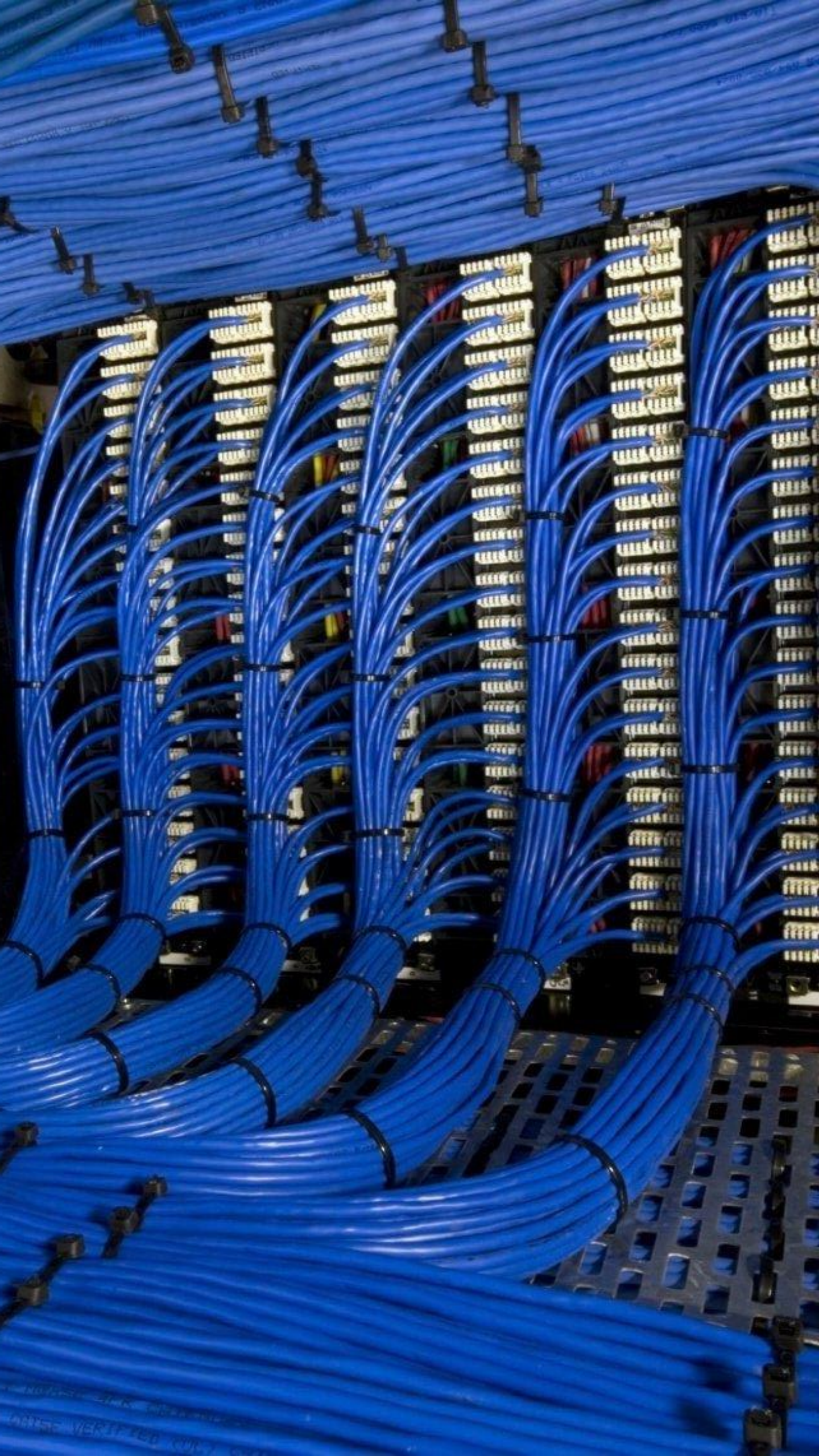
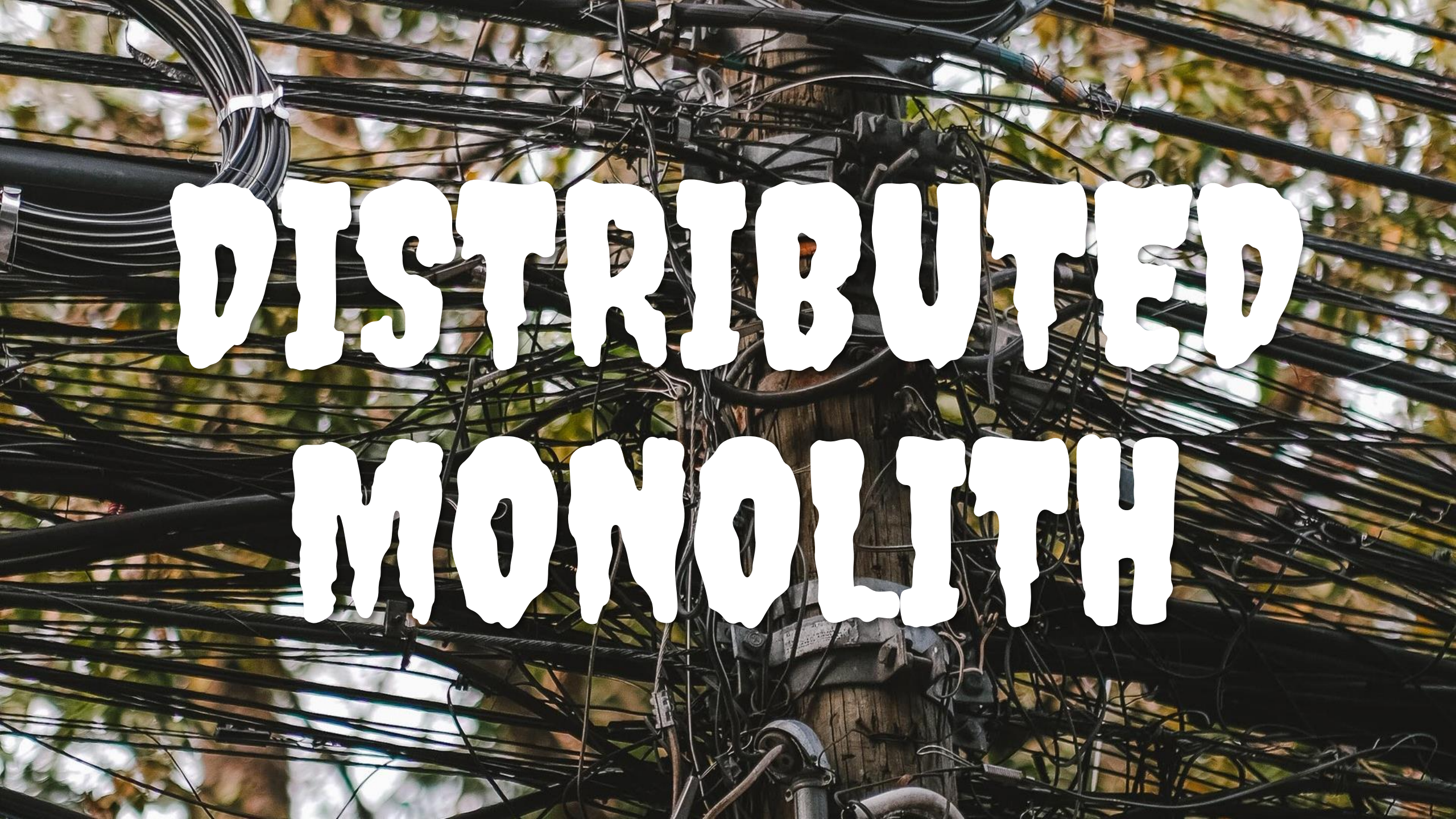
Don’t Build a Distributed Monolith

How to Avoid Doing Microservices Completely Wrong

Jonathan "J." Tower




DISTRIBUTED
MONOLITH

Avoid the **12 Most Common** Mistakes Made When Building Microservices

Hi, I'm J.

Jonathan "J." Tower

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- Microsoft MVP in .NET
- Organizer of Beer City Code

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https://github.com/jonathantower/distributed-monolith

BUT FIRST…If You Give $200, So Will I!

bit.ly/indy-water

"charity:water is a non-profit organization that provides clean and safe drinking water to people in developing nations. The organization was founded in 2006 and has helped fund 35,000 projects in 27 countries, benefiting over 9.5 million people.."
- Wikipedia

"4/4 Stars"
- CharityNavigator.org

charity: water

Some Definitions

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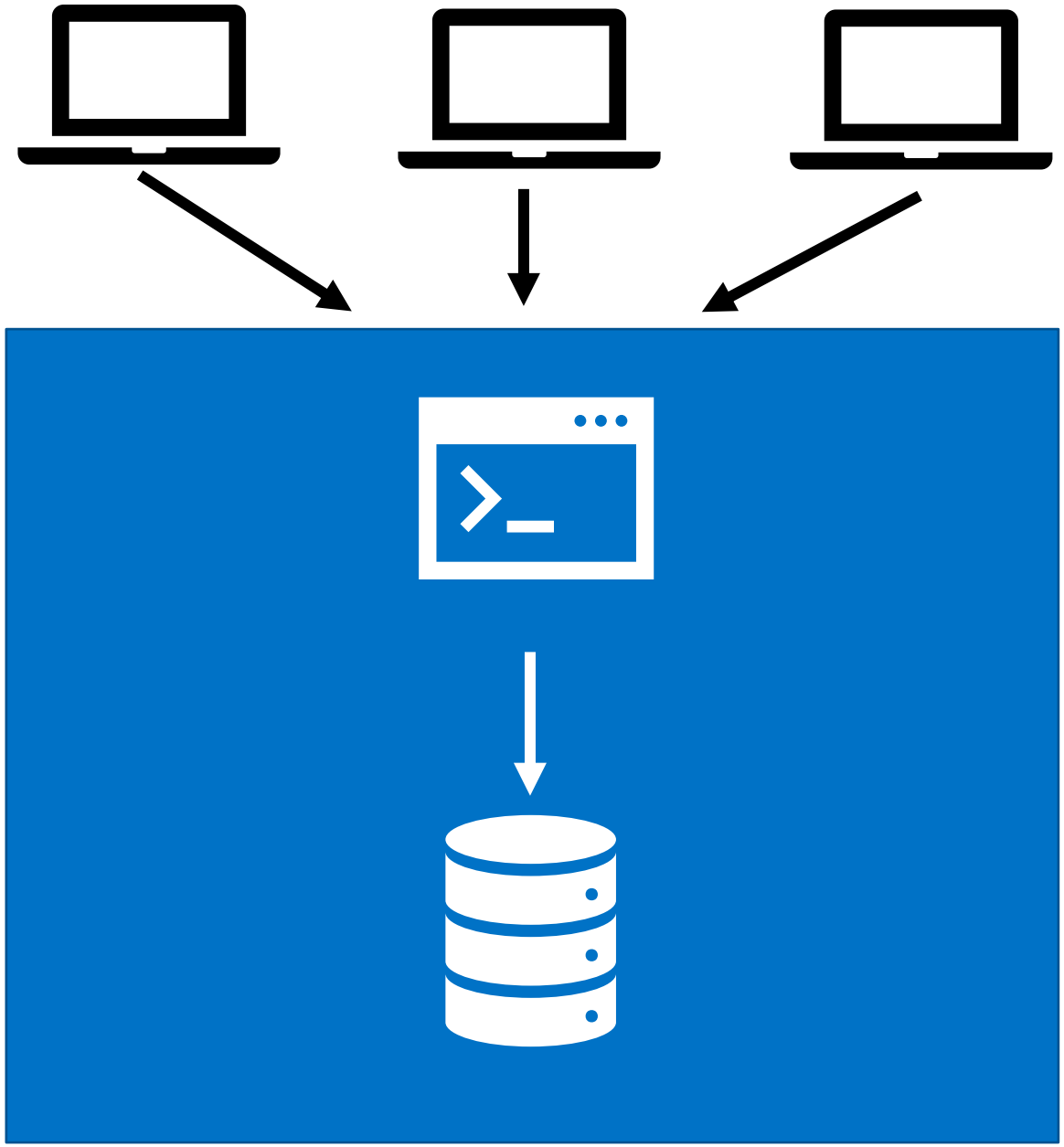
Monolith



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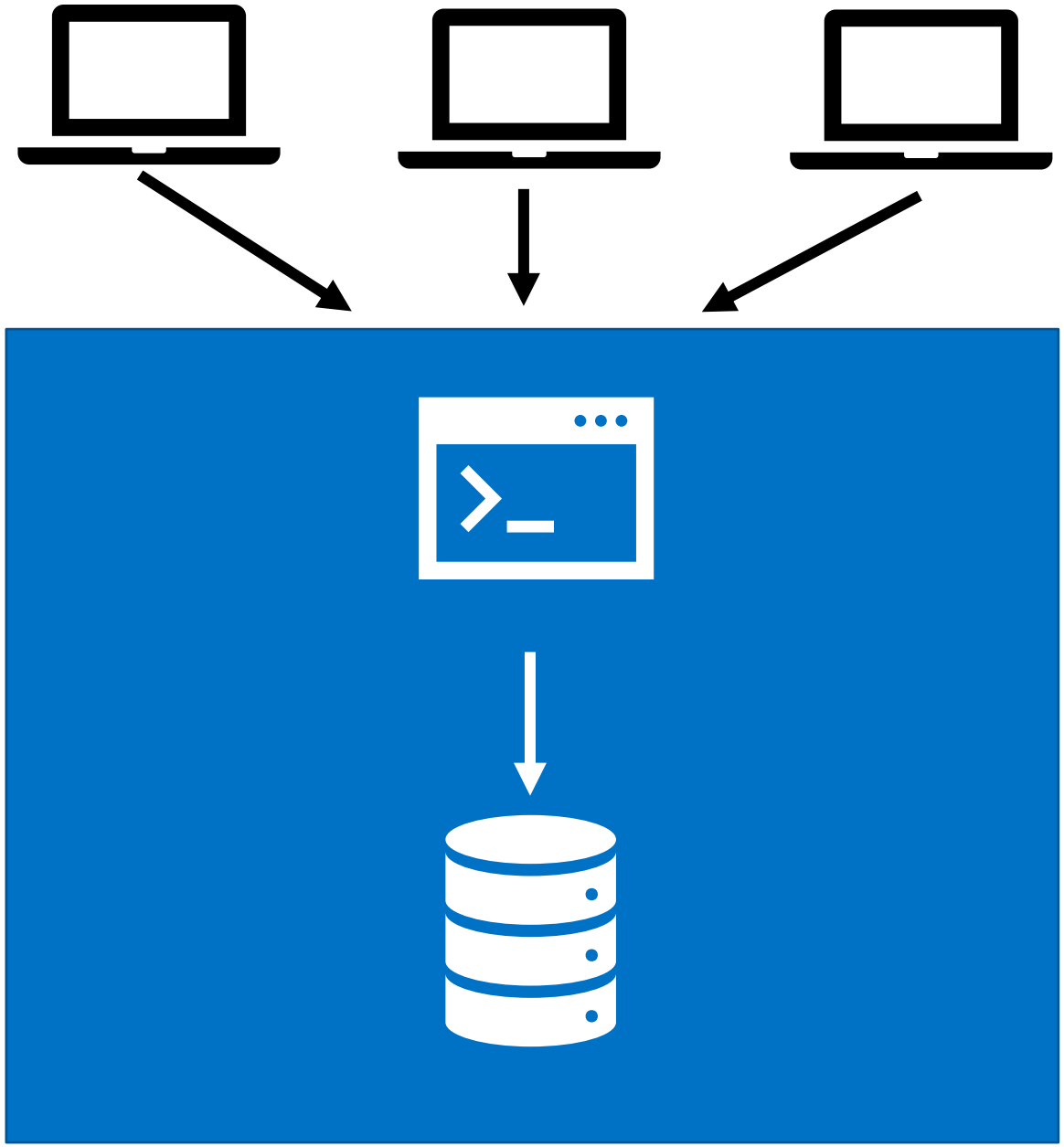

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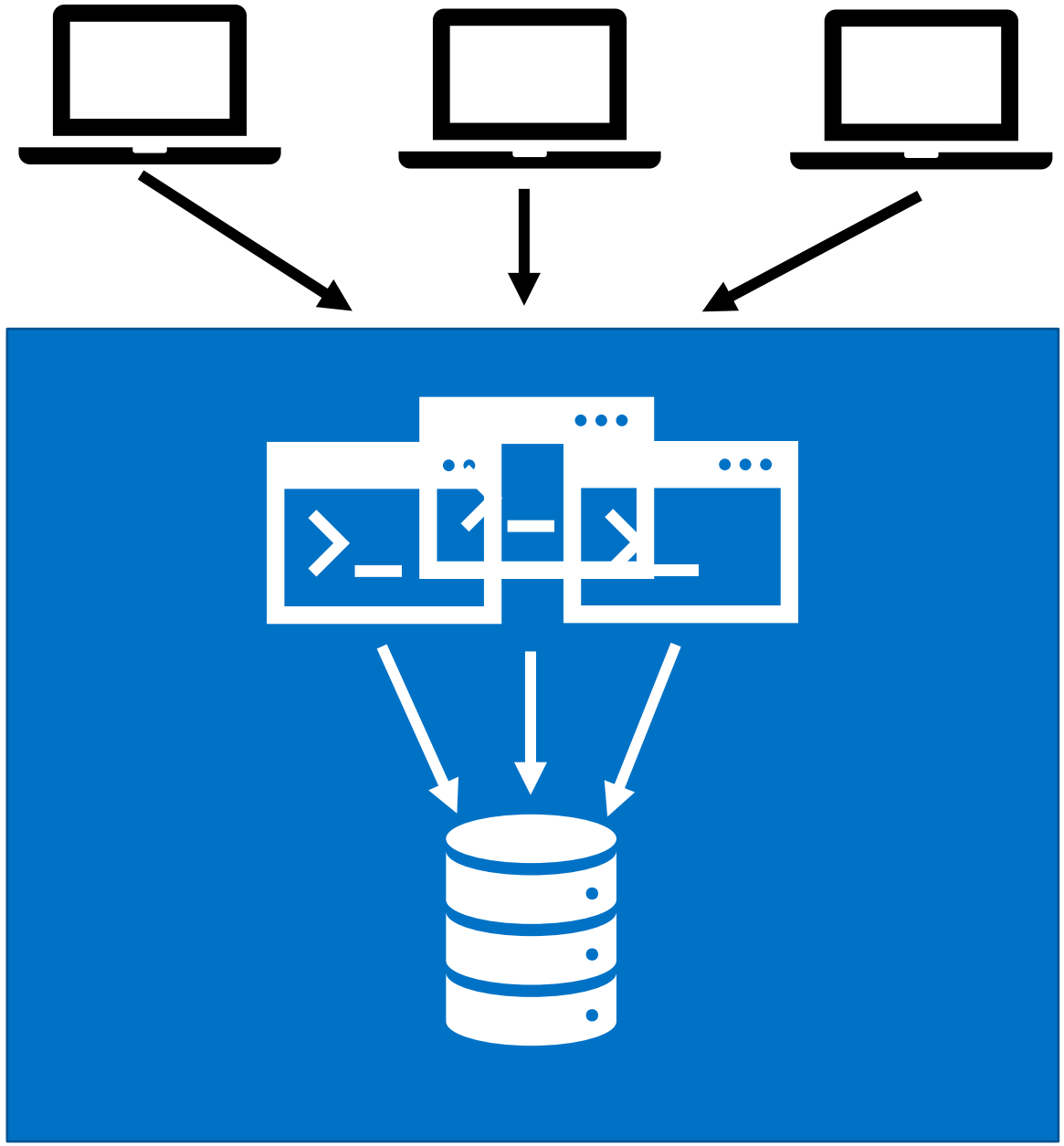

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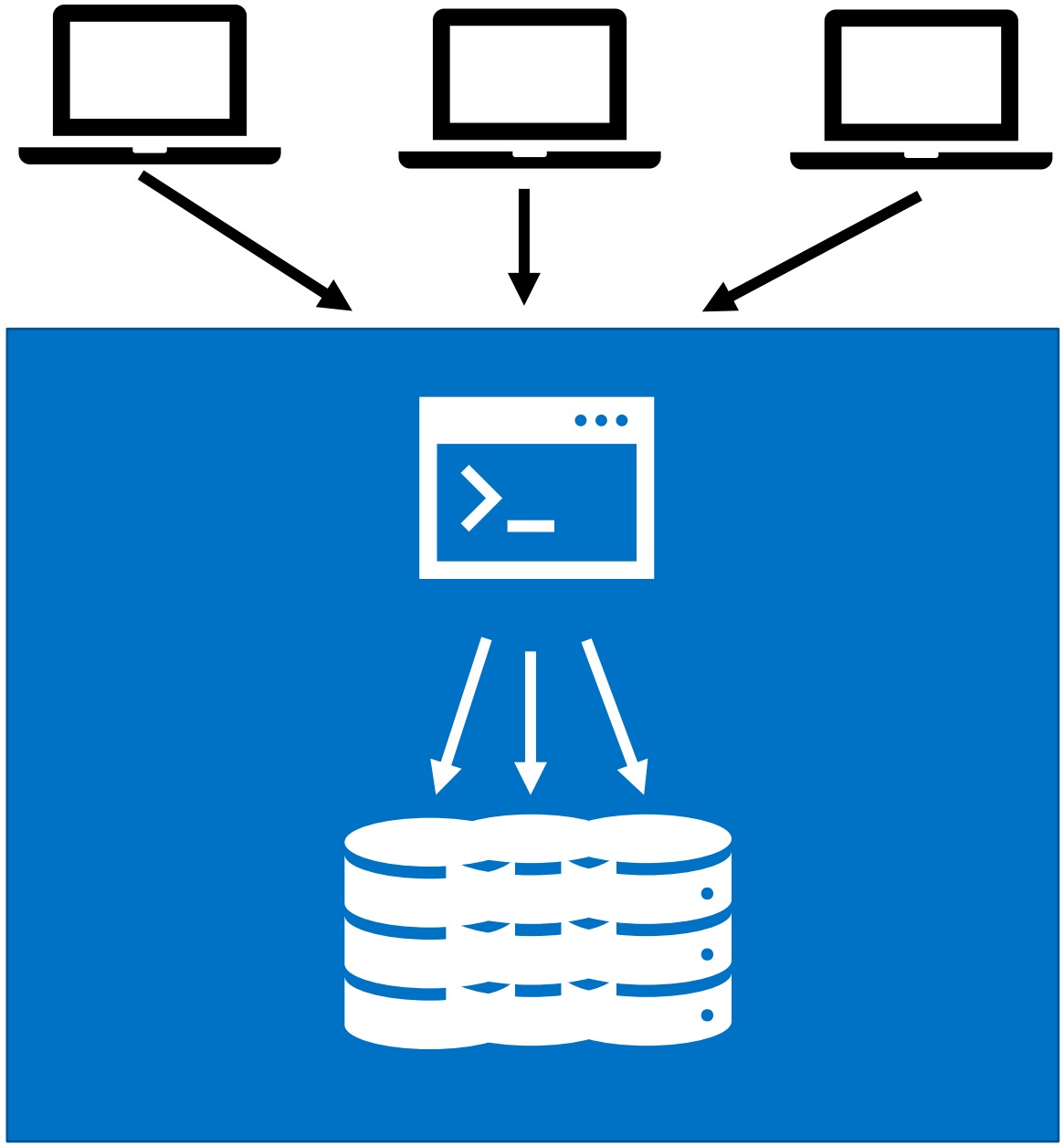

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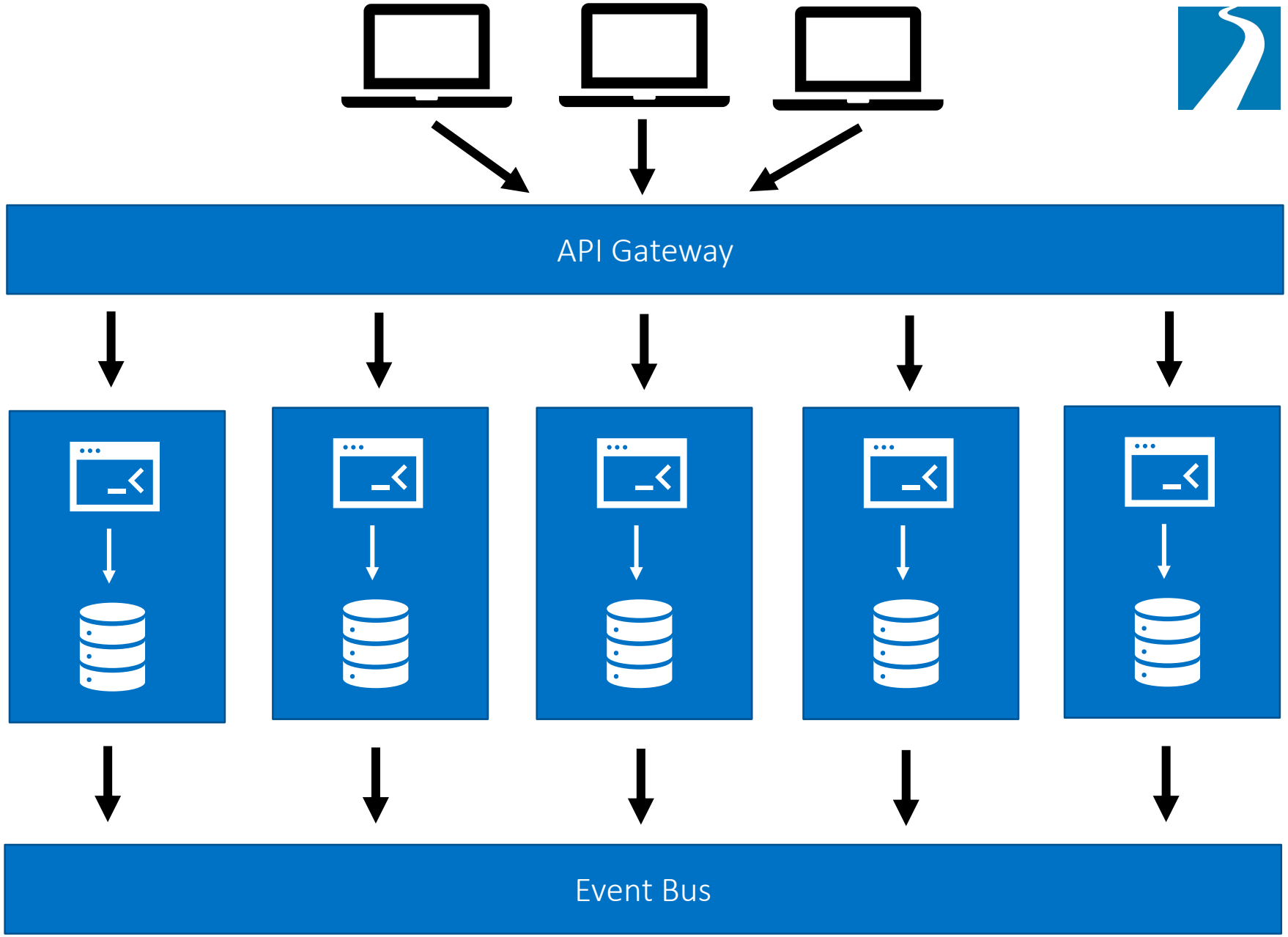
Microservices



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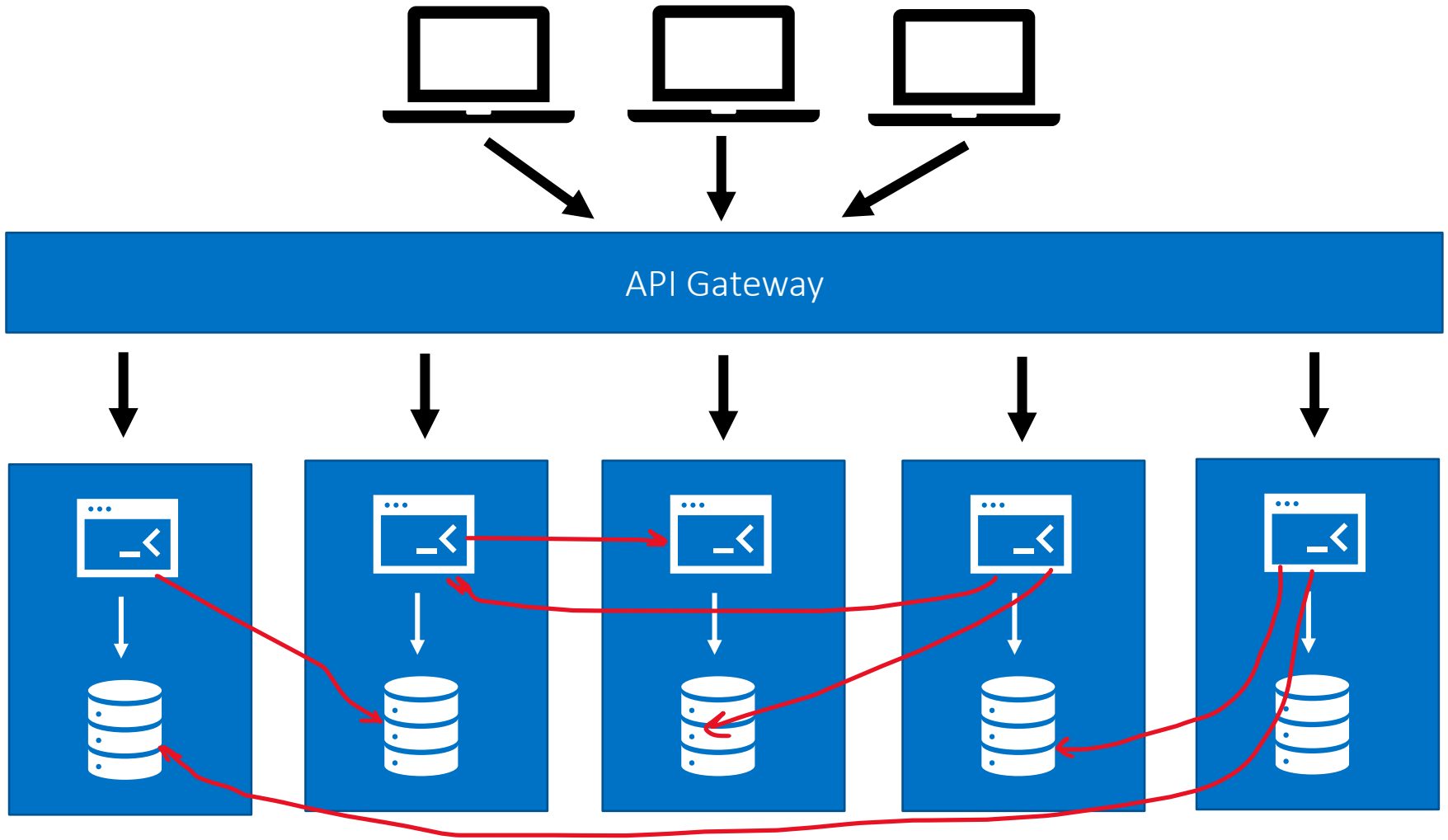
Distributed Monolith

Distributed Monolith



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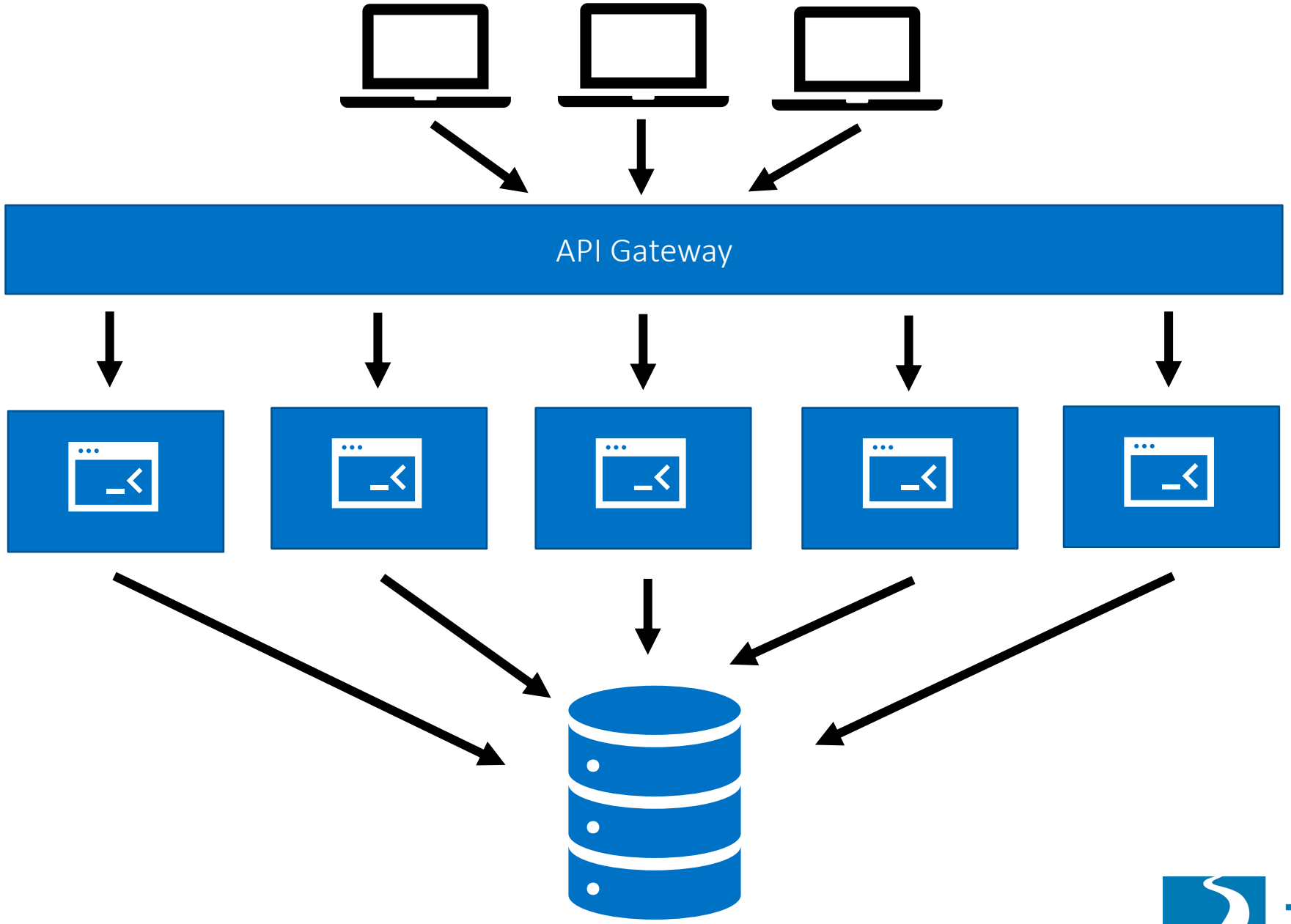

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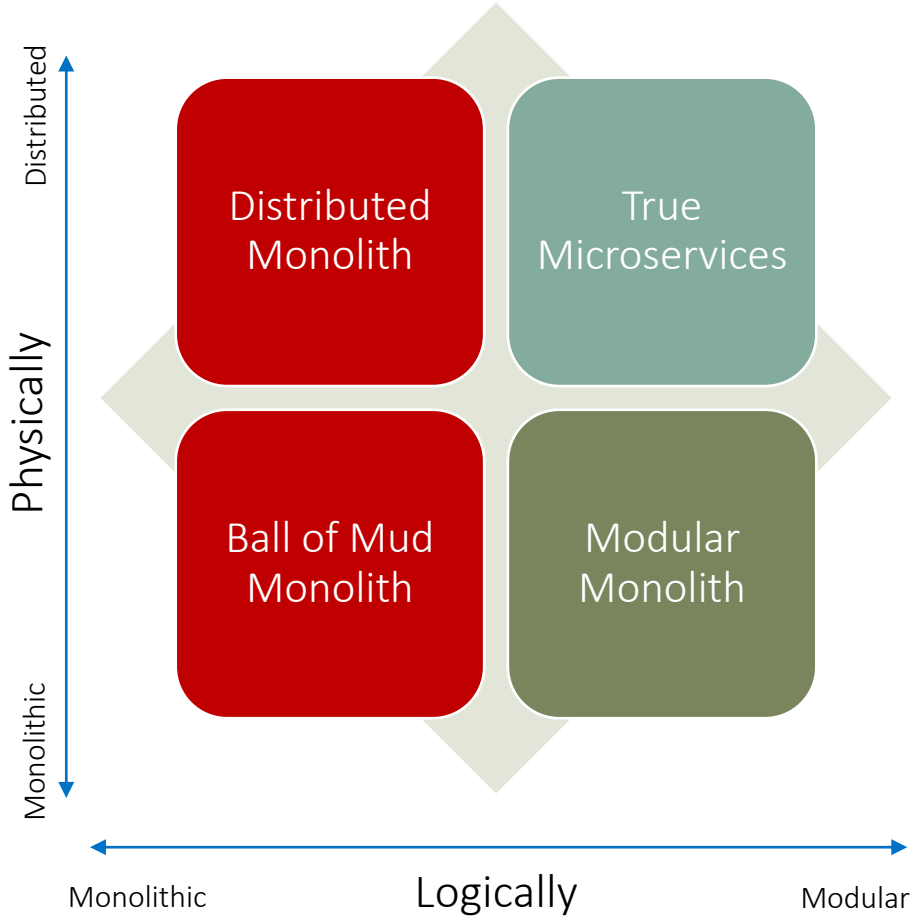
Good and Bad Monoliths



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12 Most Common Mistakes

Avoid Creating a “Monster”

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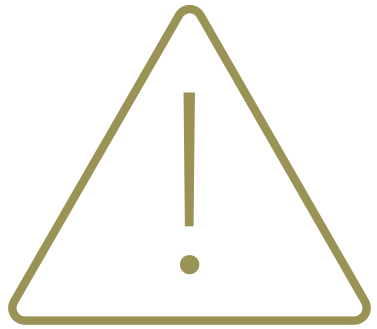
Assuming Microservices are Always Better

Problem #1

First Rule of Microservices: Don't Use Microservices

Have a "Really Good Reason" – Sam Newman

Monoliths aren't inherently bad



Microservices are *hard*

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Some Good Reasons to Microservice

A Need to Independently Deploy New Functionality with Zero Downtime

A Need to Isolate Specific Data and Data Processing Through Data Partitioning

A Need to Enable a High Degree of Team Autonomy

Source: https://blog.dreamfactory.com/when-to-use-microservices-sam-newman-and-martin-fowler-share-their-knowledge

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The Big Trade Off

Microservices

Monoliths

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Tight Coupling of Services

Problem #2

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Easy To Tightly Couple Accidentally

Synchronous calls
(time coupling)

Shared message
definitions

Shared object models
(DTOs, models)

Shared helper classes

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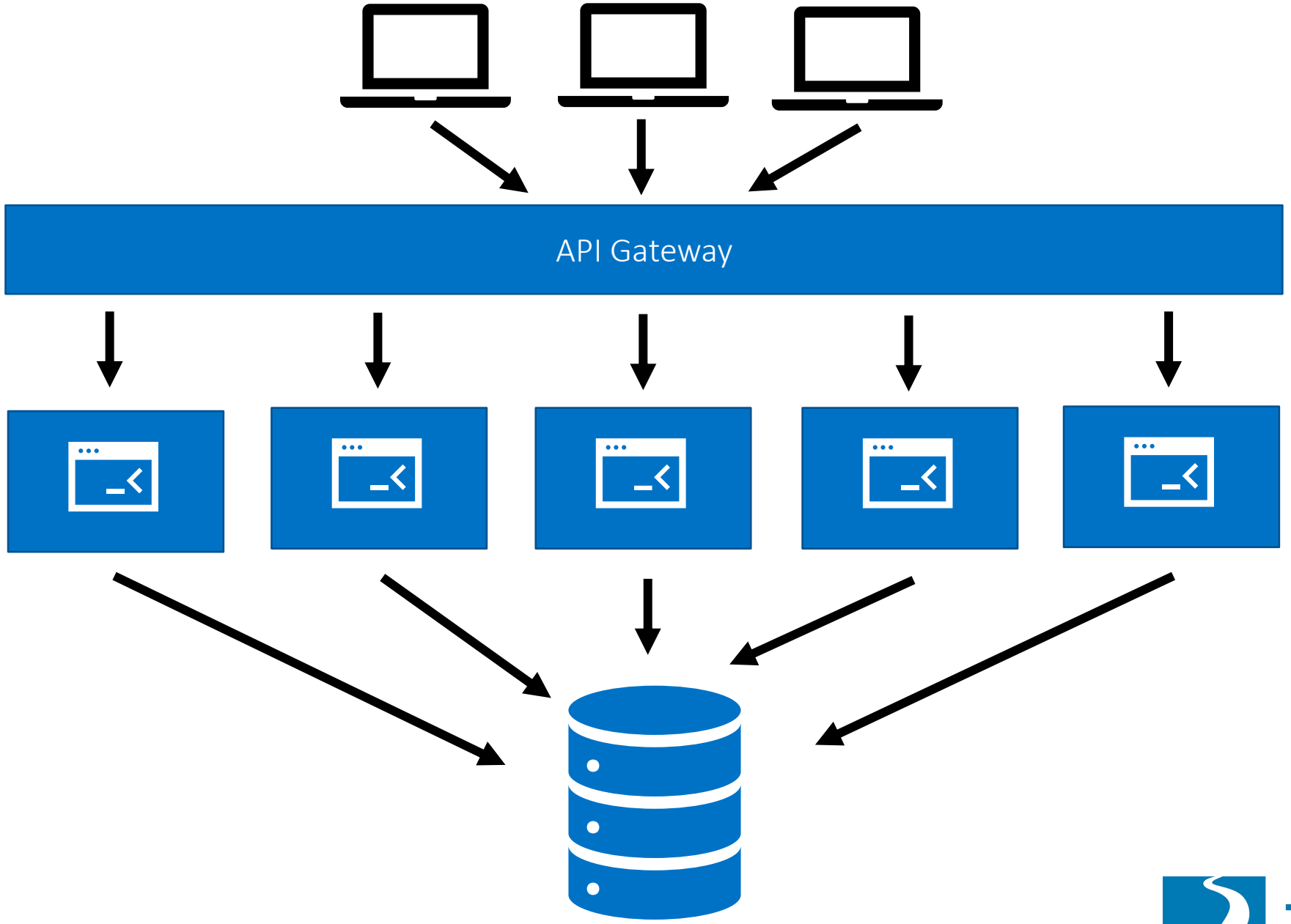
Shared Data Store or Models

Problem #3



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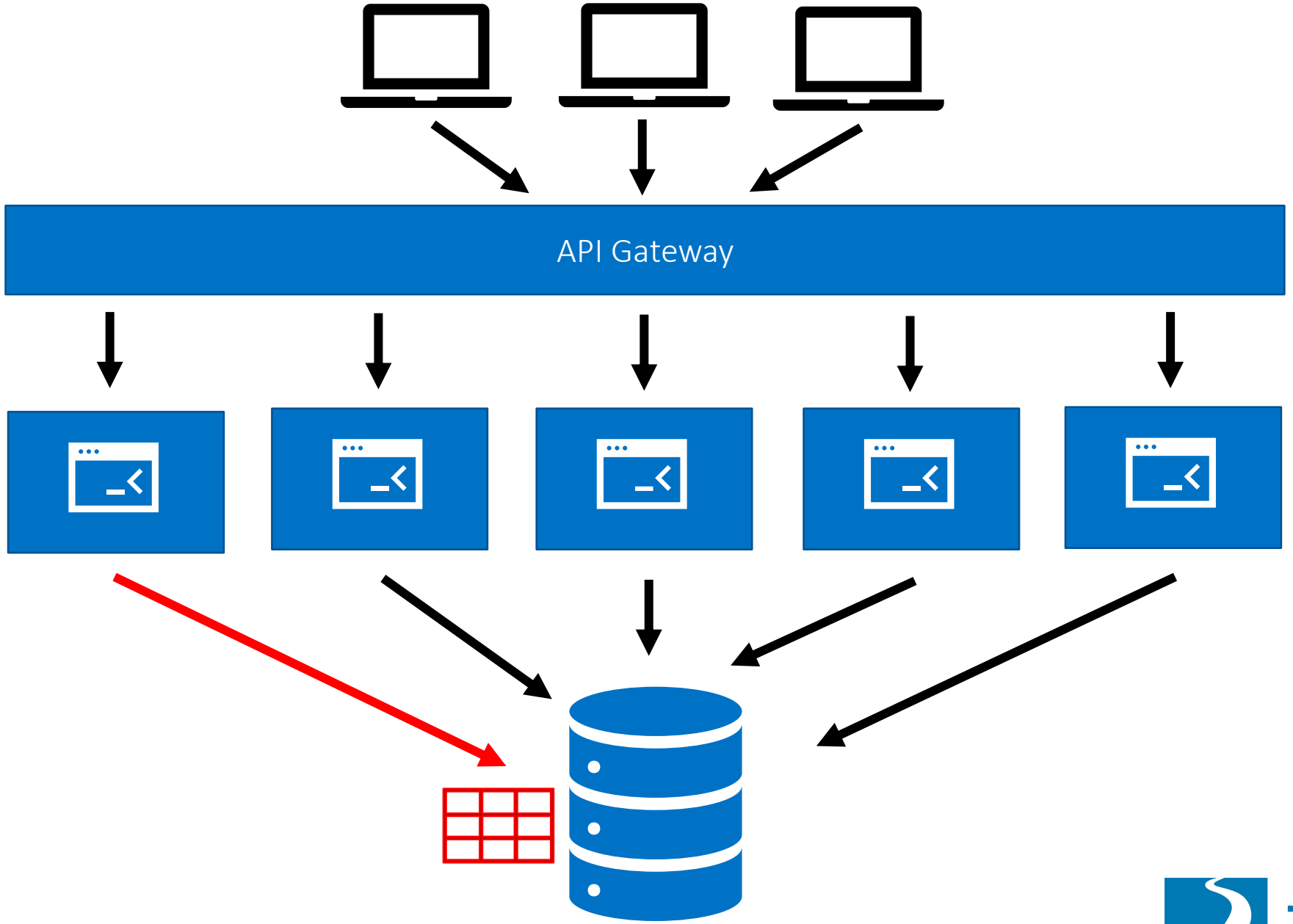

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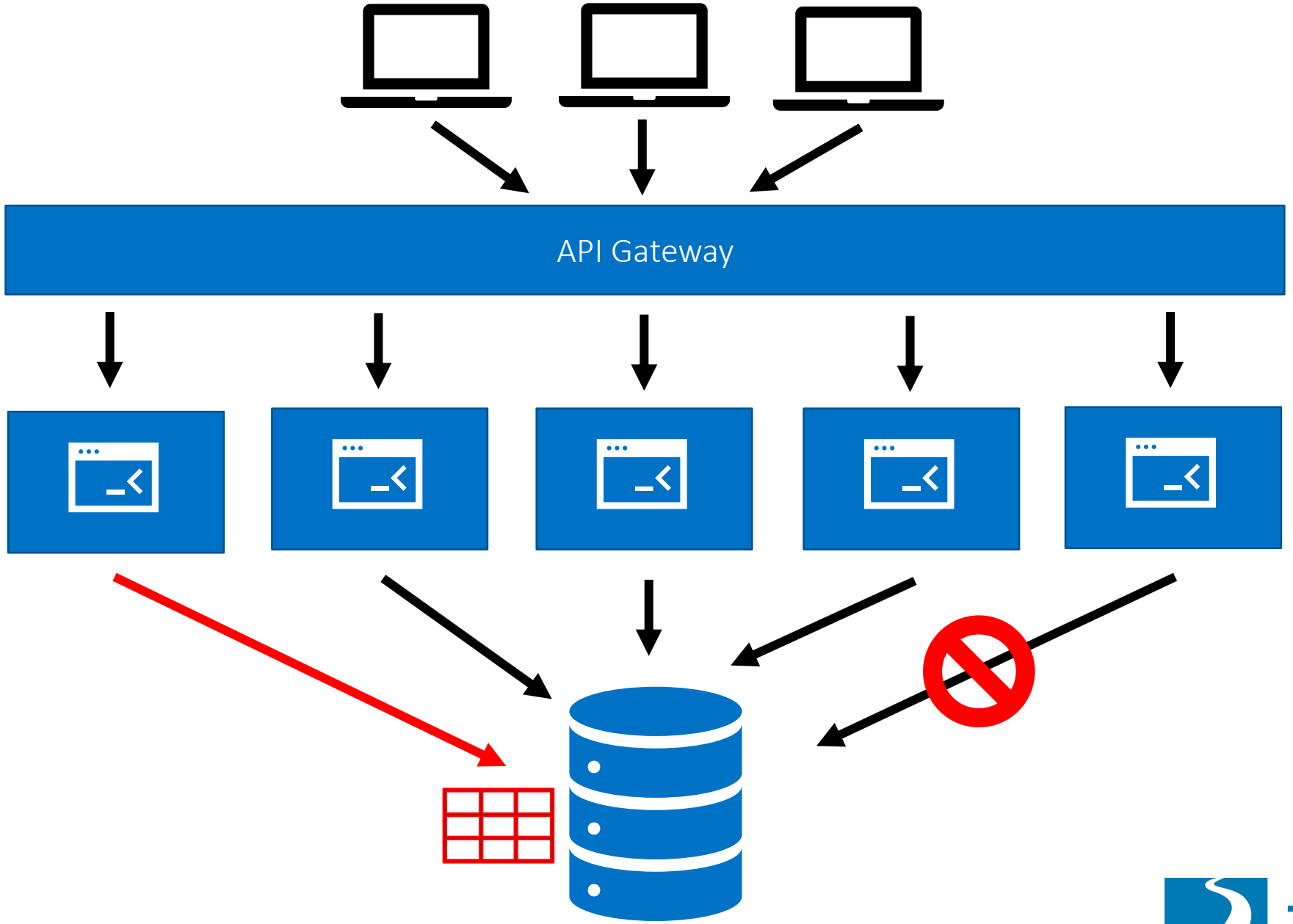

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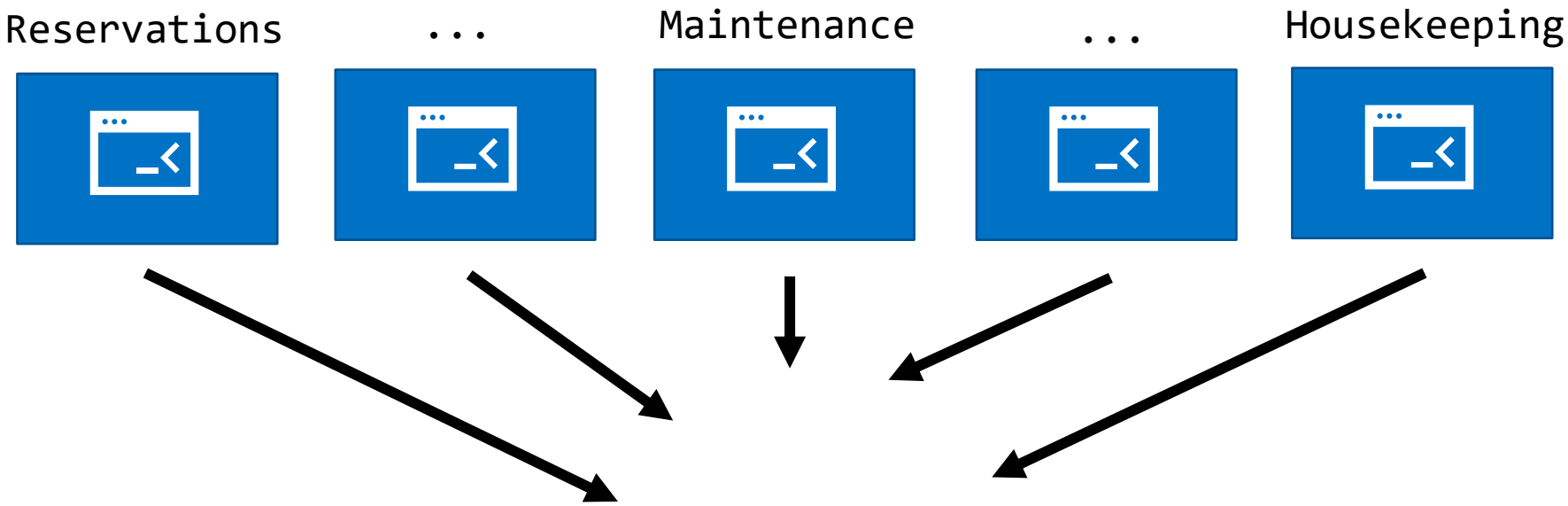


```
HotelRoom {
  CurrentlyOccupied : bool
  NumberofBeds : int
  MinutesToClean : float
  RepairHistory: [
    { RepairDate: ... },
    { RepairDate: ... },
  ]
}
```

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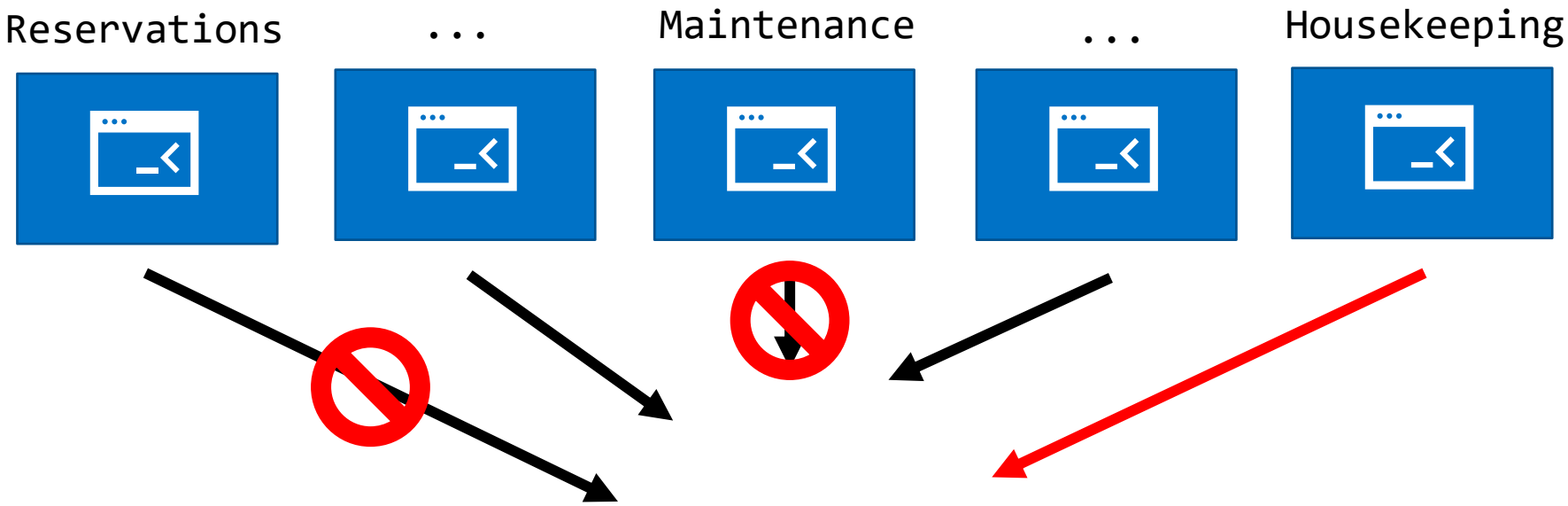


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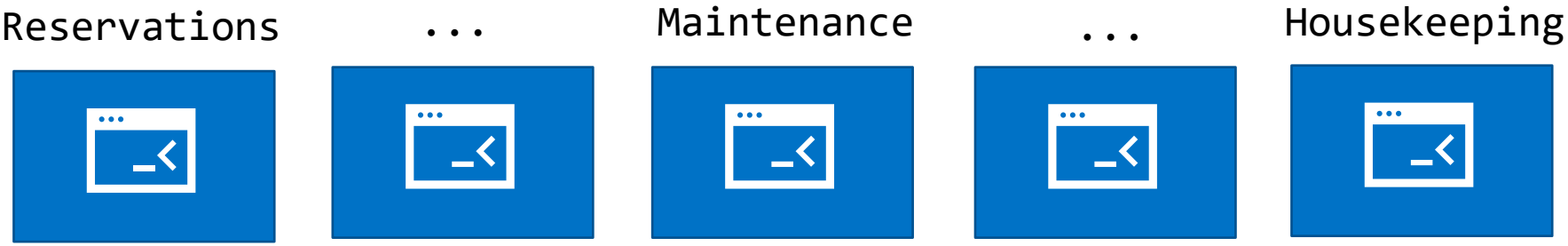


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```

```
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}
```

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Microservices That Are Too Big

Problem #4

Domain Driven Development

Domain
 Subdomain
  Bounded Context

Domain Driven Development

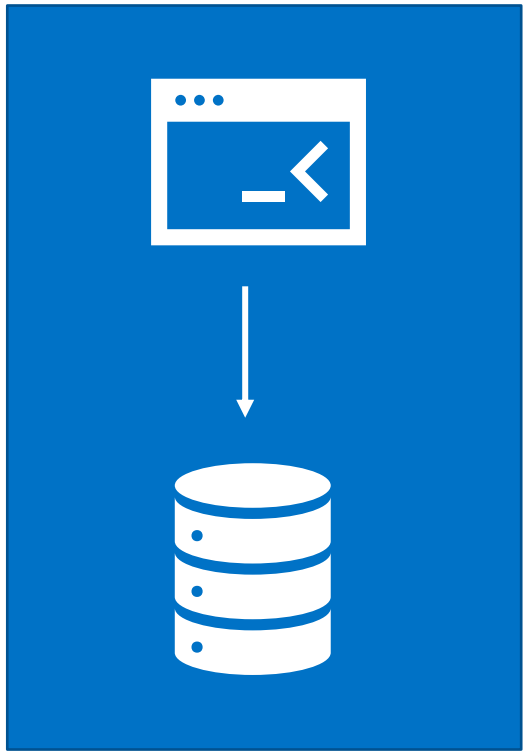
Domain
 Subdomain
  Bounded Context

Smallest possible microservices without chatty communication between services

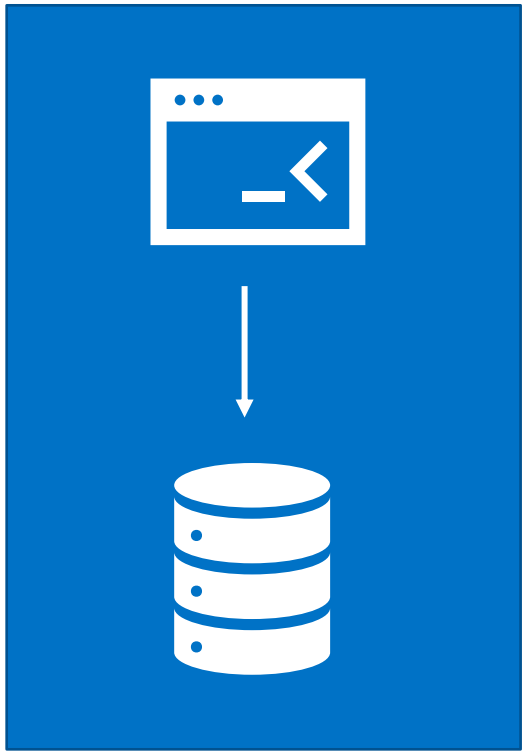
Microservices That Are Too Small

Problem #5

User Log In



Password Reset



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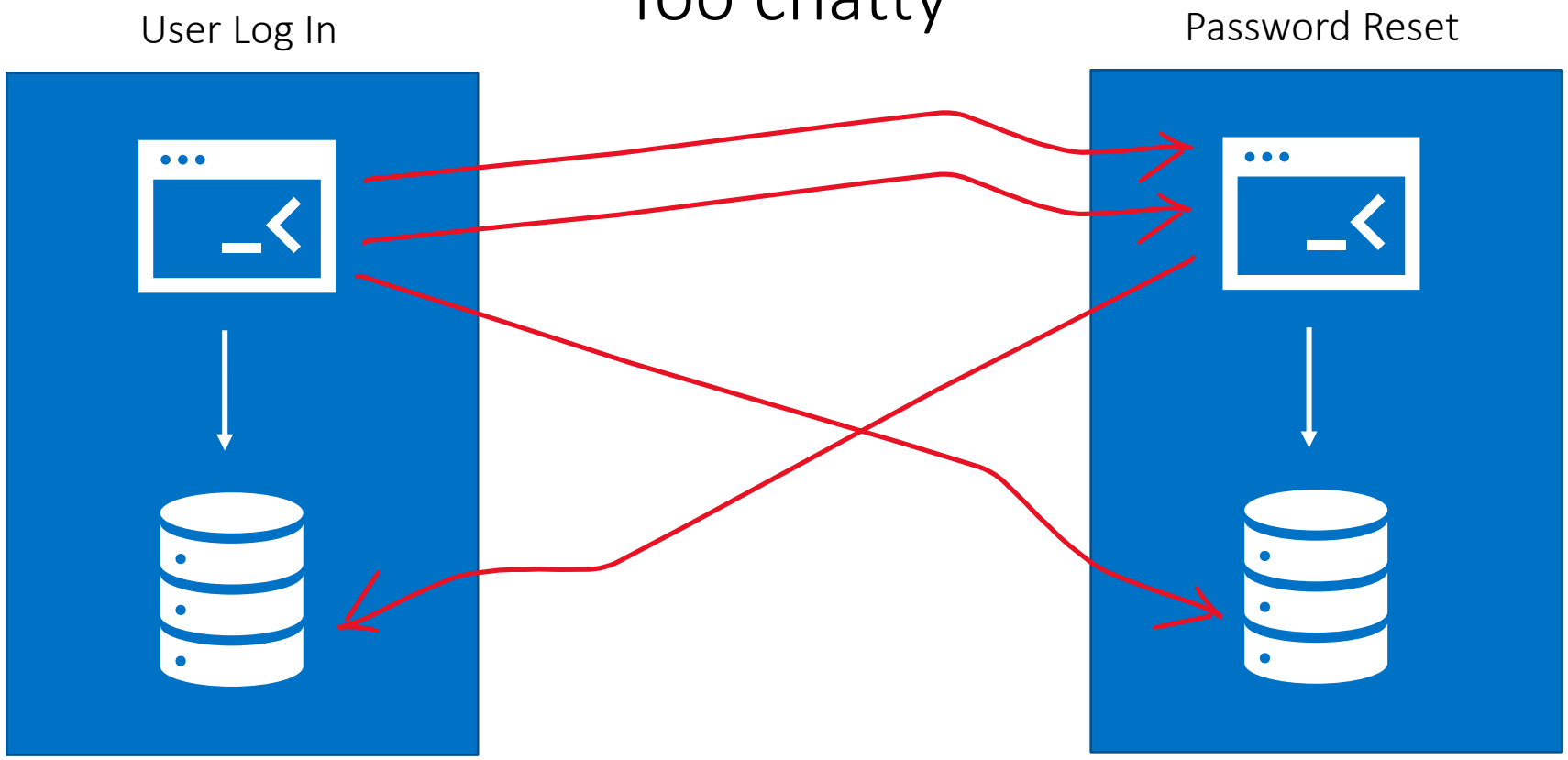
Too chatty



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Starting from Scratch

Problem #6

Greenfield is Actually Harder

Easier to partition an existing, "brownfield" system

Brownfield → Microservices Advantages:

1. Code and relationships to examine
2. People to talk to who know the system
3. A system that already works
4. Baseline to compare to refactoring

Three Approaches: Monolith to Microservices

Big bang

Evolution

“Strangler fig” pattern

Source: https://blog.dreamfactory.com/when-to-use-microservices-sam-newman-and-martin-fowler-share-their-knowledge

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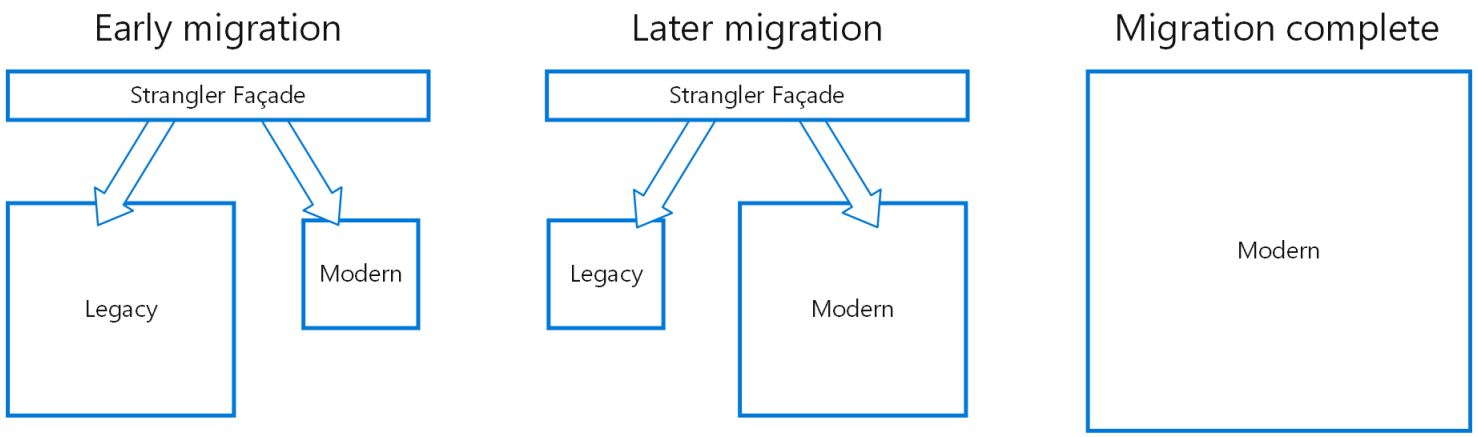
Strangler Fig Pattern



Source: https://docs.microsoft.com/en-us/azure/architecture/patterns/strangler-fig

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Reminder…If You Give $200, So Will I!

bit.ly/indy-water

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- Wikipedia

"4/4 Stars"
- CharityNavigator.org

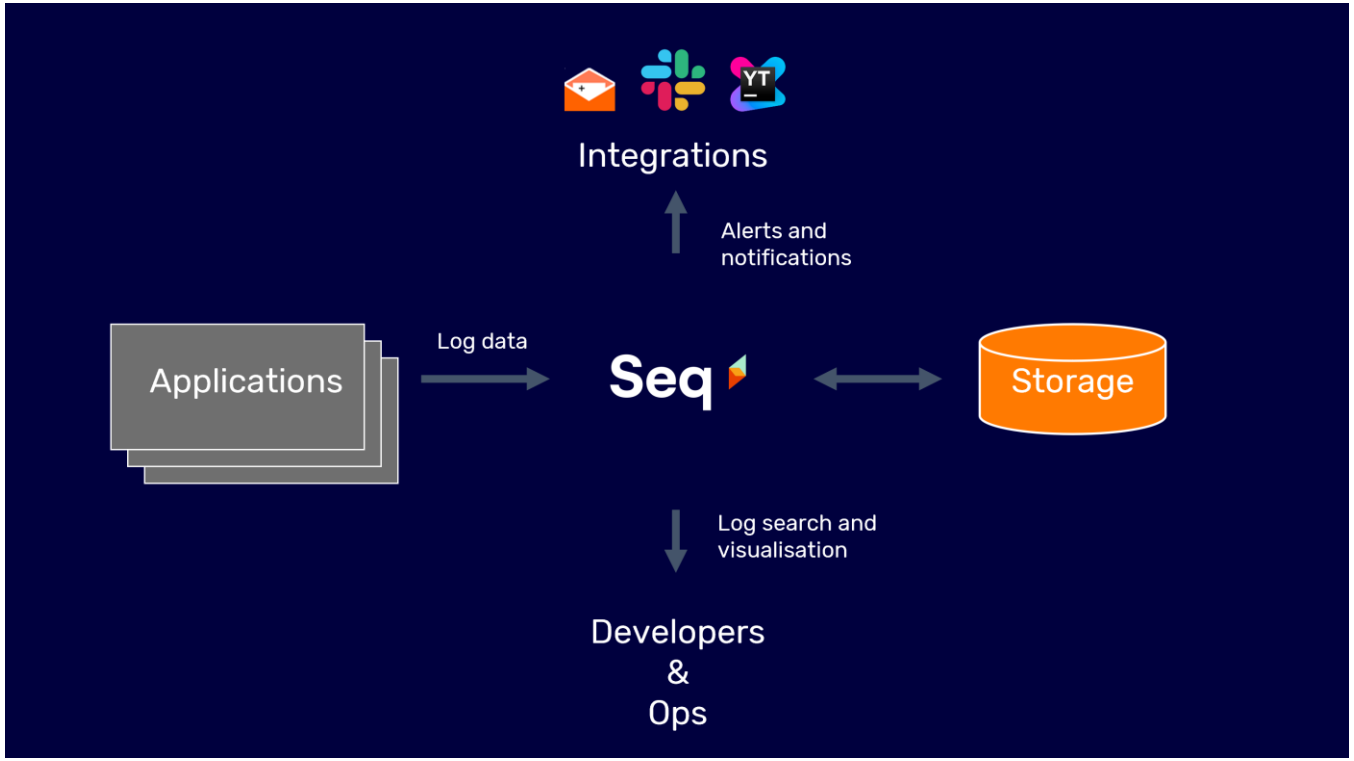
charity: water

Decentralized Logging

Problem #7

Debugging Distributed Systems Is Hard

- Centralized without coupling
- Third party solutions like Seq
  - Seq: “Intelligent search, analysis, and alerting server built specifically for modern structured log data”
  - Supports .NET, Java, NodeJS, Ruby, Go, Python, more.
  - Inherently fault tolerant, embraces eventual consistency



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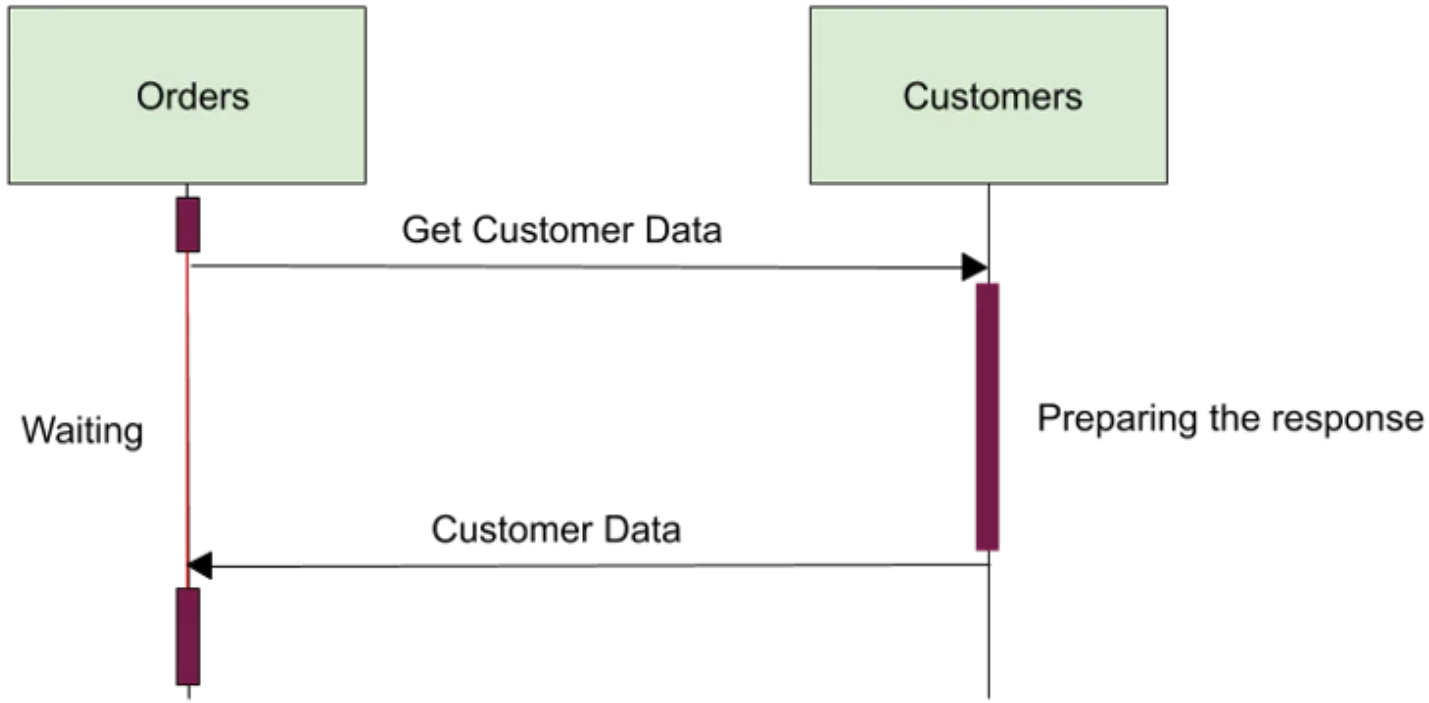
Synchronous Communication

Problem #8



Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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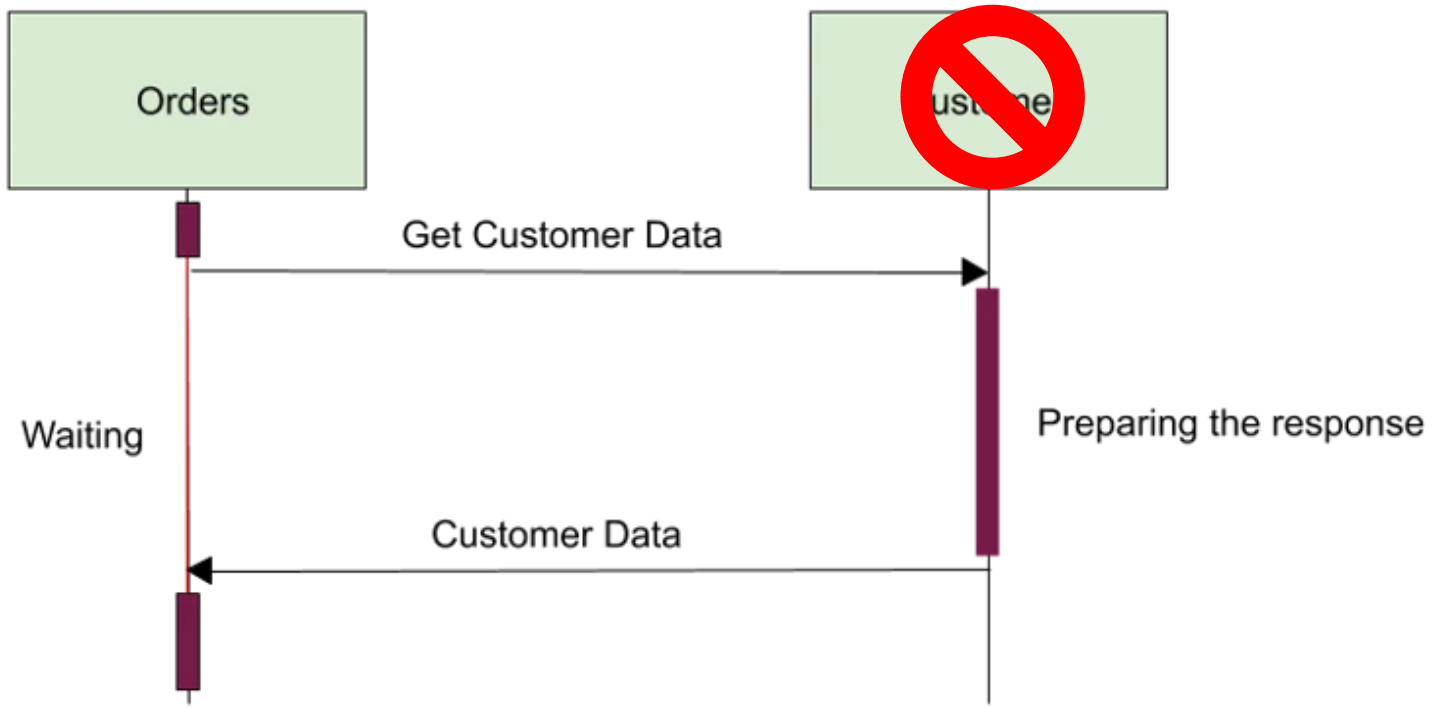

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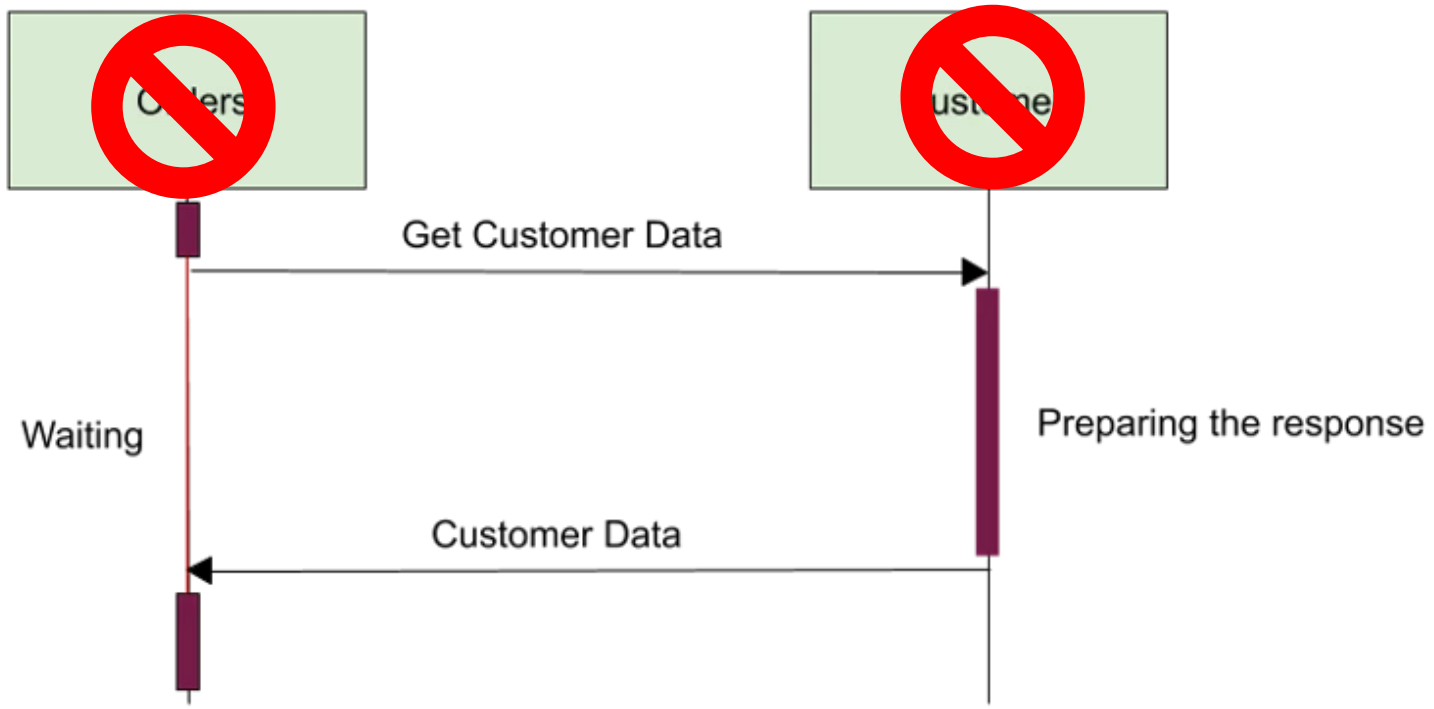

Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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Breaking Changes to Event Contracts

Problem #9

Rules for Event Changes

01

No new **required** fields, only optional fields (with documented default values).

02

Unrecognized fields are **ignored** (but forwarded)

03

Consumers of optional fields use **default** values when missing

04

When 1-3 cannot be satisfied, it's a **new event** type

Not Automating Build and Release

Problem #10

Prerequisite: Automated Build and Release

Time consuming

Prone to human error

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Mismatched Team Organization

Problem #11

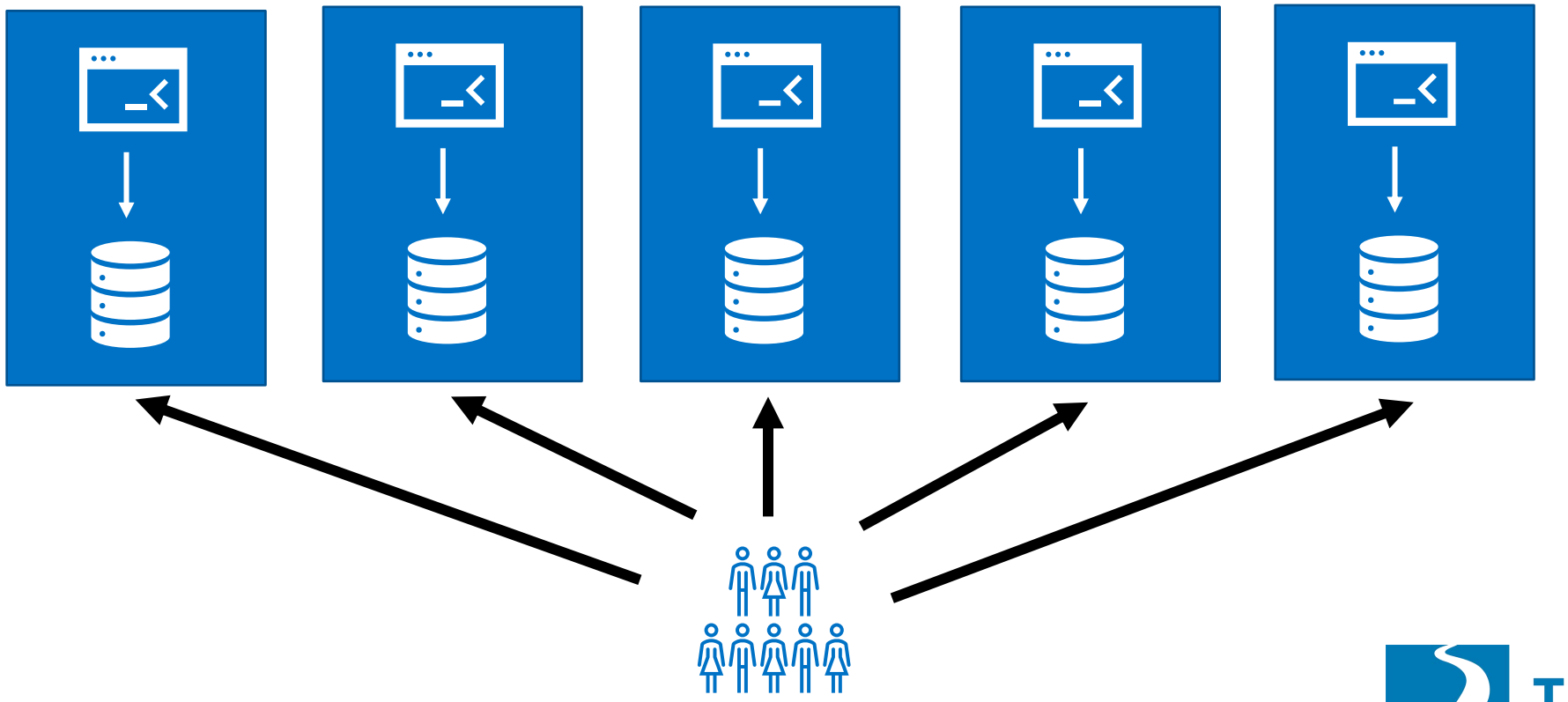
Conway's Law

"Any organization that designs a system (defined broadly) will produce a design whose **structure** is a **copy** of the organization's **communication structure**."

- Melvin E. Conway

IOW: if you have four groups working on a compiler, you'll get a 4-pass compiler.

Single Team



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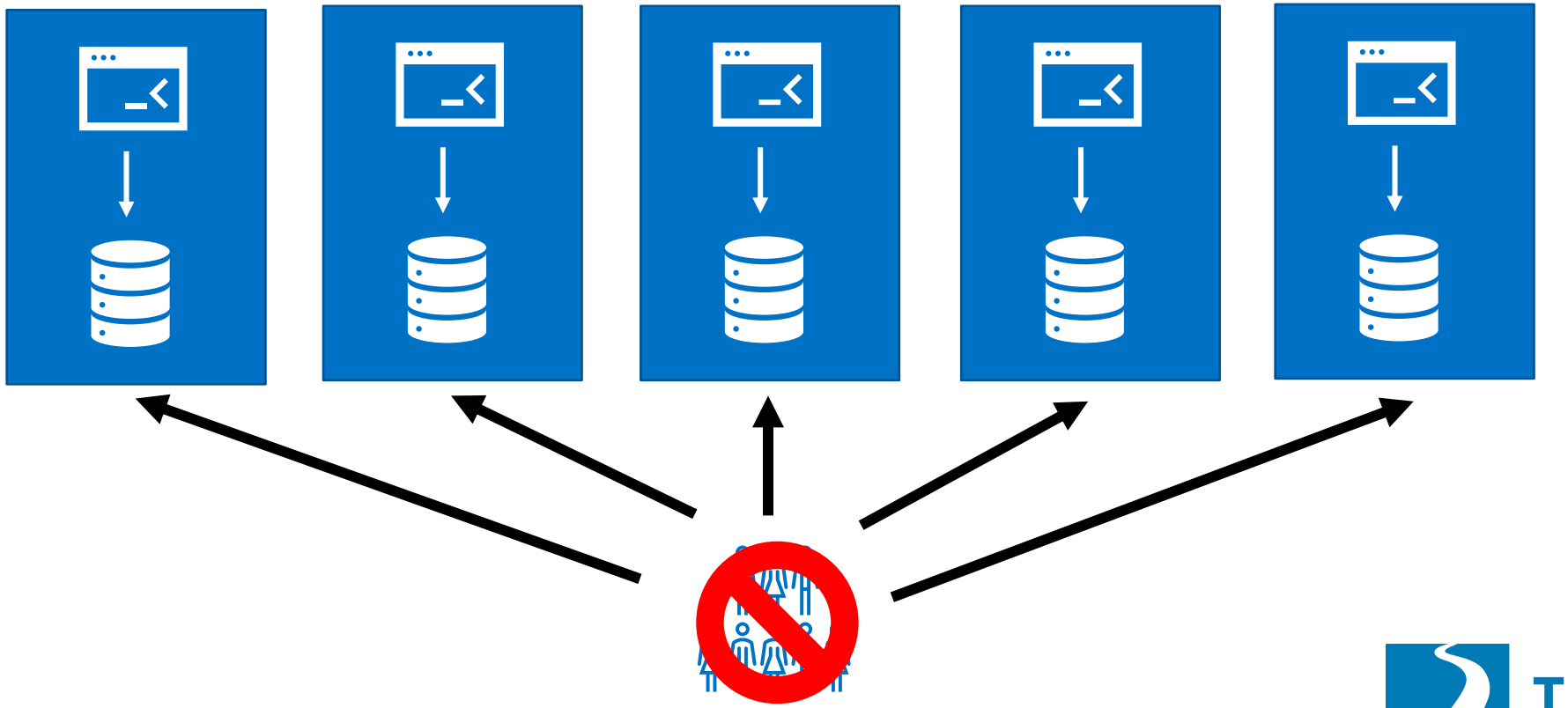
Single Team



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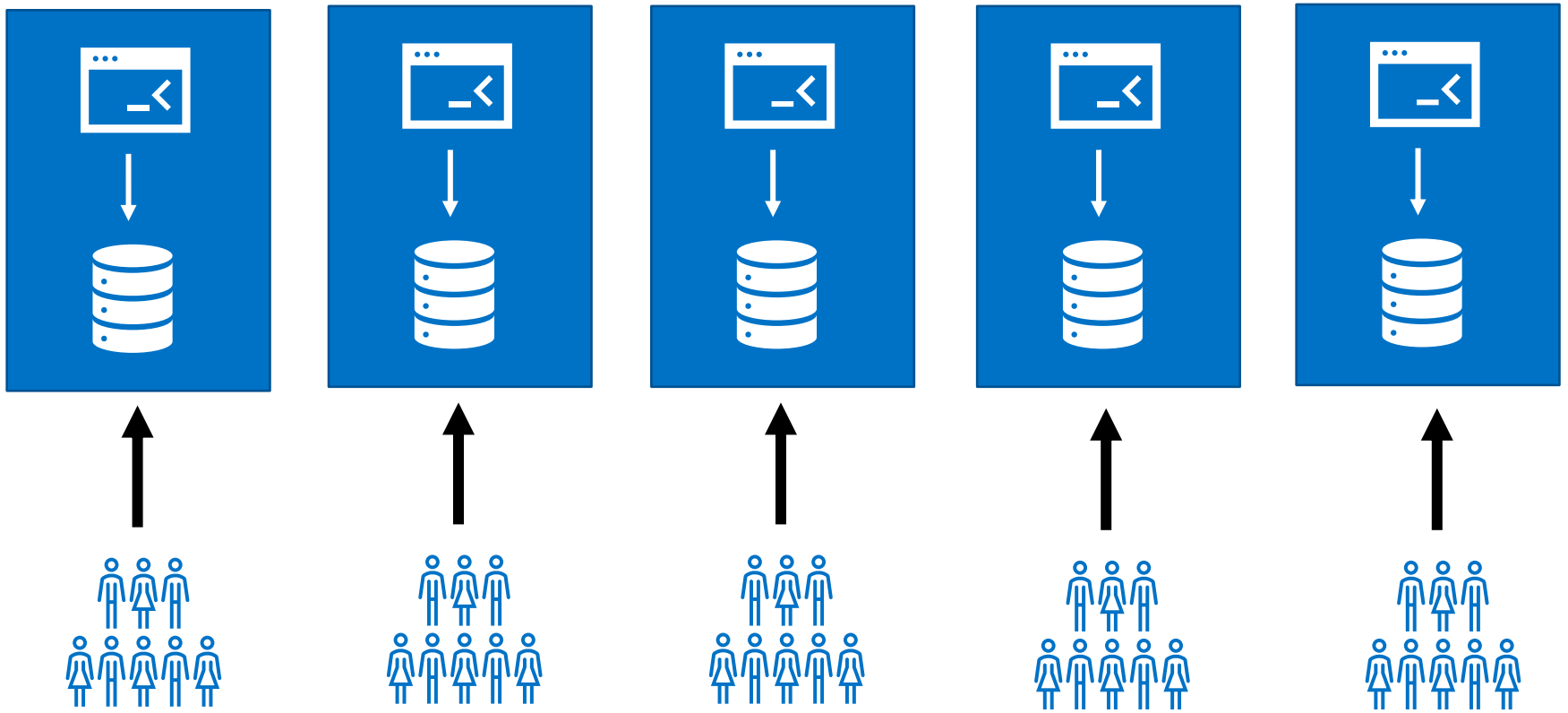
Team Per Service



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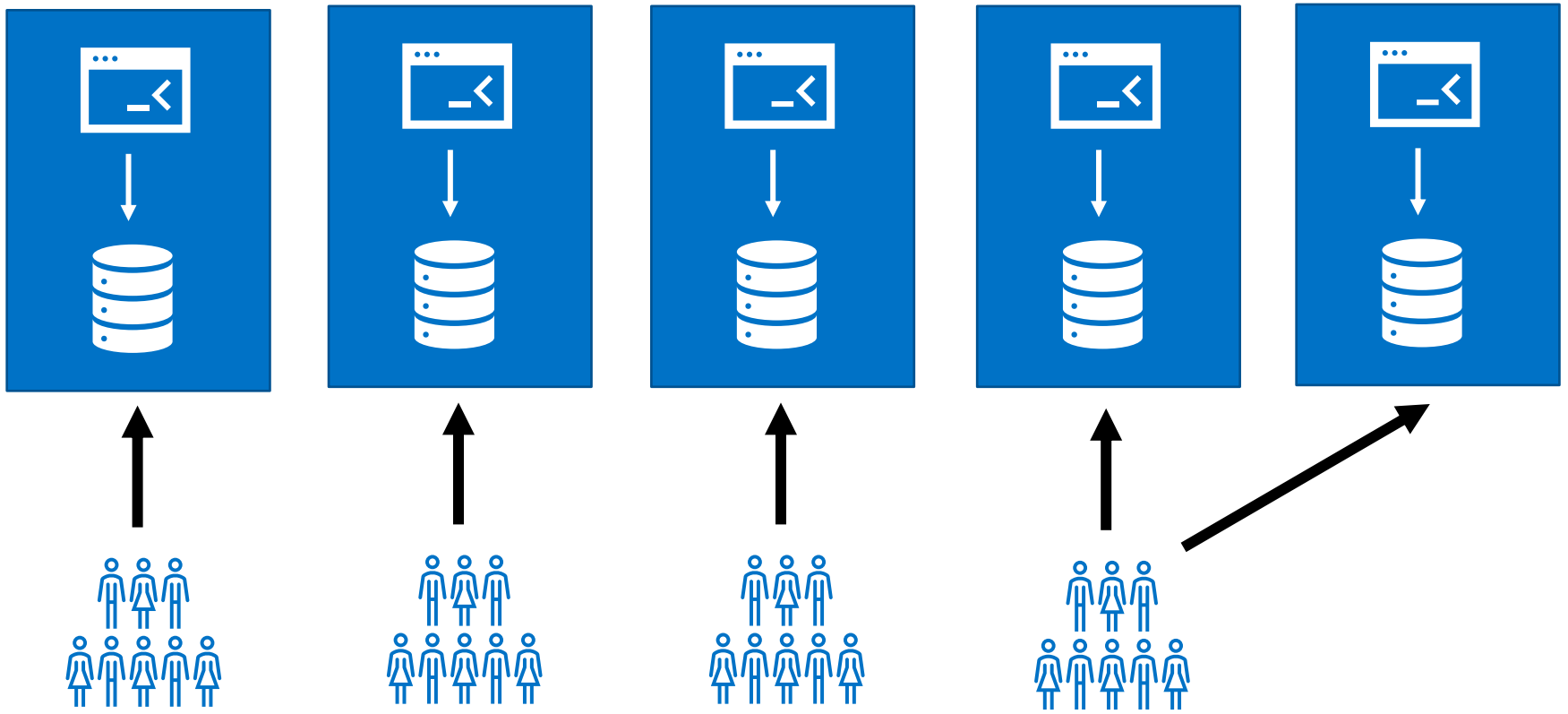


Unencapsulated Services

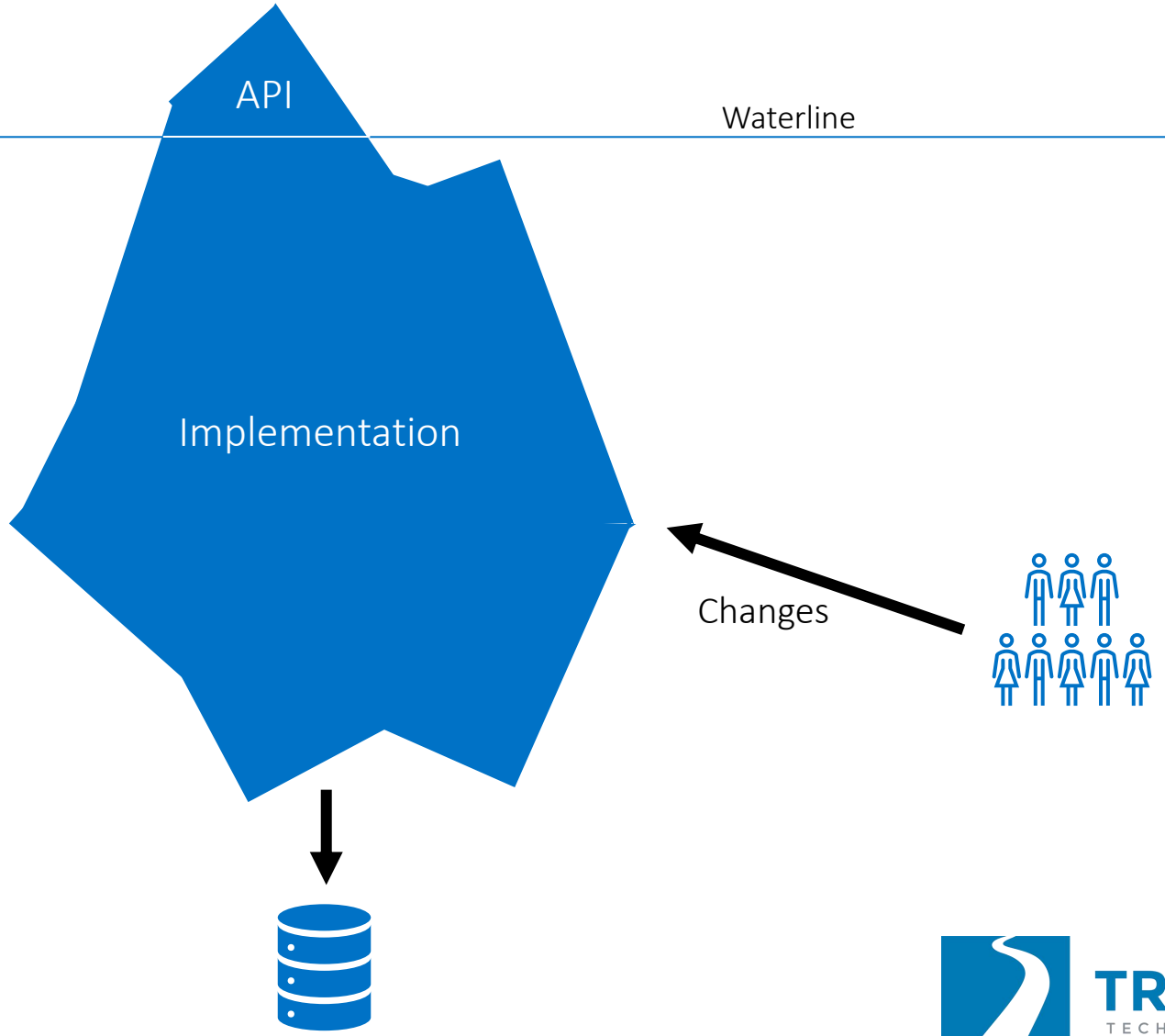
Problem #12

Iceberg Services

Services ENCAPSULATE significant business logic

Small, stable API

Large implementation



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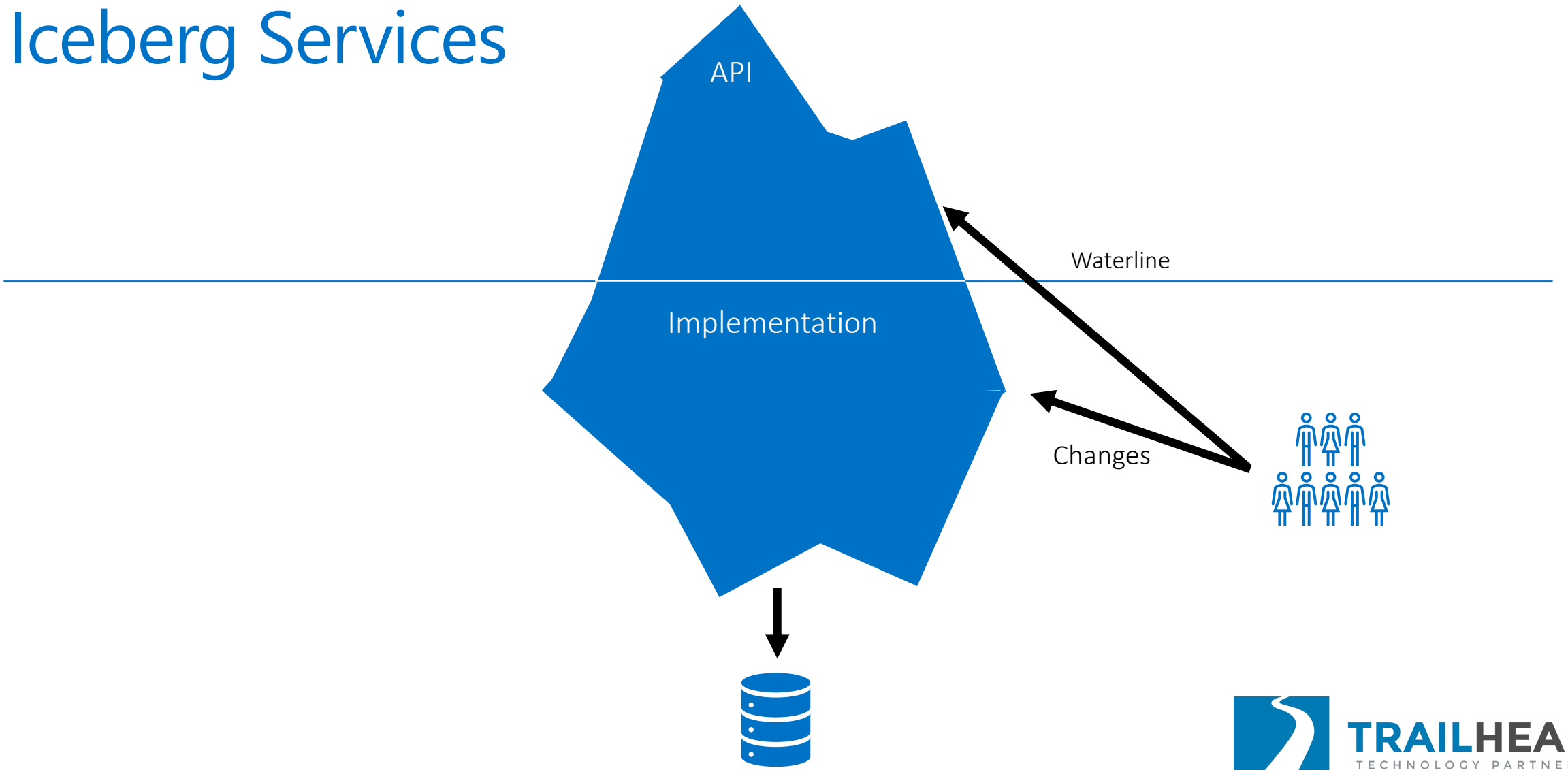
Iceberg Services



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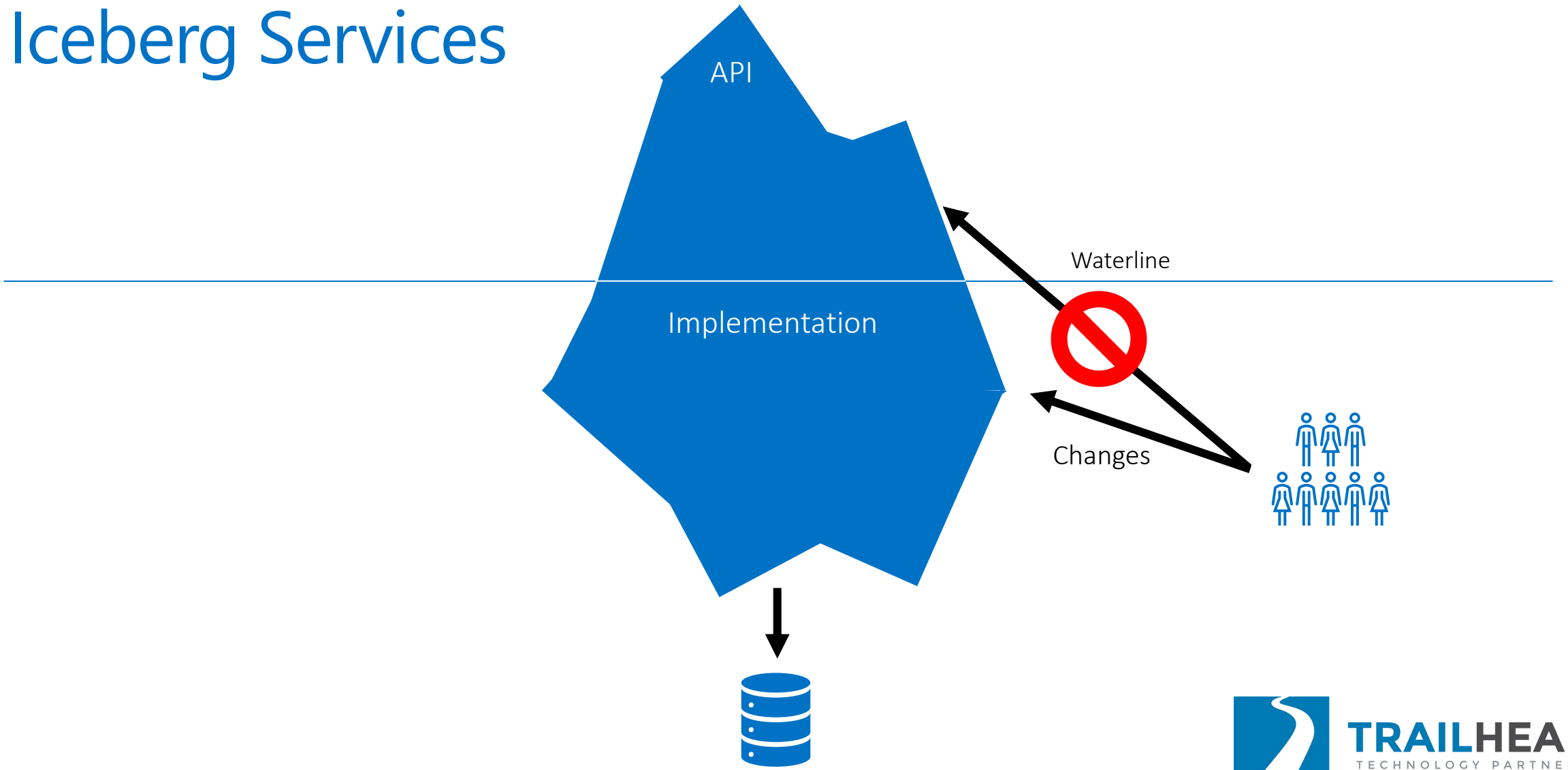
Iceberg Services



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Summing Up

1. For a lightweight application or single team, a monolithic system often suits better

2. For a complex, evolving application with clear domains and separate teams, microservices will be best

3. Don't try microservices without "a really good reason". Monoliths can be good!

4. Avoid pitfalls of the distributed monolith

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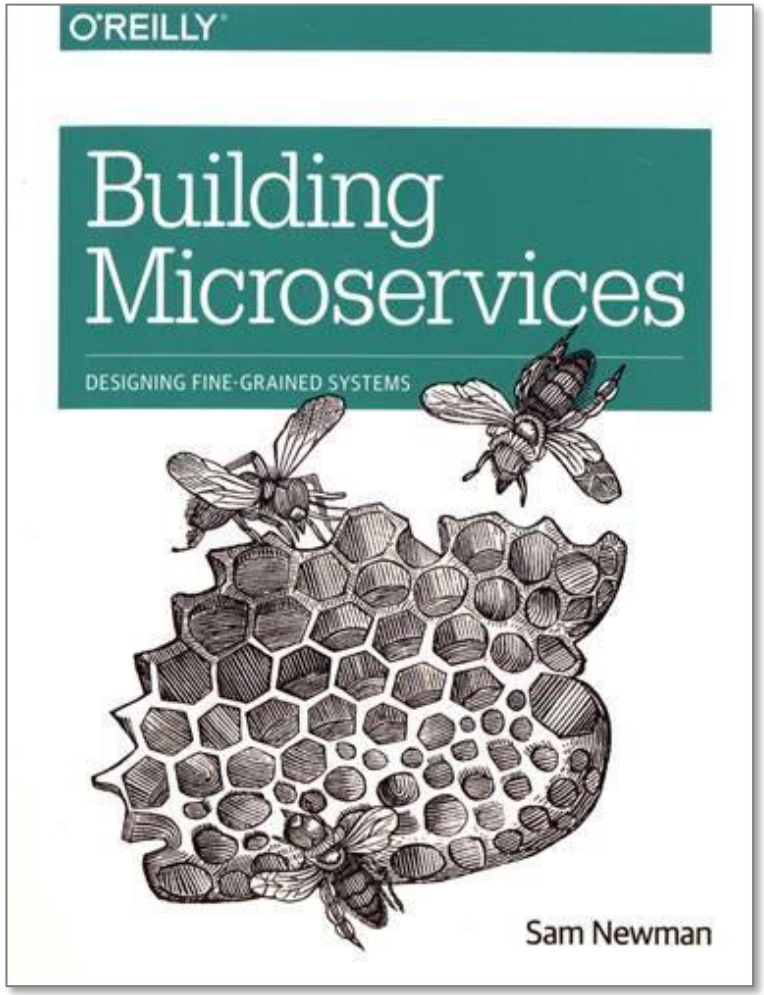
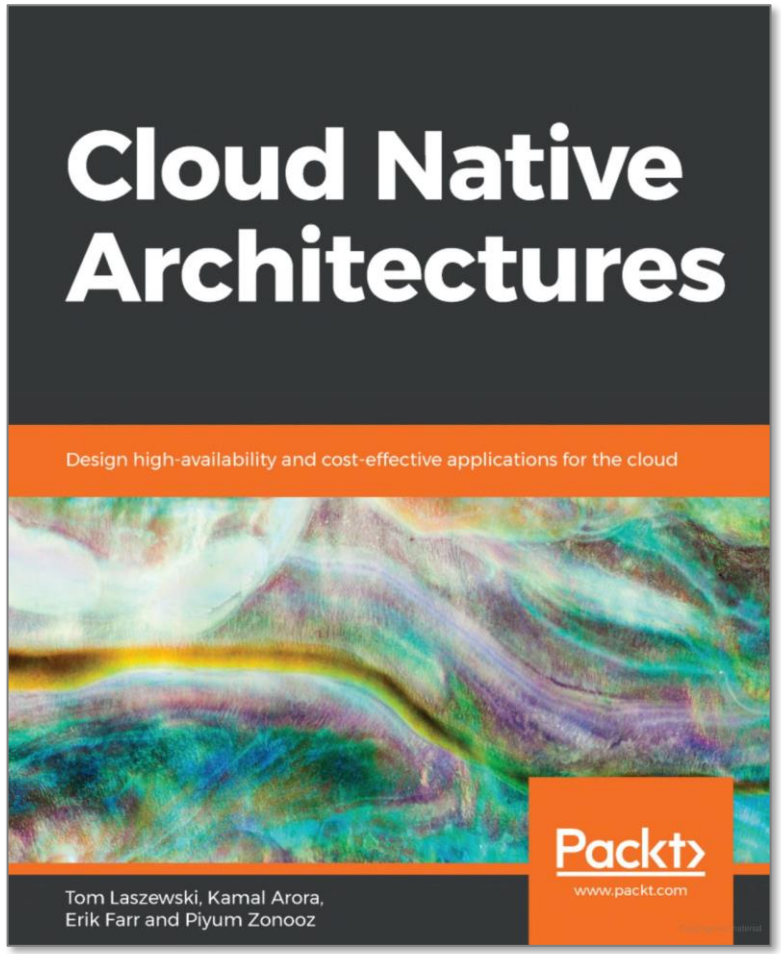
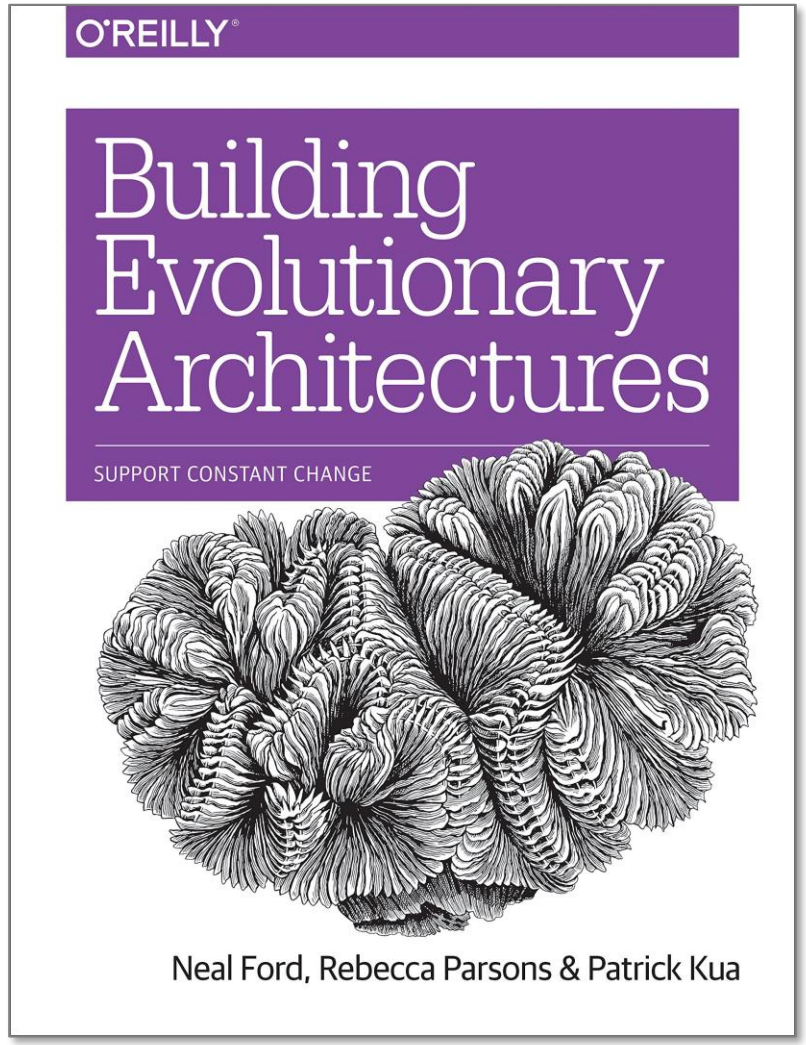
Further Reading







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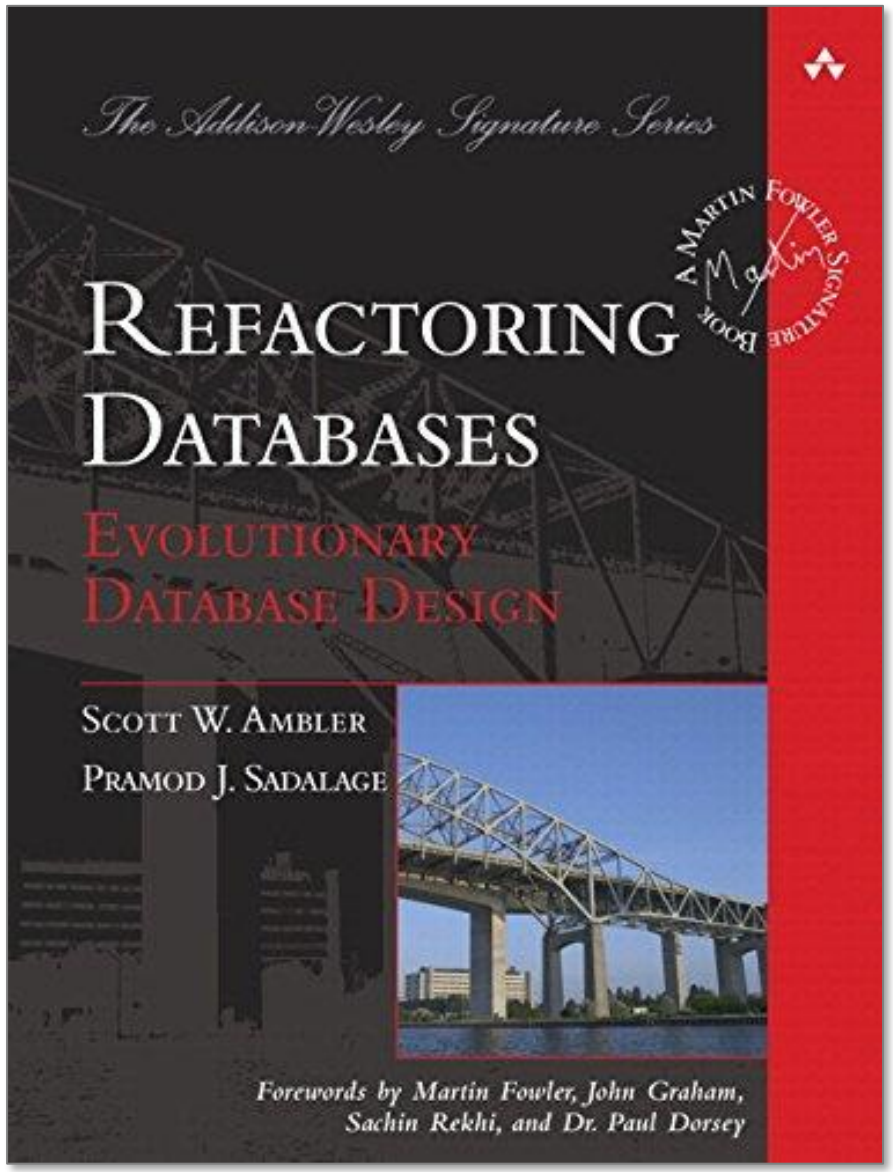

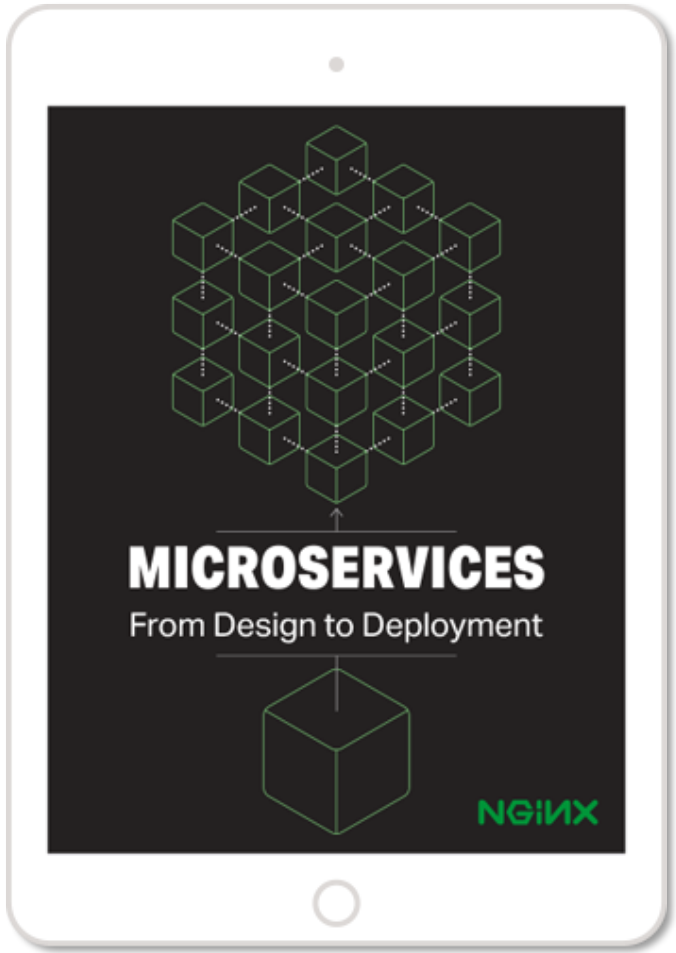

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Online Resources

https://martinfowler.com/microservices

https://martinfowler.com/articles/microservices.html

https://docs.microsoft.com/en-us/dotnet/architecture/cloud-native/introduce-eshoponcontainers-reference-app

https://docs.microsoft.com/en-us/dotnet/architecture/microservices/

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Recap

- Definitions
  - Monolith
  - Microservices
  - Distributed Monolith
- 12 Most Common Mistakes
- Further Reading
- Q&A

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charity: water

Thank You! Questions?

Jonathan "J." Tower

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- Organizer of Beer City Code

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- trailheadtechnology.com/blog
- jtowermi

https://github.com/jonathantower/distributed-monolith