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Avoidifying Over-Complexification

Rooting Out Over-Engineering in Your Projects

Jonathan “J.” Tower


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credit: scienceworld.scholastic.com

Identify **10 Types** of Over-Engineering

10 Rules to Help Avoid It

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Jonathan "J." Tower

Principal Consultant & Partner

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Microsoft MVP in .NET

jtower@trailheadtechnology.com

trailheadtechnology.com/blog

jtowermi

jtower

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10 Common Types of Over-Engineering

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Gold-Plating

Over-Engineering Type 1

Sources of Gold-Plating

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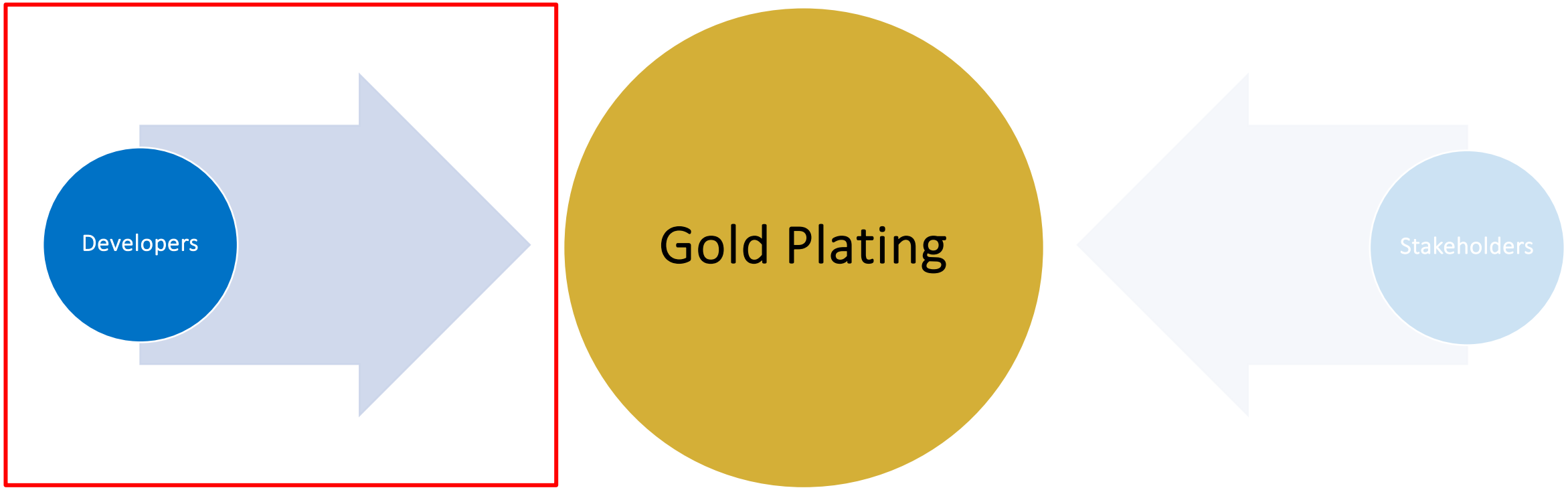
Sources of Gold-Plating



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Reasons Developers Gold-Plate

Perfectionism

Burned Previously

Personal Interest

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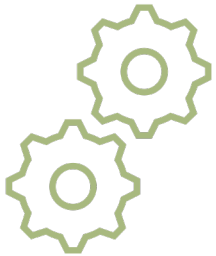
Issues With Gold-Plating



Complexity

Time & Cost

Loss of Focus

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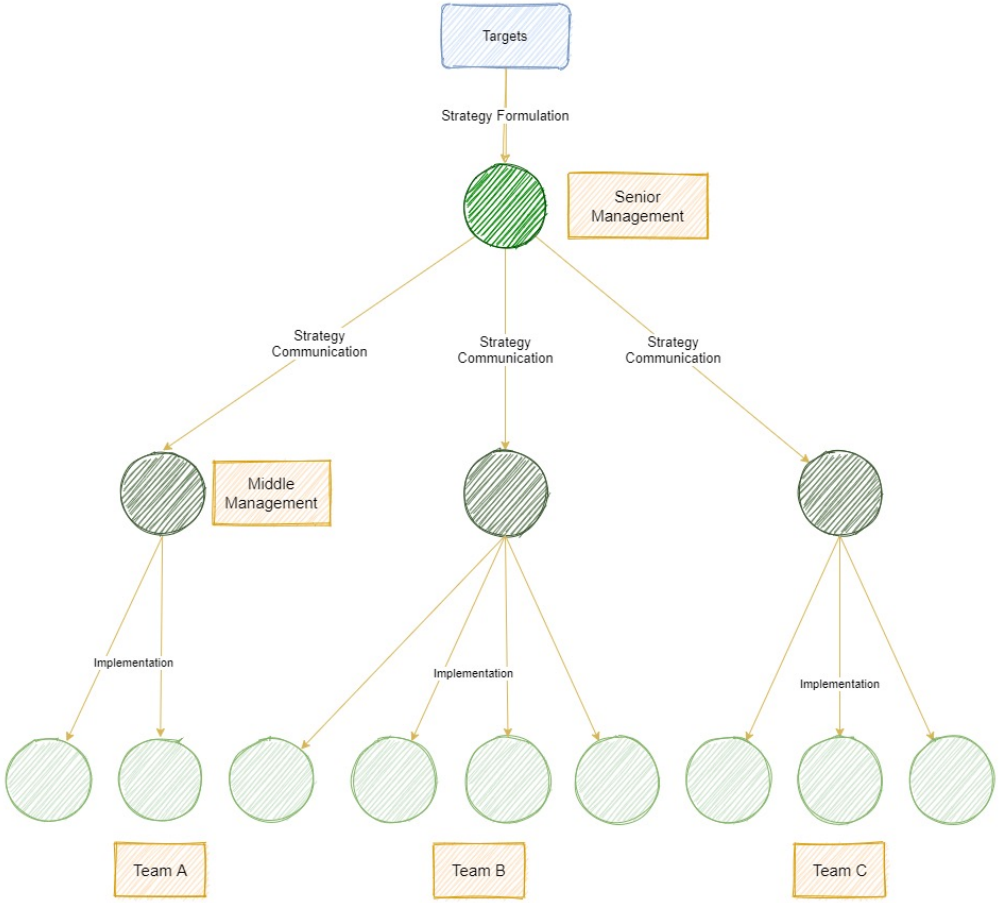
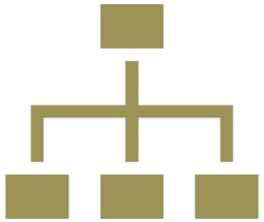
OO Gymnastics

Over-Engineering Type 2



Types of OO Gymnastics

Unnecessary Generics



Complex Inheritance Hierarchies

Properties for everything

Reasons Developers Do OO Gymnastics

Showing Off

Future Proofing

Personal Interest

Over-Abstraction

Over-Engineering Type 3

Over-Abstraction

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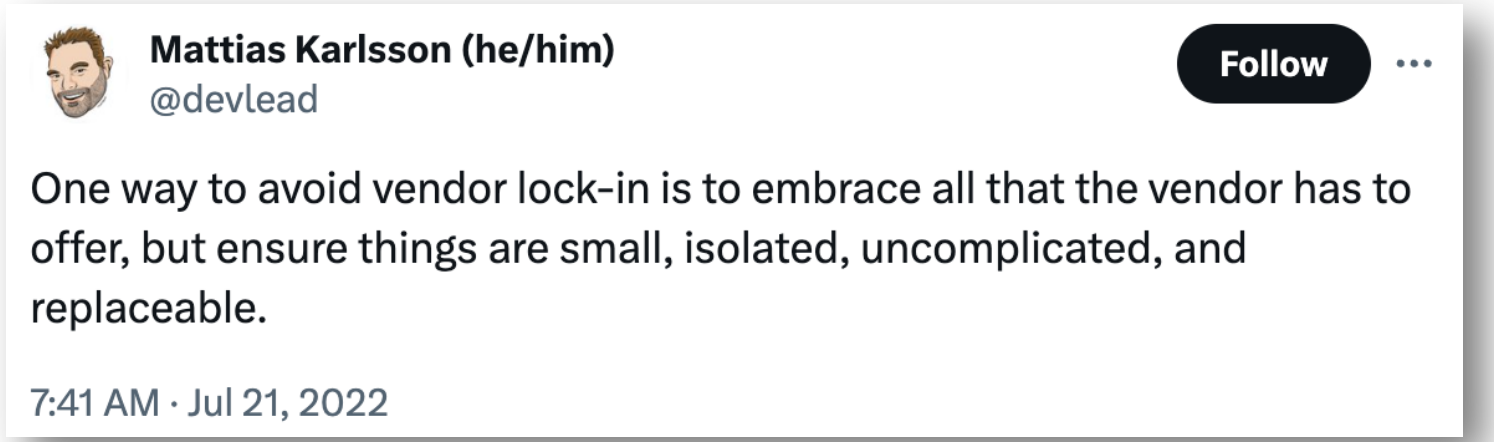
Reasons Developers Over-Abstract

Avoid Vendor Lock-In

Why You Don't Need Over-Abstraction

- Embrace all 3rd-party library has to offer
- Ensure to select libraries that:
  1. Are small
  2. Isolated
  3. Uncomplicated
  4. Replaceable



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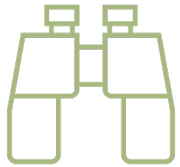
Over-Built Scalability

Over-Engineering Type 4

Reasons Developers Over-Build for Scalability



Anticipation of Future Needs

Fear of Rework

Influence of Trends

Pressure from Stakeholders

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Rule of Thumb

"Build your software for, at most, 1-2 orders of magnitude more than you currently need."

- J.

Issues with Over-Building for Scalability

Increased Time & Costs

Not Agile

Solving the Wrong Problems

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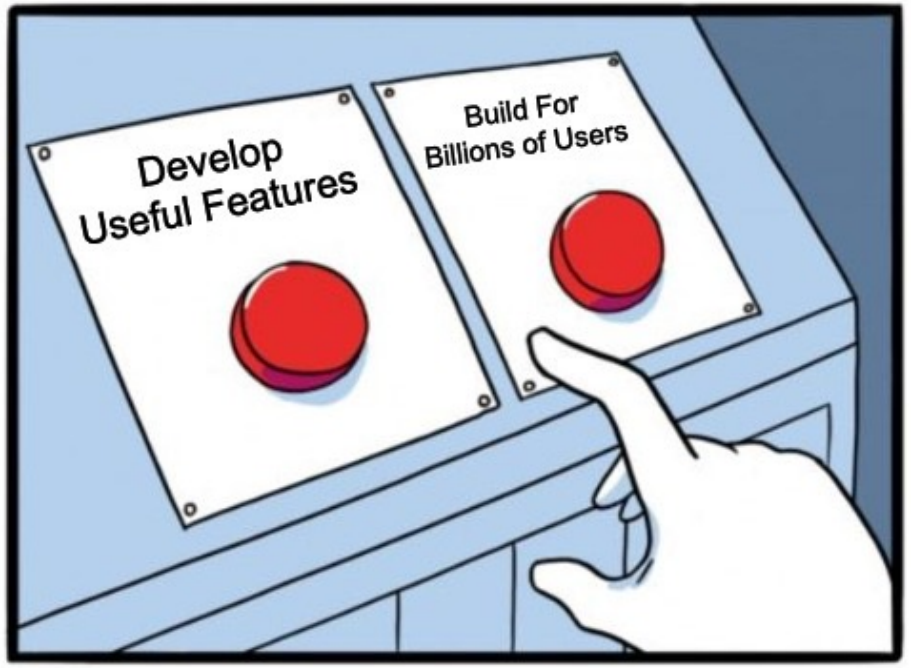
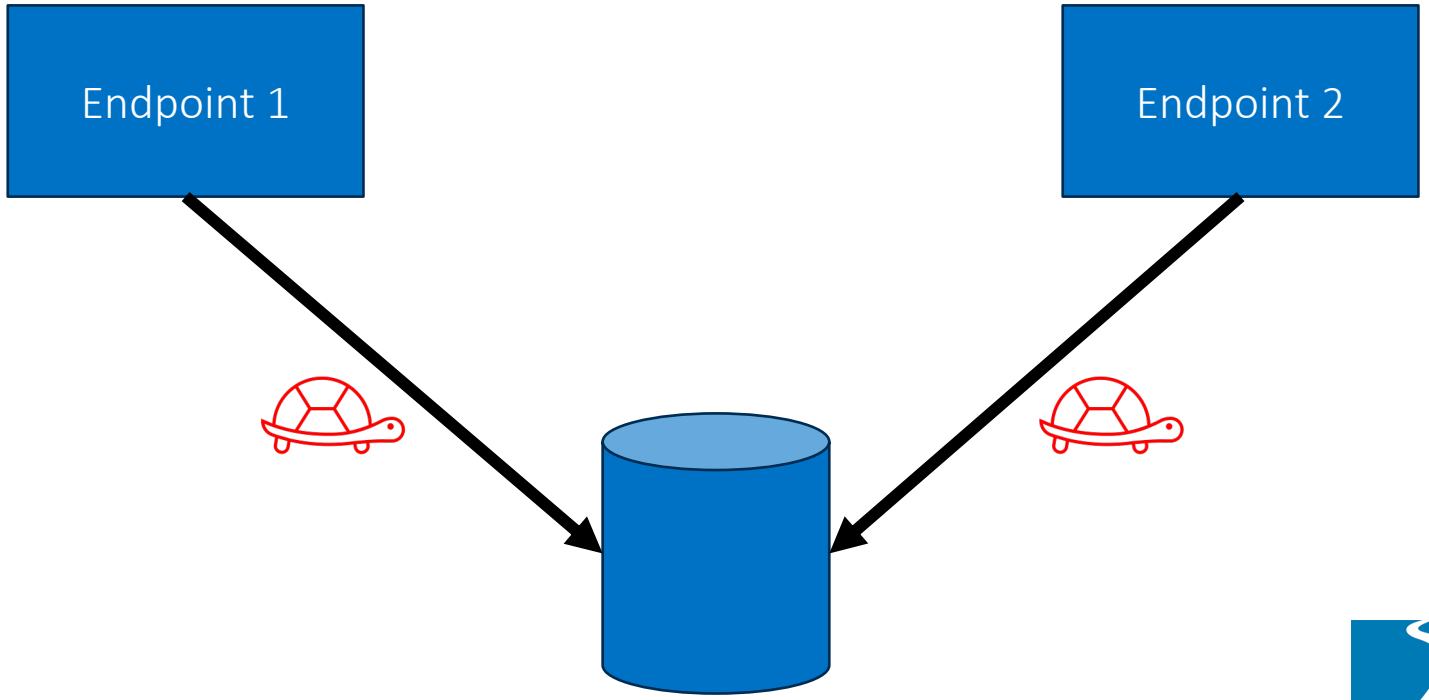
Premature Optimization

Over-Engineering Type 5



Premature Optimization



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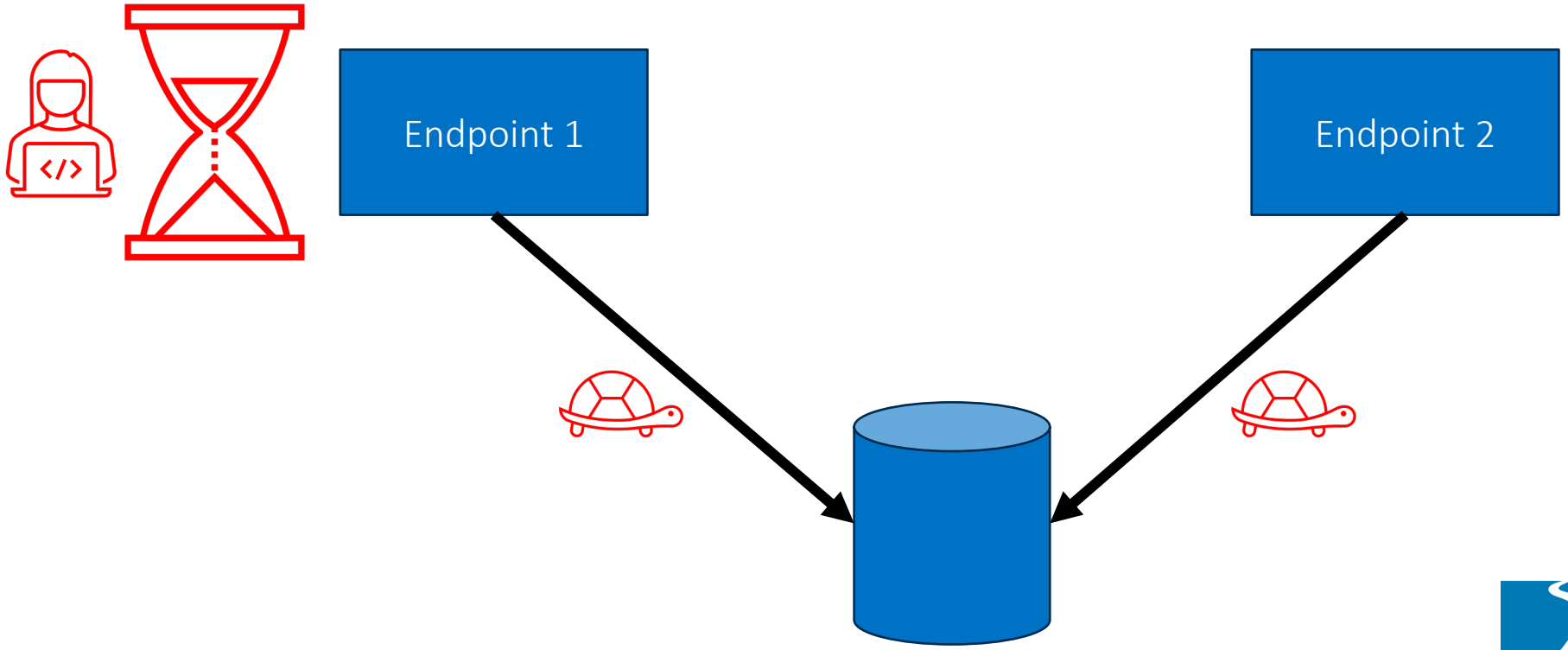
Premature Optimization



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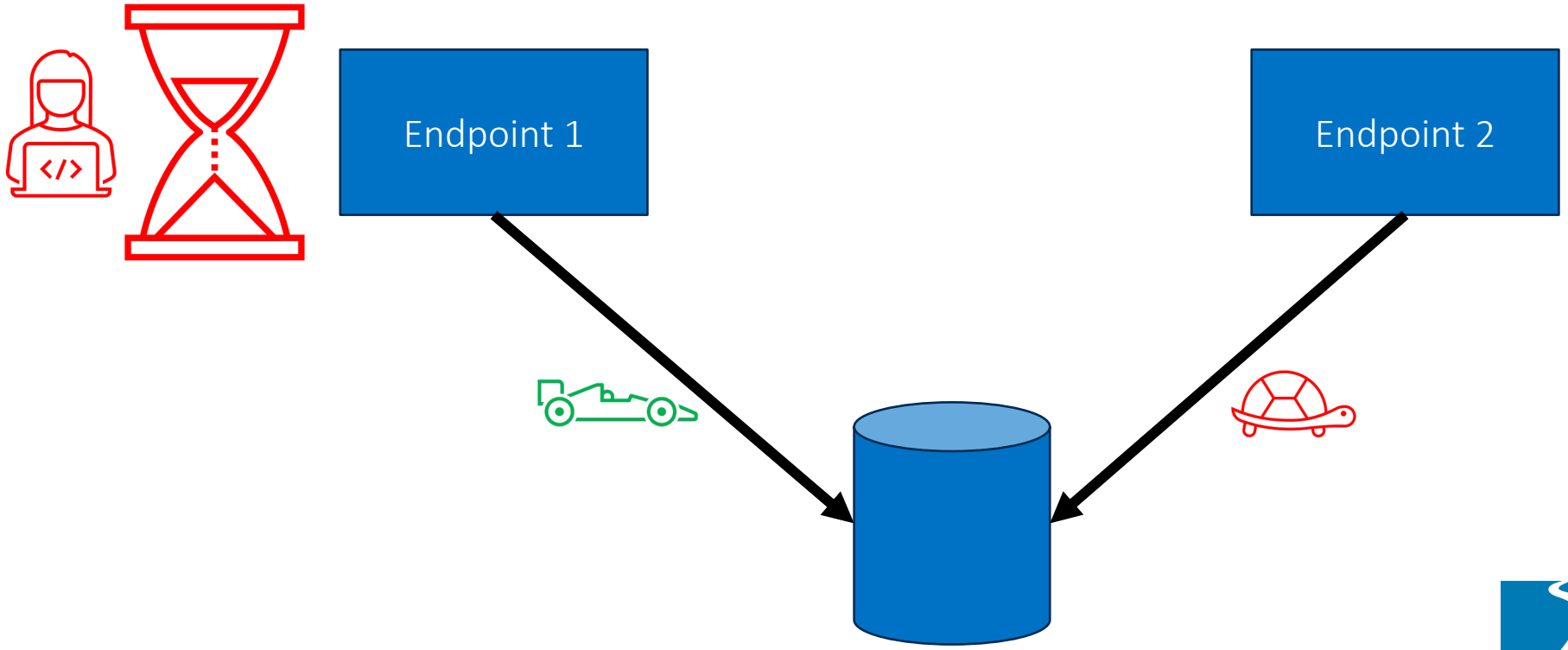
Premature Optimization



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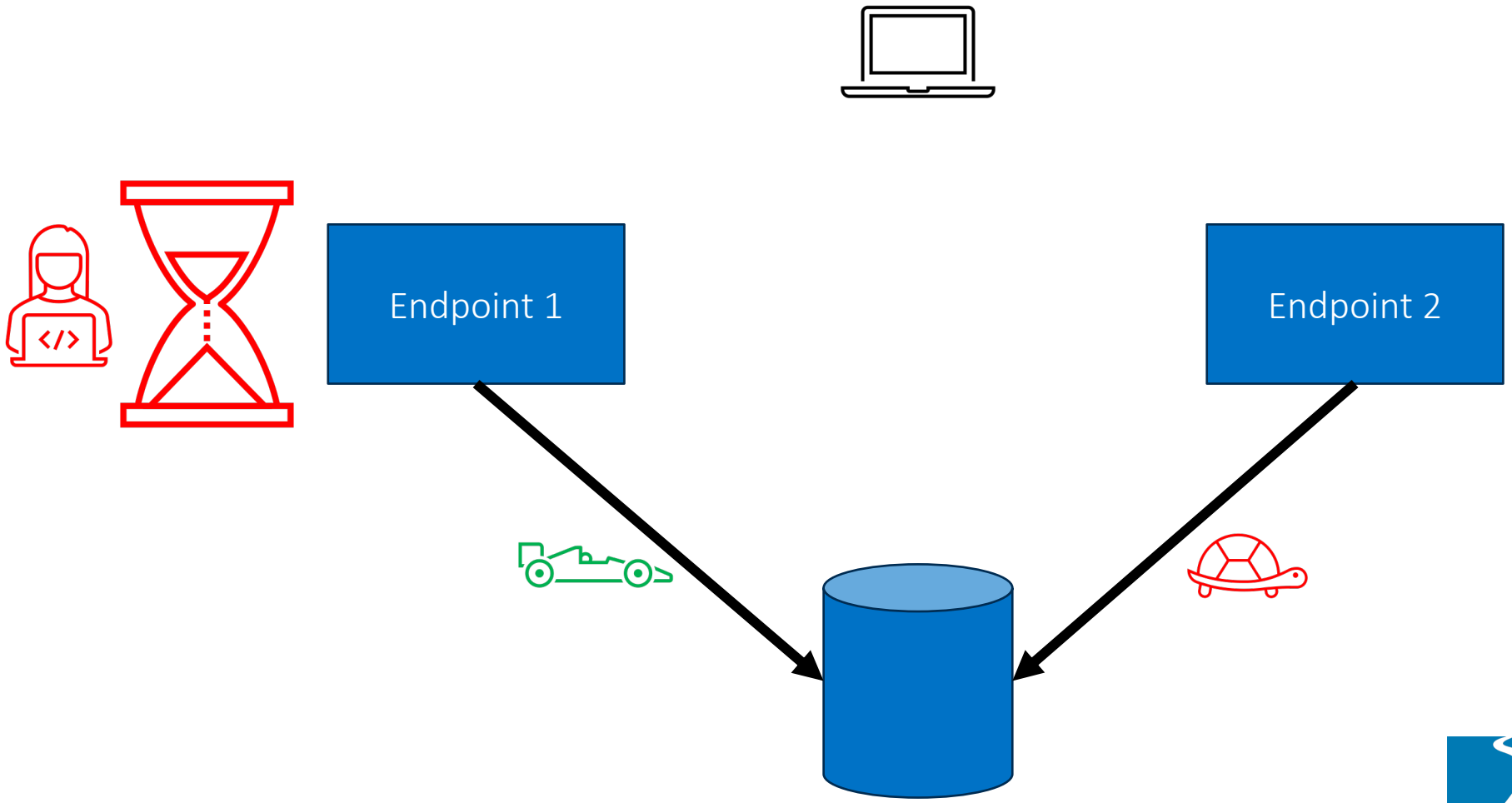
Premature Optimization



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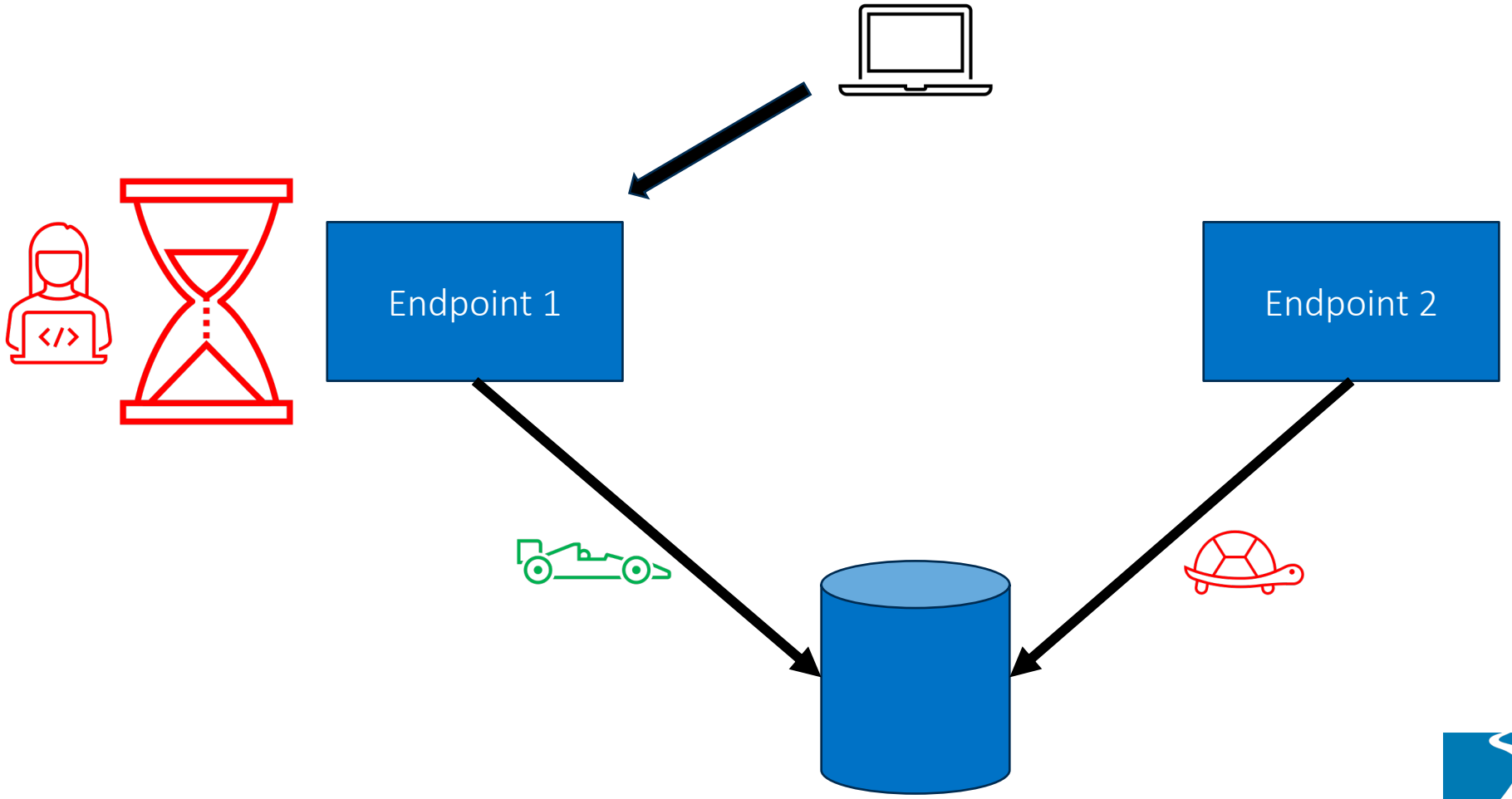
Premature Optimization



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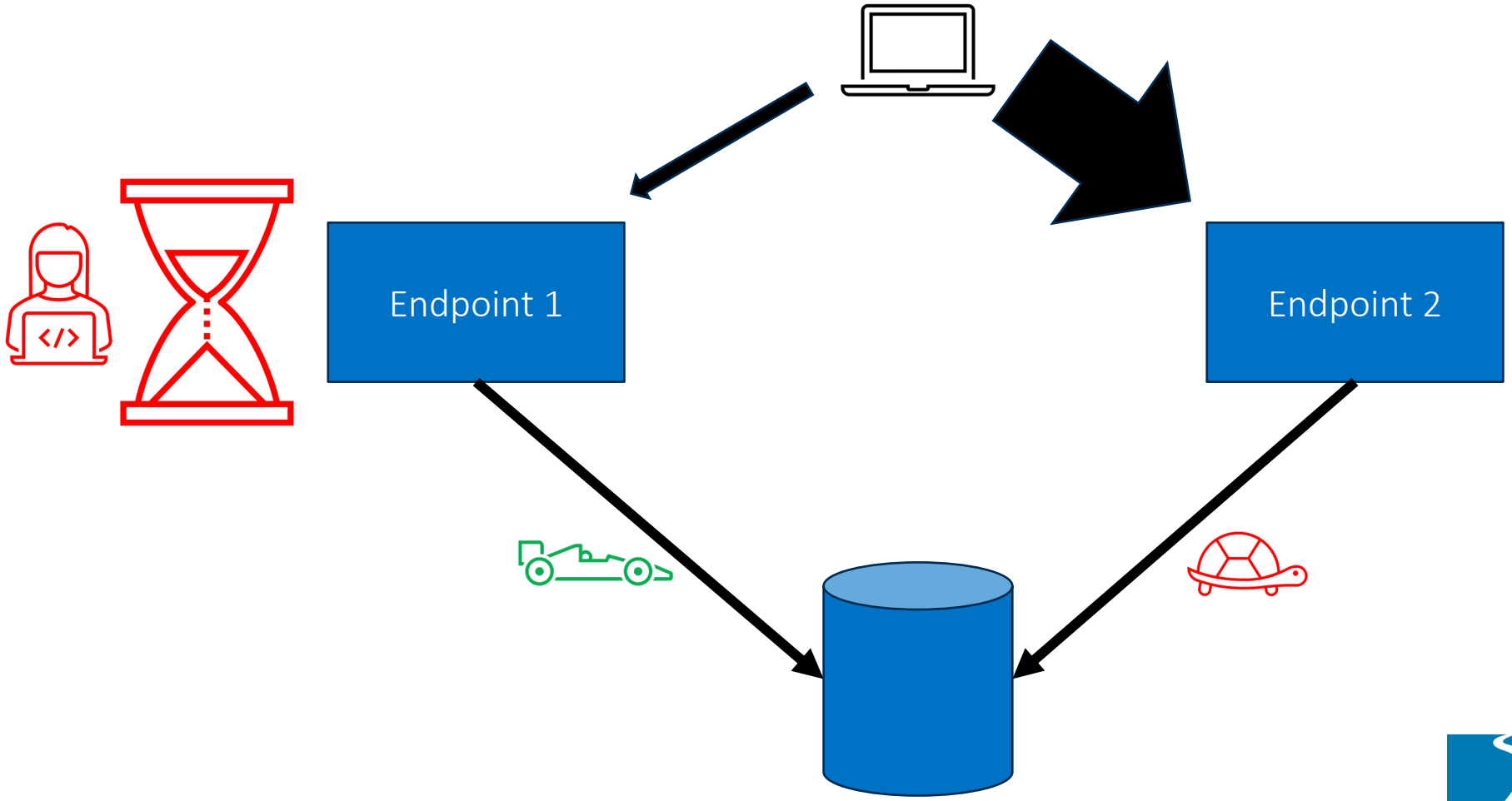
Premature Optimization



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Reasons Developers Optimize Prematurely

Perfectionism

Assumptions About Performance Needs

Fear of Future Performance Issues

Influence of High-Performance Domains

Preemptive Solution to Rare Issues

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Issues with Premature Optimization

Increased Costs

Extended
Development Time

Solving the Wrong
Problems

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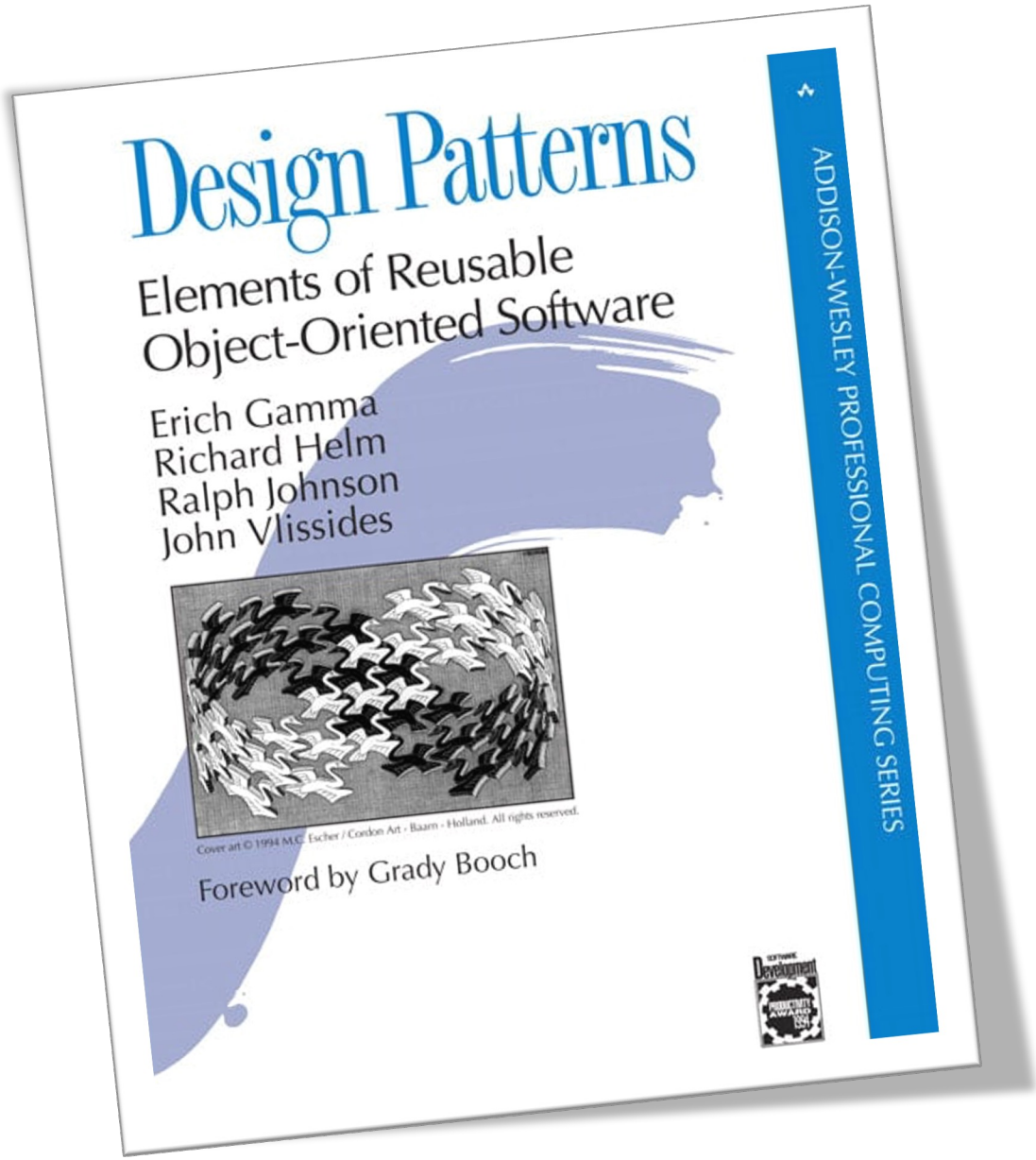
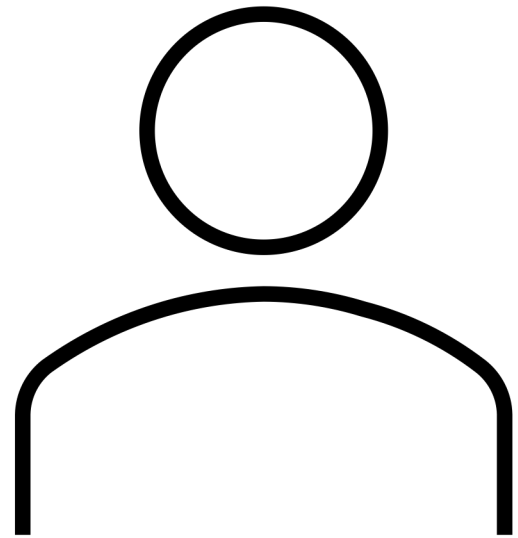
Overuse of Design Patterns

Over-Engineering Type 6

Design Patterns

Abstract Factory
Builder
Factory Method
Object Pool
Prototype
Singleton
Adapter
Bridge
Composite
Decorator
Facade
Flyweight
Private Class Data
Proxy
Chain of responsibility
Command
Interpreter
Iterator
Mediator
Memento
Null Object
Observer
State
Strategy
Template method
Visitor





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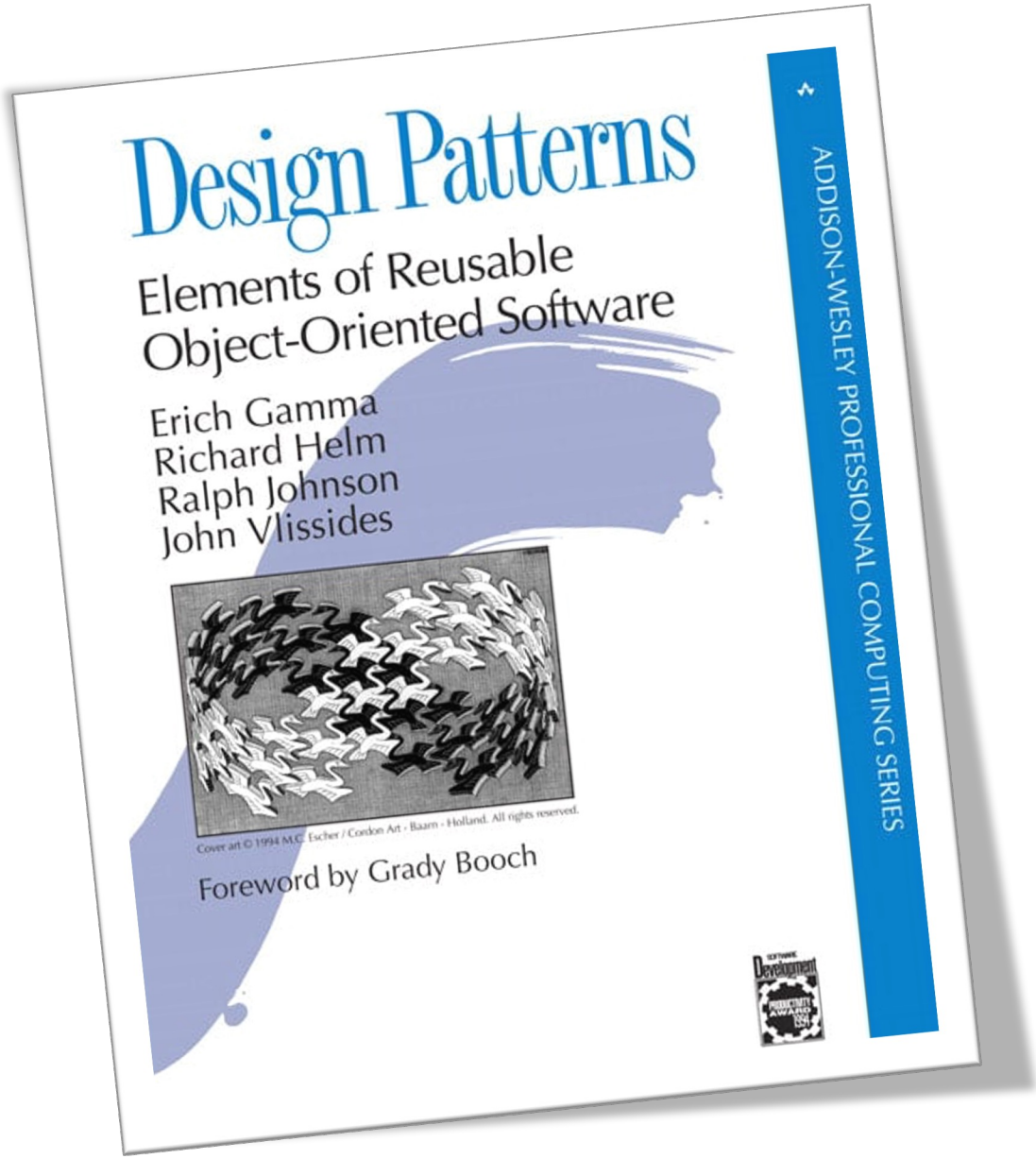

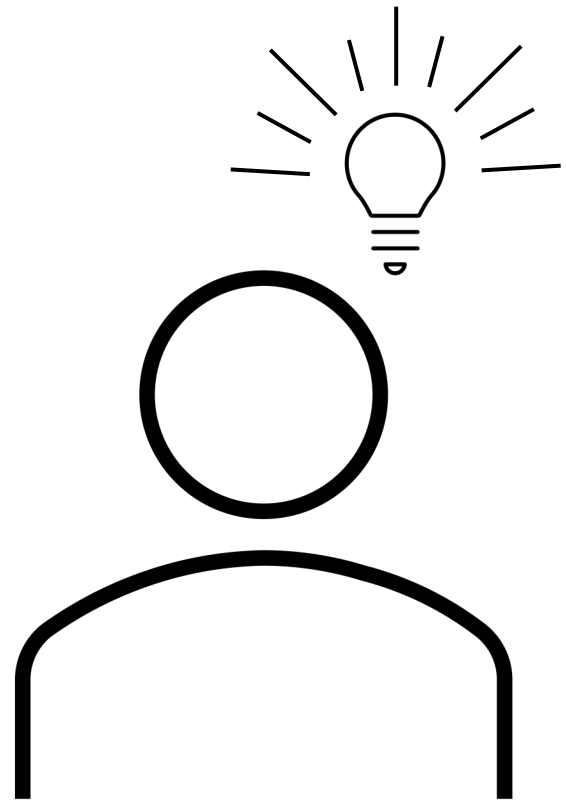

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“If the only tool **you have is a hammer**, it is tempting to treat **everything** as if it were a nail.”

- Abraham Maslow

Reasons Developers Overuse Design Patterns

Educational Enthusiasm

Misunderstanding of Design Patterns

Desire to Follow Best Practices

Peer Pressure and Industry Trends

Fear of Code Smells

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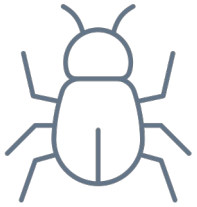
Issues with Overuse of Design Patterns

Increased Costs

Extended Development Time



Higher Risk Of Bugs

Slowing New Developers

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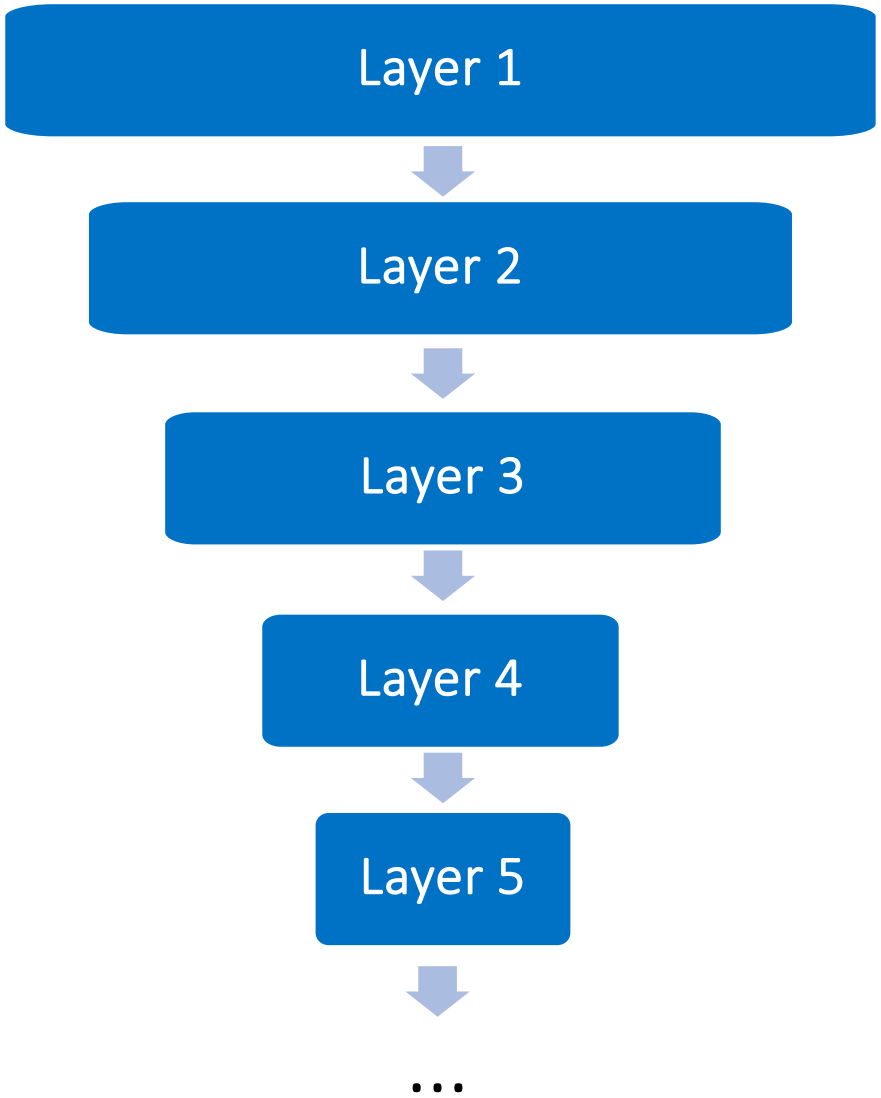
Lasagna Architecture

Over-Engineering Type 7

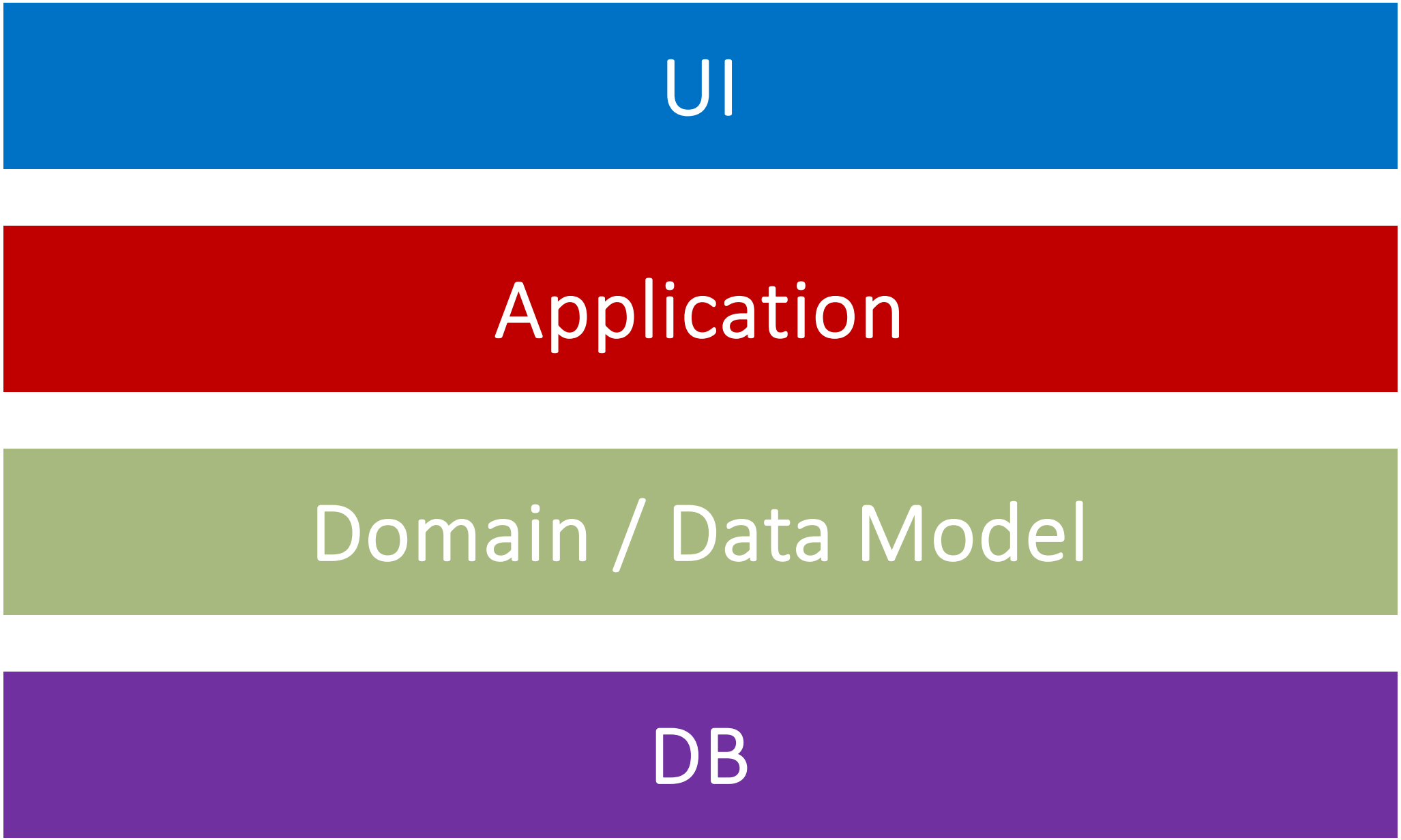
Too Many Layers

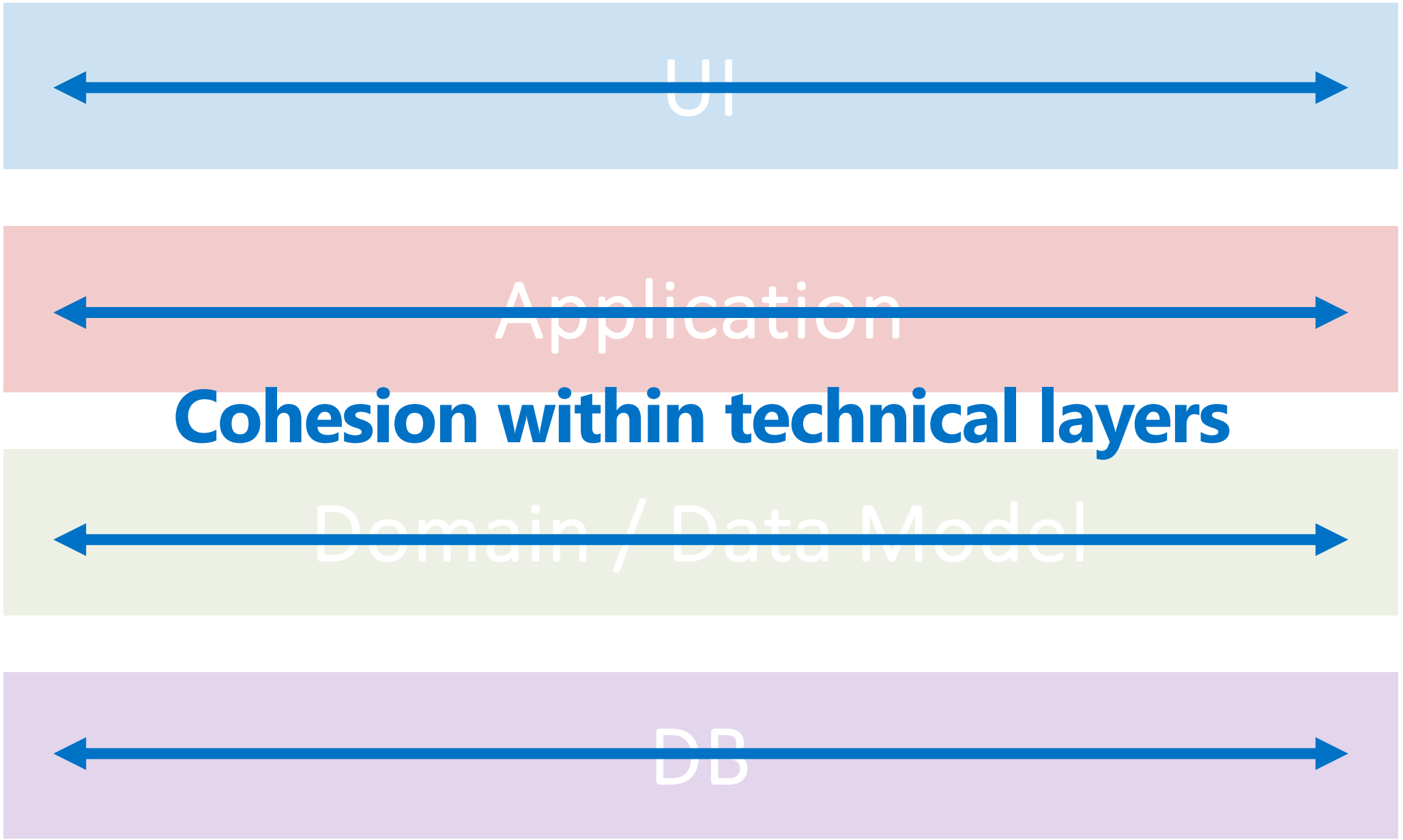


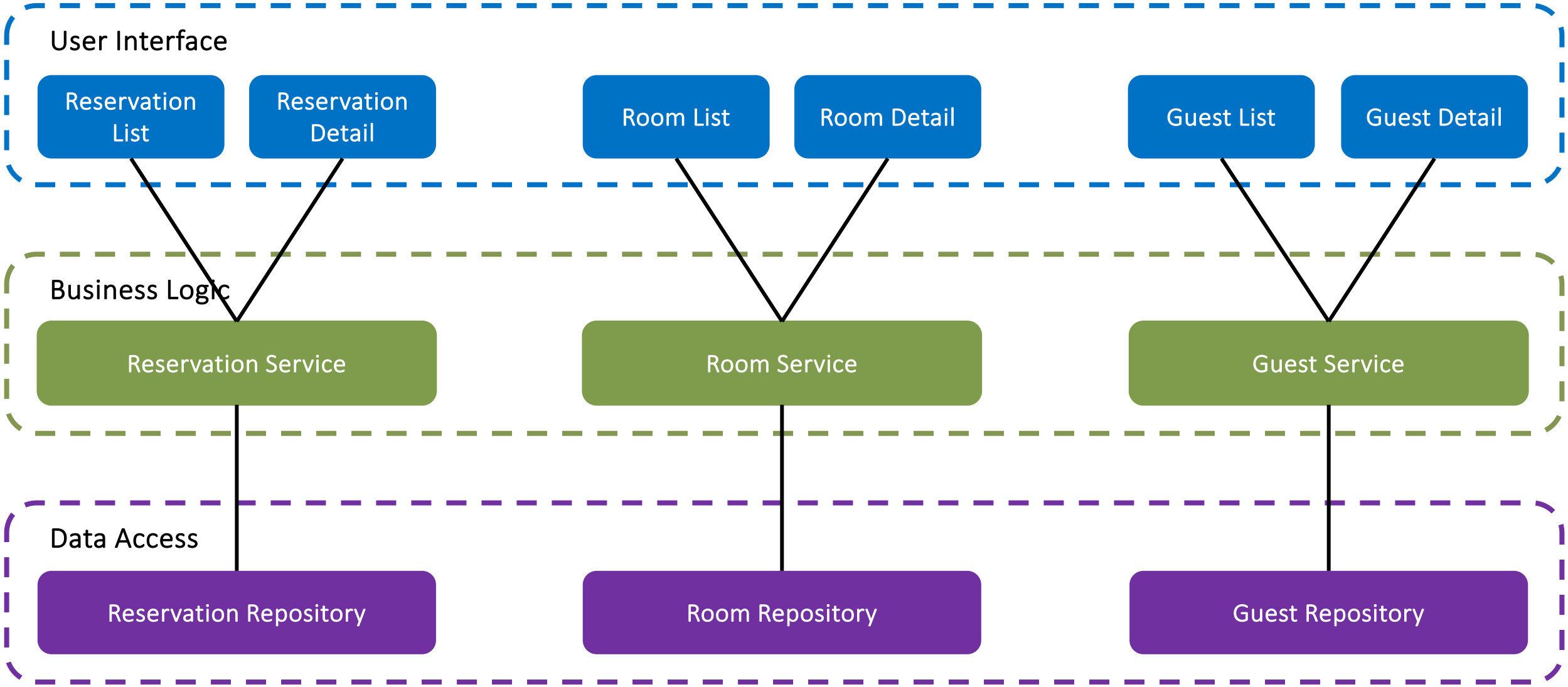
Vertical Slice Architecture

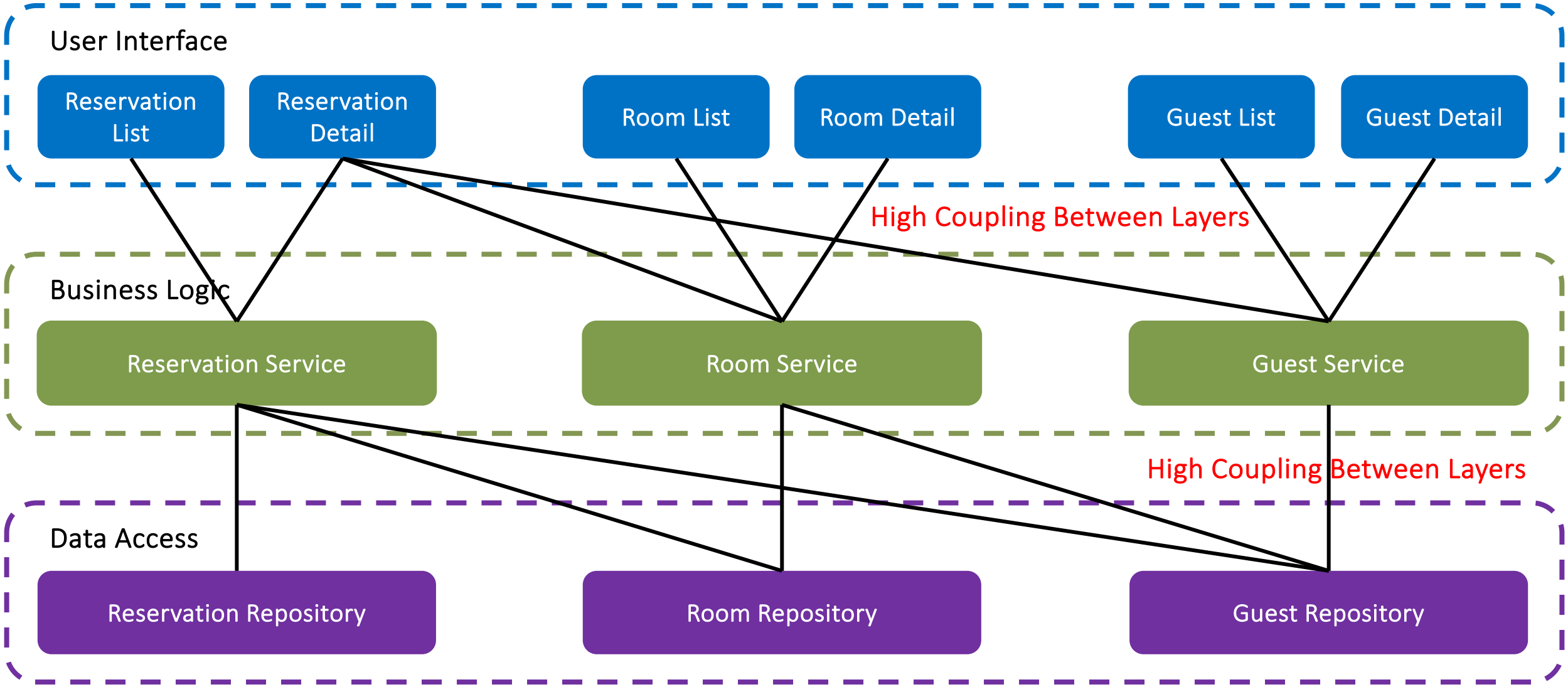
Vertical slice architecture is a **software architecture** pattern that **organizes** code **by features** or use cases **instead of technical** concerns.

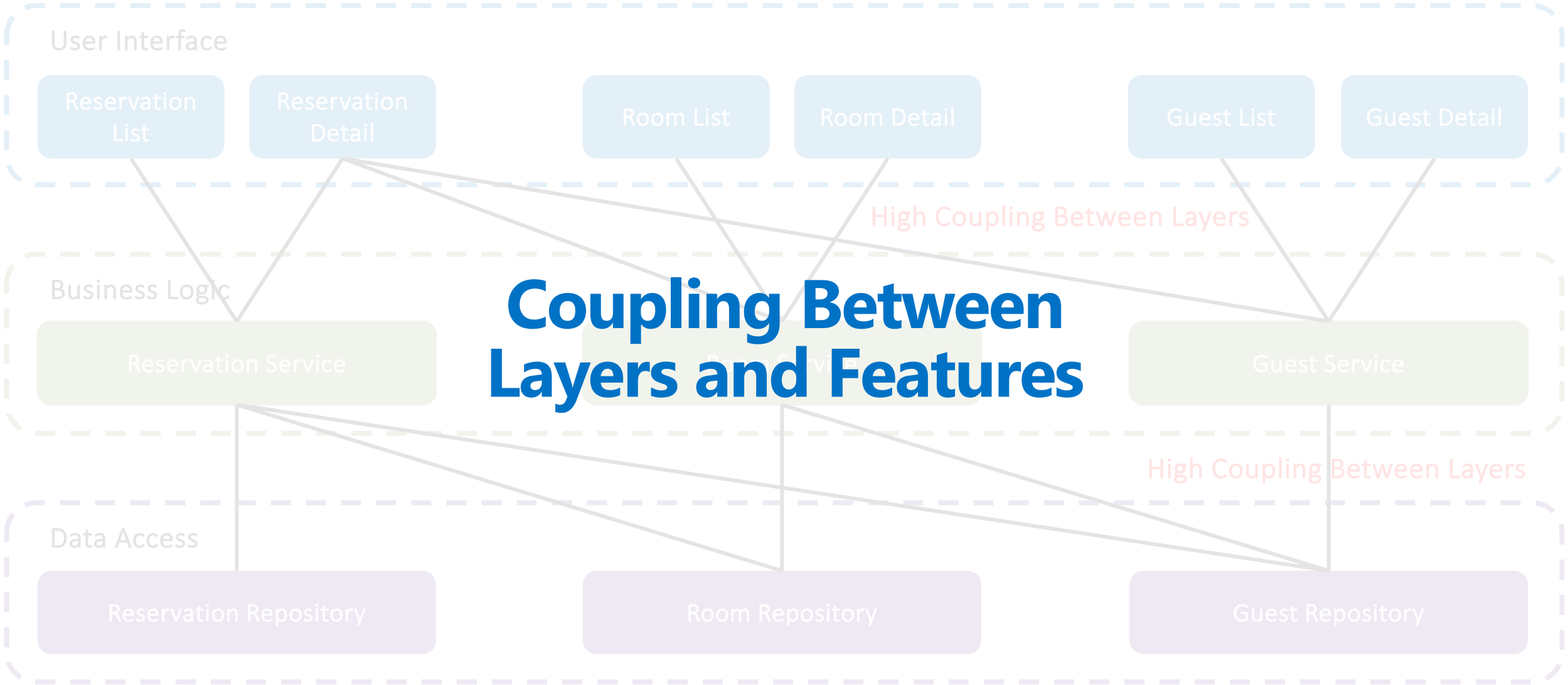
No more layers for their own sake!


UI
Application
Domain / Data Model
DB

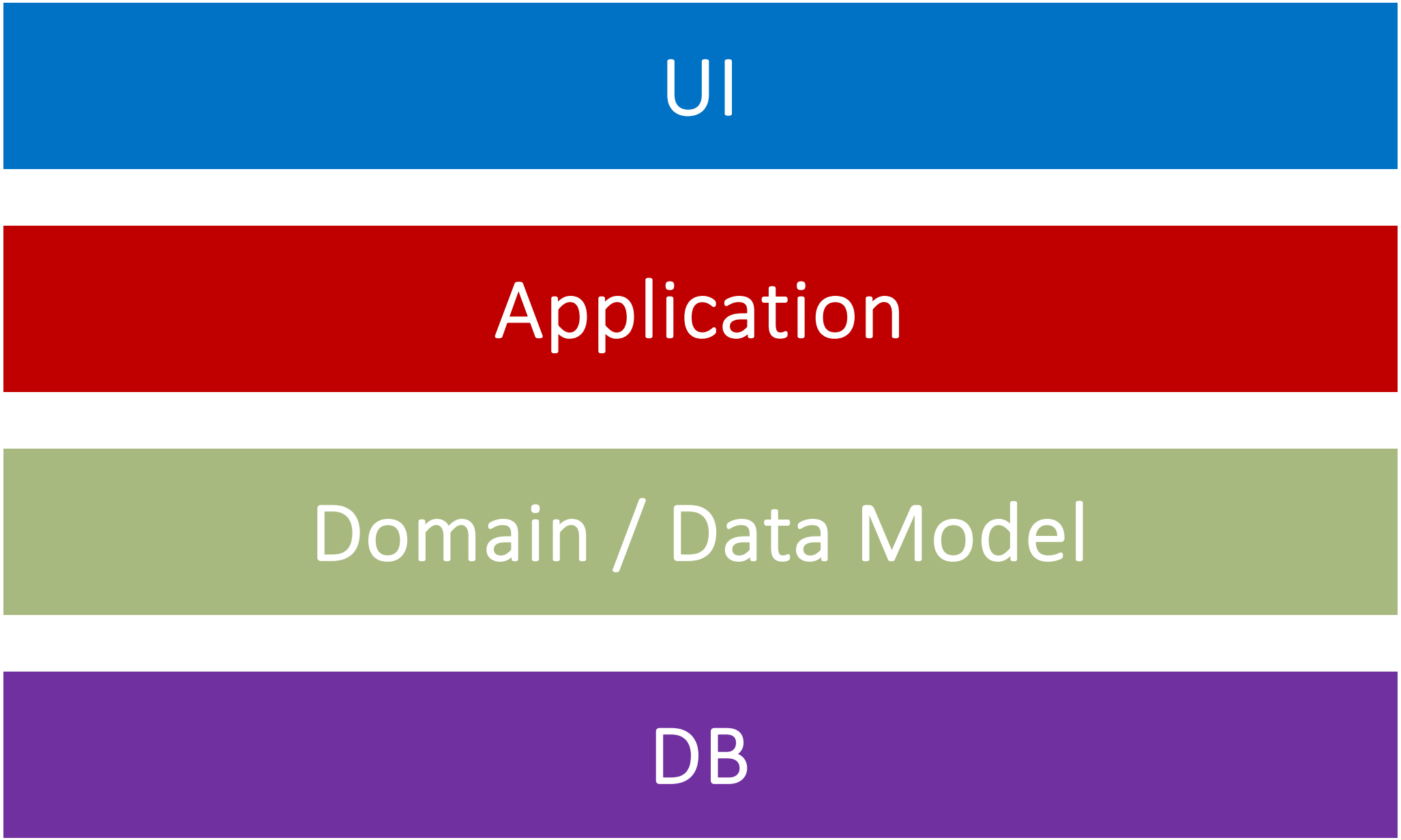

UI
Application
Cohesion within technical layers
Domain / Data Model
DB


User Interface
Reservation List
Reservation Detail
Room List
Room Detail
Guest List
Guest Detail
Business Logic
Reservation Service
Room Service
Guest Service
Data Access
Reservation Repository
Room Repository
Guest Repository


User Interface
Reservation List
Reservation Detail
Room List
Room Detail
Guest List
Guest Detail
High Coupling Between Layers
Business Logic
Reservation Service
Room Service
Guest Service
High Coupling Between Layers
Data Access
Reservation Repository
Room Repository
Guest Repository



Coupling Between Layers and Features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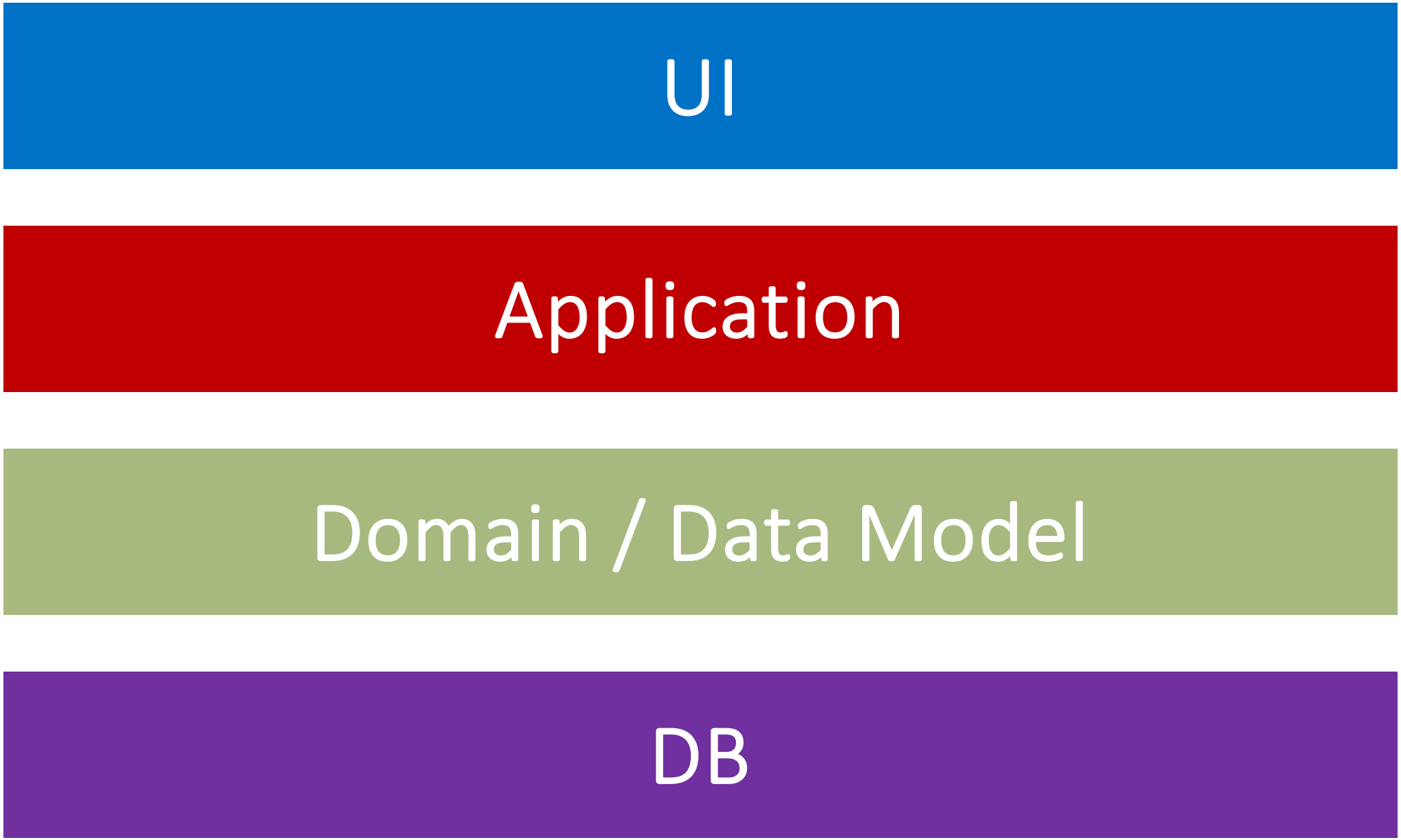
Application
Domain / Data Model
DB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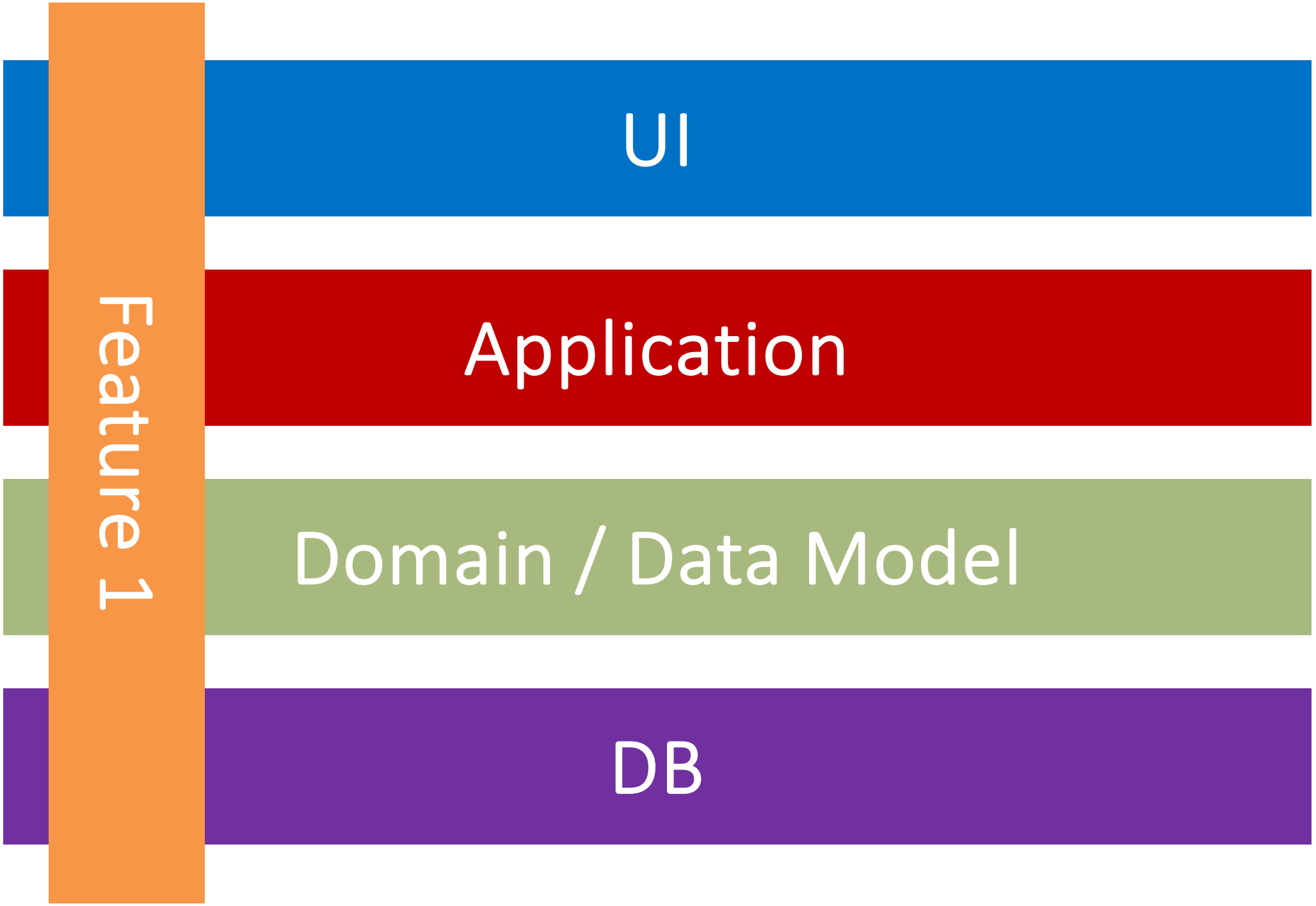
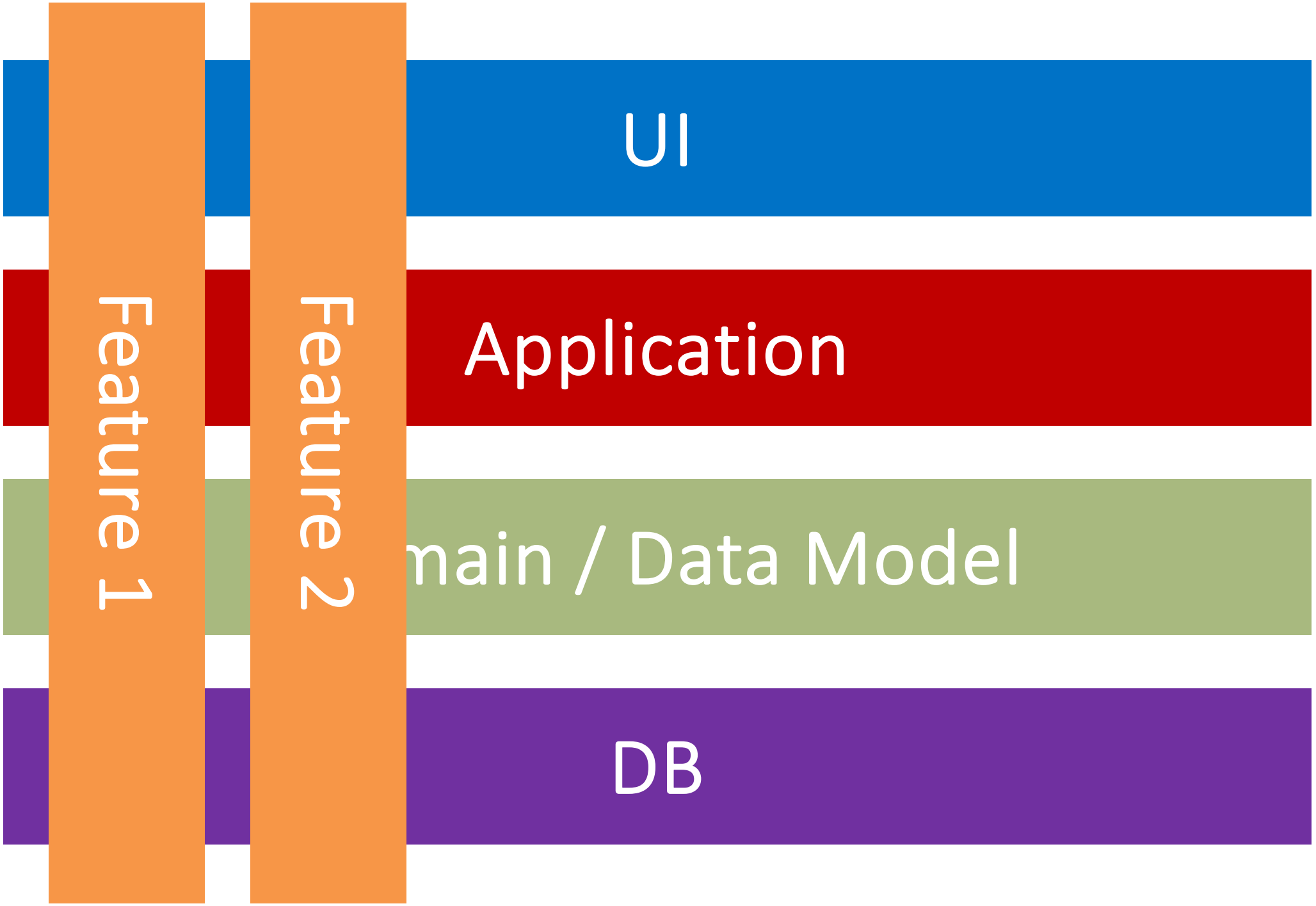
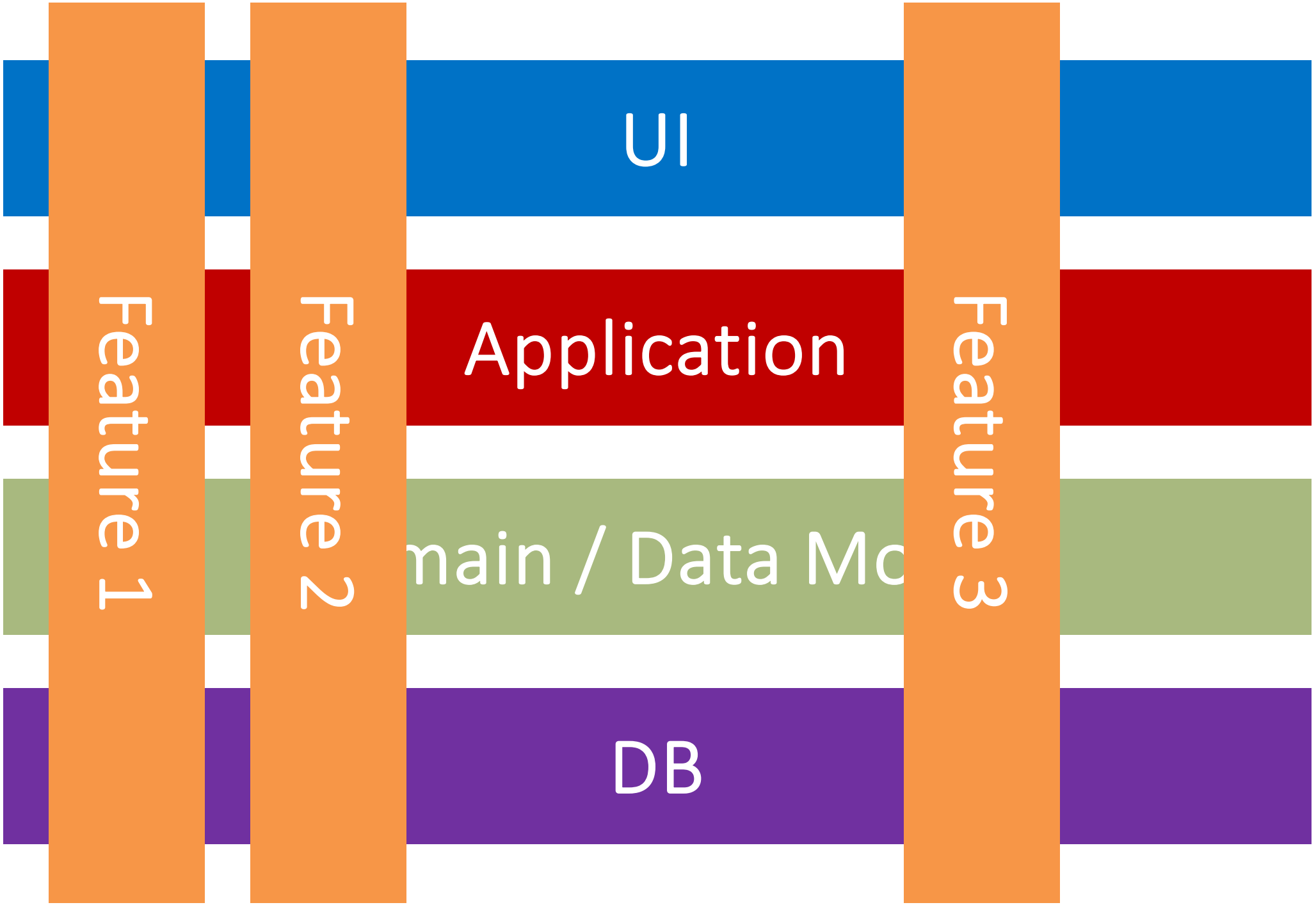

UI
Application
Domain / Data Model
DB
Feature 1


UI
Application
main / Data Model
DB
Feature 1
Feature 2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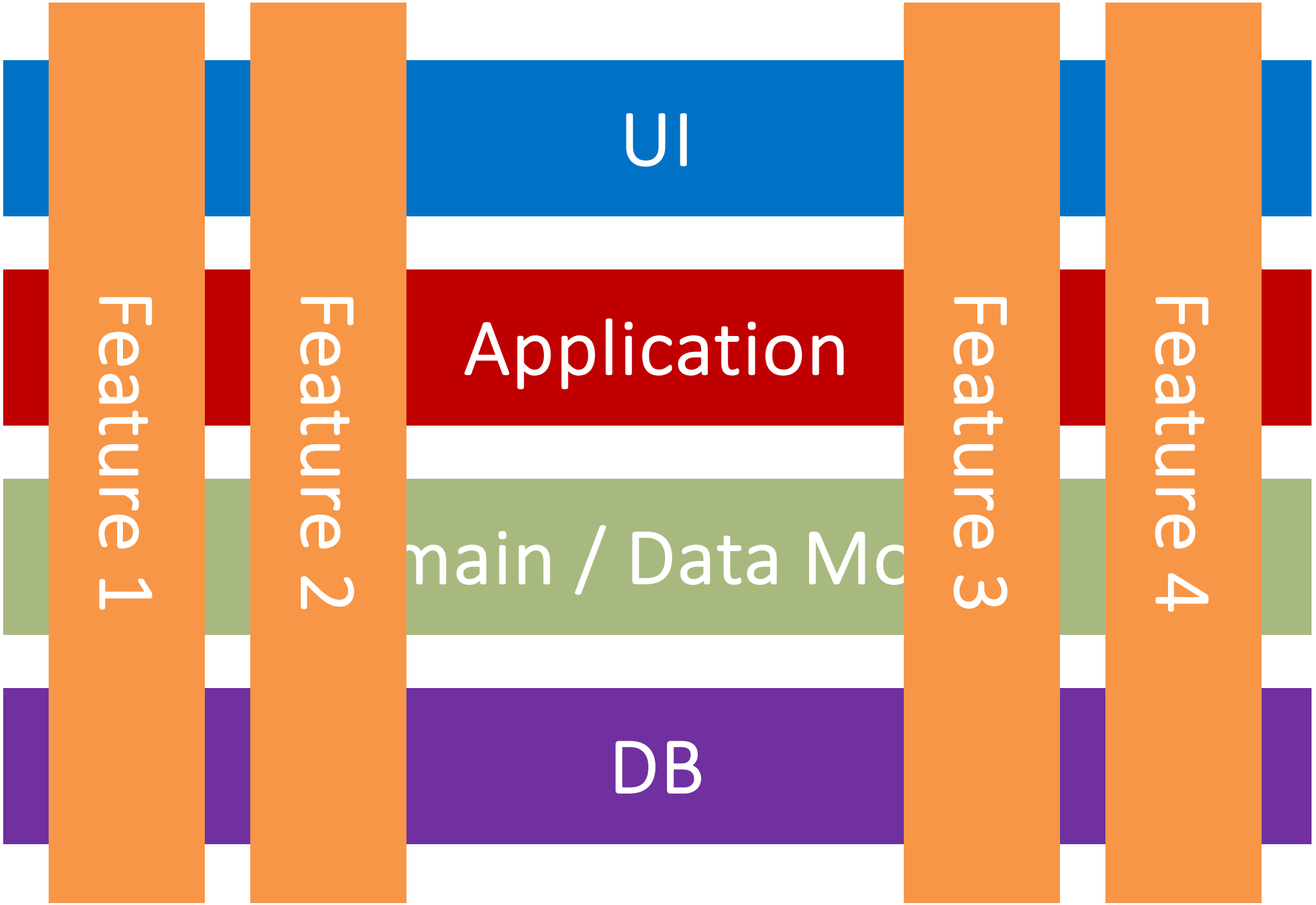
Feature 1
Feature 2
Feature 3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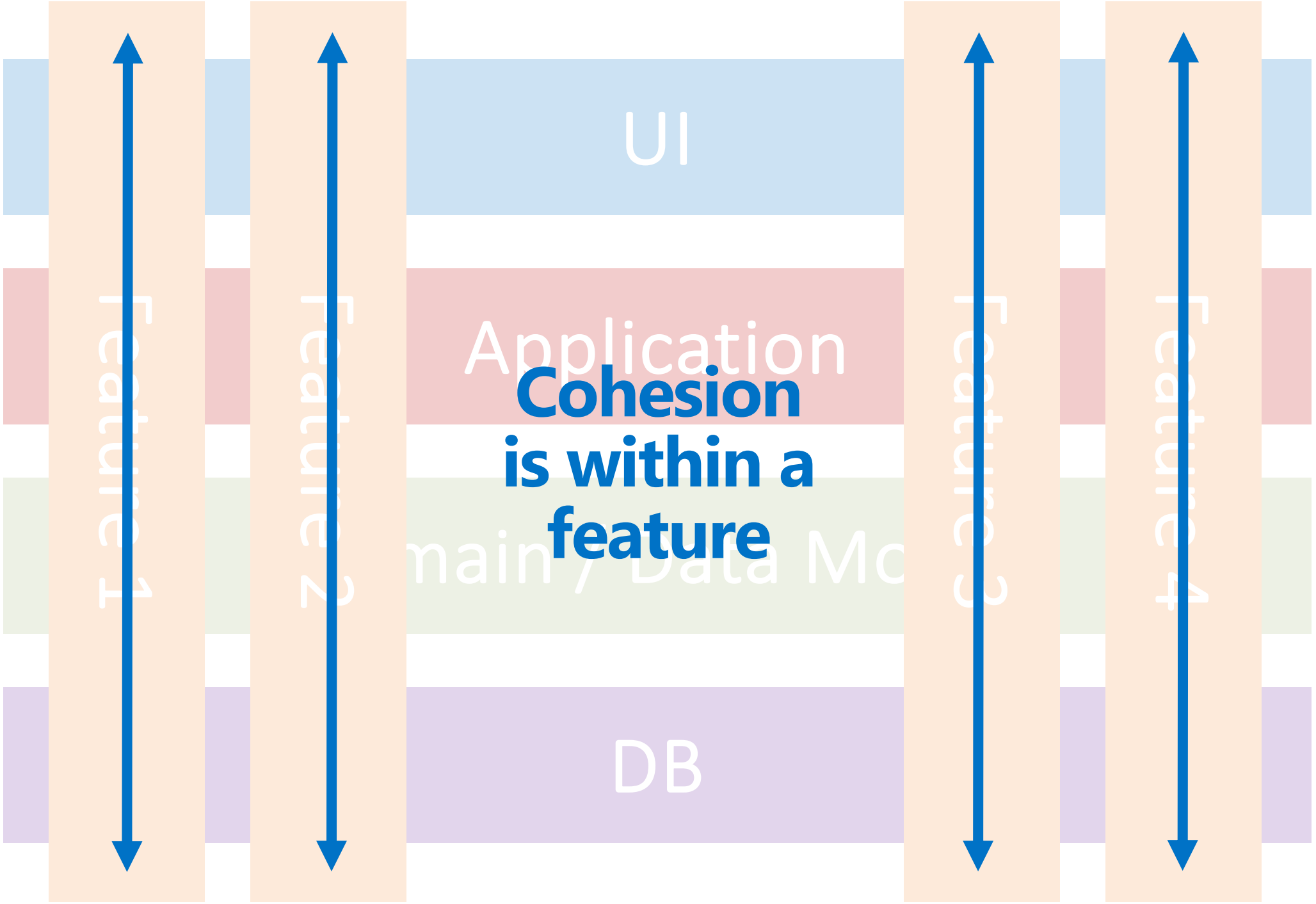
DB
Feature 1
Feature 2
Feature 3
Feature 4


UI
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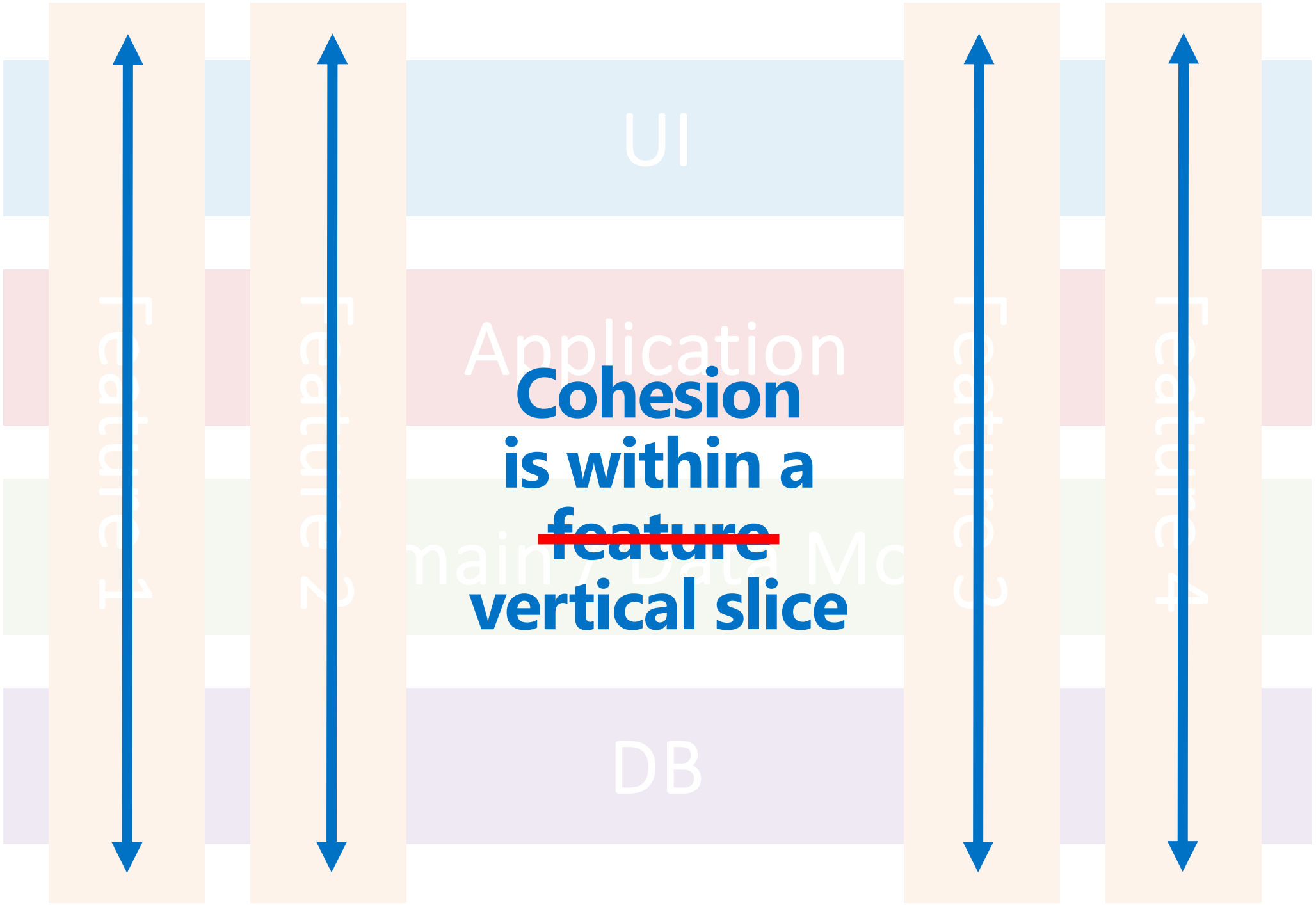
Domain / Data Mo
DB
Feature 1
Feature 2
Feature 3
Feature 4
Cohesion
is within a
feature



Cohesion is within a ~~feature~~ vertical slice

Shiny Object Syndrome

Over-Engineering Type 8

Which Stack Is More Fun?

Stuff You Already Know

All New Stuff

Reasons Developers Go For Shiny Objects

Curiosity and Enthusiasm

Perceived Prestige

Peer Pressure

Fear of Missing Out

Marketing and Hype

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Issues with Shiny Object Syndrome

Wrong Tool

Rewrite

Hard to Maintain

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Rolling Your Own

Over-Engineering Type 9

Reasons Developers Roll Their Own

Perceived Unique Requirements

Desire for Control

Lack of Awareness

Integration Issues

Performance Optimization

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Issues with Rolling Your Own

Increased Costs

Extended Development Time

Lack of Expertise

Reduced Testing Exposure

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Misapplied Libraries

Over-Engineering Type 10

Reasons Developers Misapply Libraries

Lack of Understanding

Overconfidence

Overcompensation

Fear of Simplicity

Educational Gap

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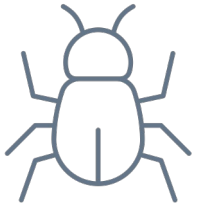
Issues with Misapplied Libraries

Increased Costs

Extended Development Time



Higher Risk Of Bugs

Slowing New Developers

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10 Rules To Avoid
Over-Engineering

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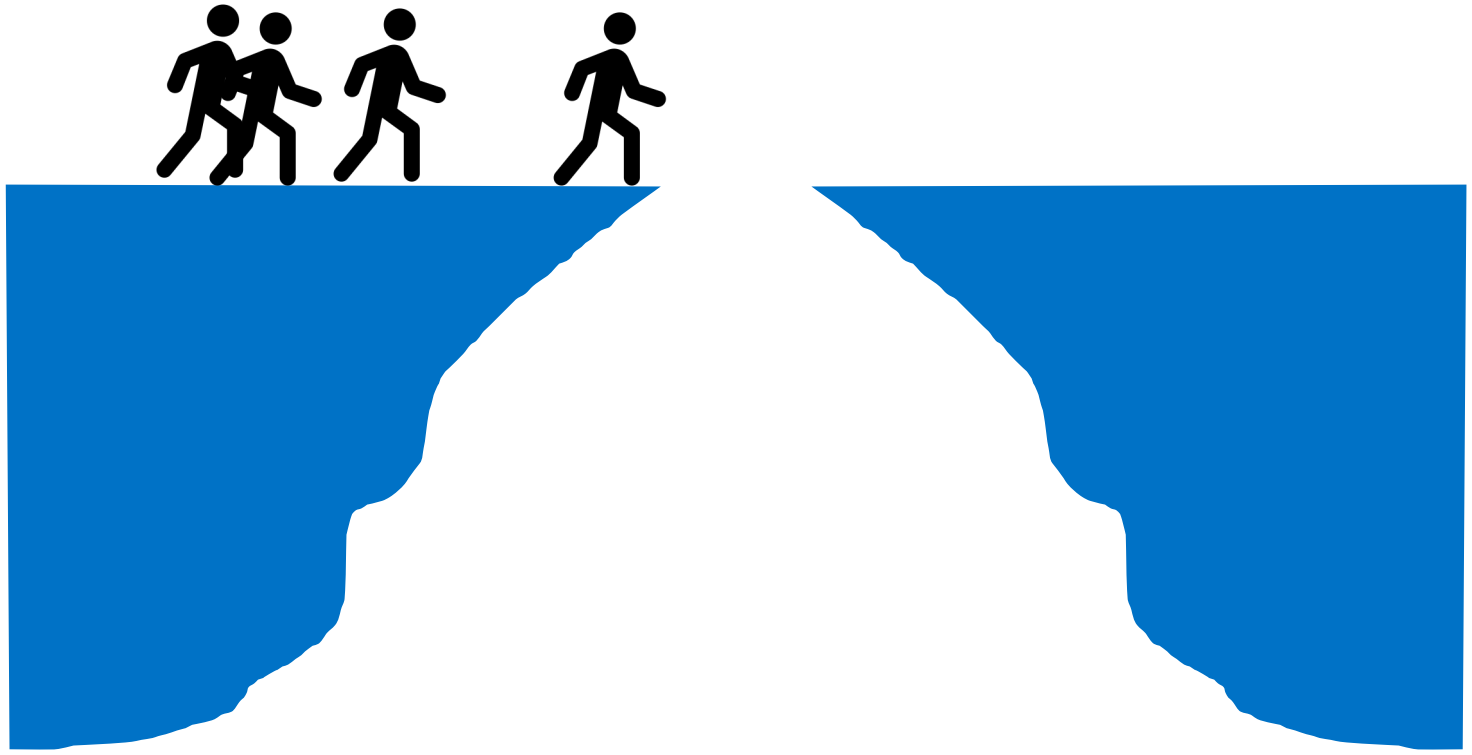
Document Engineering Decisions

Rule 1

Avoid Mistakes In The Future



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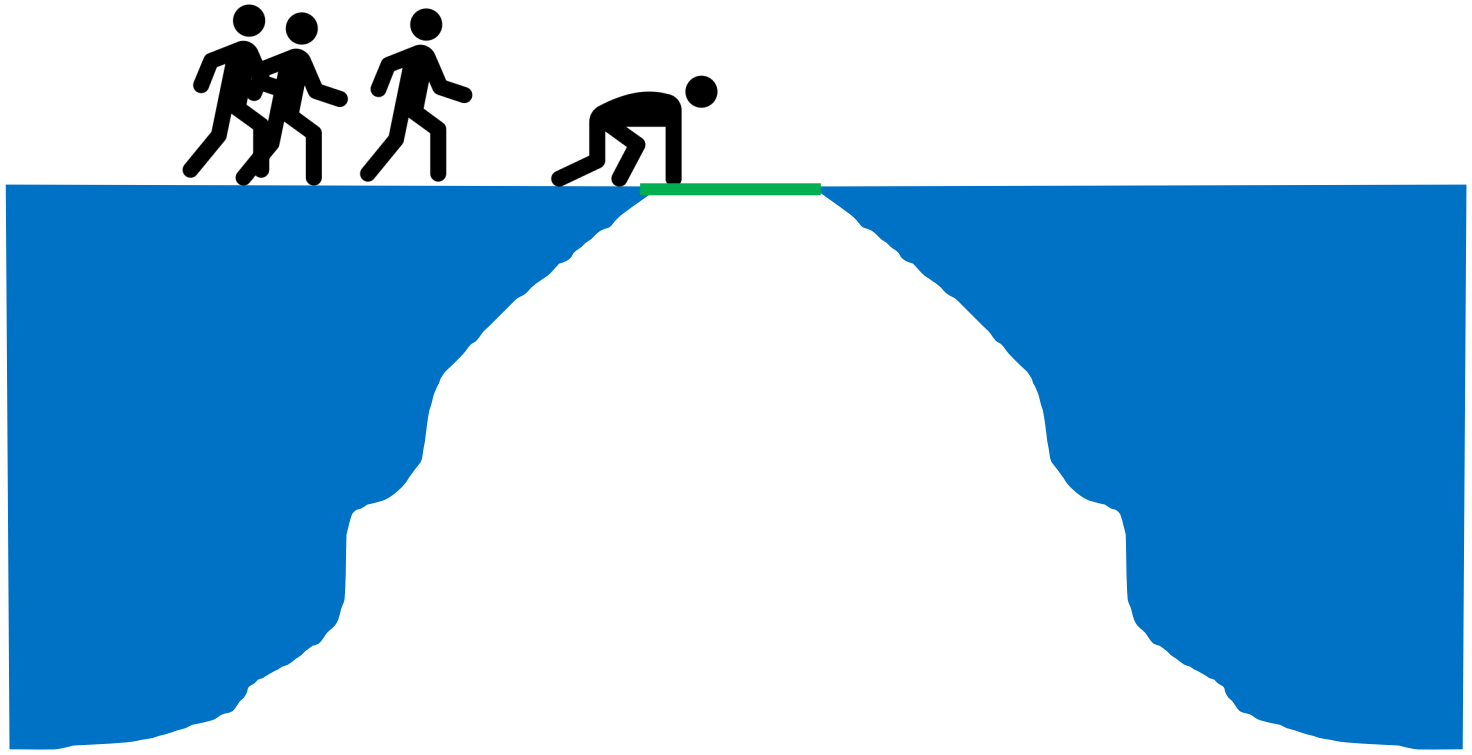
Avoid Mistakes In The Future



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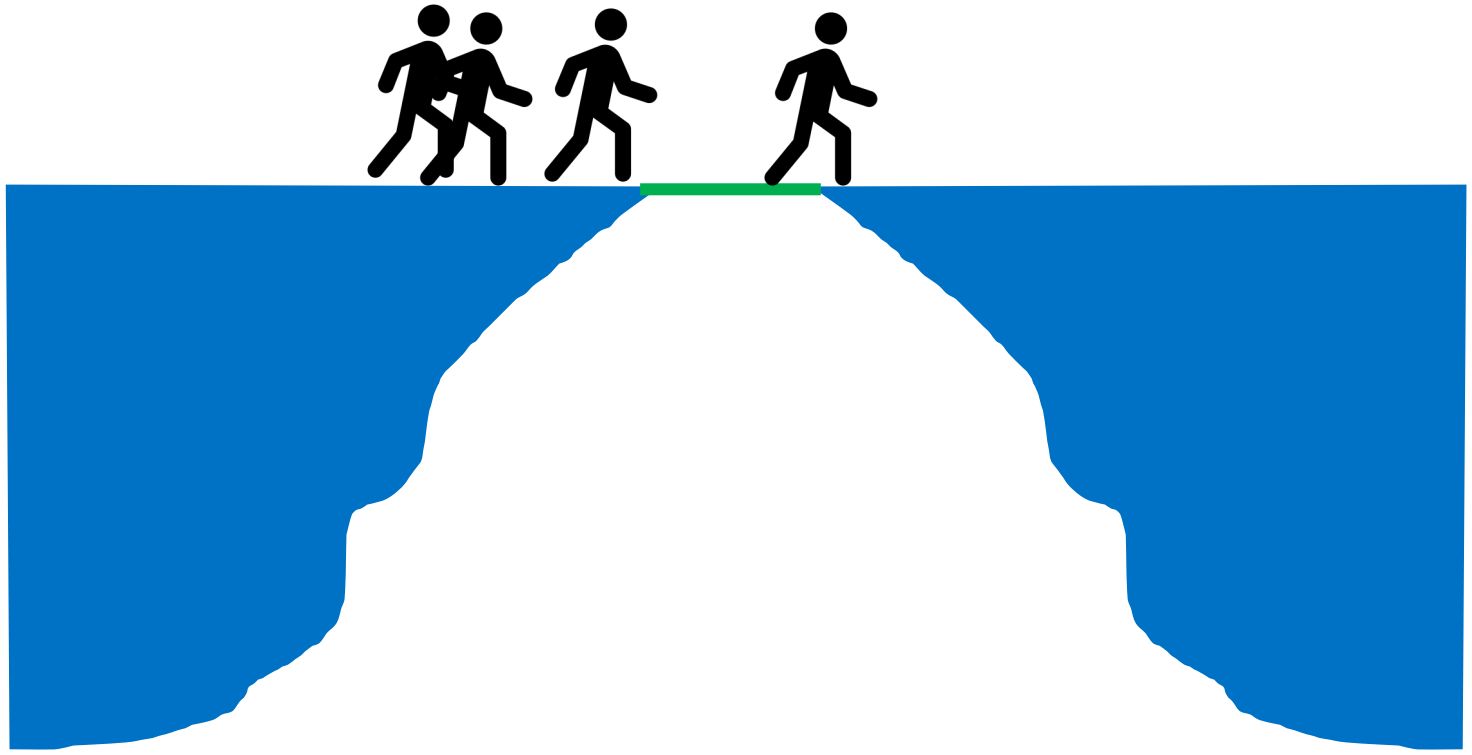
Avoid Mistakes In The Future



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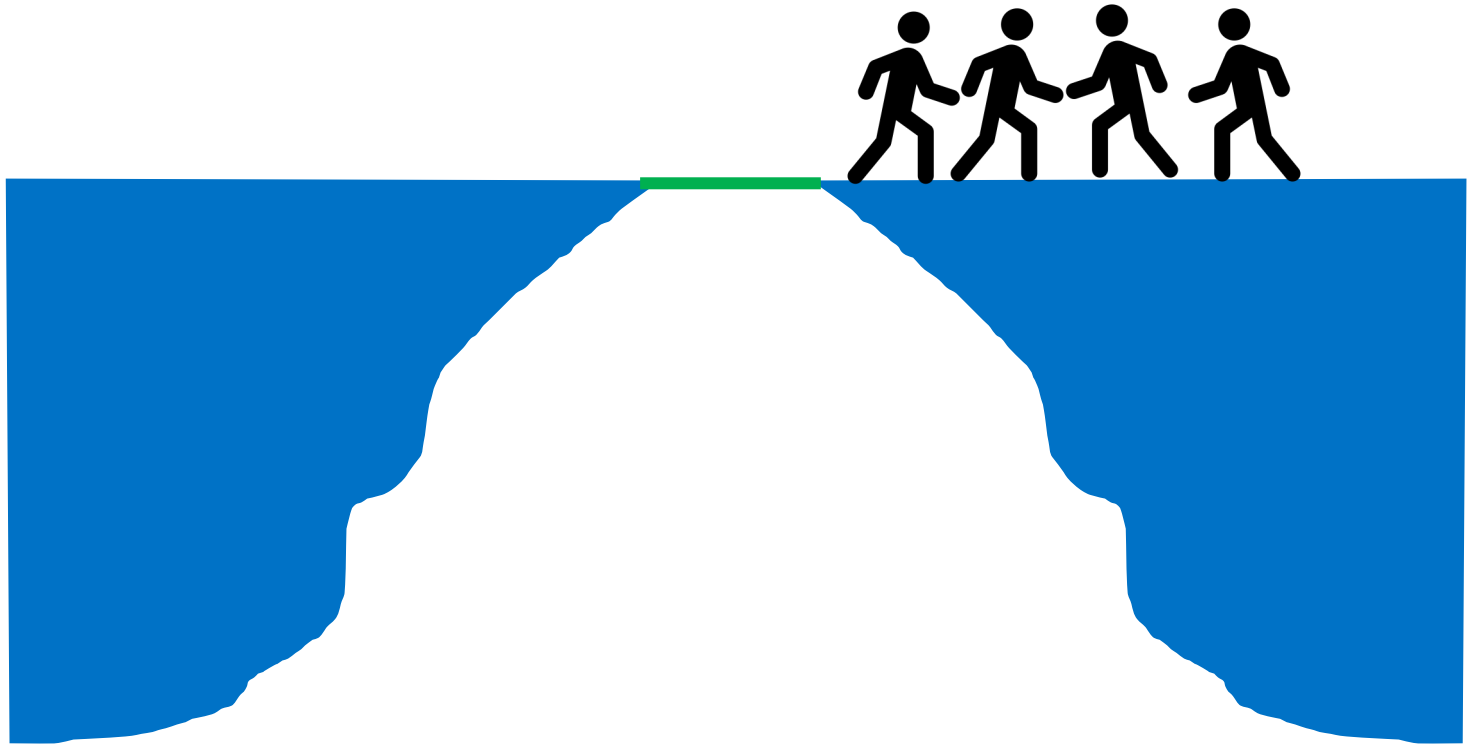
Avoid Mistakes In The Future



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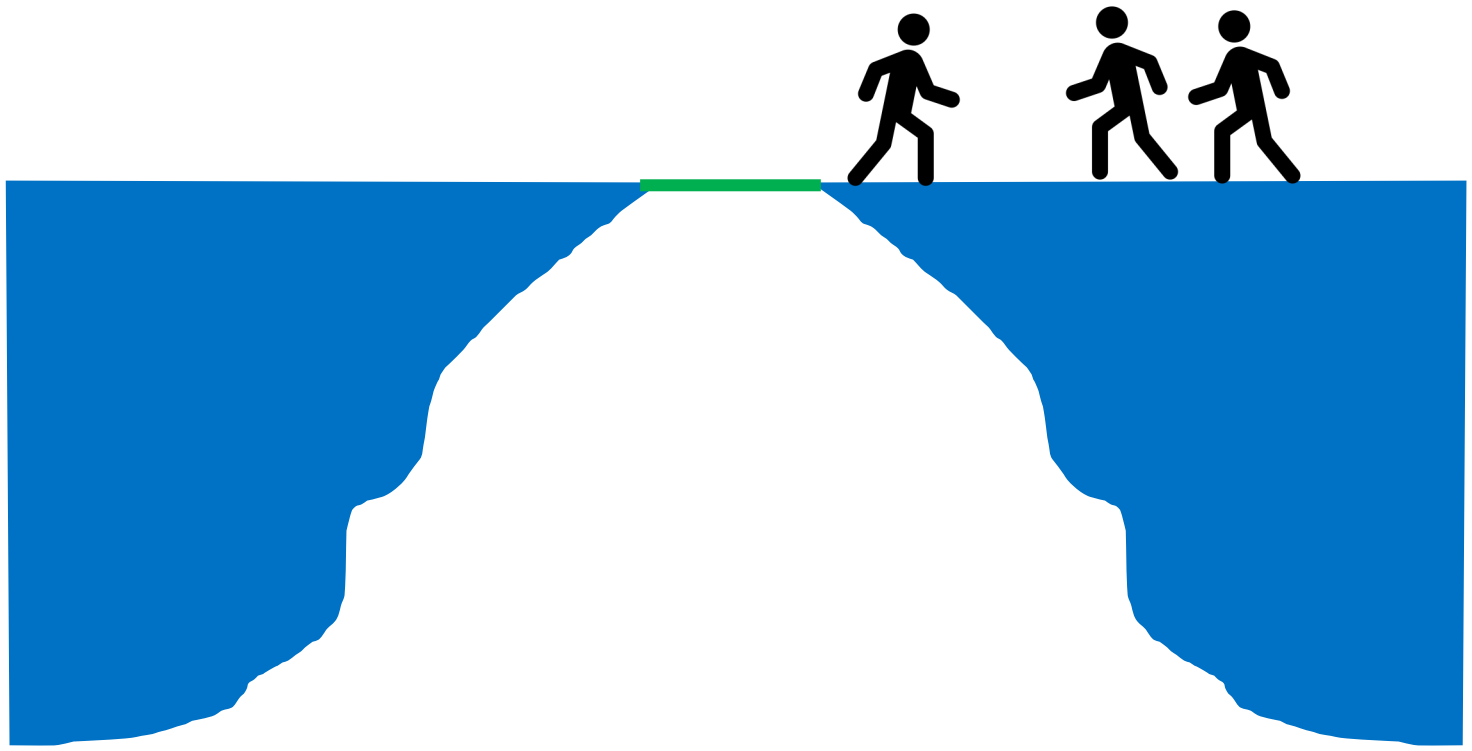
Avoid Mistakes In The Future



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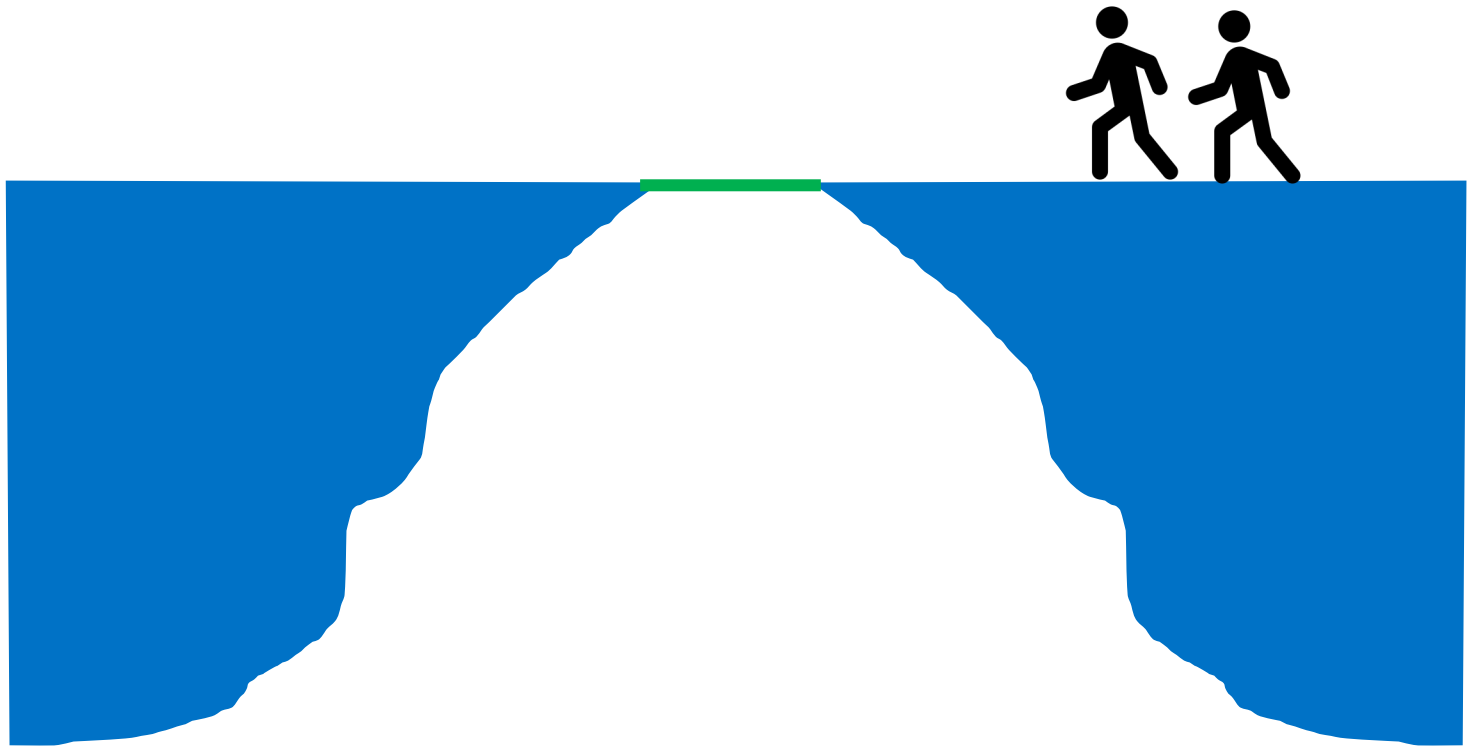
Avoid Mistakes In The Future



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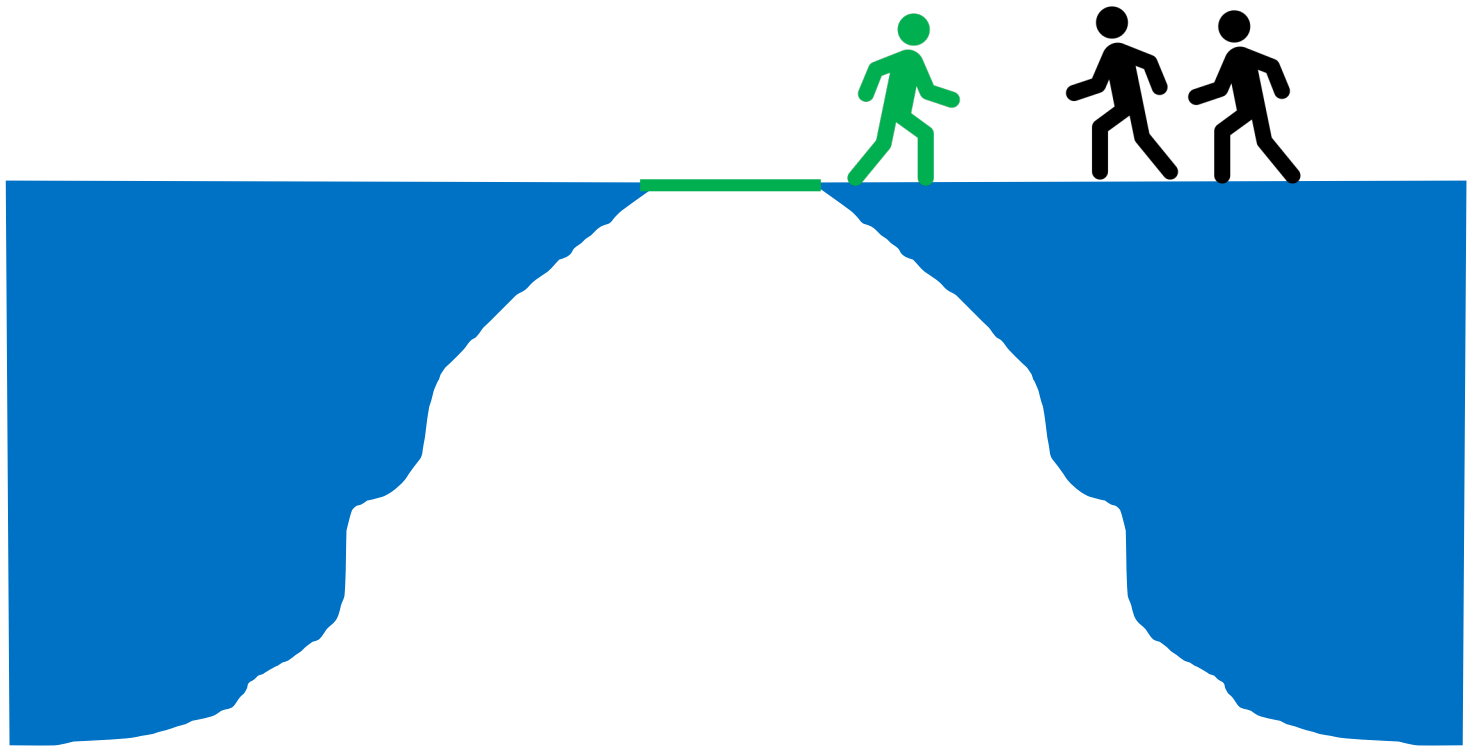
Avoid Mistakes In The Future



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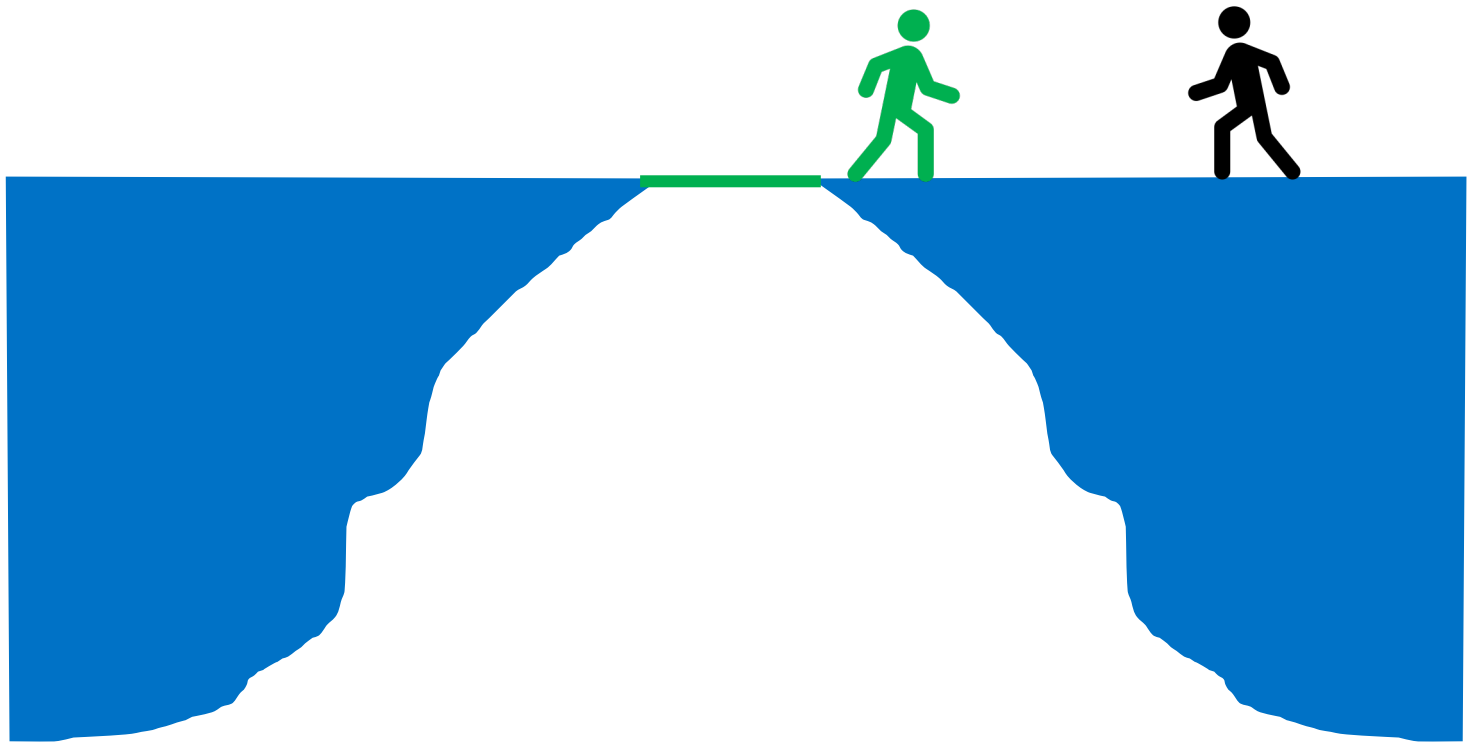

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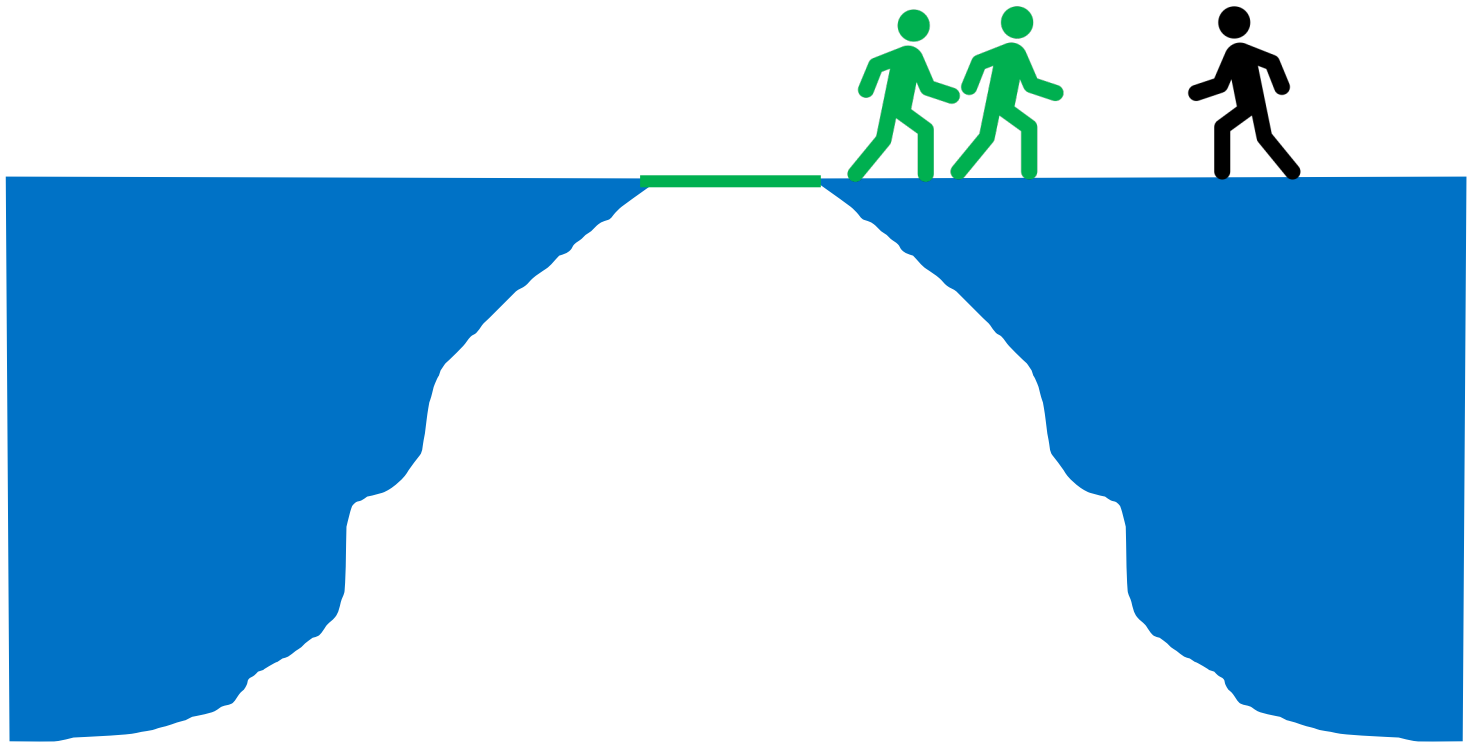

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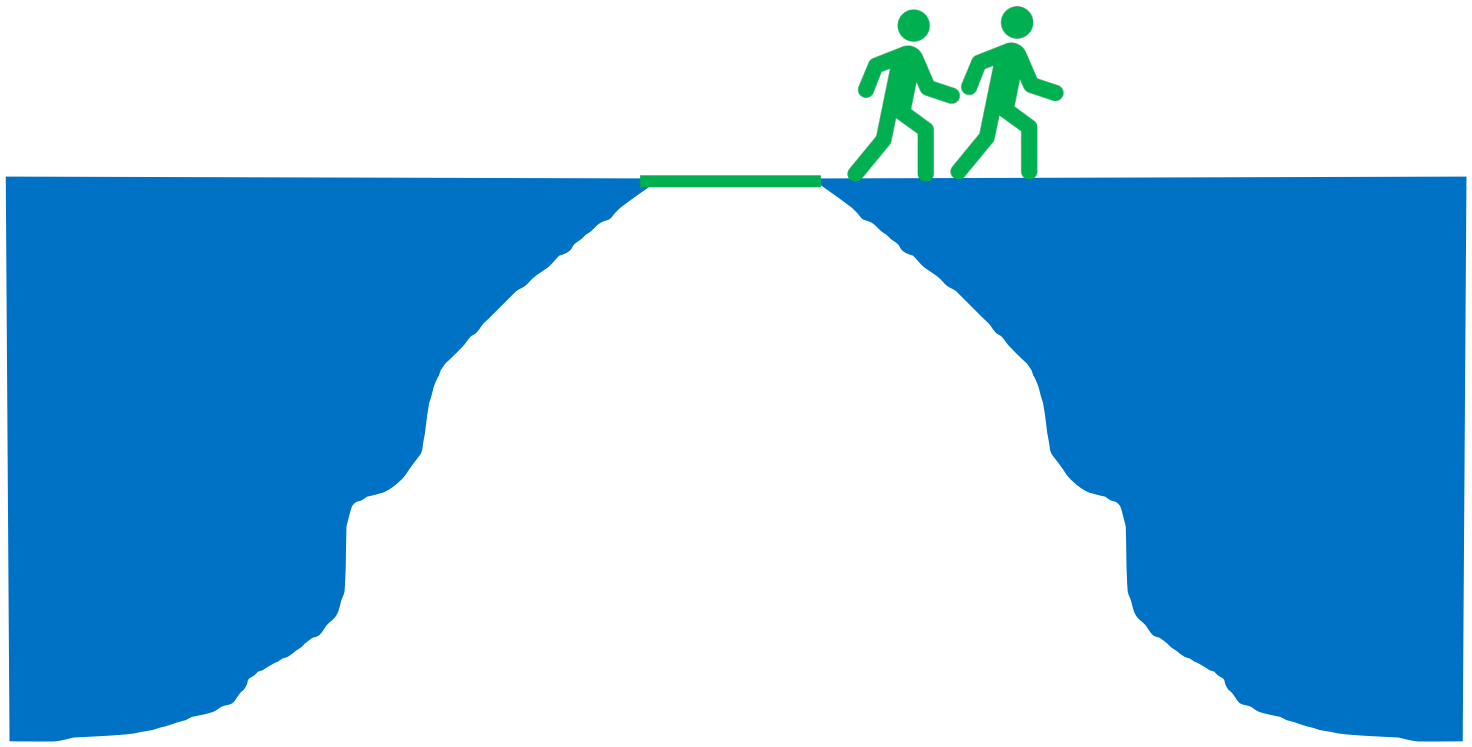

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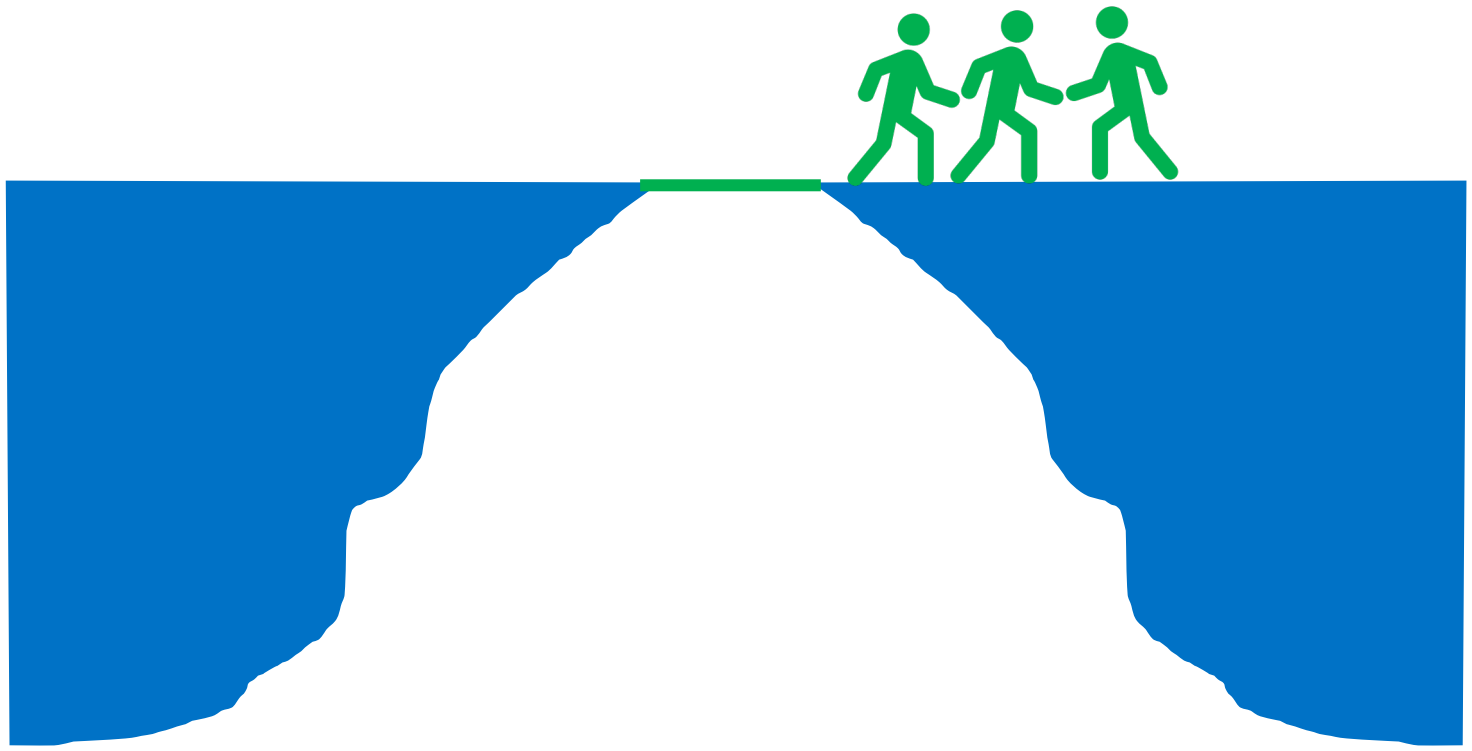

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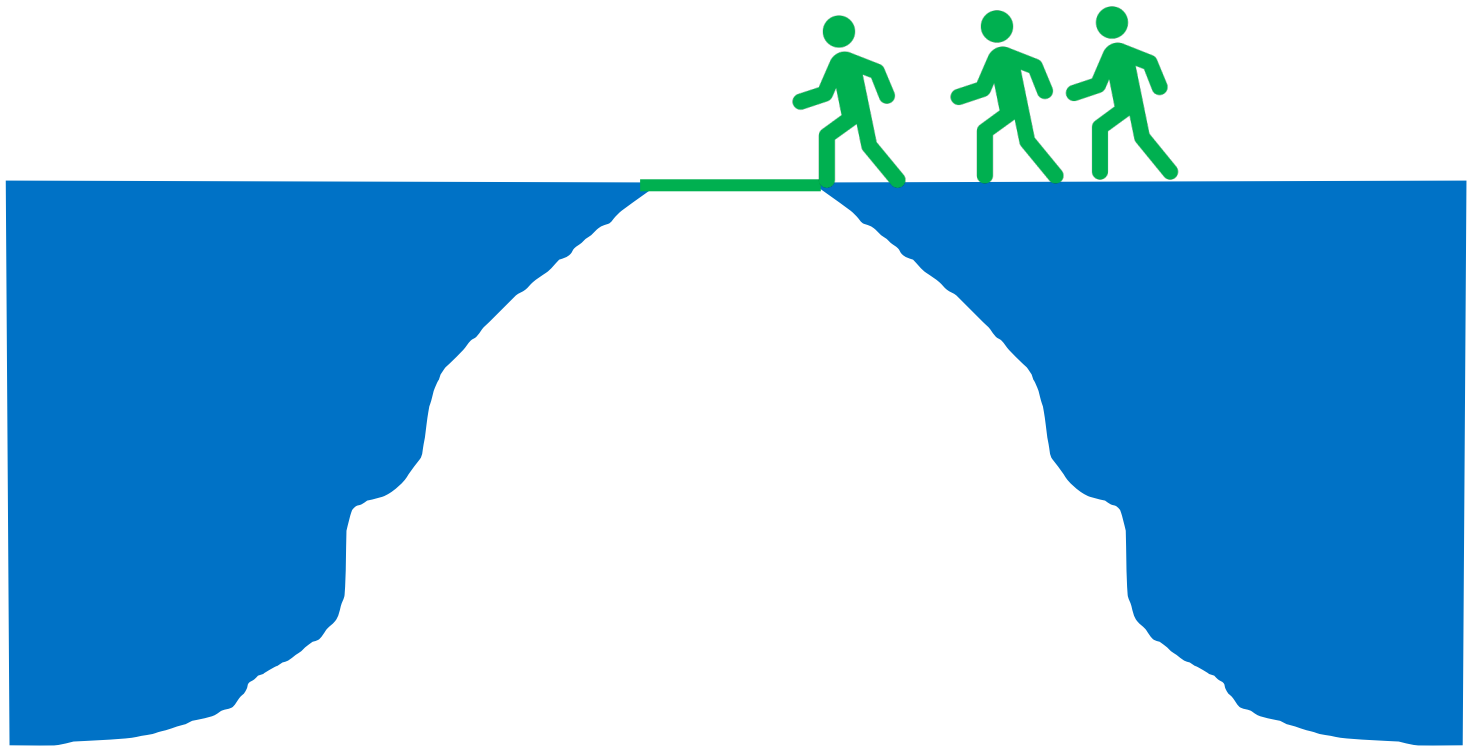

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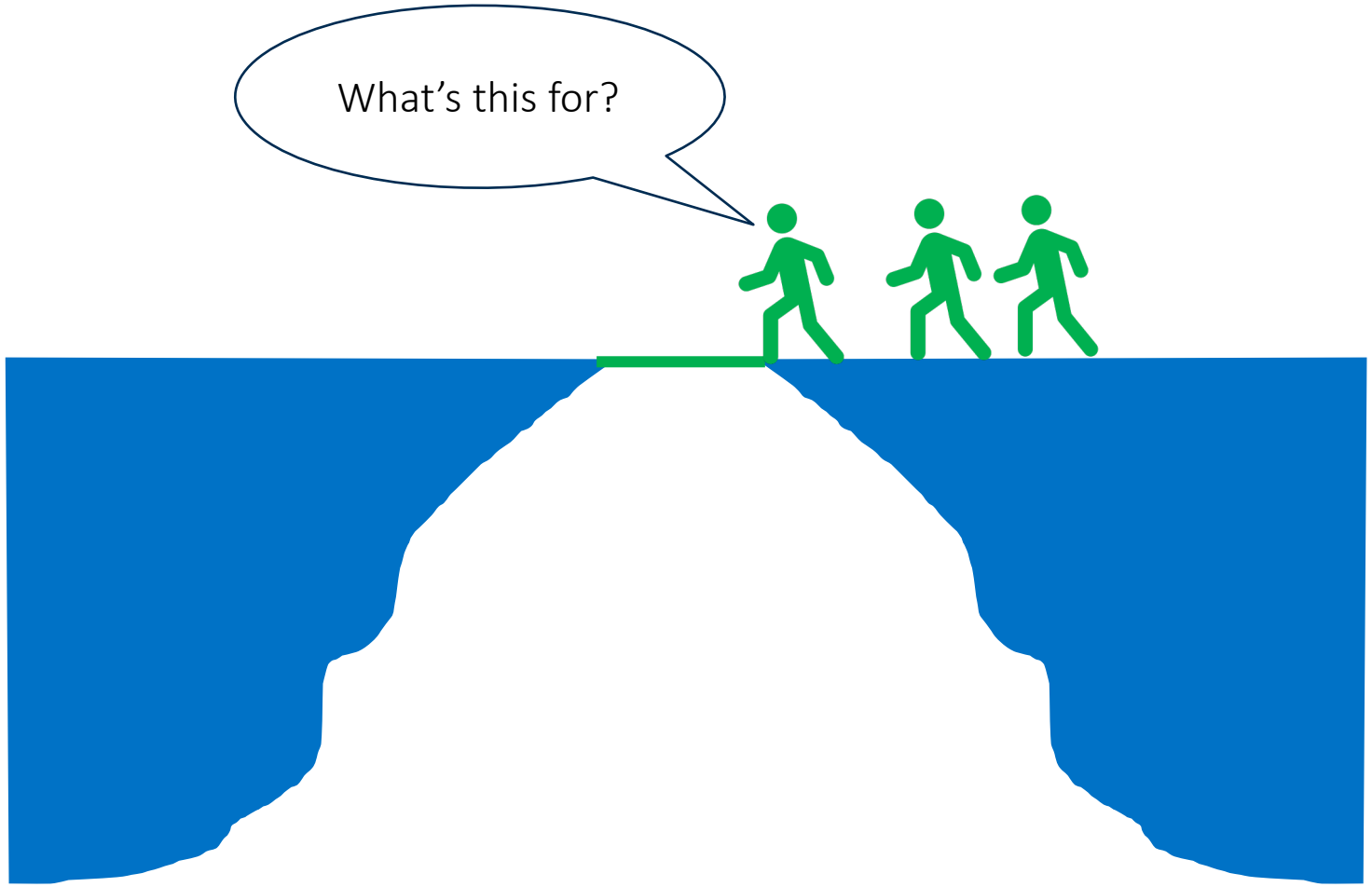

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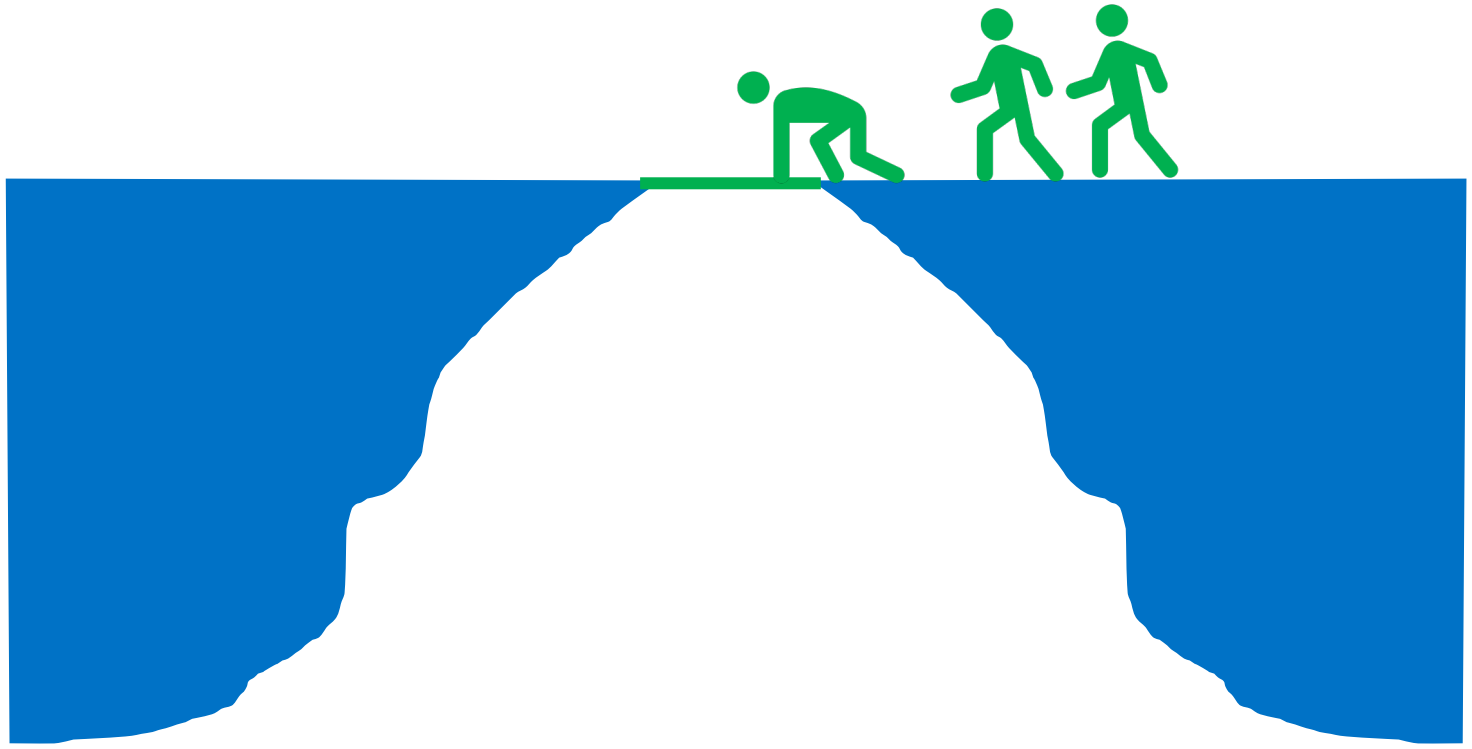

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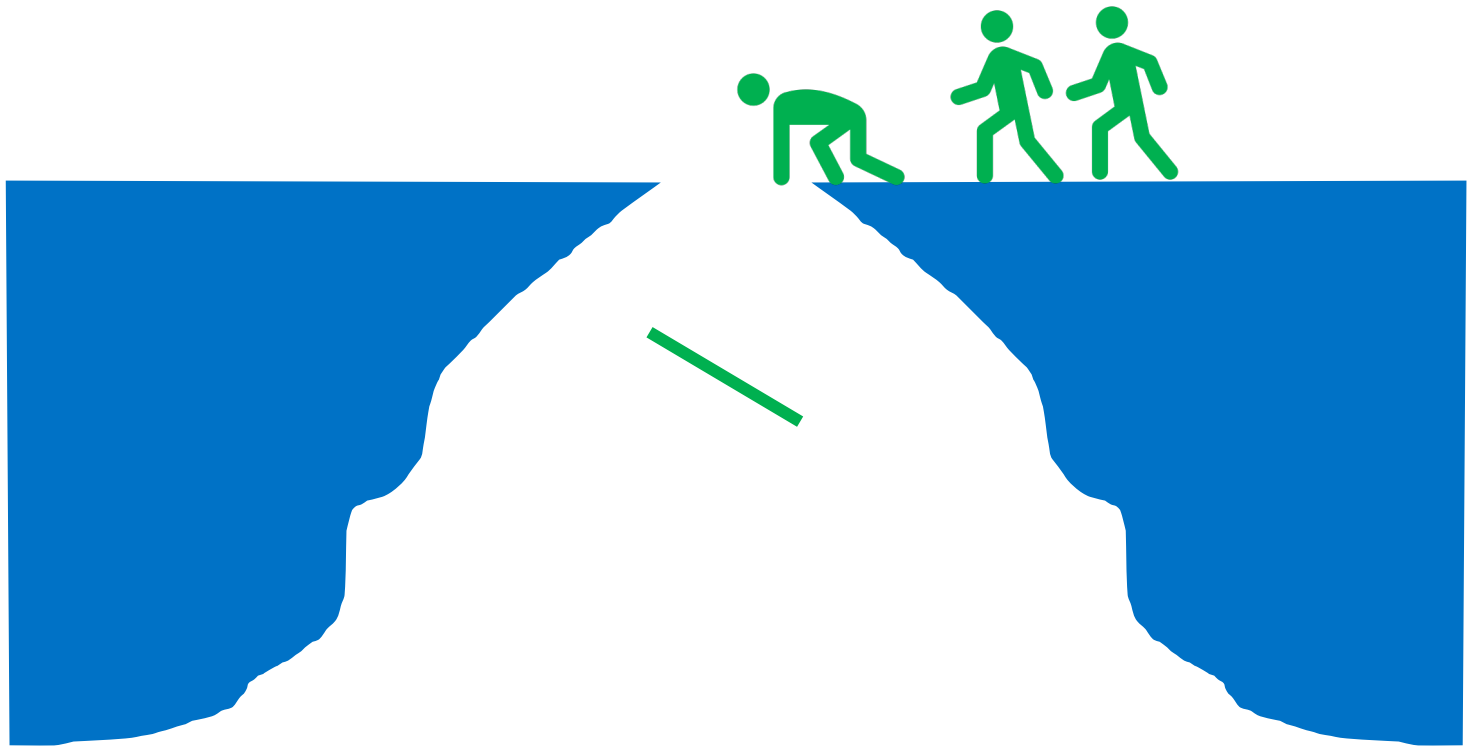

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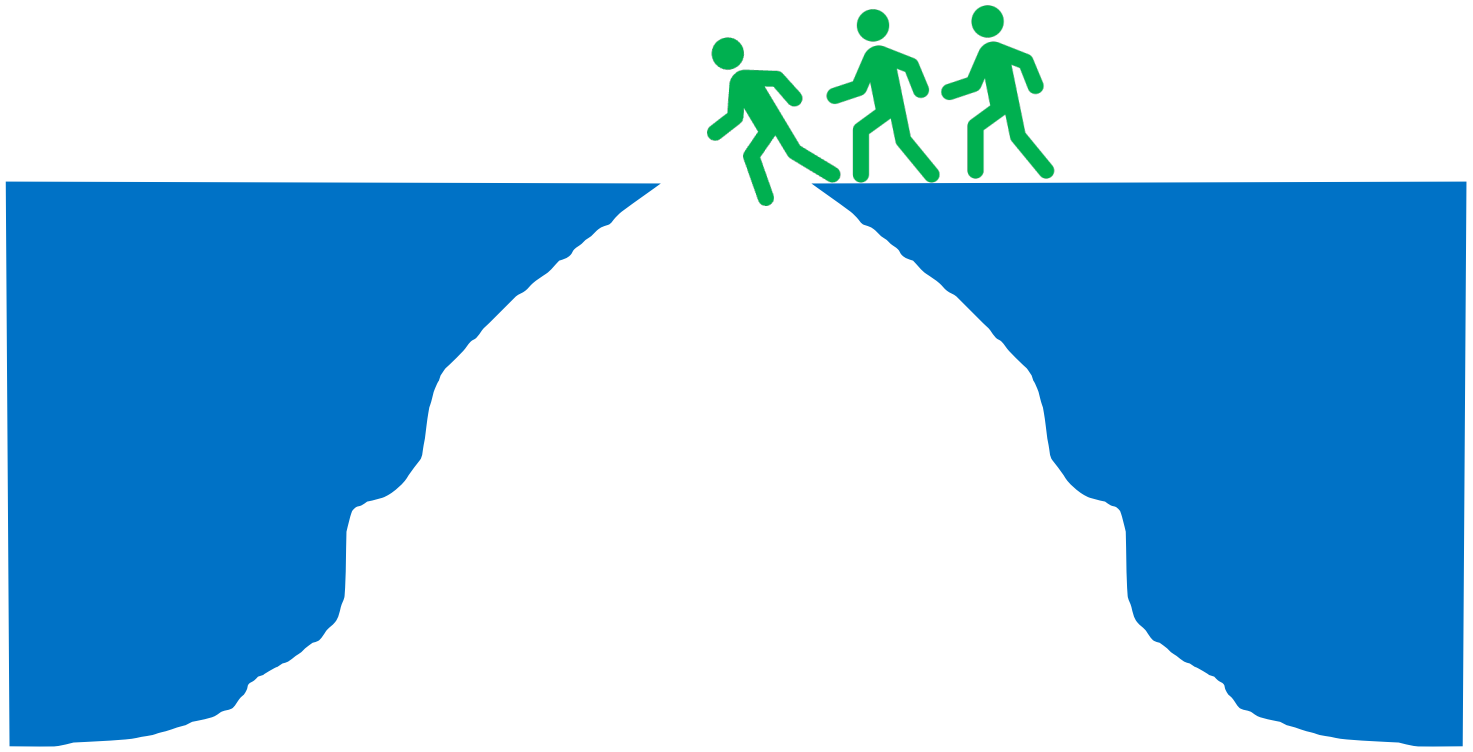

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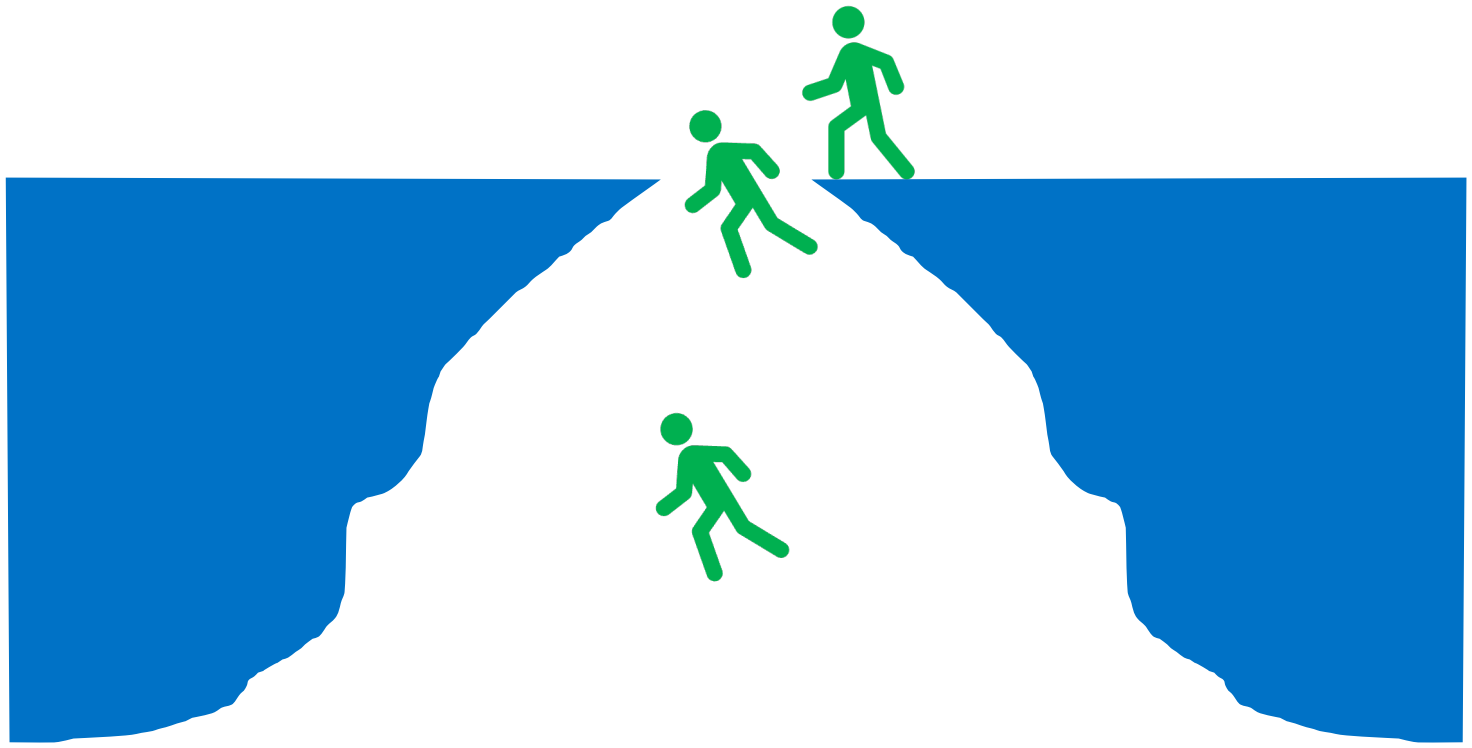

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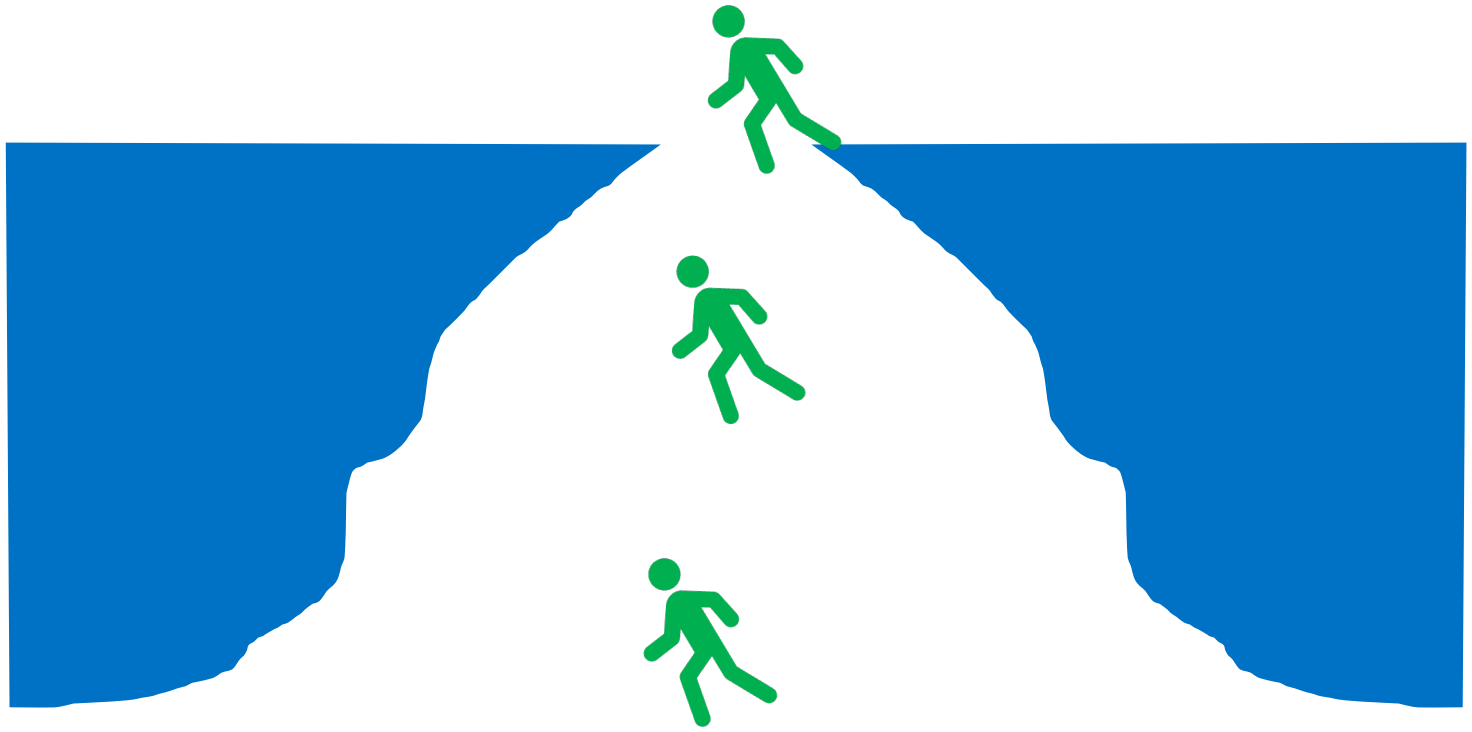

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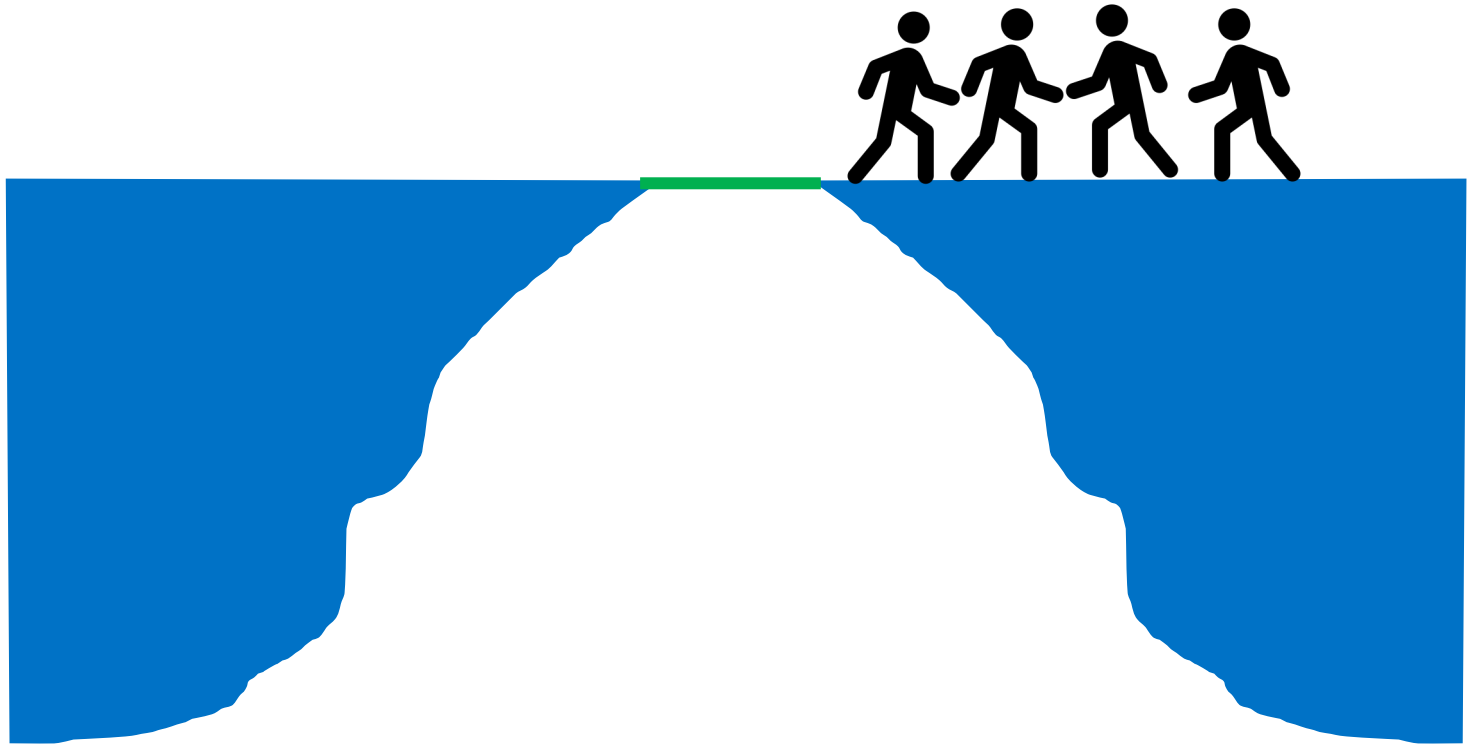

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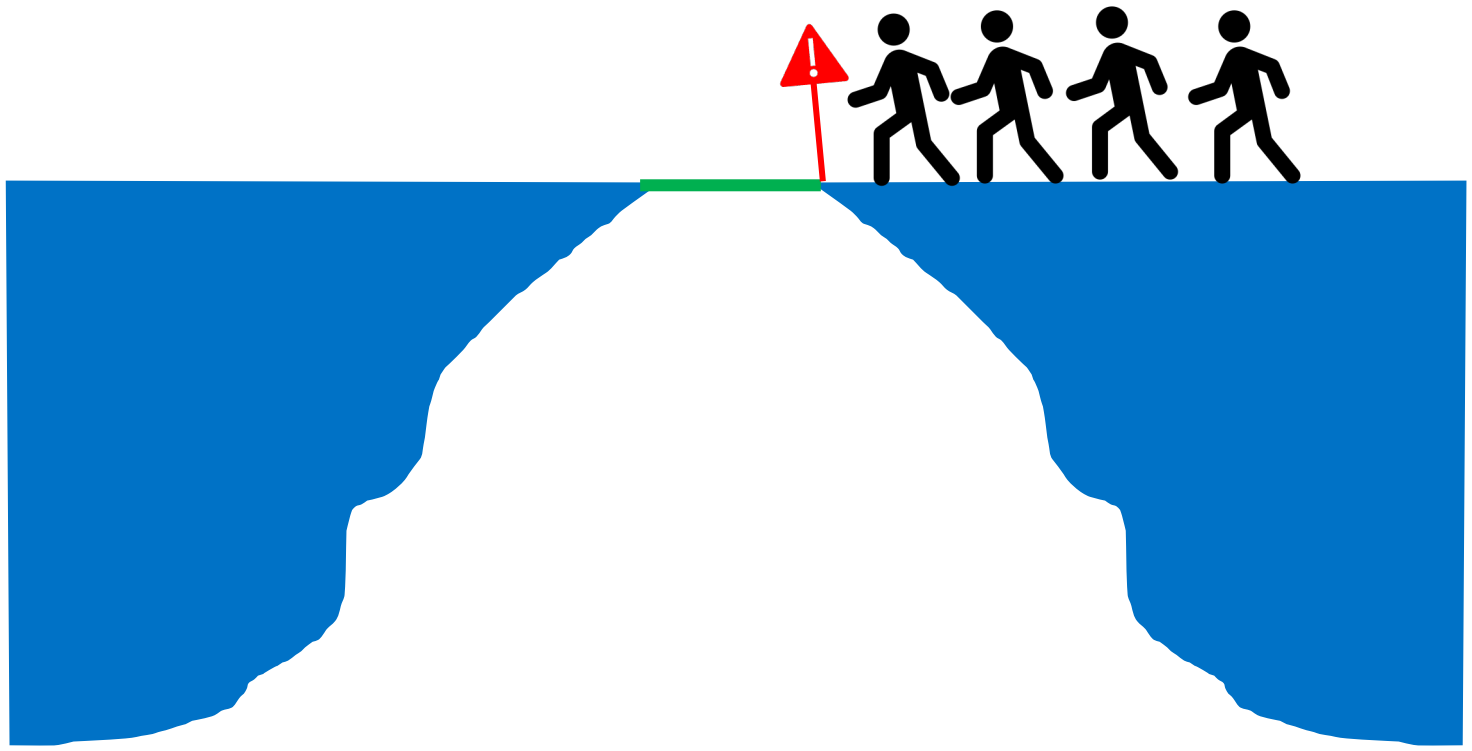

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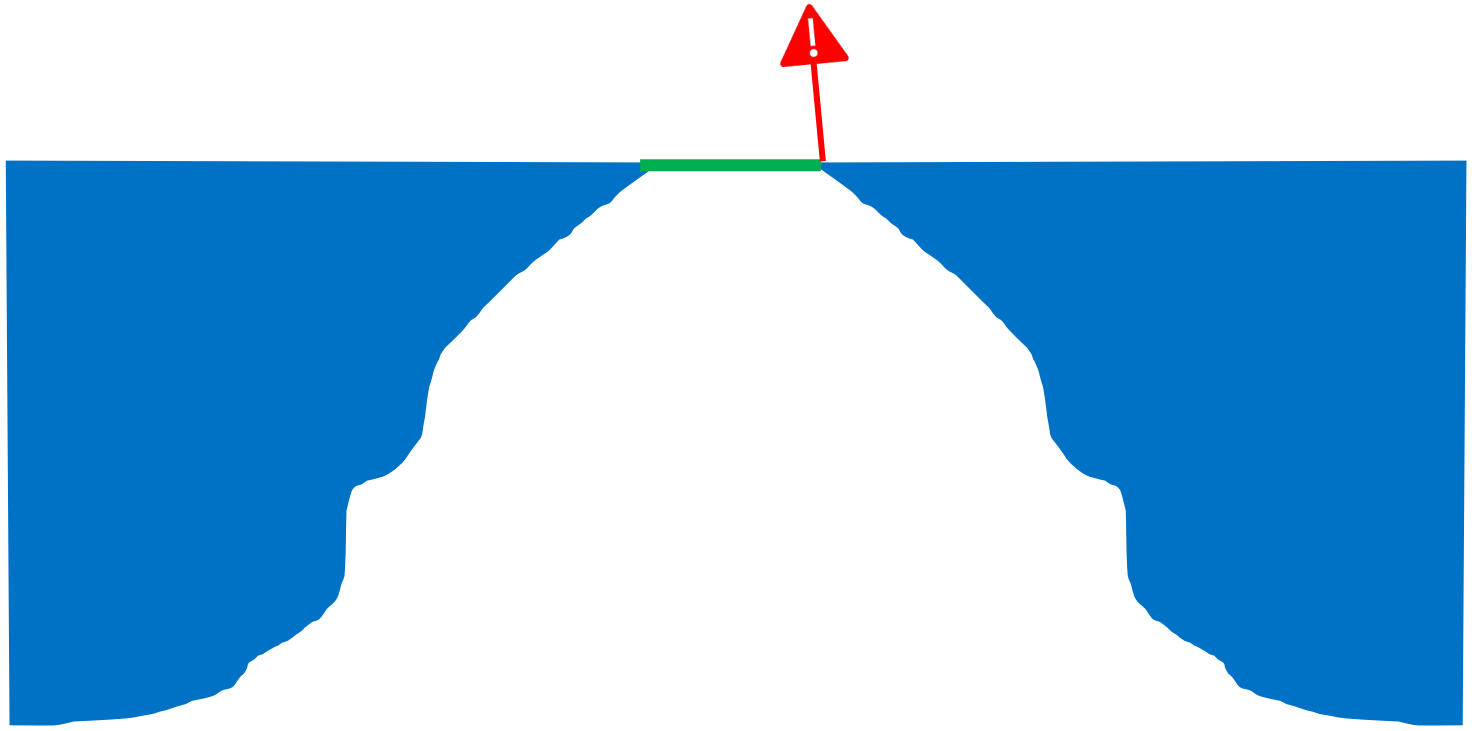

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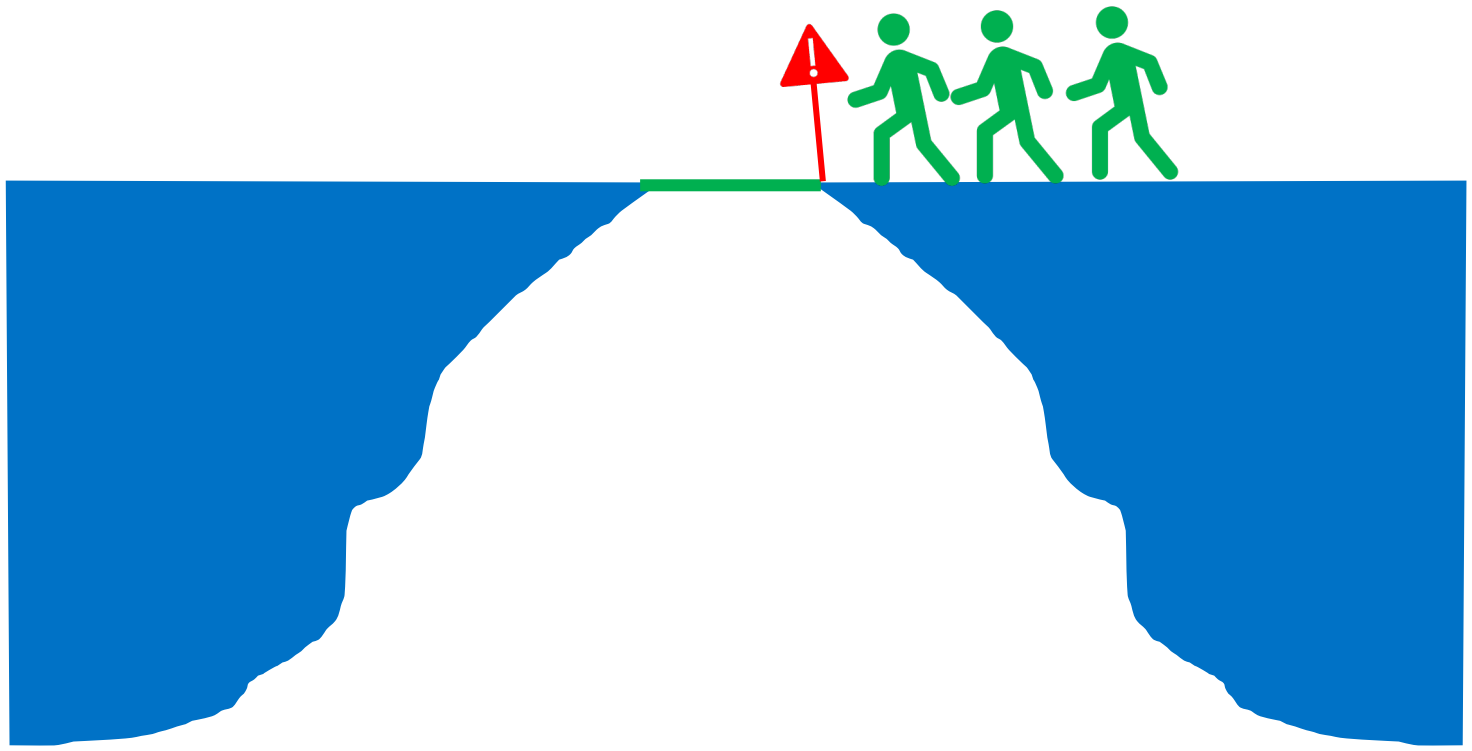

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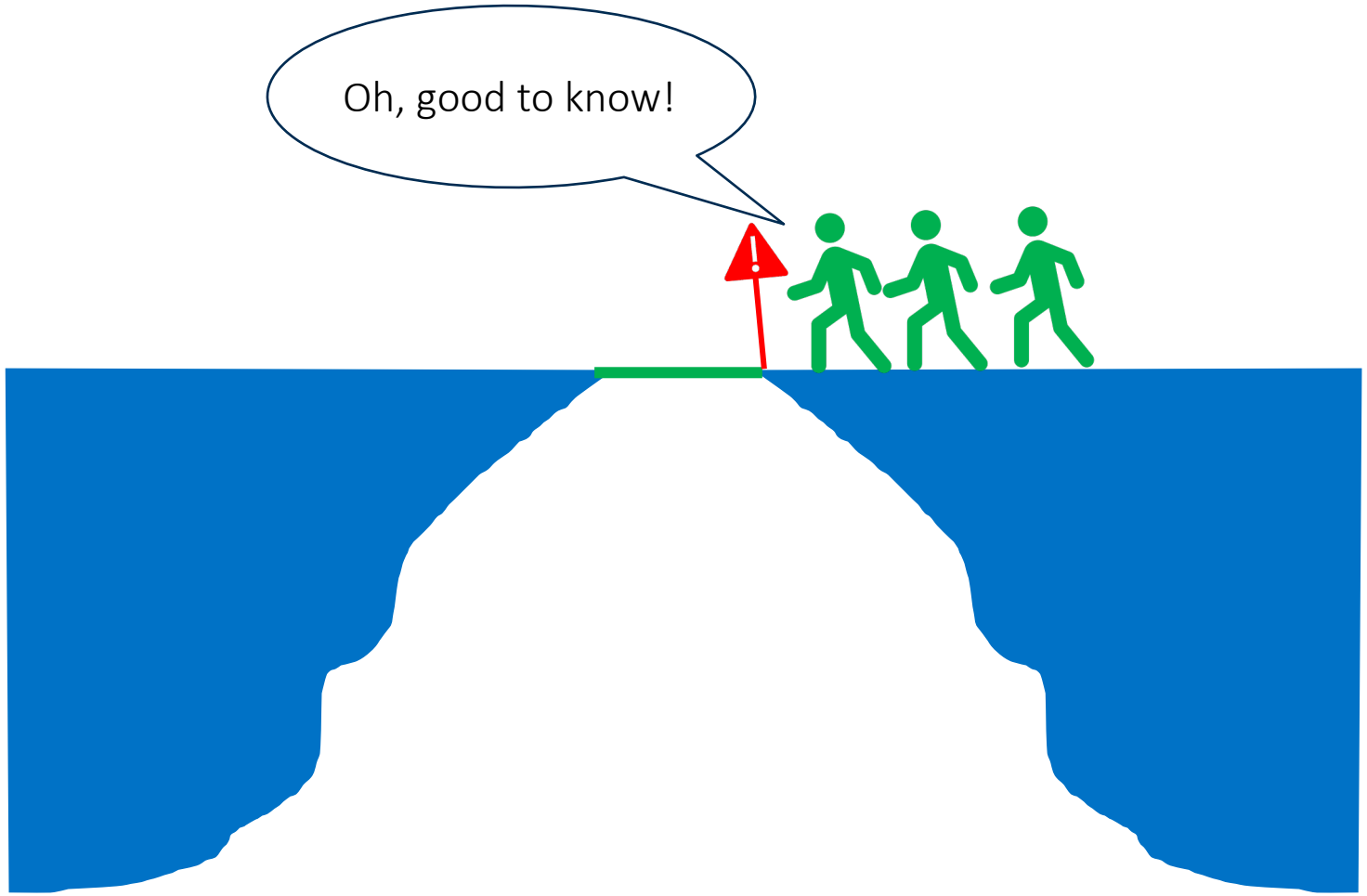

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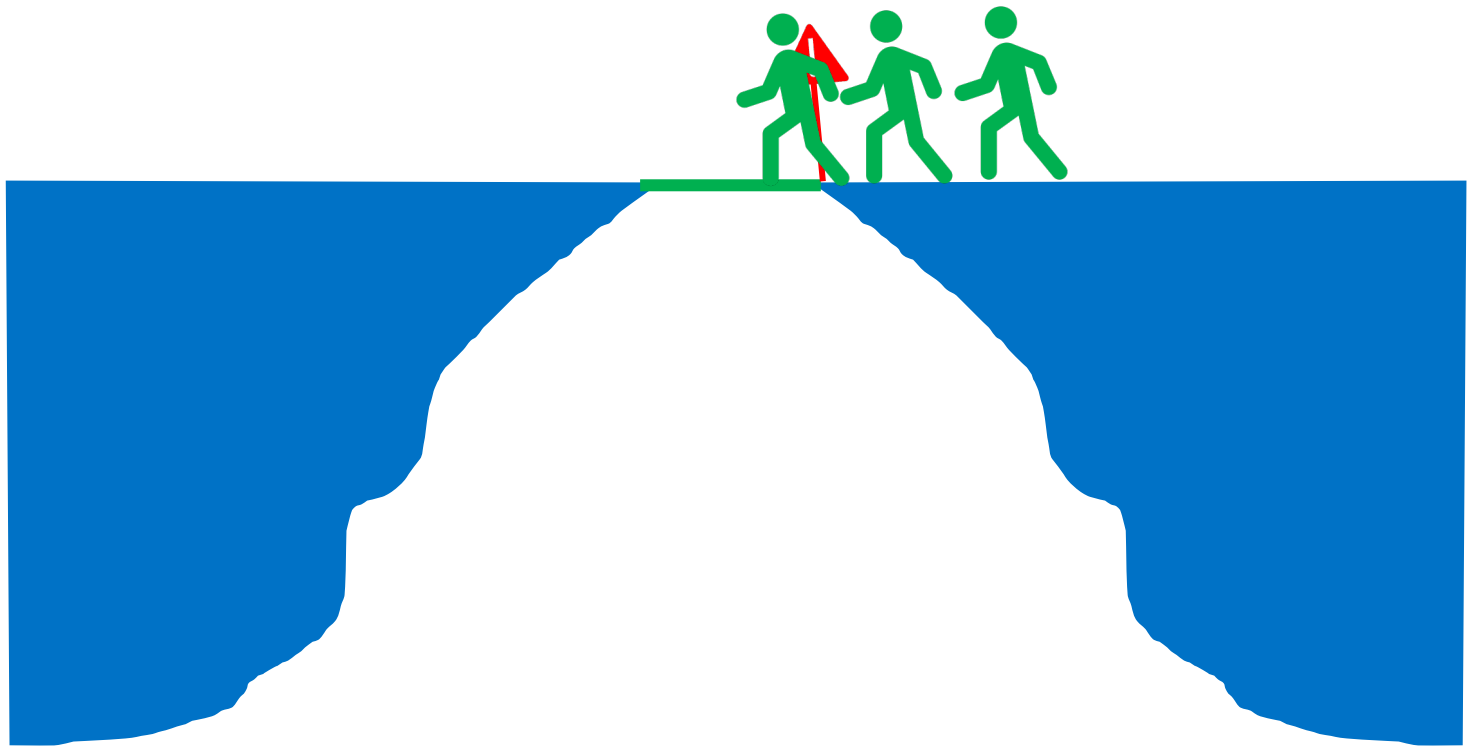

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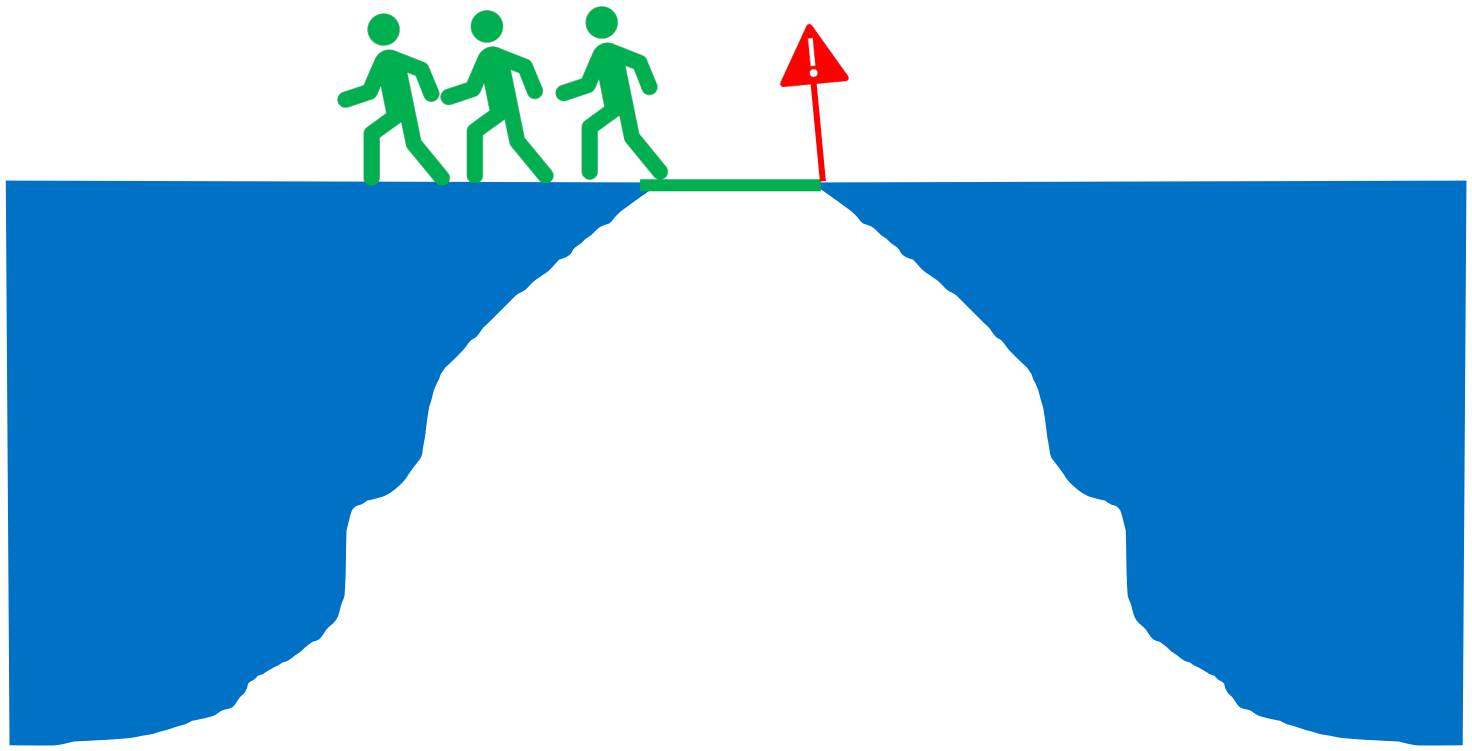

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Architecture Decision Records (ADR)

ADR.md

Title: Avoid Implementing Feature ‘Awaken Balrog’

Status: Accepted

Context:
In deciding whether to implement the Balrog Awakening feature, we draw inspiration from Gandalf's advice in Moria.

Decision:
We will not implement the Balrog Awakening feature to avoid potential catastrophic issues, such as losing our only wizard.

Consequences:
Every time we’ve awaken a Balrog in the past, we’ve lost a perfectly good wizard.

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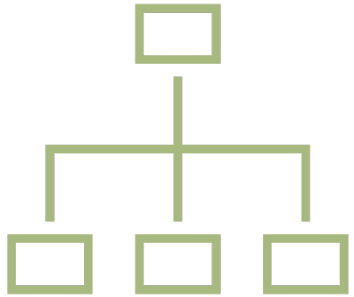
Architecture Decision Records (ADR)



Git

Wiki

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Agile / Iterative Development

Rule 2

Agile / Iterative Development

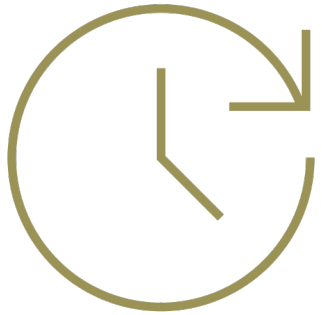
- Implement **as little as possible** to solve the problem (**MVP**)
- **Iterate** quickly with **feedback**

YAGNI
(You Aren't Gonna Need It)

Rule 3

YAGNI

Implement Only
Current Requirements



Don’t Build For
Future Needs

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KISS (Keep It Simple, Software-developer)

Rule 4

KISS

Less Surface Area
For Failures

Easier to
Maintain

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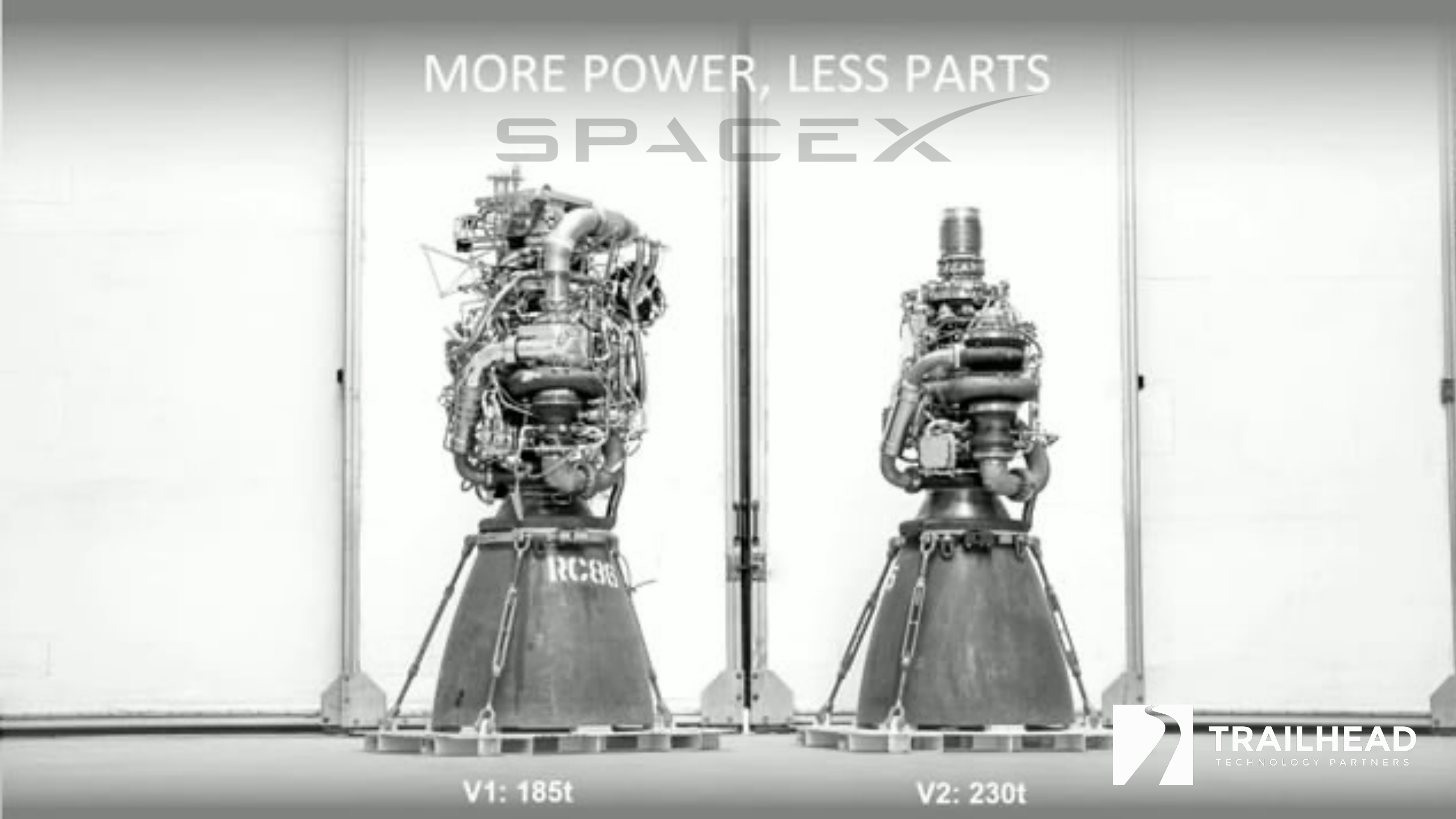
MORE POWER, LESS PARTS

SPACEX



V1: 185t

V2: 230t

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DRY (Don't Repeat Yourself)

Rule 5

DRY

- Reduce the amount of duplicate code written.
- This can save time and energy,
- Helps developers focus on more important problems.
- Can also make software more maintainable, readable, and consistent

Principle of Least Astonishment (POLA)

Rule 6

Principle of Least Astonishment

"A **component** of a system **should behave** in a way that **most users will expect** it to behave, and therefore **not astonish** or surprise users."

Principle of Least Astonishment (POLA)

Reduces
Cognitive Load

Reduces
Mistakes

Easier to
Learn

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Pull Reqs / Code Reviews

Rule 7

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Pull Reqs / Code Reviews

Detecting Patterns of Over-Engineering

Catching Unnecessary Features Early

Ensuring Adherence to Best Practices

Encouraging Incremental Development

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“Shift Left”

The **earlier** in the development lifecycle you **catch a defect**, the **less expensive** it is to fix.

Typical Code Review Checklist

- Bug Check
- Acceptance Criteria Check
- Code Standards Check
- Clarity Check
- Performance Check
- Documentation Check

Typical Code Review Checklist

- Bug Check
- Acceptance Criteria Check
- Code Standards Check
- Clarity Check
- Performance Check
- Documentation Check

- ✓ Simplicity Check
- ✓ YAGNI Check
- ✓ KISS Check
- ✓ Premature Optimization Check

Feedback Loops

Rule 8

Feedback Loops

Aligning Development with User Needs

Encouraging Iterative Development

Detecting and correcting over-engineering early

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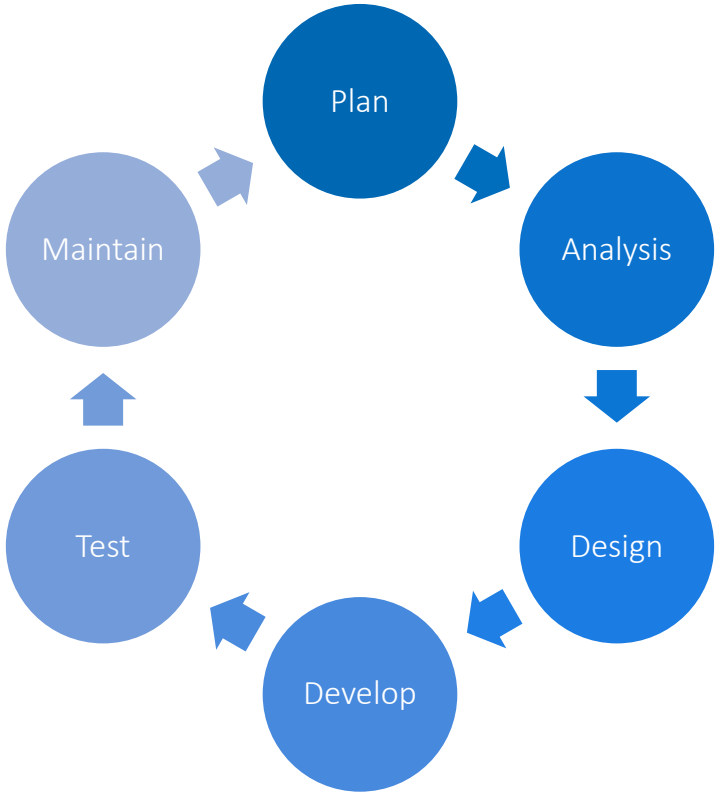
Feedback Loops



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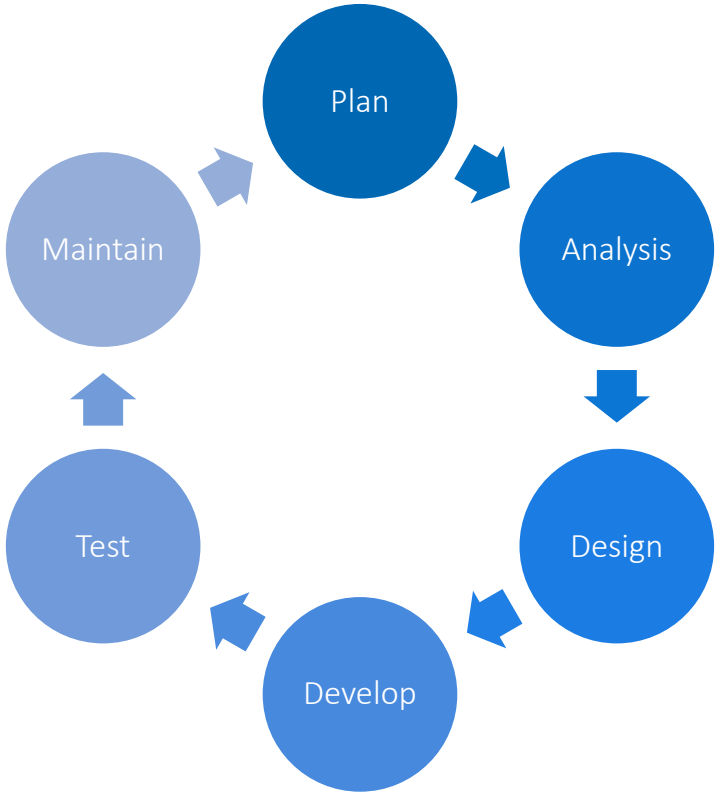
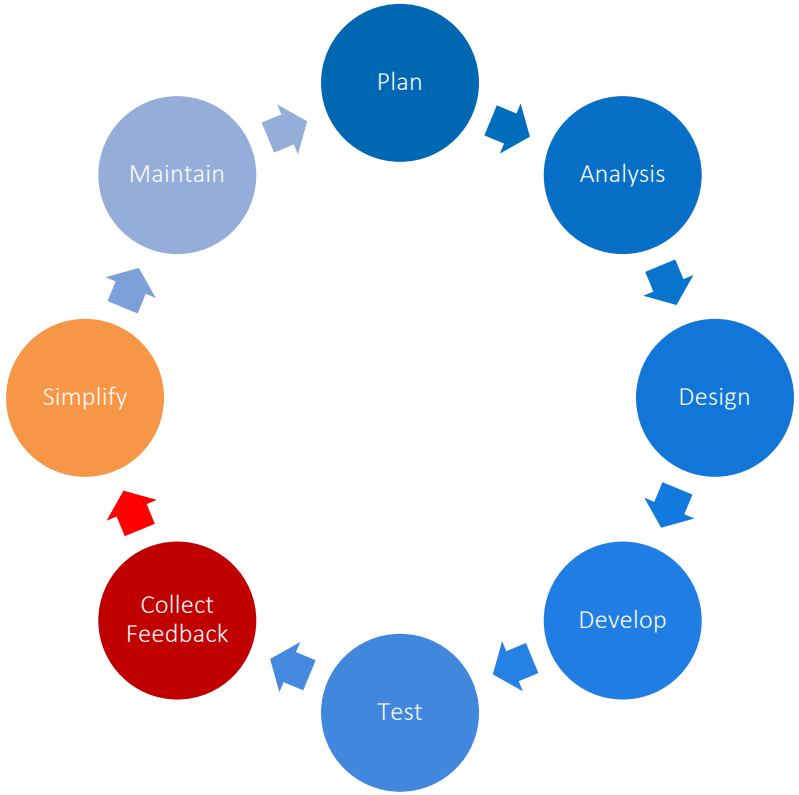
Feedback Loops





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Adopt Proven Solutions

Rule 9

Adopt Proven Solutions

Adapting Proven Solutions

More predictable outcomes

Reduces unknowns

Manages risk

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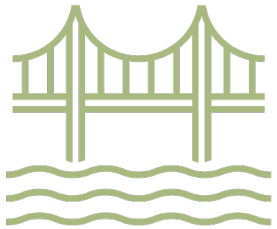
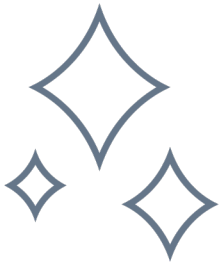
Adapting Proven Solutions



Use Frameworks
You Know

New Architectures
Only as POC



Adopt New Tech Behind
Buzzword Curve

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80/20 Rule (Pareto Principle)

Rule 10

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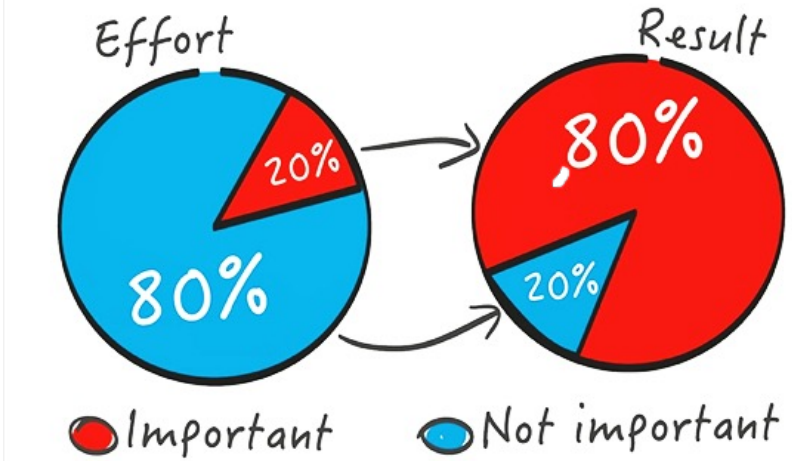
80/20 Rule

"Roughly 80% of consequences come from 20% of causes."



SOURCE https://www.sreedeep.com/the-pareto-principle-explained/

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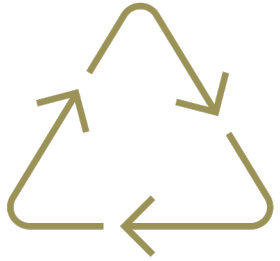
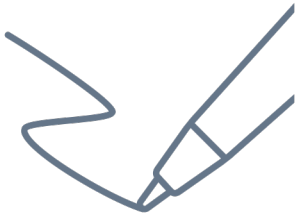
80/20 Rule Allows

Focusing on
high-impact features



Efficient
use of resources



Avoid
perfectionism

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Summing Up

1. Over-engineering is **common** and **costly**
2. **Know the signs** of over-engineering
3. Implement the **rules to avoid** over-engineering

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Thanks! Questions?

Jonathan "J." Tower

- Microsoft MVP in .NET
- jtower@trailheadtechnology.com
- trailheadtechnology.com/blog
- jtowermi
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FREE

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bit.ly/th-offer

github.com/trailheadtechnology/over-engineering