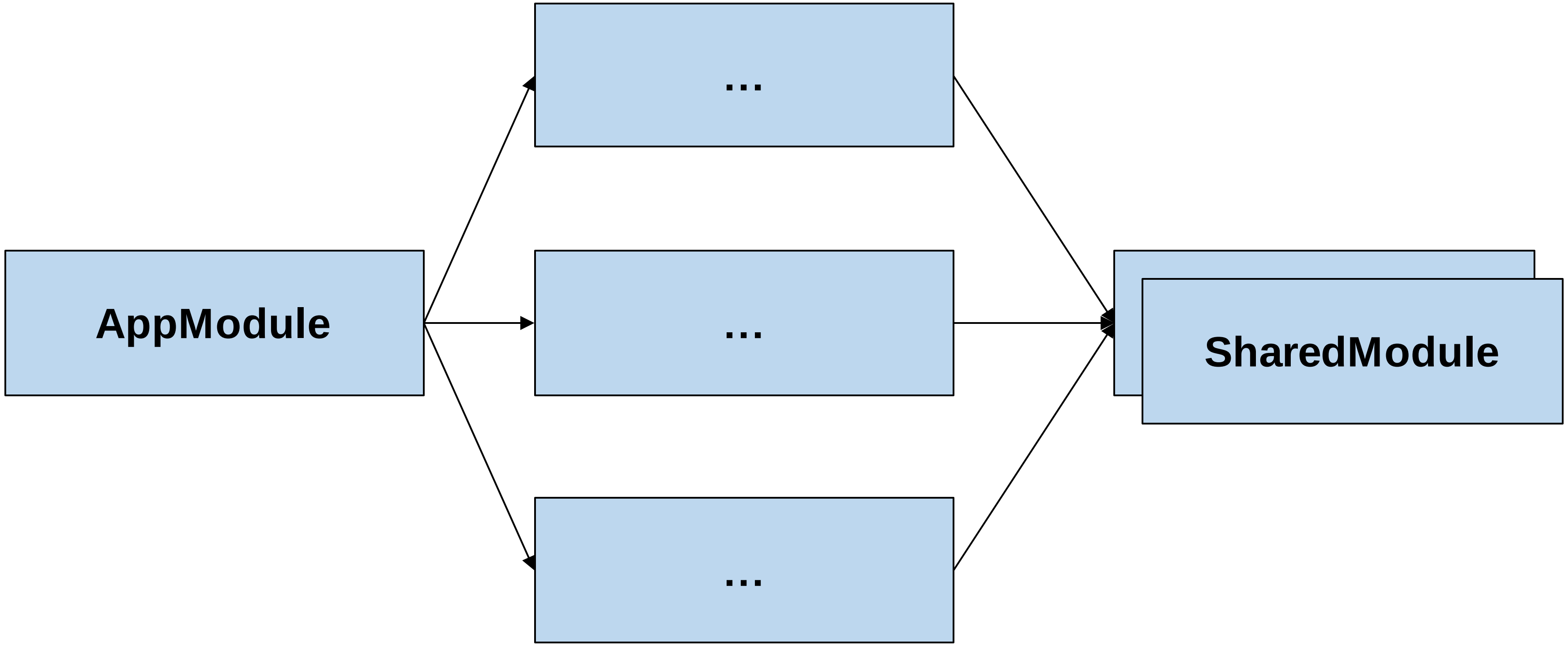
ANGULAR
ARCHITECTS
INSIDE KNOWLEDGE

Angular Architektur-Workshop: Strategic Design and Micro Frontends

ANGULARarchitects.io

Typical Module Structure



Root Module **Feature Modules** **Shared Modules**

Contents

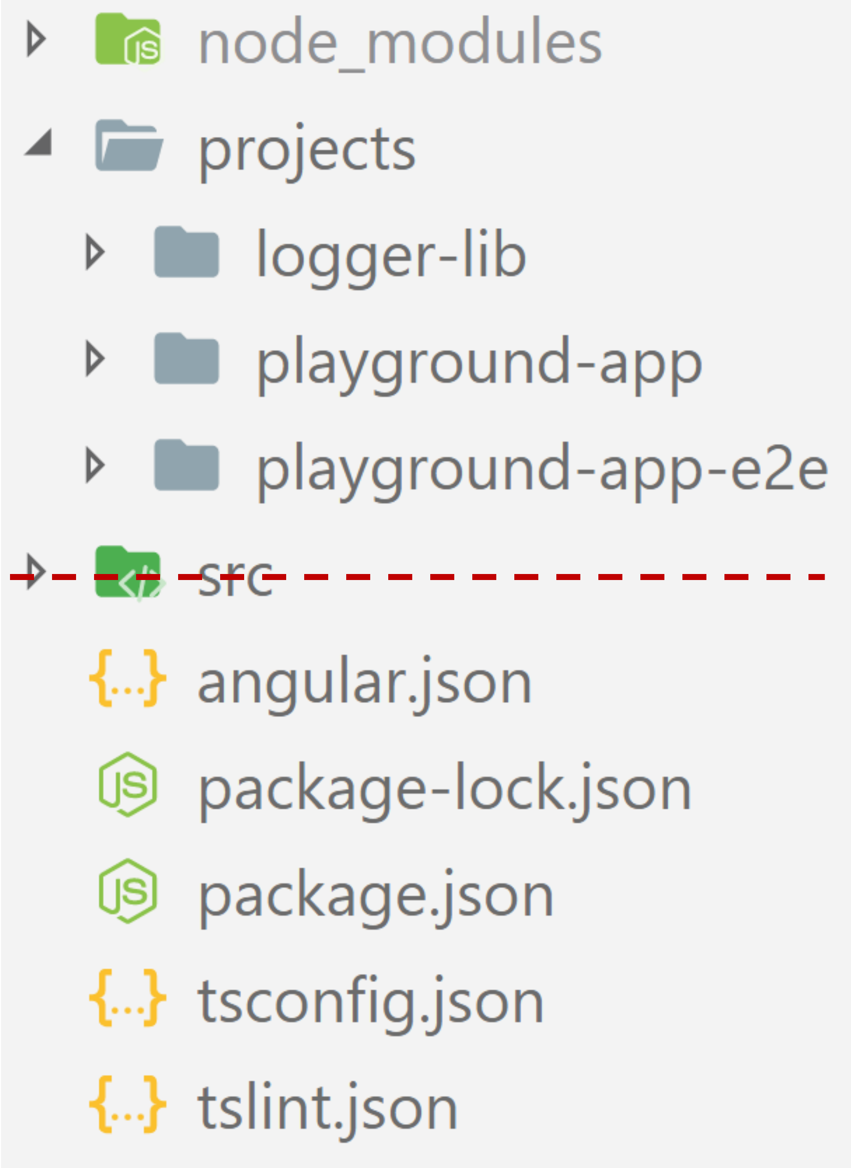
- (npm-)Packages
- Nx Monorepos
- Strategic Design and DDD
- Microfrontends

npm Packages

Create Library with CLI >= 6

```
npm install -g @angular/cli

ng new lib-project

cd lib-project

ng generate library logger-lib
ng generate application playground-app

ng serve --project playground-app
ng build --project logger-lib
```

Folder Structure



- node_modules
- projects
  - logger-lib
  - playground-app
  - playground-app-e2e
- ~~src~~
- angular.json
- package-lock.json
- package.json
- tsconfig.json
- tslint.json

Create Library with CLI >= 6

```
npm install -g @angular/cli

ng new lib-project --create-application false

cd lib-project

ng generate library logger-lib
ng generate application playground-app

ng serve --project playground-app
ng build --project logger-lib
```

Leerungszeiten
Deutsche Post
Tagesleerungen
Spätleerung
Nachtleerung
Montag - Freitag
08:00
Samstag
08:00
Sonntag
Service-Telefon der Briefkastenleerung:
0228 4333112
Briefkästen mit späteren Leerungen:
letzte Tagesleerung
Spätleerung
Nachtleerung
Montag - Freitag
Samstag
Sonntag

Publishing

Publishing to npm Registry

- Increment version in package.json
- ng build logger-lib --prod
- npm publish *dist/logger-lib* --registry http://localhost:4873
- npm install logger-lib --registry http://localhost:4873

Alternatives for setting the Registry

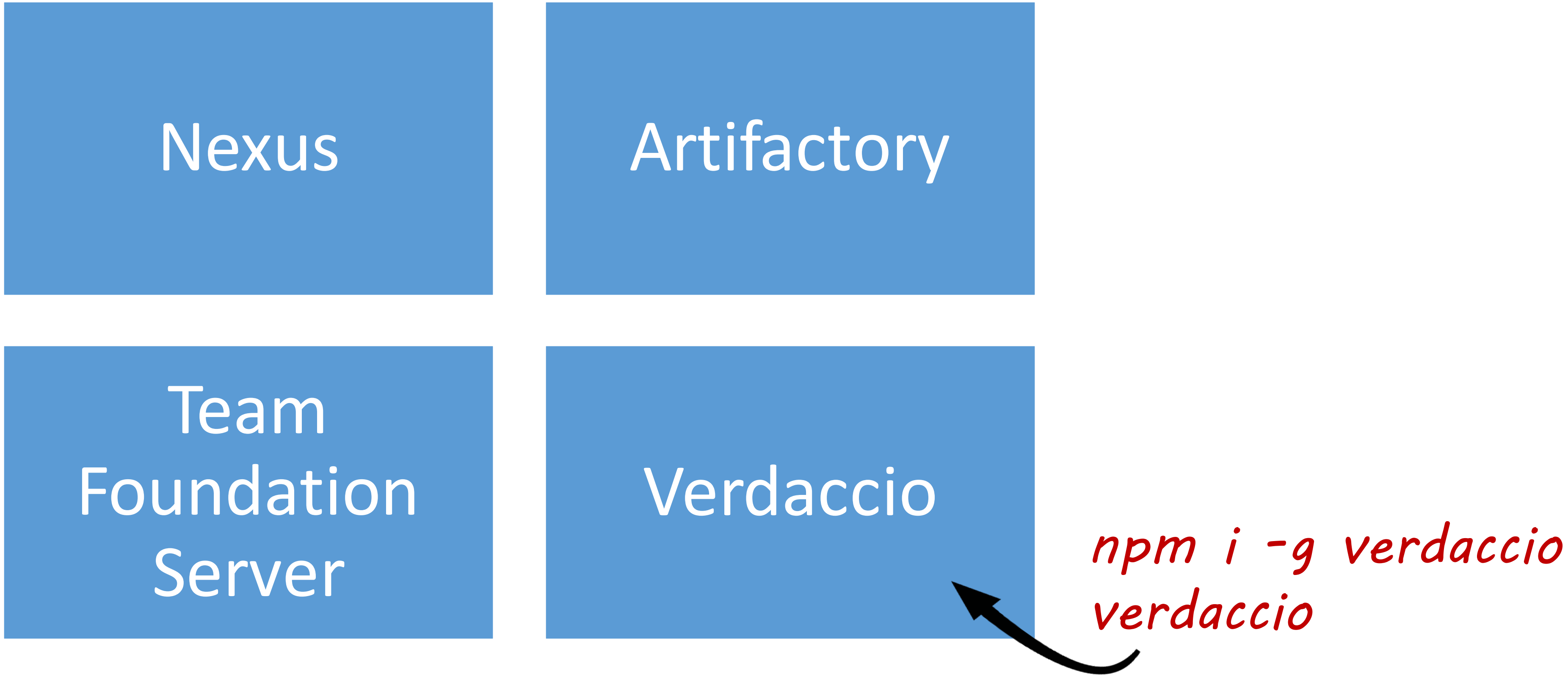
- Global: npm set registry http://localhost:4873
  - Default: registry.npmjs.org
  - npm get registry

- Project: .npmrc in project root

```
registry=http://localhost:4873/
```

```
@my-company:registry=http://my-server:4873/
```

npm Registries



Nexus

Artifactory

Team Foundation Server

Verdaccio

npm i -g verdaccio
verdaccio

DEMO

Advantages

- Distribution
- Versioning

Disadvantages

- Distribution
- Versioning

;-)

Disadvantages

Distribution

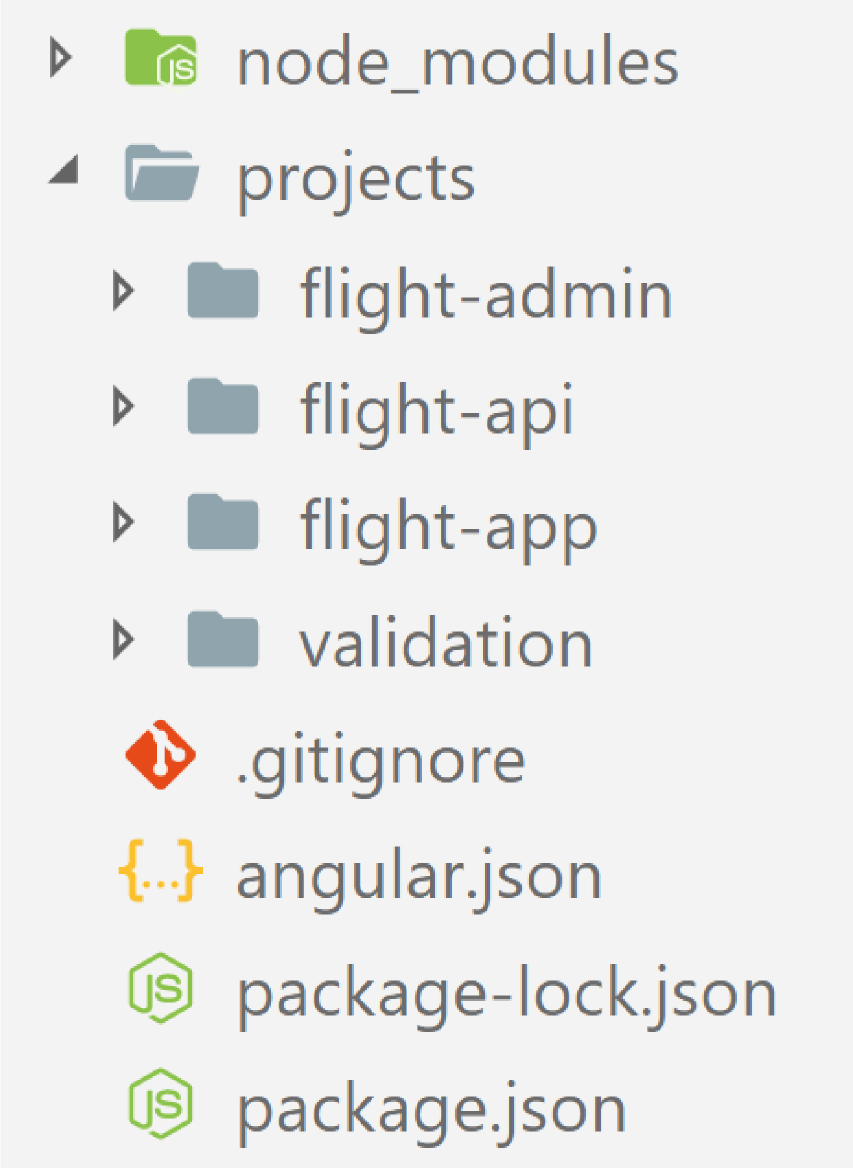
- Annoying within project
- Prevents gritting further libs

Versioning

- Old versions
- Conflicts
- How to force devs to use latest version?

Monorepos

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
- Creating new libs: Adding folder
- Experience: Successfully used at Google, Facebook, …

Two Flavors

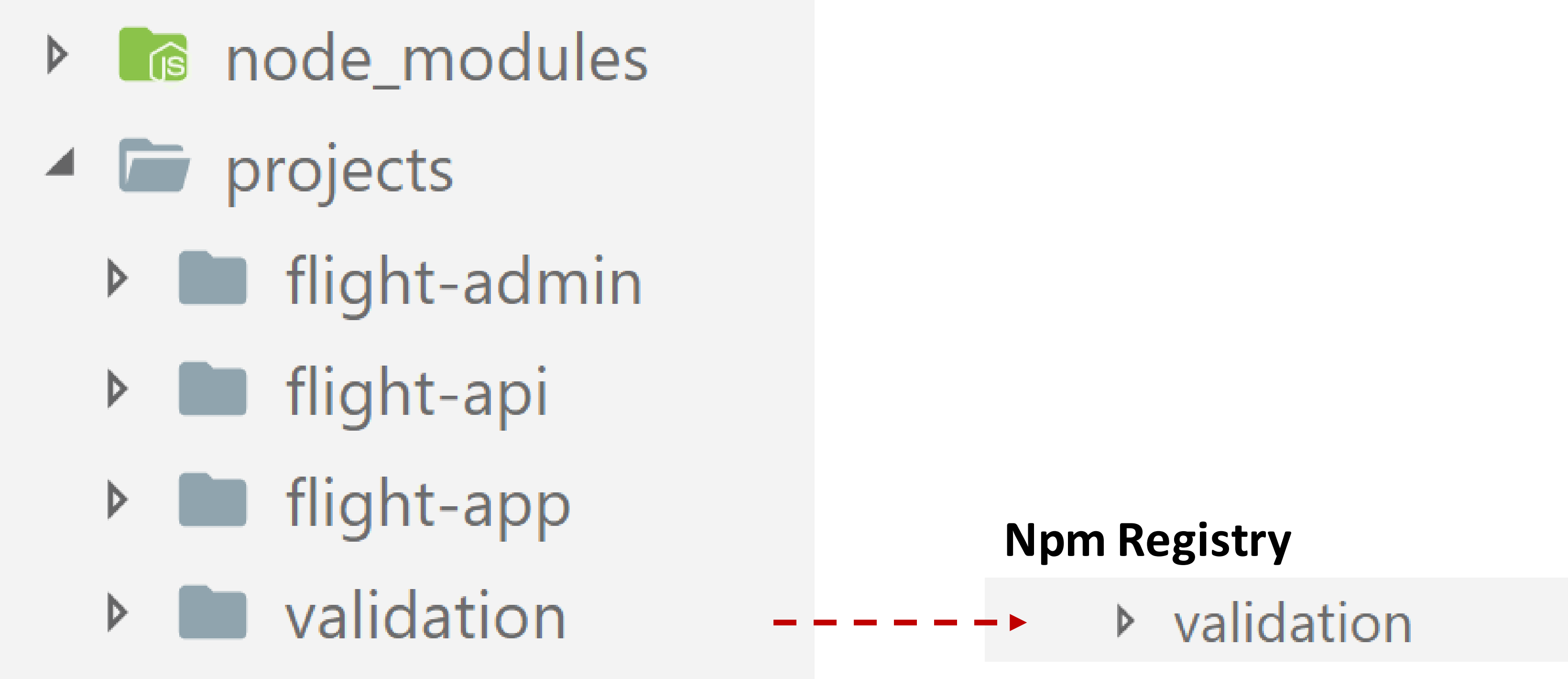
Project Monorepo

- Like Workspaces/Solutions in different IDEs

Company-wide Monorepo

- E. g. used at Google or Facebook

Moving back and forth



- node_modules
- projects
  - flight-admin
  - flight-api
  - flight-app
  - validation

Npm Registry

- validation

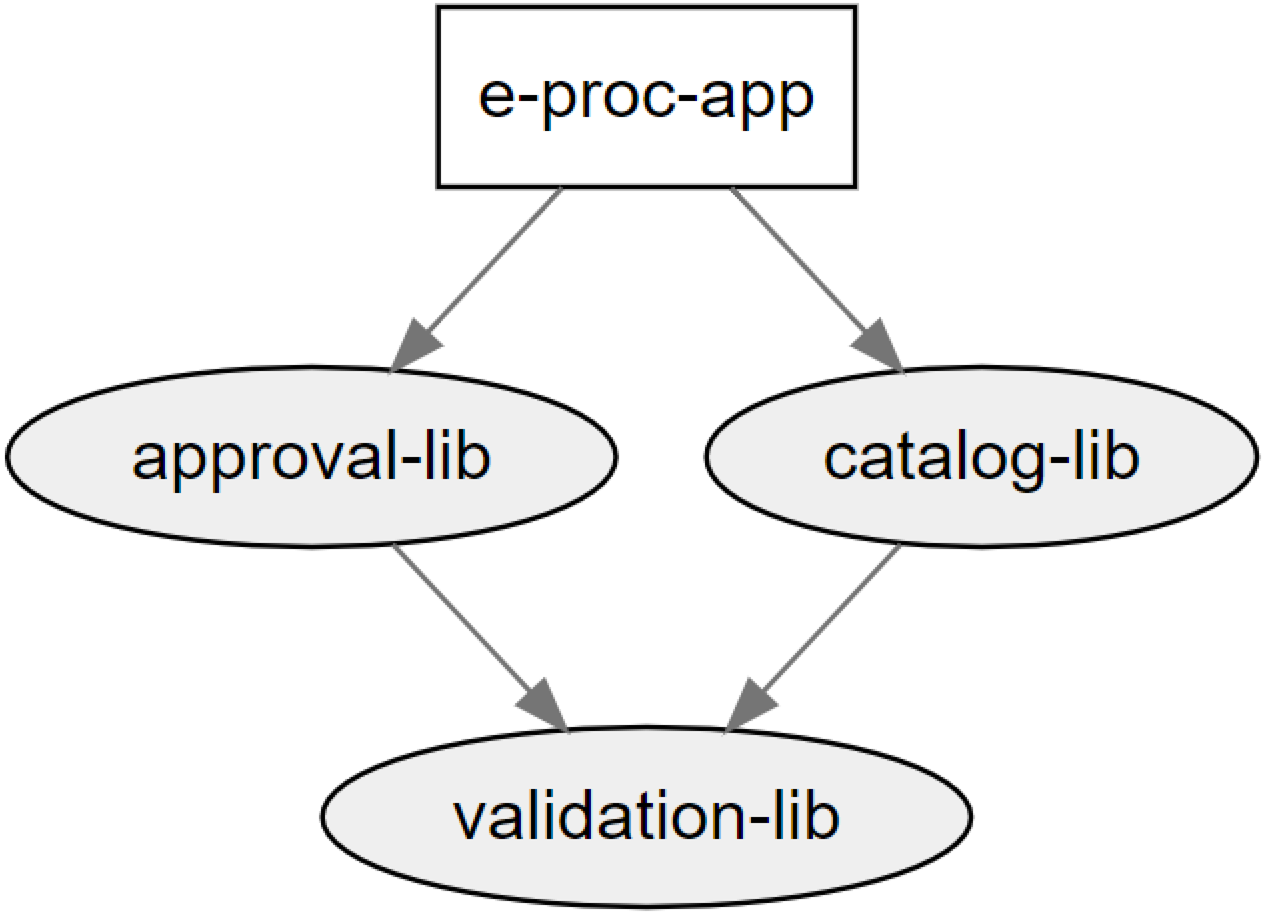
Tooling & Generator

https://nrwl.io/nx

Nrwl Extensions for Angular

An open source toolkit for enterprise Angular applications.

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
```

Creating a Workspace

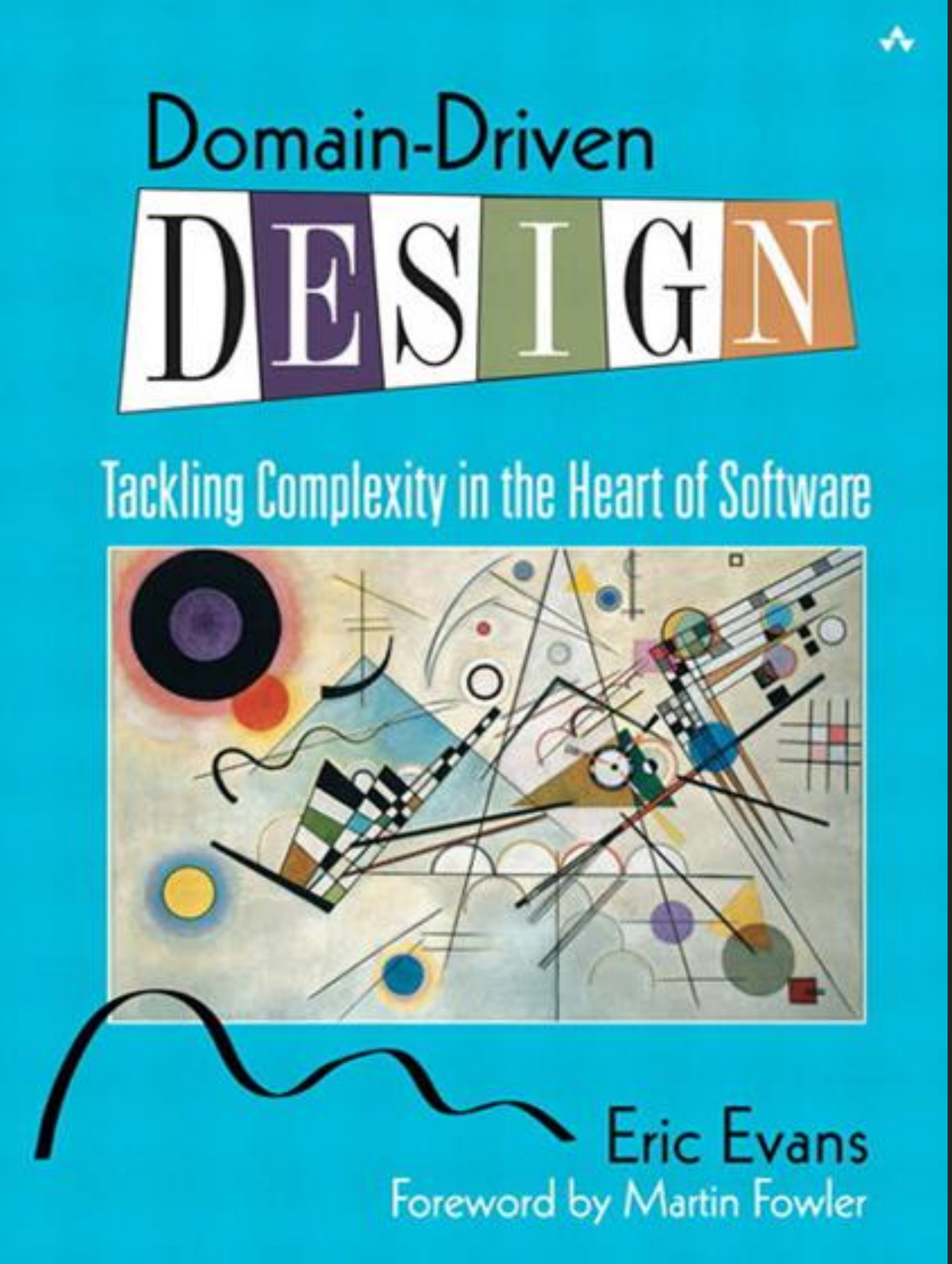
```
npm install -g @angular/cli

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
```

DEMO

LAB

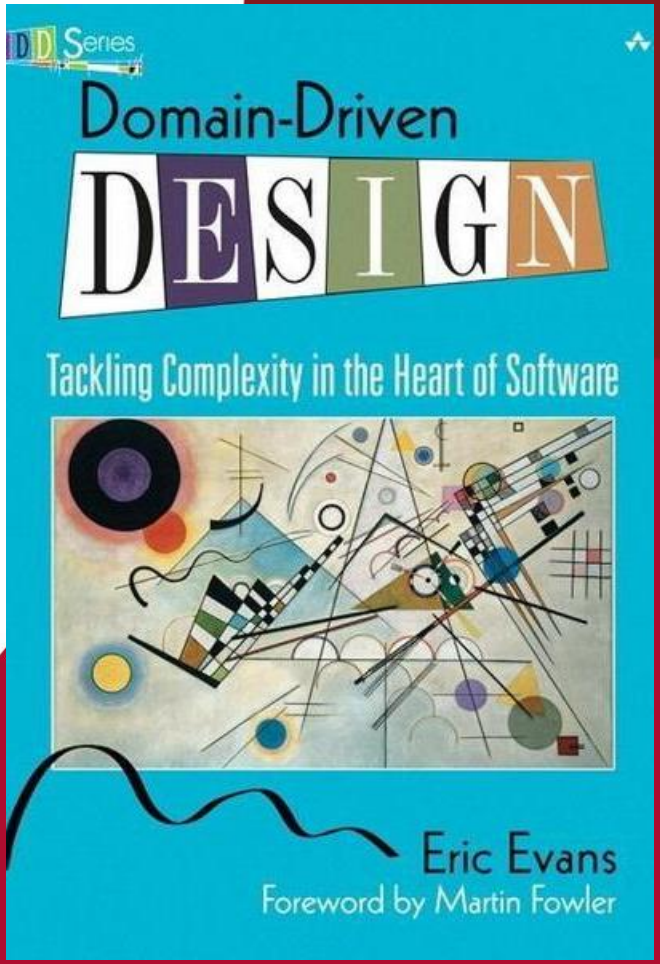
DDD

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?


DDD Series
Domain-Driven
DESIGN
Tackling Complexity in the Heart of Software
Eric Evans
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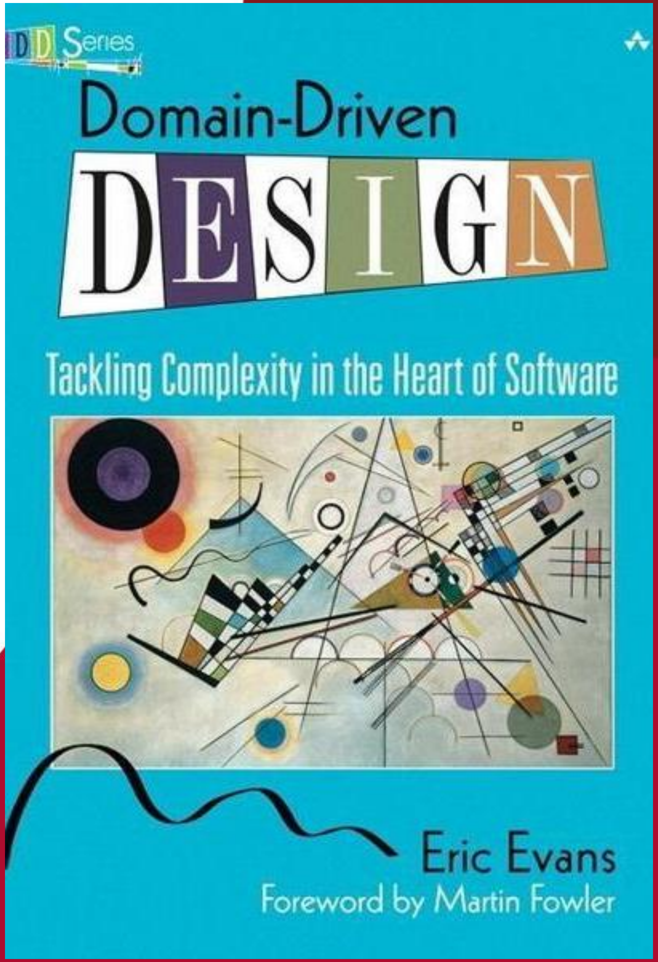
How to create **sustainable** frontend architectures with **ideas from DDD**?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Domain Driven Design

Decomposing a System

Design Patterns
& Practices

Strategic Design

Tactical Design

Domain Driven Design

Decomposing a System

Design Patterns
& Practices

Strategic Design

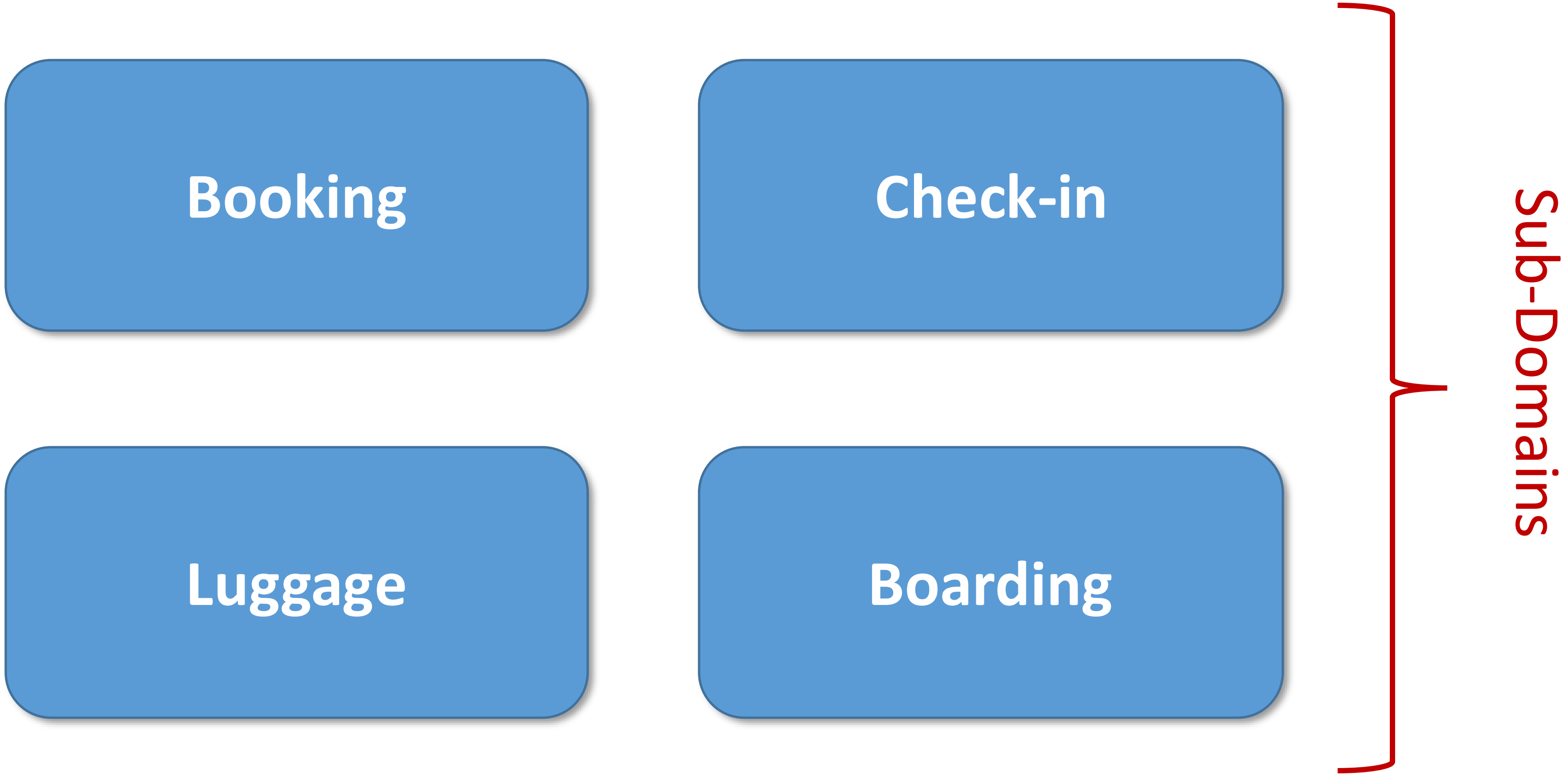
Tactical Design

This is what Strategic DDD prevents

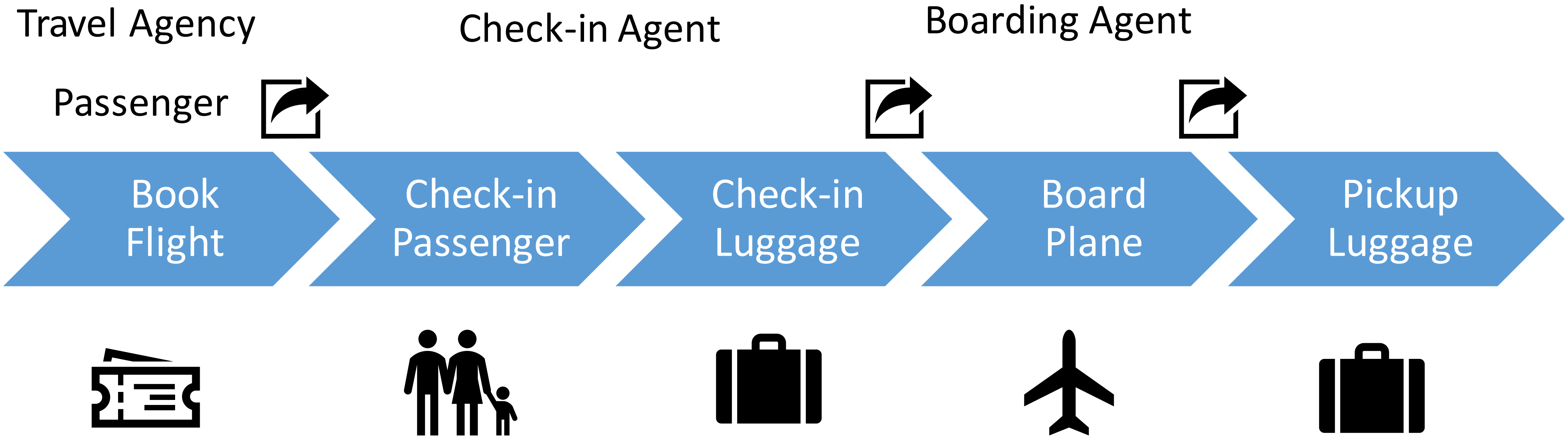
Example

Flight System

Example



Finding Sub-Domains



Travel Agency

Check-in Agent

Boarding Agent

Passenger

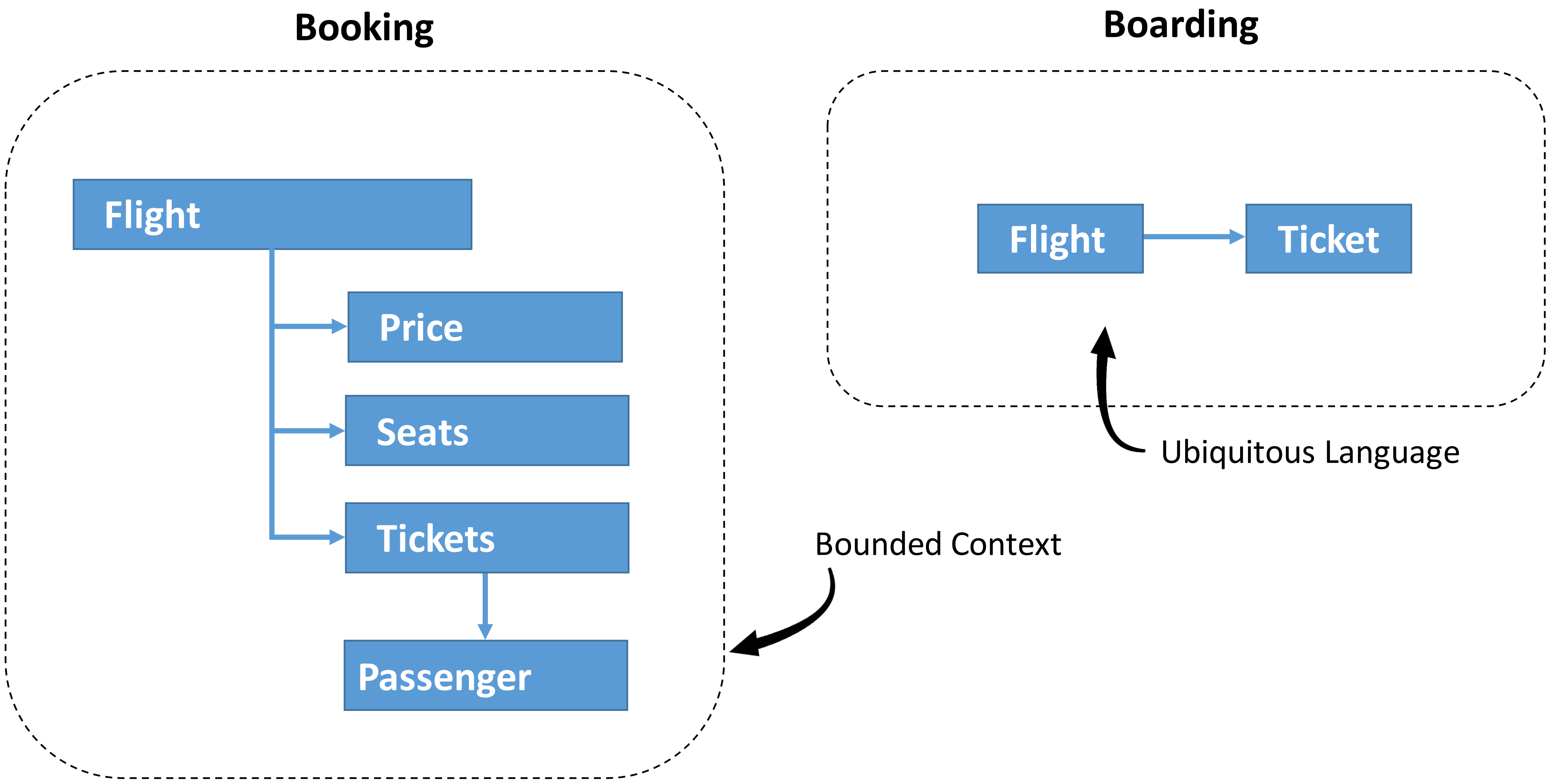
Book Flight

Check-in Passenger

Check-in Luggage

Board Plane

Pickup Luggage



Booking

Flight

Price

Seats

Tickets

Passenger

Boarding

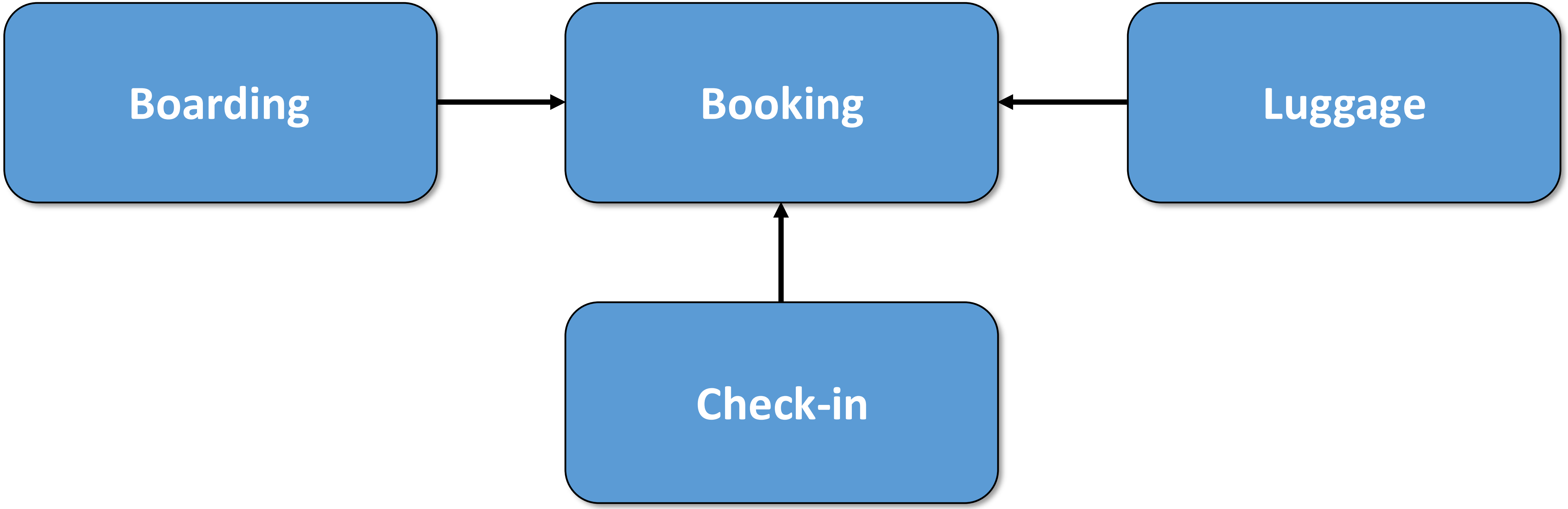
Flight

Ticket

Ubiquitous Language

Bounded Context

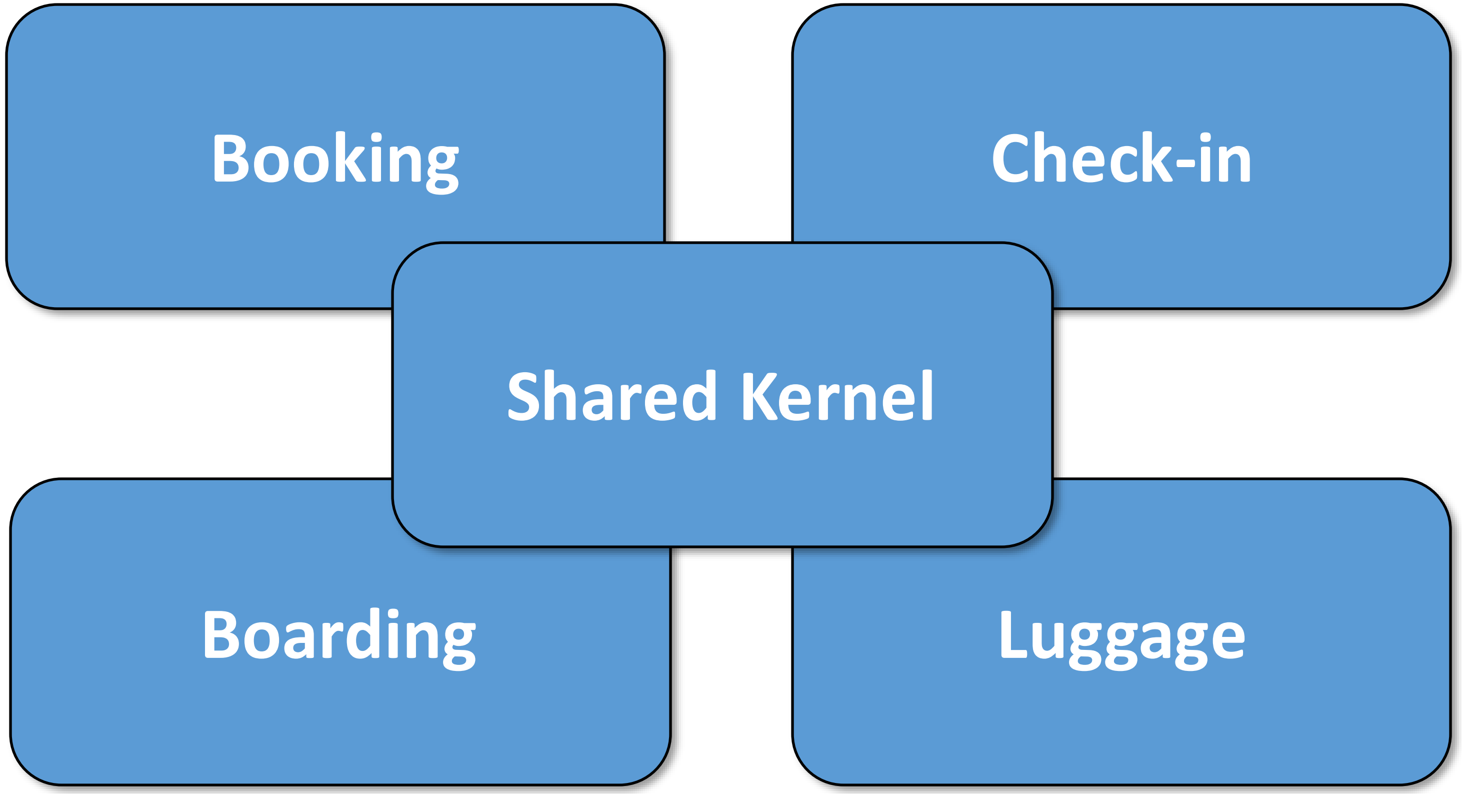
Context Map

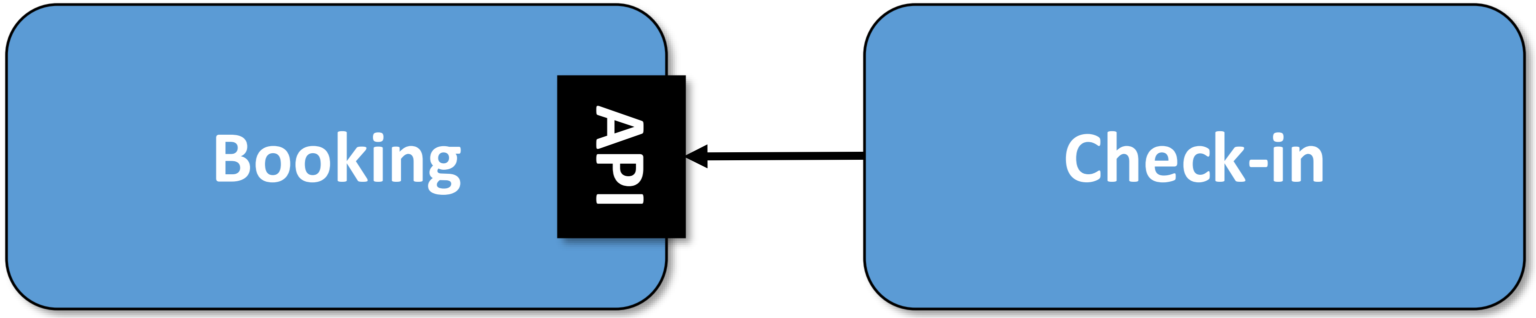


Context Map

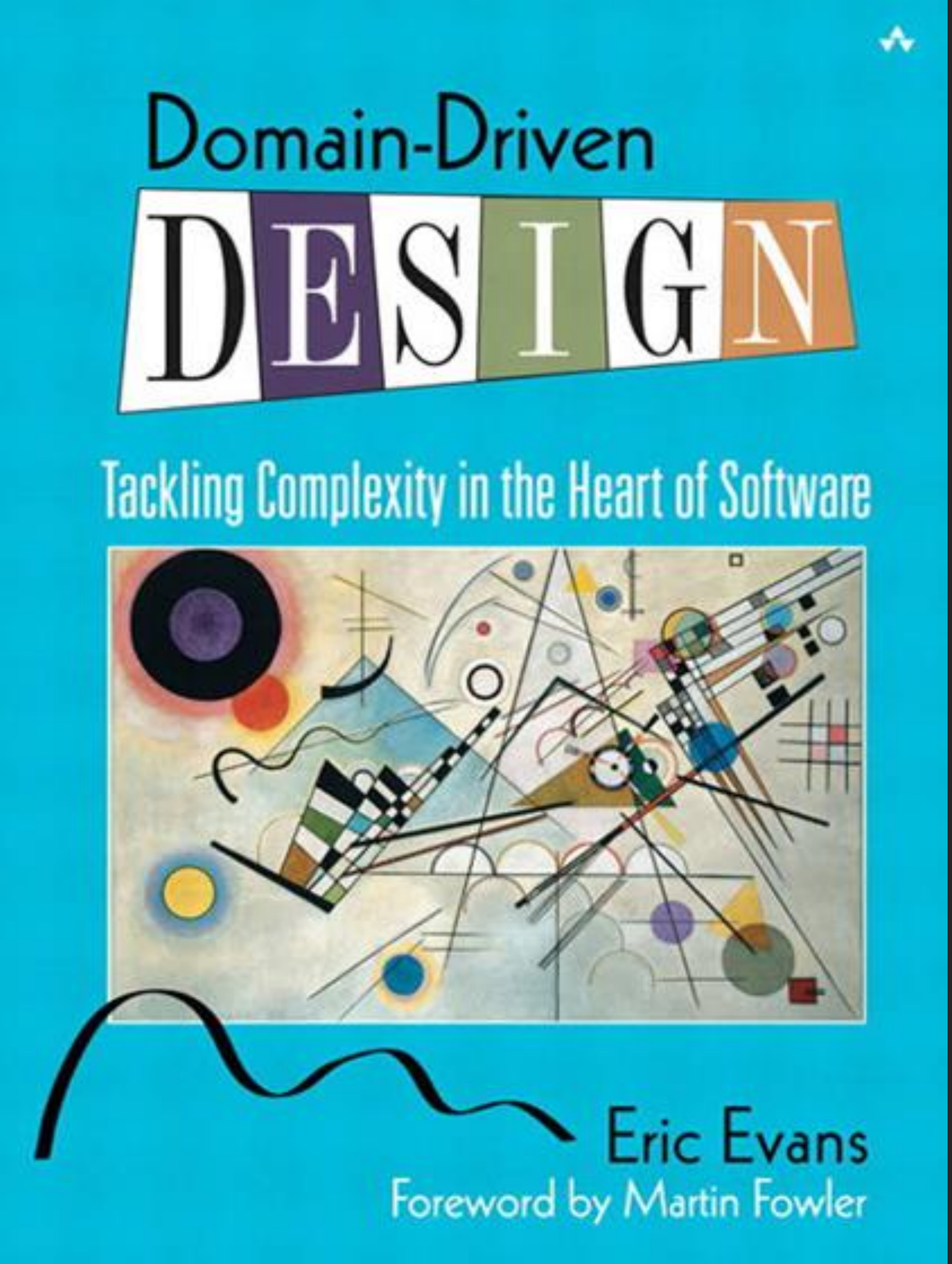
Responsibilities?

Breaking Changes?





Open-/Host-Service


Domain-Driven
DESIGN
Tackling Complexity in the Heart of Software
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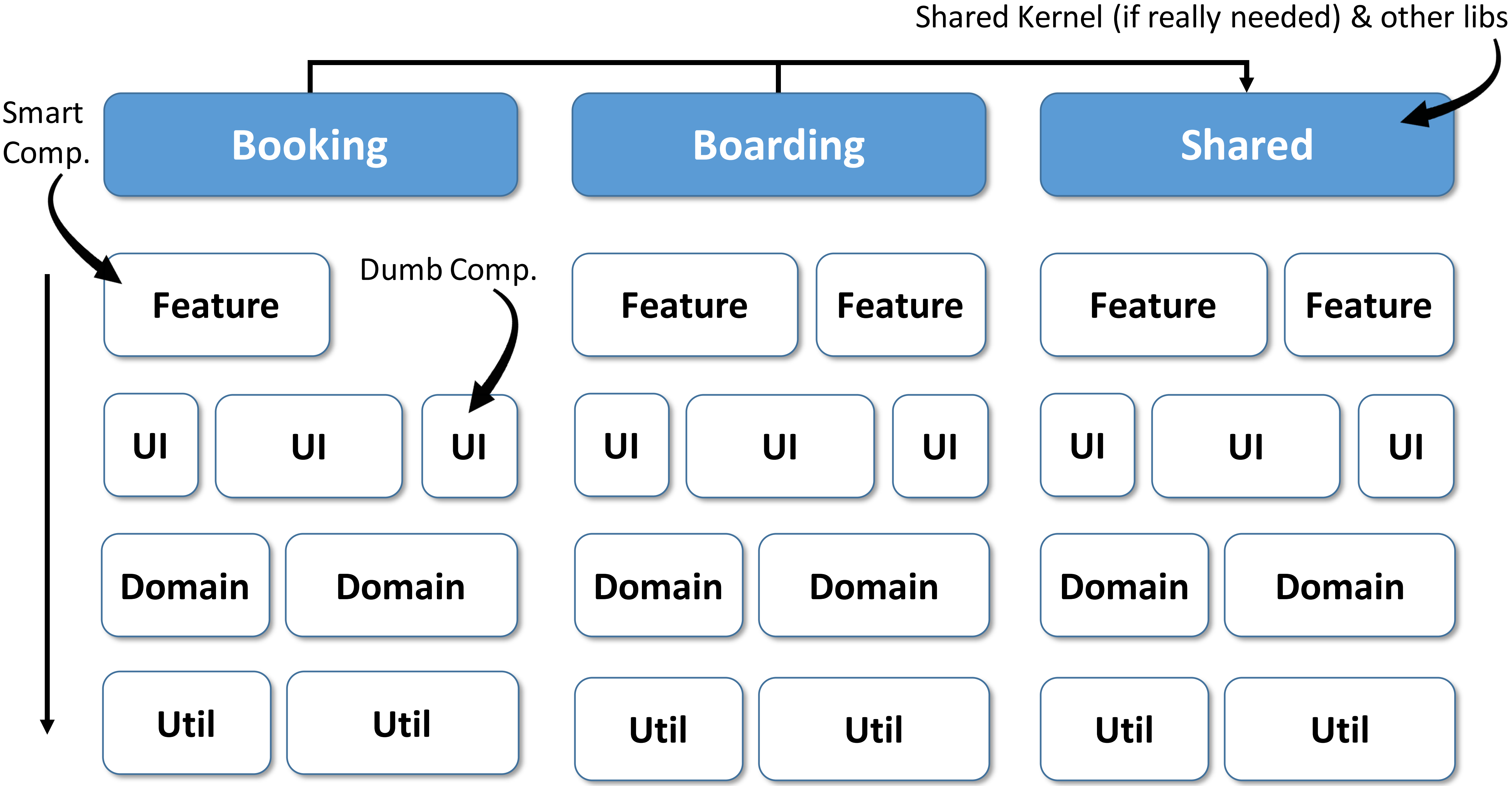
Lots of approaches for cross-domain communication and more …



Shared Kernel (if really needed) & other libs

Smart Comp.

Dumb Comp.

Booking

Feature

UI UI UI

Domain Domain

Util Util

Boarding

Feature Feature

UI UI UI

Domain Domain

Util Util

Shared

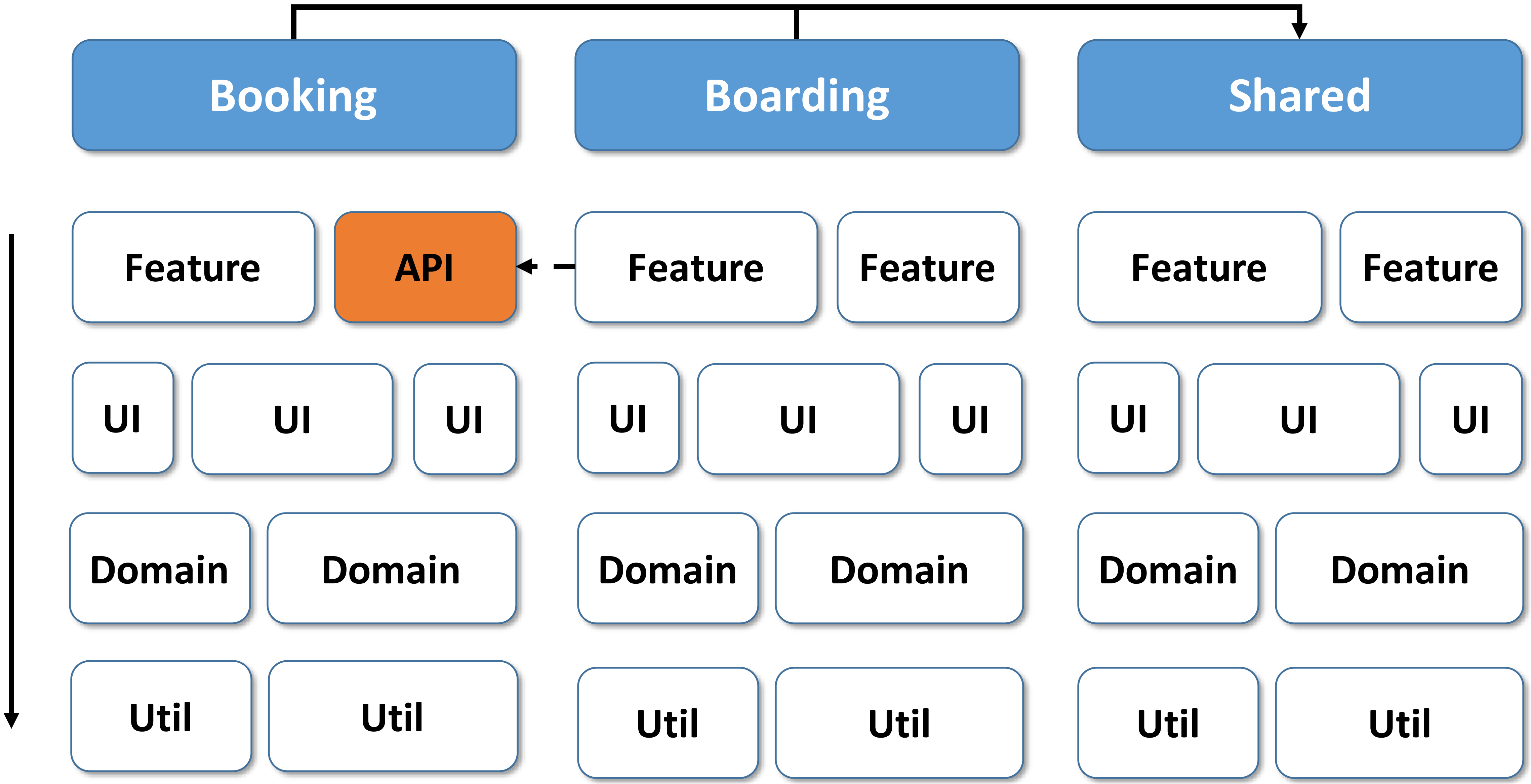
Feature Feature

UI UI UI

Domain Domain

Util Util

Enterprise Monorepo Patterns, Nrwl 2018: https://tinyurl.com/y2jjxld7



Booking

Boarding

Shared

Feature

API

Feature

Feature

Feature

Feature

UI

UI

UI

UI

UI

UI

UI

UI

UI

Domain

Domain

Domain

Domain

Domain

Domain

Util

Util

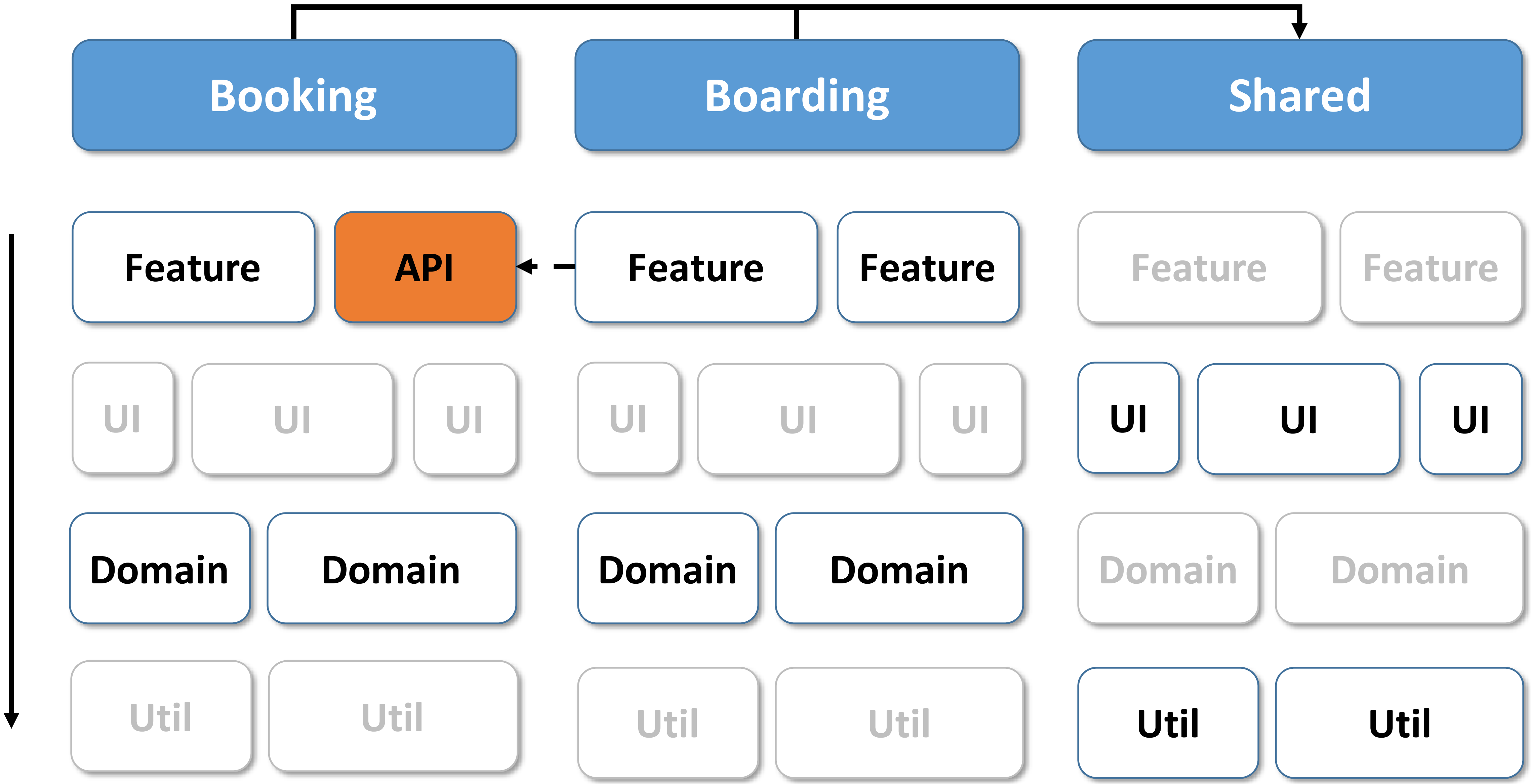
Util

Util

Util

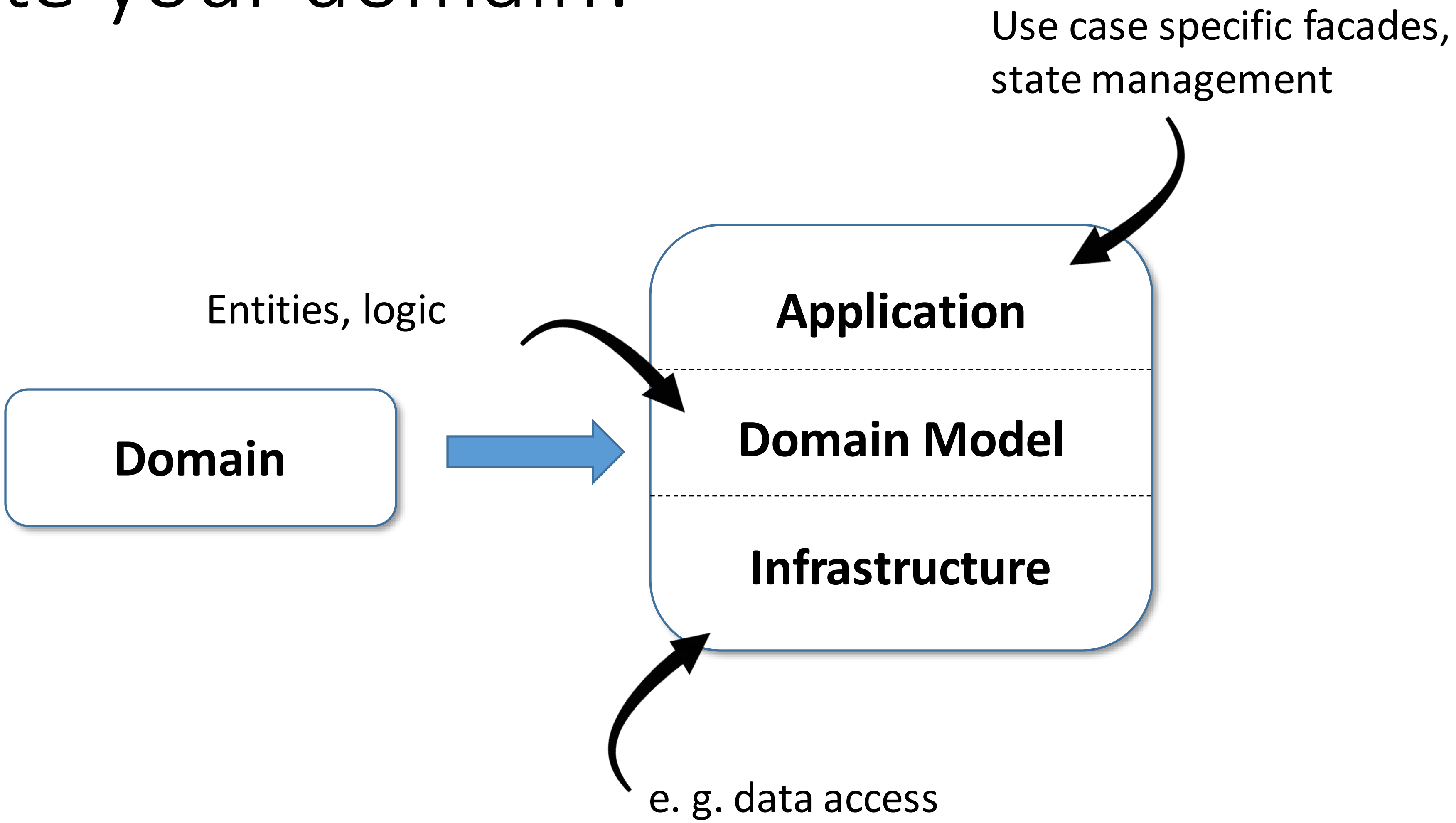
Util

@ManfredSteyer



@ManfredSteyer

Isolate your domain!



Use case specific facades, state management

Entities, logic

Domain

Application

Domain Model

Infrastructure

e. g. data access

Alternatives to layering

- e. g. Hexagonal Architecture, Clean Architecture
- Anyway: We need to **restrict access** b/w libraries

DEMO

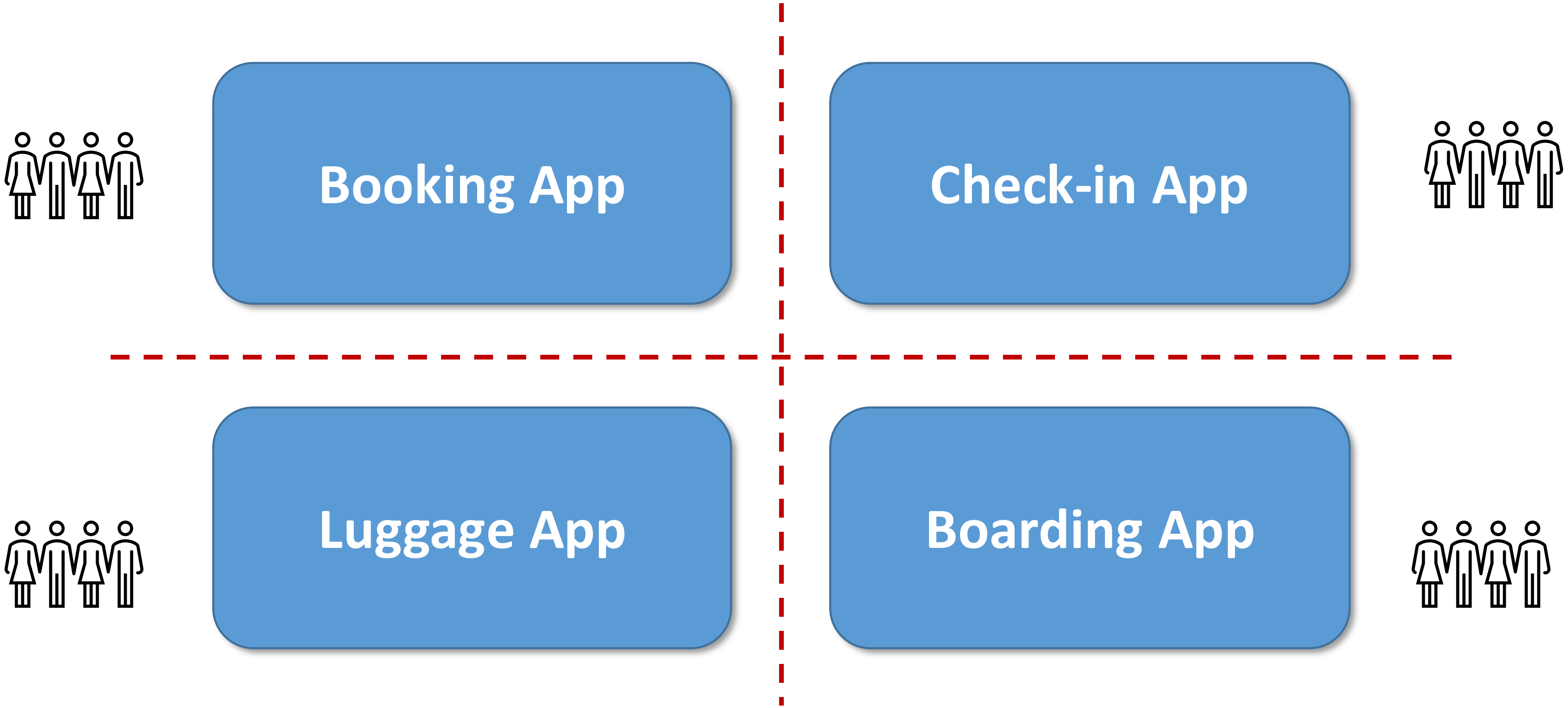
Finegrained Libraries

- 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!**

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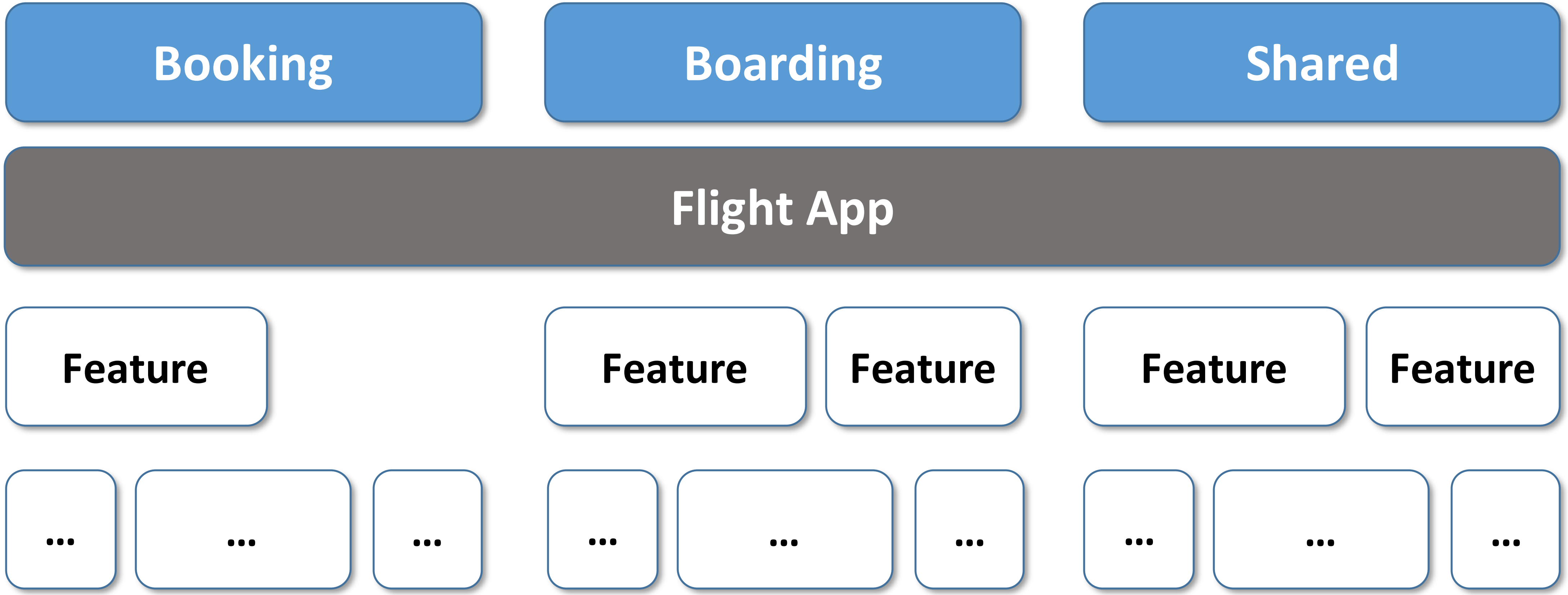
Deployment Monolith



Booking

Boarding

Shared

Flight App

Feature

Feature

Feature

Feature

Feature

...

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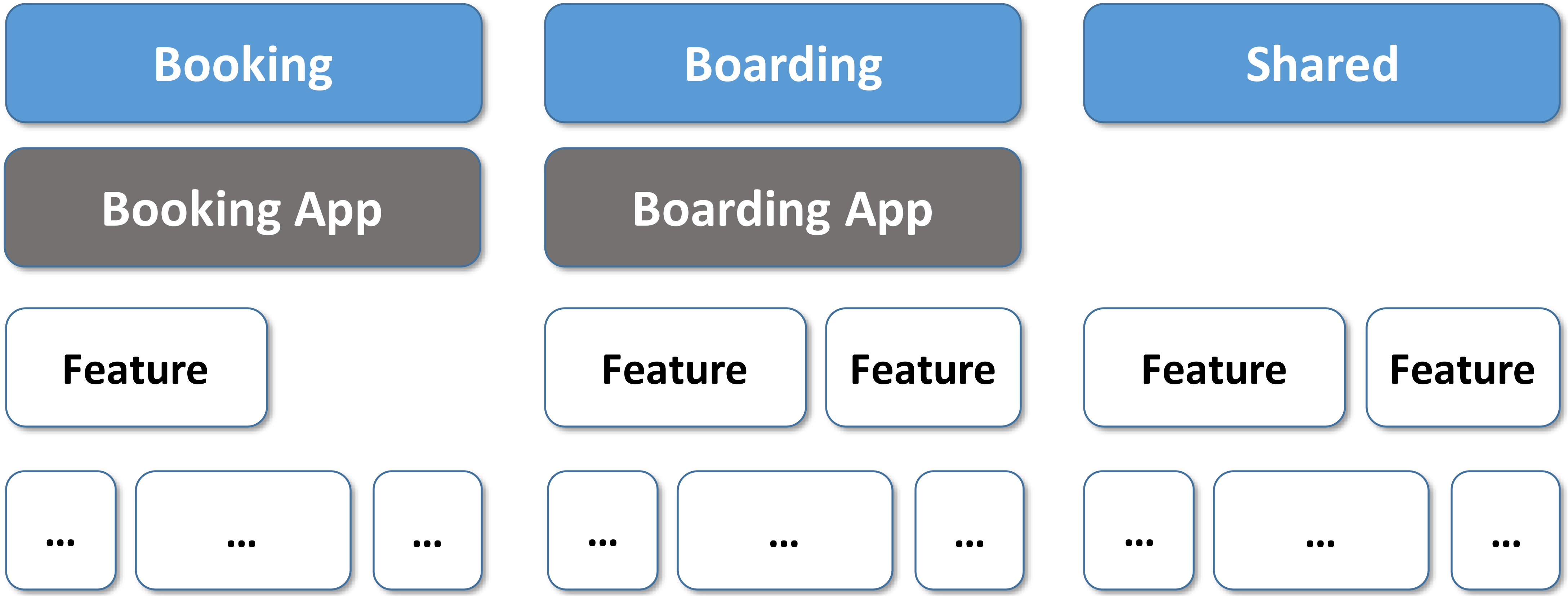
@ManfredSteyer

Microfrontends



Booking

Boarding

Shared

Booking App

Boarding App

Feature

Feature

Feature

Feature

Feature

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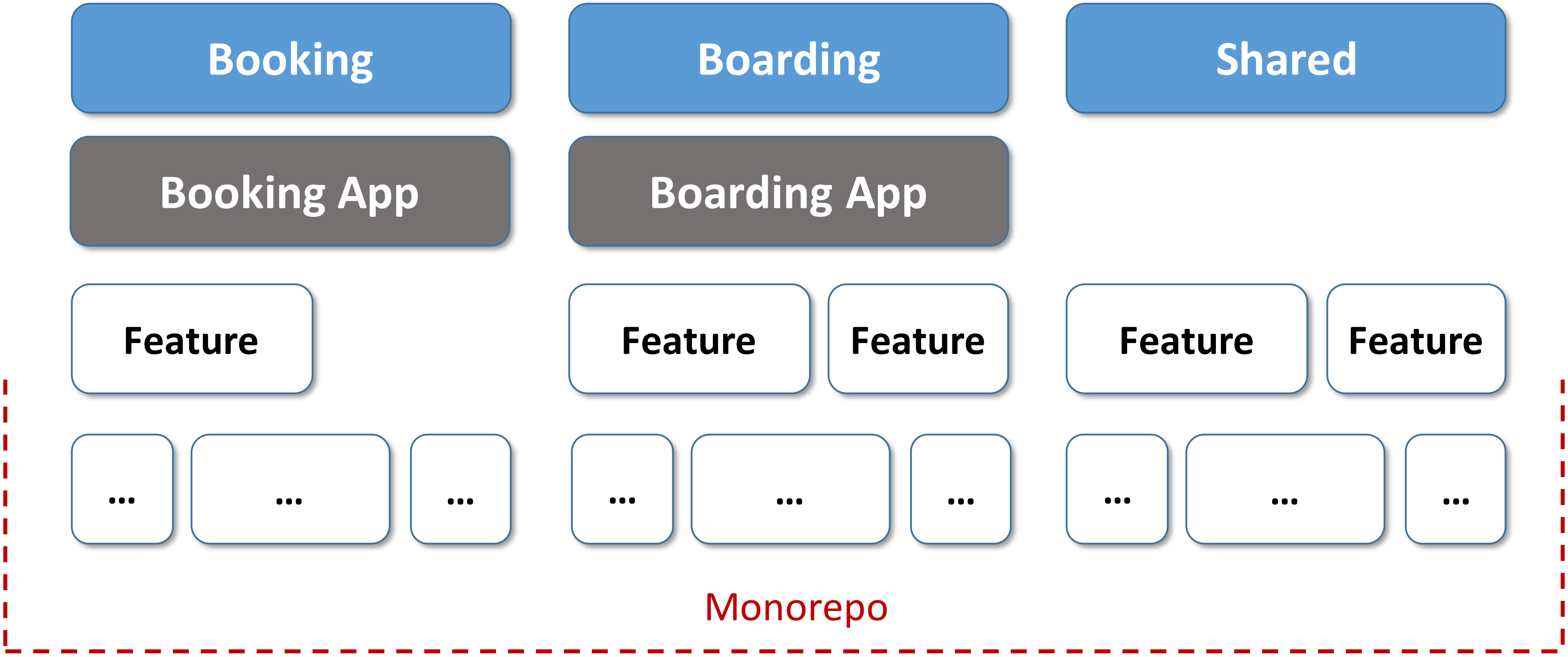
Option 1: One App per Domain



Booking

Boarding

Shared

Booking App

Boarding App

Feature

Feature

Feature

Feature

Feature

...

...

...

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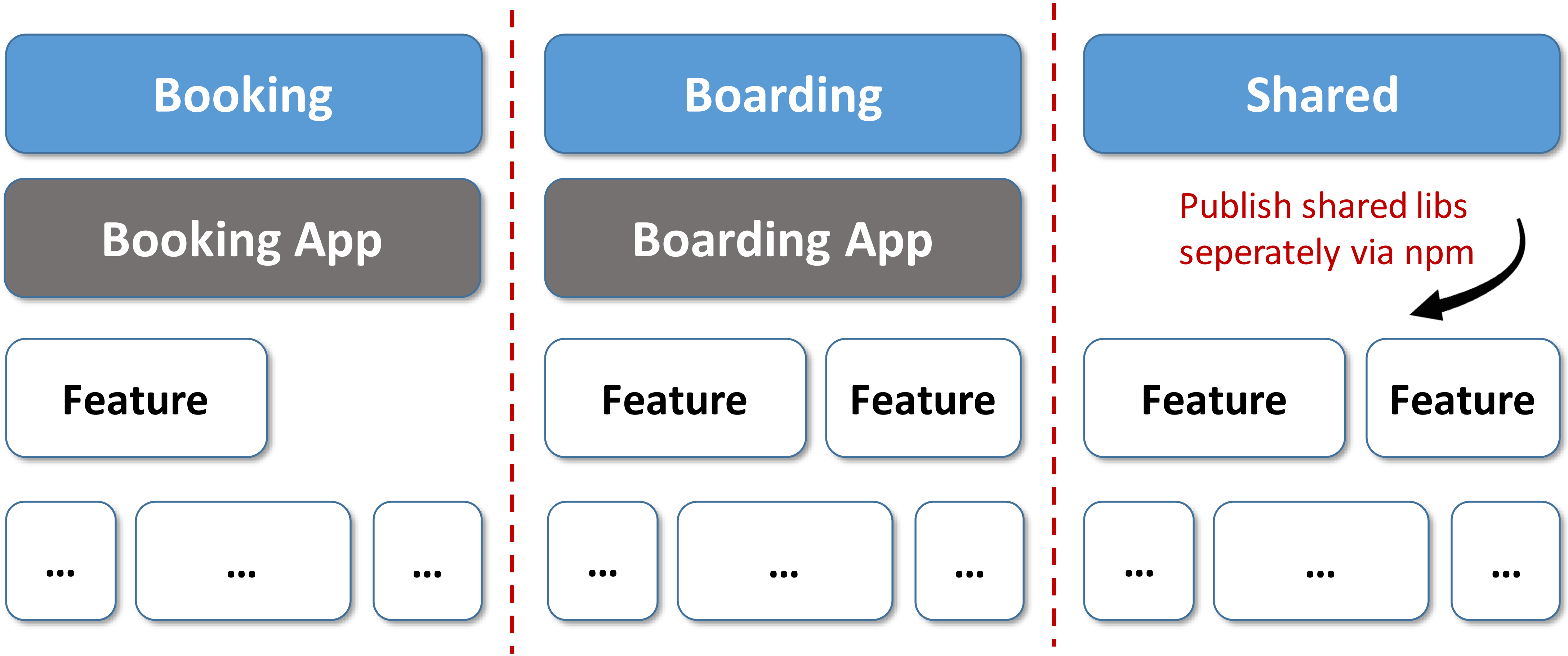
...

Monorepo

Option 2: One Monorepo per Domain



Publish shared libs seperately via npm

Repository 1

Repository 2

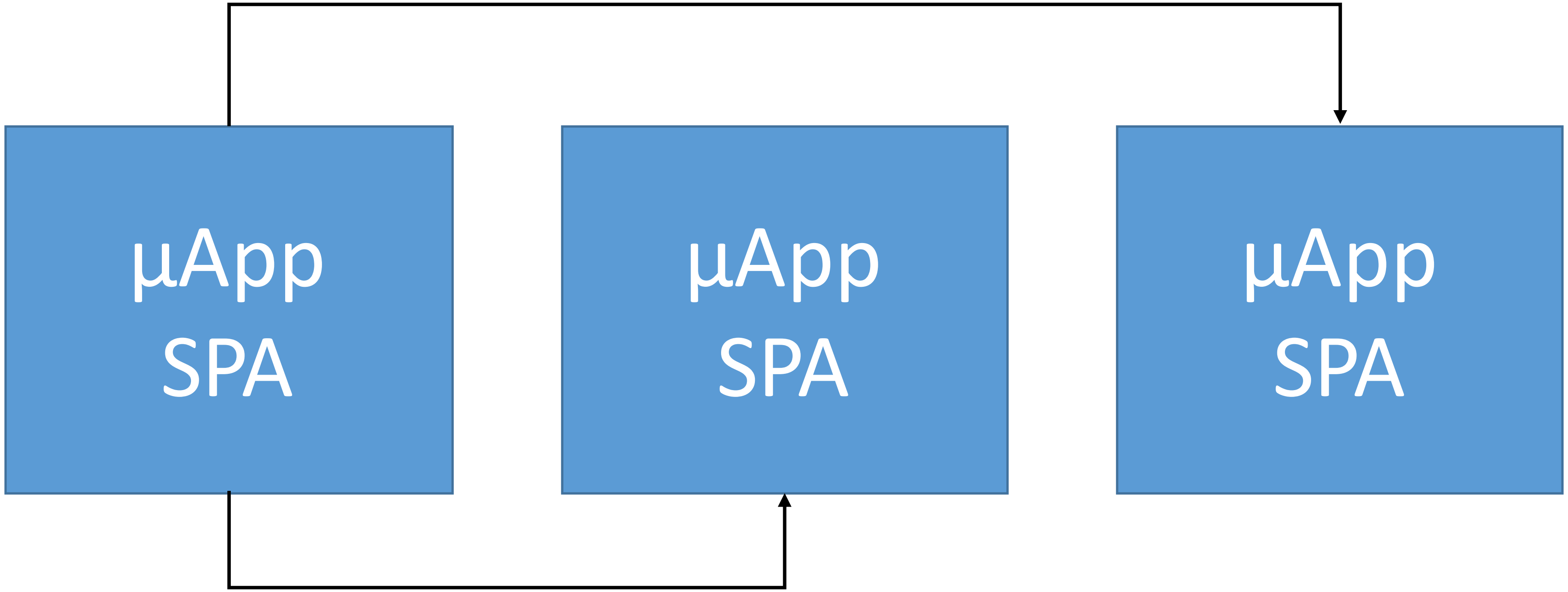
Repository n

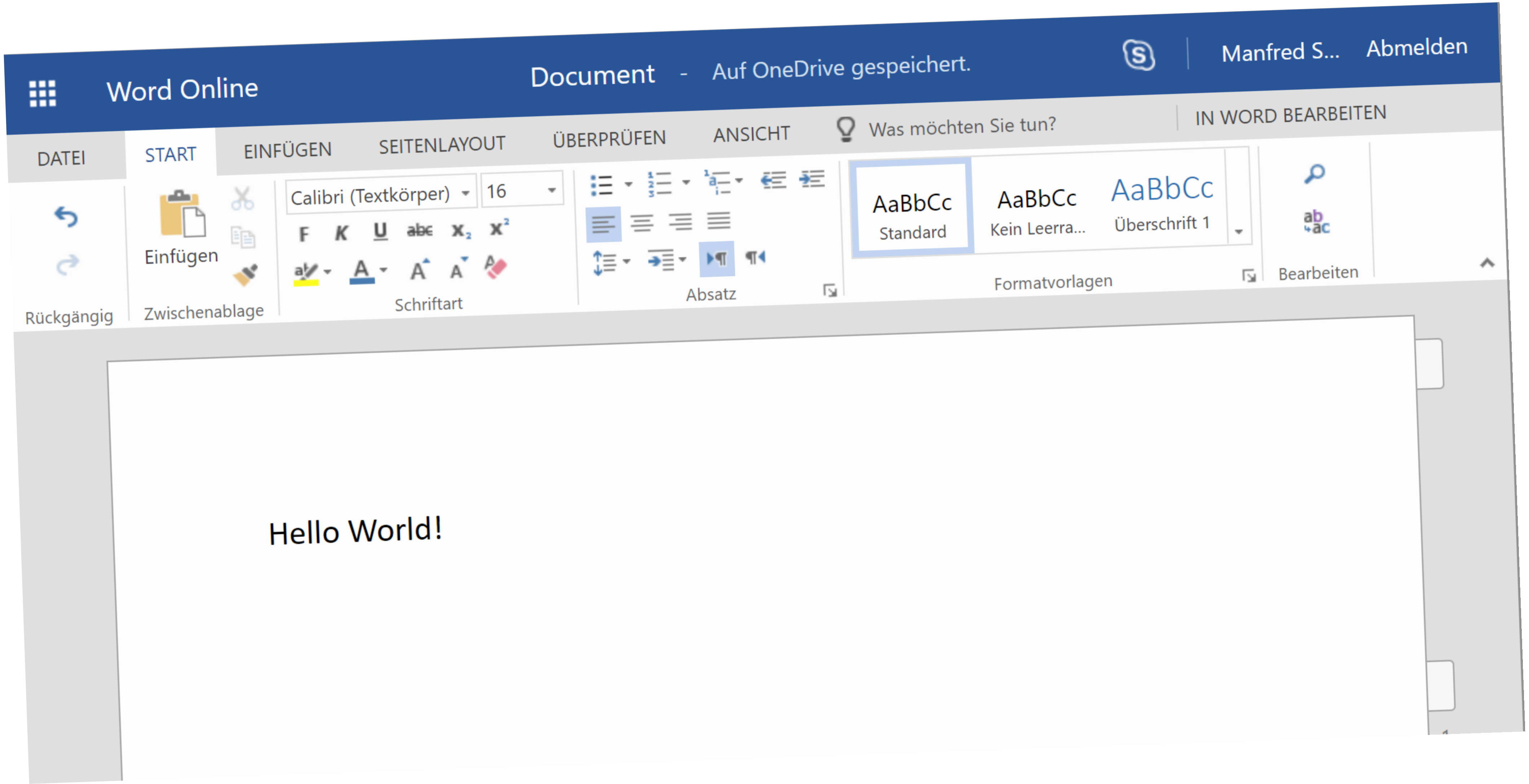
Benefits

- **Autonomous Teams**
- Separate Development
- Separate Deployment
- Own architecture decisions
- Own technology descisions

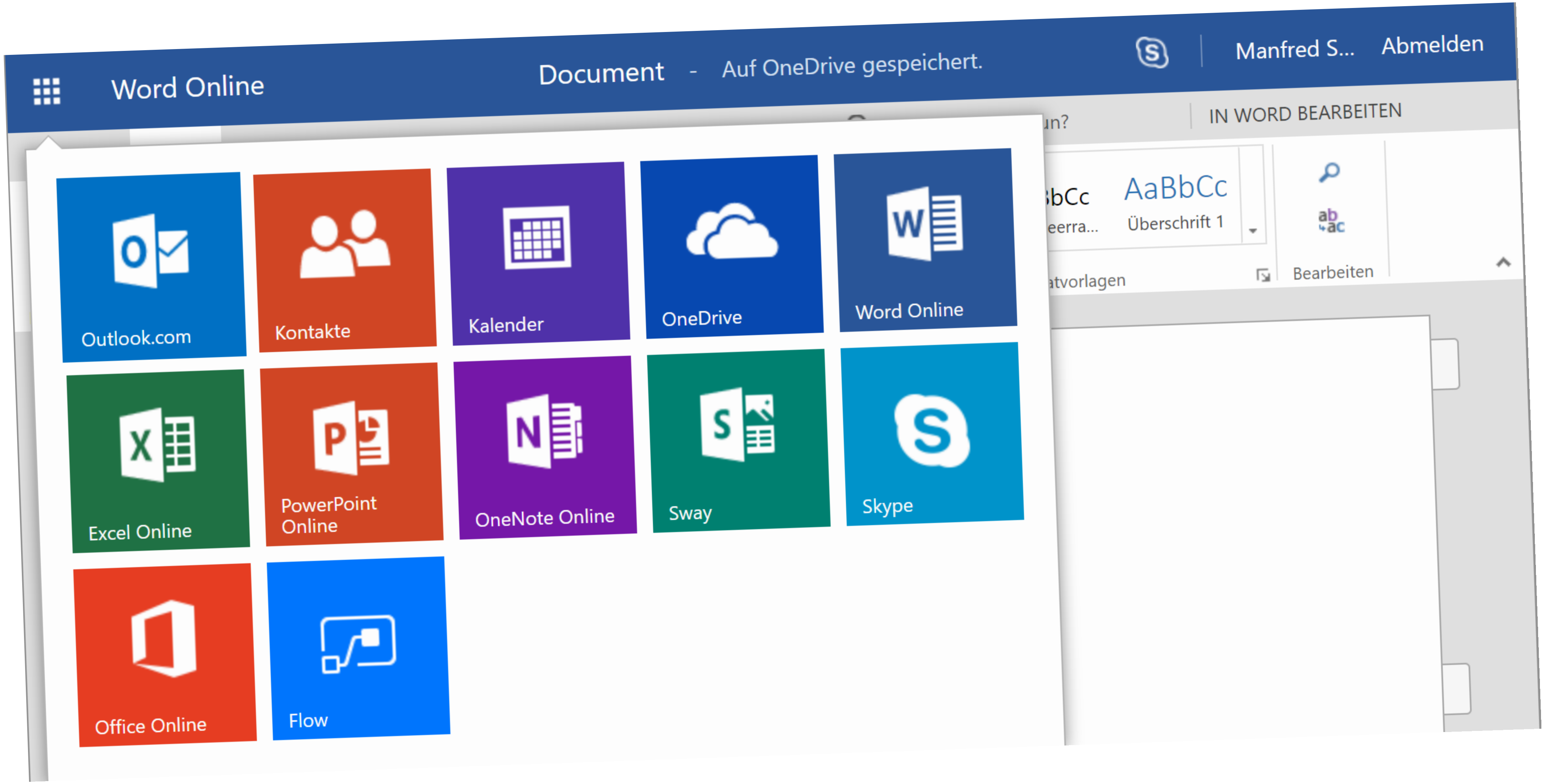
Integration via Hyperlinks

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
Schriftart
Absatz
AaBbCc Standard
AaBbCc Kein Leerra...
AaBbCc Überschrift 1
Formatvorlagen
Bearbeiten

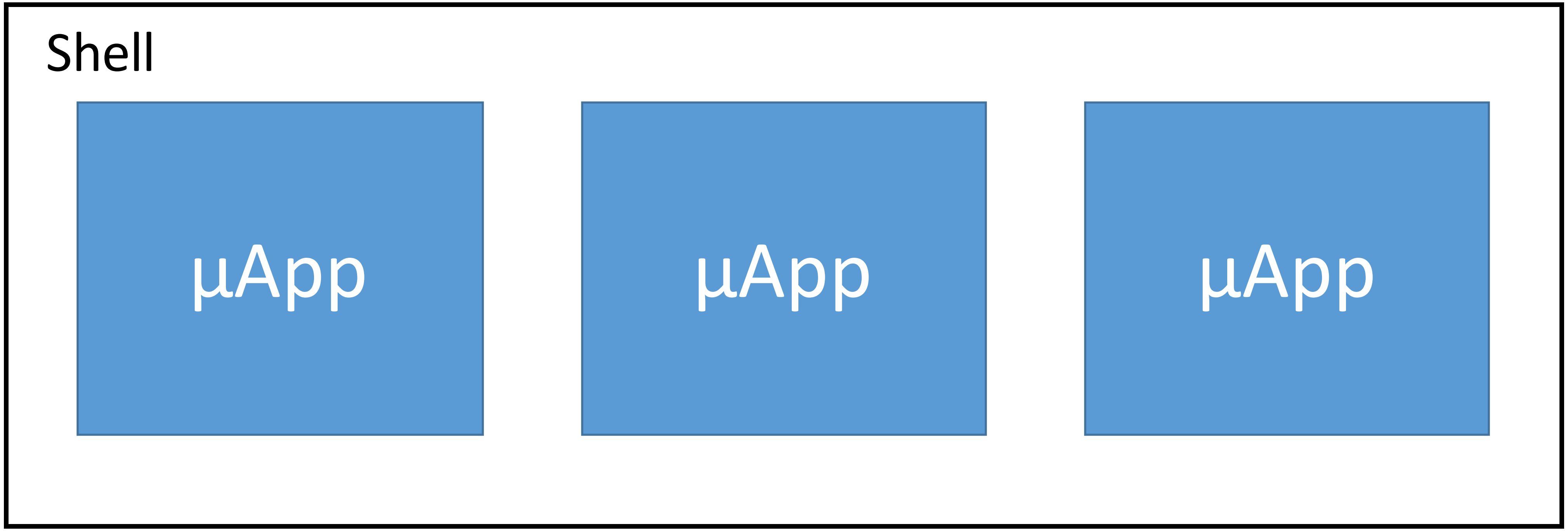
Hello World!



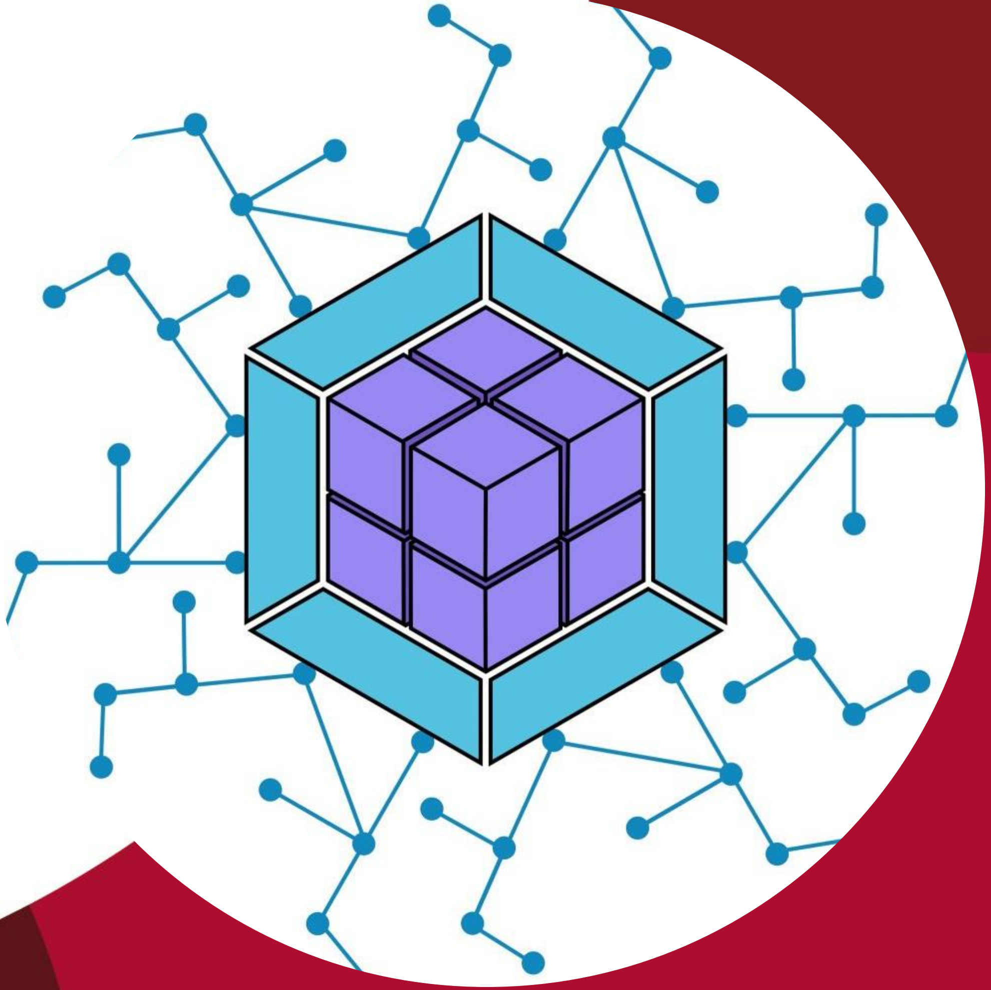
@ManfredSteyer

Integration via Shell

Providing a (SPA based) Shell



Webpack 5
Module Federation



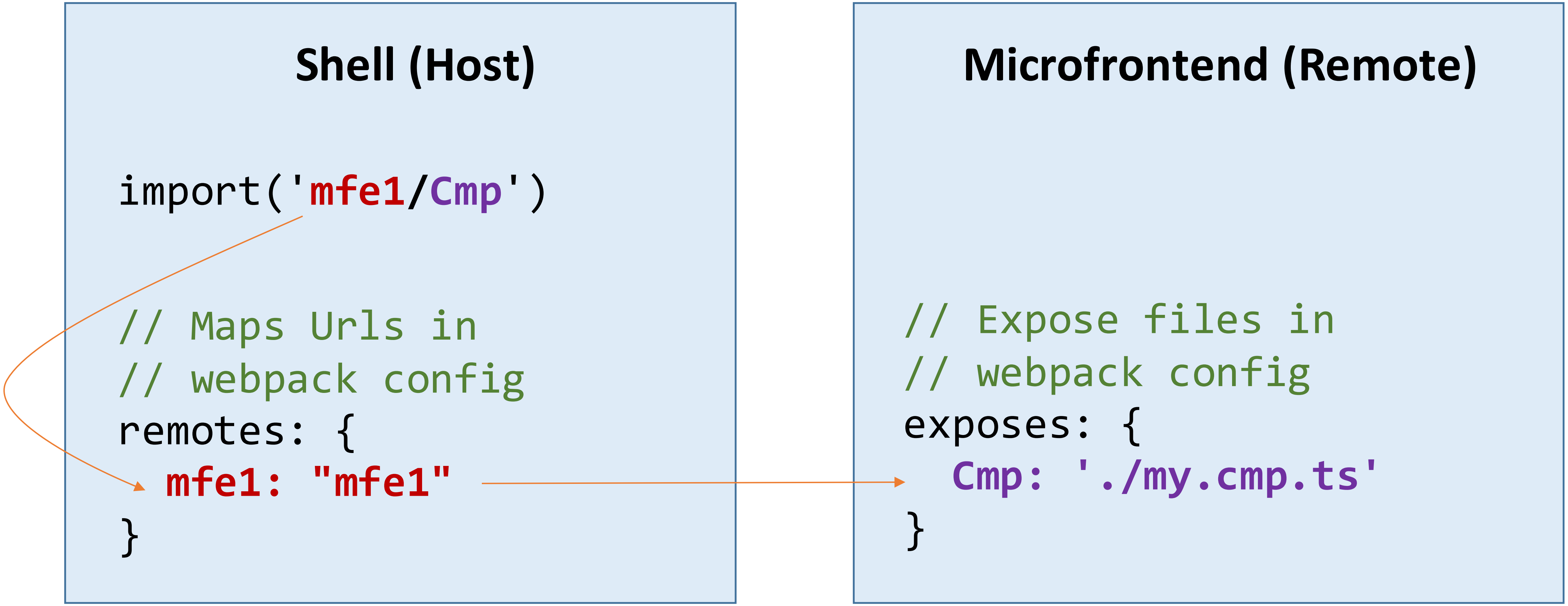
Idea

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)

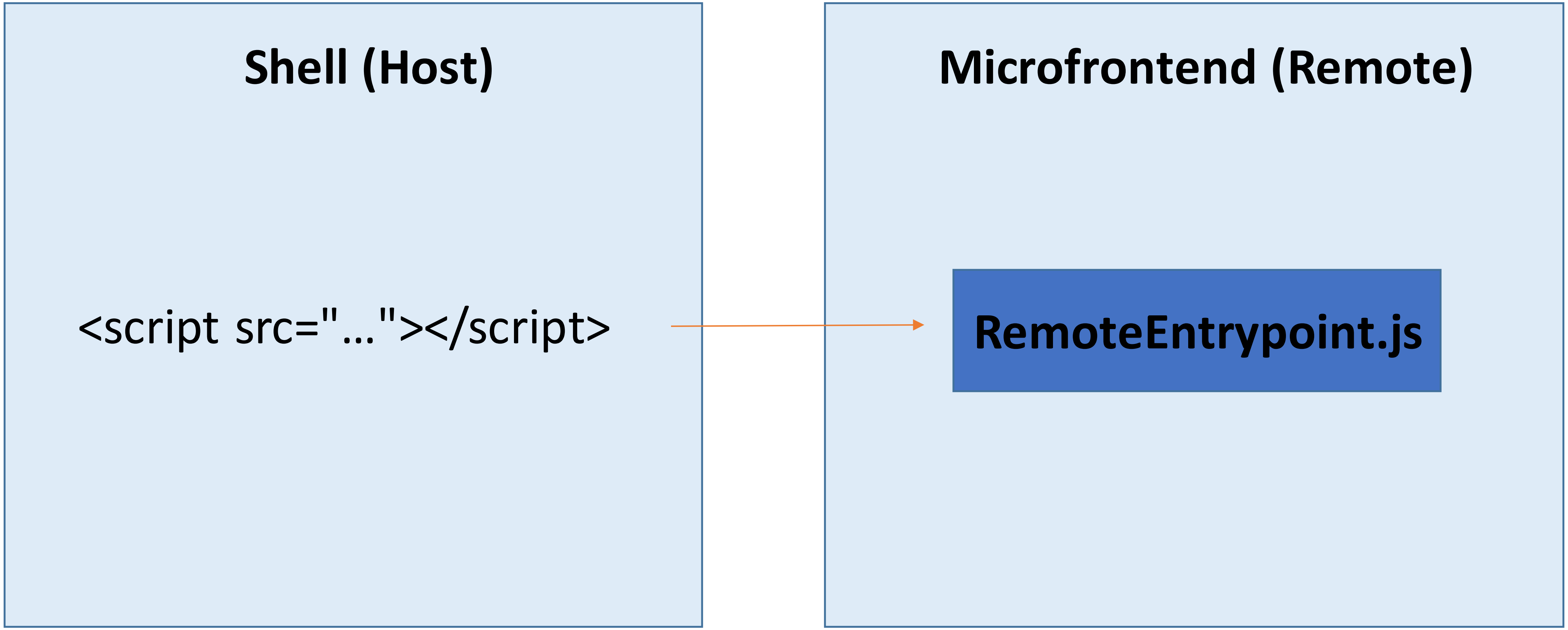
```
import('mfe1/Cmp')

// Maps Urls in
// webpack config
remotes: {
  mfe1: "mfe1"
}
```

Microfrontend (Remote)

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

How to Get the Microfrontend's URL?



Shell (Host)

<script src="..."></script>

Microfrontend (Remote)

RemoteEntrypoint.js

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 ✓

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!
  }
}
```

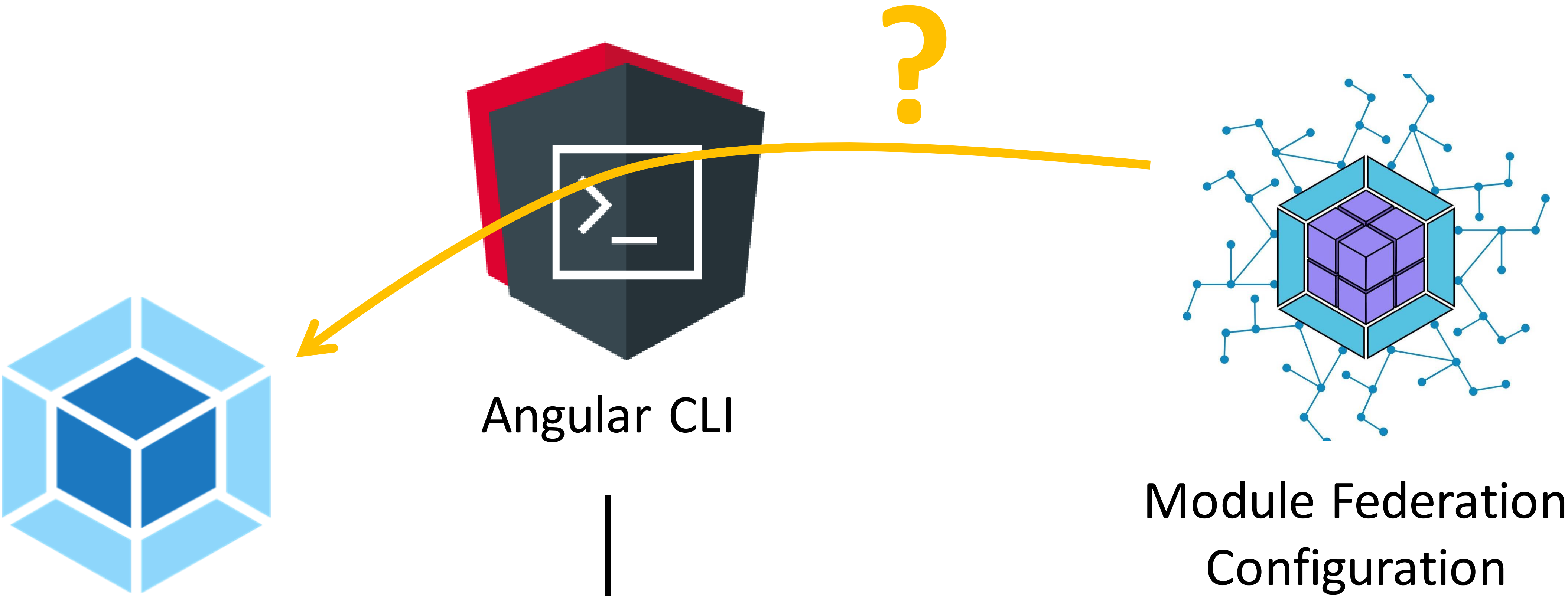
11.0 ✓   10.1 ✗

Relaxing Version Requirements

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

Federated Angular:
Angular, CLI, & Module Federation

ANGULAR ARCHITECTS
INSIDE KNOWLEDGE

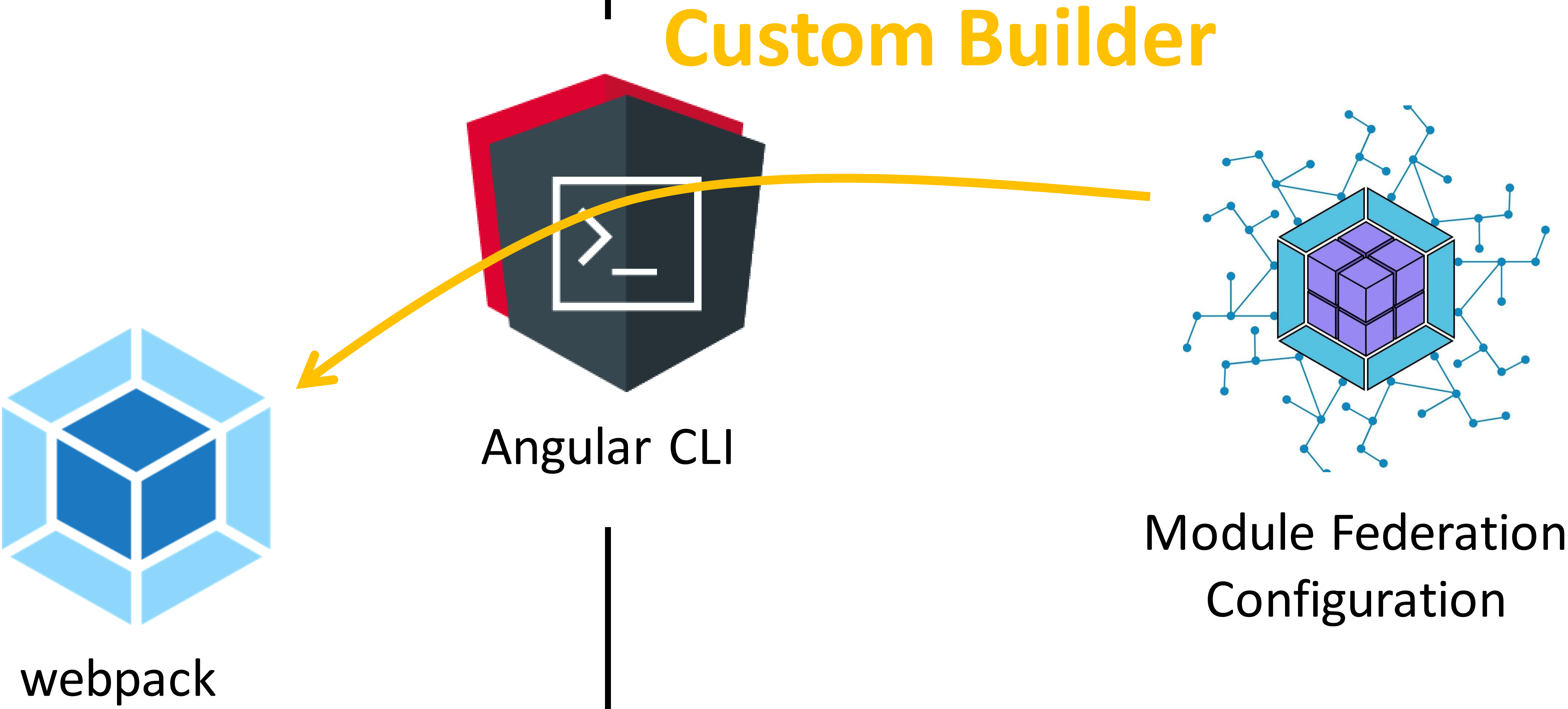


?

Angular CLI

webpack

Module Federation Configuration

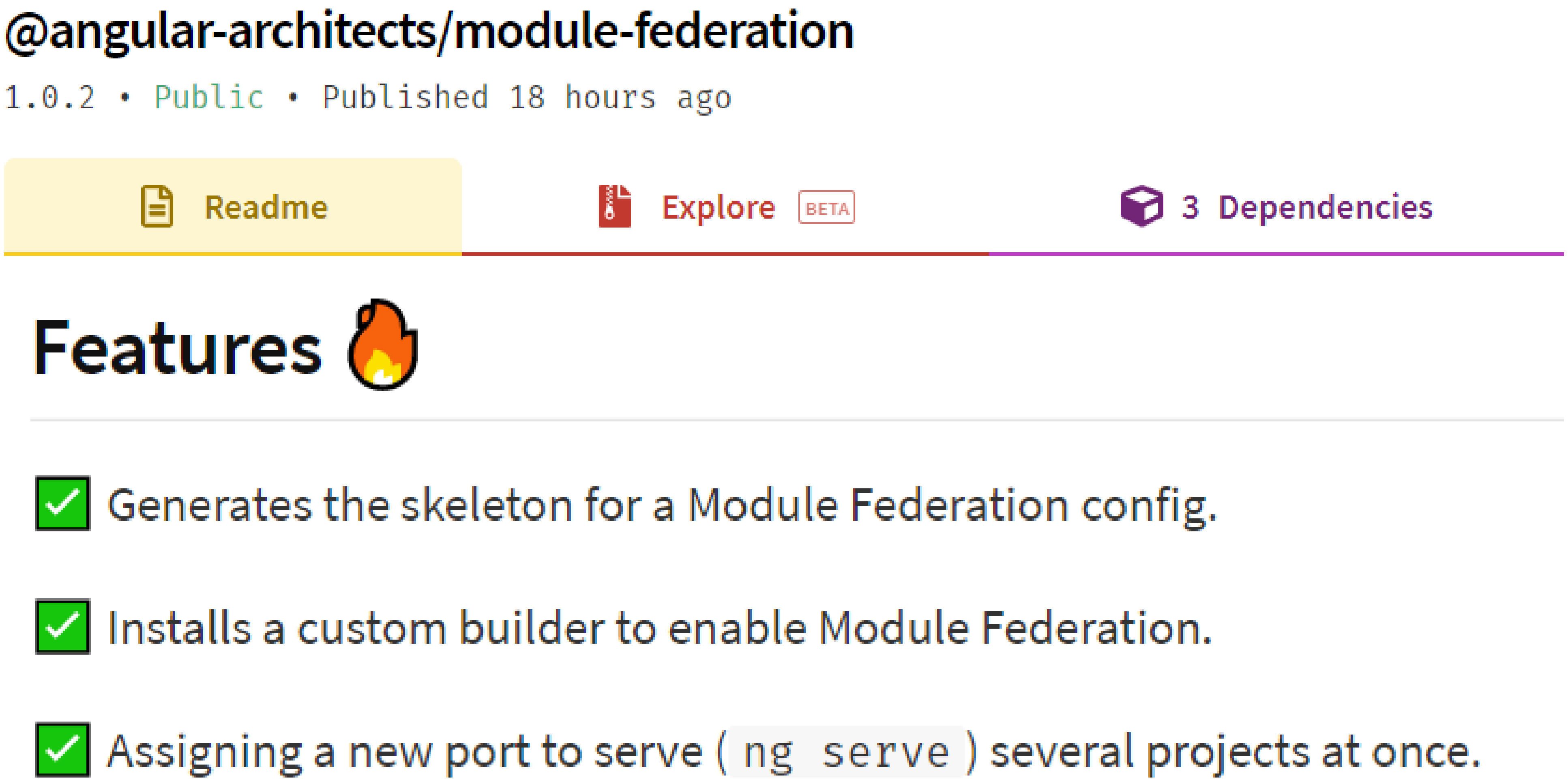


Custom Builder

Angular CLI

webpack

Module Federation
Configuration



@angular-architects/module-federation

1.0.2 • Public • Published 18 hours ago

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.

Usage

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

DEMO

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Multi Framework/ Version Solutions

Module Federation

```
const Component = await import('other-app/cmp');
```

Module Federation

```
const main = await import('other-app/main');

main.bootstrap();
```

Module Federation

```
const rootElm = document.createElement('app-root')
document.body.appendChild(rootElm);

const main = await import('other-app/main');

main.bootstrap();
```

Module Federation

```
const rootElm = document.createElement('app-root')
document.body.appendChild(rootElm);

await import('other-app/main'); // Self-Bootstrapping
```

Routing to Another SPA?

WrapperComponent

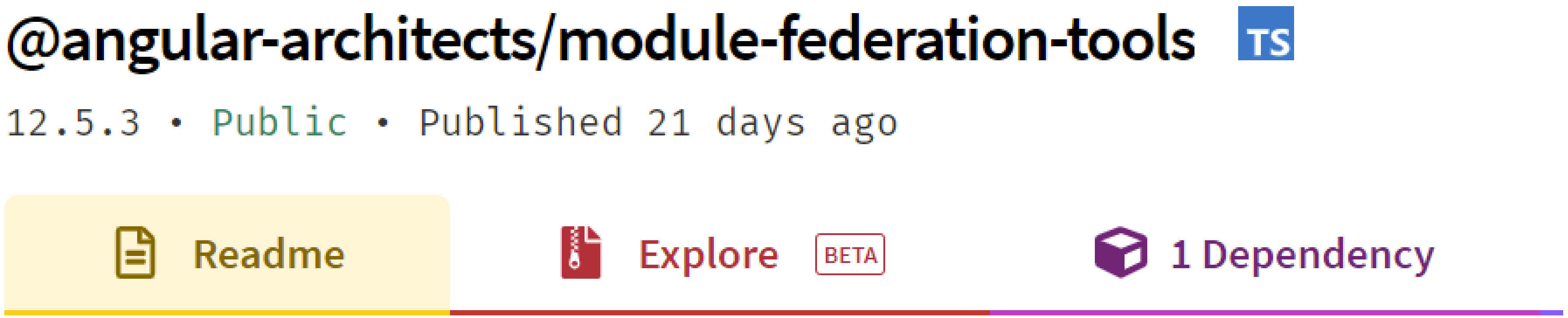
```
const rootElm = document.createElement('app-root')
document.body.appendChild(rootElm);

await import('other-app/main');
```

Challanges

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

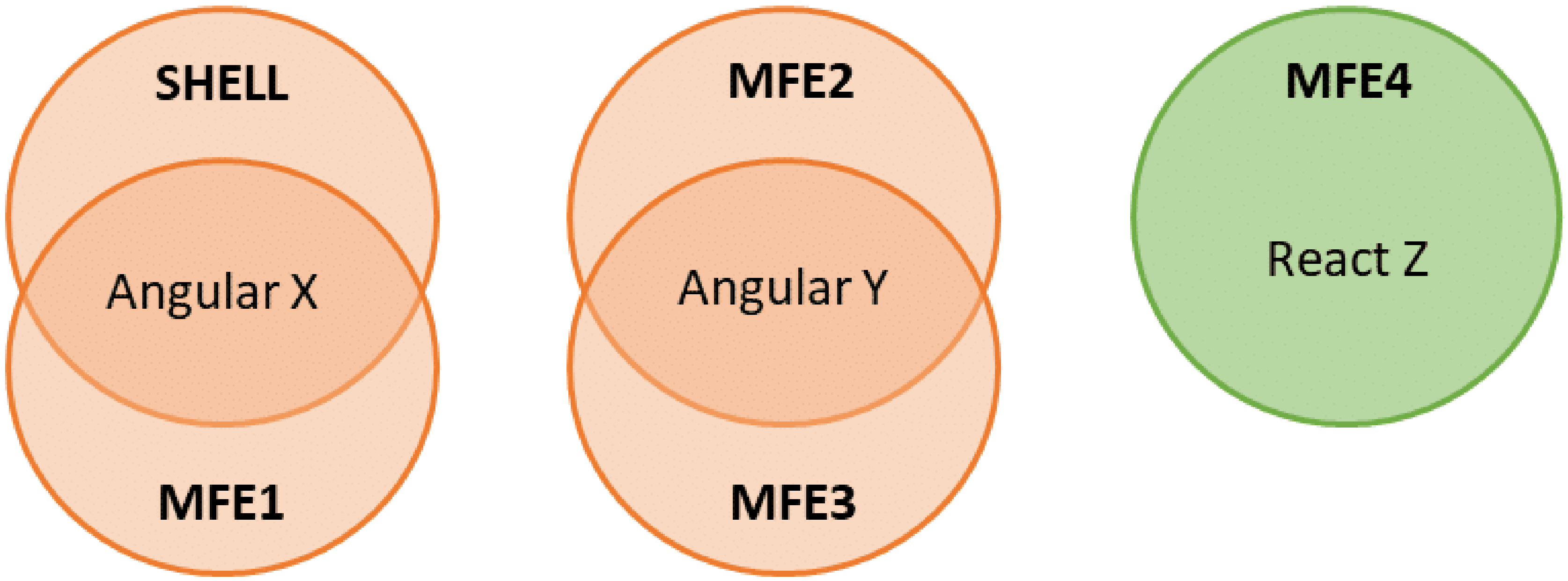
Challanges & Solutions



@angular-architects/module-federation-tools

12.5.3 • Public • Published 21 days ago

Result

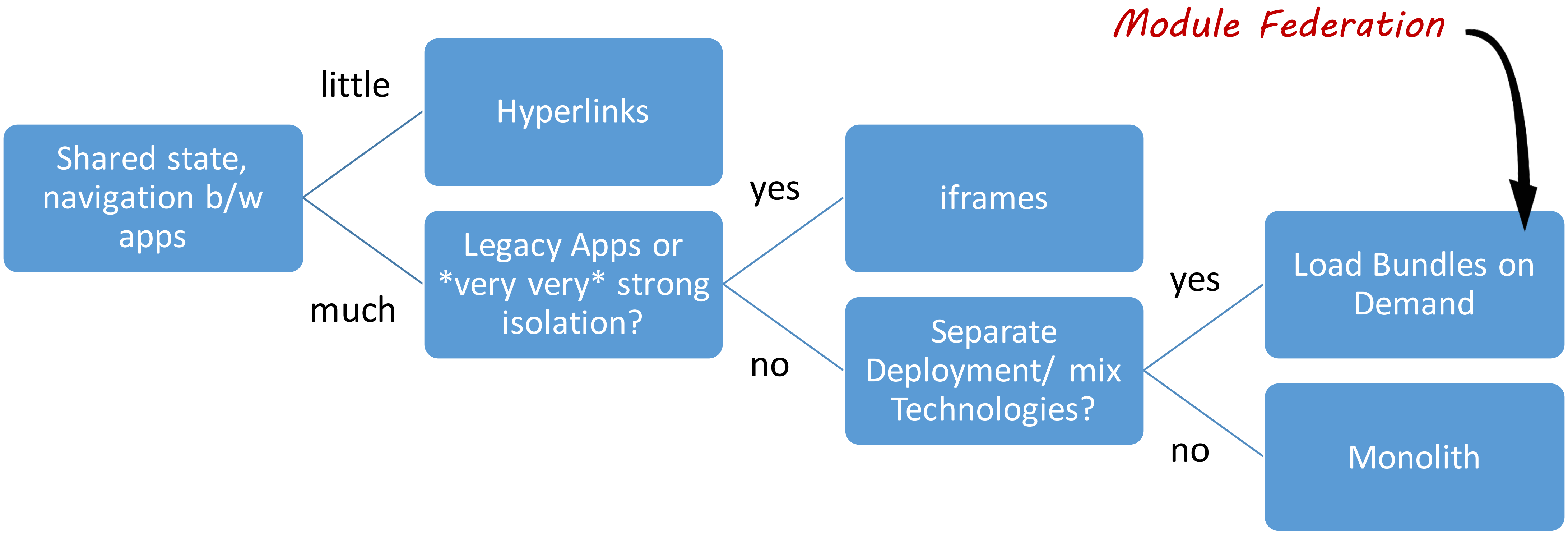


DEMO

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

Choosing a Solution

Some General Advice



Shared state, navigation b/w apps

little

Hyperlinks

much

Legacy Apps or *very very* strong isolation?

yes

iframes

no

Separate Deployment/ mix Technologies?

yes

Load Bundles on Demand

no

Monolith

Module Federation