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Don’t Build a Distributed Monolith

How to Avoid Doing Microservices Completely Wrong

Jonathan "J." Tower

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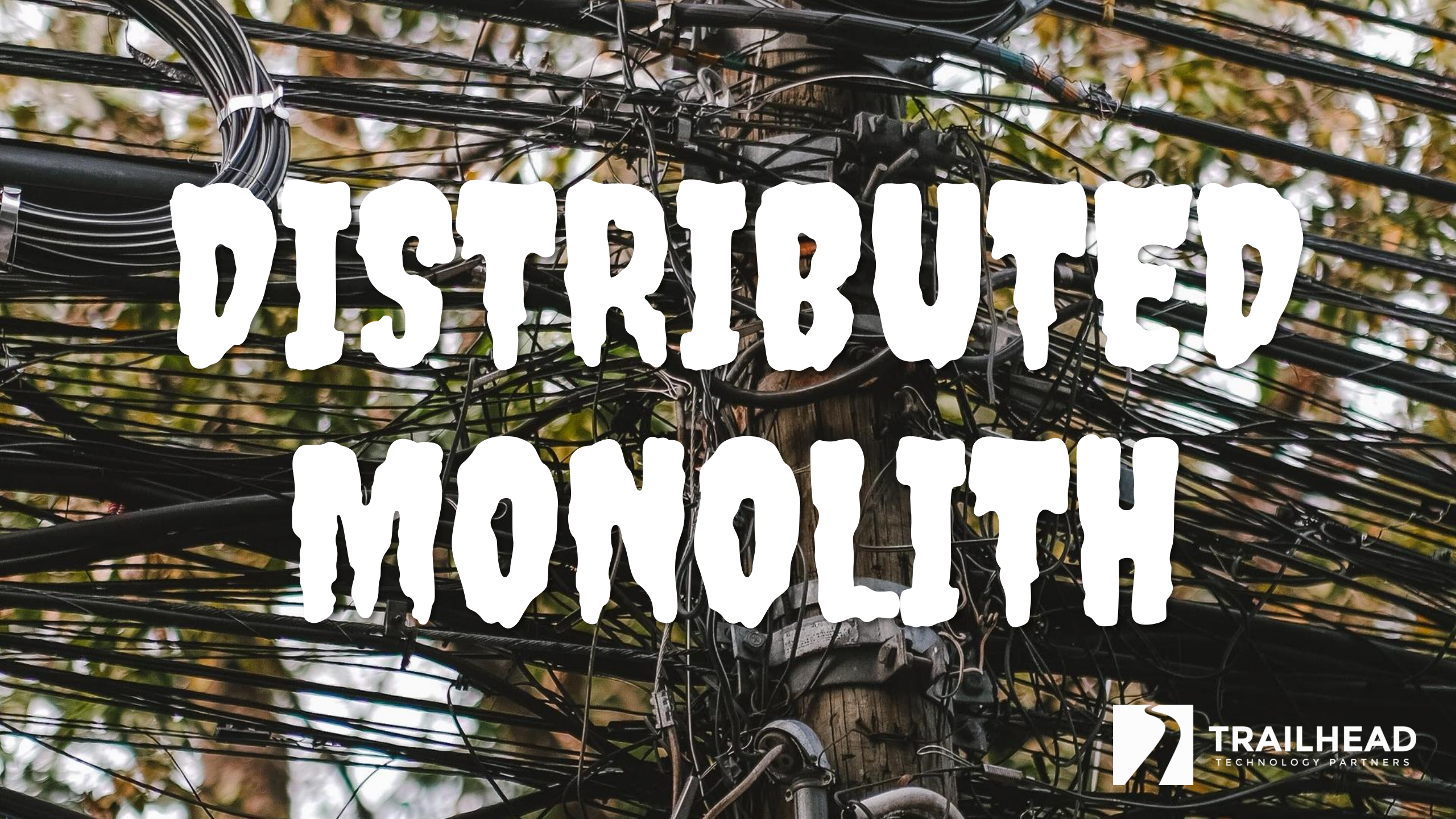
DISTRIBUTED
MONOLITH
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Avoid the **10 Most Common** Mistakes Made When Building Microservices

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Jonathan "J." Tower

Principal Consultant & Partner

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Free

Consultation

bit.ly/th-offer

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

Some Definitions

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Monolith
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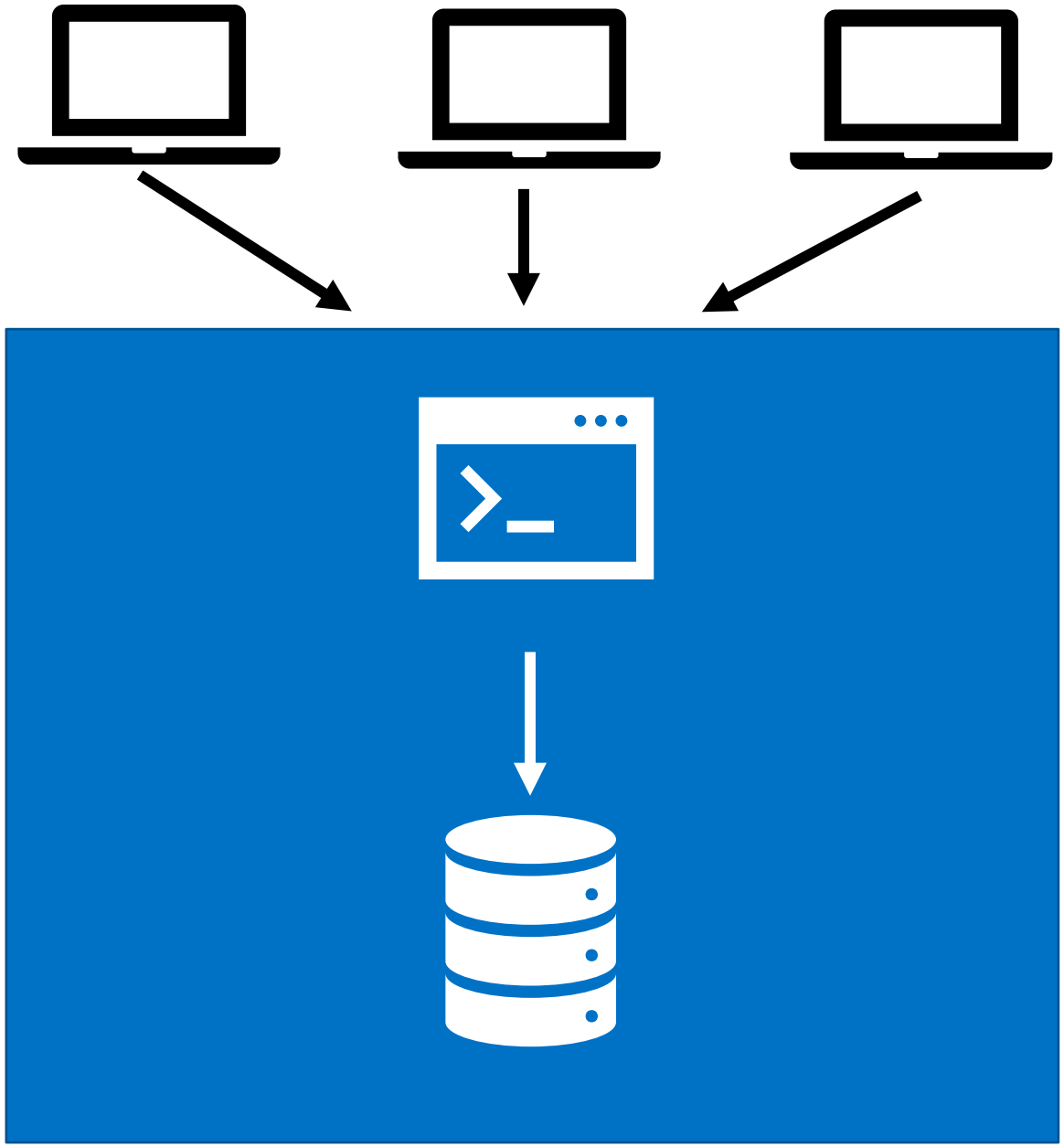

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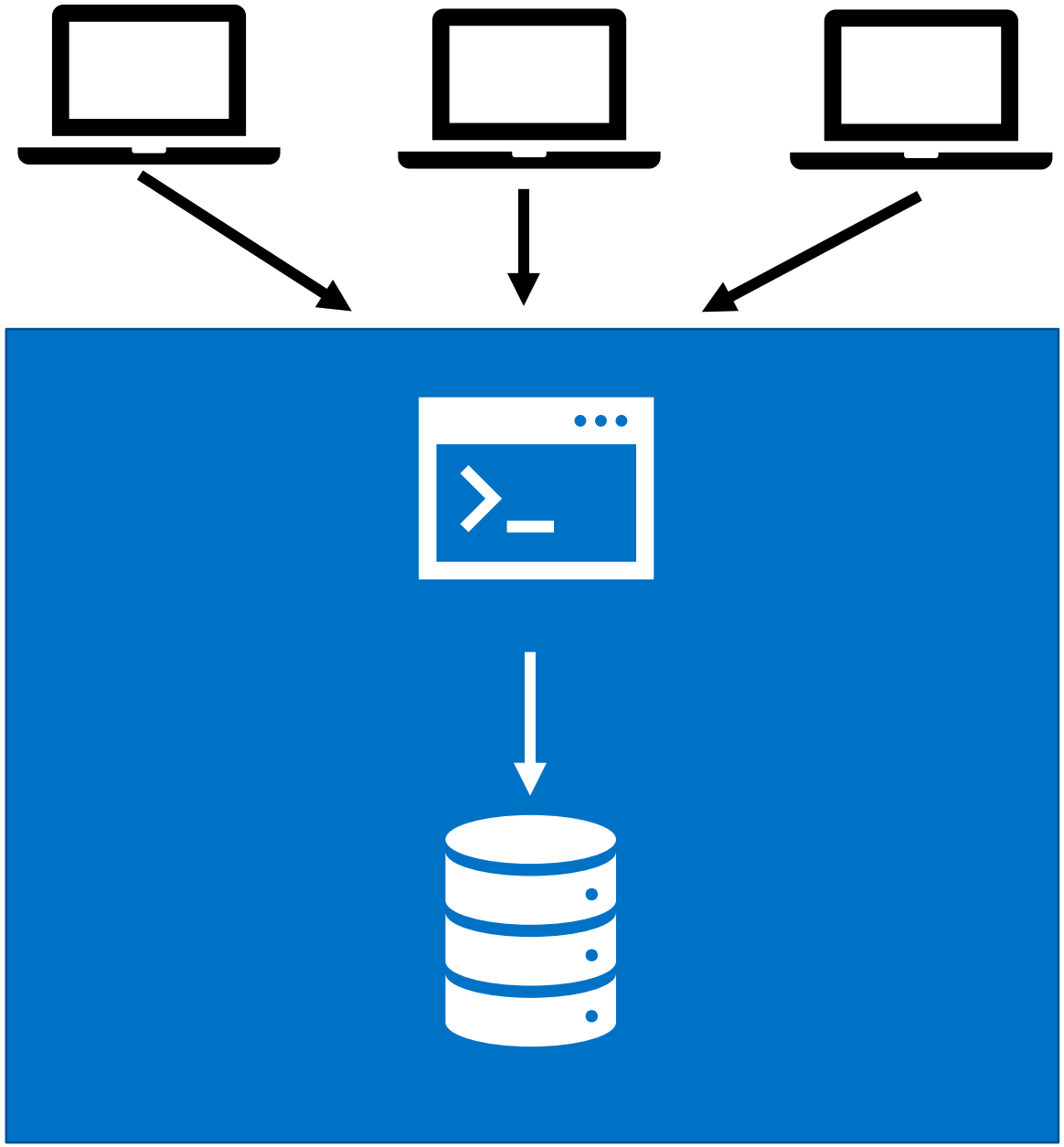

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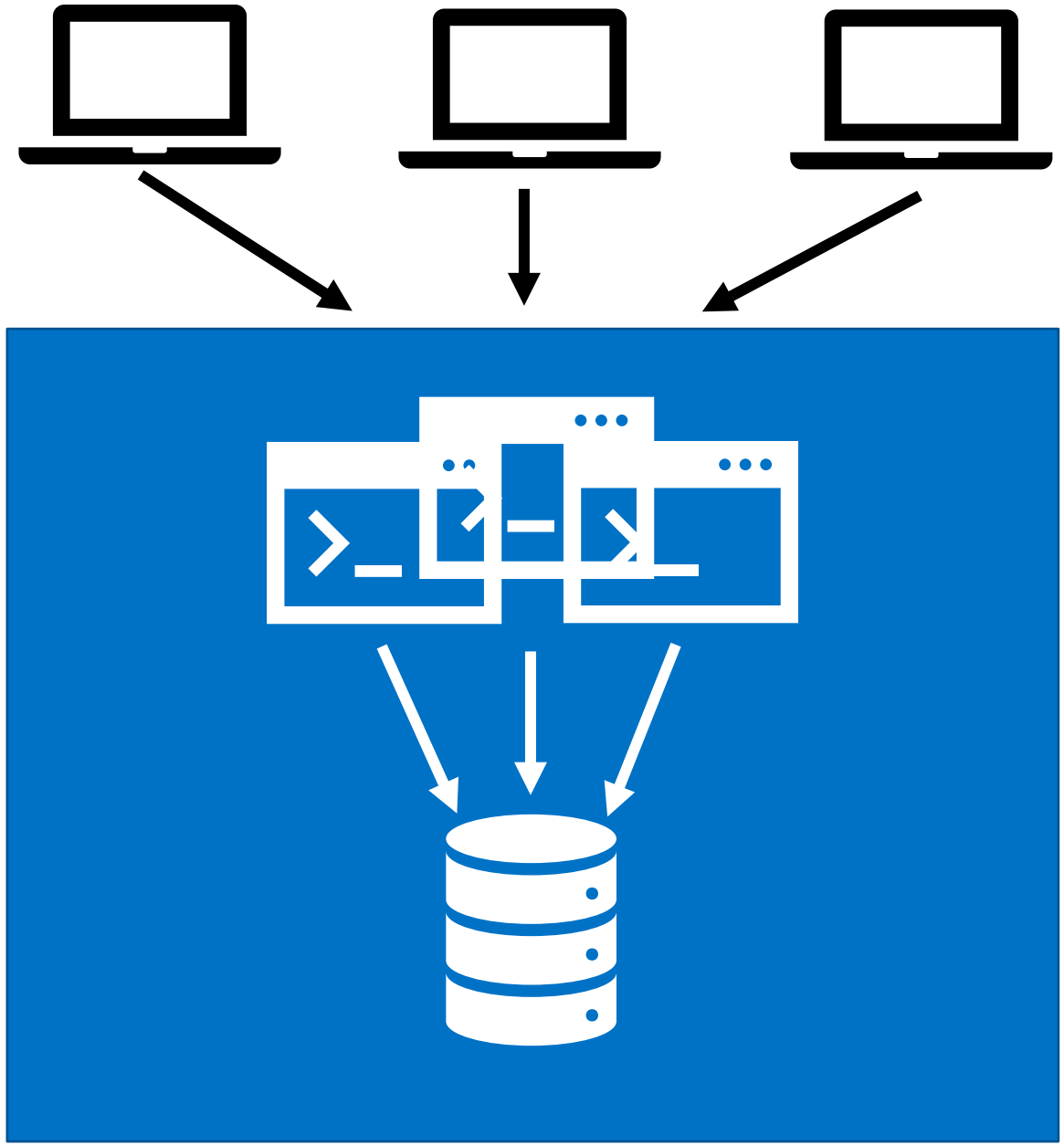

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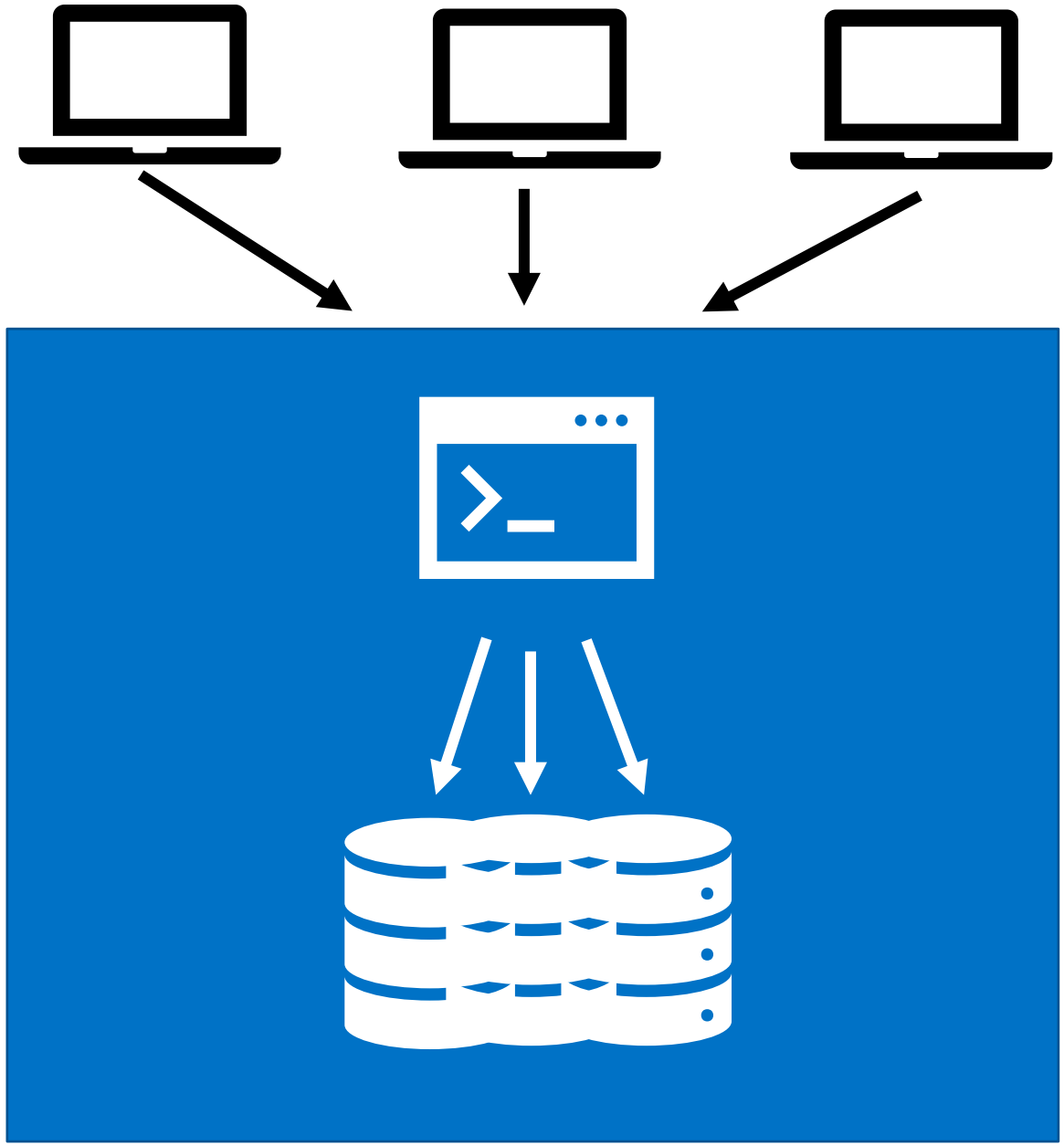

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Modular

Ball Of Mud

Microservices

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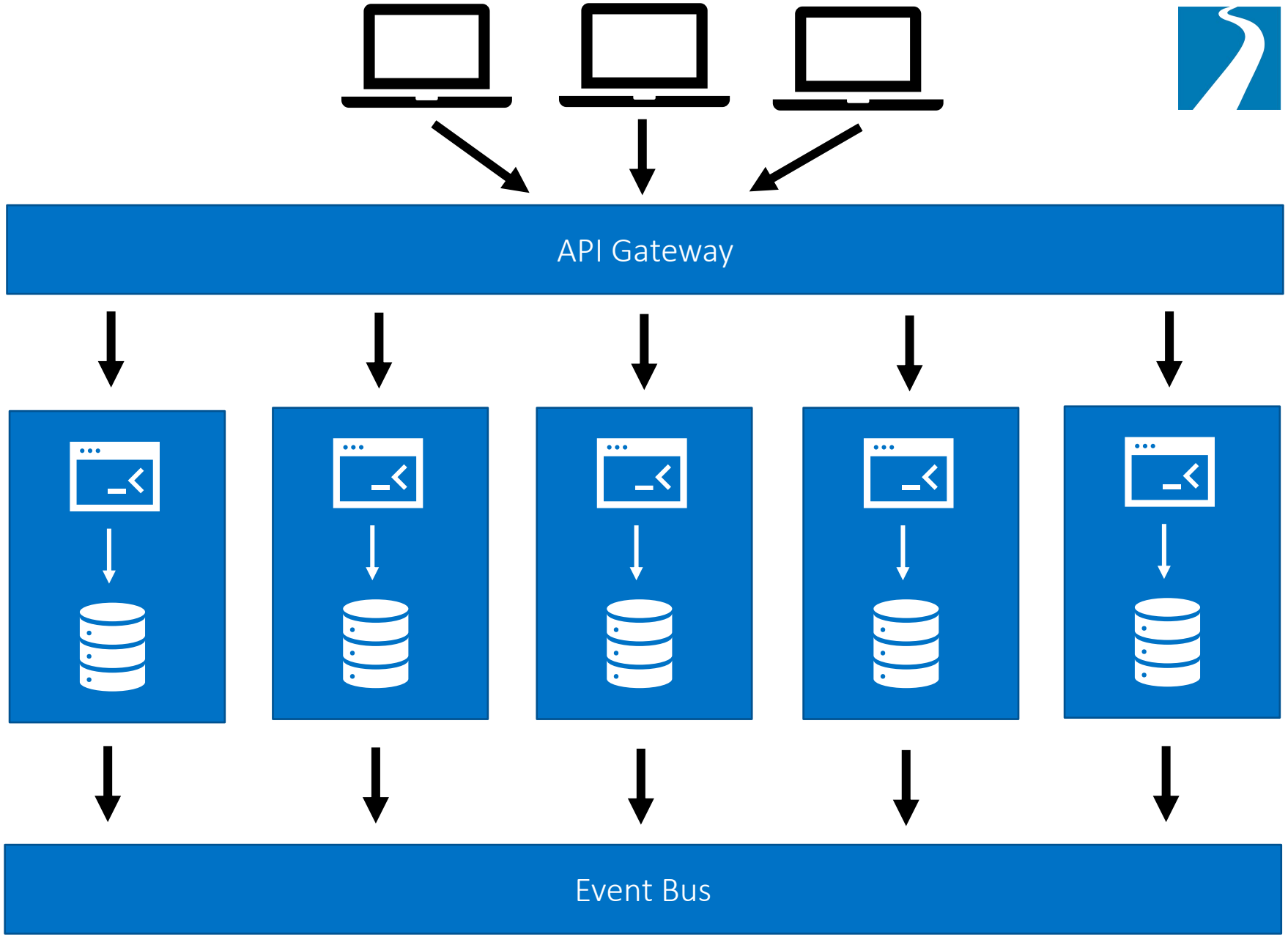

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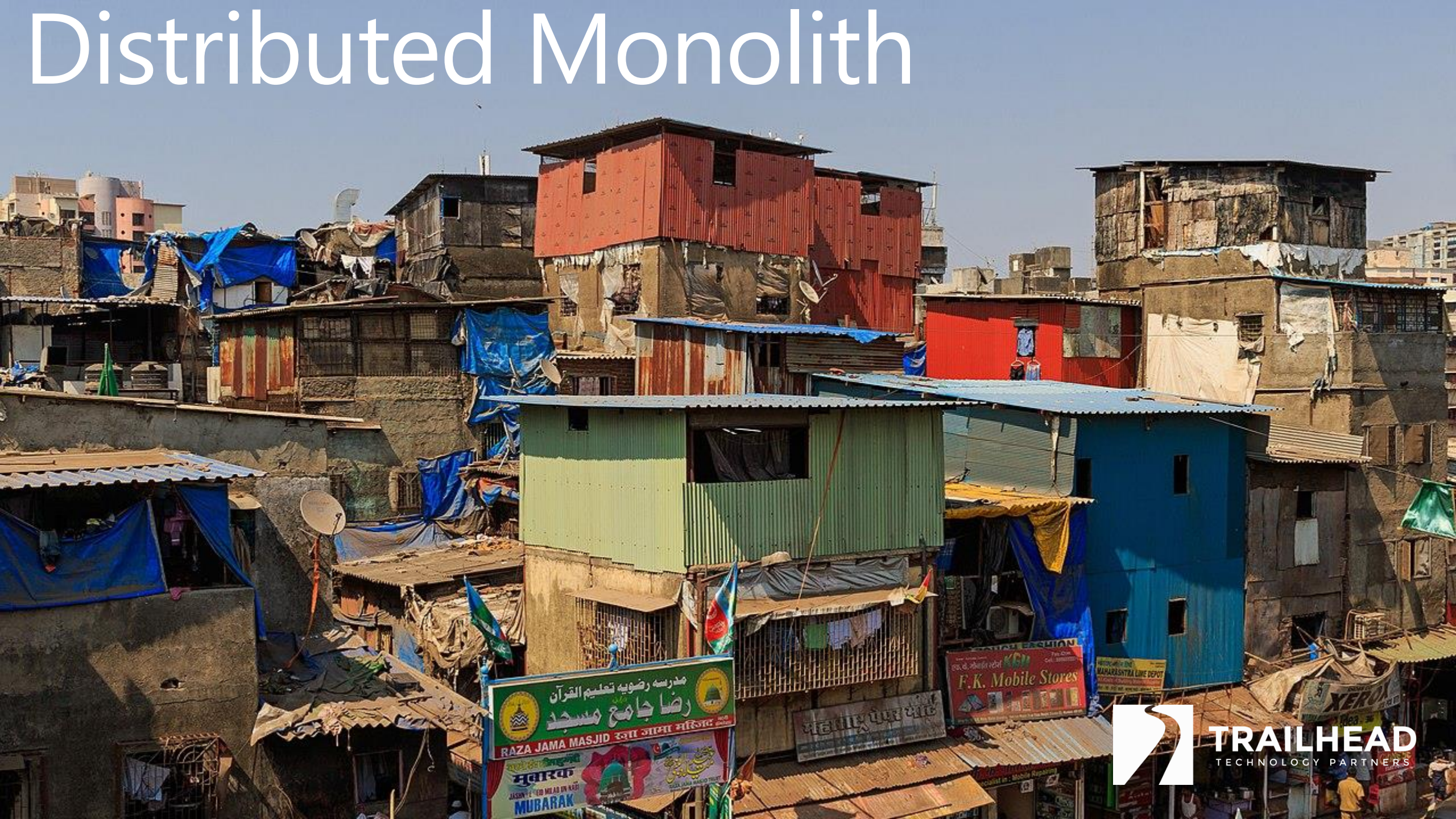
Distributed Monolith



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Distributed Monolith

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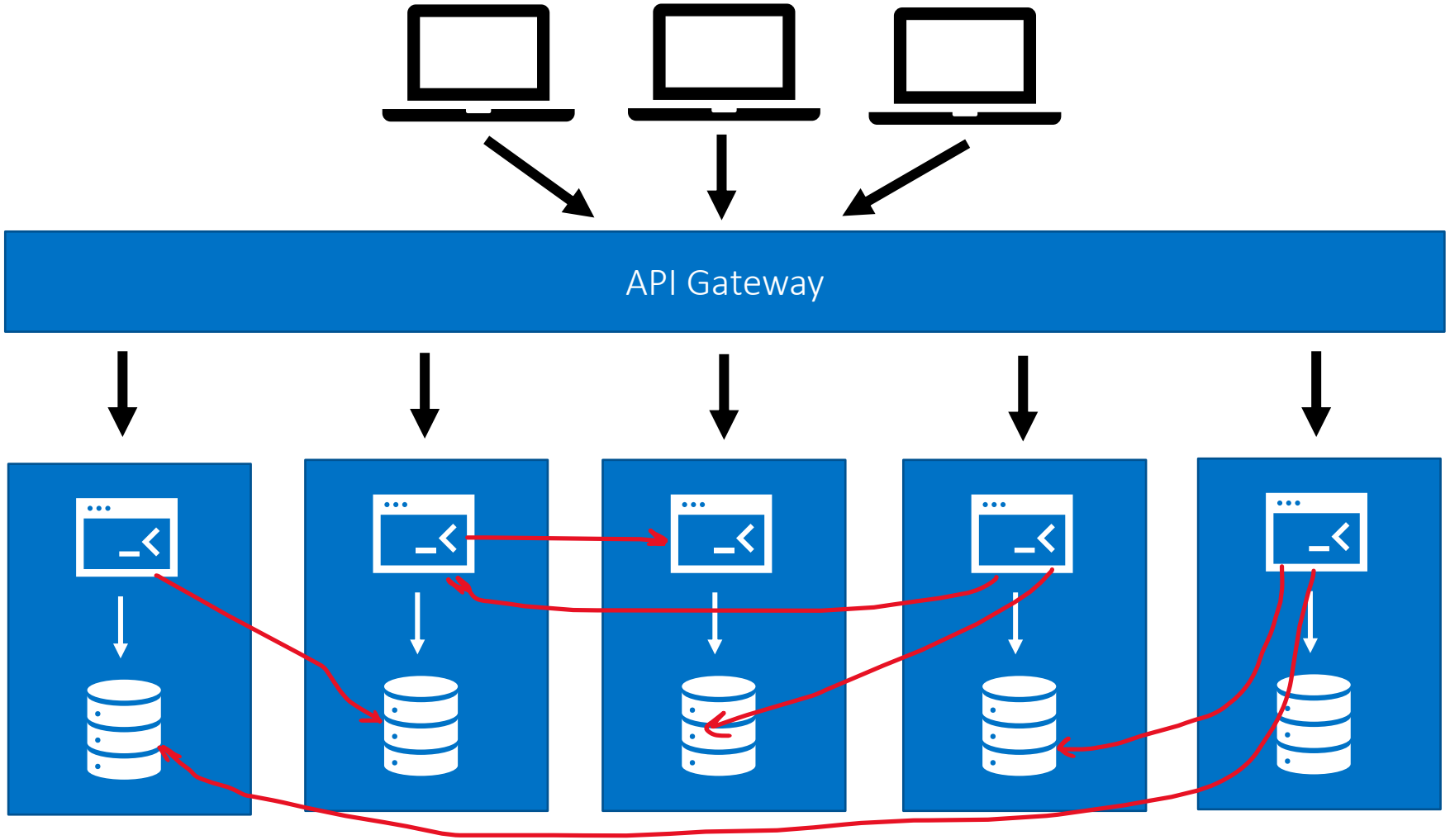

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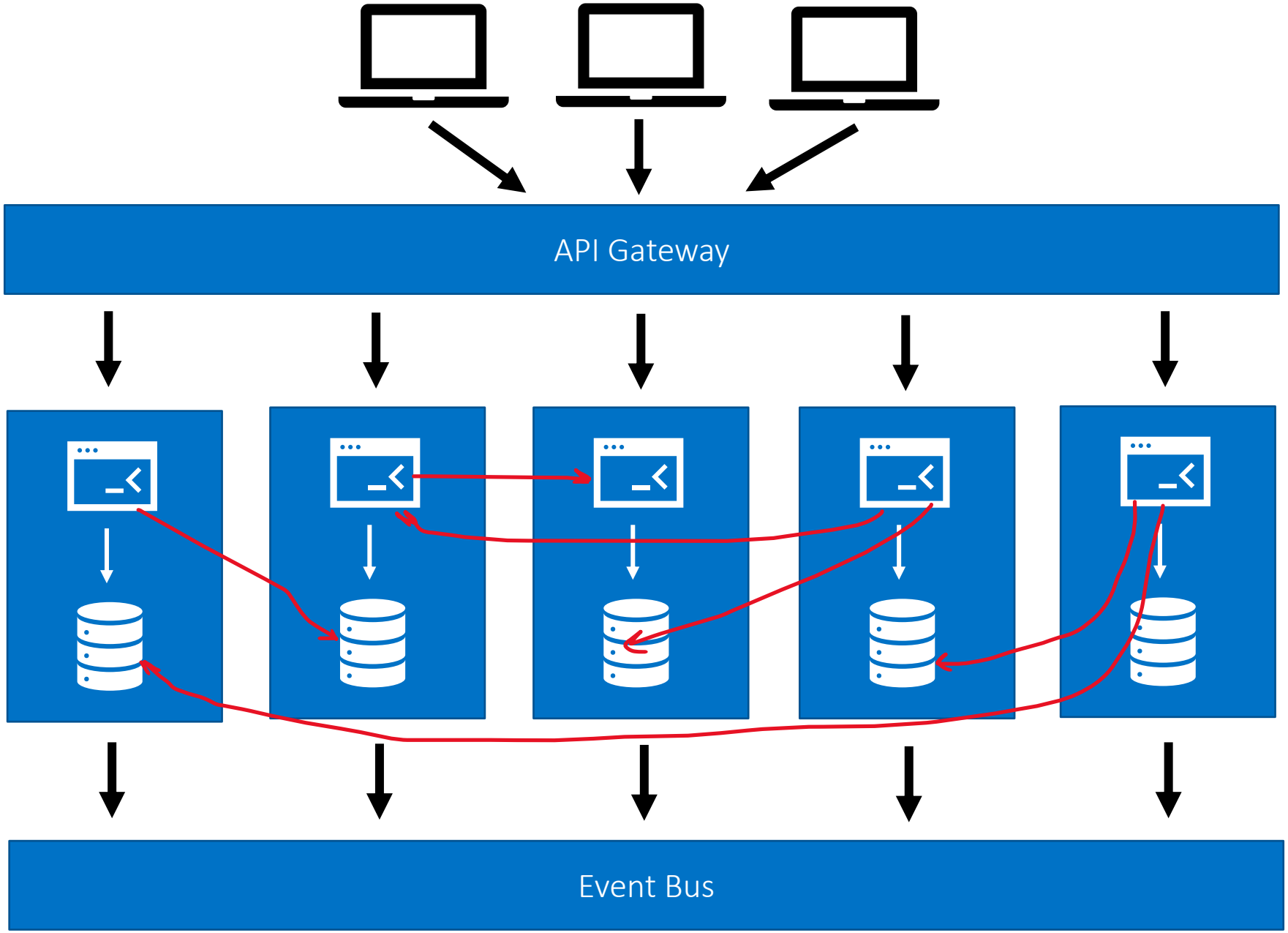
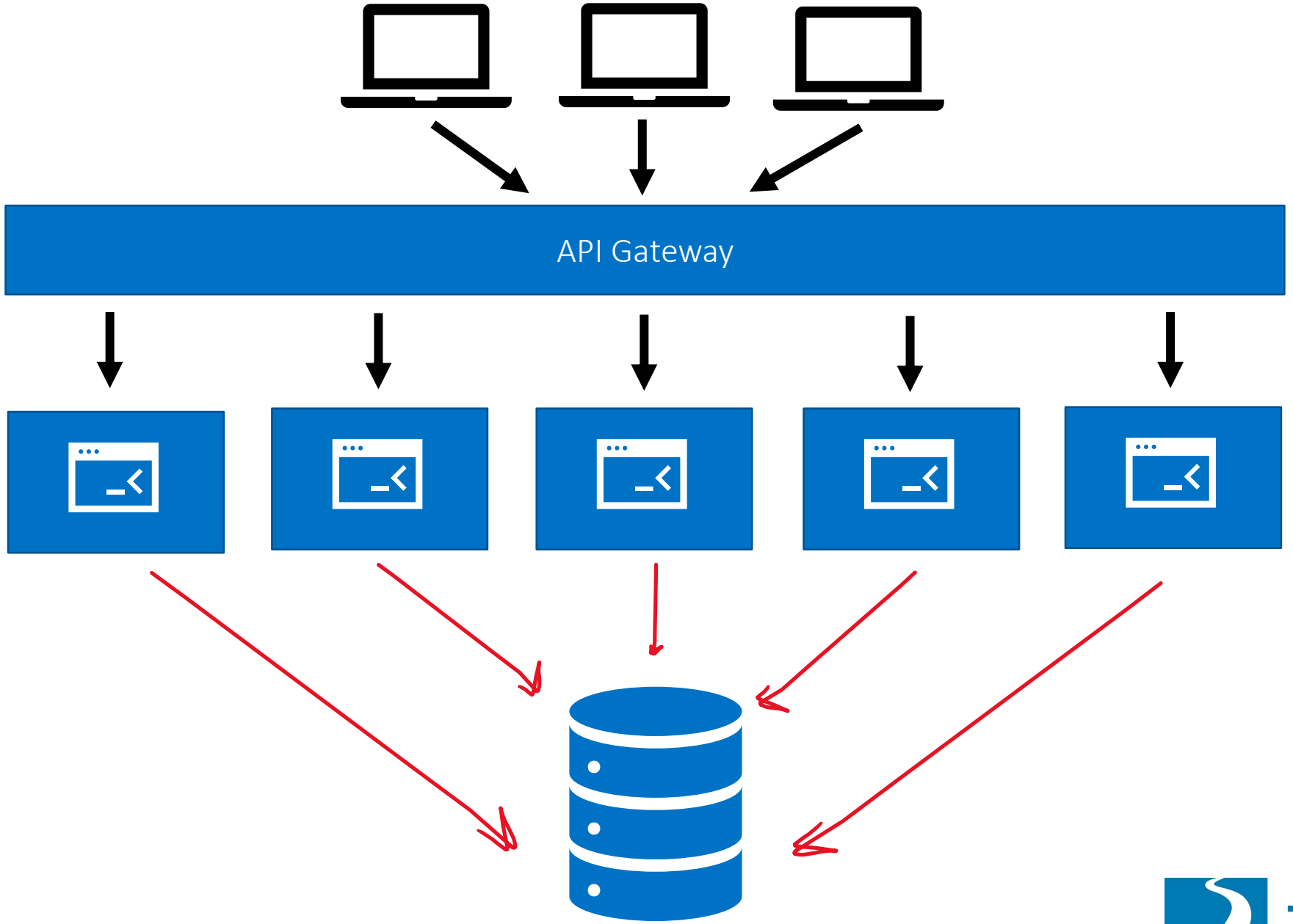

API Gateway
Event Bus



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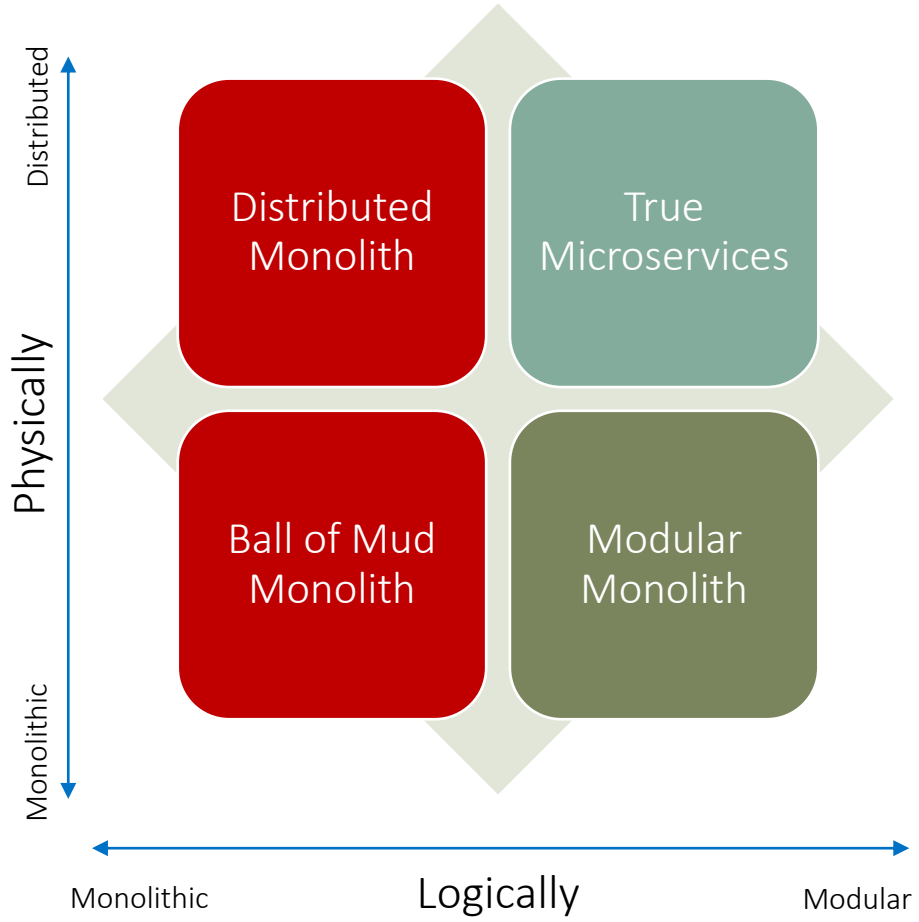
Good vs Bad Monoliths



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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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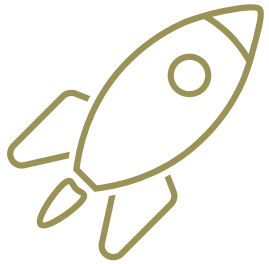
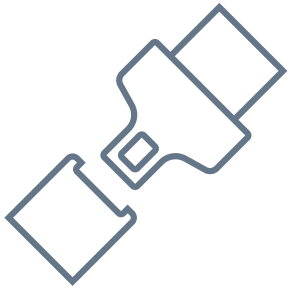
Some Good Reasons to Microservice

"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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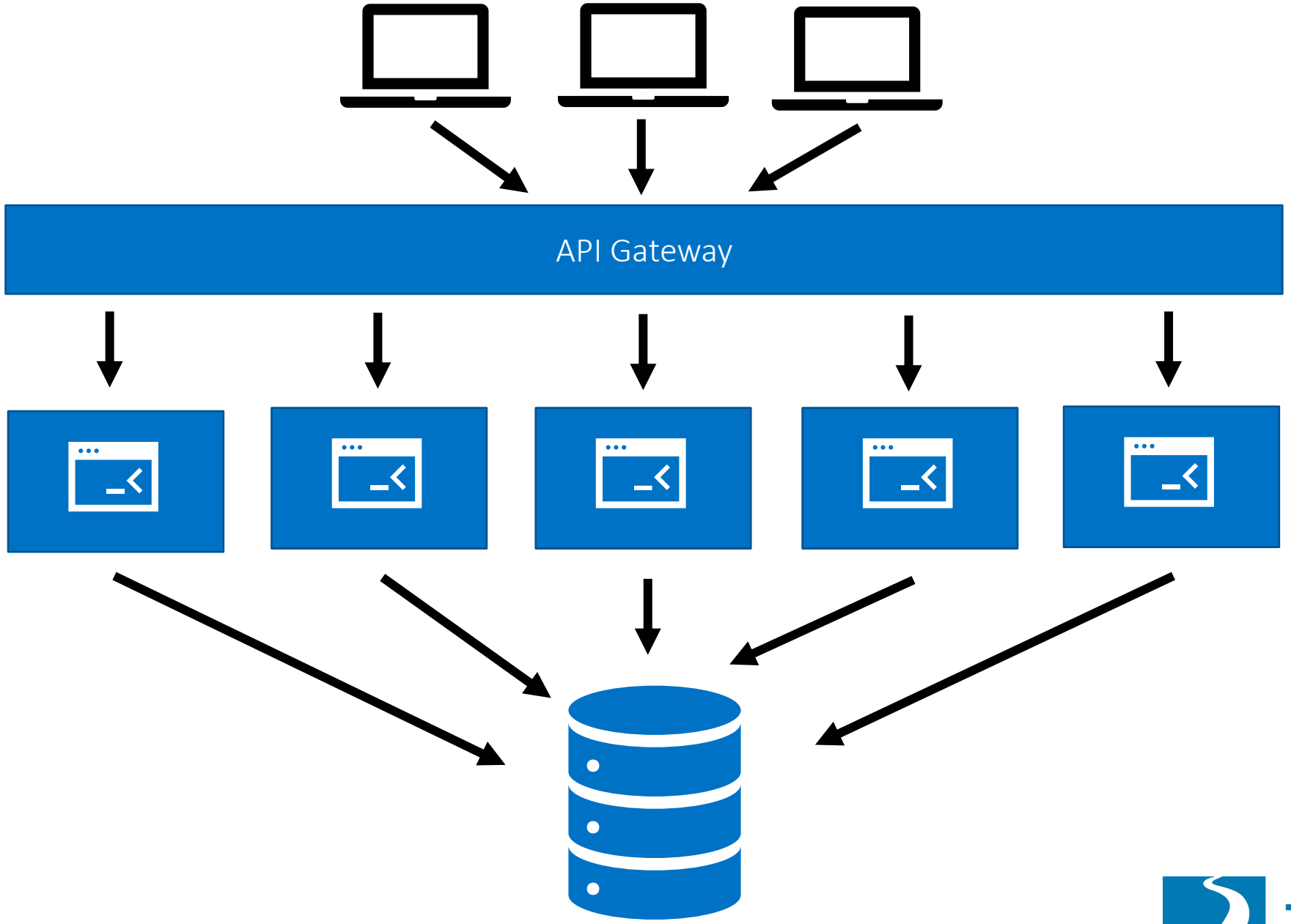
Shared Data Store or Models

Problem #2



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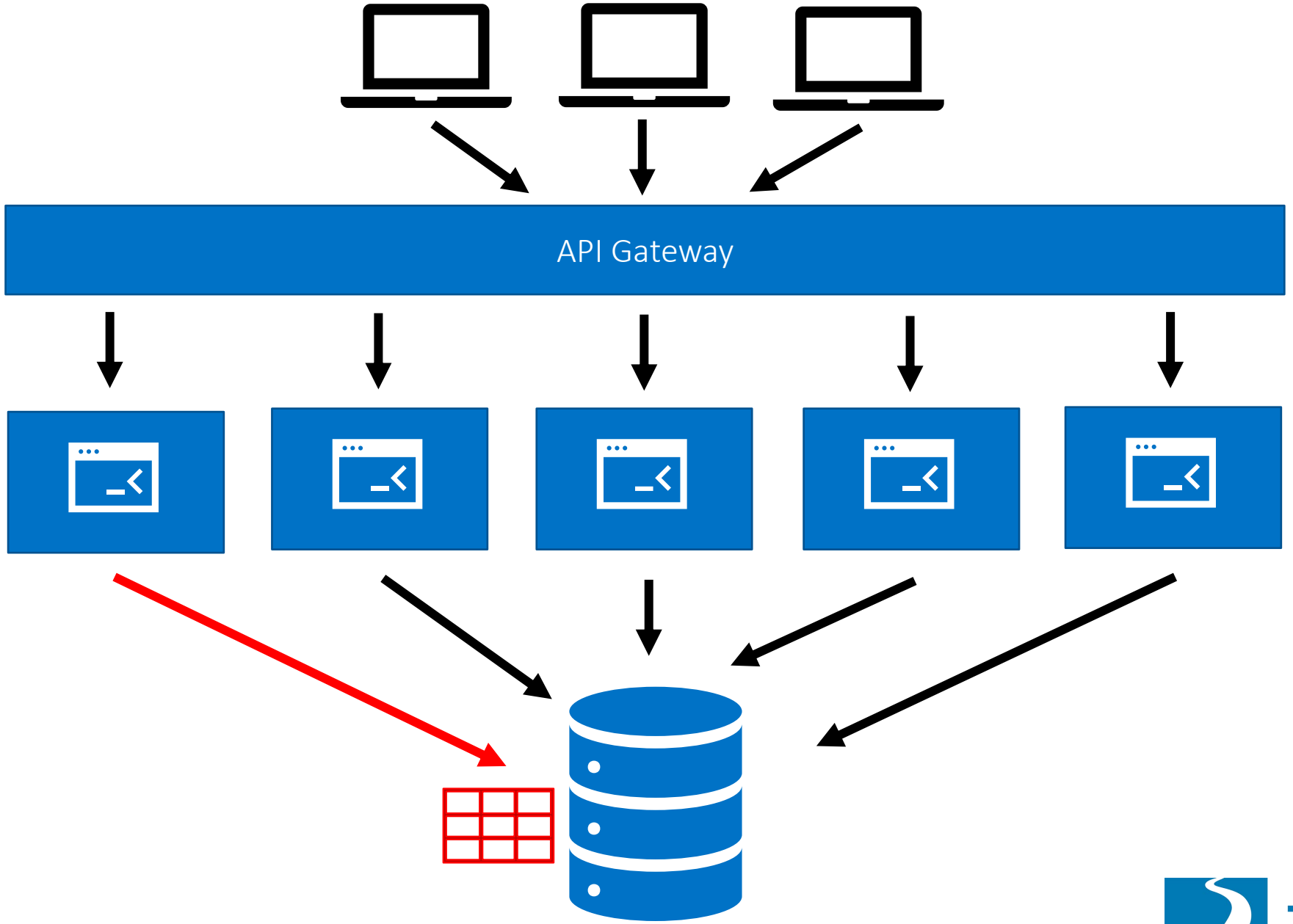

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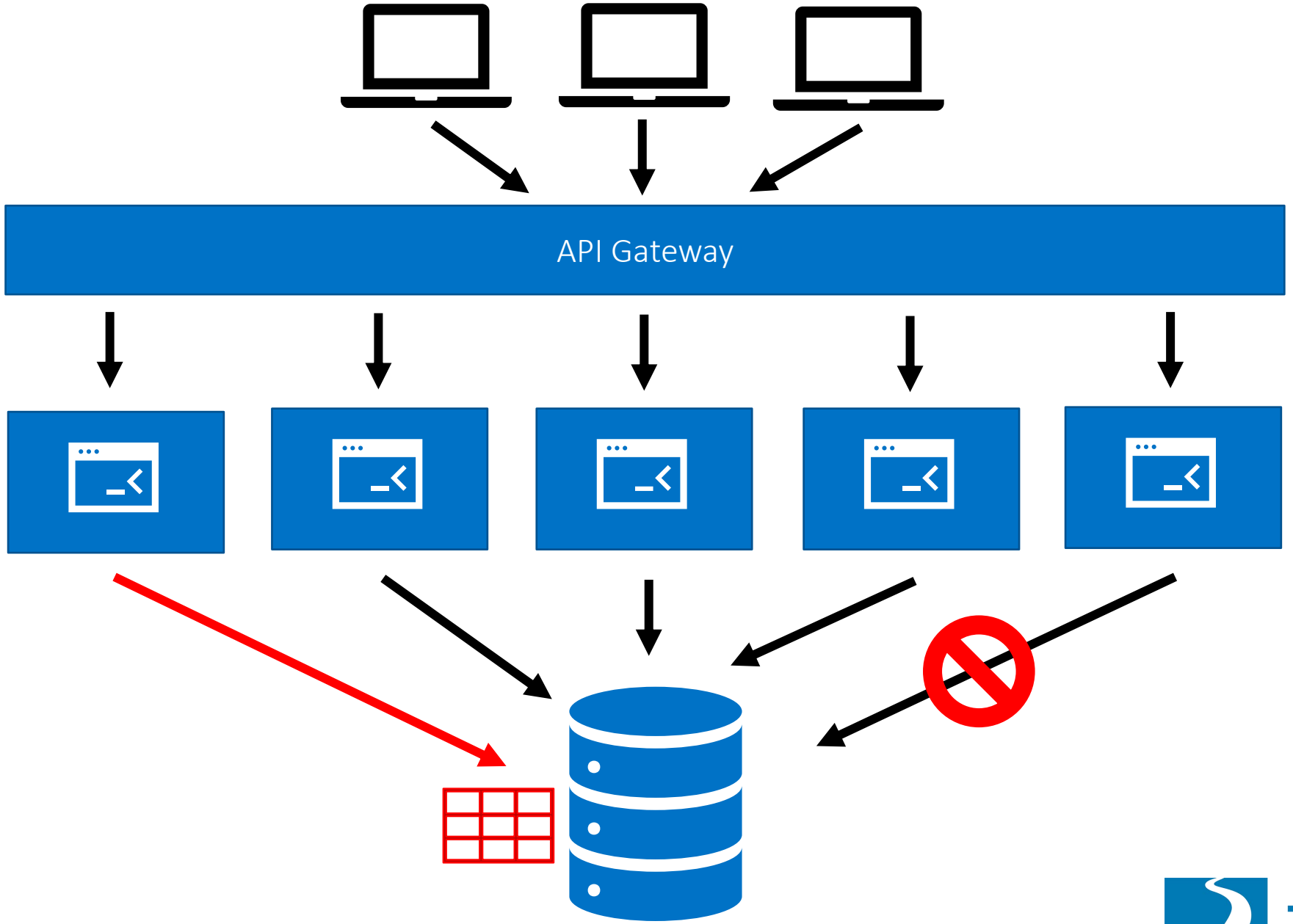

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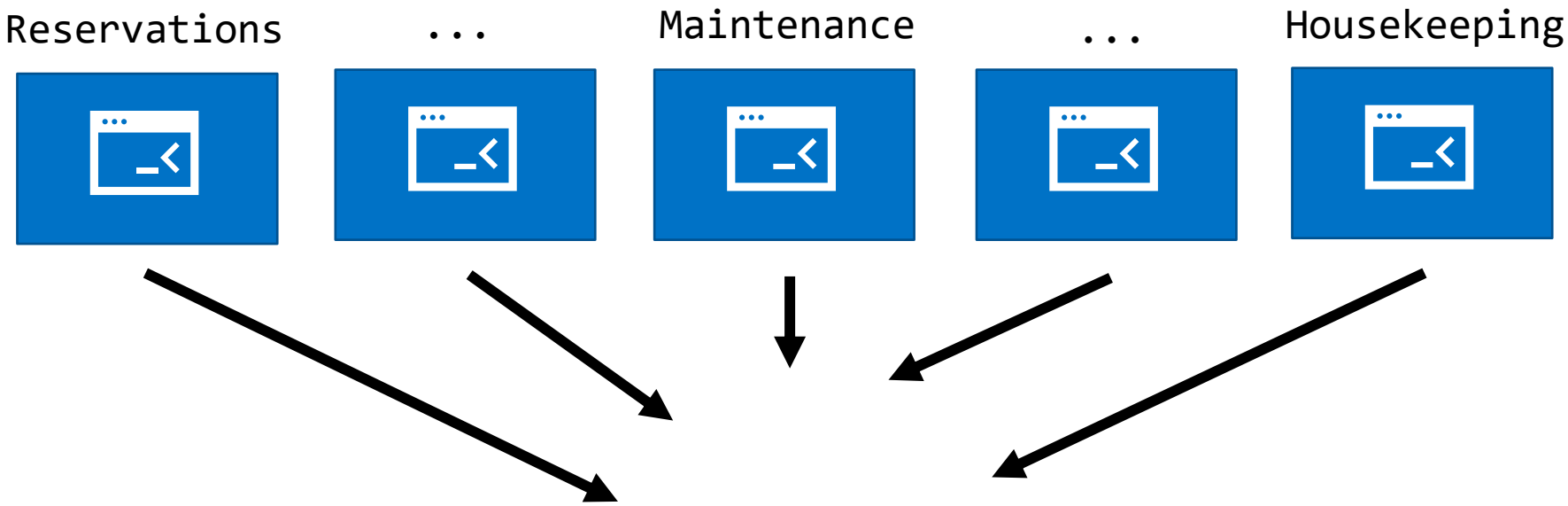


```
HotelRoom {
  CurrentlyOccupied : bool
  NumberofBeds : int
  MinutesToClean : float
  RepairHistory: [
    { RepairDate: ... },
    { RepairDate: ... },
  ]
}
```

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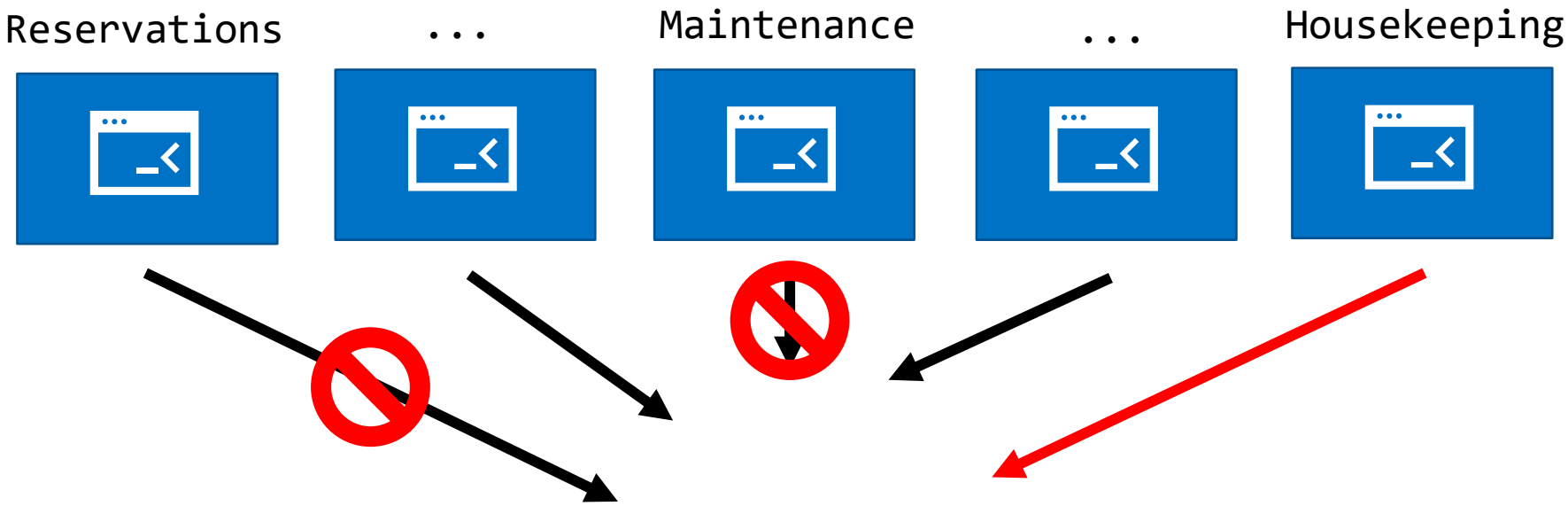


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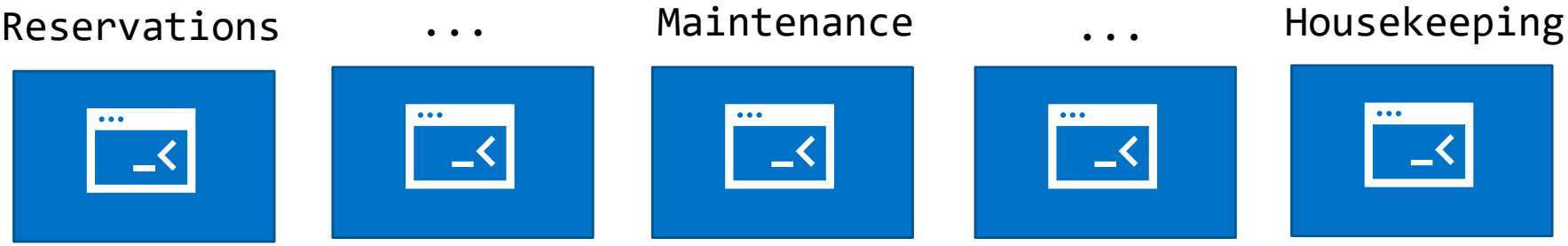


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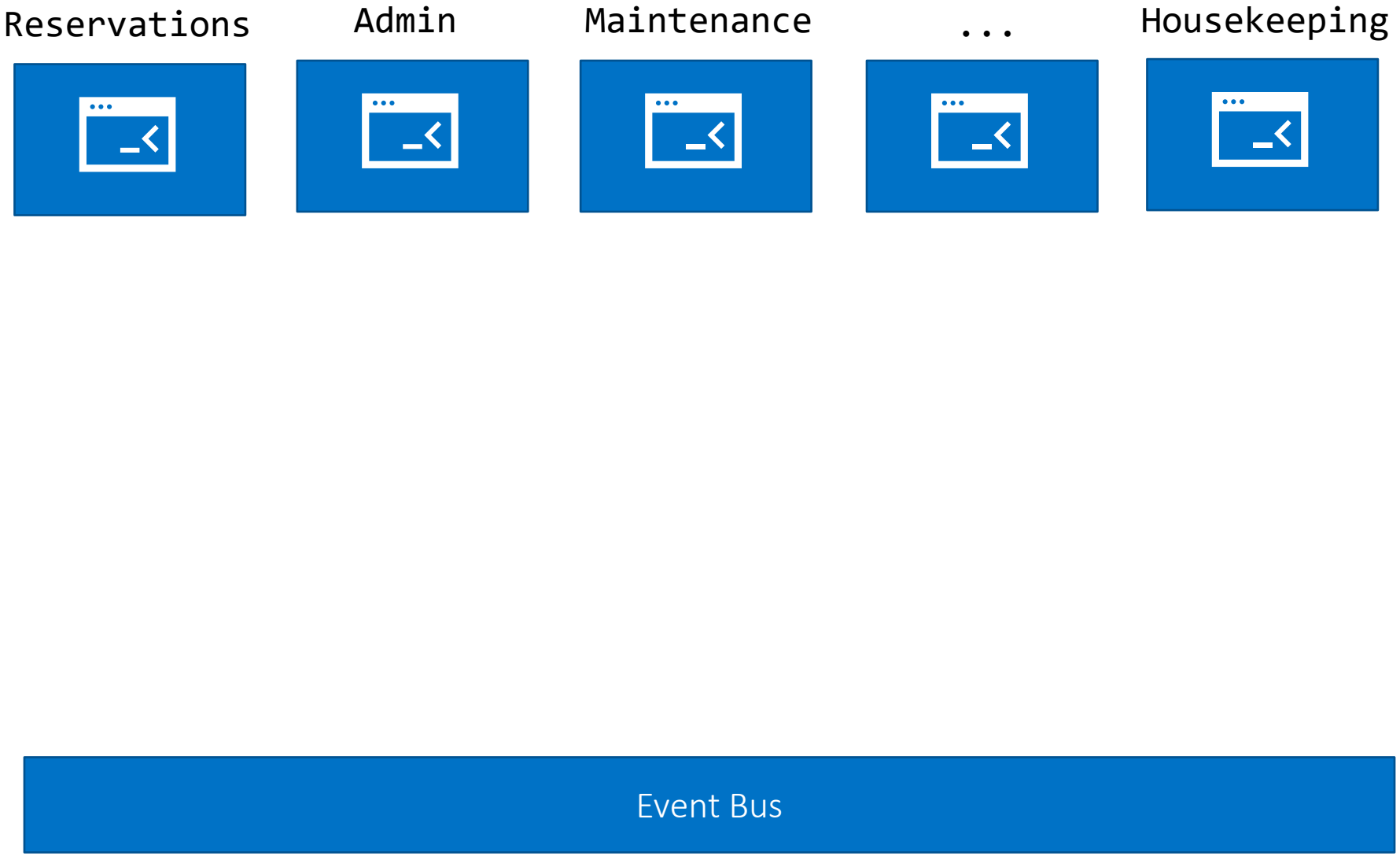

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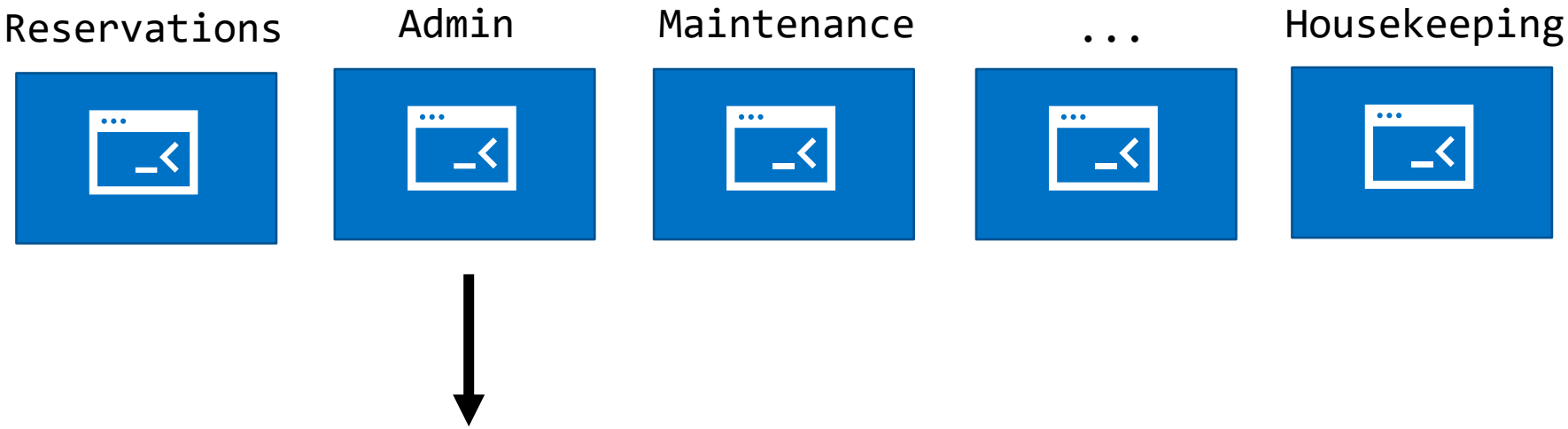


```
HotelRoom {
  RoomNumber: int
}
```

Event Bus

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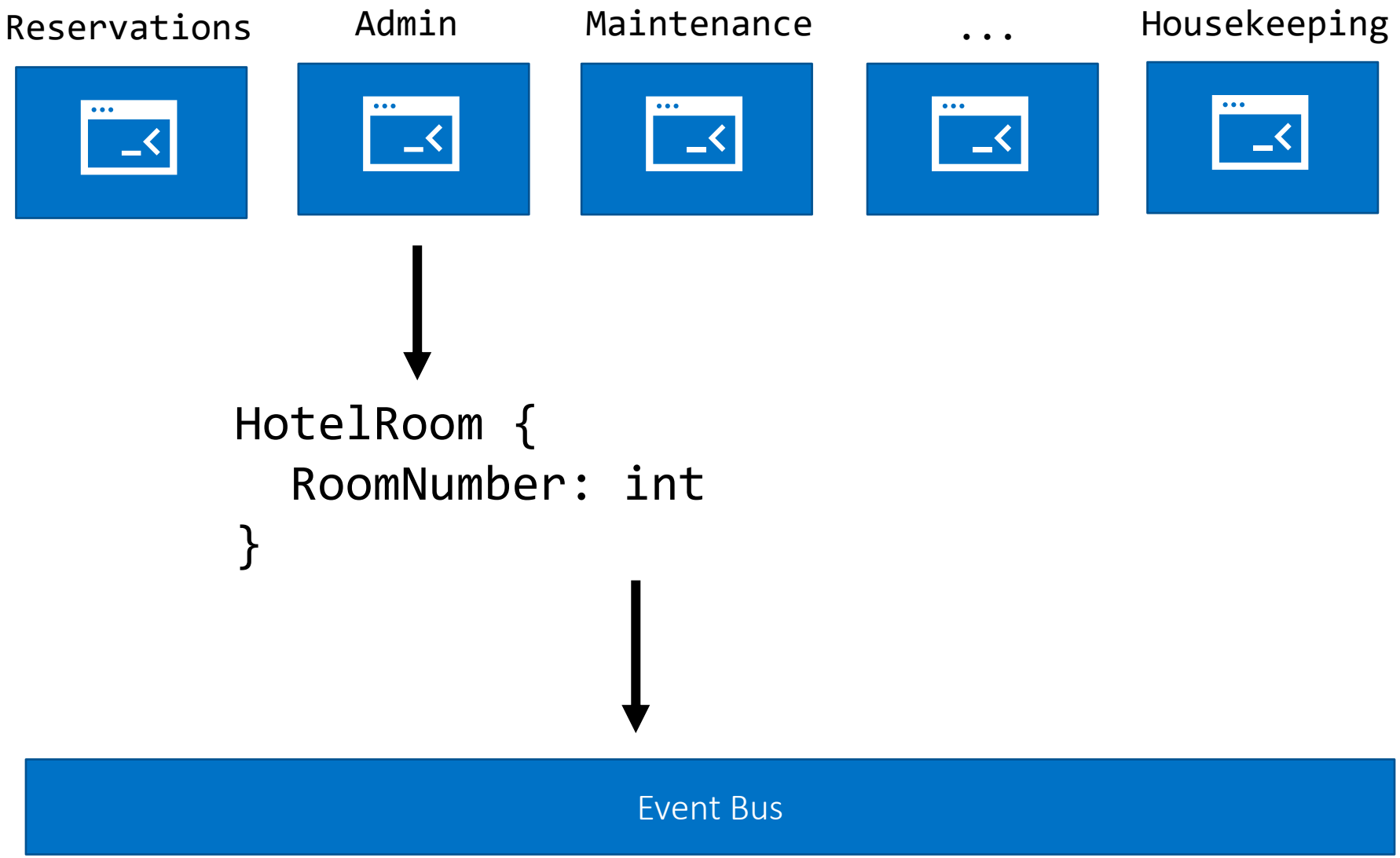

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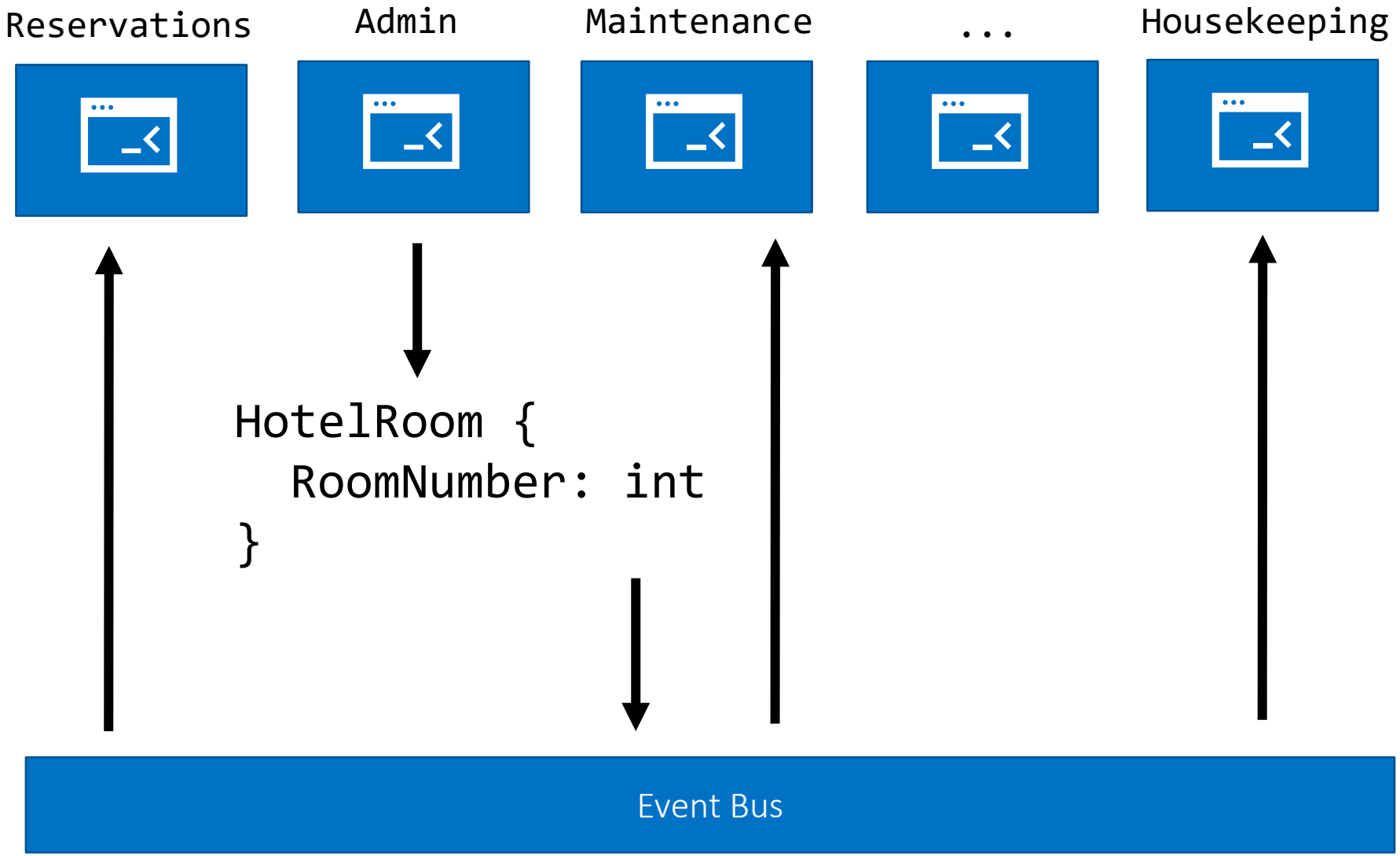

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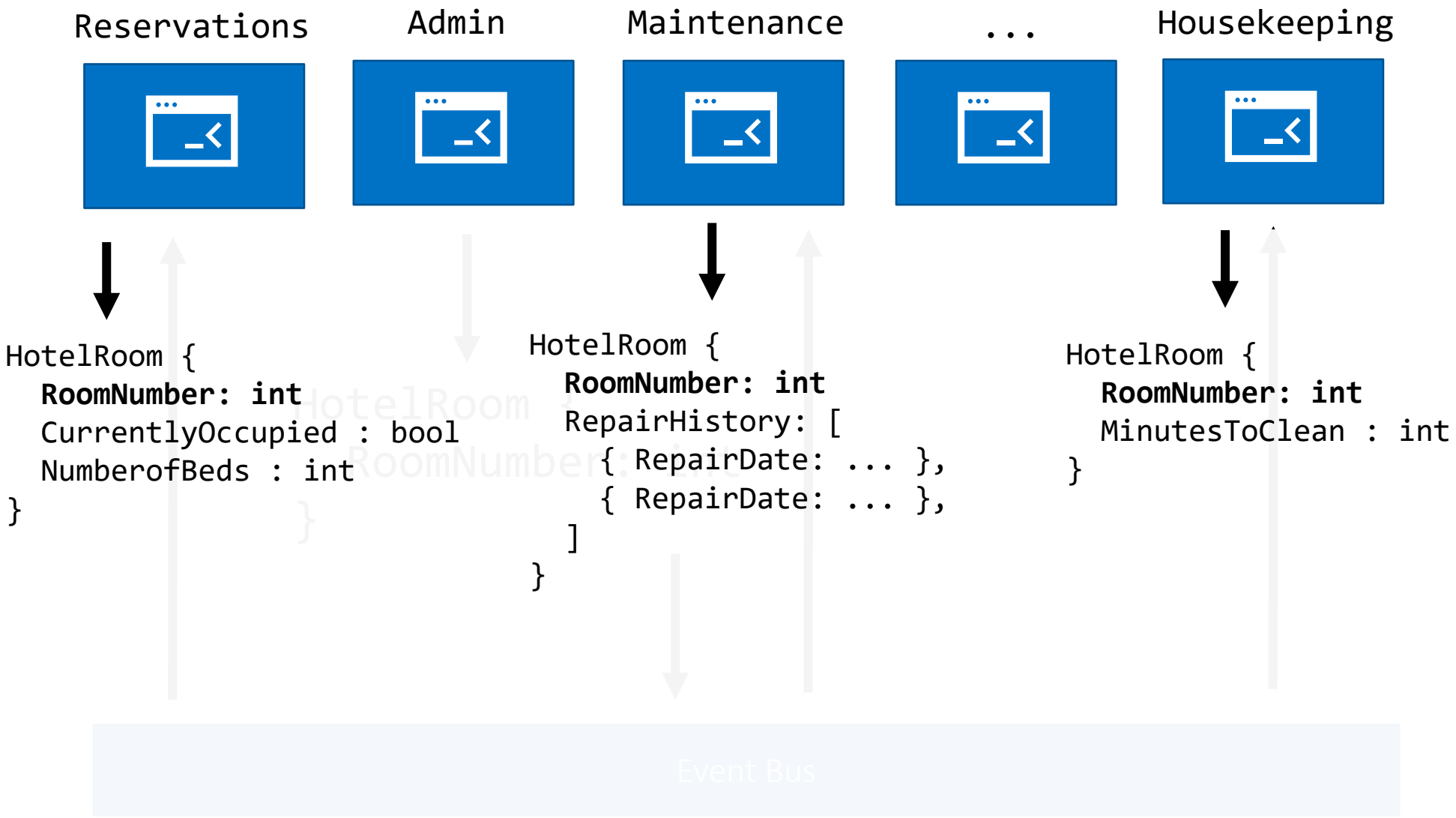

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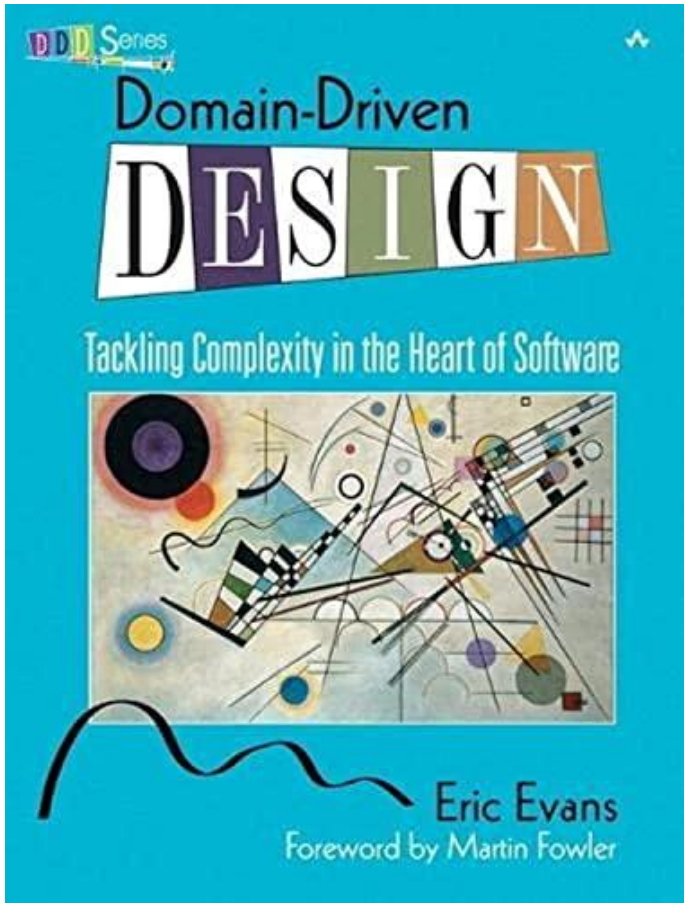
Microservices That Are Too Big

Problem #3

Domain Driven Design (DDD)

Domain
 Subdomain
  Bounded Context

Domain Driven Design



Domain
  Subdomain
    Bounded Context

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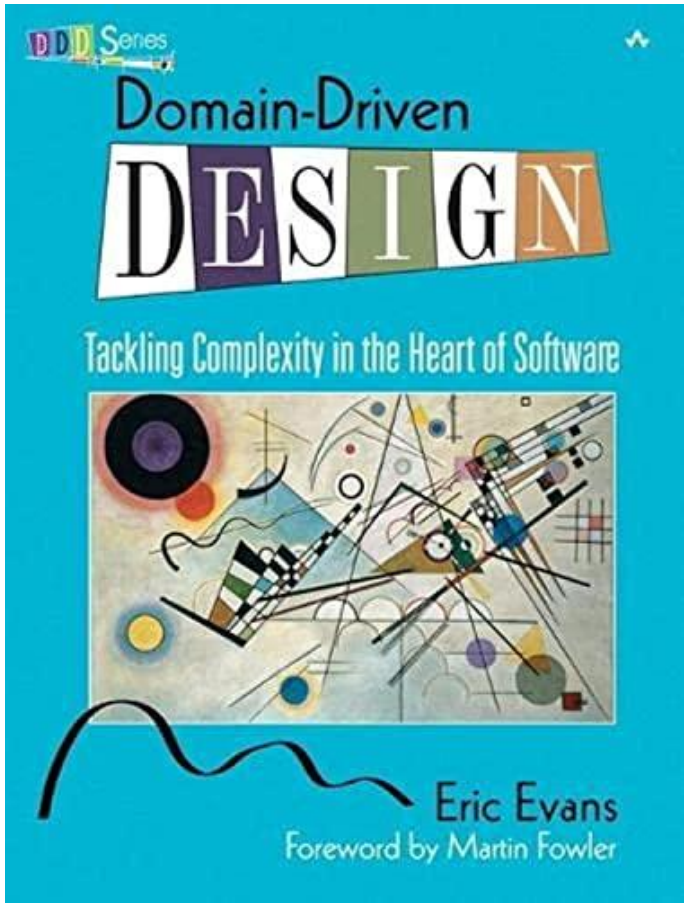
Domain Driven Design



Domain
  Subdomain
    Bounded Context

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

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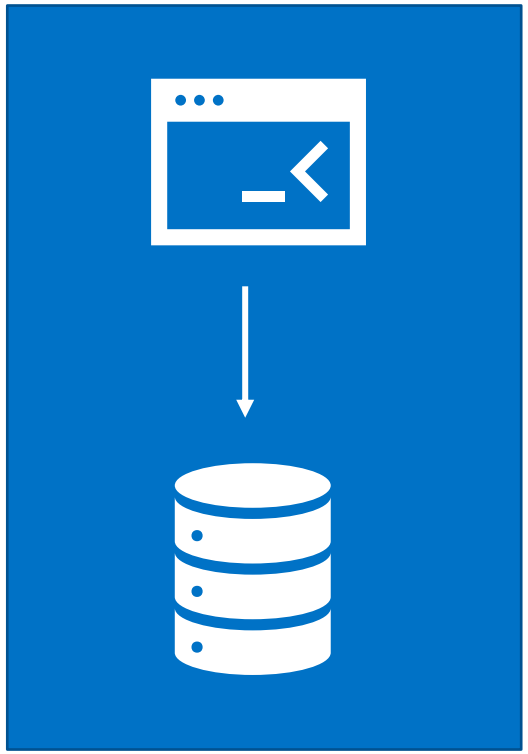
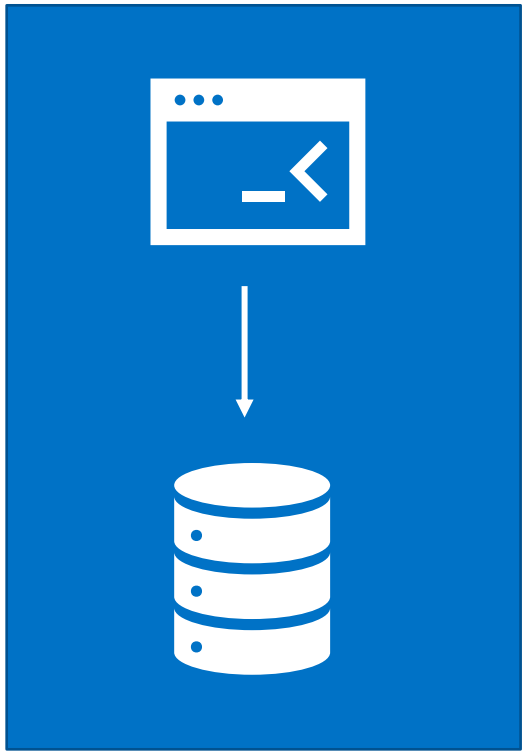
Microservices That Are Too Small

Problem #4

User Log In



Password Reset



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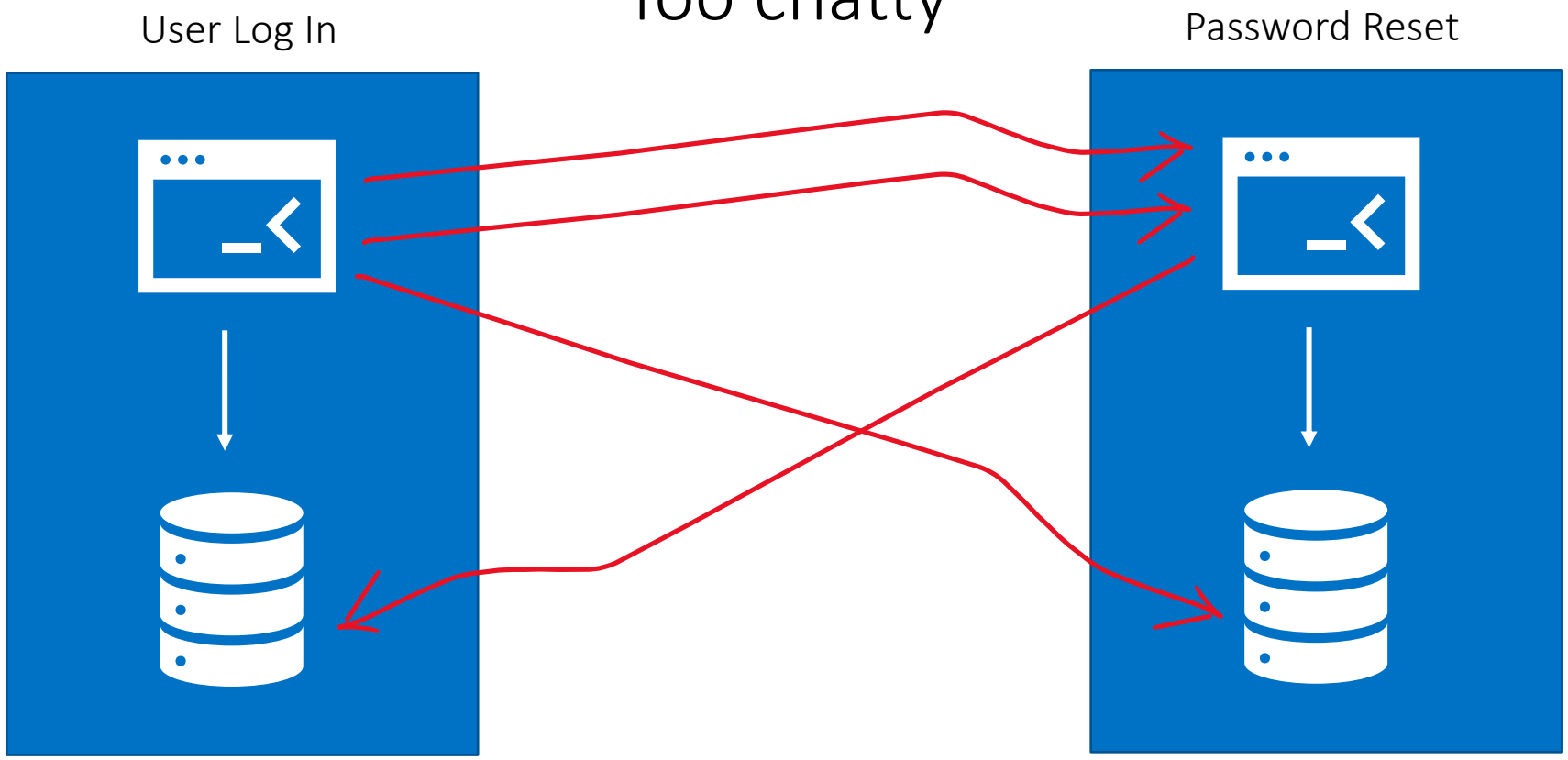
Too chatty



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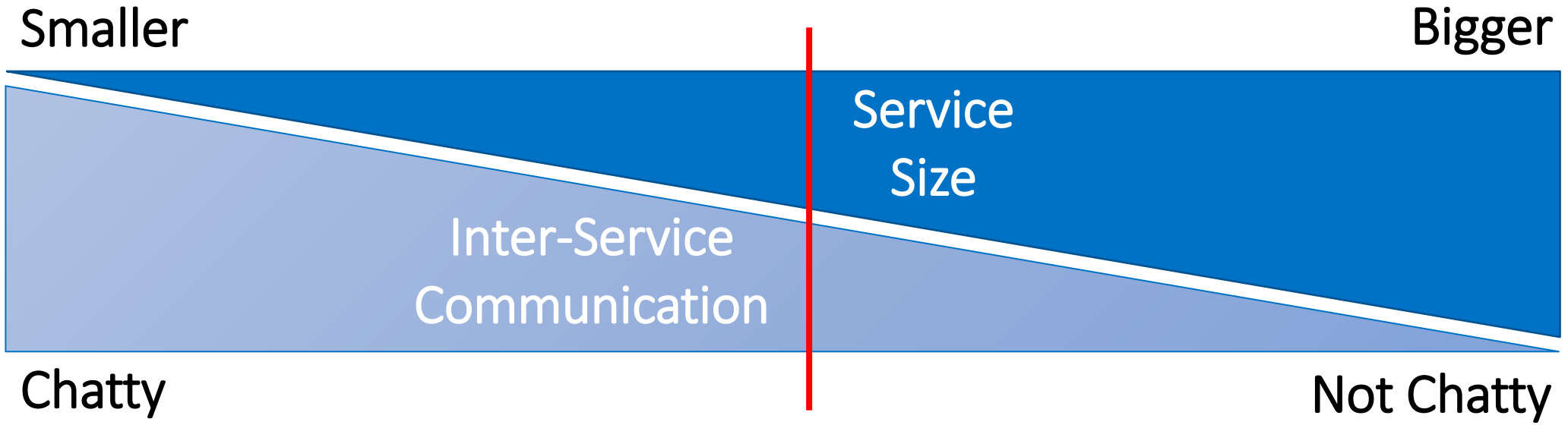
Balance



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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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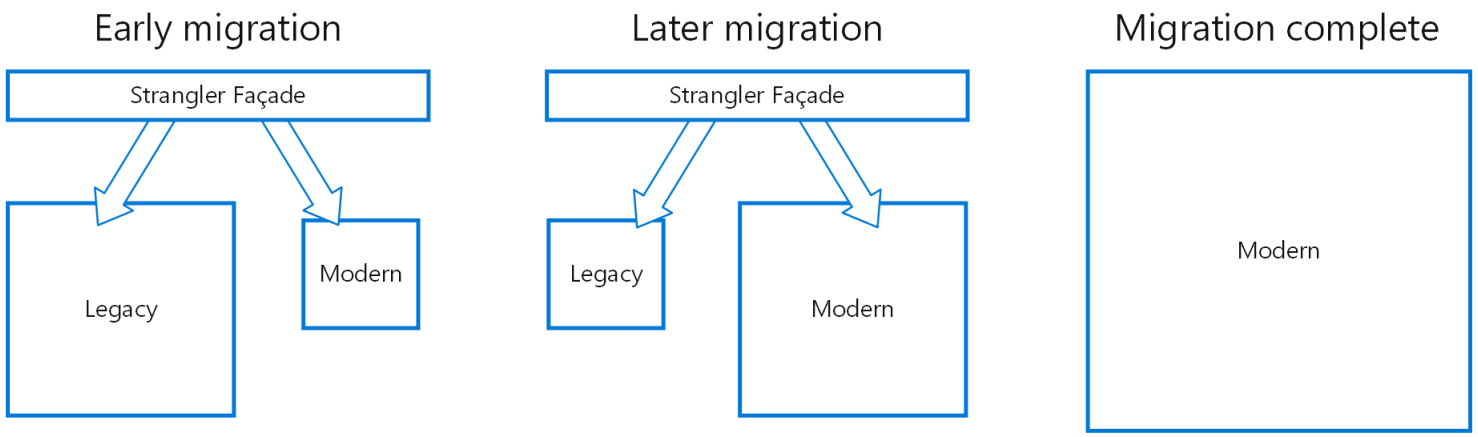
Strangler Fig Pattern



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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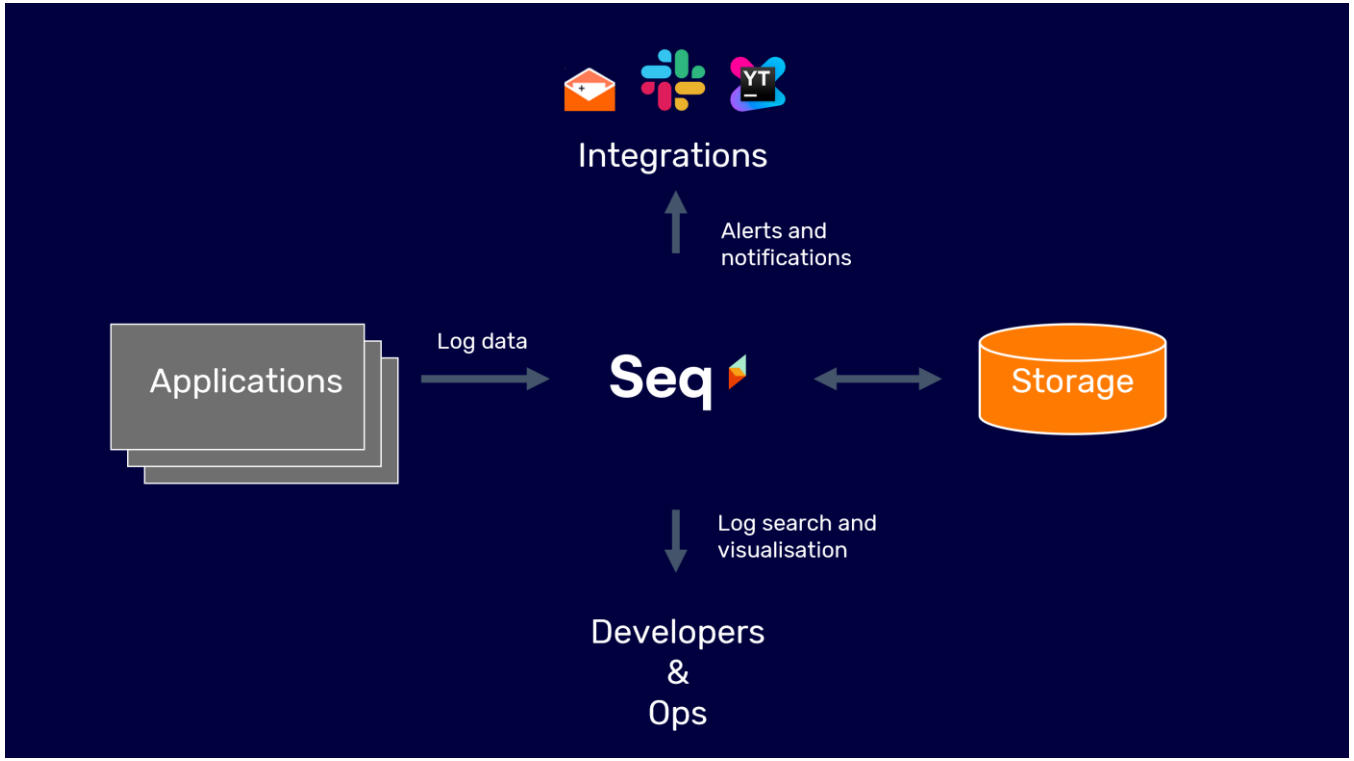
Example: Distributed Logging Is Hard

- 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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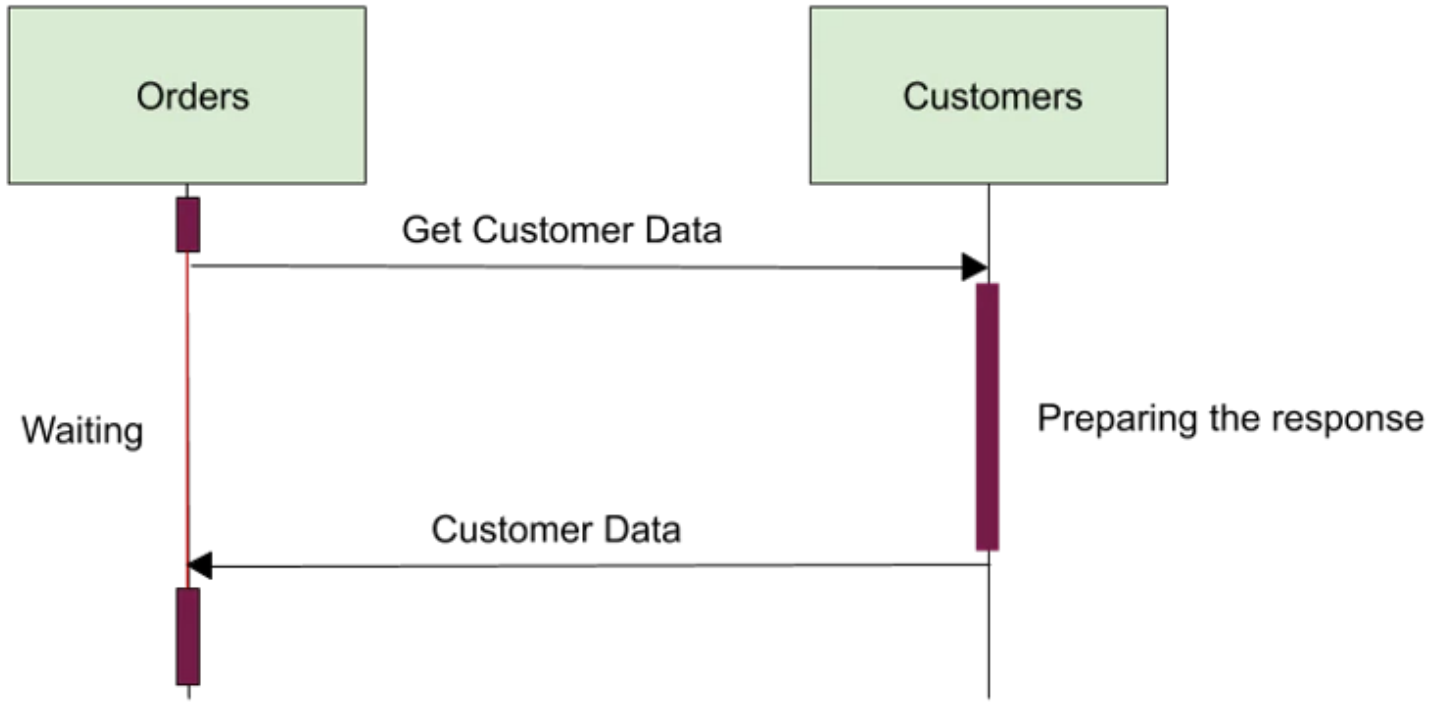

Source: https://www.capitalone.com/tech/software-engineering/how-to-avoid-loose-coupled-microservices/

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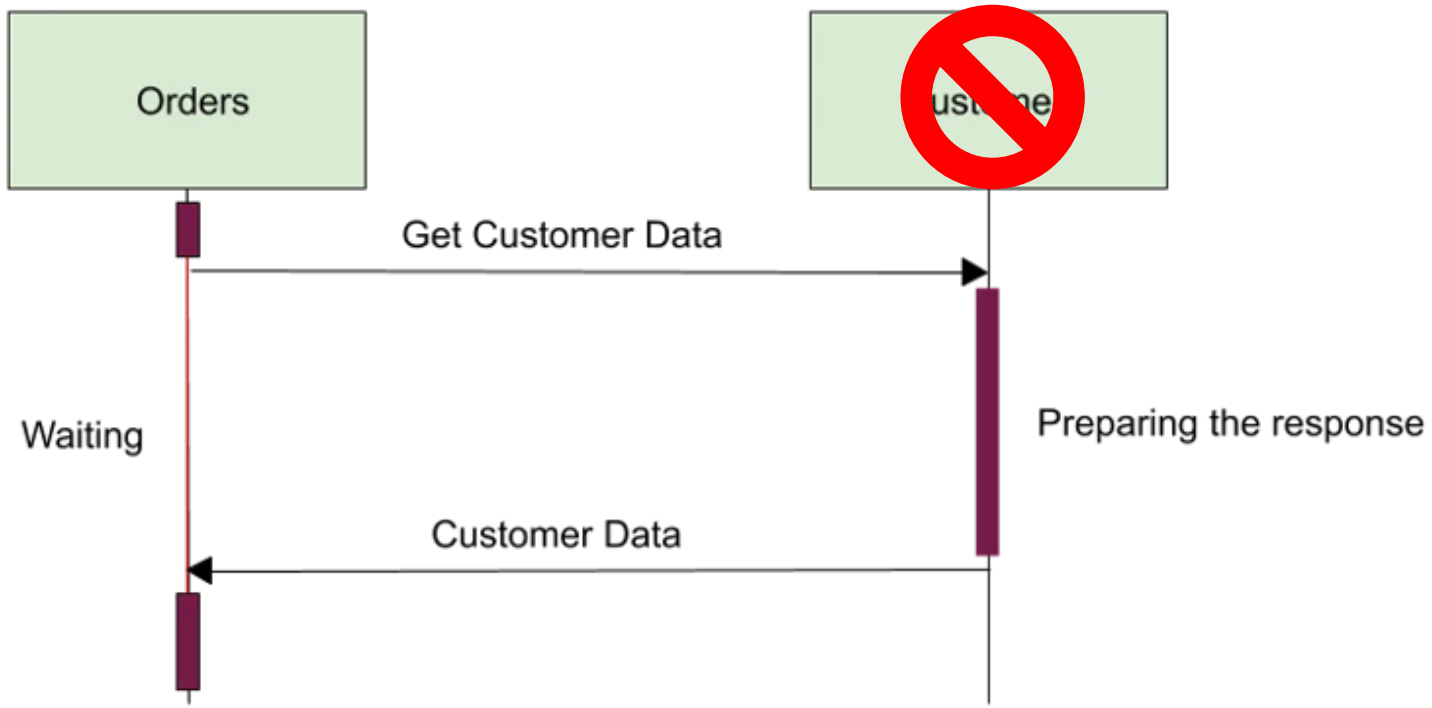

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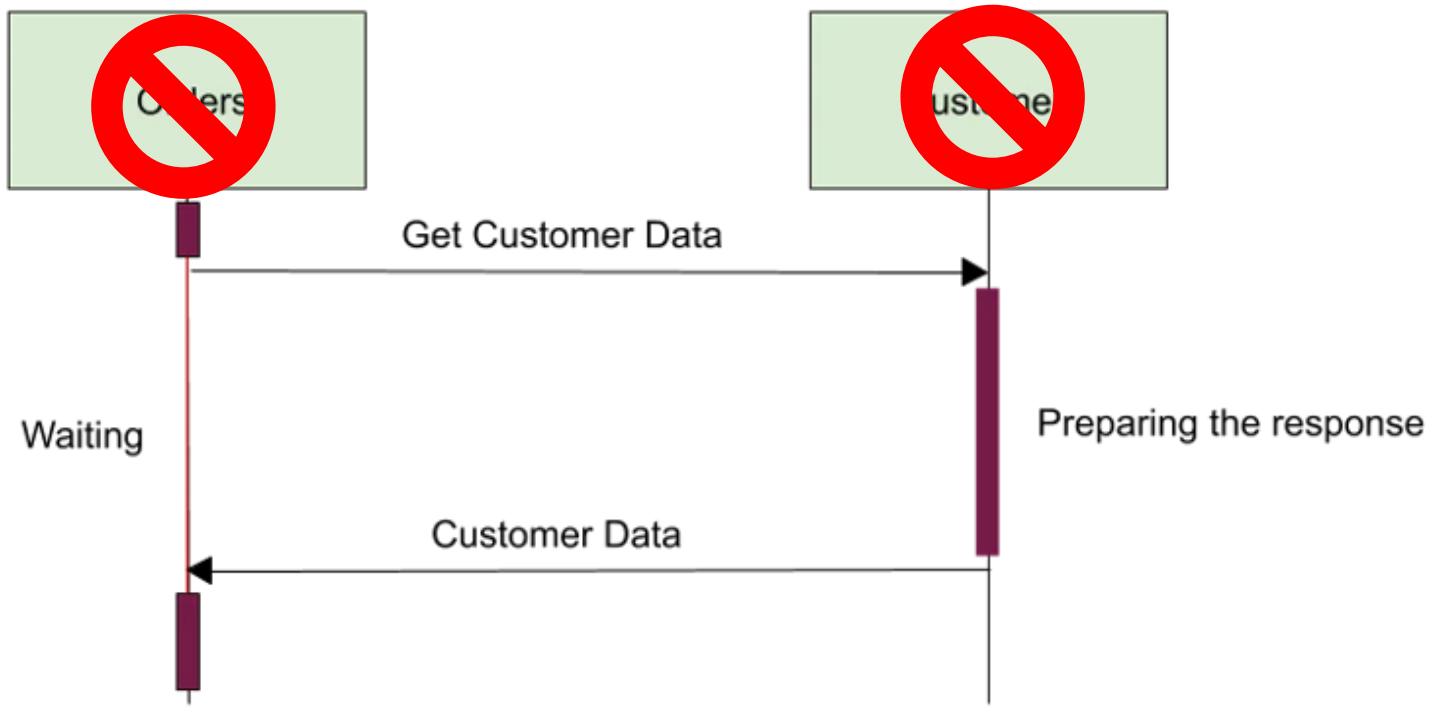

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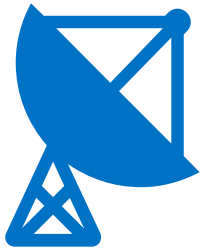
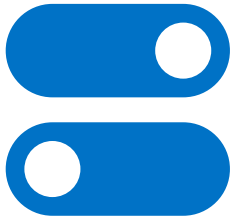
Alternatives to Synchronous Communications

Asynchronous Service Bus



Asynchronous Polling



Circuit breaker pattern

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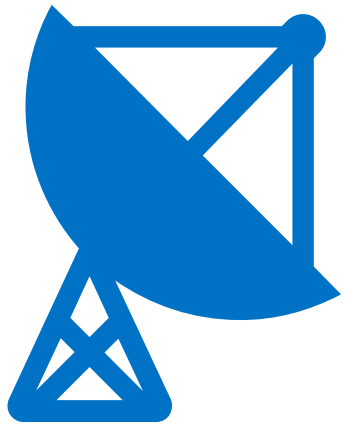
Alternatives to Synchronous Communications

Asynchronous Service Bus



Asynchronous Polling

Circuit breaker pattern

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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Mismatched Teams

Problem #10

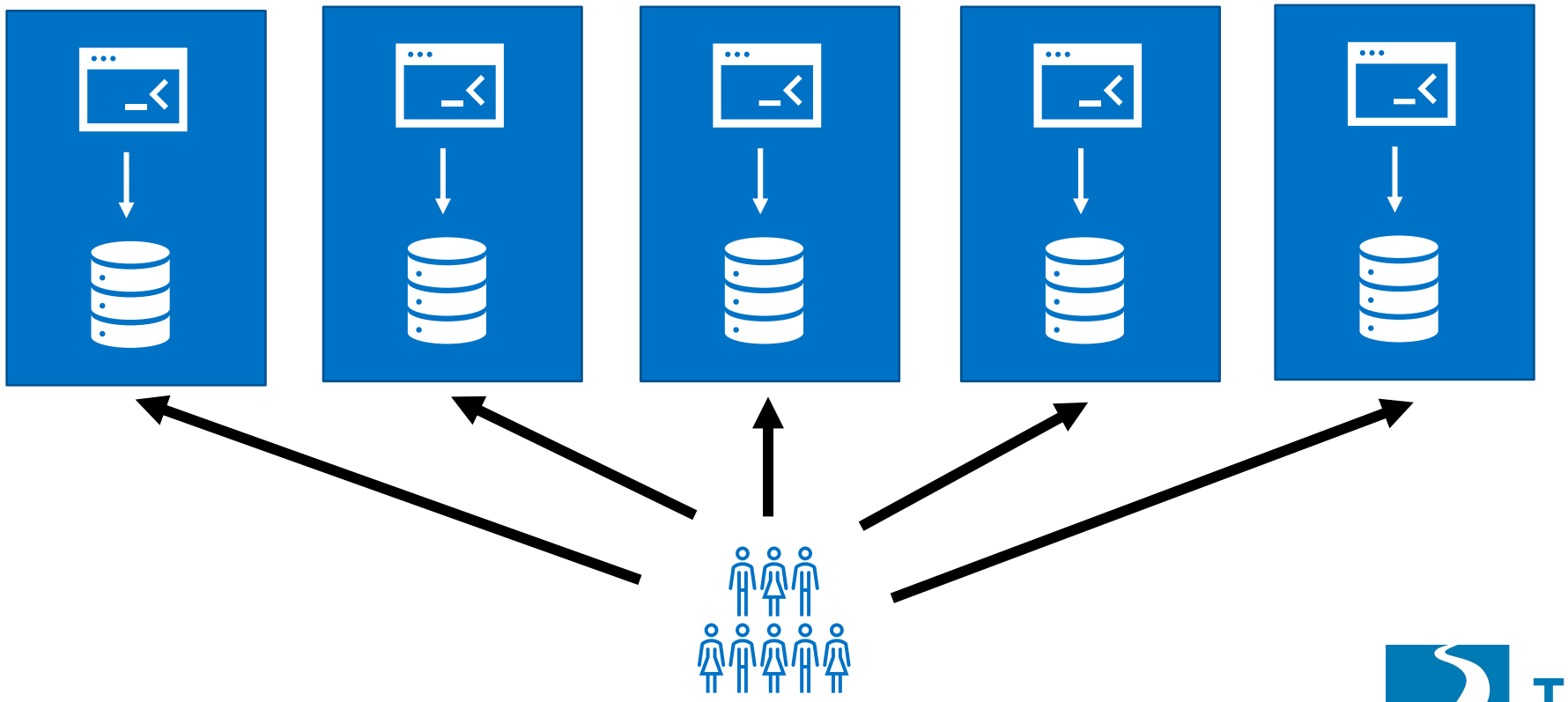
Conway's Law

"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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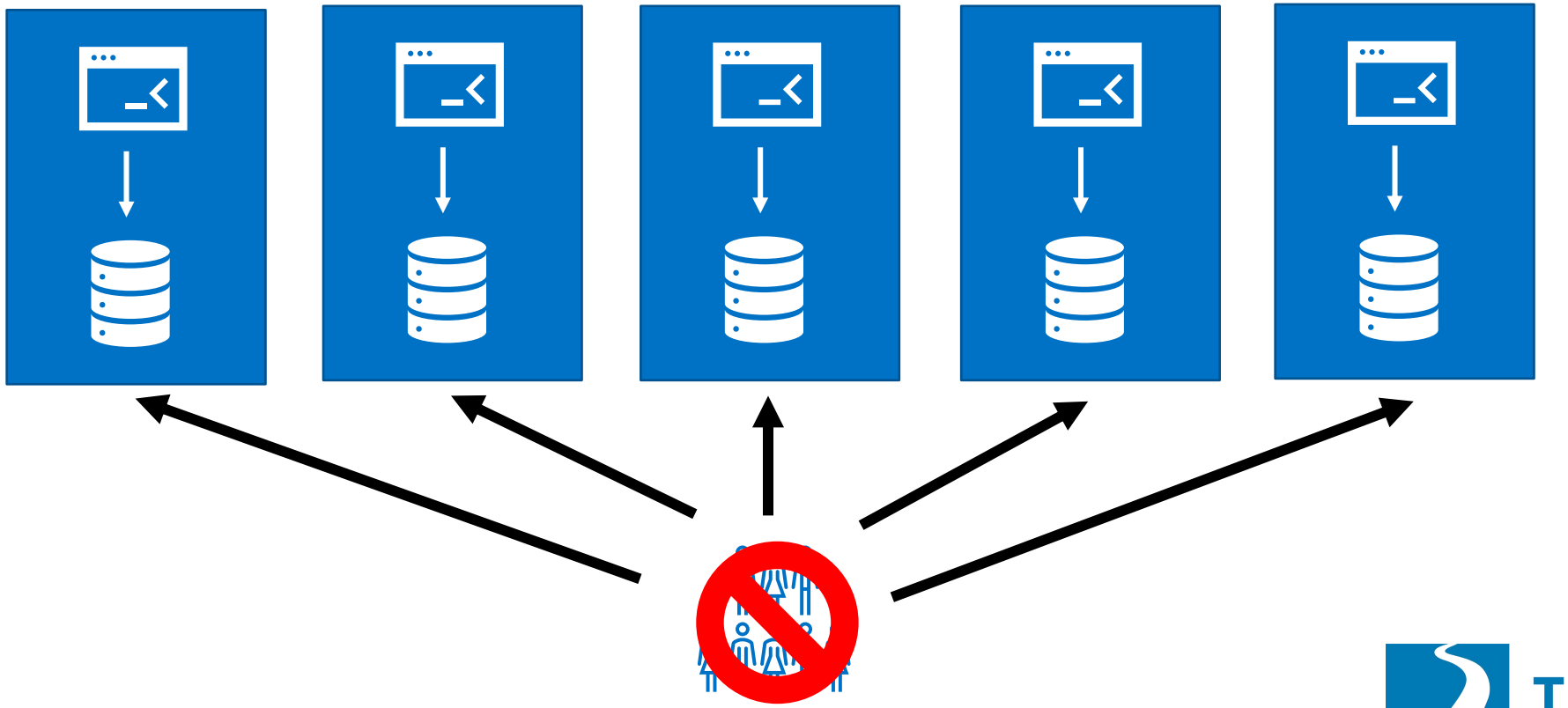
Single Team



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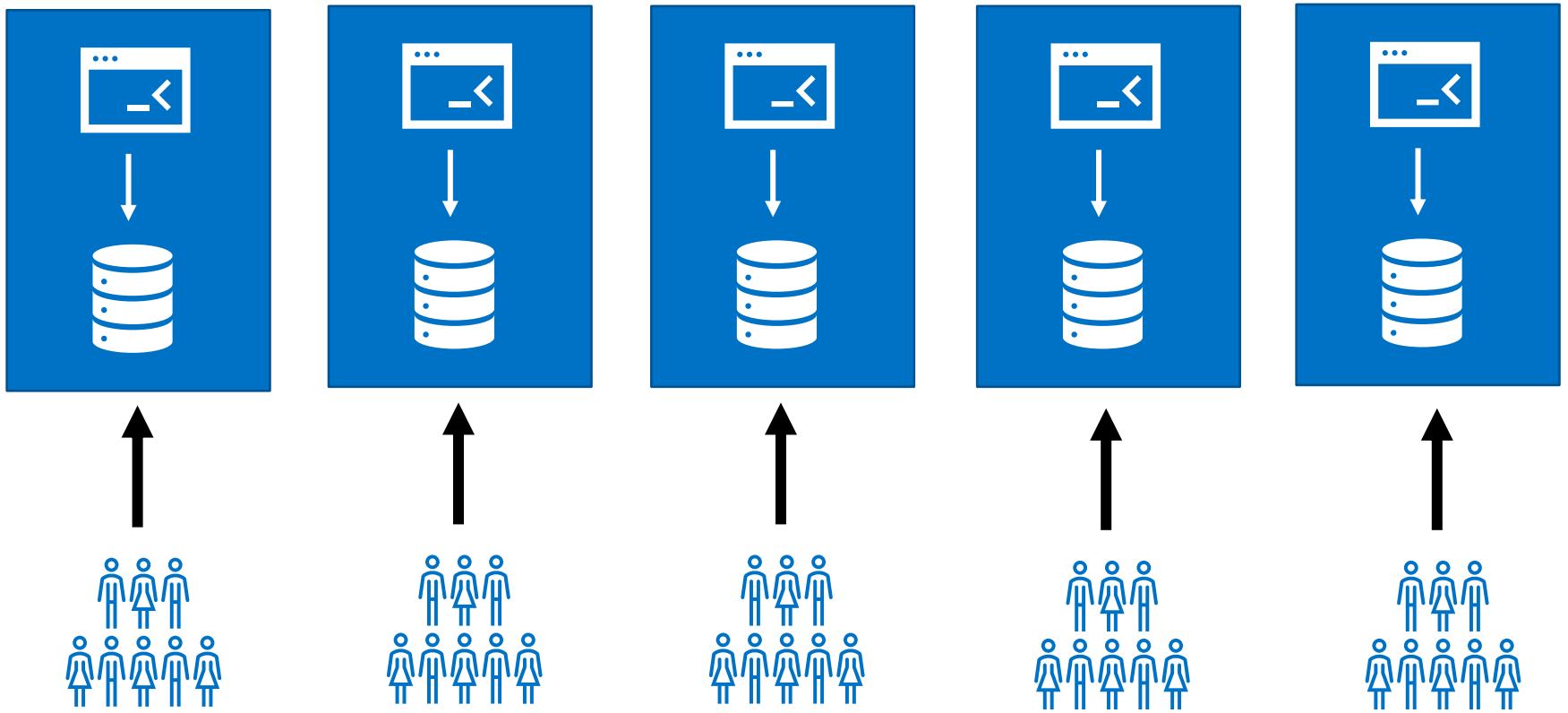
Team Per Service



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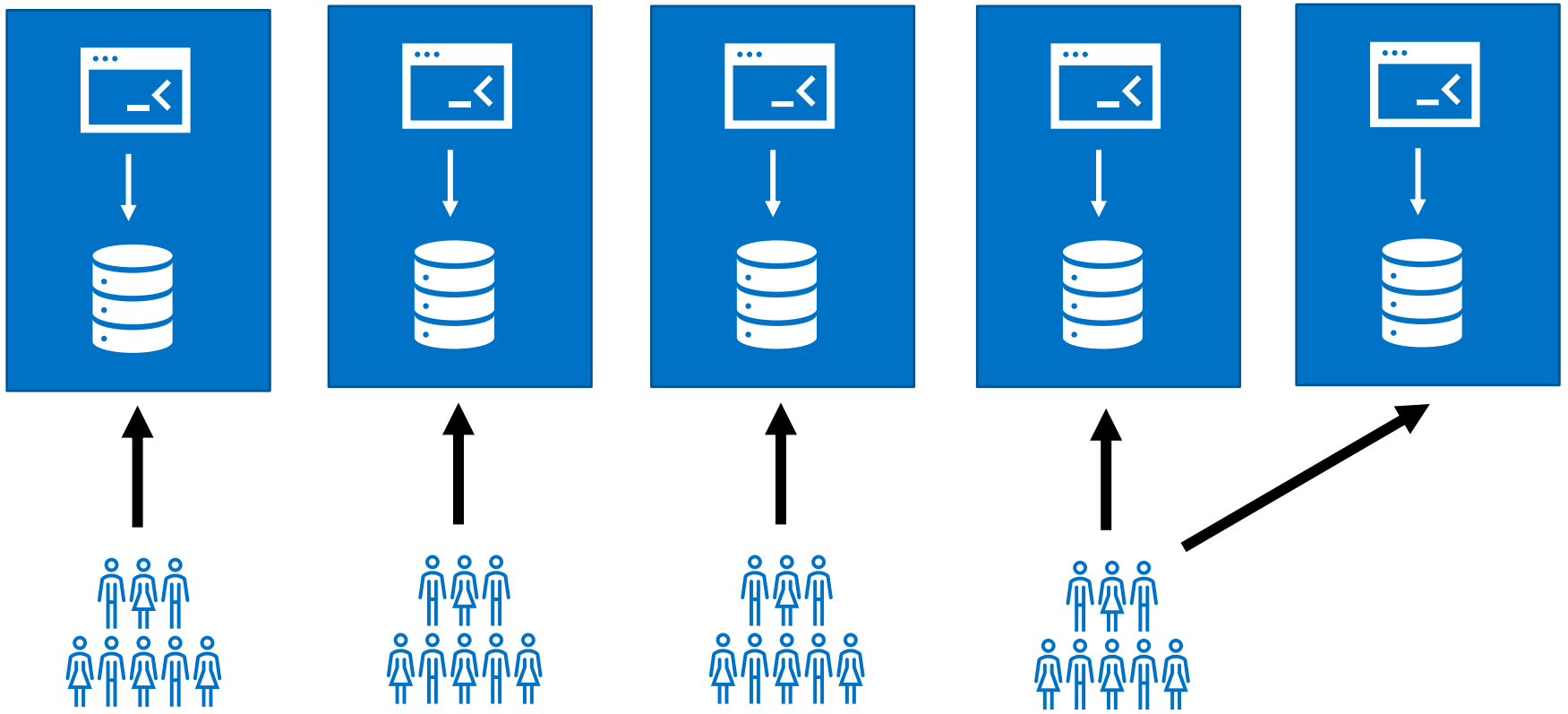
Team Per Service



Summing Up

1. Monoliths can be good too!
2. Only use microservices with “a really good reason”.
3. Consider starting with a monolith.
4. Monolith with a single team; microservices for separate teams.
5. When implementing microservices, avoid the 10 commons pitfalls leading to distributed monoliths.

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Thanks! Questions?

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