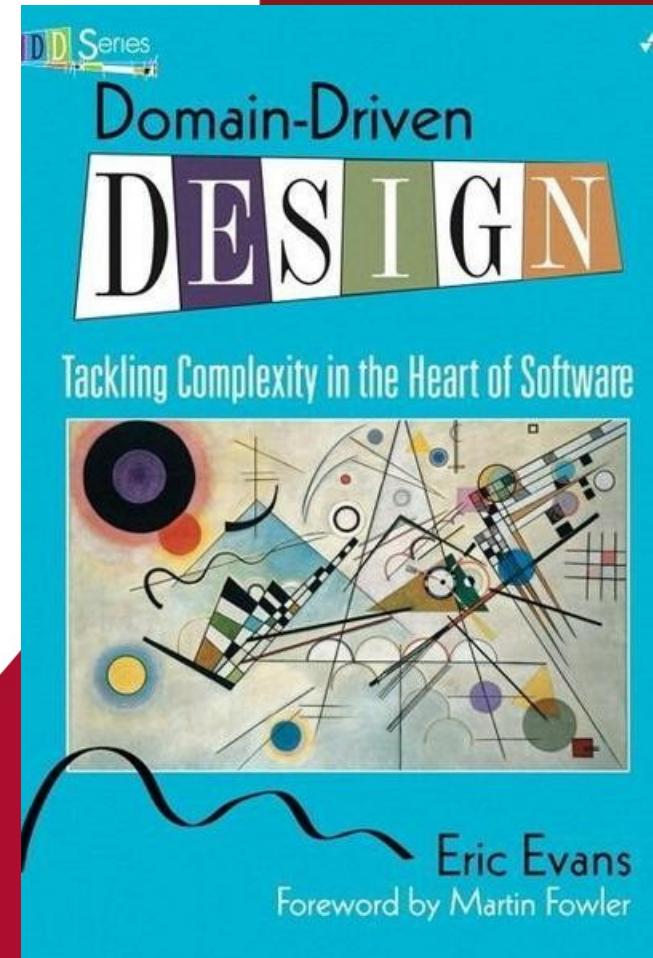
Methodology for  
bridging the gap b/w  
requirements and  
architecture/ design

# How to create sustainable frontend architectures with ideas from DDD?



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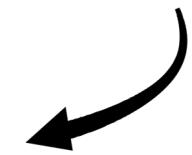
# How to create **sustainable** frontend architectures with **ideas from DDD?**



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**ARCHITECTS**  
INSIDE KNOWLEDGE

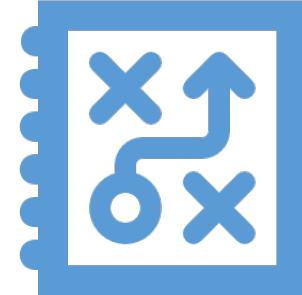
# Domain Driven Design

Decomposing a System



Strategic Design

Design Patterns  
& Practices



Tactical Design



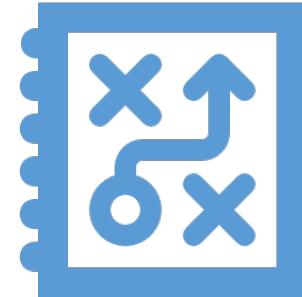
# Domain Driven Design

Decomposing a System



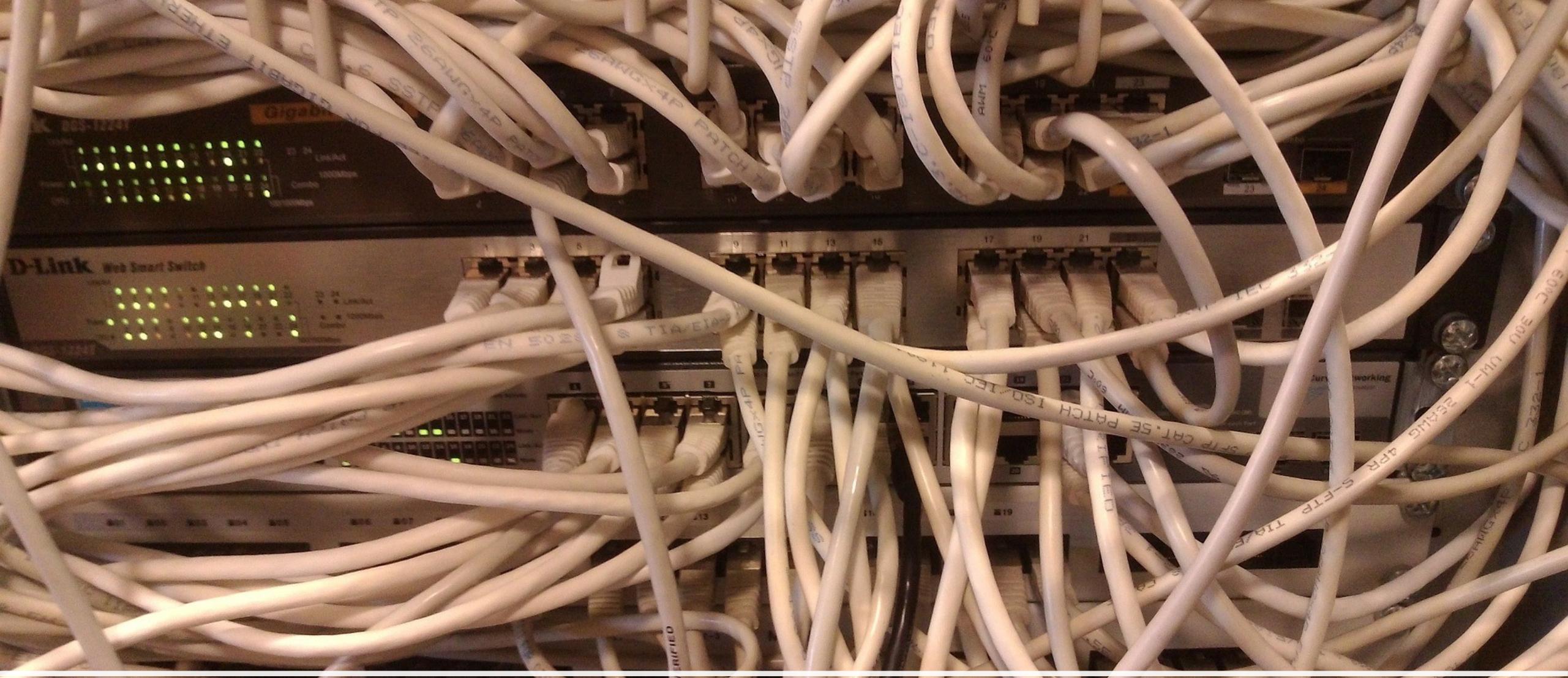
**Strategic Design**

Design Patterns  
& Practices



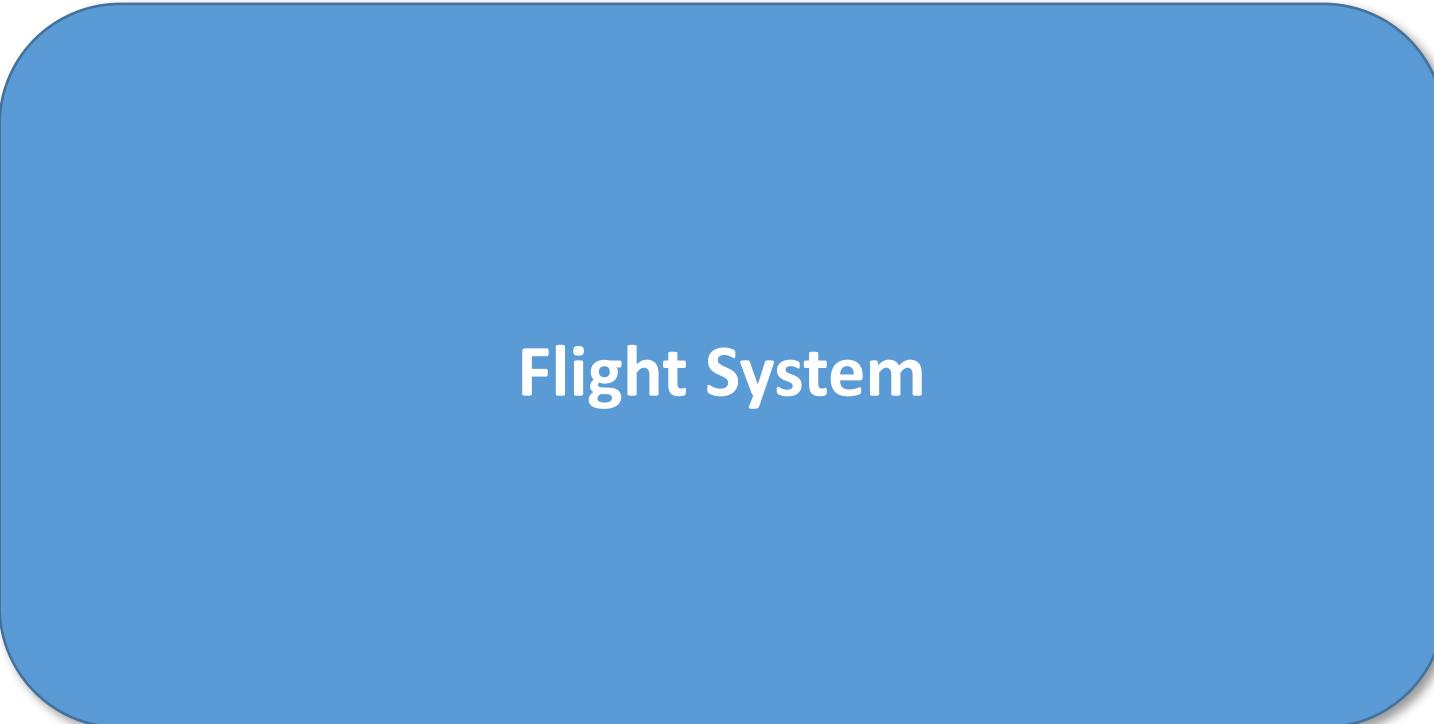
Tactical Design





# This is what Strategic DDD prevents

# Example

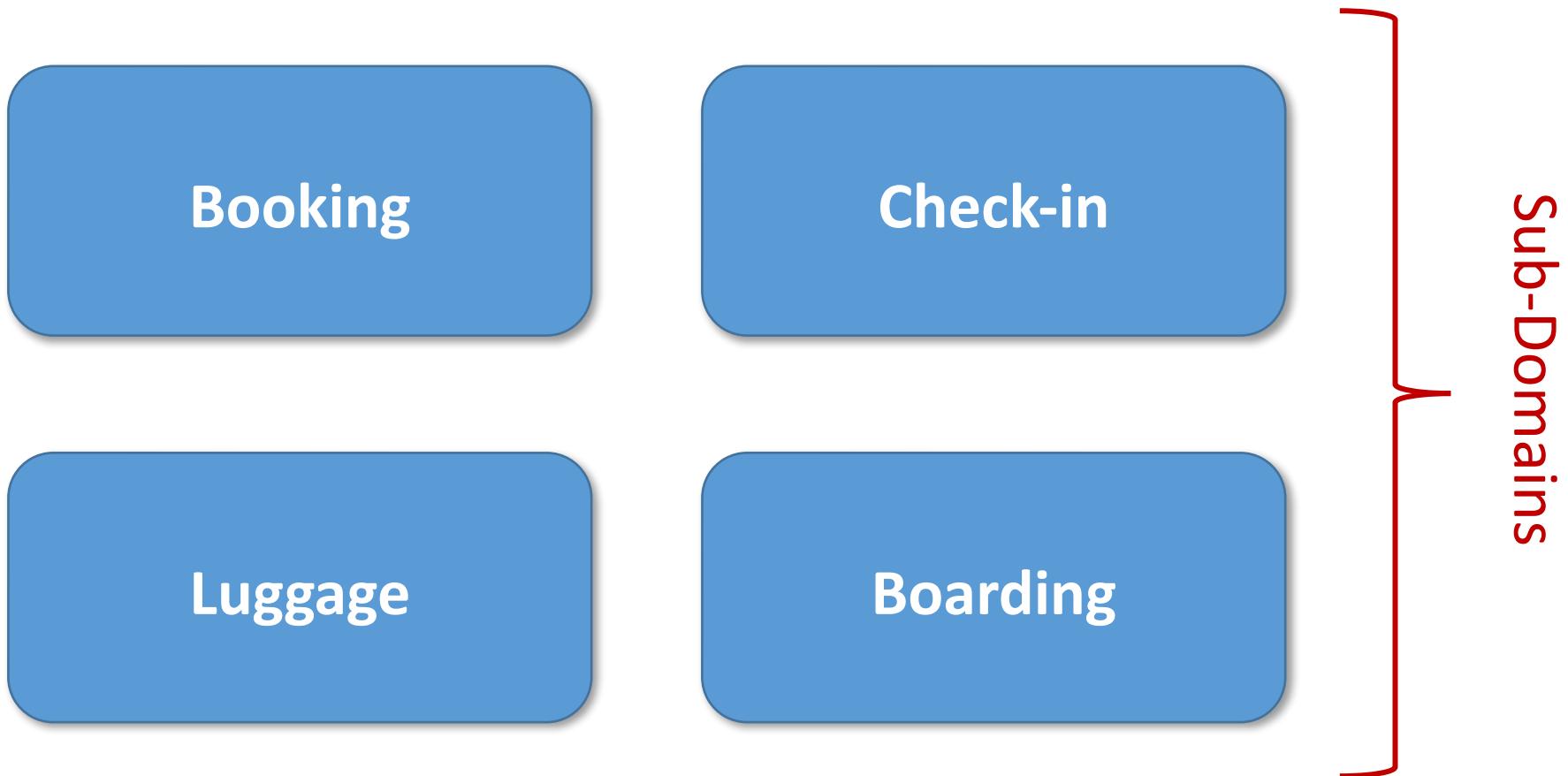


Flight System

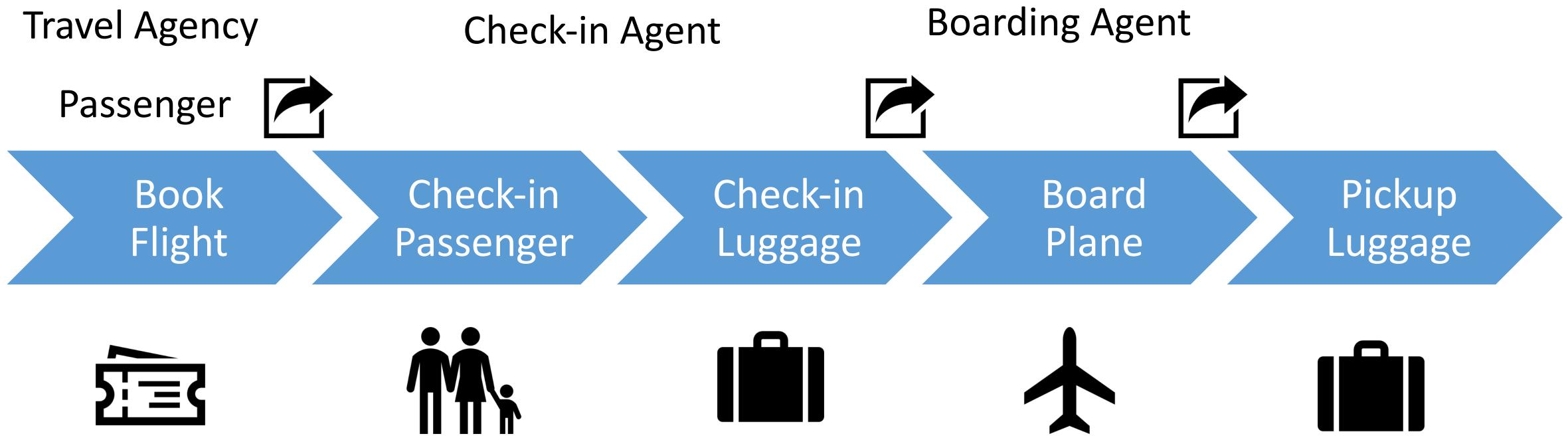


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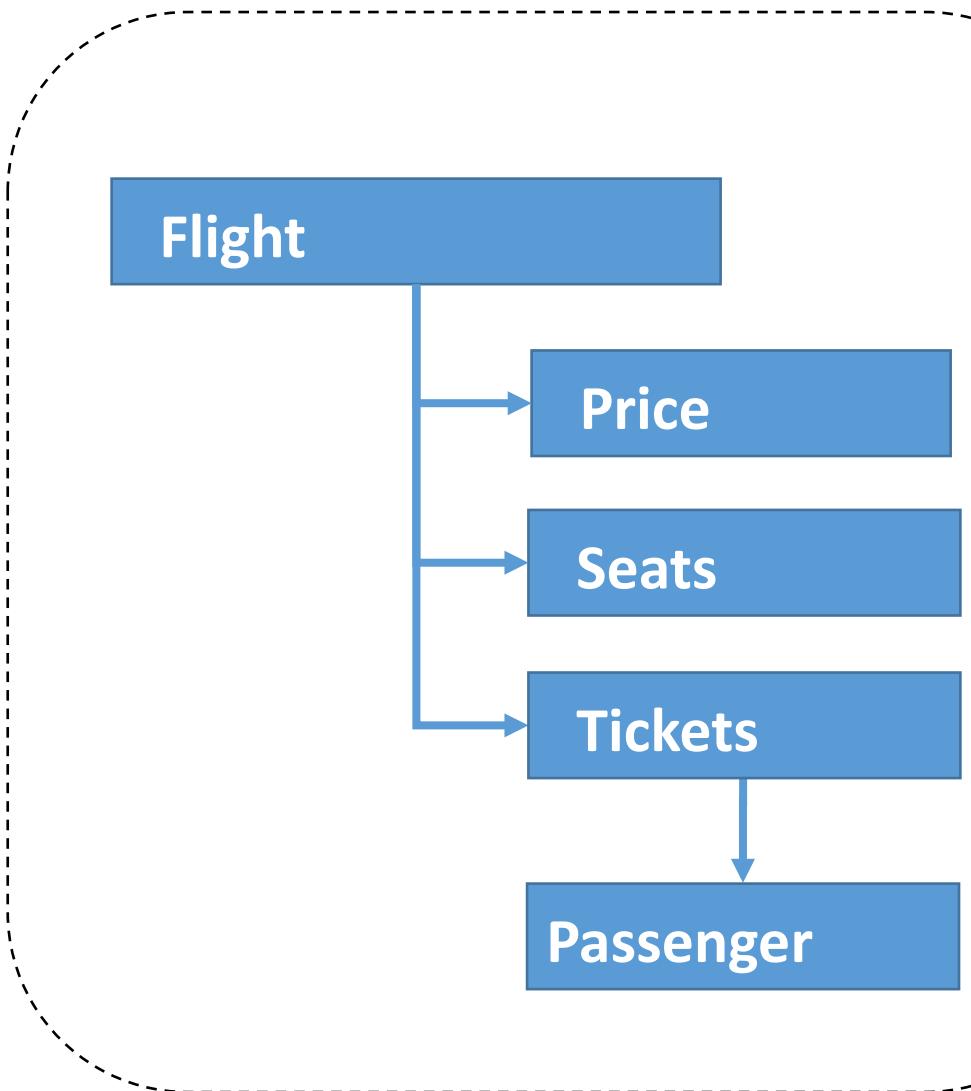
# Example



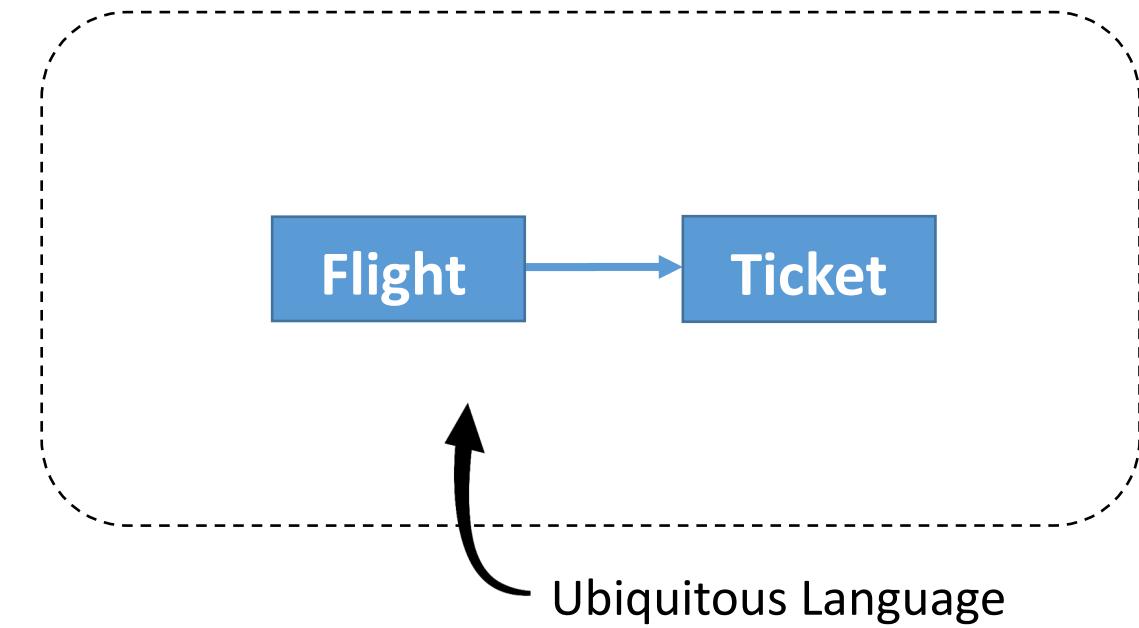
# Finding Sub-Domains



## Booking



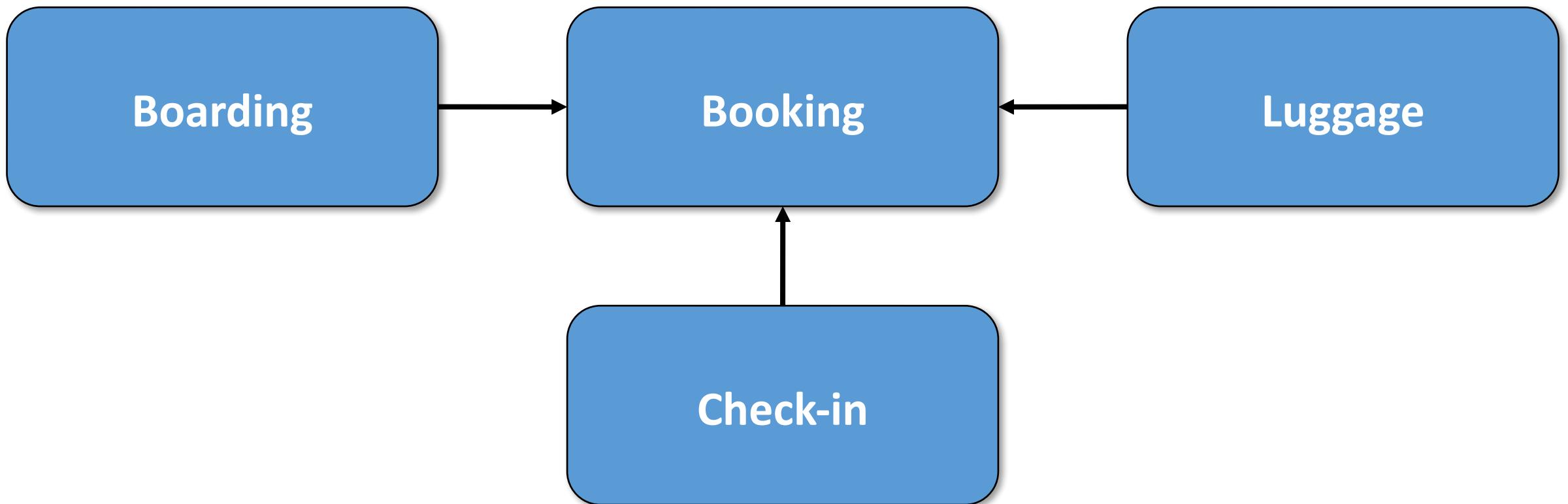
## Boarding



Bounded Context



# Context Map



Shared Kernel (if really needed) & other libs

Smart  
Comp.

**Booking**

**Boarding**

**Shared**

Dumb Comp.

**Feature**

**Feature**

**Feature**

**Feature**

**Feature**

**UI**

**UI**

**UI**

**UI**

**UI**

**UI**

**UI**

**UI**

**UI**

**Domain**

**Domain**

**Domain**

**Domain**

**Domain**

**Domain**

**Util**

**Util**

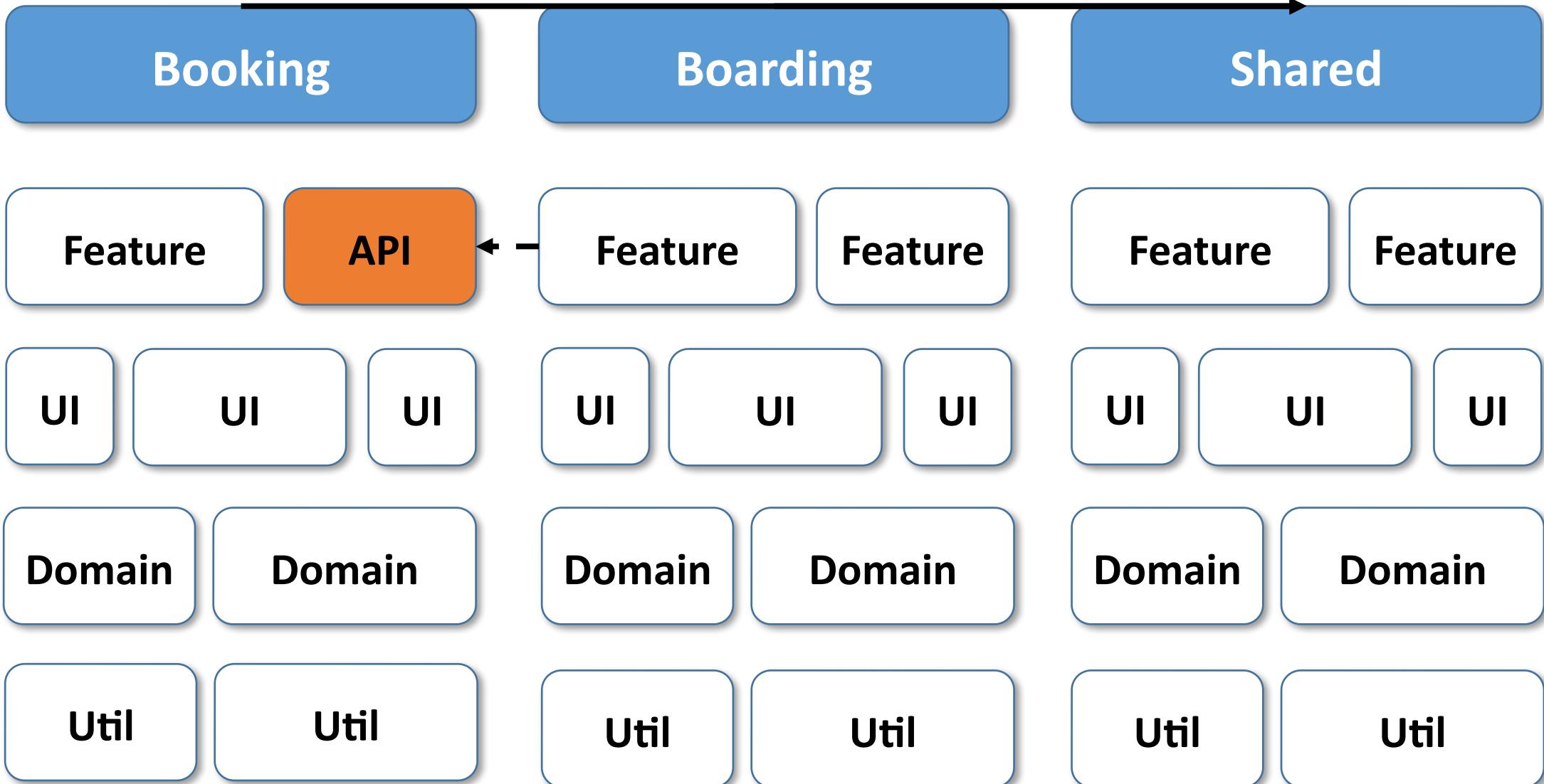
**Util**

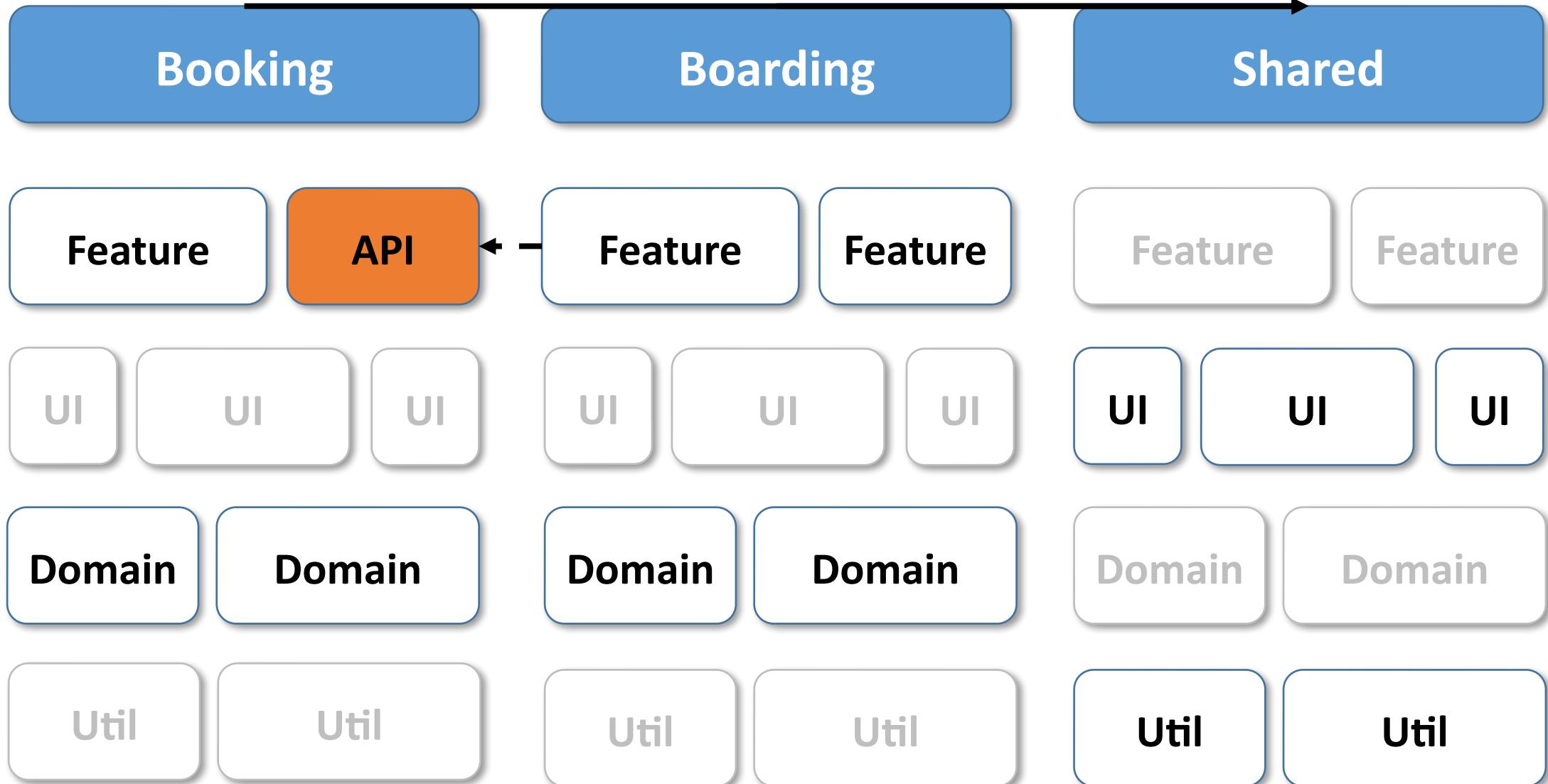
**Util**

**Util**

**Util**







# DEMO



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# Build Cache

Best Performance:  
Several Apps!



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# Nx Plugins



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# Add Plugin to Workspace

```
npm i @nrwl/nx-plugin
```

```
nx generate @nrwl/nx-plugin:plugin my-plugin
```



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# Building Blocks in Plugins

Executors

- Build-related Tasks
- nx build, nx test, ...
- nx run

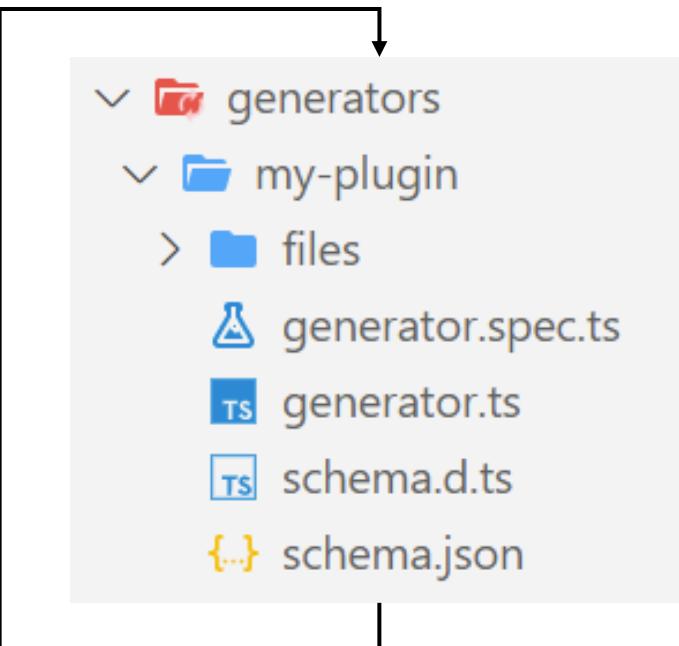
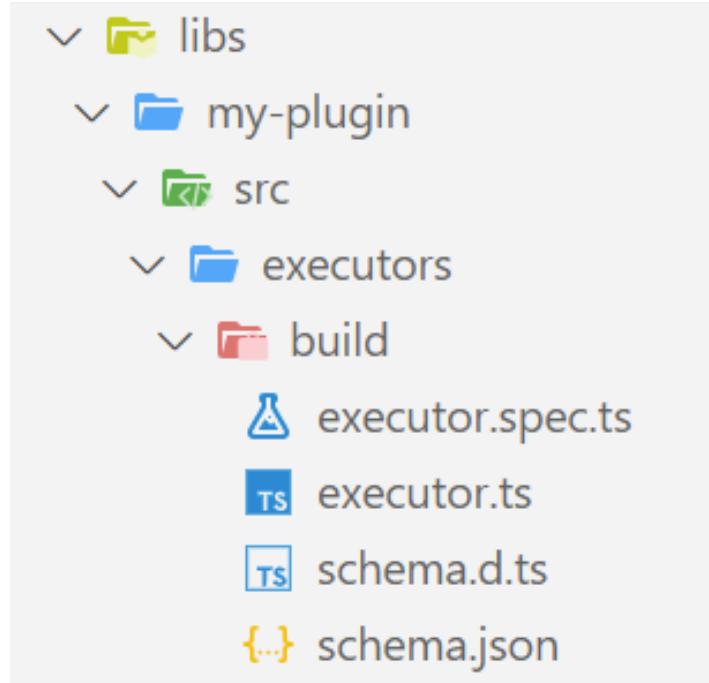
Generators

- Generate Code
- nx generate



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# Folder Structure



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# Execute Generators

```
nx g @workspace-name/plugin-name:generator-name ...params...
```

```
nx g @flight-workspace/my-plugin:data-lib ...params...
```



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# Execute Generators/ Executors

```
nx run app-or-lib-name:target-name
```

```
nx run flight-app:demo-executor
```



target in project.json



# DEMO

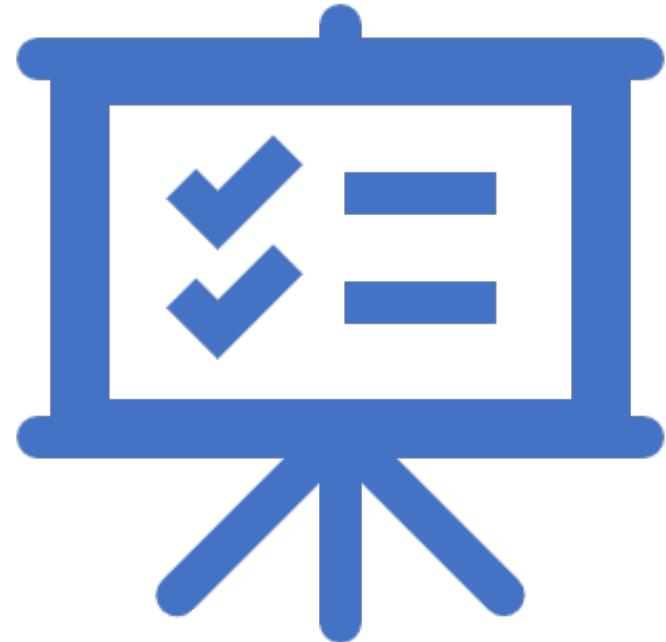


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# LAB



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## Finegrained Libraries

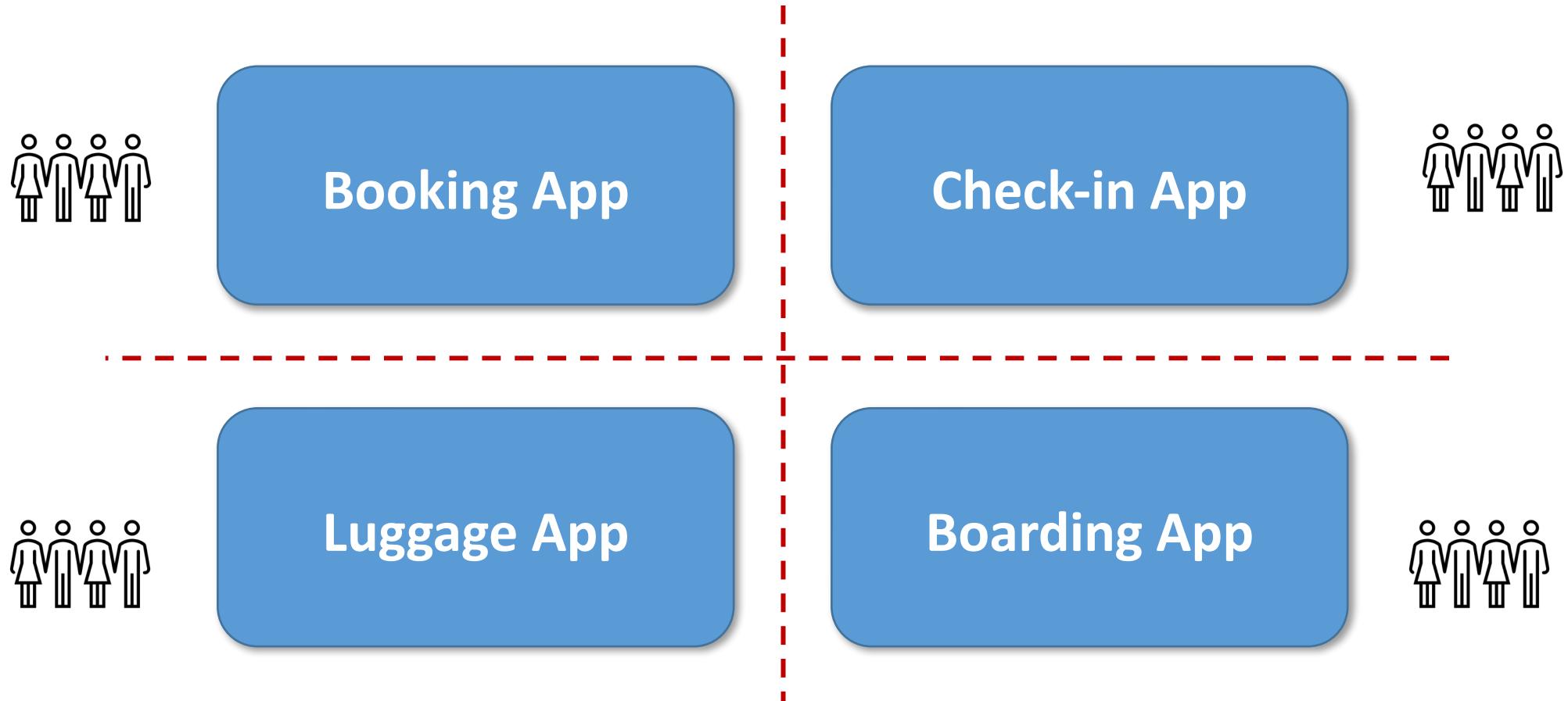
- Unit of recompilation
- Unit of retesting
- Access restrictions
- Information Hiding
- Easy: Just `ng g lib ...`
- Future replacement for NgModules?



# Micro Frontends?

Short outlook

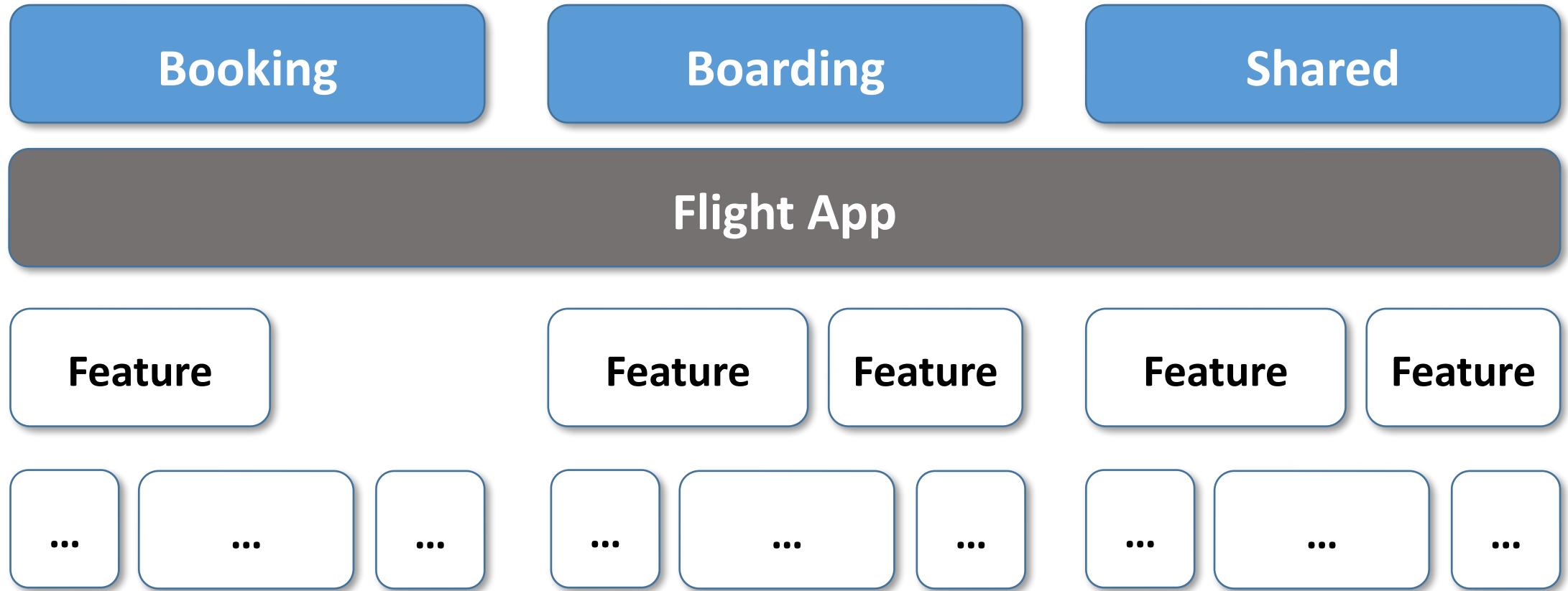
# Microfrontends



Microfrontends  
are first and foremost  
about **scaling teams!**



# Deployment Monolith



# Microfrontends

Booking

Boarding

Shared

Booking App

Boarding App

Feature

Feature

Feature

Feature

Feature

...

...

...

...

...

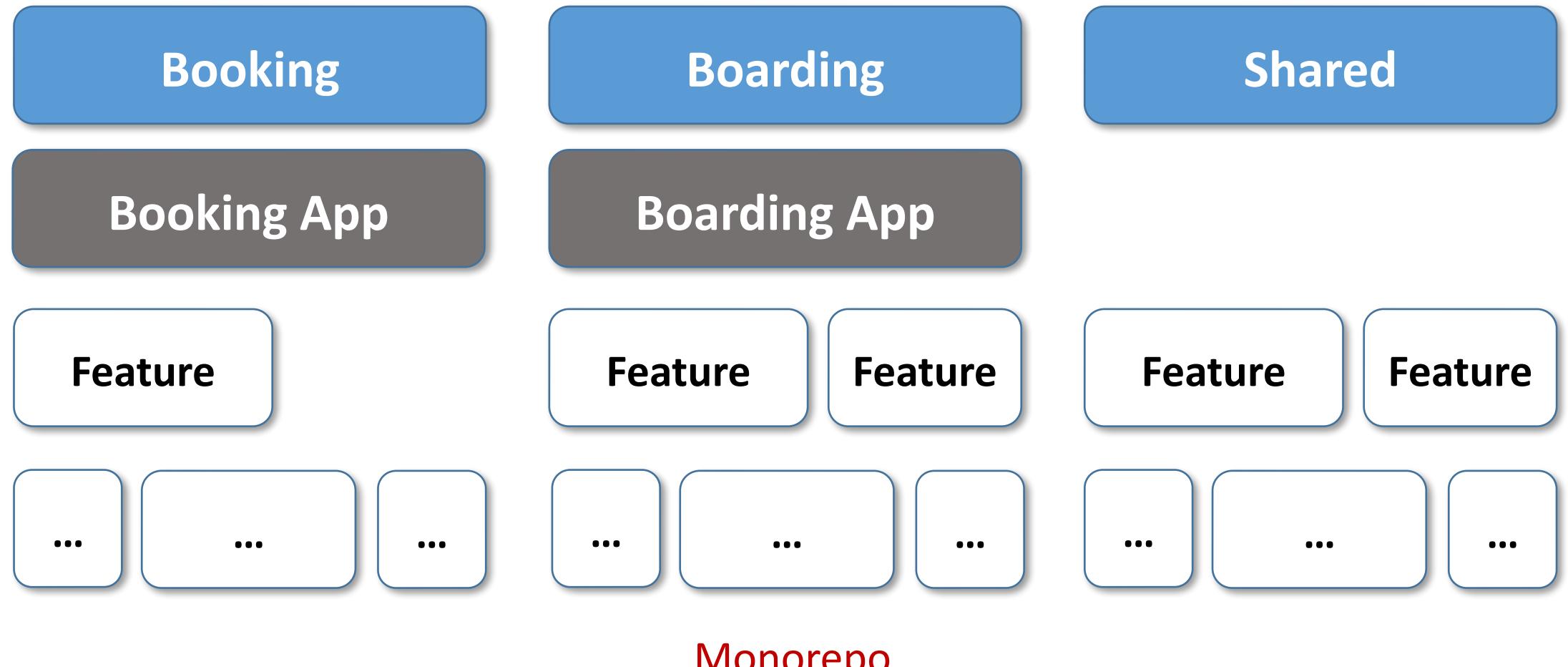
...

...

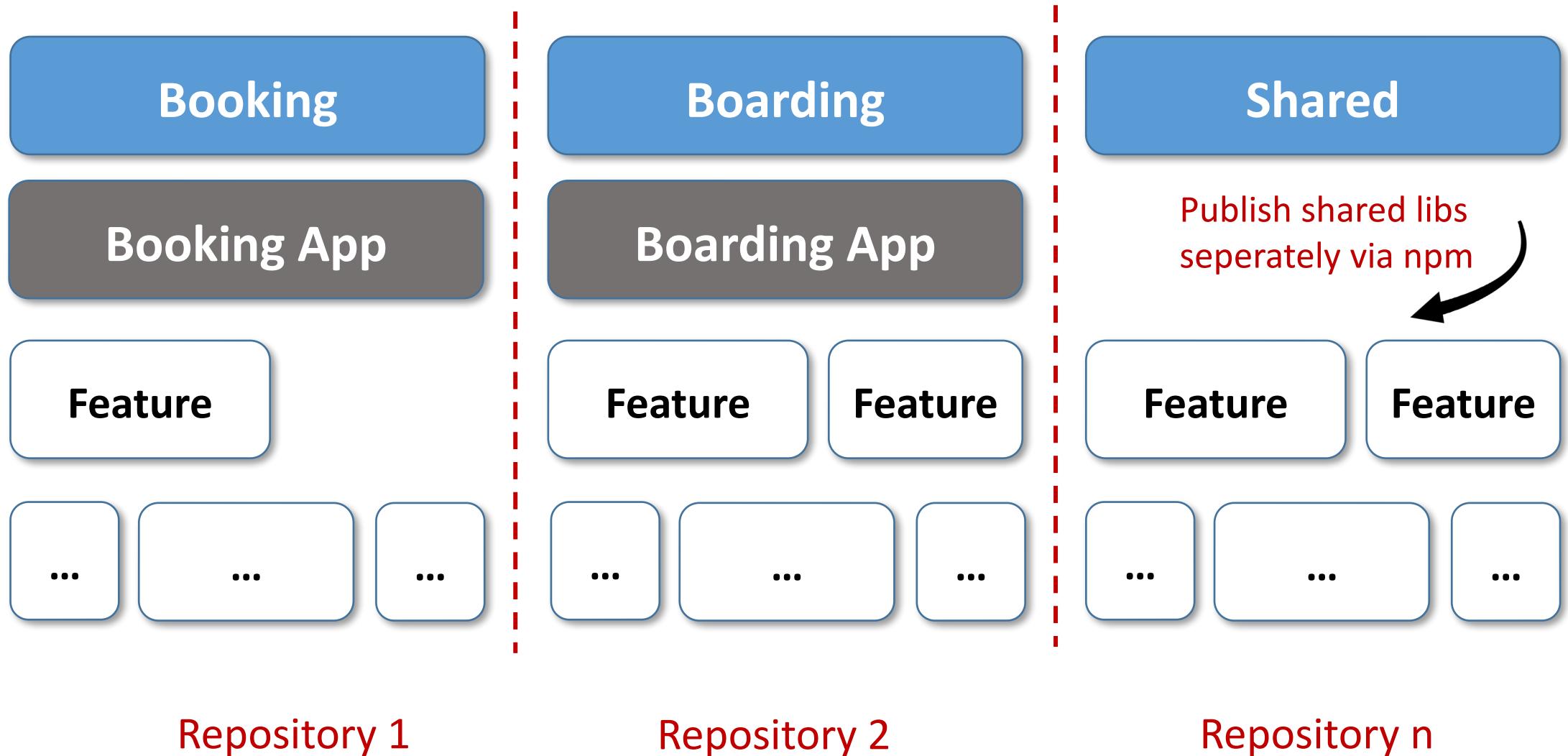
...

...

# Option 1: One App per Domain



# Option 2: One Monorepo per Domain



# Benefits

Autonomous Teams

Separate Development

Separate Deployment

Own architecture decisions

Own technology decisions

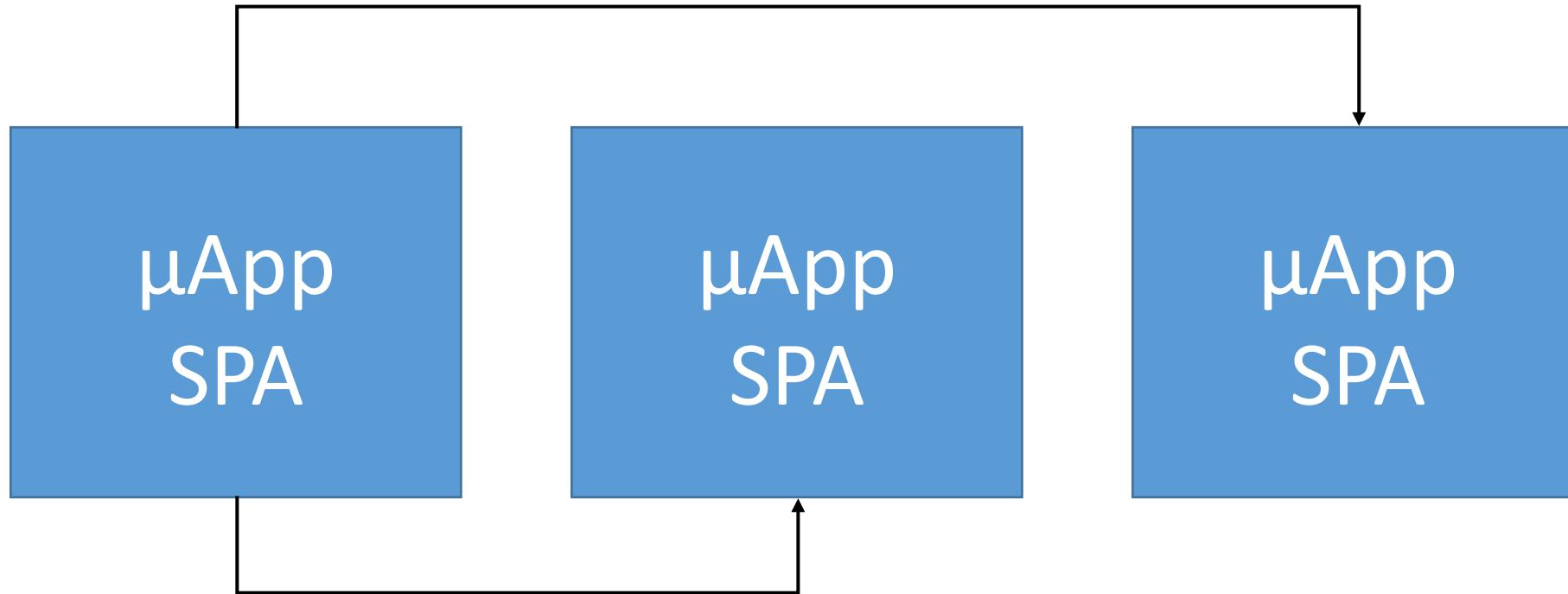




Integration via  
Hyperlinks

---

# UI Composition w/ Hyperlinks



Word Online

Document - Auf OneDrive gespeichert.

Manfred S... Abmelden

DATEI START EINFÜGEN SEITENLAYOUT ÜBERPRÜFEN ANSICHT Was möchten Sie tun? IN WORD BEARBEITEN

Rückgängig Einfügen Zwischenablage

Calibri (Textkörper) 16

F K U abc x<sub>2</sub> x<sup>2</sup>

a<sup>b</sup> A A A A

Schriftart

AaBbCc Standard AaBbCc Kein Leerra... AaBbCc Überschrift 1

Absatz Formatvorlagen Bearbeiten

Hello World!

This screenshot shows the Microsoft Word Online interface. The top navigation bar includes 'Word Online', the document title 'Document - Auf OneDrive gespeichert.', user information 'Manfred S... Abmelden', and a 'Was möchten Sie tun?' (What would you like to do?) button. The ribbon tabs shown are DATEI, START (selected), EINFÜGEN, SEITENLAYOUT, ÜBERPRÜFEN, and ANSICHT. The 'IN WORD BEARBEITEN' (Edit in Word) context menu is open, listing options like 'Formatvorlagen' (Styles) and 'Bearbeiten' (Edit). On the left, the ribbon also displays 'Rückgängig' (Undo) and 'Zwischenablage' (Clipboard). The main content area contains the text 'Hello World!'. The ribbon's font and size dropdowns show 'Calibri (Textkörper)' and '16'. The 'Schriftart' (Font) section includes icons for bold (F), italic (K), underline (U), superscript (x<sup>2</sup>), subscript (x<sub>2</sub>), and various character styles (abc, a<sup>b</sup>, A, A, A, A).



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Word Online

Document - Auf OneDrive gespeichert.

Manfred S... Abmelden

Outlook.com Kontakte Kalender OneDrive Word Online

Excel Online PowerPoint Online OneNote Online Sway Skype

Office Online Flow

IN WORD BEARBEITEN

AaBbCc Überschrift 1

Bearbeiten

This screenshot shows the Microsoft Word Online interface. At the top, there's a navigation bar with 'Word Online' on the left, the document title 'Document - Auf OneDrive gespeichert.' in the center, and 'Manfred S... Abmelden' on the right. Below the title, a ribbon bar has 'IN WORD BEARBEITEN' selected, showing options like 'AaBbCc' and 'Überschrift 1'. To the left of the ribbon, there's a grid of colored tiles representing various Microsoft services: Outlook.com (blue), Kontakte (orange), Kalender (purple), OneDrive (dark blue), Word Online (blue), Excel Online (green), PowerPoint Online (orange), OneNote Online (purple), Sway (teal), Skype (light blue), Office Online (red), and Flow (blue). The 'Word Online' tile is highlighted with a white border.



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A large, light-colored seashell, possibly a cone shell, is positioned in the center-right of the frame. It rests on a bed of fine, light-colored sand. In the background, the ocean is visible with gentle waves breaking towards the shore under a clear, blue sky.

Integration via  
Shell

# Providing a (SPA based) Shell

Shell

μApp

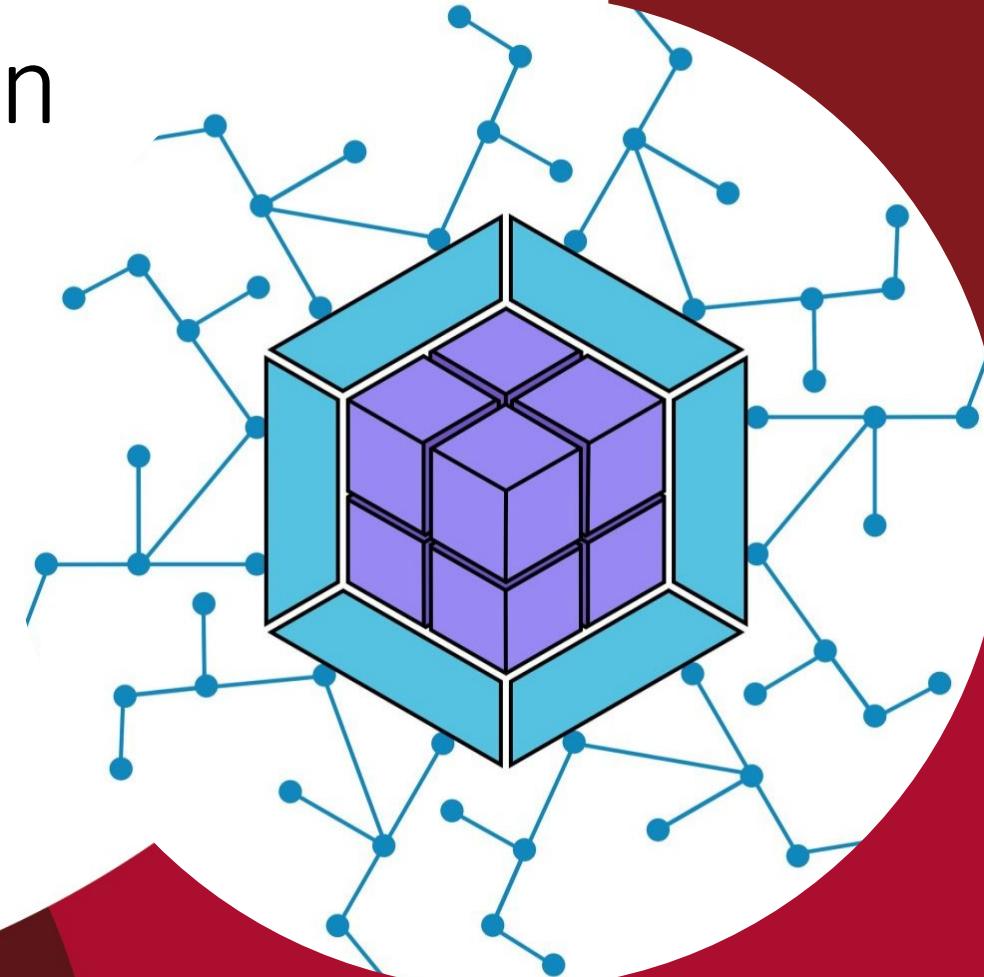
μApp

μApp



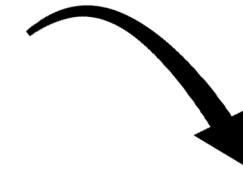
@ManfredSteyer

# Webpack 5 Module Federation



# Idea

Does not work with  
webpack/ Angular CLI



```
const Component = import('http://other-app/xyz')
```

Even lazy parts must be  
known at compile time!



# Webpack 5 Module Federation

## Shell (Host)

```
import('mfe1/Cmp')

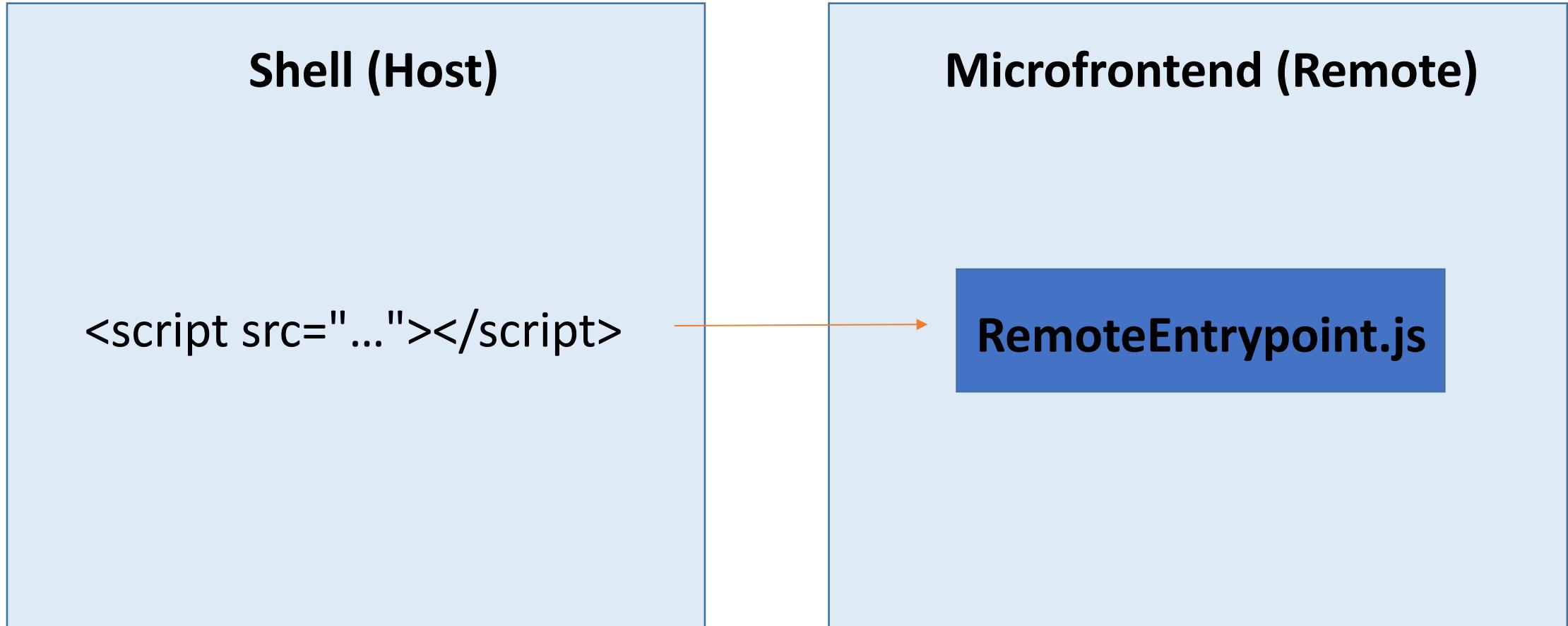
// MapsUrls in
// webpack config
remotes: {
  mfe1: "http://..."
}
```

## Microfrontend (Remote)

```
// Expose files in
// webpack config
exposes: {
  Cmp: './my.cmp.ts'
}
```



# How to Get the Microfrontend's URL?



# How to Share Libs?

## Shell (Host)

```
shared: [  
  "@angular/core", "..."  
]
```

## Microfrontend (Remote)

```
shared: [  
  "@angular/core", "..."  
]
```



# Dealing with Version Mismatches



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# Default Behavior

Selecting the highest compatible version

10~~0~~  
10.1

10.1  




# Default Behavior

Conflict: No highest compatible version

11.0 

10.1 



# Example

- Shell: my-lib: ^10.0
- MFE1: my-lib: ^10.1
- MFE2: my-lib: ^9.0
- MFE3: my-lib: ^9.1

## Result:

- Shell and MFE1 share ^10.1
- MFE2 and MFE3 share ^9.1



# Configuring Singletons

```
shared: {  
  "my-lib": {  
    singleton: true  
  }  
}
```

11.0  10.1 



# Configuring Singletons

```
shared: {  
  "my-lib": {  
    singleton: true,  
    strictVersion: true // Error instead of warning!  
  }  
}
```

11.0 

10.1 



# Relaxing Version Requirements

```
shared: {  
  "my-lib": {  
    requiredVersion: ">=1.0.1 <11.1.1"  
  }  
}
```

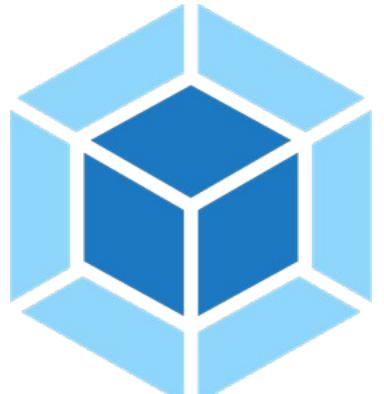


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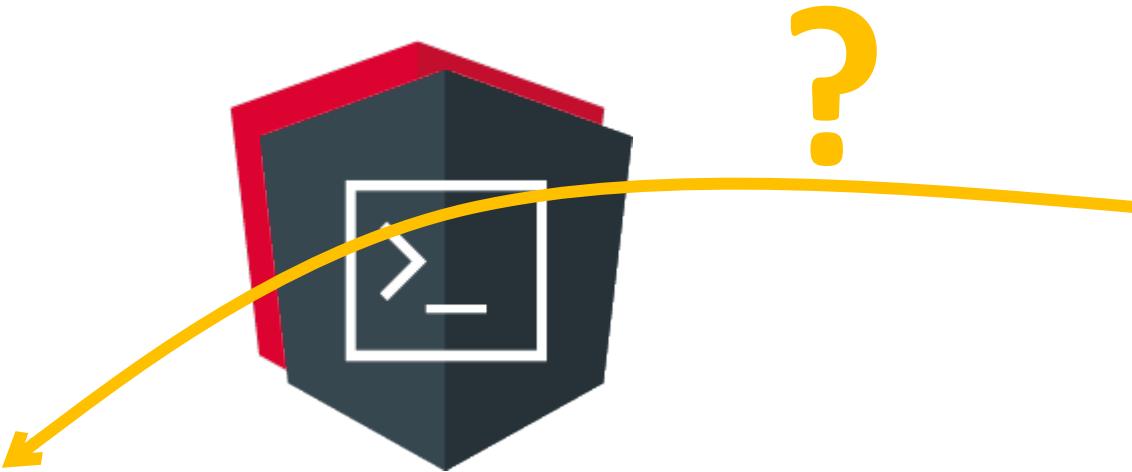
# Federated Angular: Angular, CLI, & Module Federation



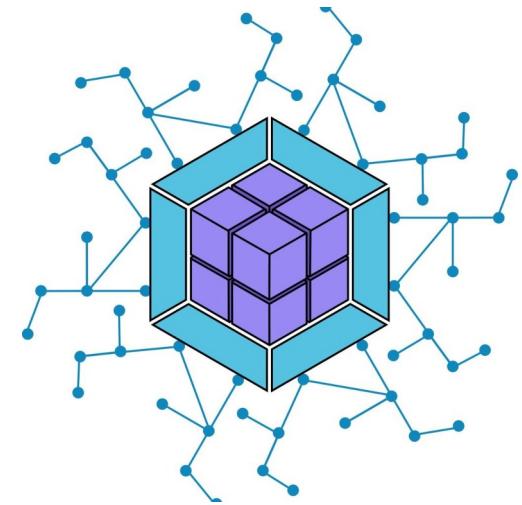
ANGULAR  
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webpack



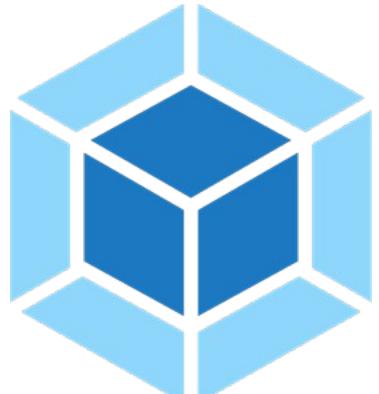
Angular CLI



Module Federation  
Configuration



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webpack

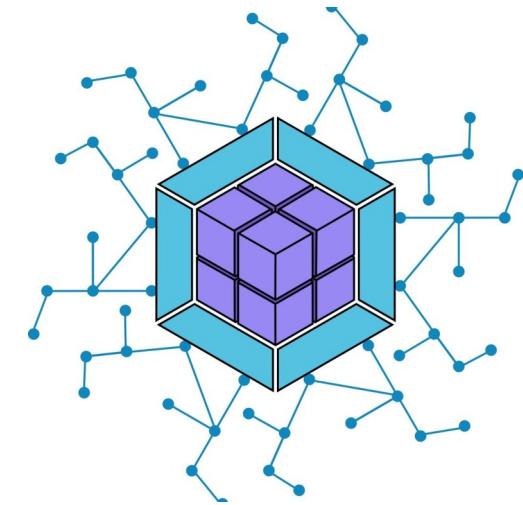


Angular CLI



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Custom Builder



Module Federation  
Configuration

# @angular-architects/module-federation

1.0.2 • Public • Published 18 hours ago

 Readme

 Explore BETA

 3 Dependencies

## Features 🔥

- Generates the skeleton for a Module Federation config.
- Installs a custom builder to enable Module Federation.
- Assigning a new port to serve (`ng serve`) several projects at once.



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# Usage

- 1) ng add @angular-architects/module-federation
- 2) Adjust generated configuration
- 3) ng serve



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# Usage

- 1) npm i @angular-architects/module-federation -D
- 2) ng g @angular-architects/module-federation:init
- 3) Adjust generated configuration
- 4) ng serve



# DEMO

# Multi Framework/ Version Solutions



# Abstracting Differences b/w SPA Frameworks

Wrap them into Web Components



# Loading Web Components via Module Federation



# Module Federation

```
await import('other-app/web-cmp');
```



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# Module Federation

```
const rootElm = document.createElement('web-cmp')
document.body.appendChild(rootElm);

await import('other-app/web-cmp');
```



# Routing to Another SPA?

## WrapperComponent

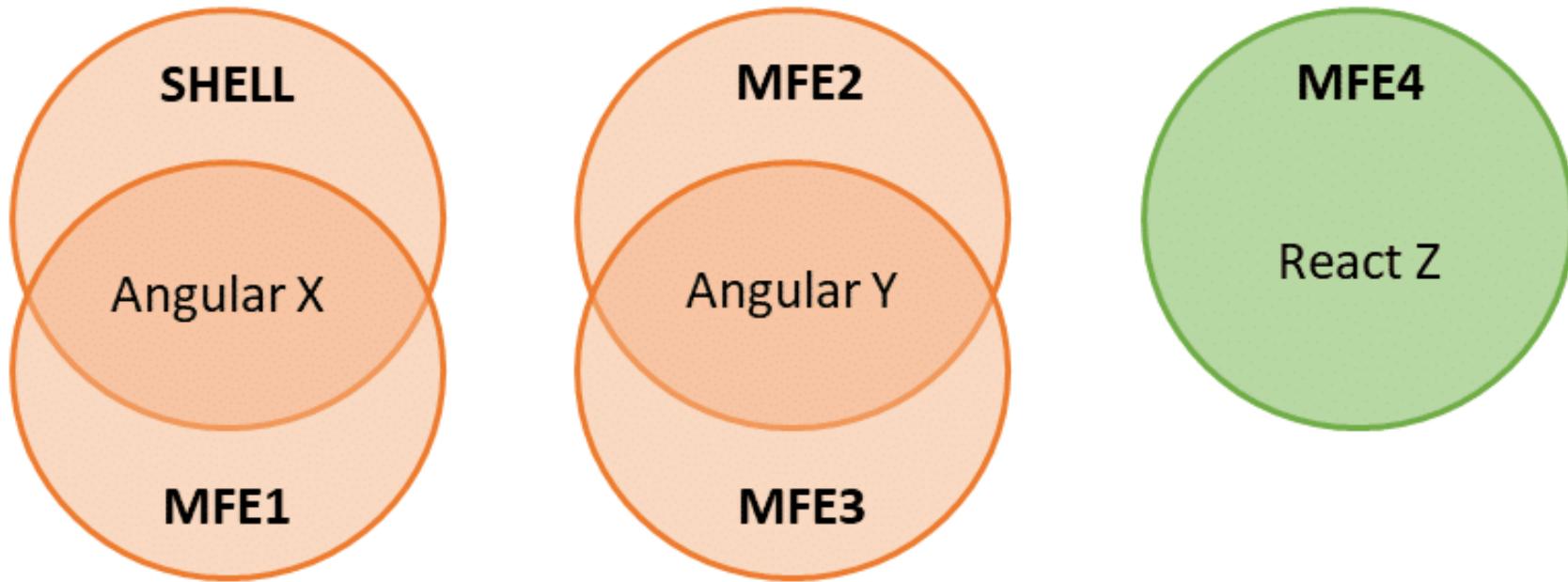
```
const rootElm = document.createElement('web-cmp')
document.body.appendChild(rootElm);

await import('other-app/web-cmp');
```



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# Result



# DEMO

<https://red-ocean-0fe4c4610.azurestaticapps.net>

# Challanges

- Bundle Size
- Multiple Routers
- Bootstrapping Several Angular Instances
  - Share Platform-Object when same version is reused
  - Share ngZone



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# Challanges & Solutions

@angular-architects/module-federation-tools 

12.5.3 • Public • Published 21 days ago

 Readme

 Explore BETA

 1 Dependency



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The background of the image is a dark, atmospheric room. The walls are covered in a repeating pattern of dark, ornate floral or damask motifs. In the center of the room, there is a row of several closed doors, all of which appear to be made of a light-colored wood or similar material. The doors are evenly spaced and extend from the foreground towards the background, creating a sense of depth. The floor is made of dark, polished wooden planks that reflect the dim light.

# Choosing a Solution

# Some General Advice

