# Scaling Applications with Microservices and NServiceBus

## DISTRIBUTED APPLICATIONS, MICROSERVICES AND THE SERVICE BUS

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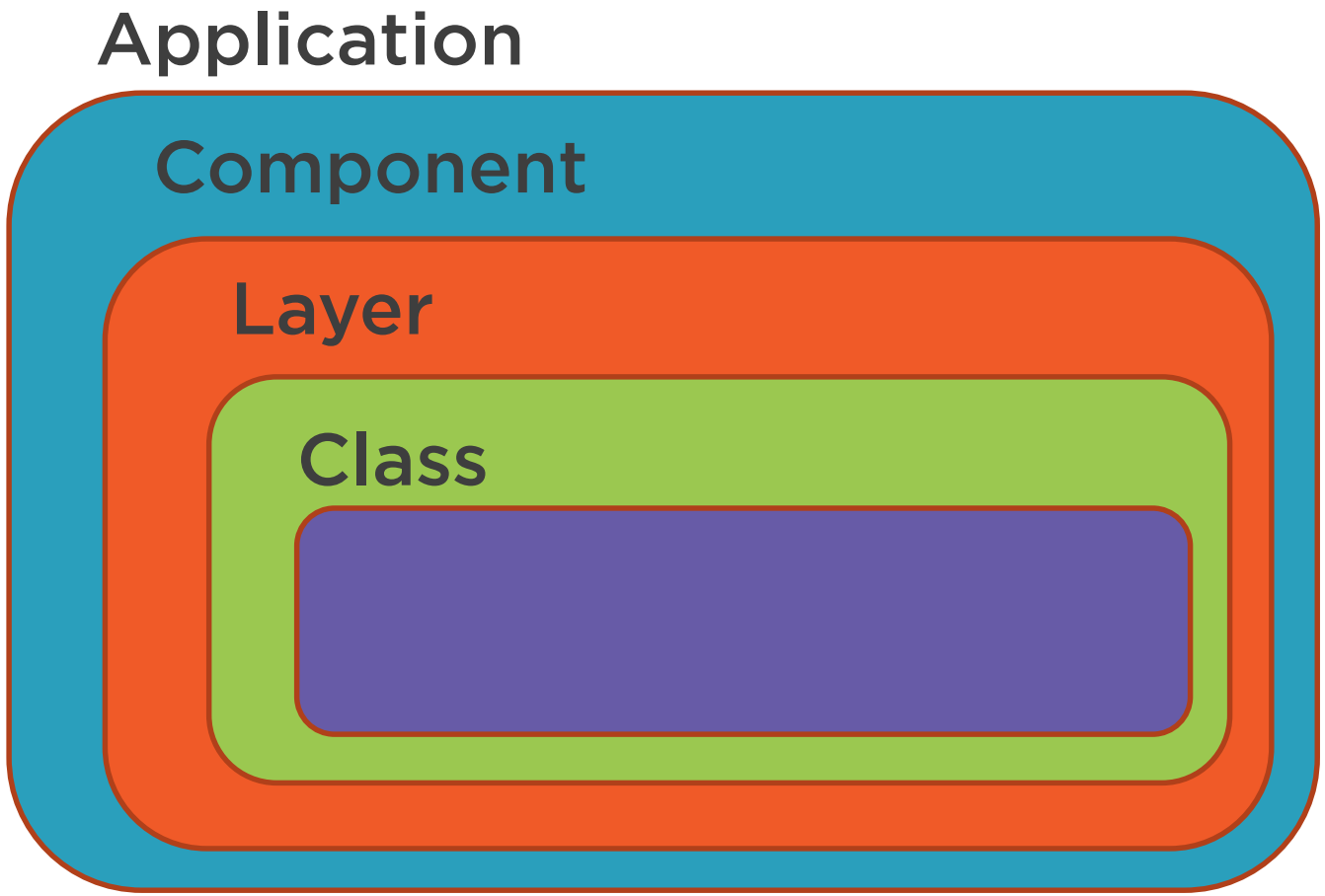
# Overview

- Monolith
- Distributed applications
- Microservices
- Servicebus

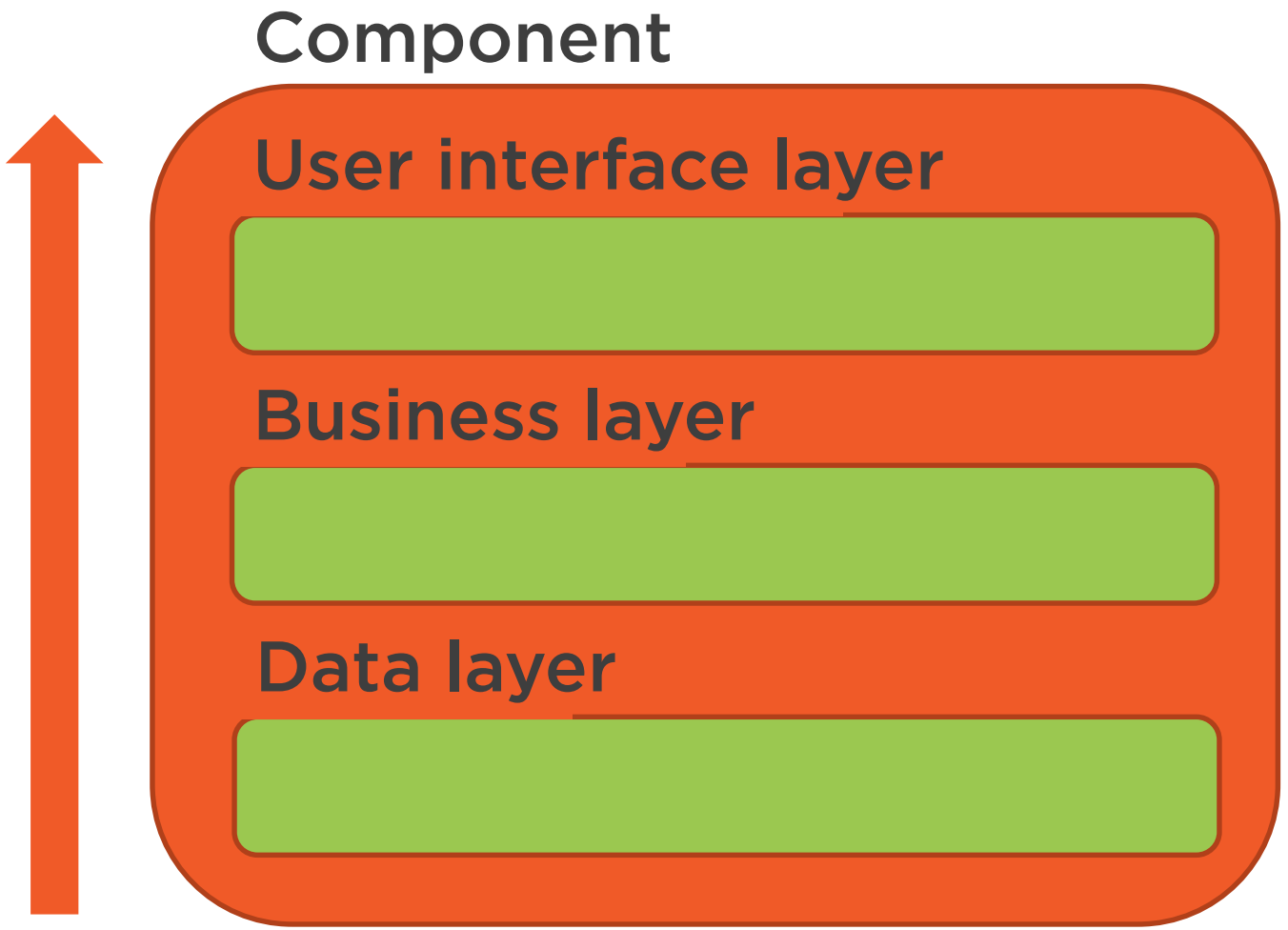
# Monolithic application

A single-tiered software application in which the user interface and data access code are combined into a single program from a single platform

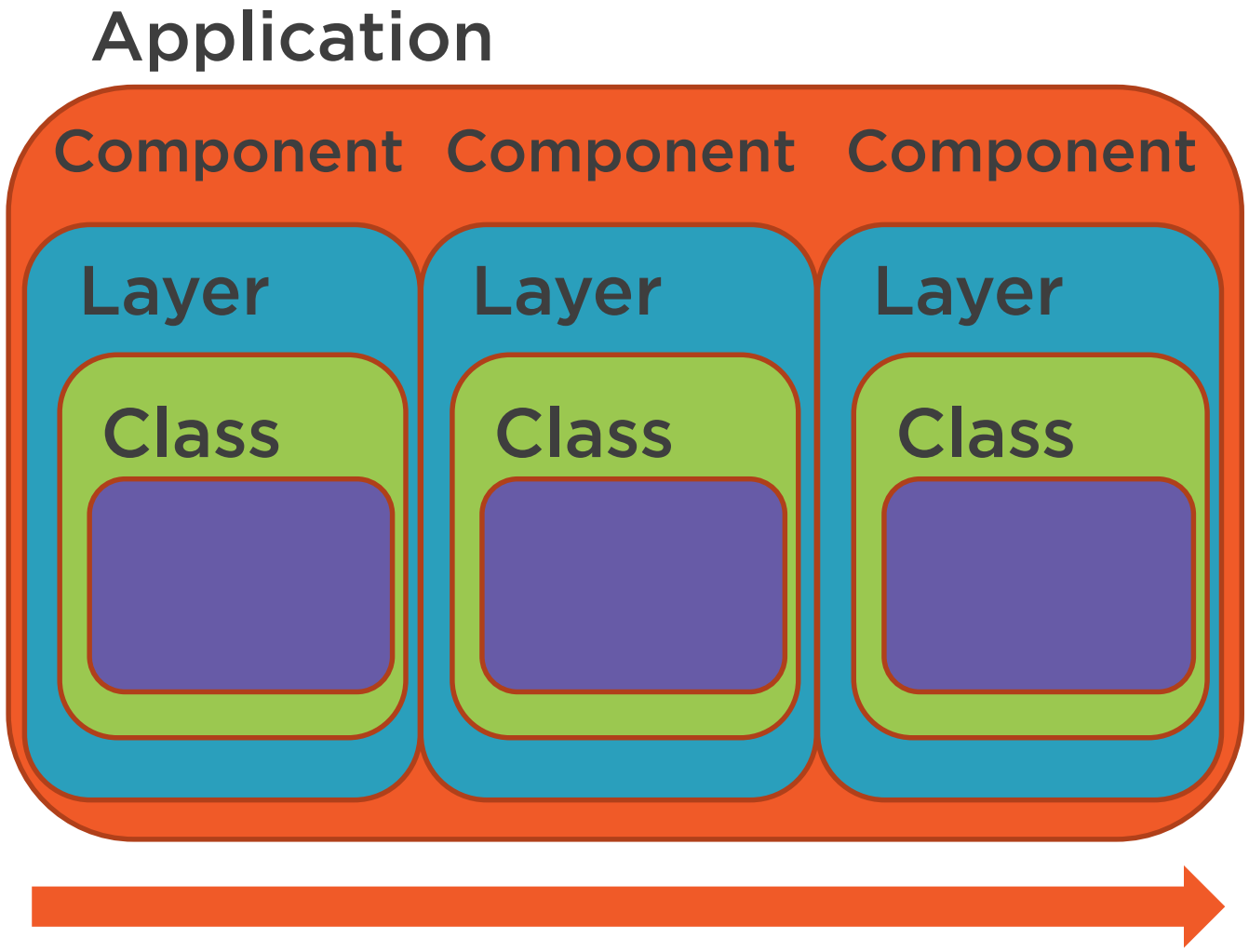
# General Architecture of an App



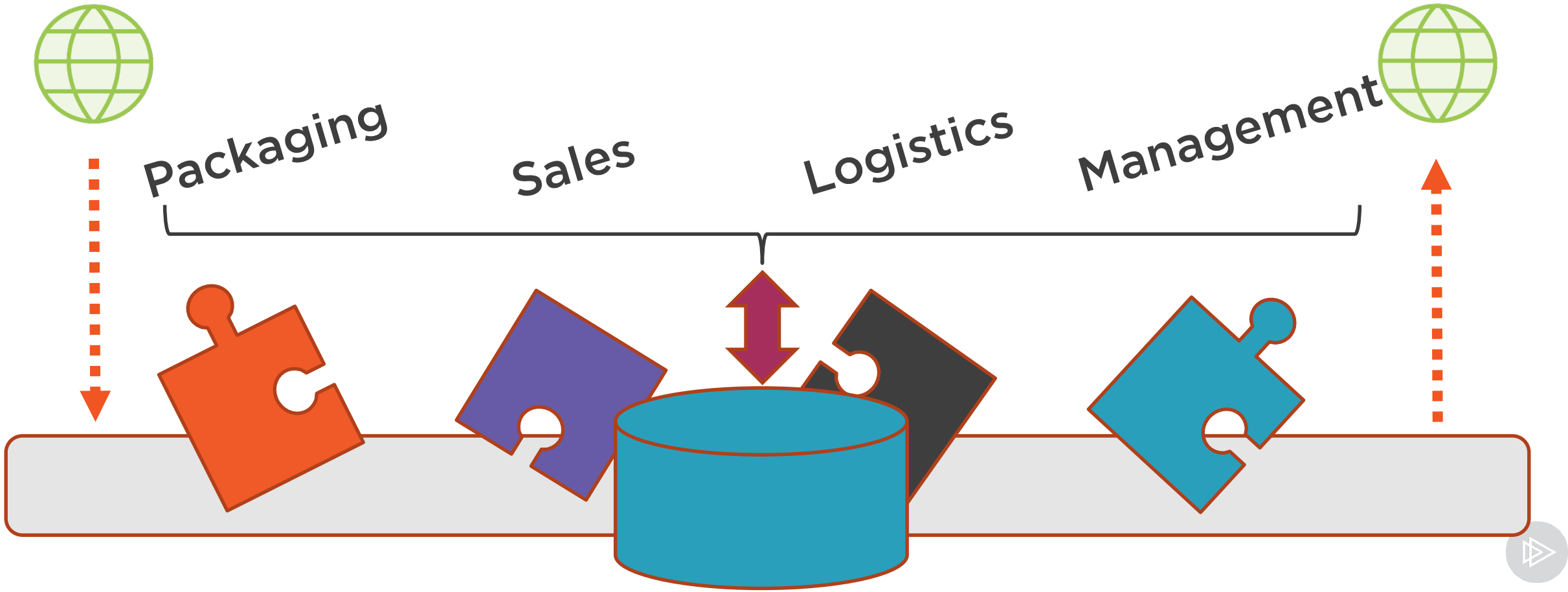
# Vertical Coupling



# Horizontal Coupling



# Request Handling



# Benefits of Monolithic Applications

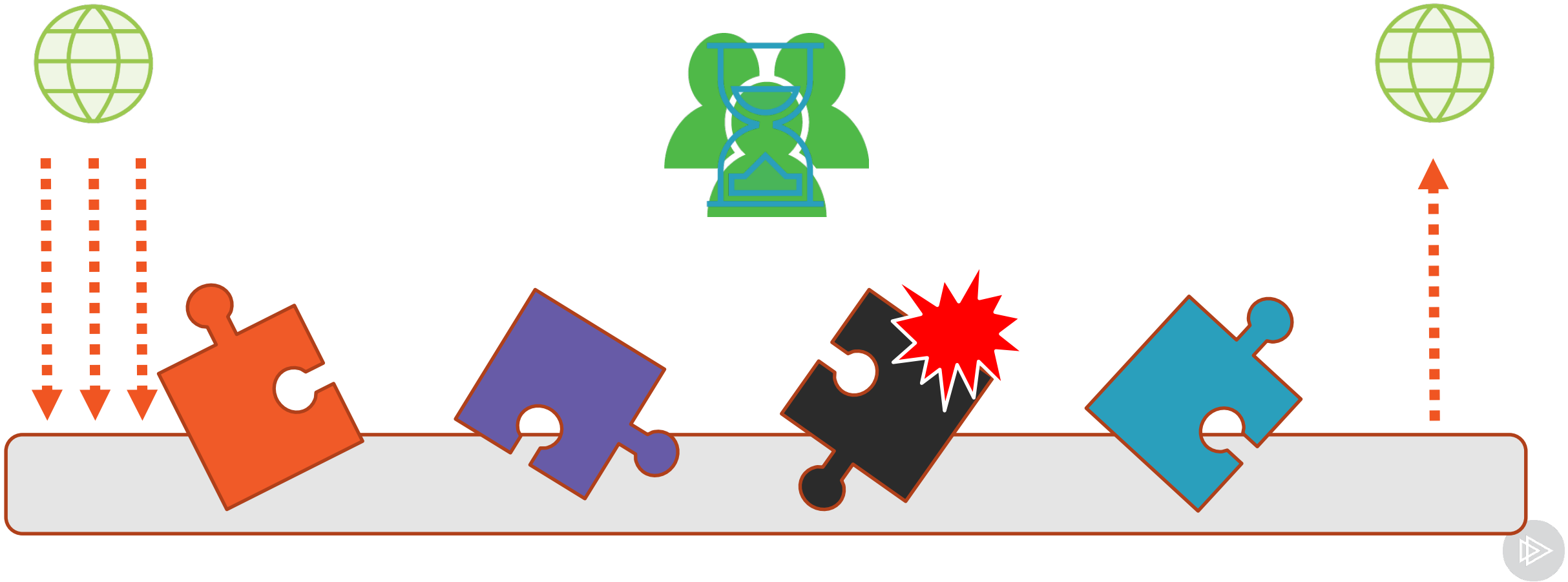
**Easy to deploy**

**Well known**

**No external dependencies**

**IDE friendly**

# Possible Problems



# Downsides of Monolithic Applications

If complex hard to maintain

Tends to get complex

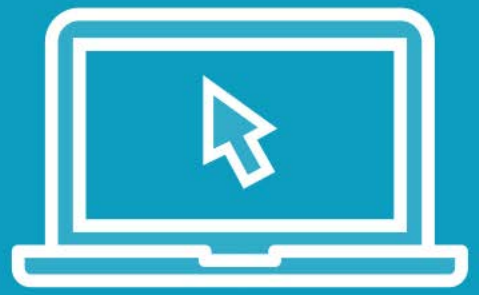
Release hardening

Performance

Reliability

One stack

# Demo



Fire On Wheels

Startup in the package delivery business

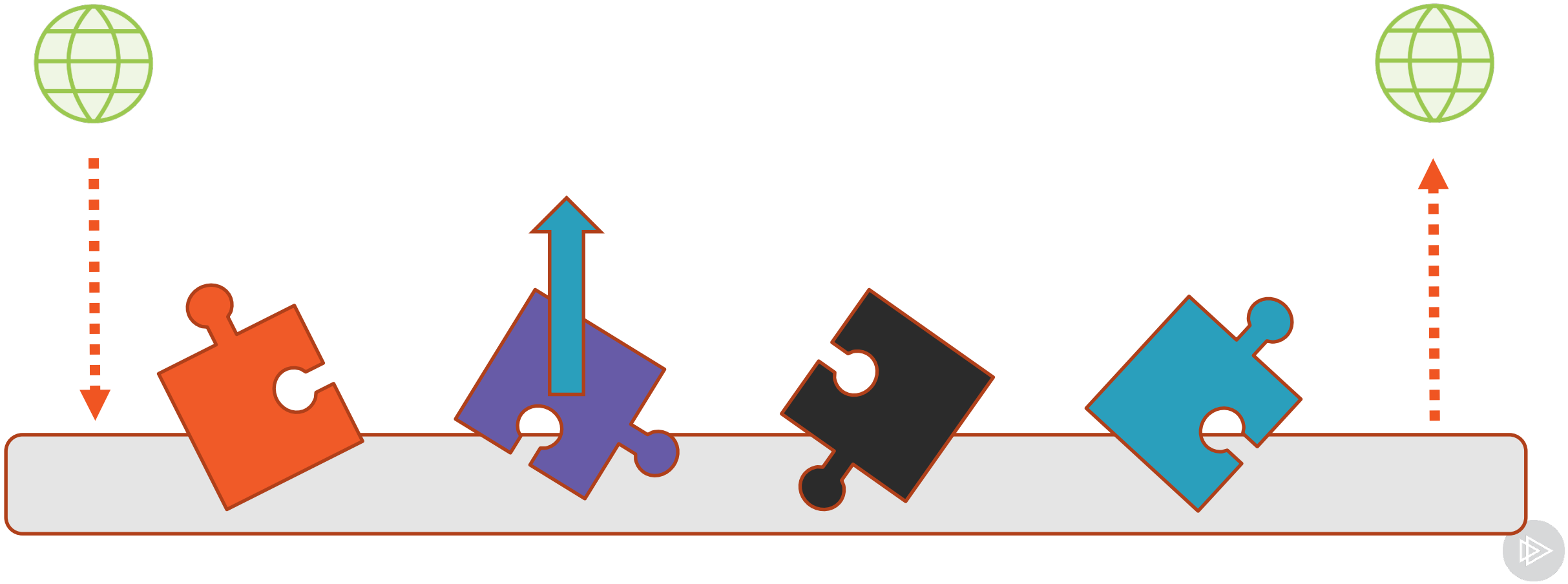
Customers can enter package delivery order in an ASP.NET MVC application

It sends an email to the person responsible for delivering the package

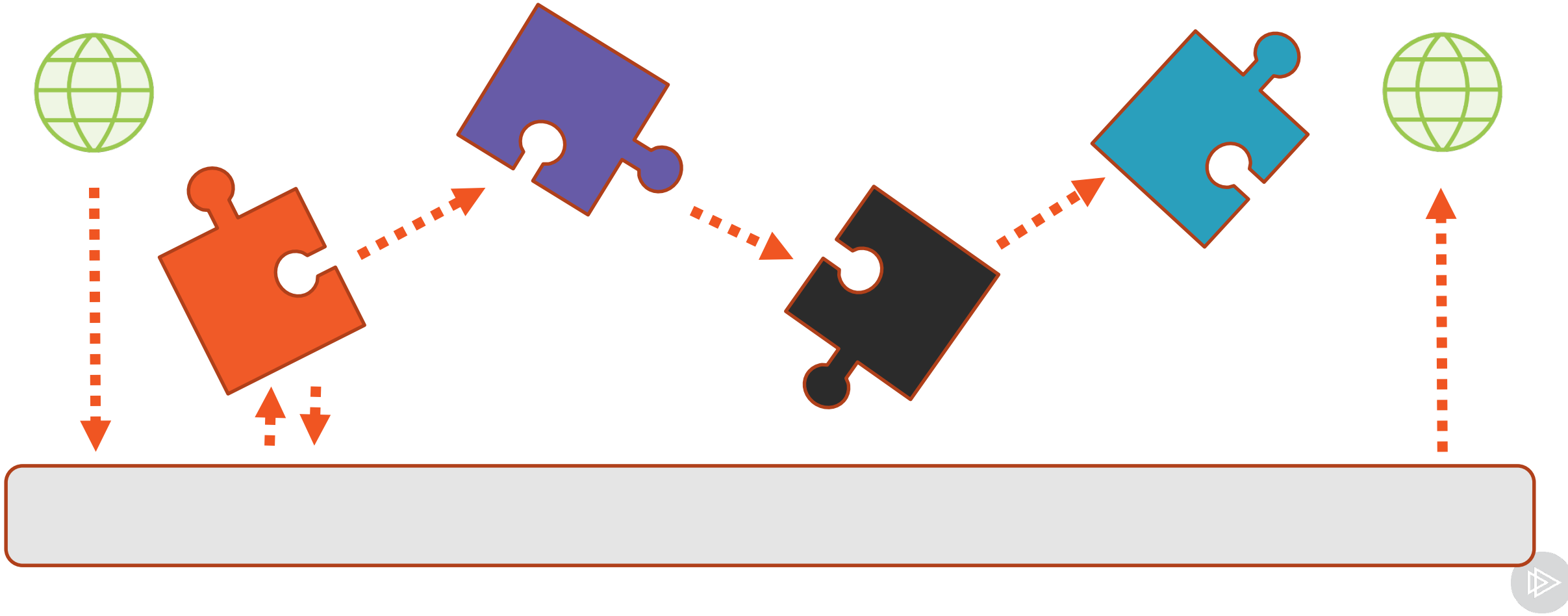
# Distributed system

A distributed system is a software application in which components located on networked computers communicate and coordinate their actions by issuing calls or passing messages

# Distributing Components



# Service-oriented Architecture



# Fallacies of Distributed Computing

- The network is reliable
- Latency is zero
- Bandwidth is infinite
- The network is secure
- Topology won't change
- There is one administrator
- Transport cost is zero
- The network is homogeneous

# High Cohesion

**Related functionality together**

**Hide complexity**

# Before You Begin

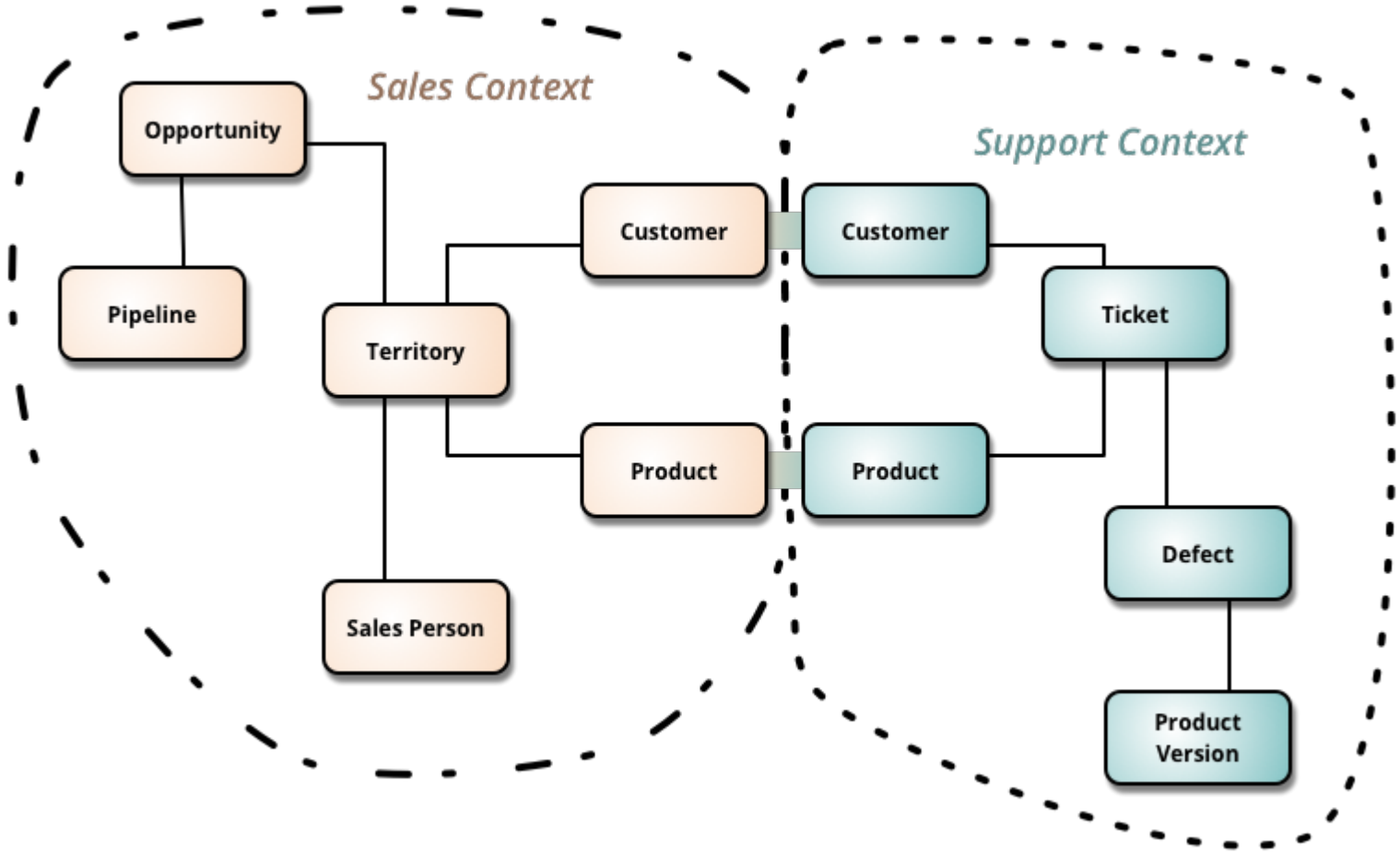
Make a diagram of your services

Overlap of entities, business rules, functionality is unavoidable

Include the boundaries of the services in your diagram

Result: Best possible (start of) architecture up front

# Bounded Context




Picture by Martin Fowler

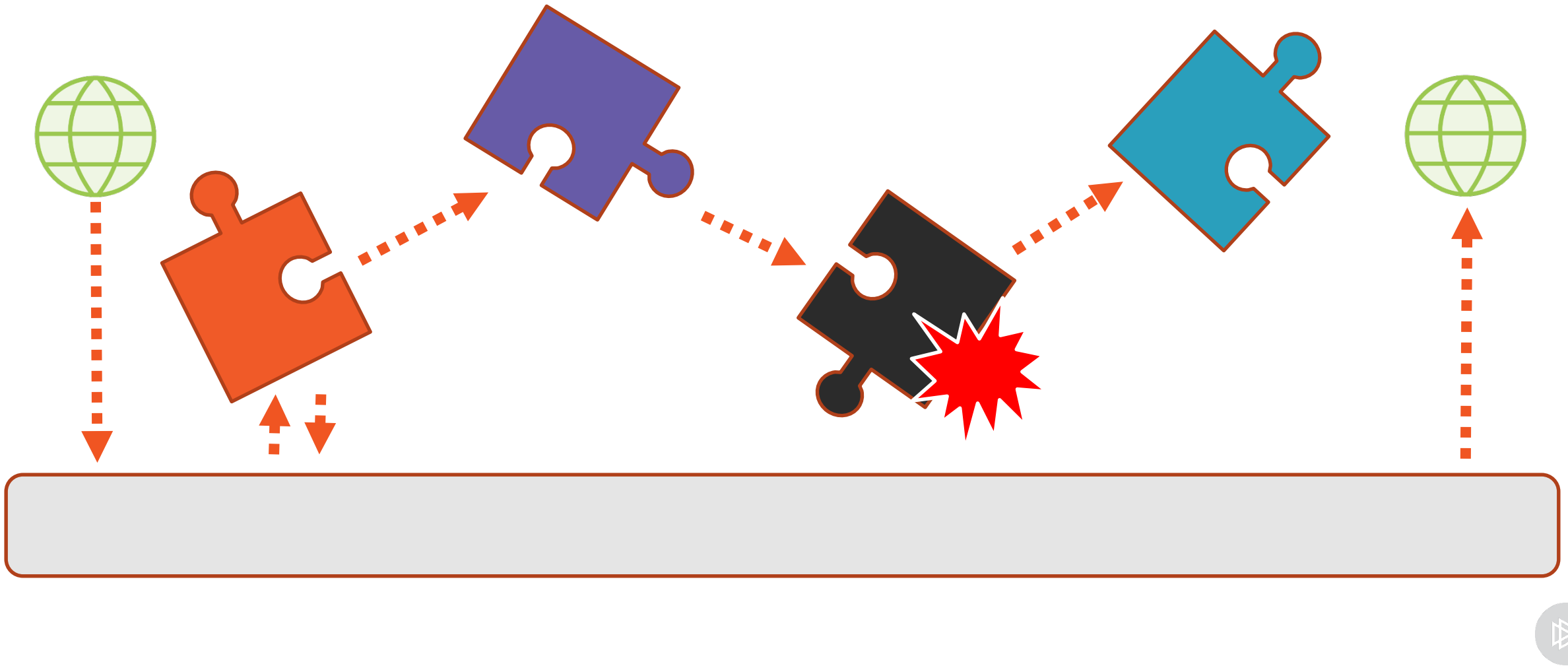
# Coupling

**Platform**

**Behavioral**

**Temporal**

# Service-oriented Architecture



# Remote Procedure Call

**Call a method over the wire**

**.NET Remoting/Java RMI**

# Remote Procedure Call (RPC)

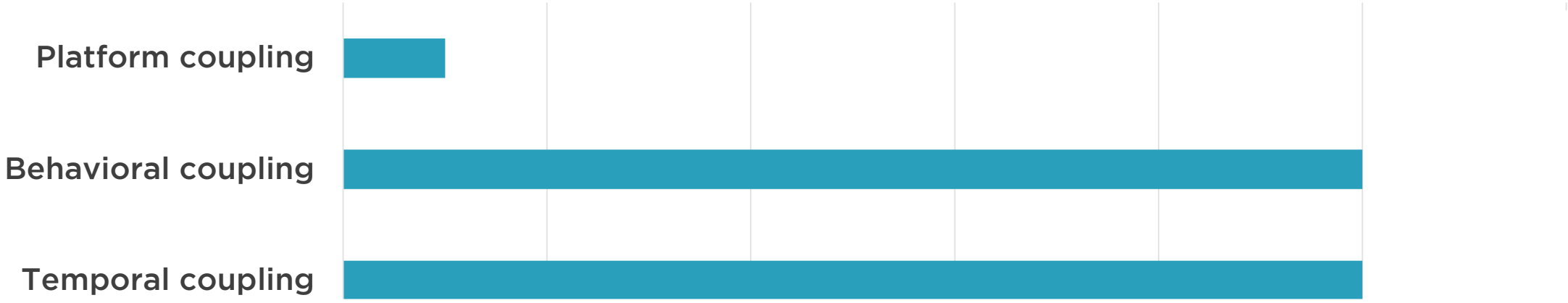
**Proxy classes**

**Beware of the fallacies of distributed computing!**

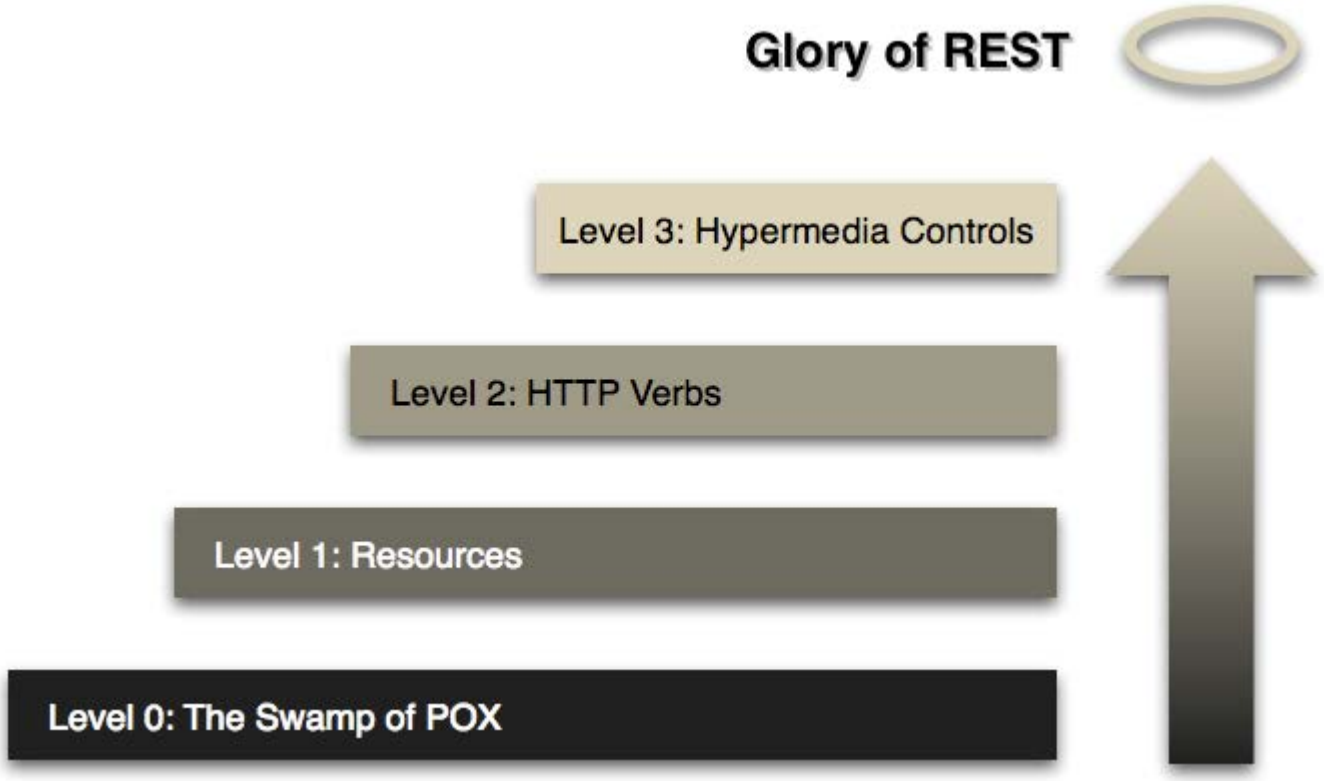
# Remote Procedure Call: SOAP

**Simple Object Access Protocol**

**Call method using standarized XML**

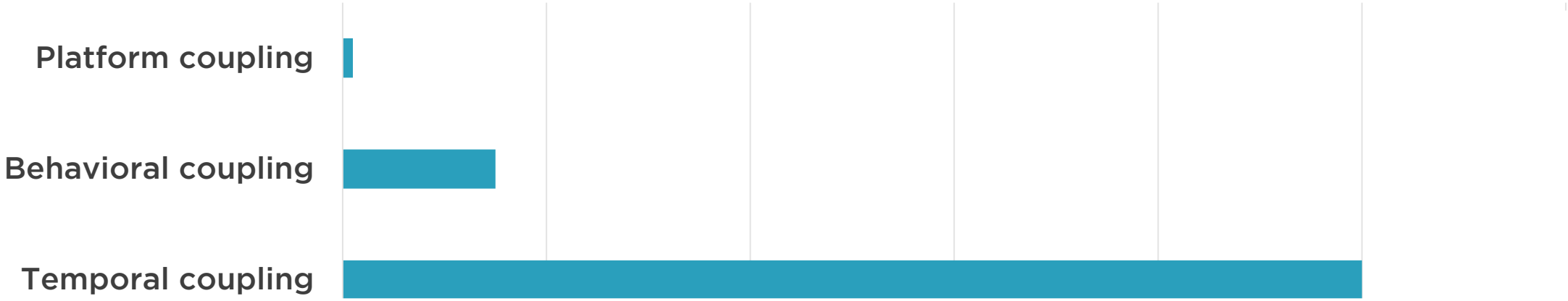


# Representational State Transfer (REST)



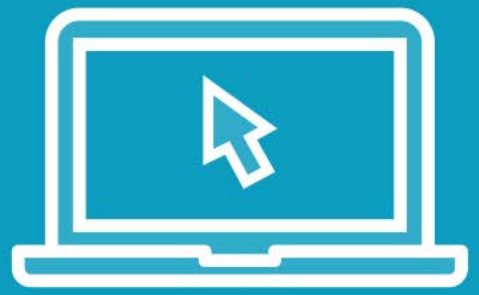

Picture by Martin Fowler

# Representational State Transfer




**Fallacies more apparent than with RPC**

# Demo



Business is great

Amazon wants Fire On Wheels to deliver packages for them

But they don’t want to fill out a web page

# FireOnWheels REST Solution

No platform coupling

Code overlap

Behavioral coupling

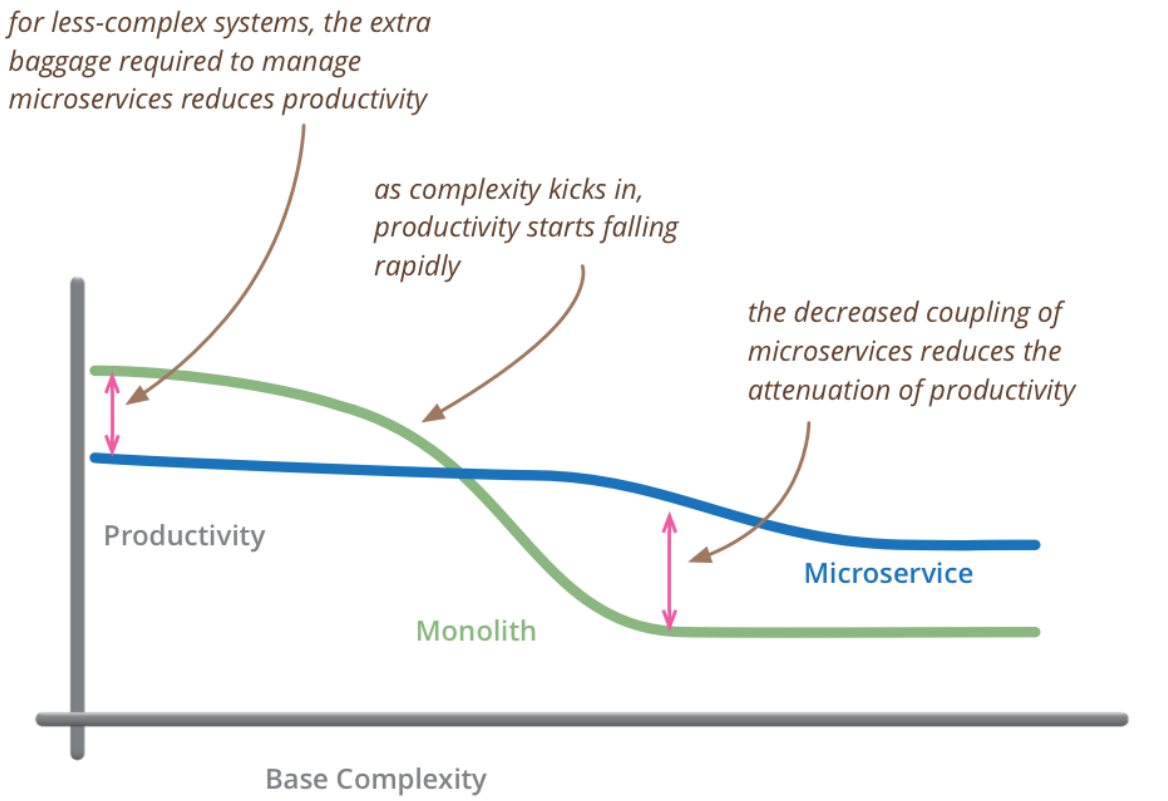
Response times

Temporal coupling

# Microservices

A software architecture style, in which complex applications are composed of small, autonomous processes communicating with each other using language-agnostic APIs.

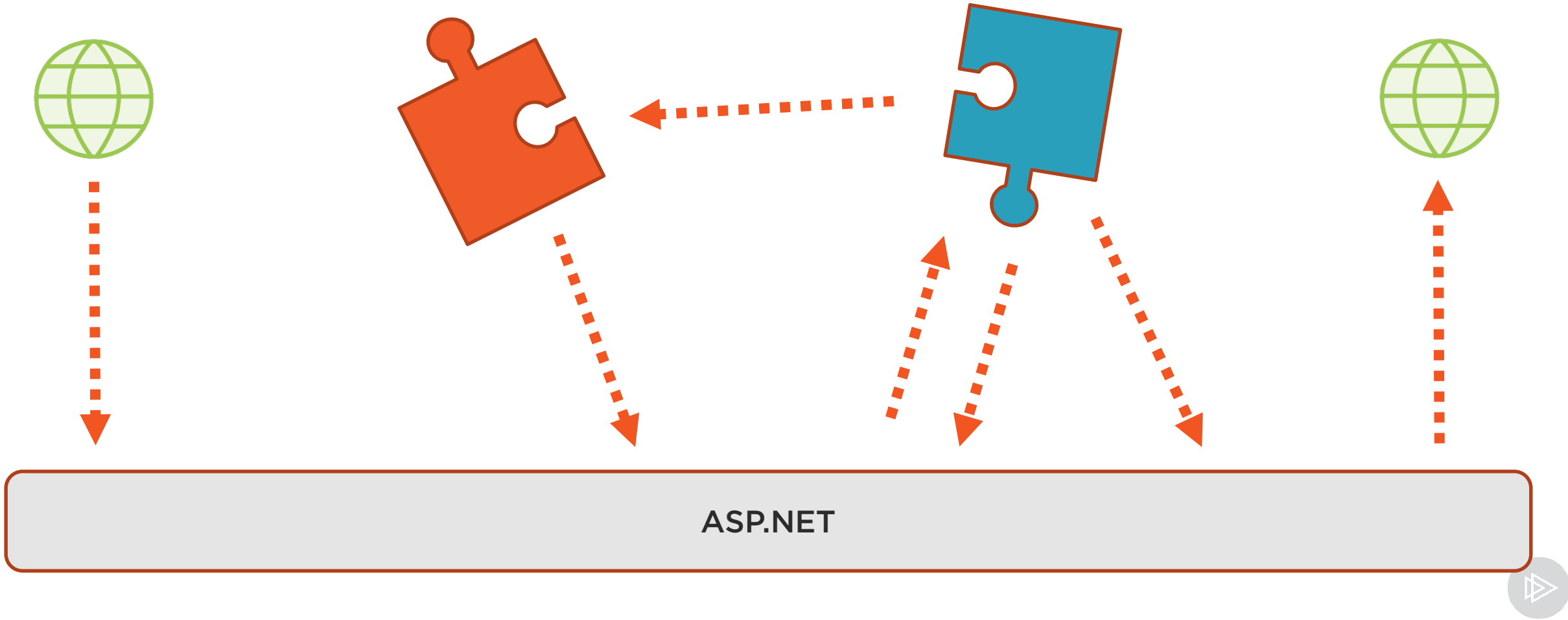
# Should You?




*but remember the skill of the team will outweigh any monolith/microservice choice*

Picture by Martin Fowler

# Microservices with Messaging



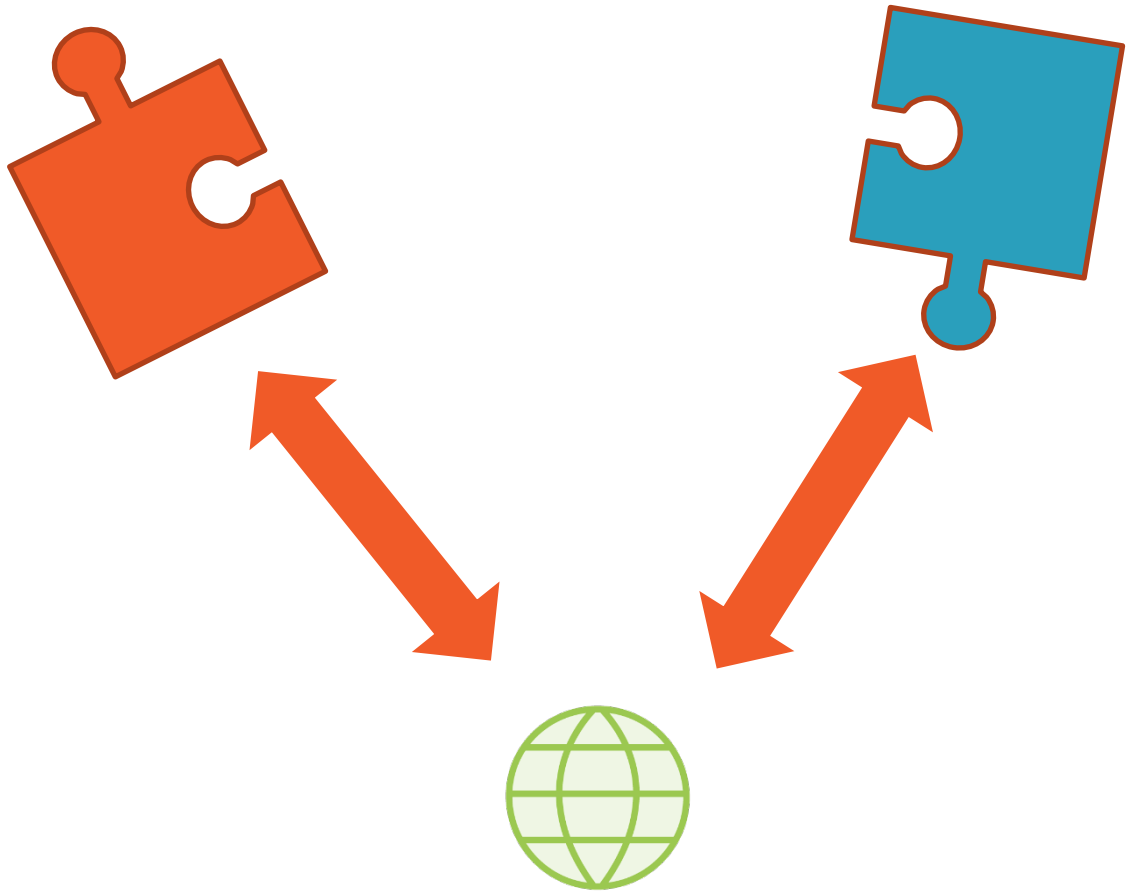
# Microservices and UI

Each service should expose it's own UI

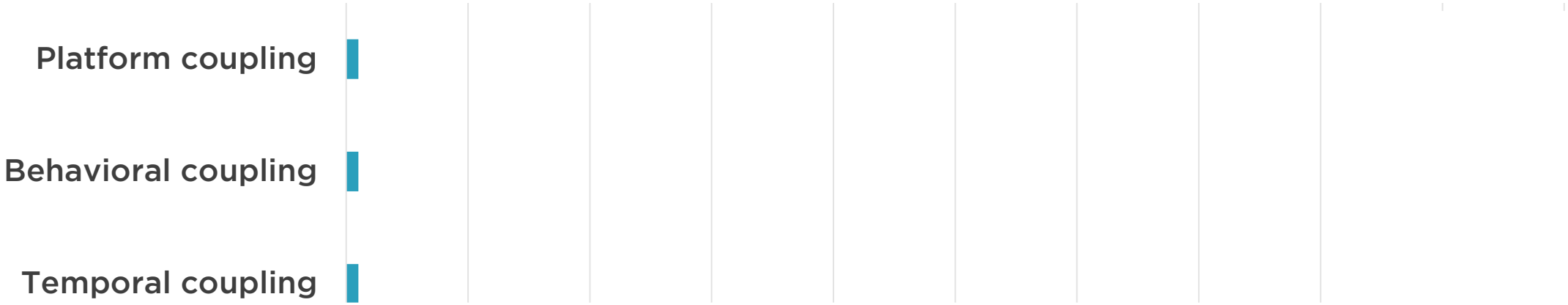
When one service fails the rest of the UI is shown

Need UI composition

# Microservices and SPAs



# Microservices




**Fallacies still apply!**

# Properties of Microservices (1)

| | | |
|---|---|---|
| **Maintainable** | **Versioning** | **Each their own** |
| **Hosting** | **Failure isolation** | **Observable** |

# Properties of Microservices (2)

UI

Discovery

Security

Deployment

The downside of the microservice architecture is that it's relatively complex.

# Reuse and Microservices

Code is typically not shared among services

But... What about DRY!? (Don't Repeat Yourself)

Set yourself free from DRY, use source control

# Databases and Microservices

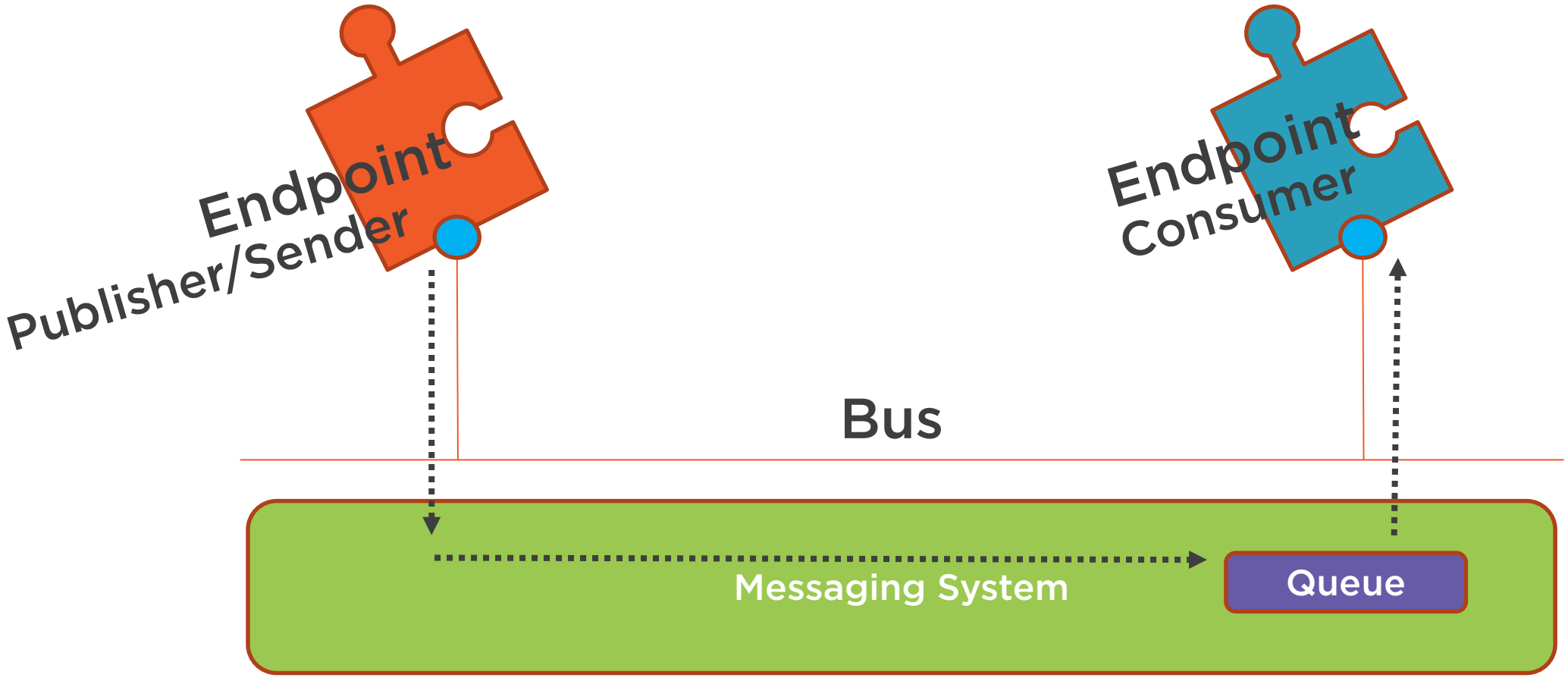
An entity can exist in multiple services and databases

Data duplication is fine

But... How about foreign keys?

Set yourself free from data integrity

# The Services



# NServiceBus

An implementation of a service bus

Written for .NET services

Non- .NET services can use other bus implementations compatible with the same messaging system

# ESB

Example: Biztalk

Don’t confuse with our service bus

Logic in the bus

Microservices = dumb pipes

# What About Some Demos?

**More technical explanation needed**

**In the next module!**

# Summary

Monoliths are great but become unmaintainable when they get more complex

SOA with RPC and REST has some distinctive downsides

Microservices solve these downsides but beware of the complexity

The service bus facilitates the communication between services through a messaging backend