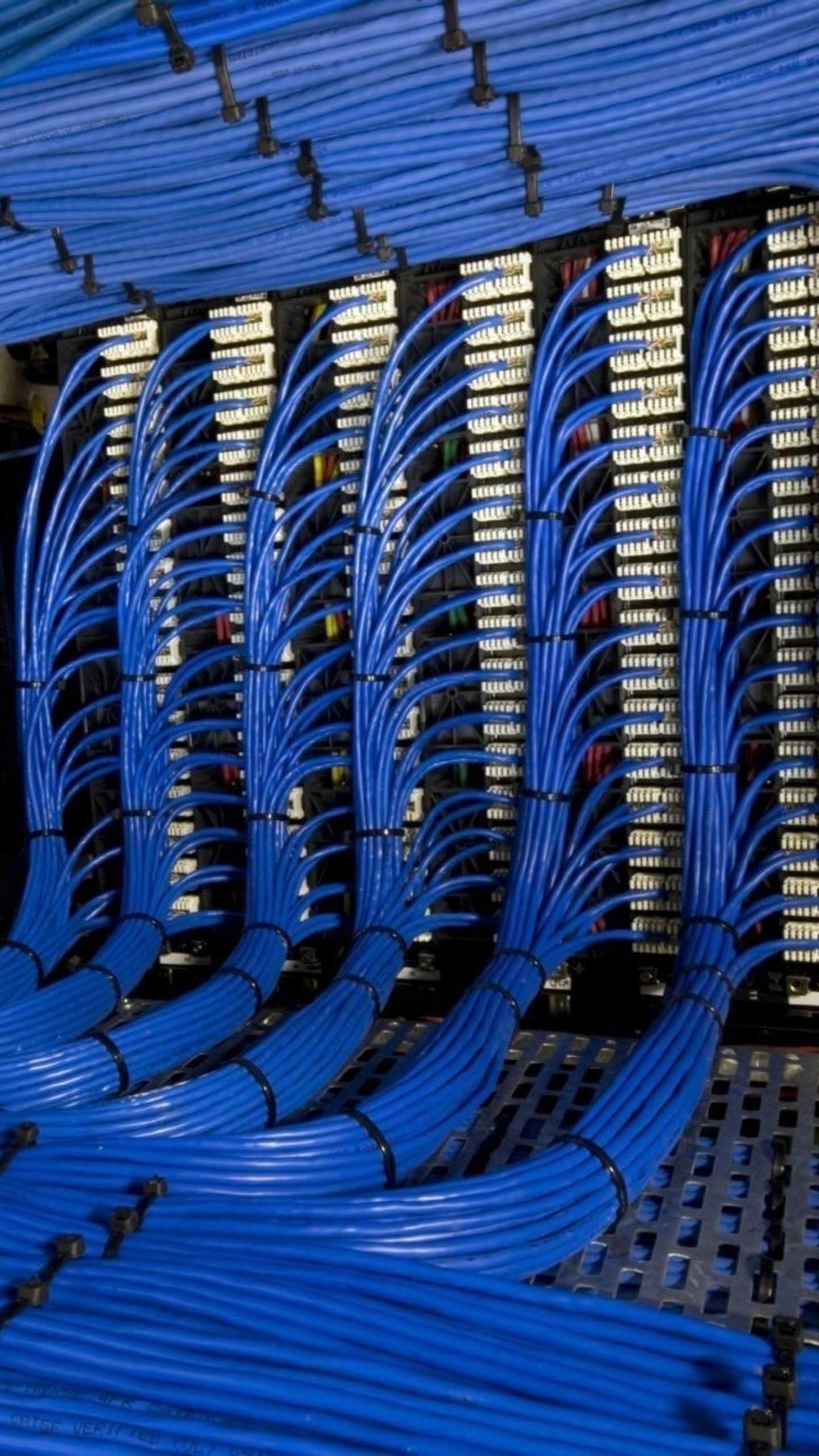
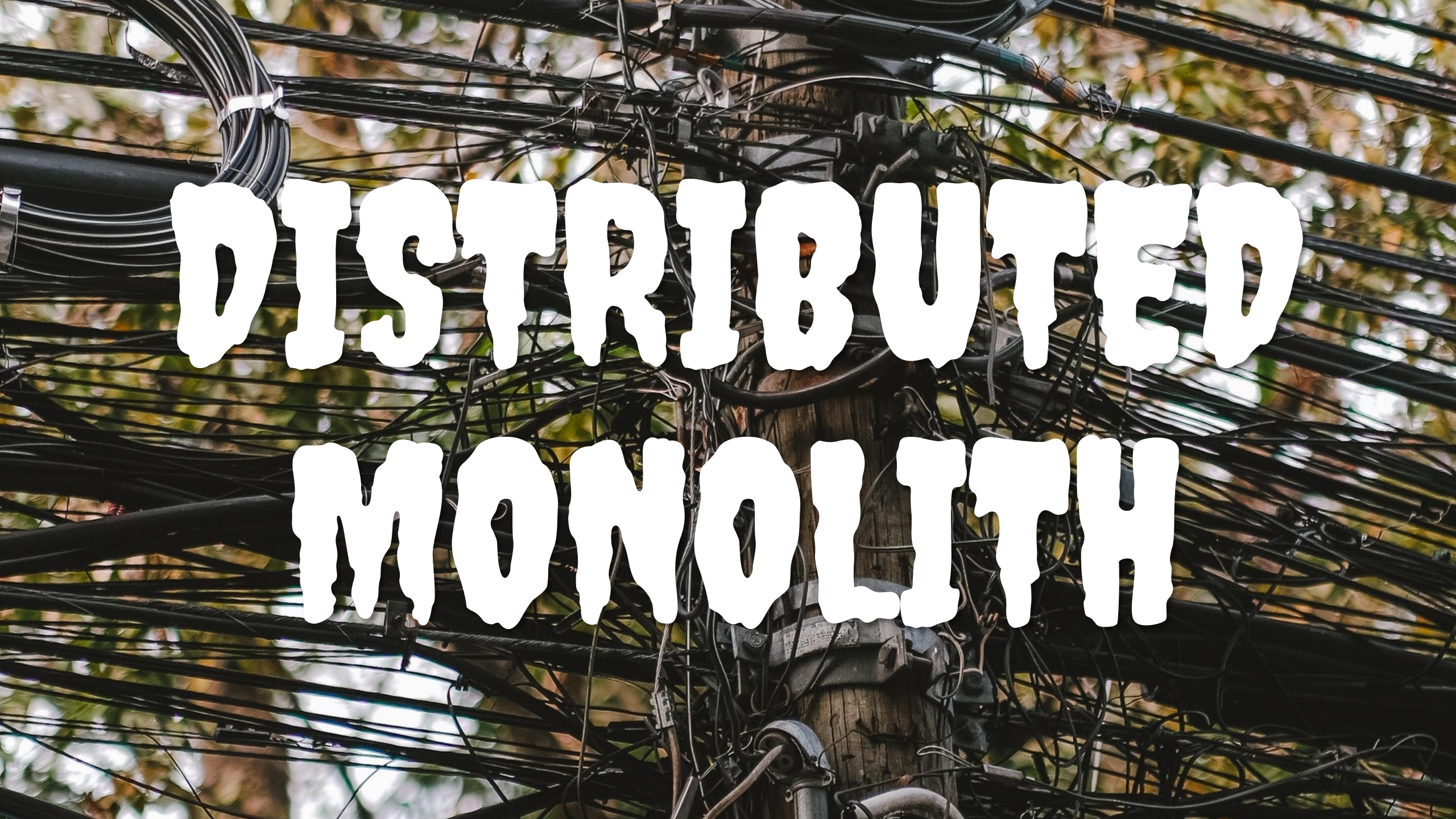
Don’t Build a Distributed Monolith

How to Avoid Doing Microservices Completely Wrong

Jonathan "J." Tower




DISTRIBUTED
MONOLITH

Avoid the **10 Most Common** Mistakes Made When Building Microservices

Jonathan "J." Tower

Principal Consultant & Partner

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Microsoft MVP in .NET

jtower@trailheadtechnology.com

trailheadtechnology.com/blog

jtowermi

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

Some Definitions

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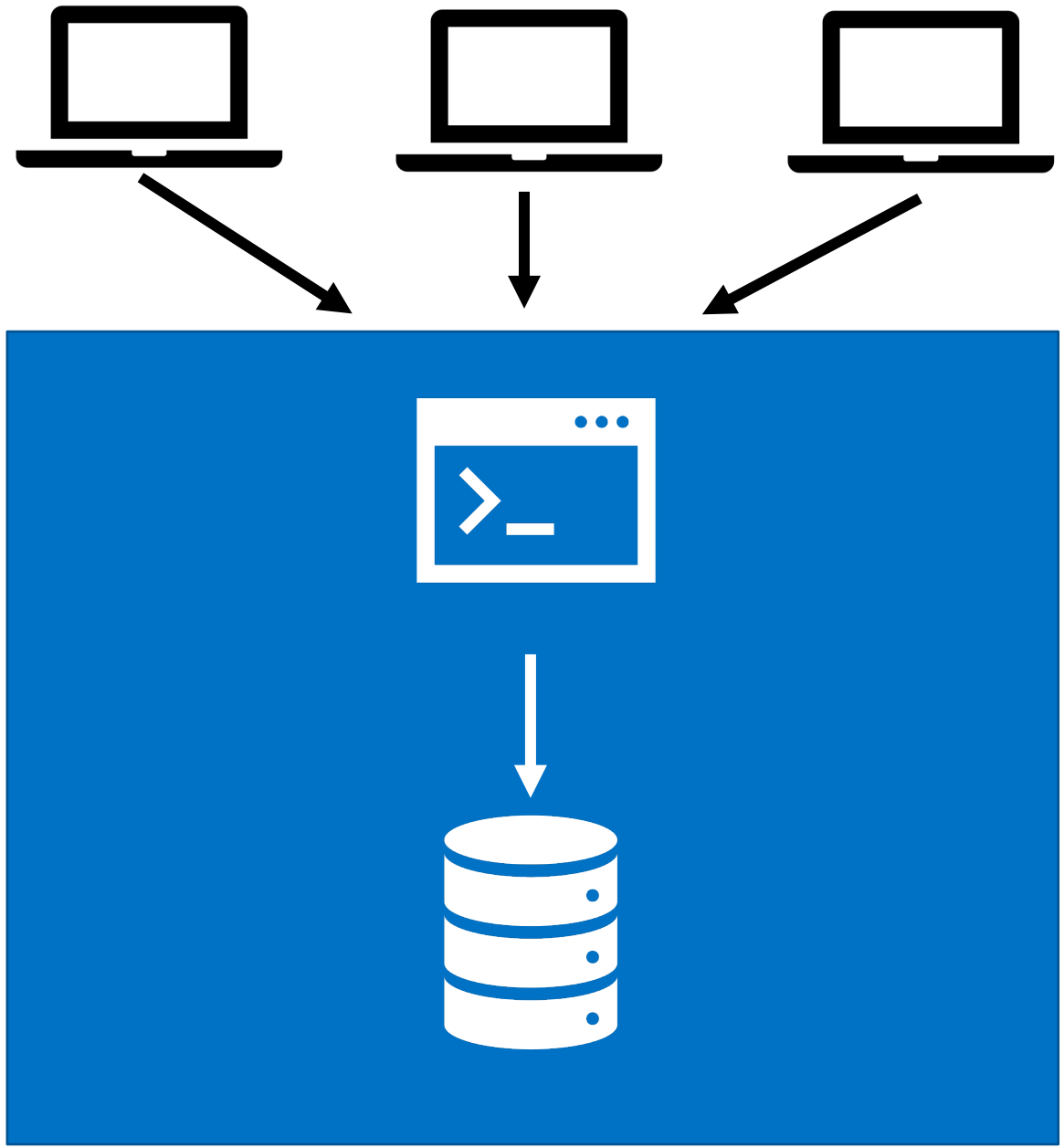
Monolith



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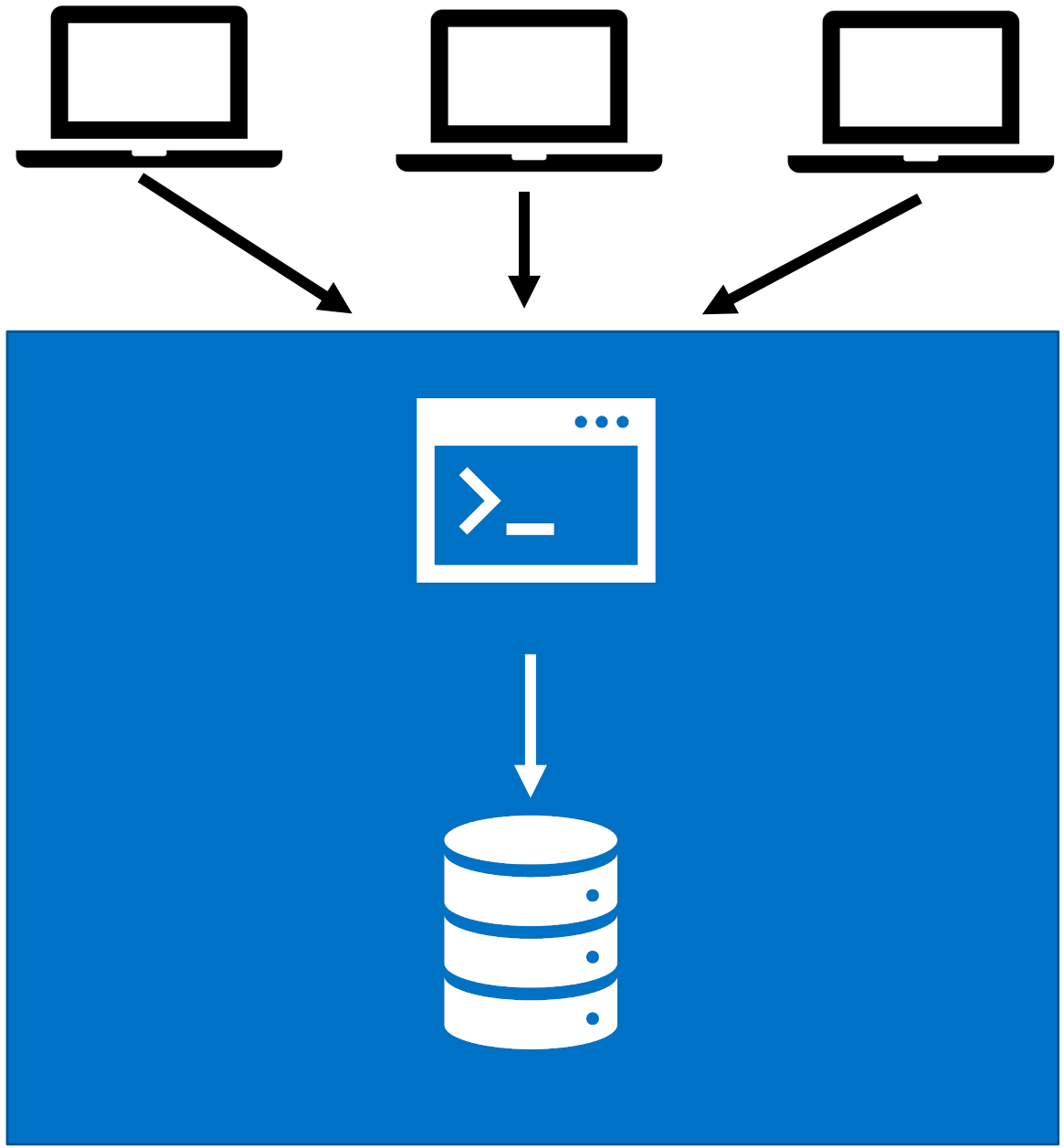

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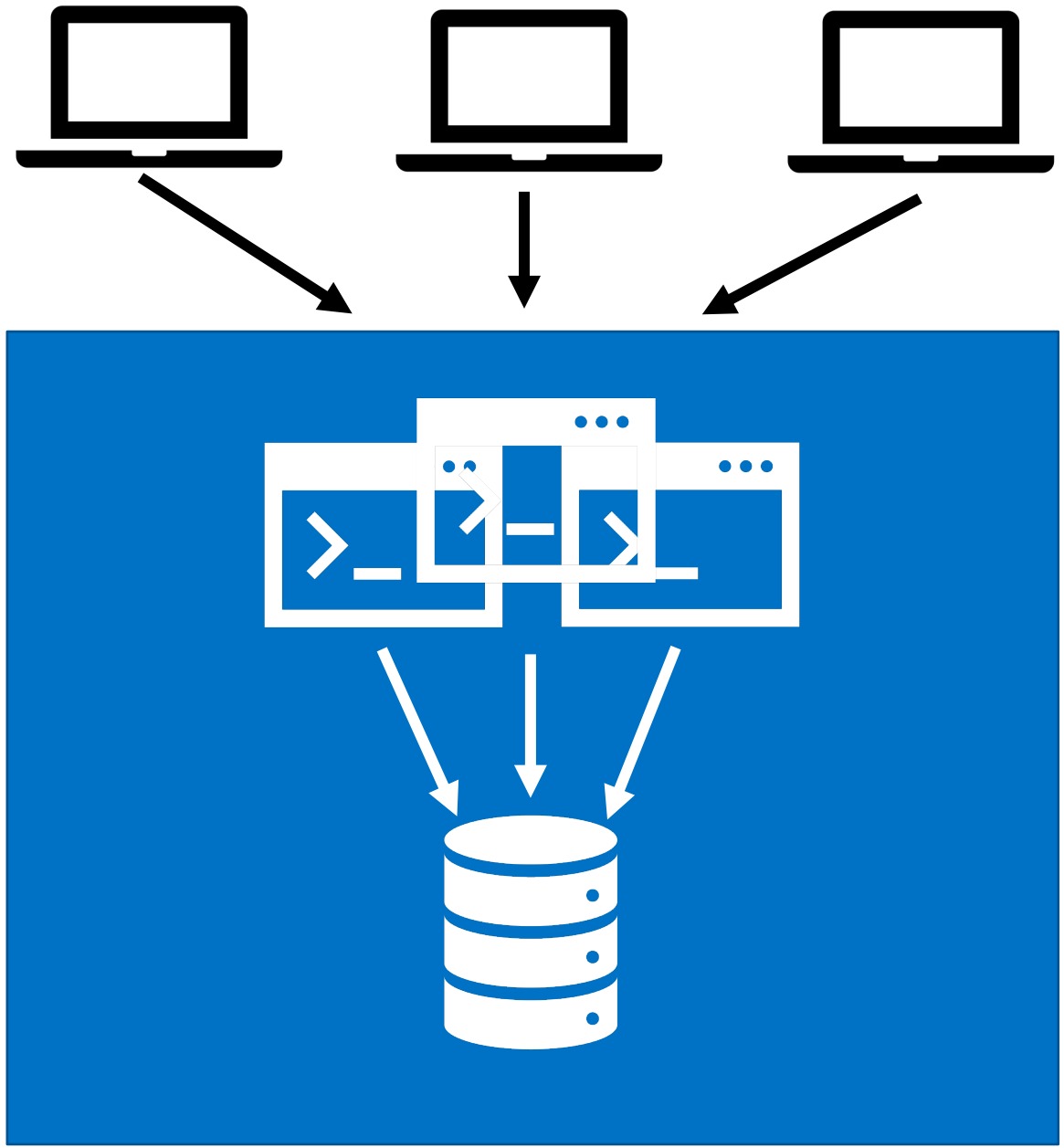

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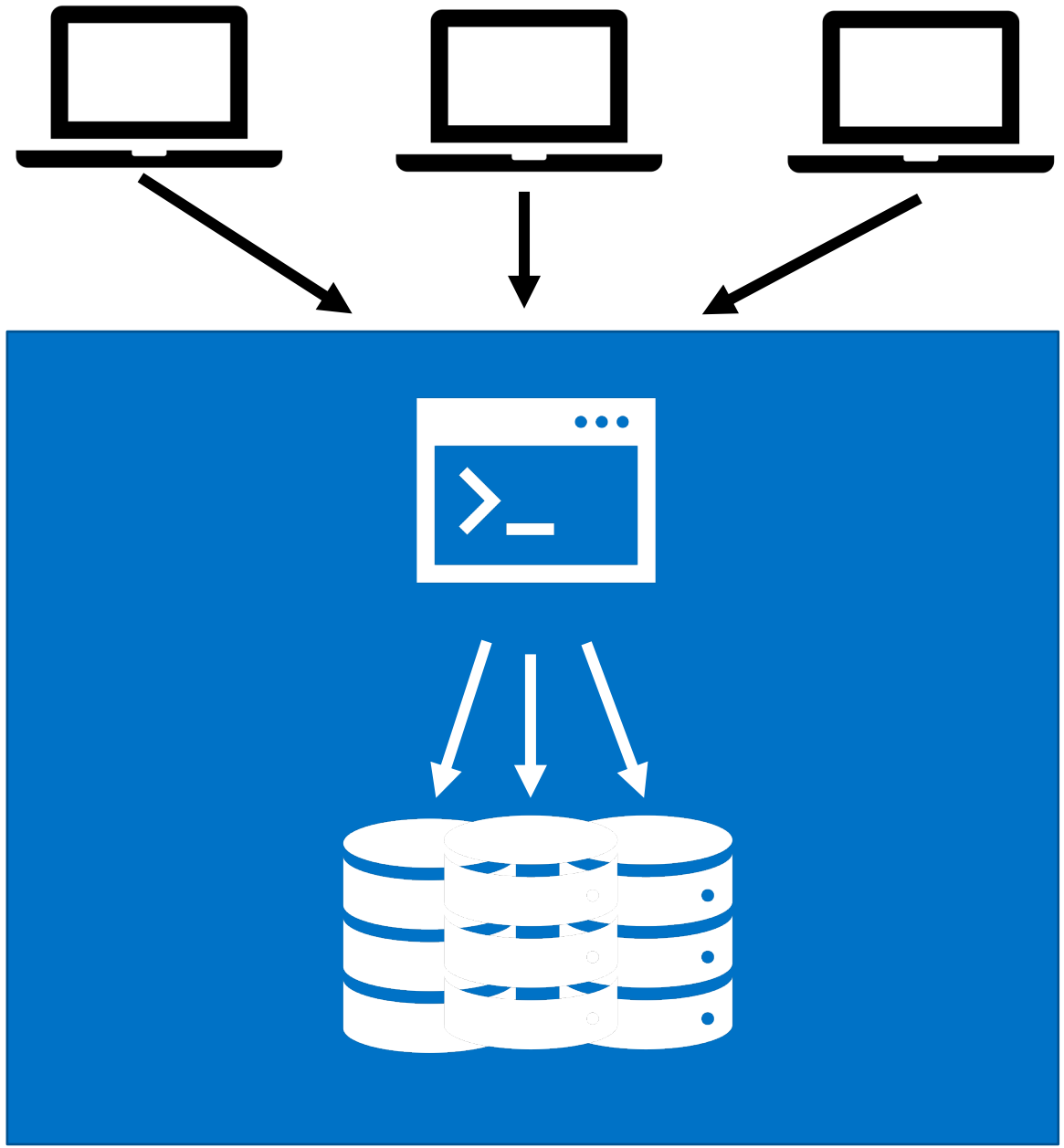

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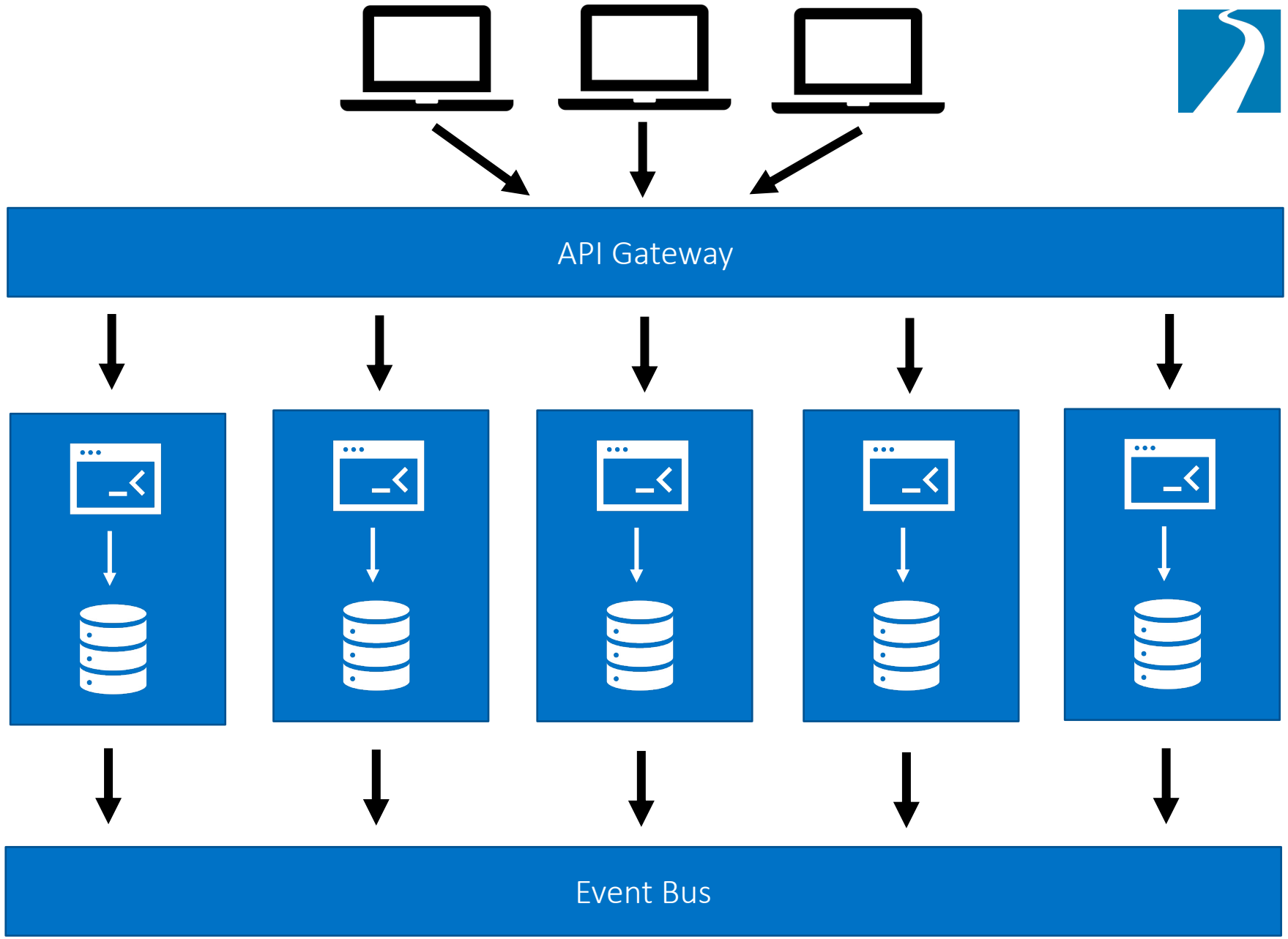
Microservices



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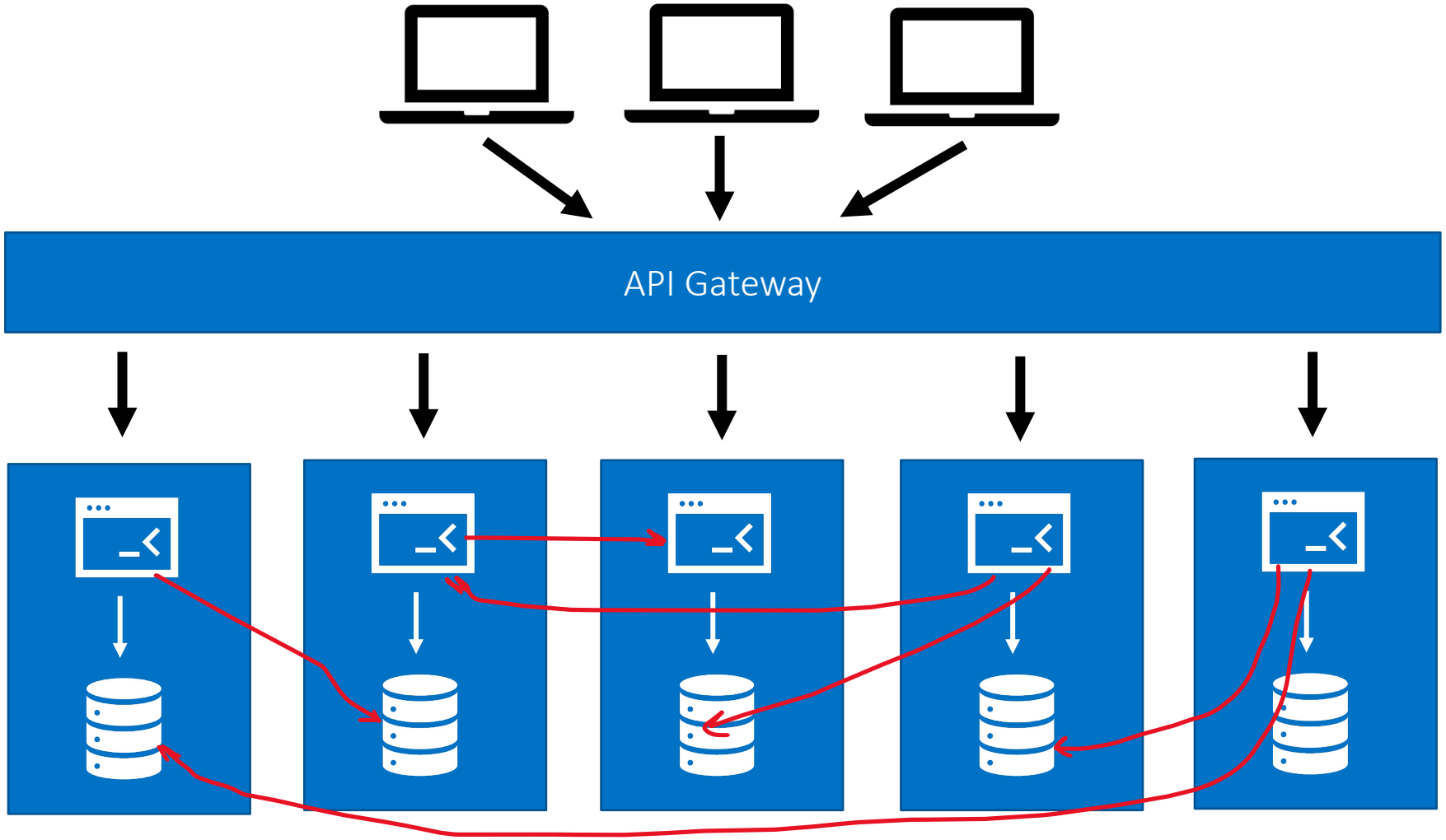
Distributed Monolith

Distributed Monolith



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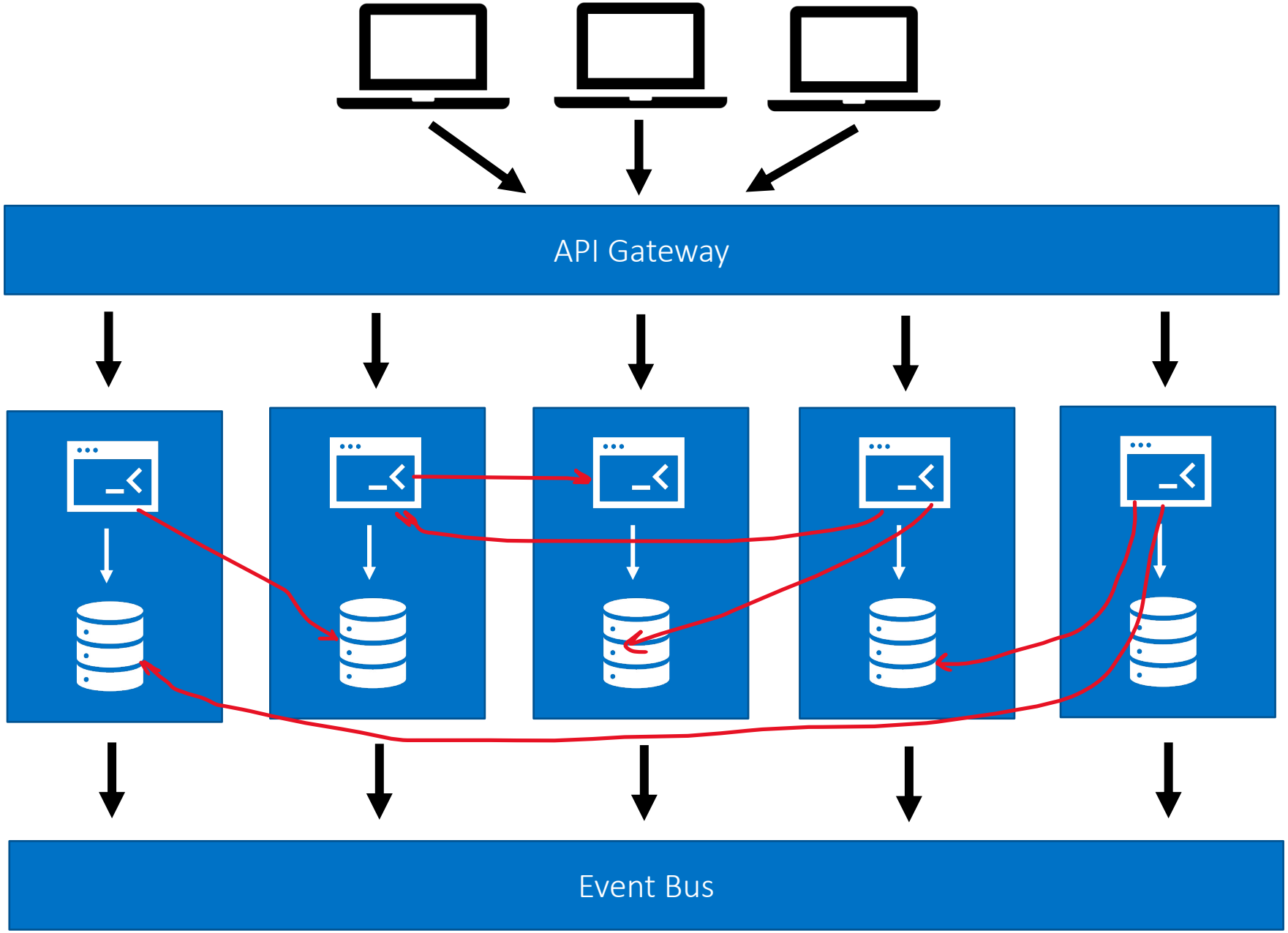
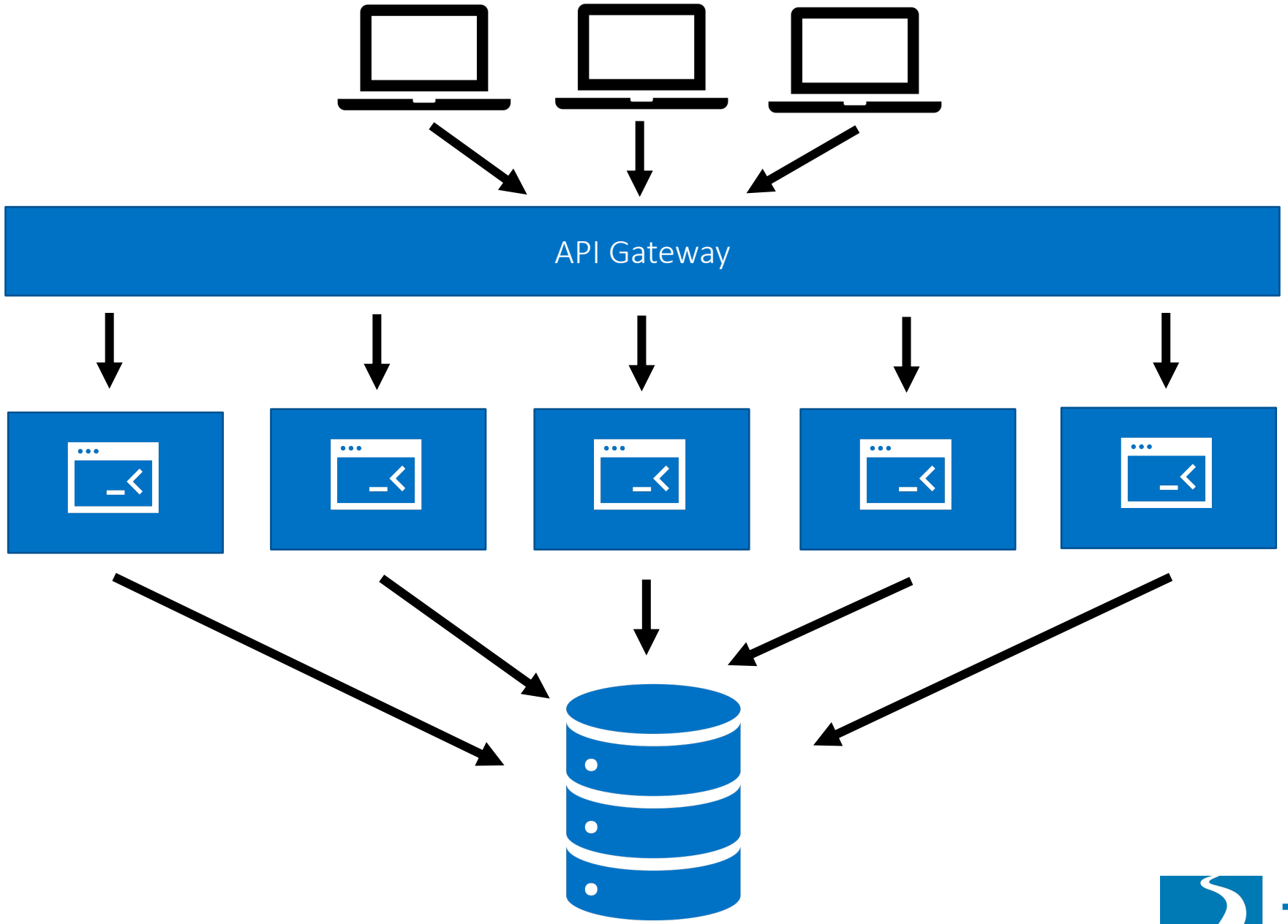

API Gateway
Event Bus



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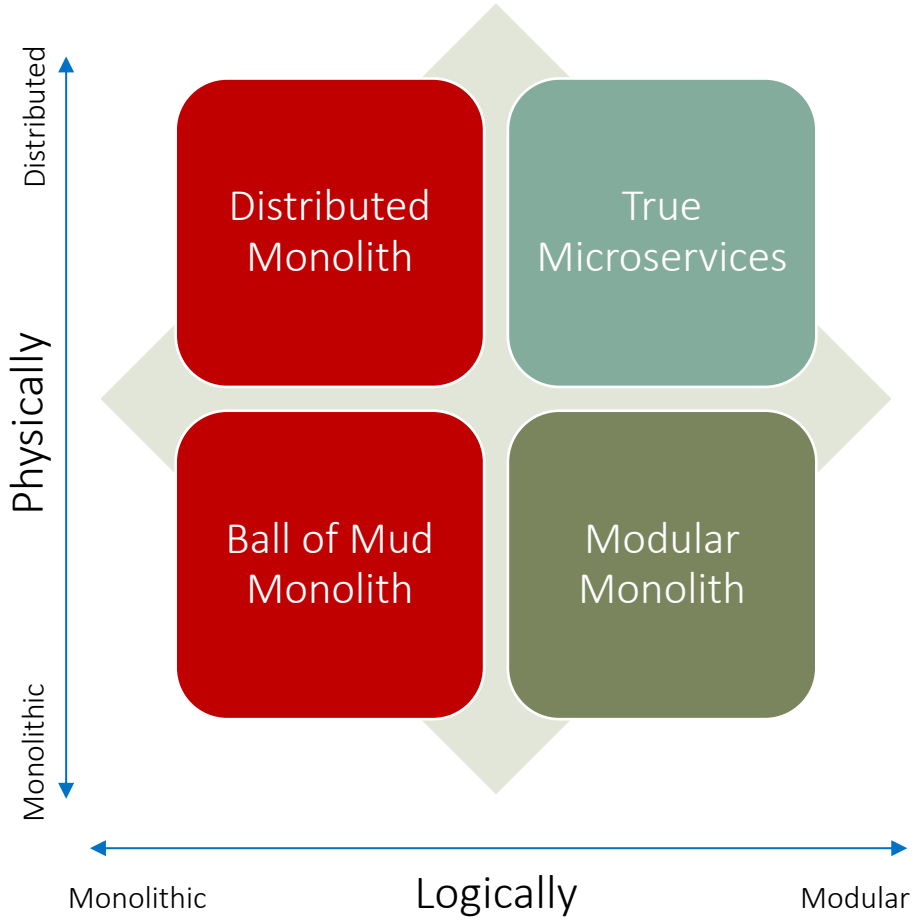
Good vs Bad Monoliths



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10 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 or un-scalable

Microservices are *hard* to do well

Wrong reasons create distributed monoliths

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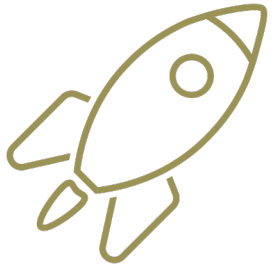
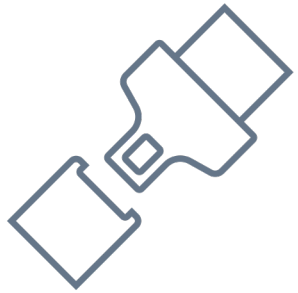
Some Good Reasons to Microservice

"Microservice architectures **buy** you **options**" – James Lewis

More Scalability Options



Independent Deployability



Isolate Surface Area of Failure

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The Big Trade Off

Microservices

Monoliths

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Shared Data Store or Models

Problem #2

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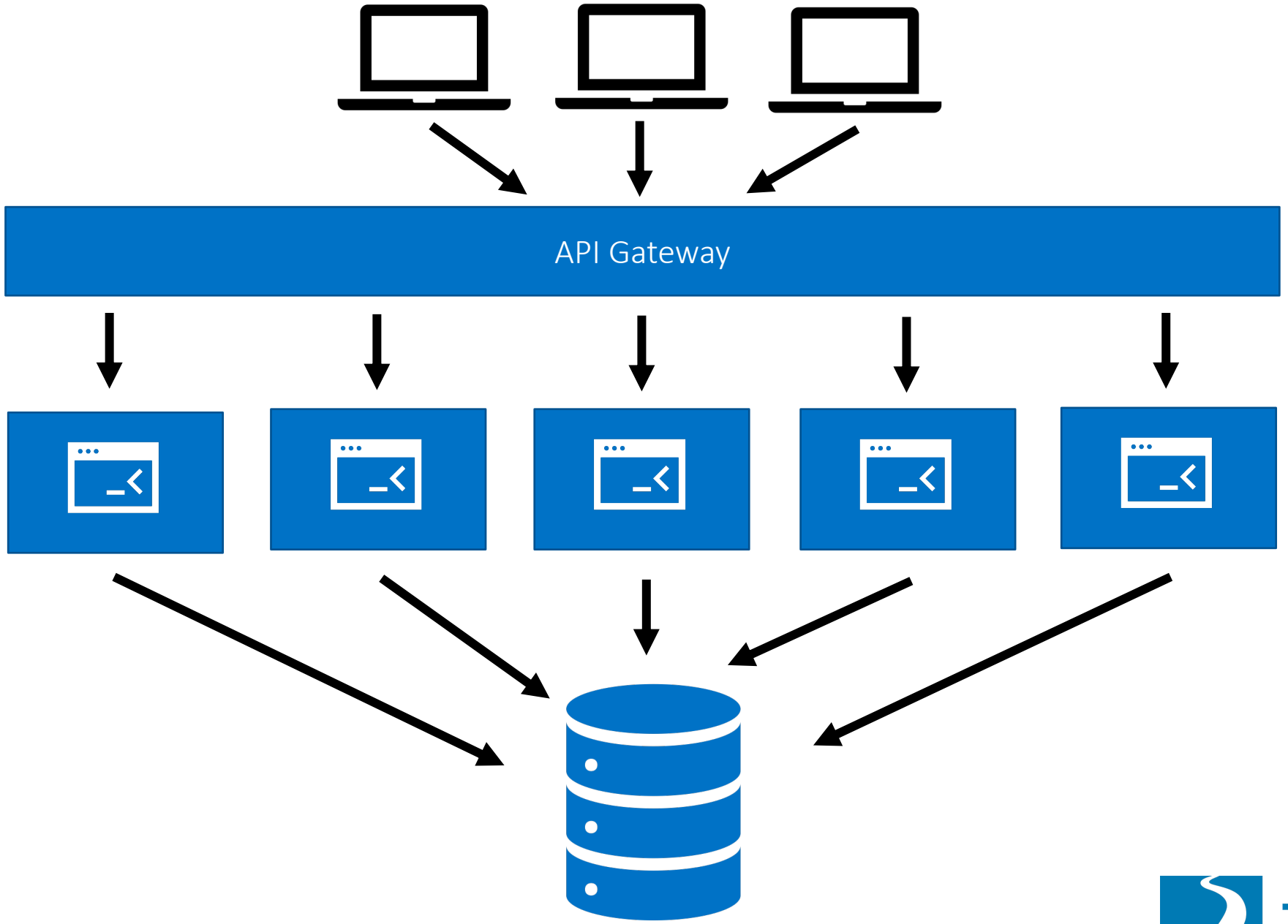

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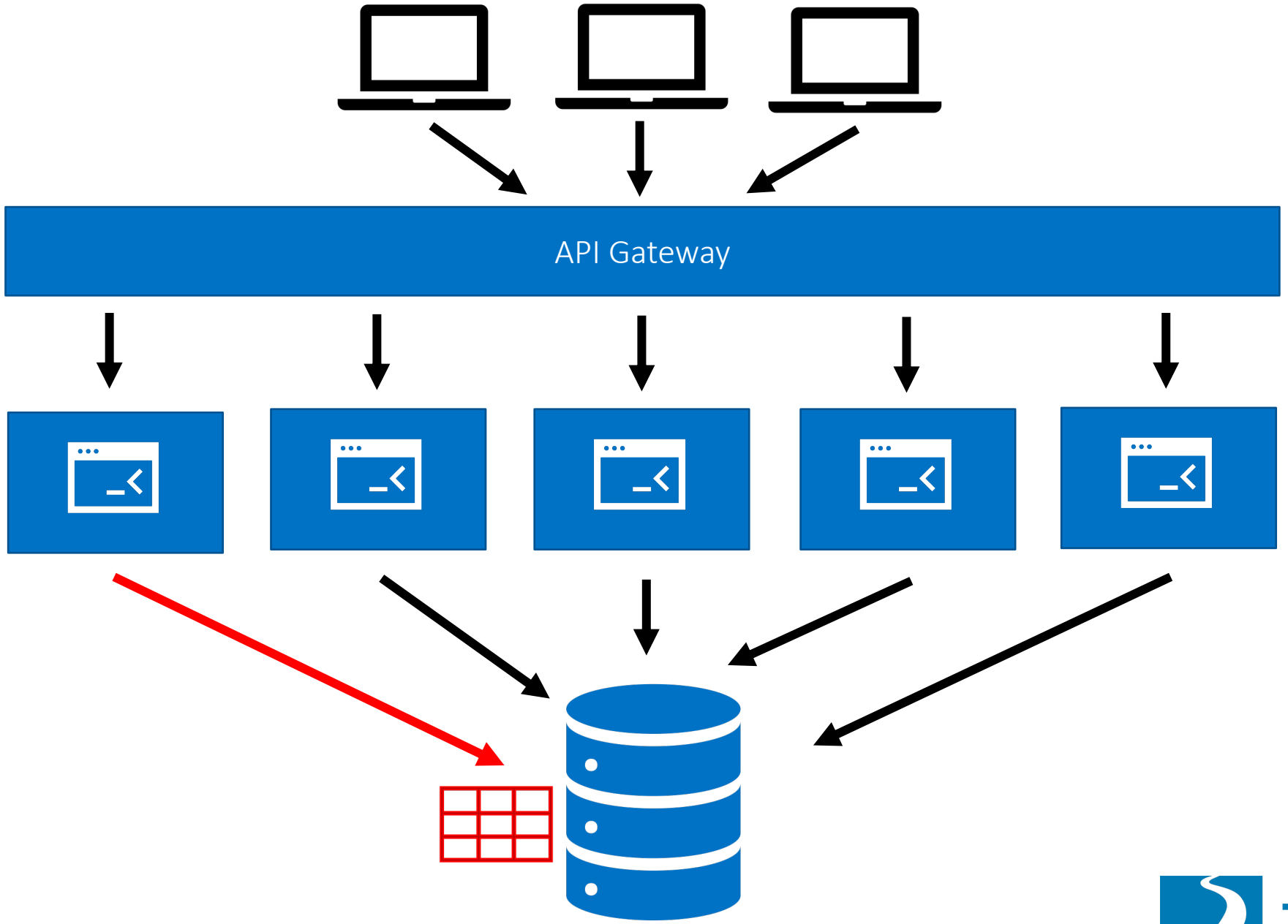

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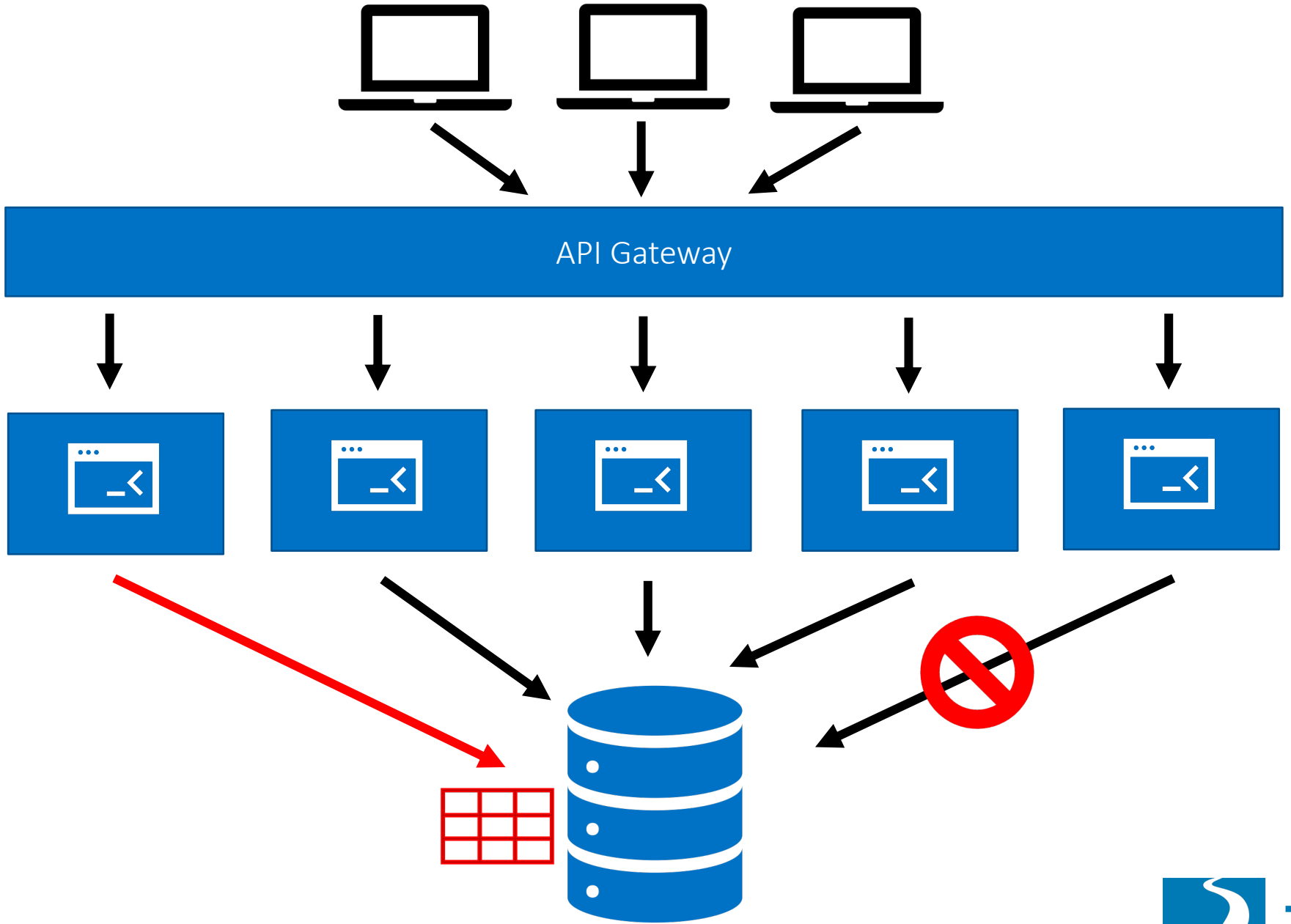

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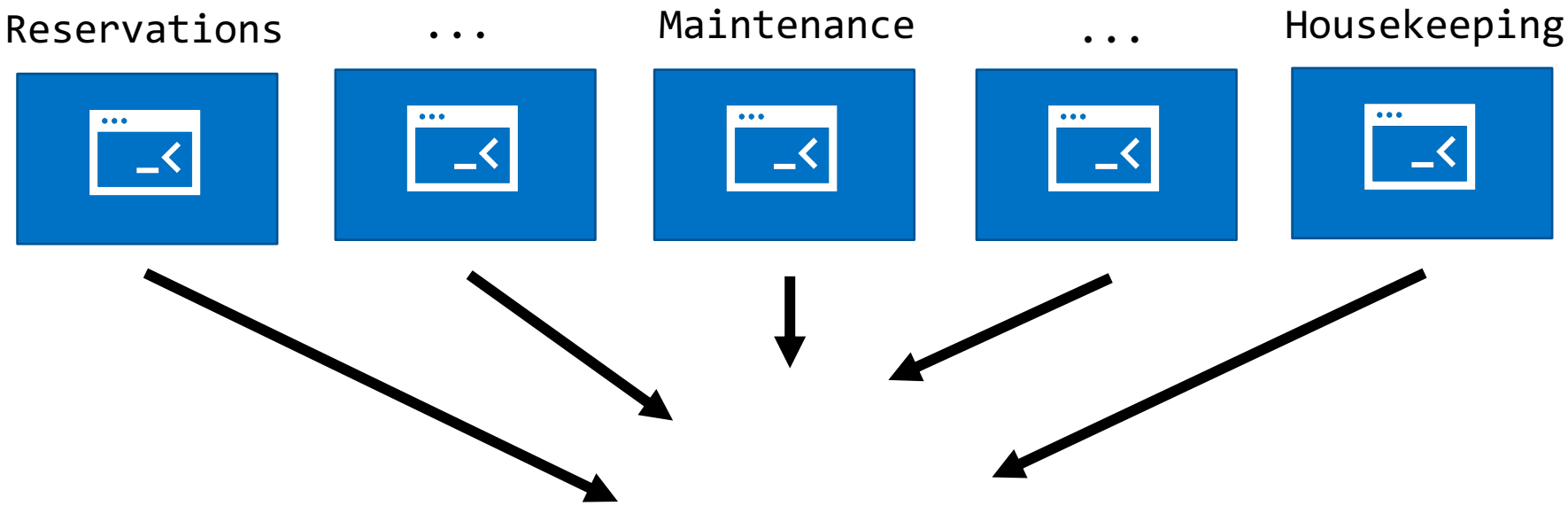


```
HotelRoom {
  CurrentlyOccupied : bool
  NumberofBeds : int
  MinutesToClean : float
  RepairHistory: [
    { RepairDate: ... },
    { RepairDate: ... },
  ]
}
```

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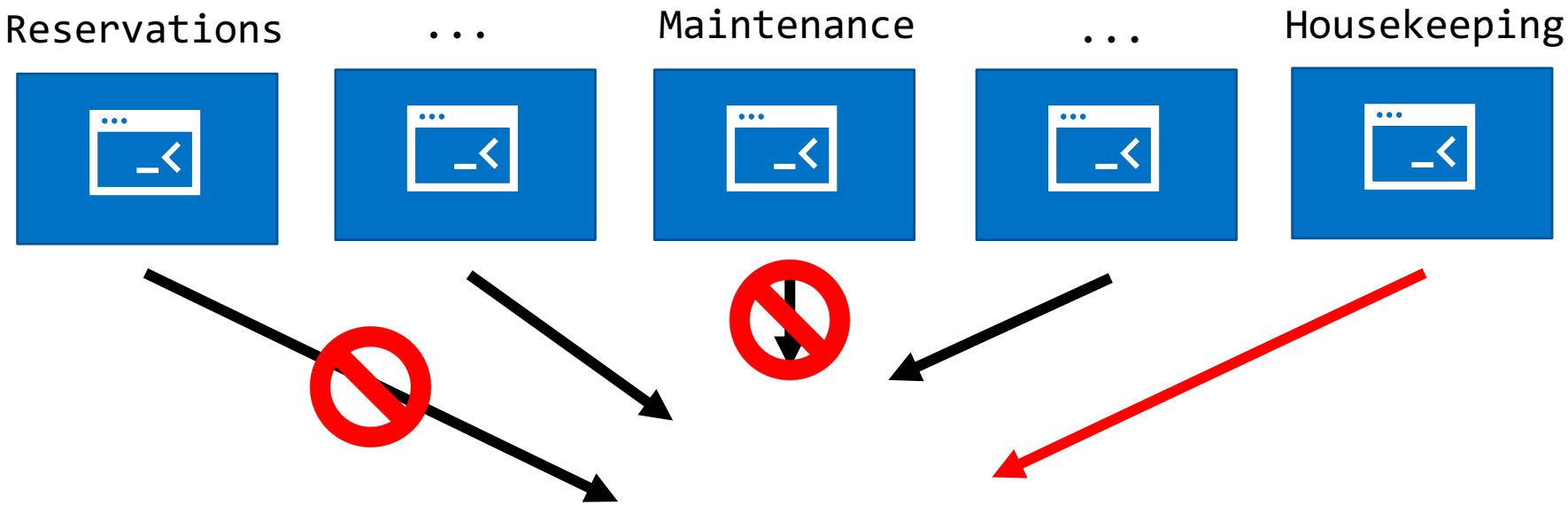


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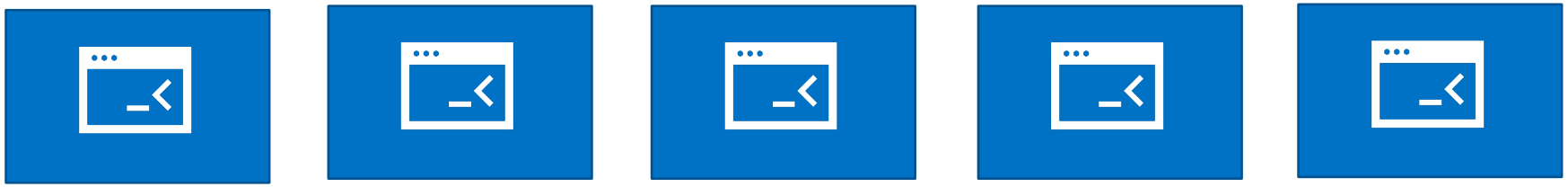


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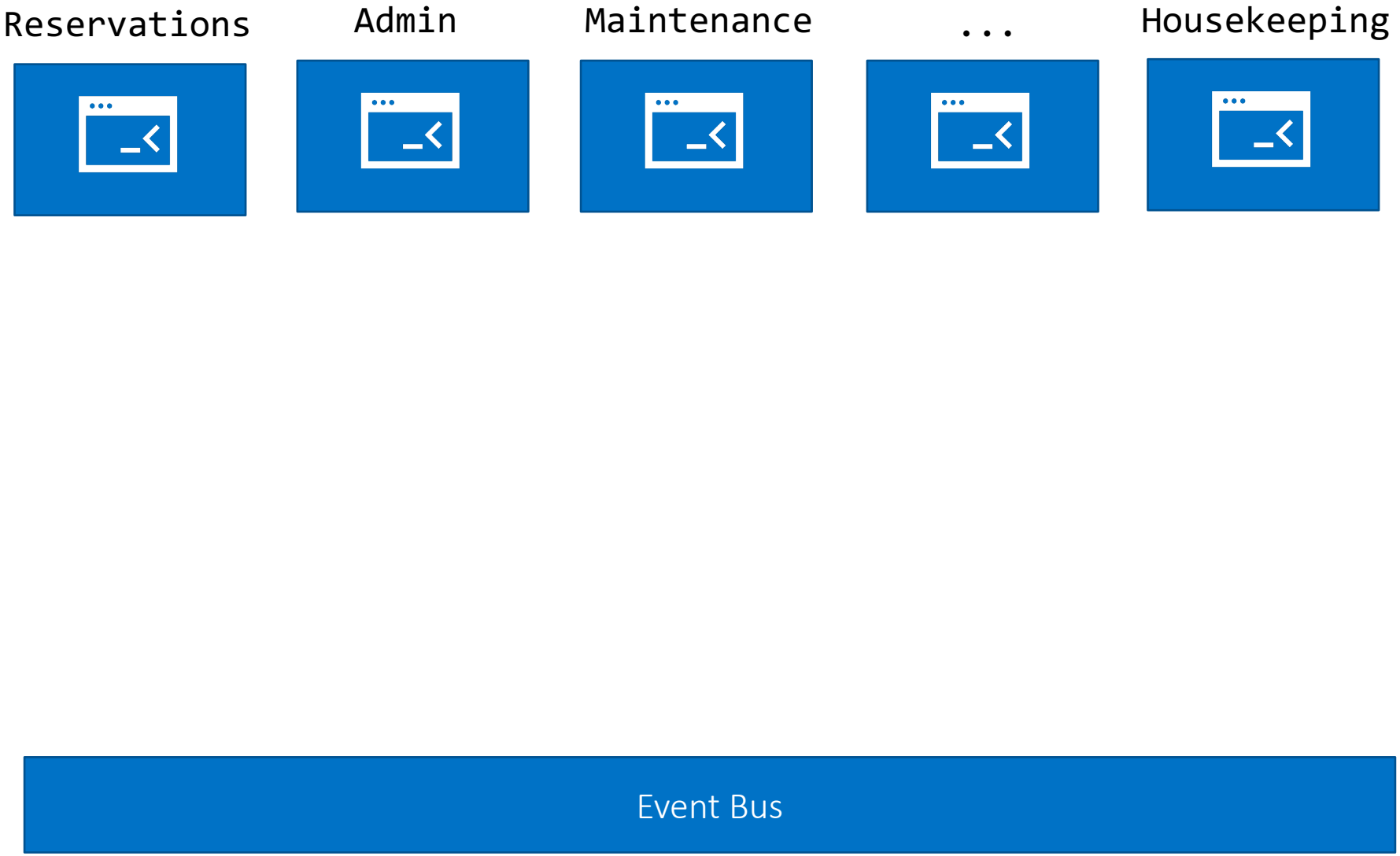

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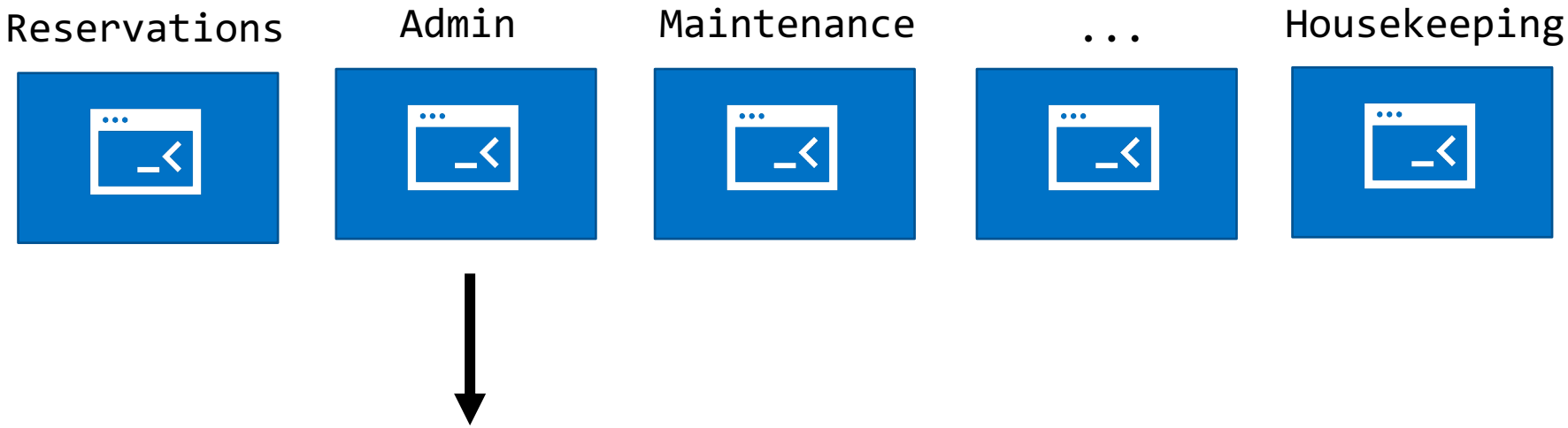


```
HotelRoom {
  RoomNumber: int
}
```

Event Bus

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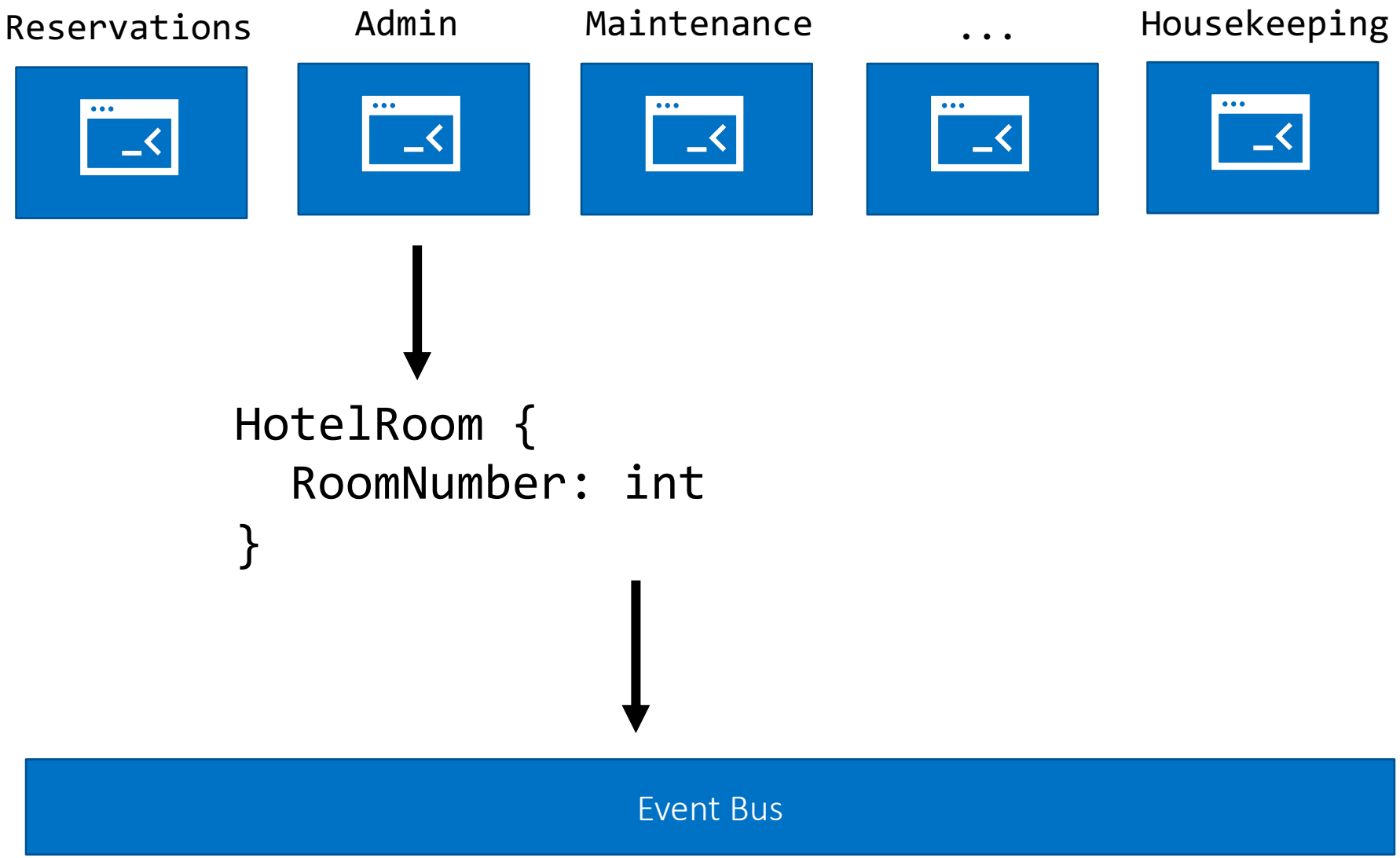

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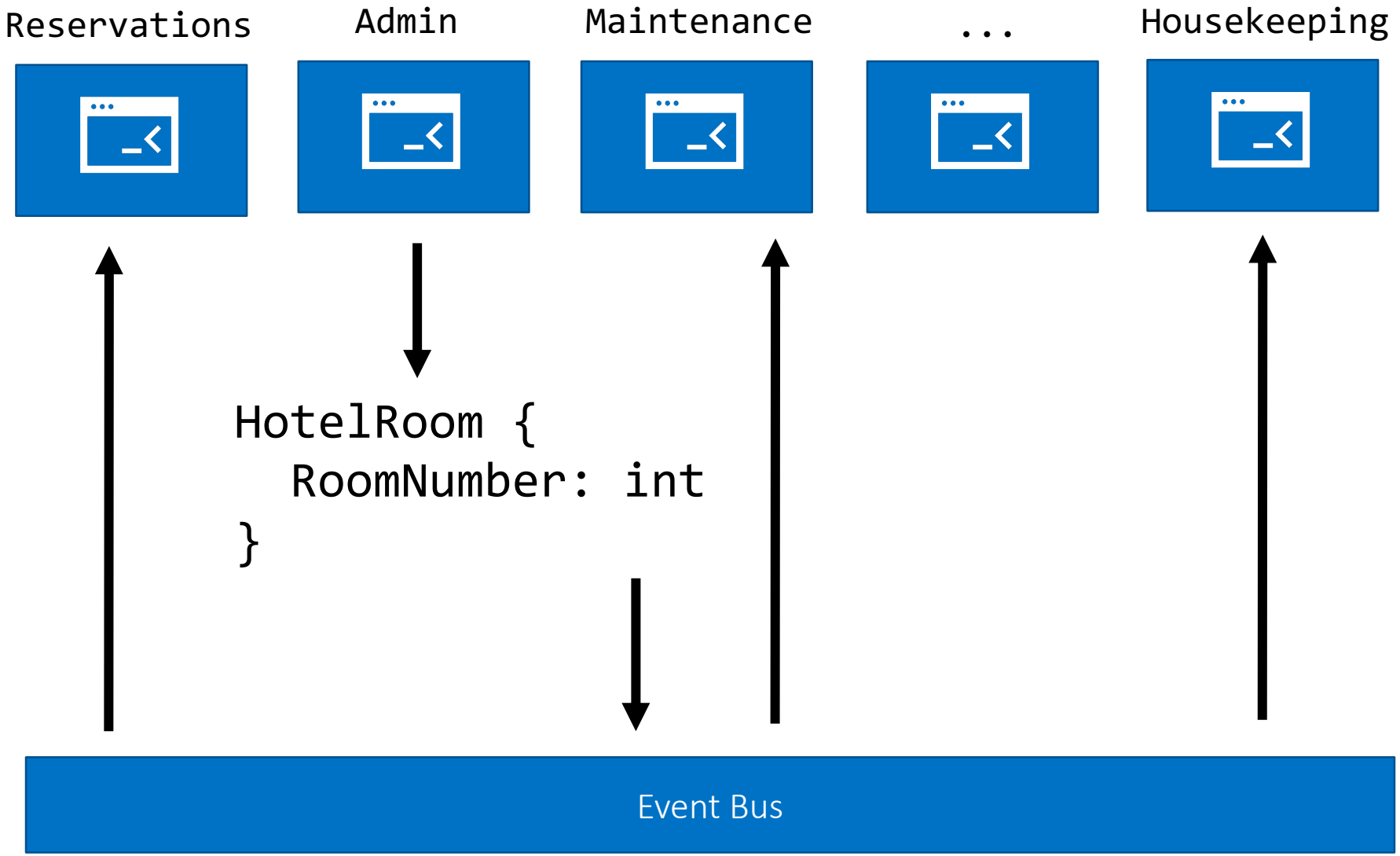

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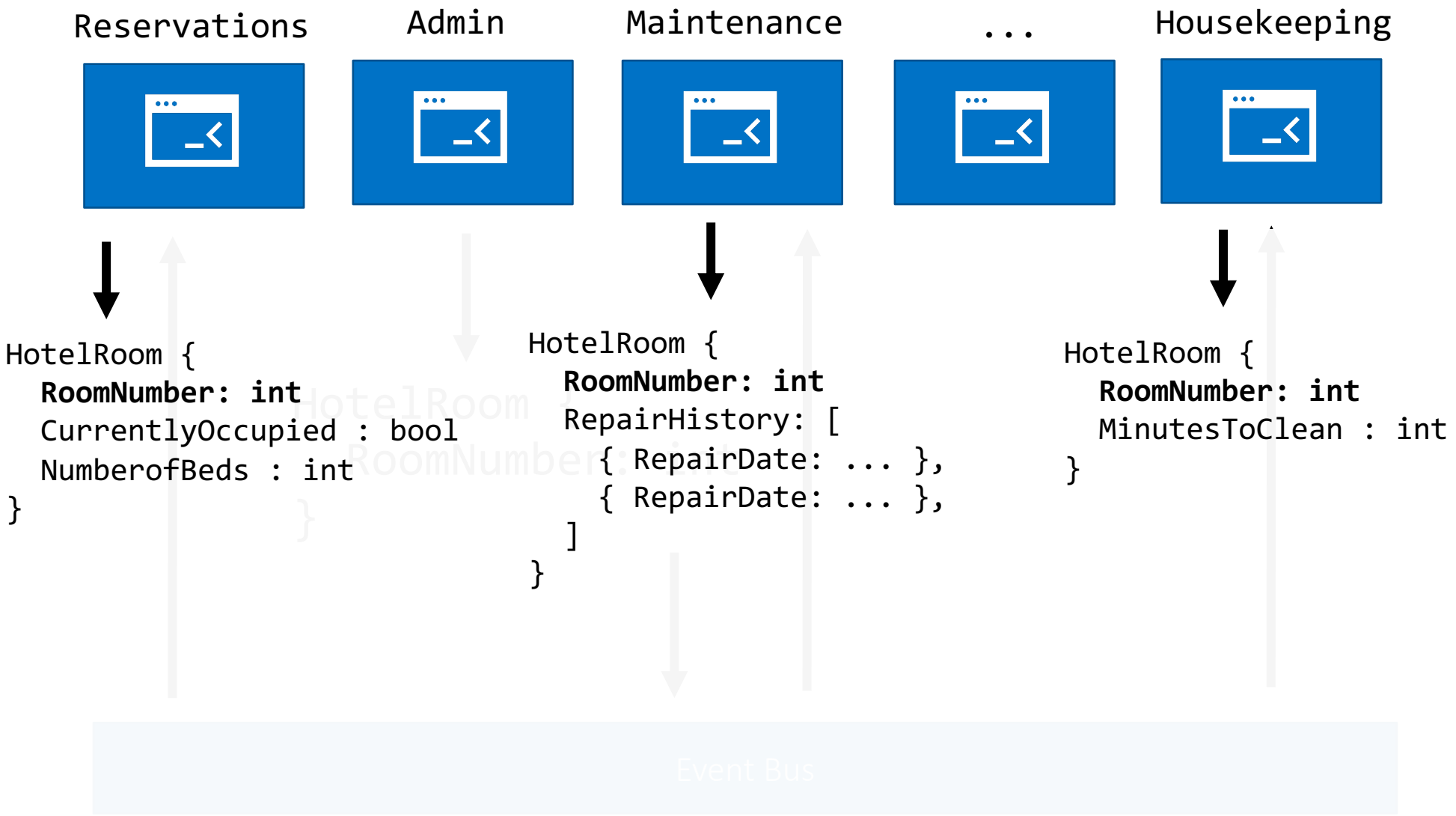

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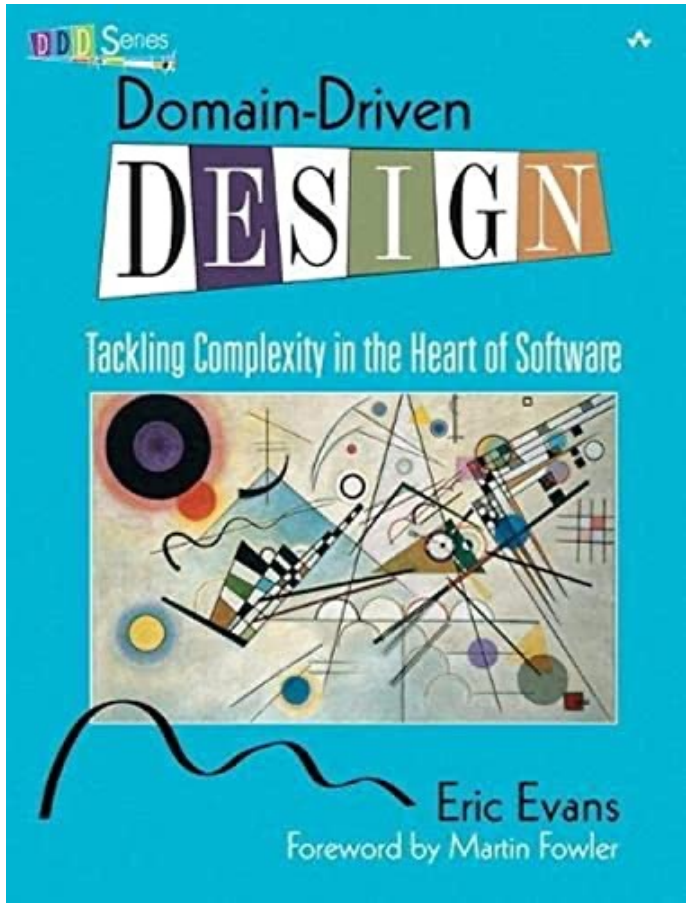
Microservices That Are Too Big

Problem #3

Domain Driven Development

Domain
 Subdomain
  Bounded Context

Domain Driven Development



Domain
Subdomain
Bounded Context

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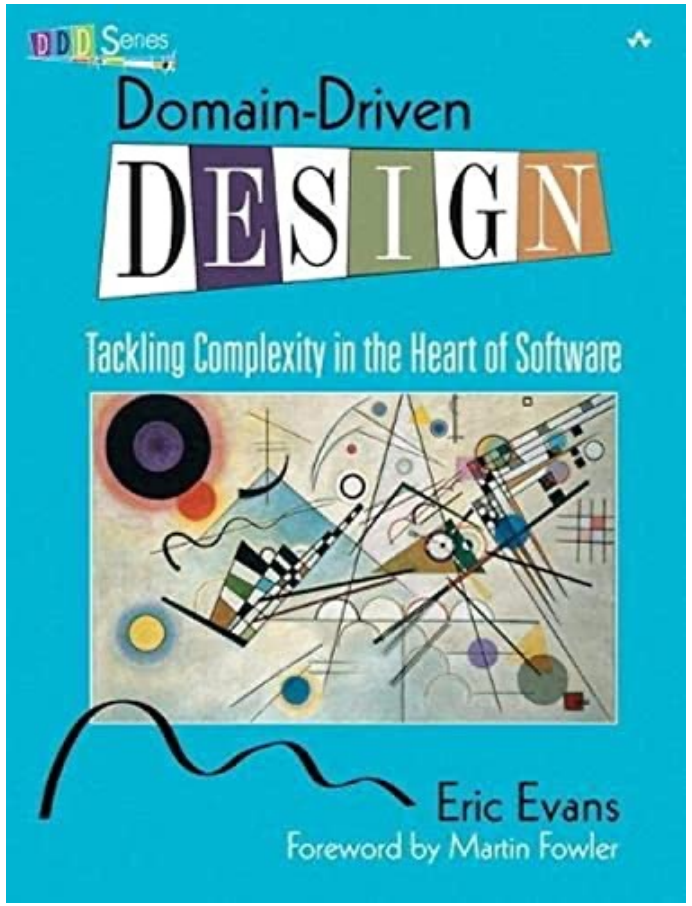
Domain Driven Development



Domain
Subdomain
Bounded Context

J's SIMPLE RULE: smallest possible microservices without chatty communication between services

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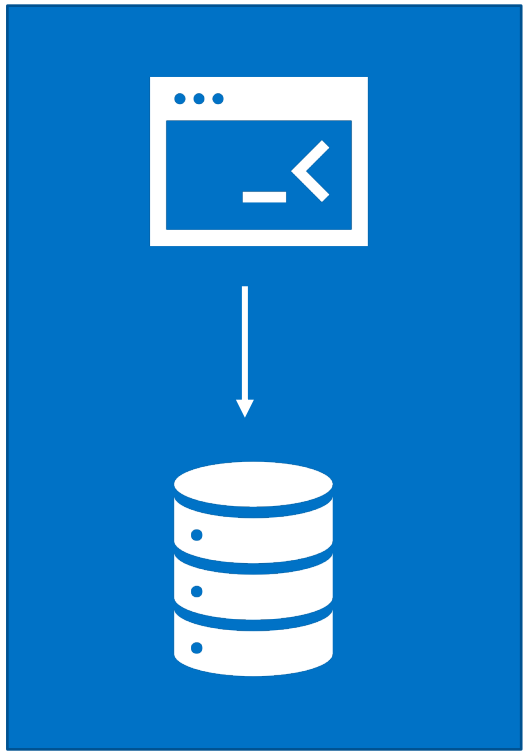
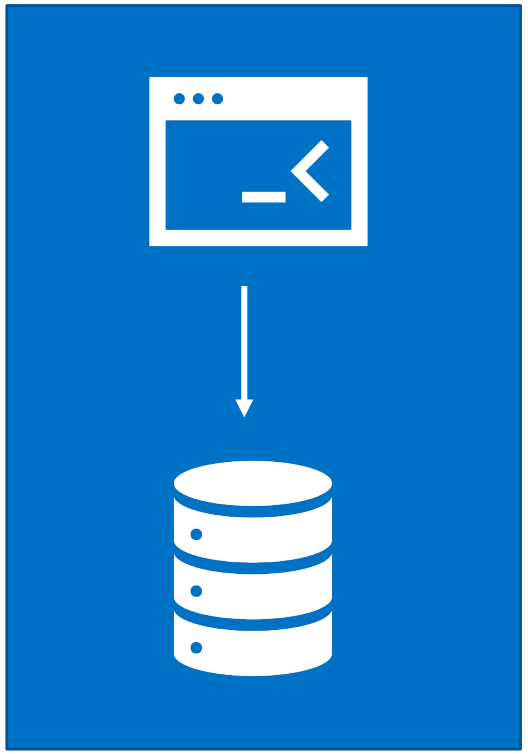
Microservices That Are Too Small

Problem #4

User Log In



Password Reset



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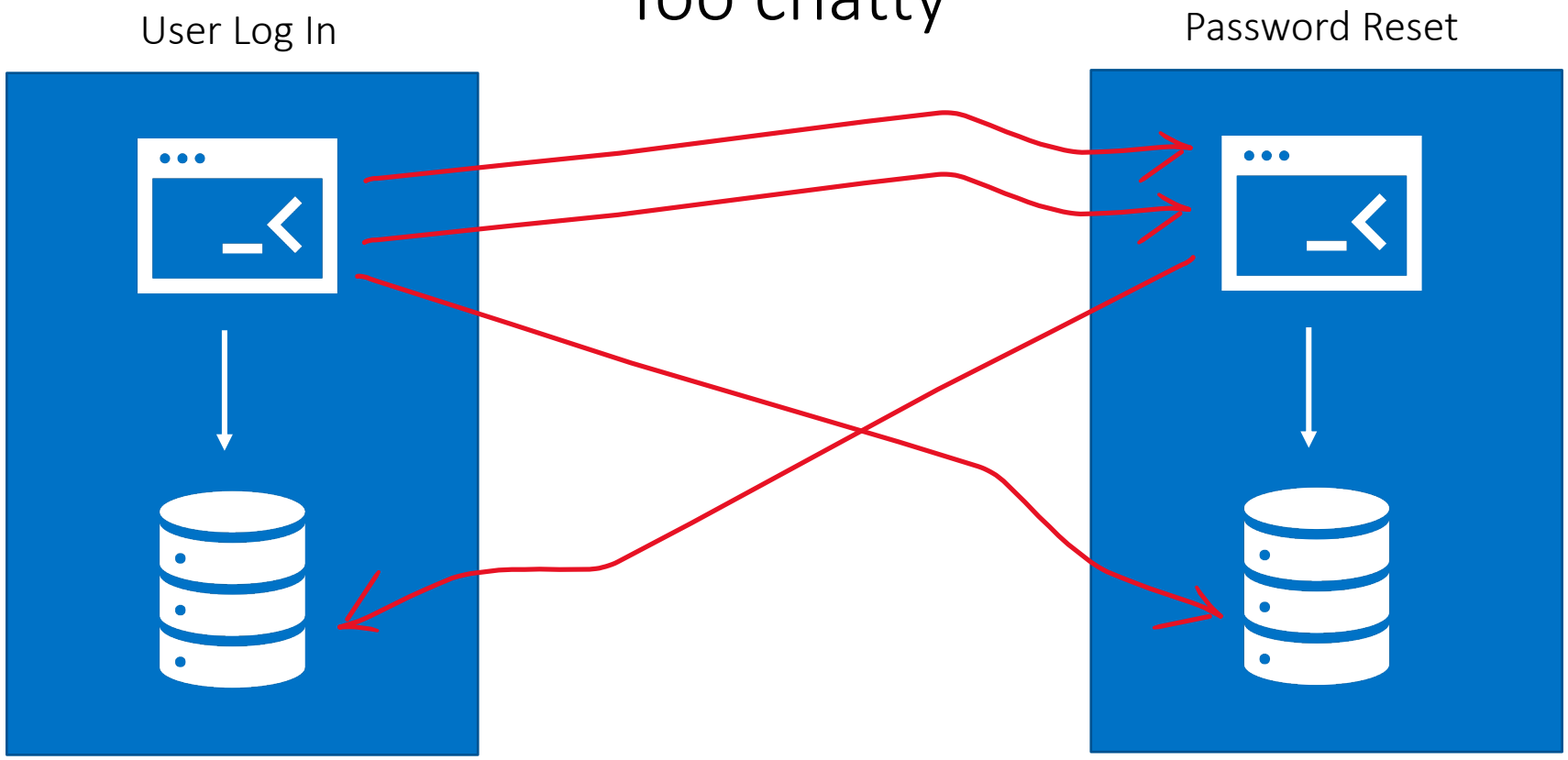
Too chatty



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Starting from Scratch

Problem #5

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 “Brownfield” Migration Approaches

Big bang

Evolution

“Strangler fig” pattern

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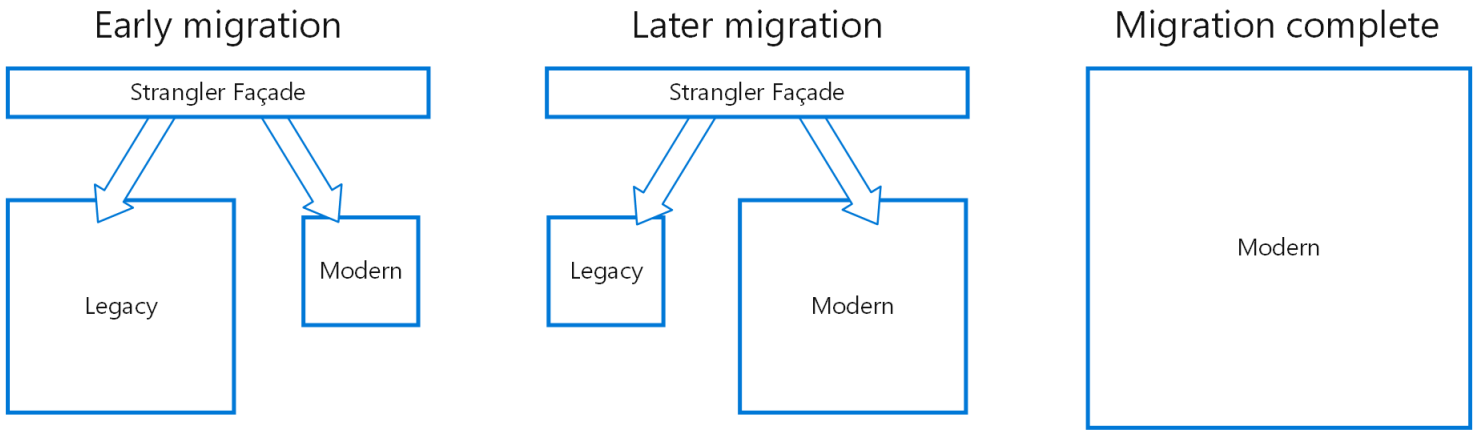
Strangler Fig Pattern



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

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Coupling Through Cross-Cutting Concerns

Problem #6

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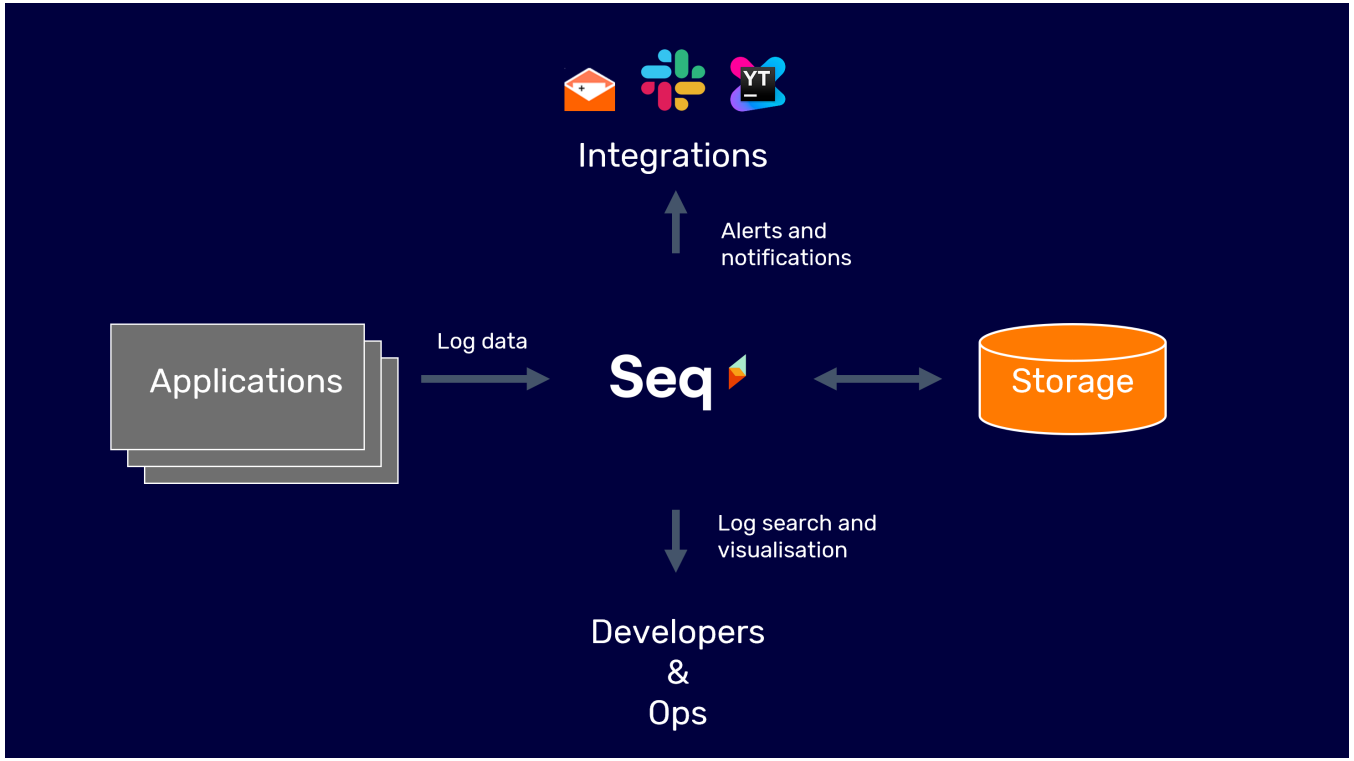
Example: Distributed Logging Is Hard

- 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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Use of Synchronous Communication

Problem #7

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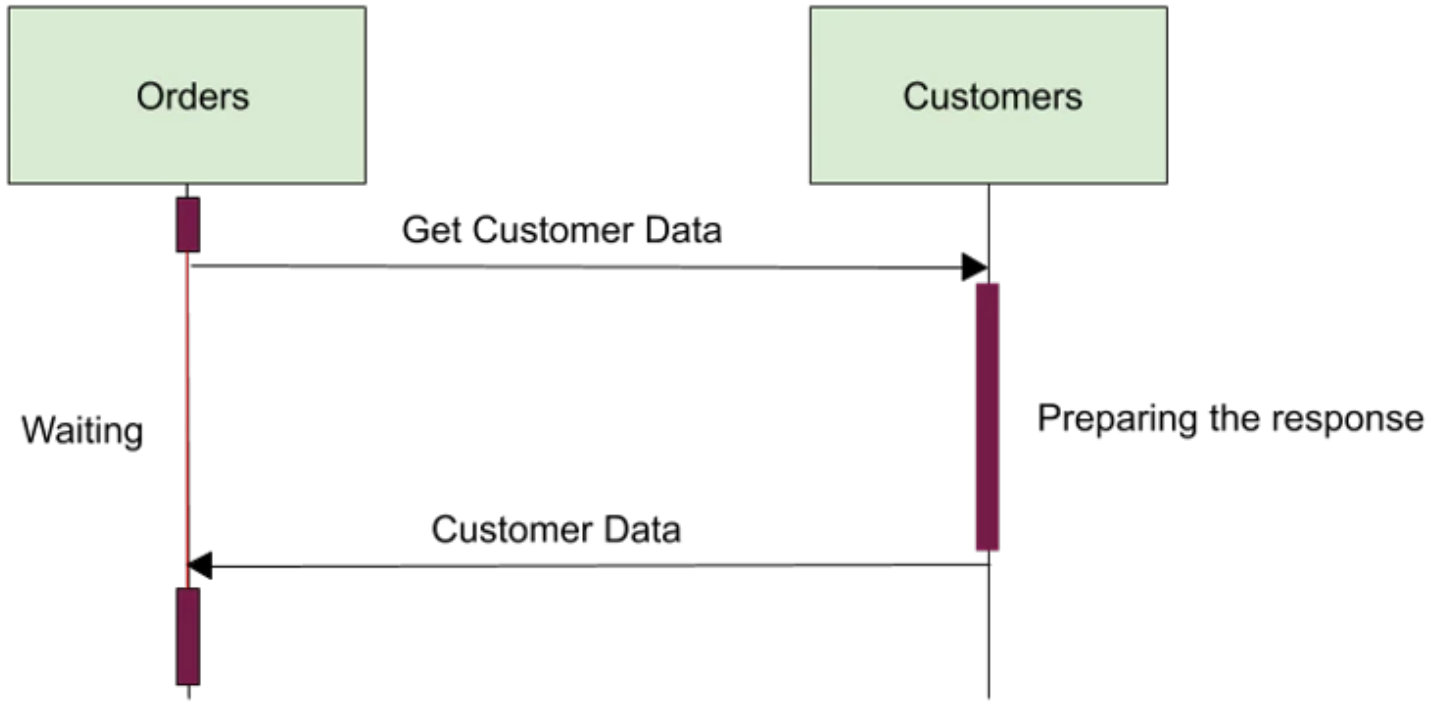

Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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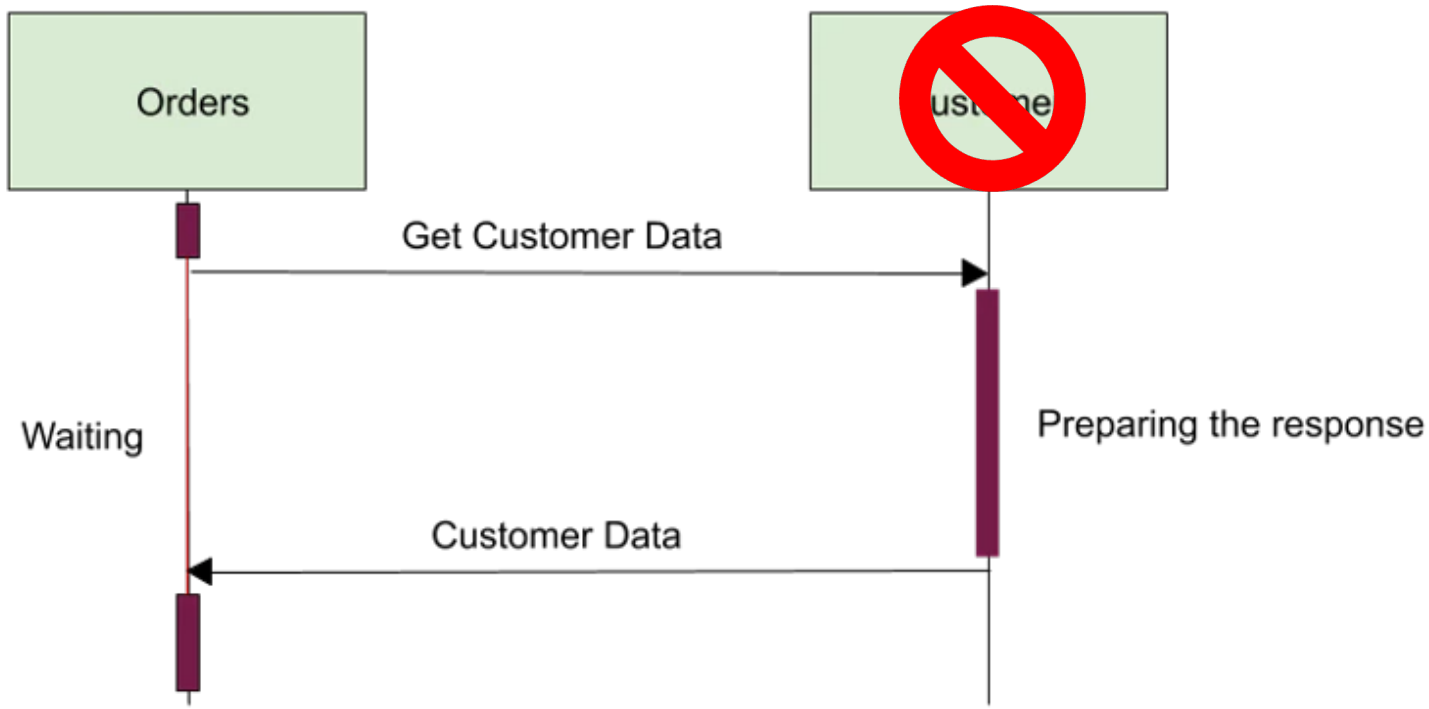

Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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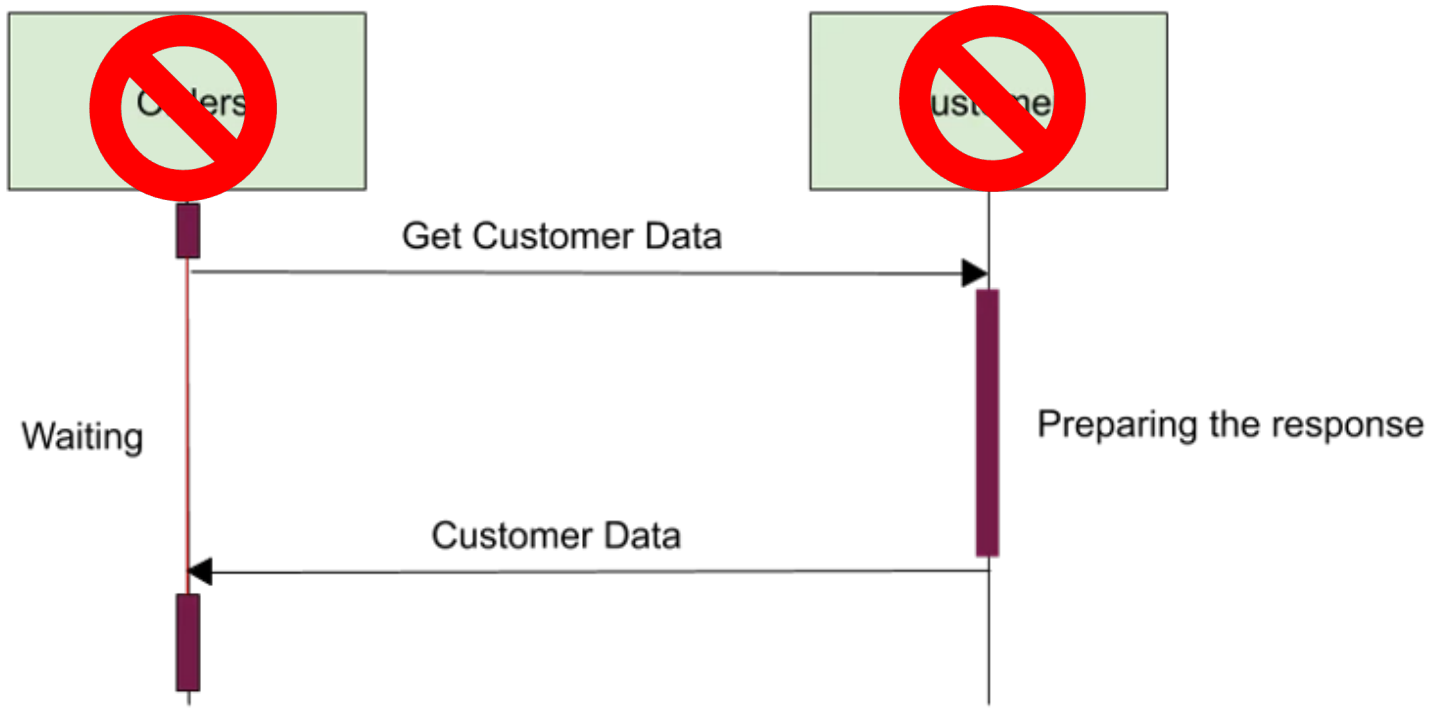

Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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Breaking Changes to Event Contracts

Problem #8

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 #9

Prerequisite: Automated Build and Release

Time consuming

Prone to human error

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Unencapsulated Services

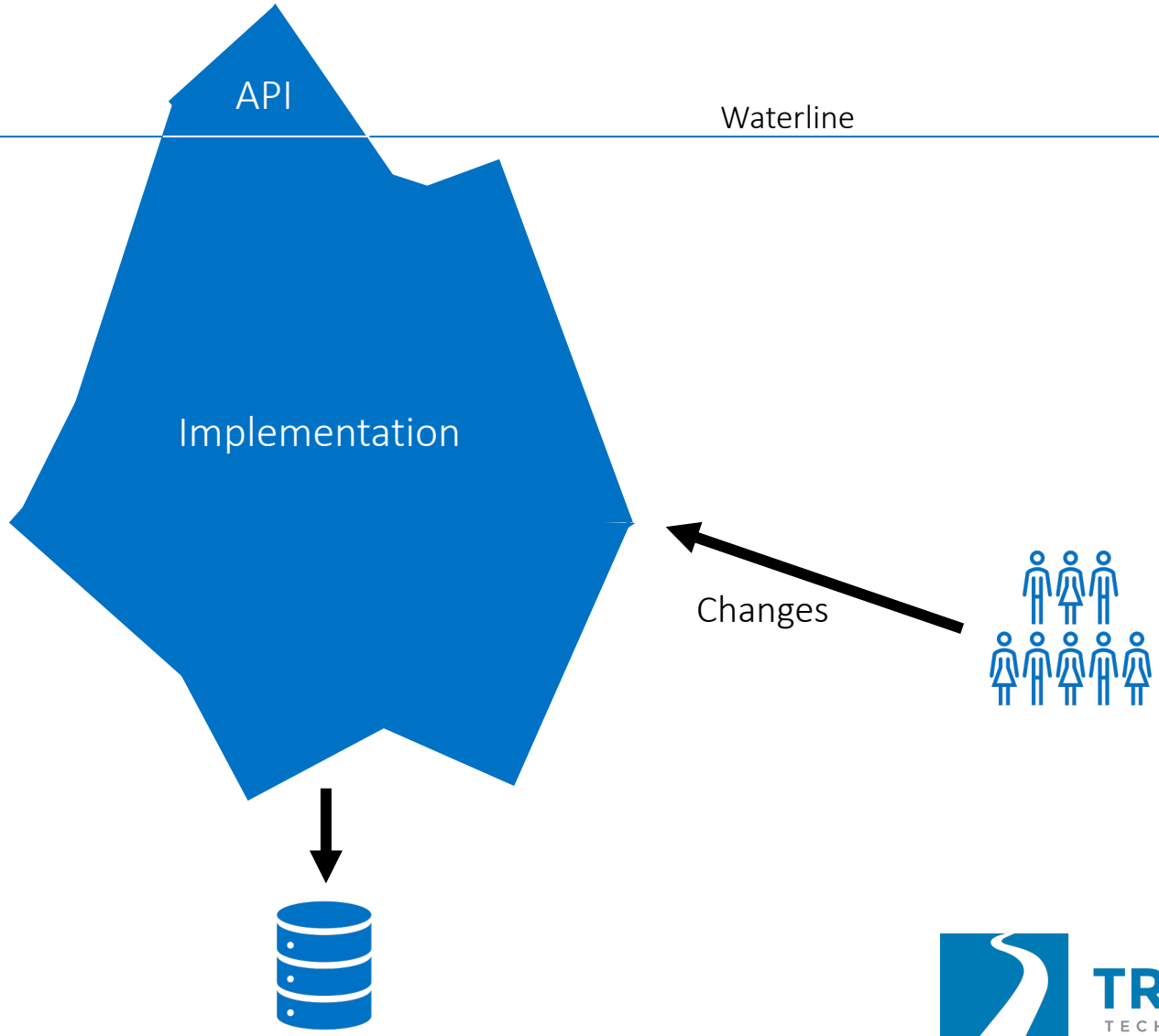
Problem #10

Iceberg Services

Services ENCAPSULATE significant business logic

Small, stable API

Large implementation



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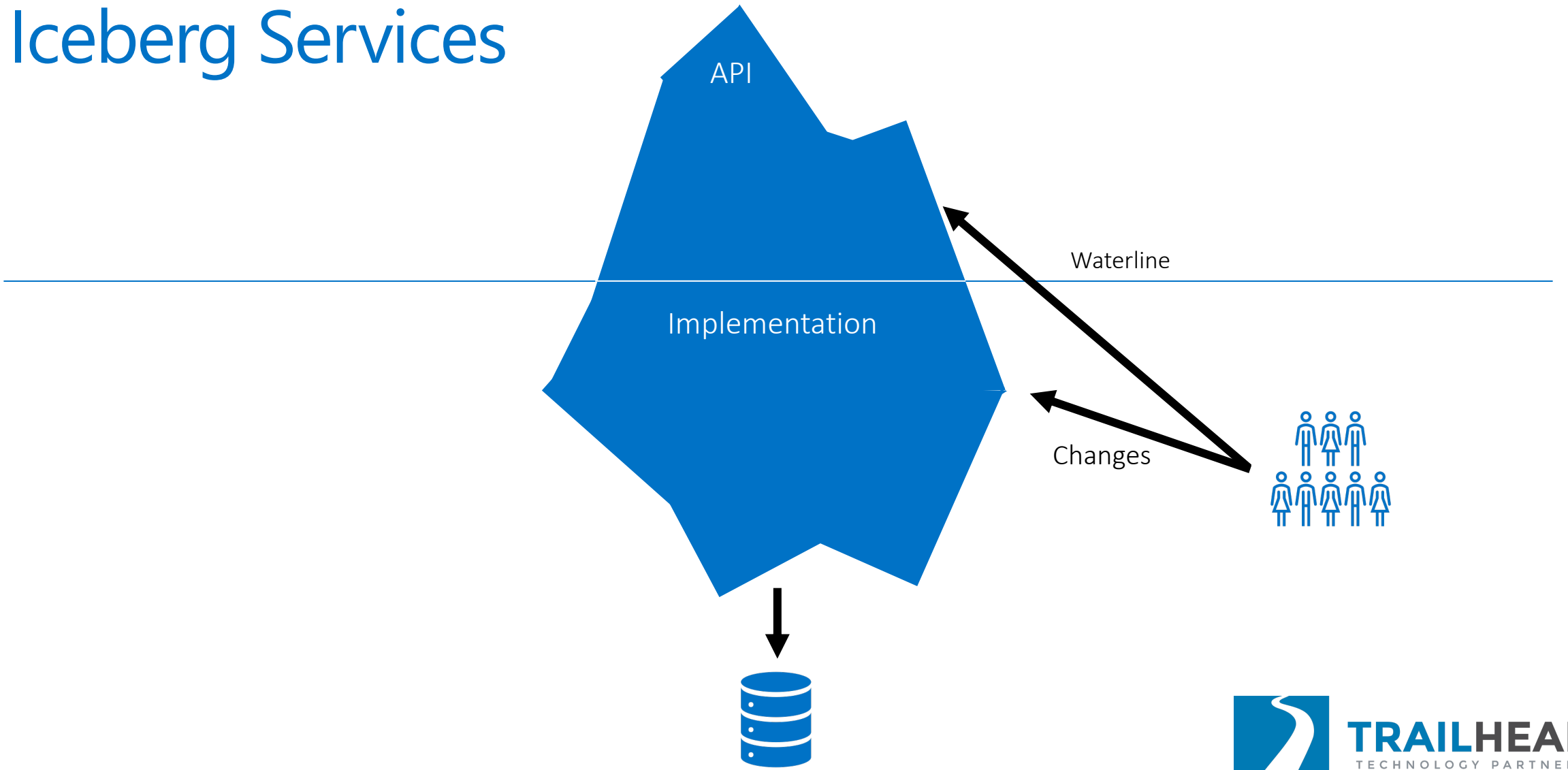
Iceberg Services



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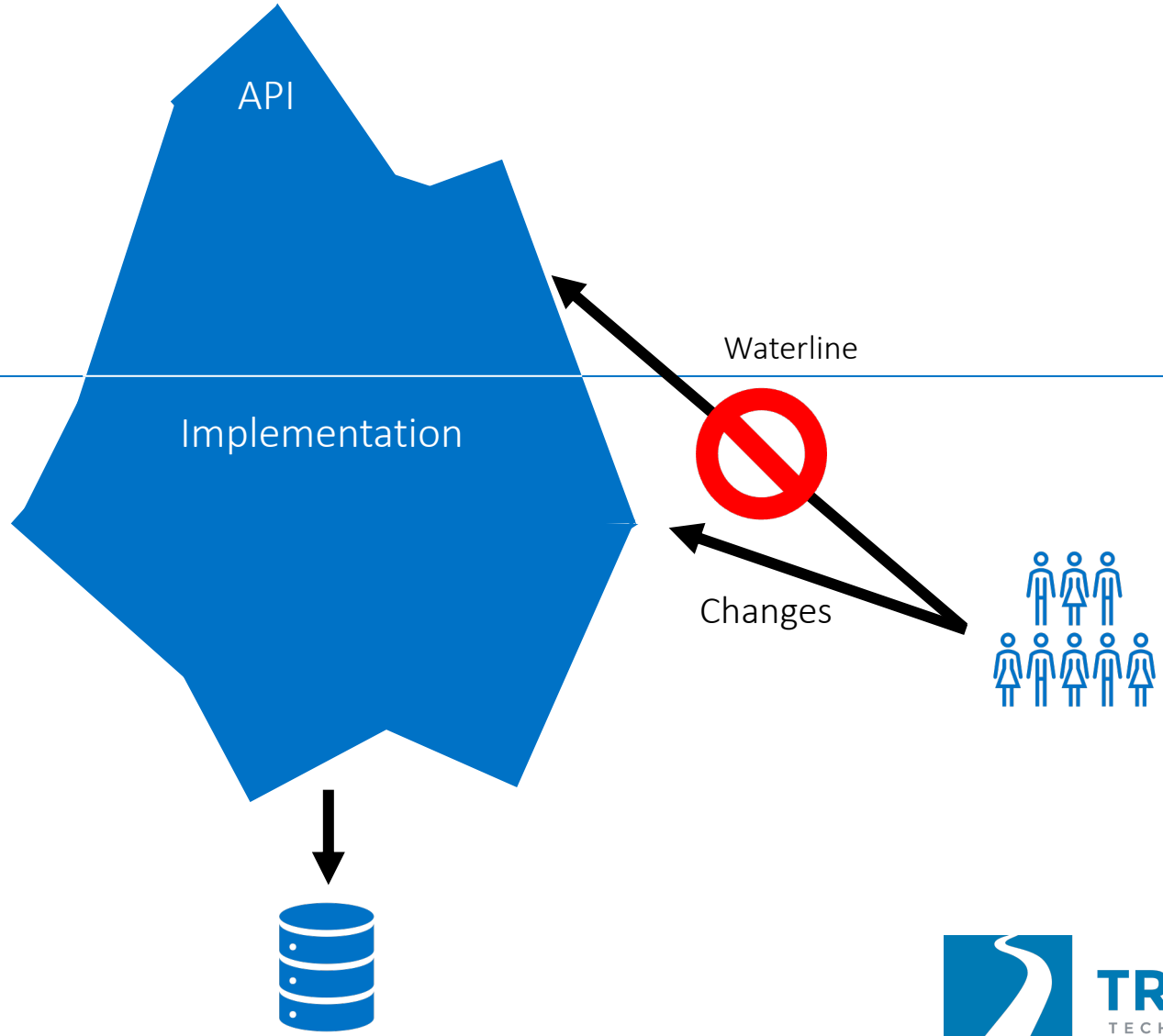
Iceberg Services



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Mismatched Teams

BONUS PROBLEM

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.

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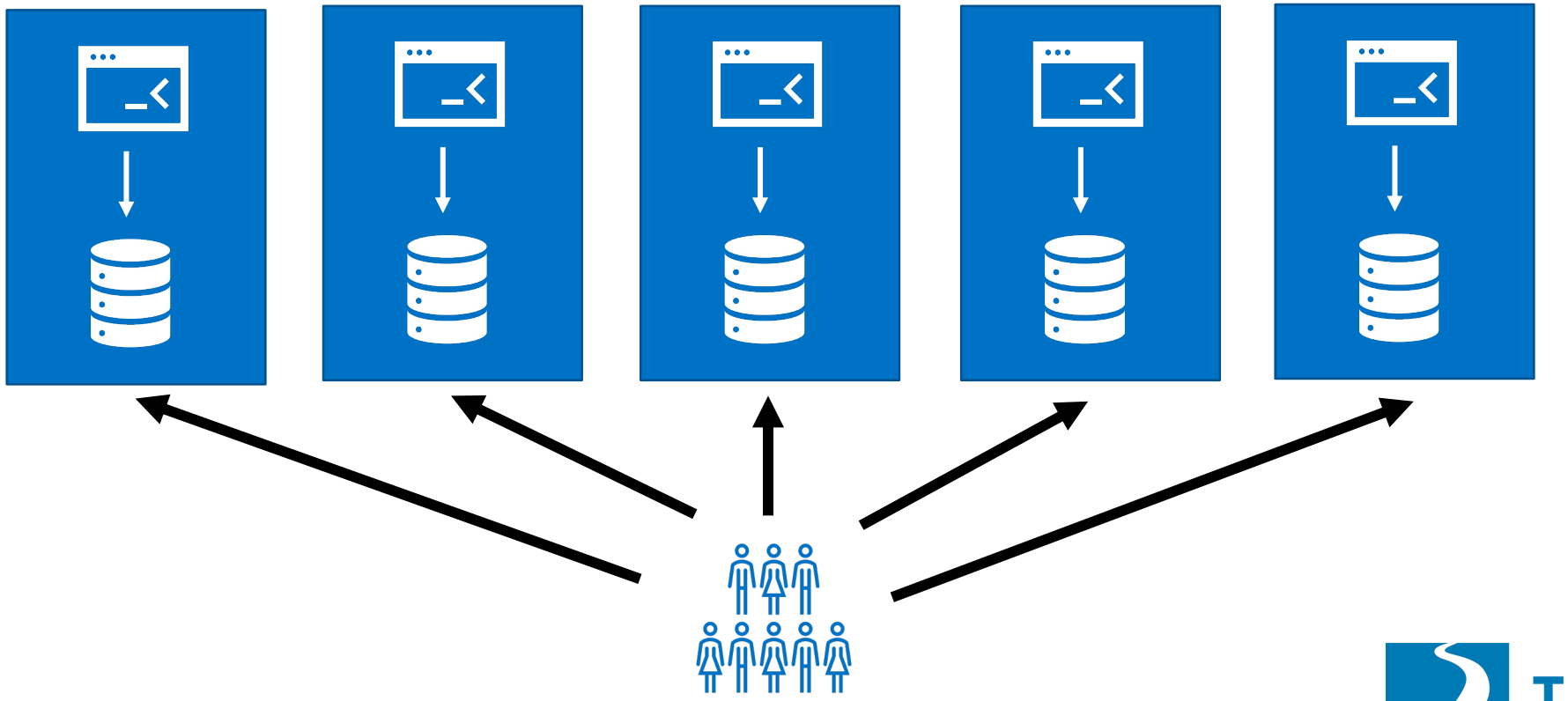
Single Team



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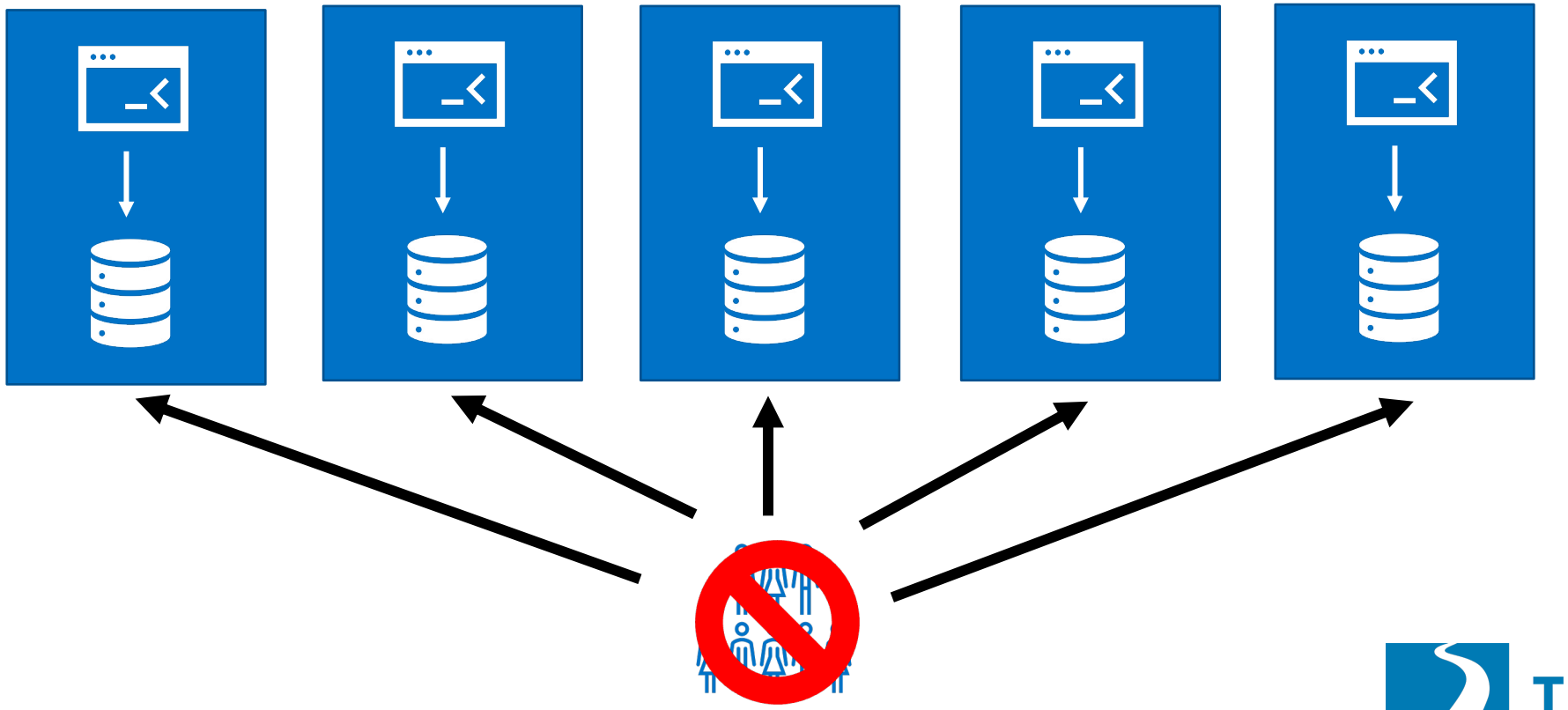
Single Team



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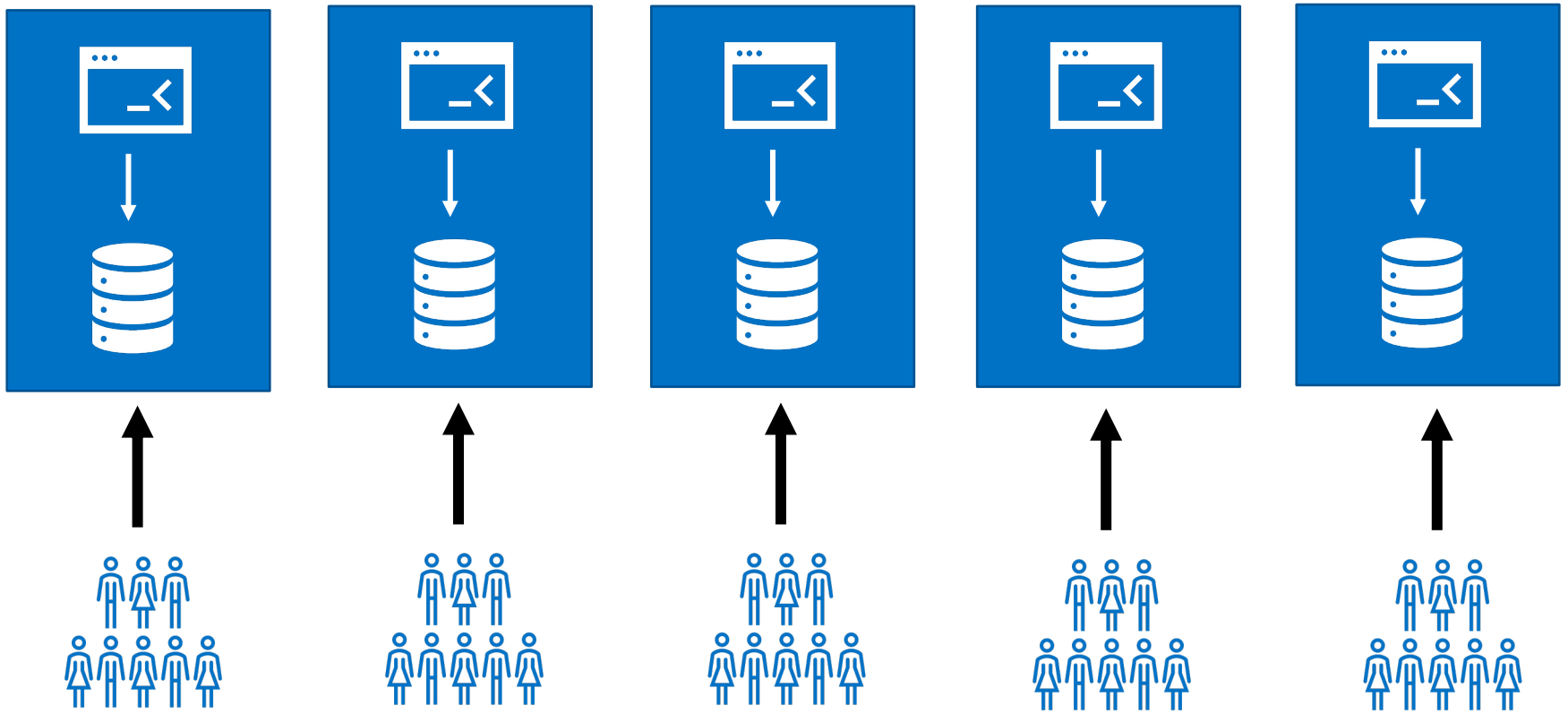
Team Per Service



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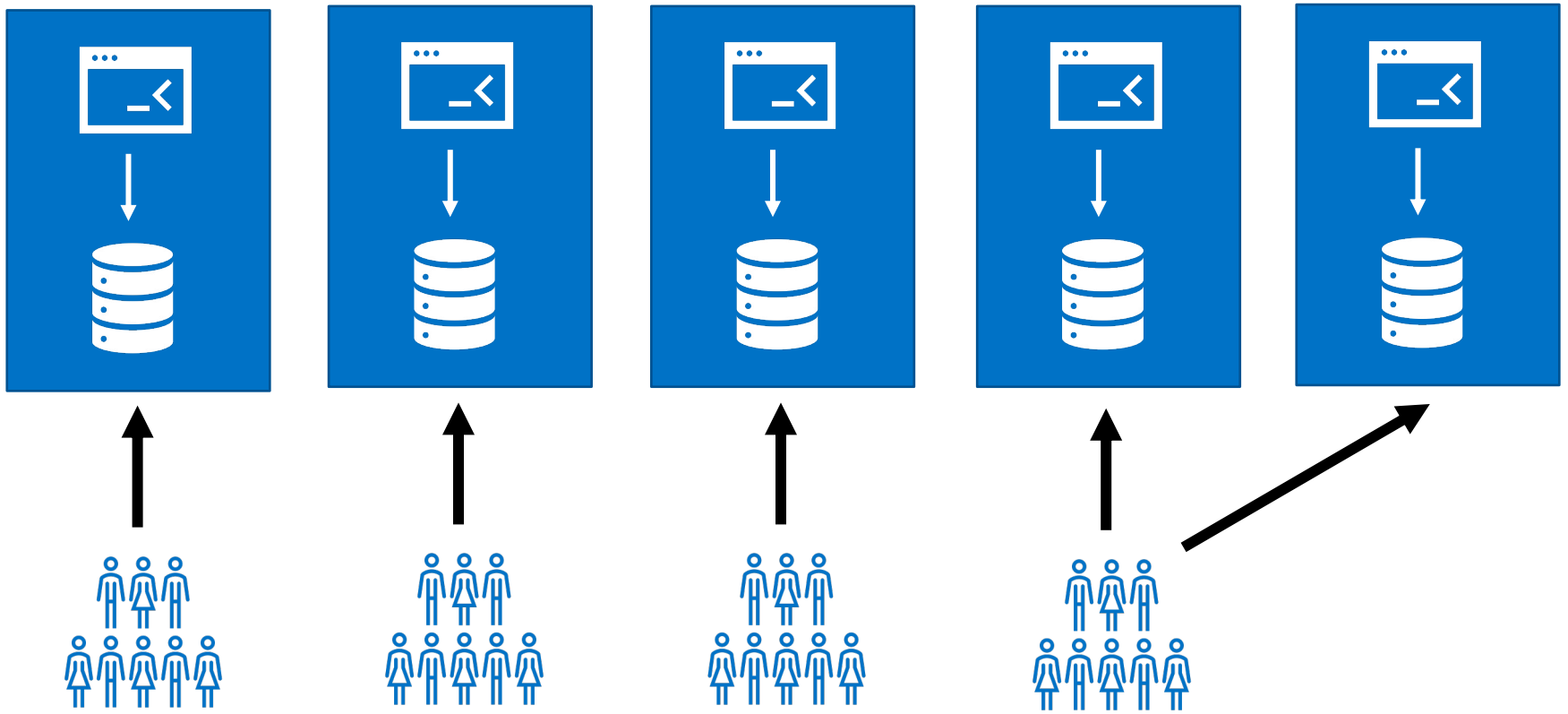
Team Per Service



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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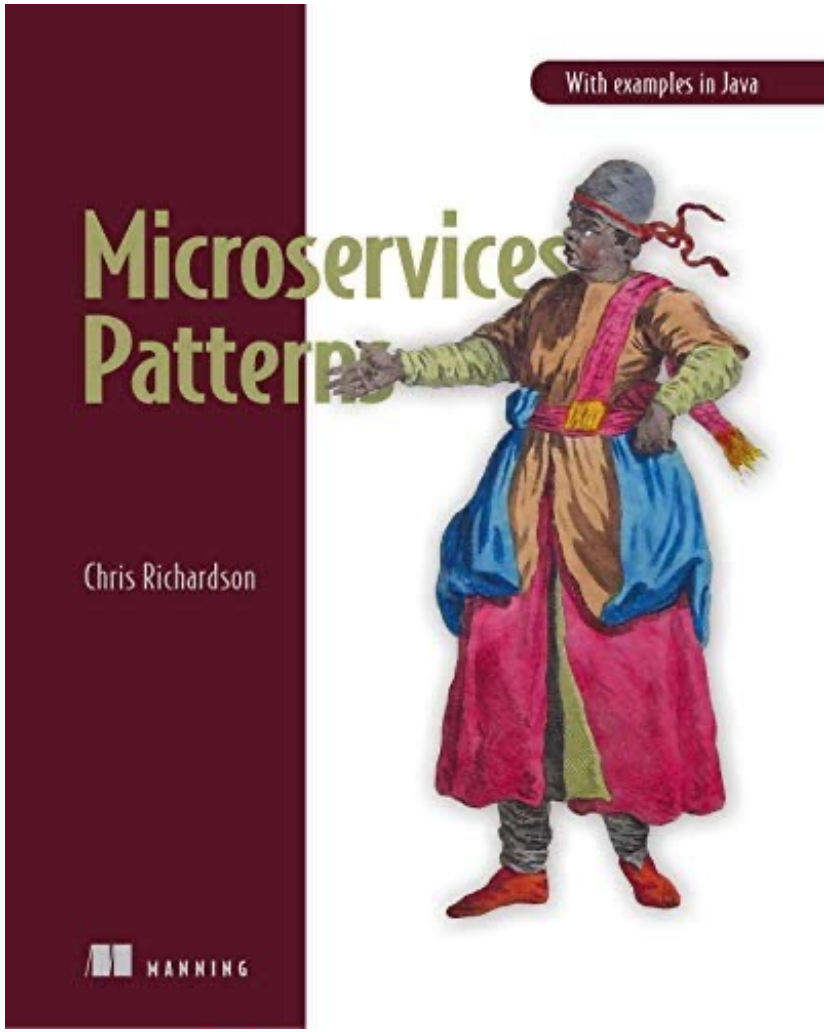
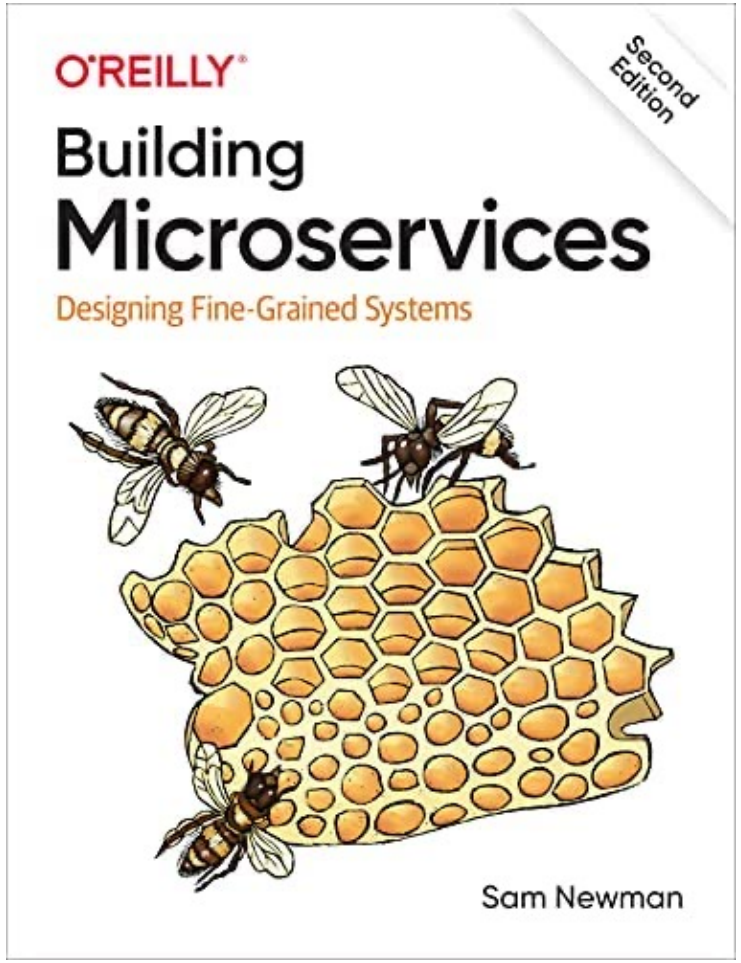
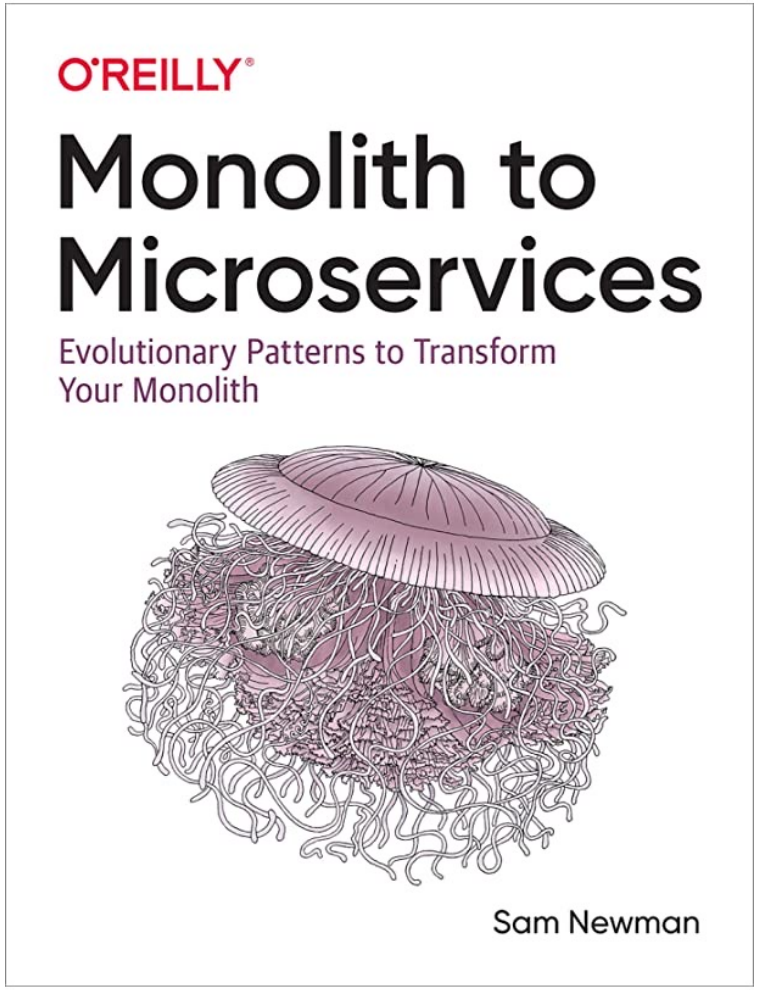
Further Reading







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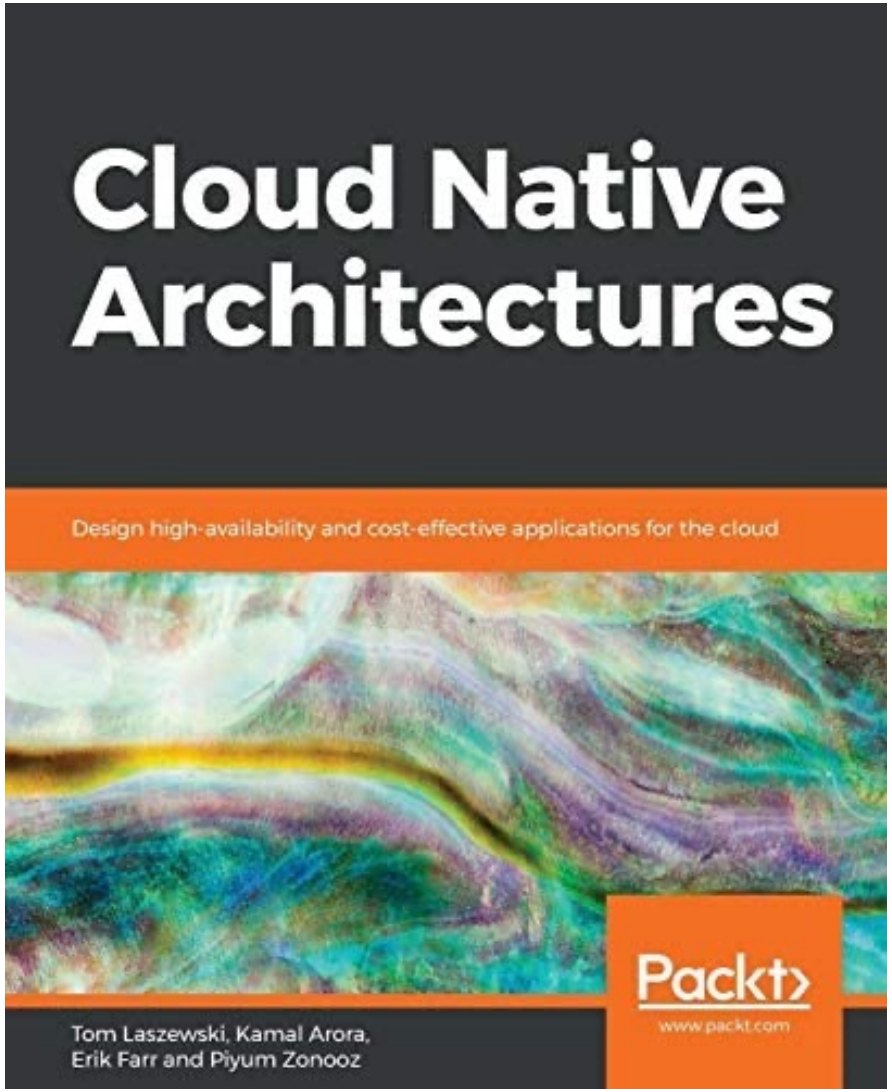

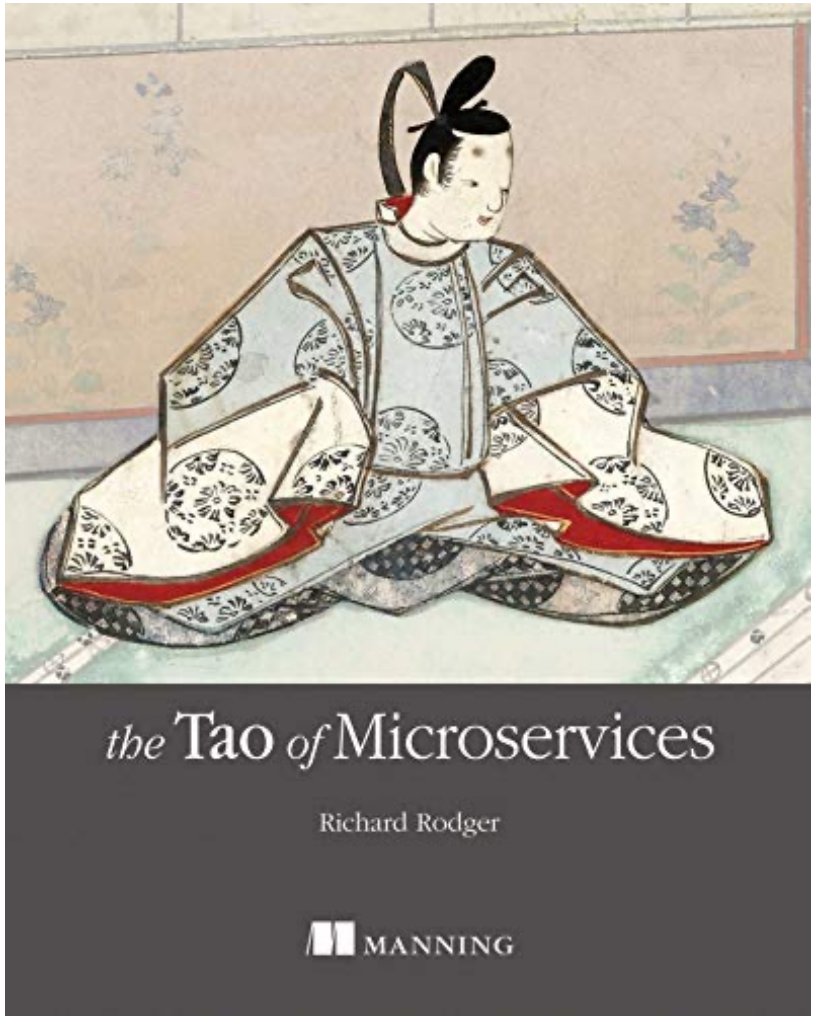

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Recap

- Definitions
  - Monolith
  - Microservices
  - Distributed Monolith
- 10 Most Common Mistakes
- 1 Bonus Mistake
- Further Reading
- Q&A

Thanks! Questions?

Jonathan "J." Tower

jtower@trailheadtechnology.com

trailheadtechnology.com/blog

jtowermi

Free Offer

30-Minute Consultation

bit.ly/th-offer

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