Music City Code Edition

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MICROSERVICES

Lessons from the Trenches

@gbworld

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#buildwhatmatters
LIFEWAY LABS
NASHVILLE

TEKsystems
Our people make IT possible

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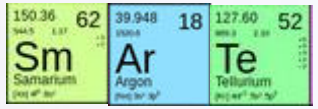
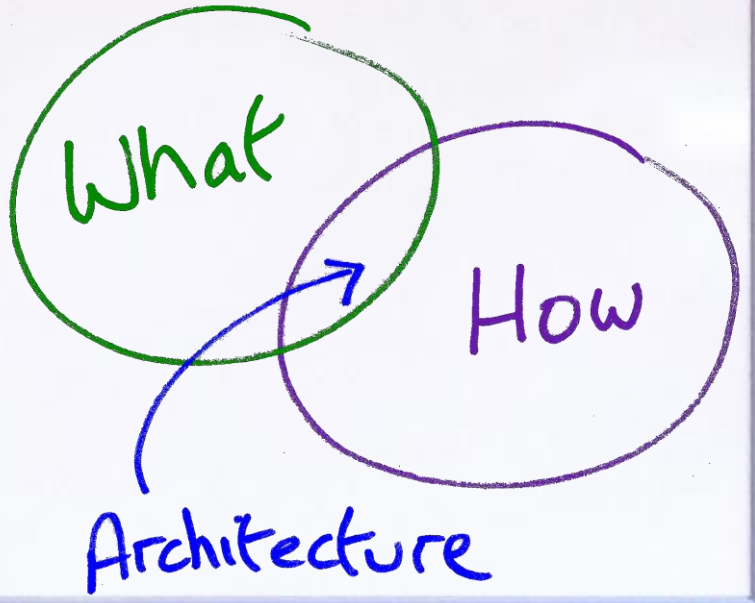
Who?

Gregory A. Beamer

- Senior Architect, UST Global
  - Microservices Practice
  - Senior Architect
    - Modernization
    - Integration
    - Service Enablement
    - Microservices
  - Other
    - Agile
    - DevOps





Opening Remarks

- Insert Greg's Random Bull Here
  Possibilities
  - Architectural Styles
  - Other Bull

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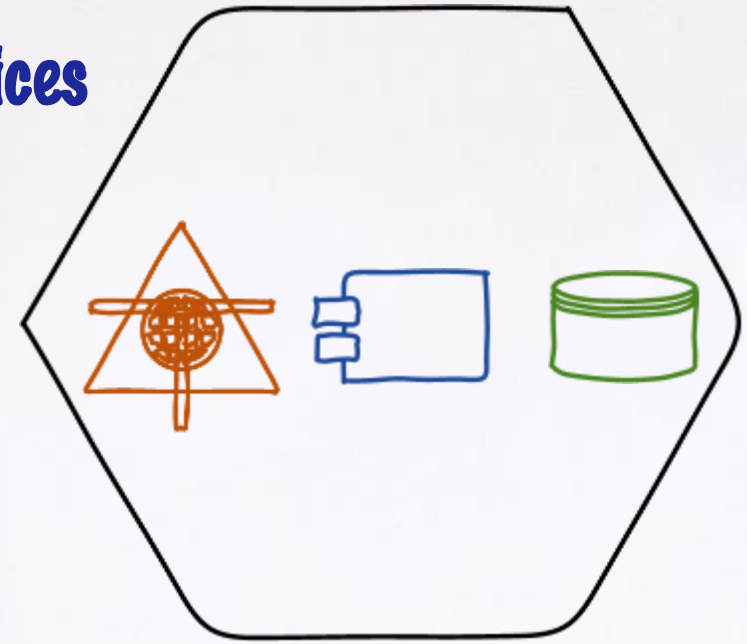
Agenda

- What are Microservices?
  A Brief Introduction
- Why use Microservices?
  Benefits and breaking some myths about microservices
- How do we do this?
  Prepping for & Implementing Microservices
- Here in the Real World
  Inspired by Real Events



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What are Microservices?

A Brief Introduction

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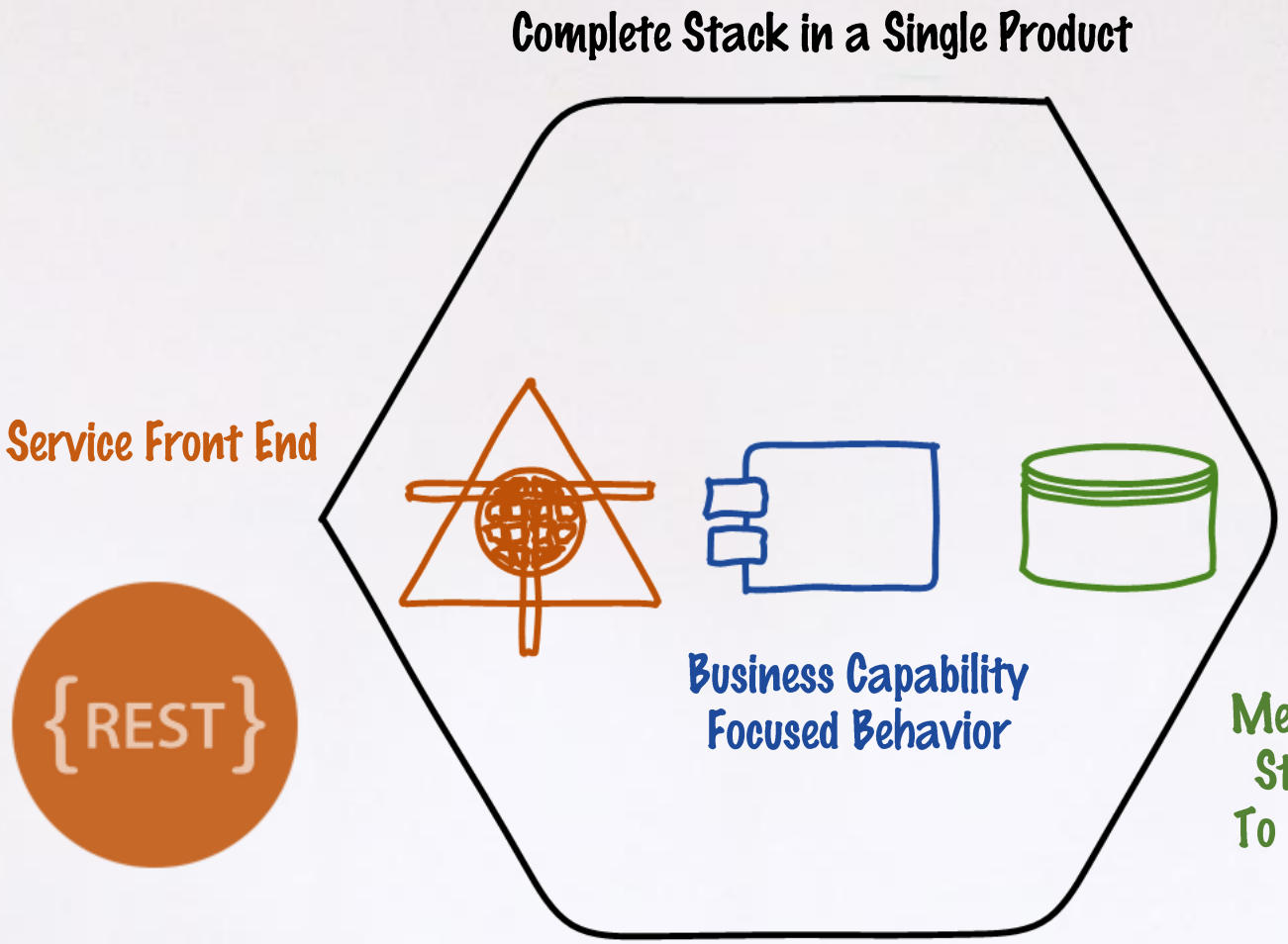
What?

In a Nutshell

PURIST VIEW



Architectural Style

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What?

Architectural Style

In short, the microservice architectural style is an approach to developing a single application as a suite of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API

From "Characteristics of a Microservice"-
Martin Fowler
http://goo.gl/AZwucZ

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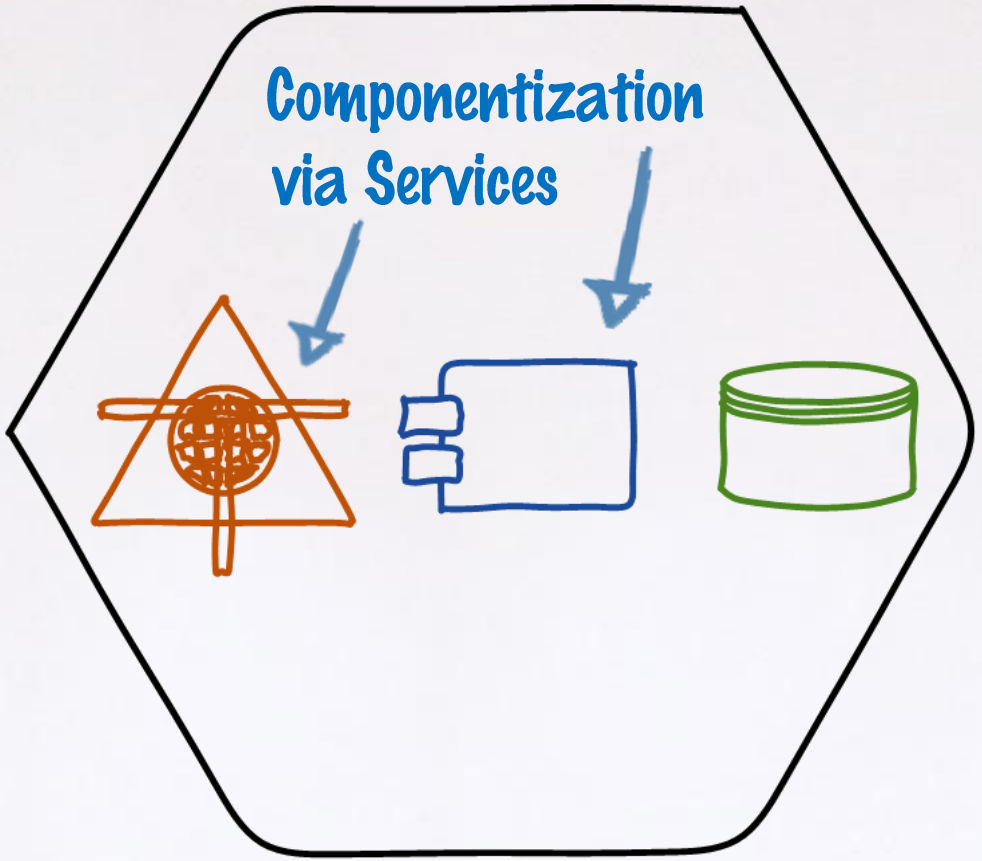
What?

Characteristics



From "Characteristics of a Microservice" -
Martin Fowler
http://goo.gl/AZwucZ

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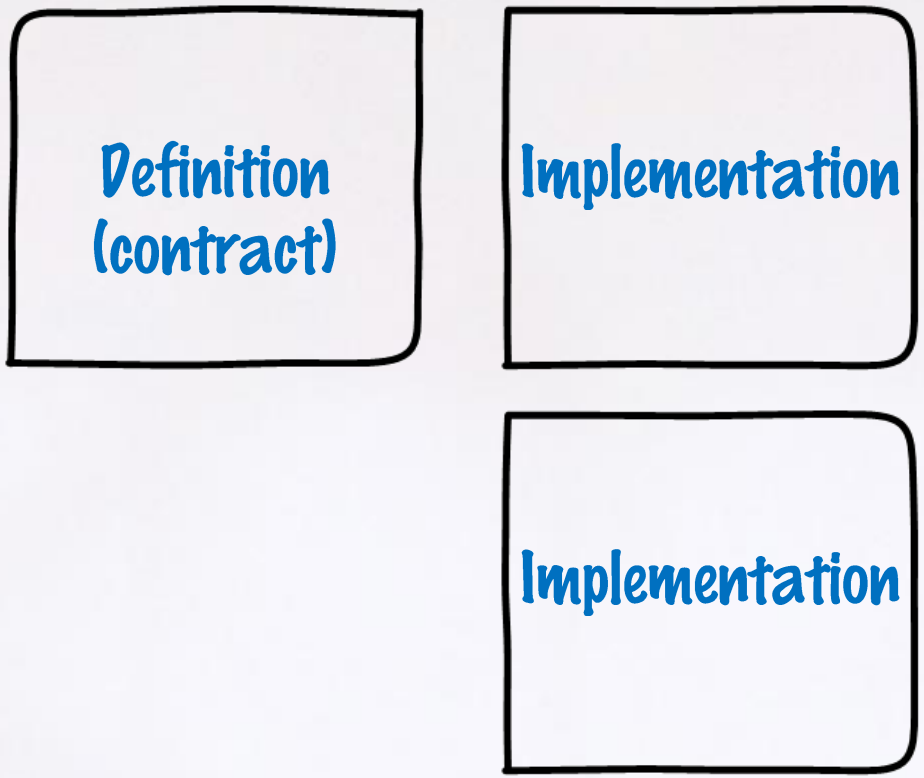
Sidebar 1

What is a Component?



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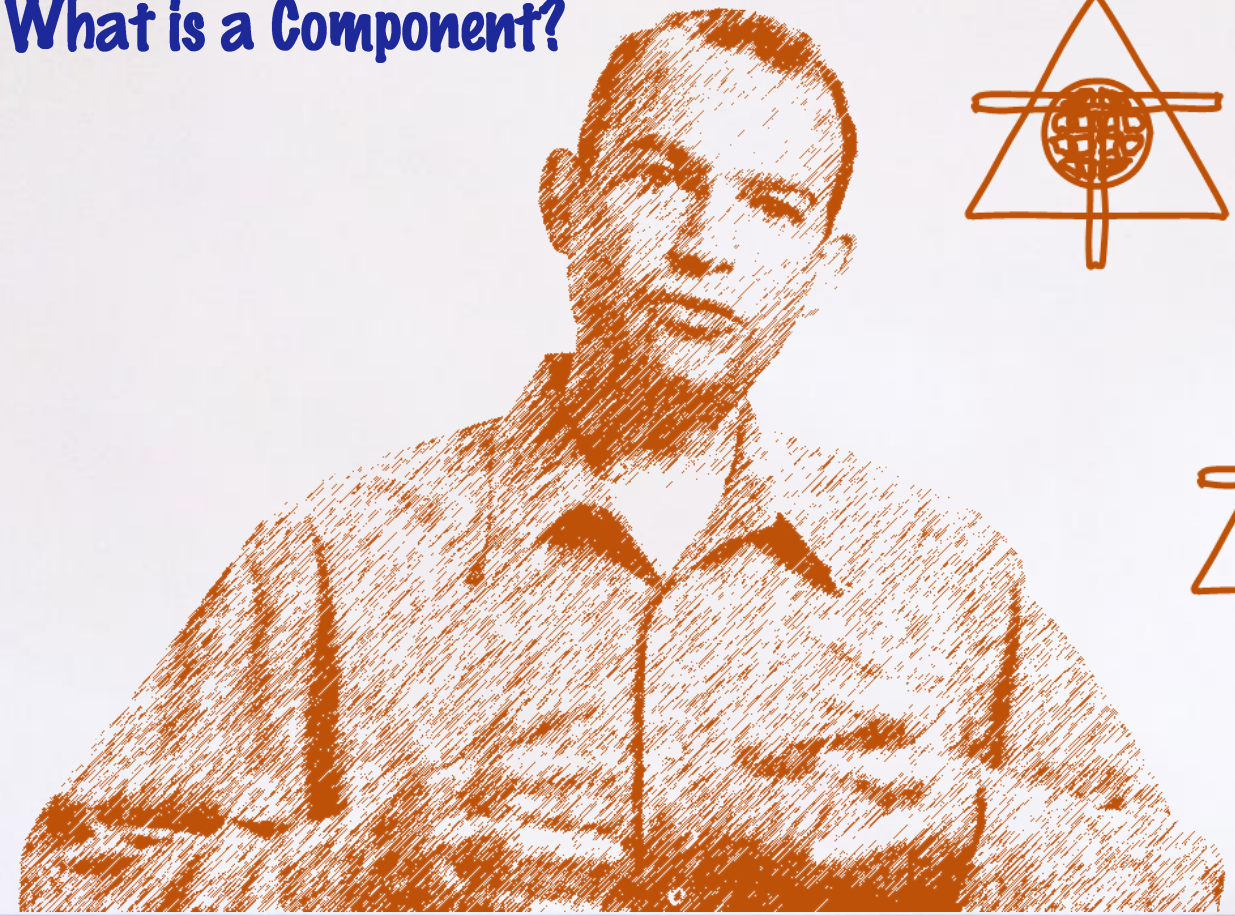
Microsoft .NET WCF

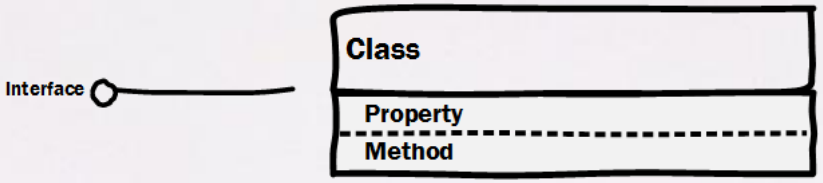
Sidebar 1

What is a Component?



Contract

Implementation



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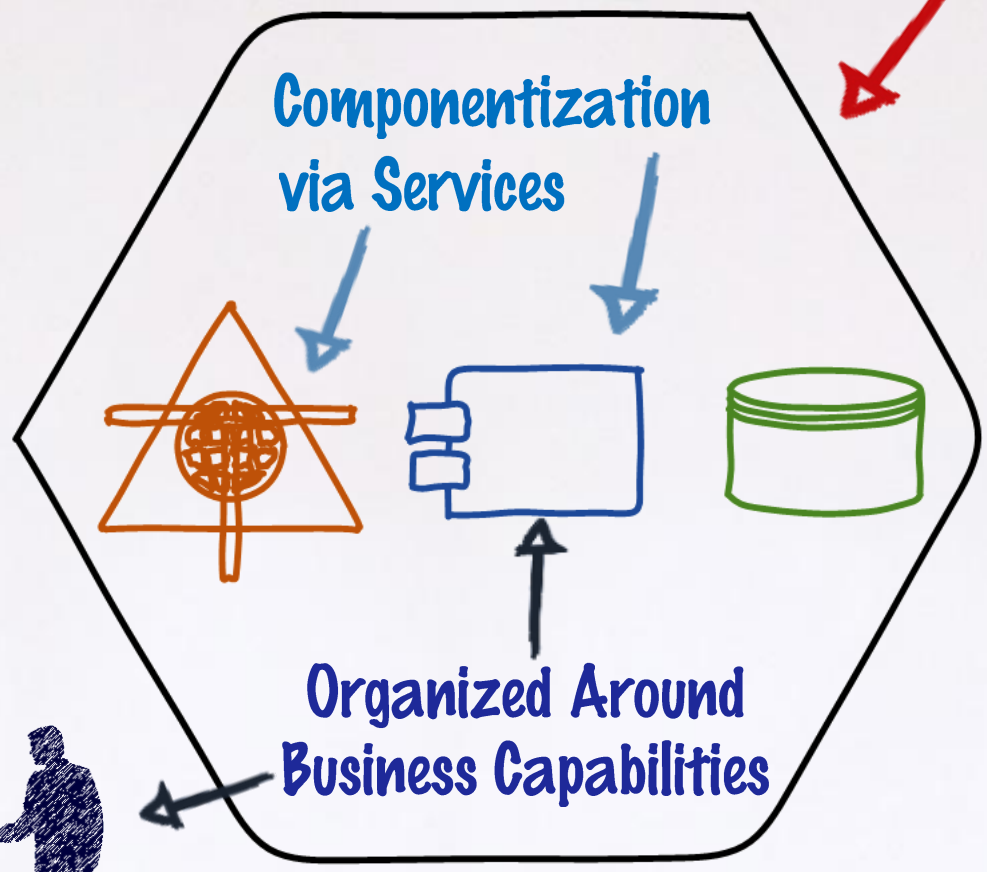
What?

Characteristics



From "Characteristics of a Microservice"- Martin Fowler
http://goo.gl/AZwucZ

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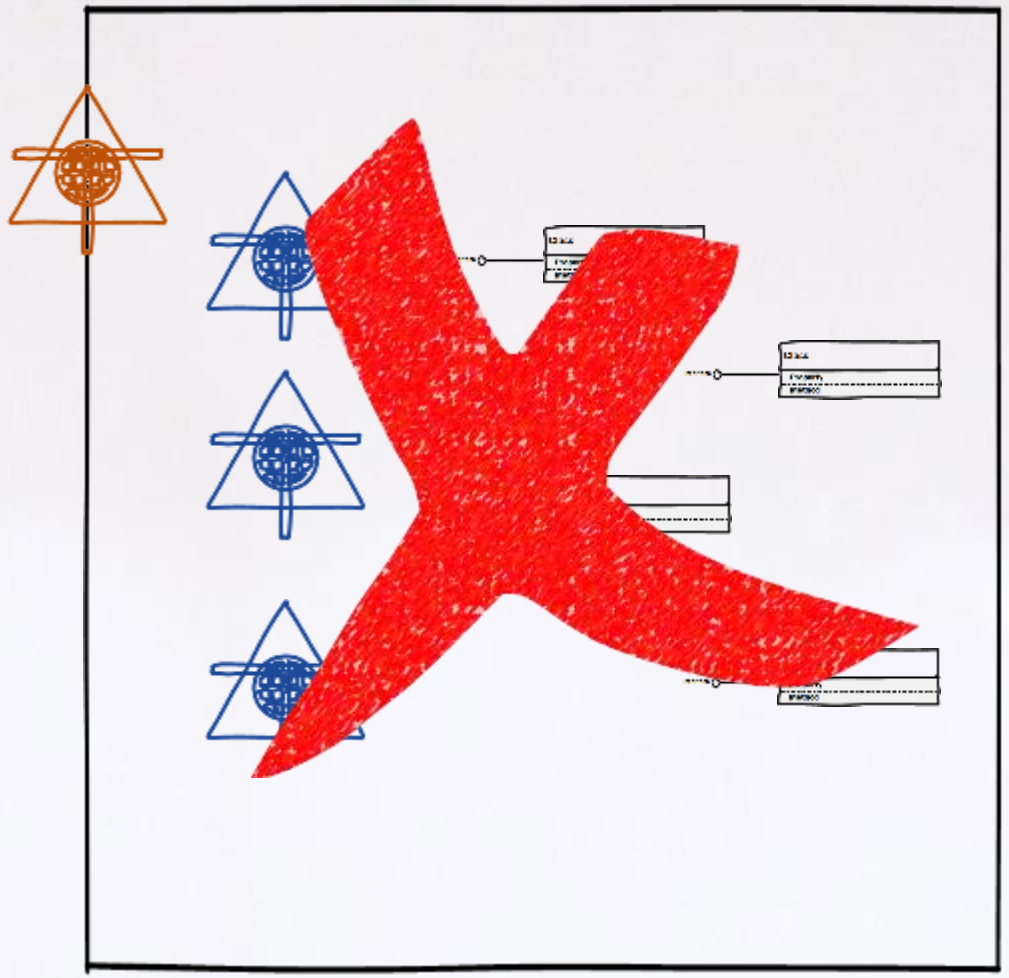
Sidebar 2

What is a Product?



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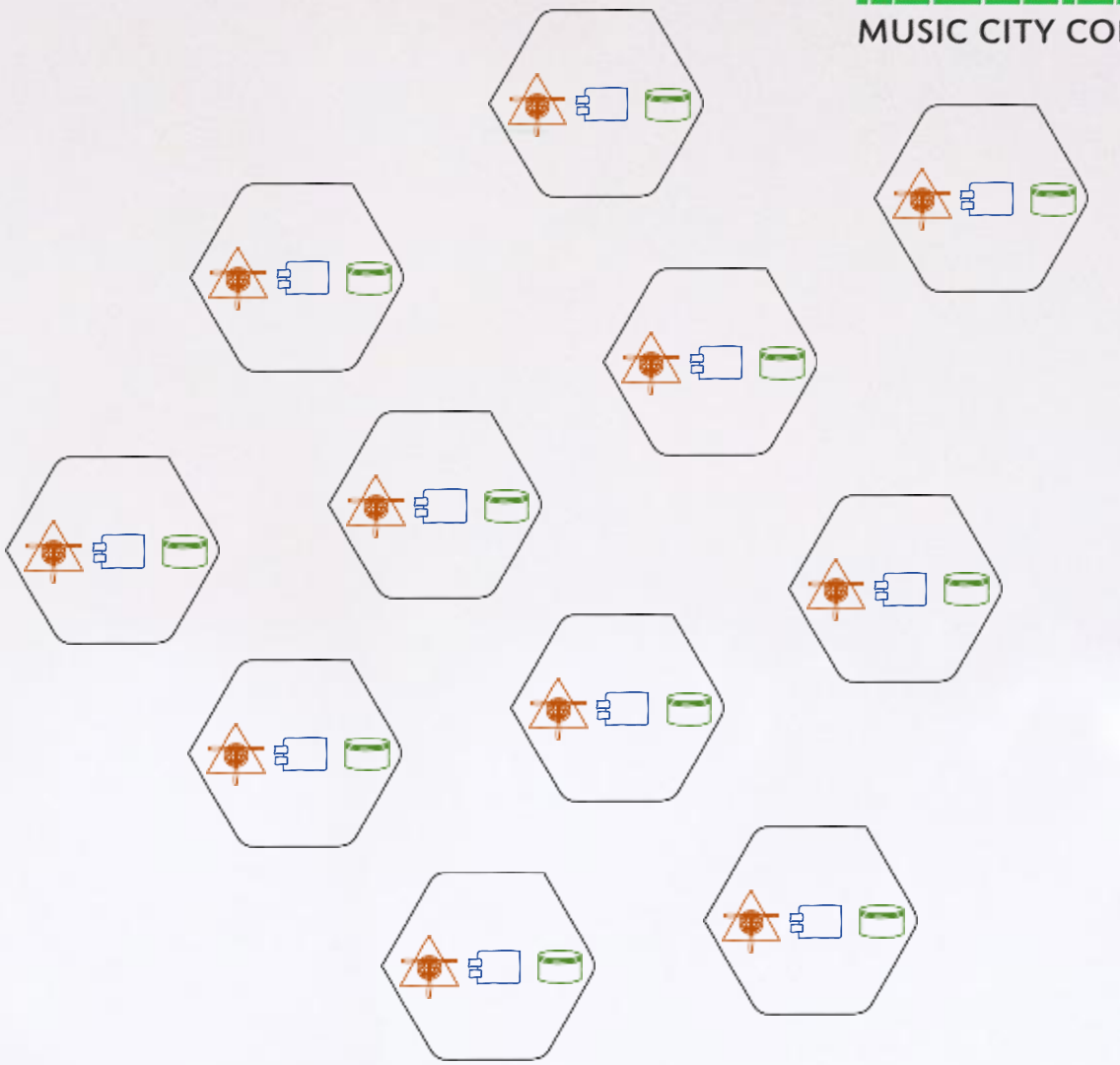
Sidebar 2

What is a Product?



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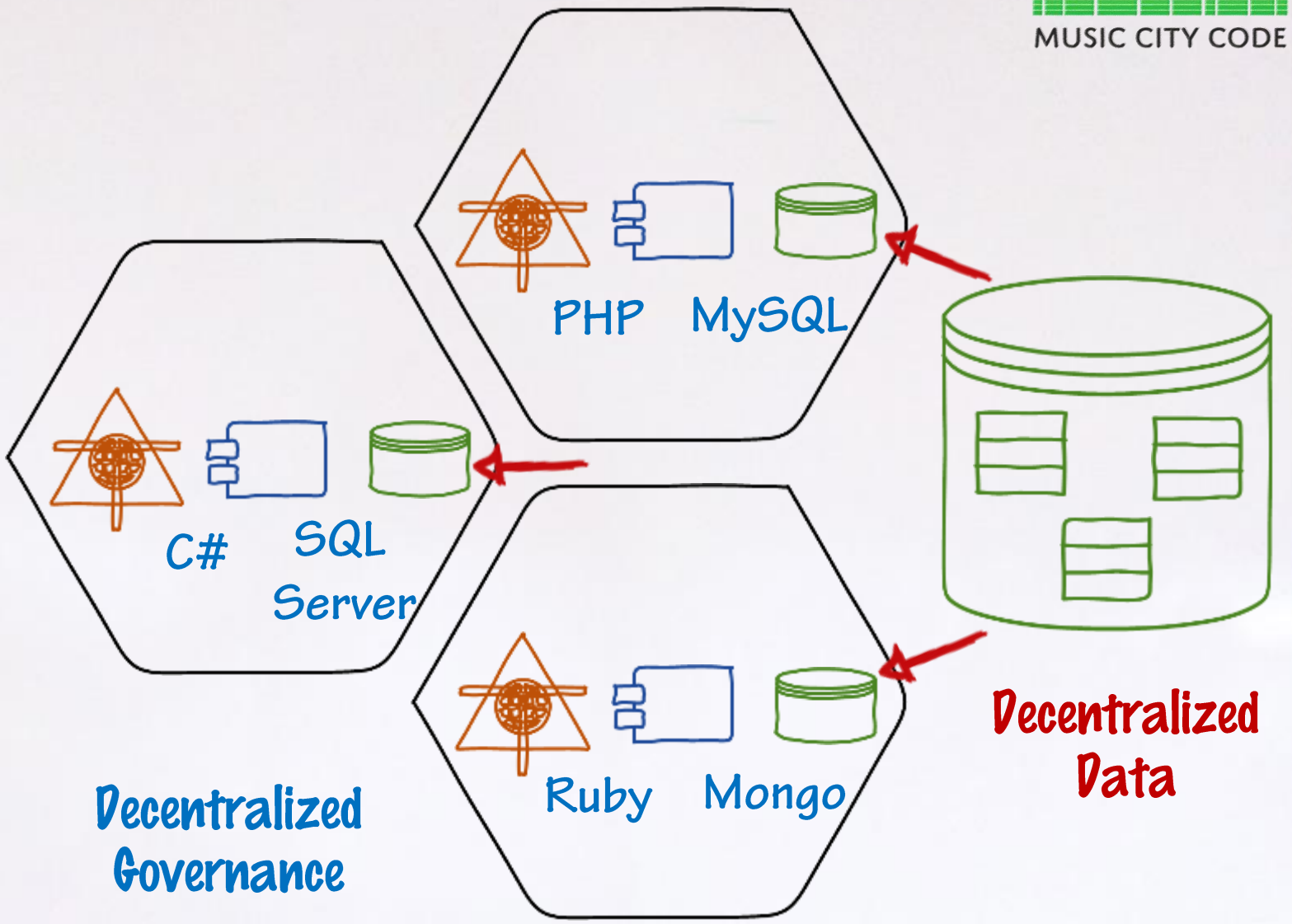
What?

Characteristics

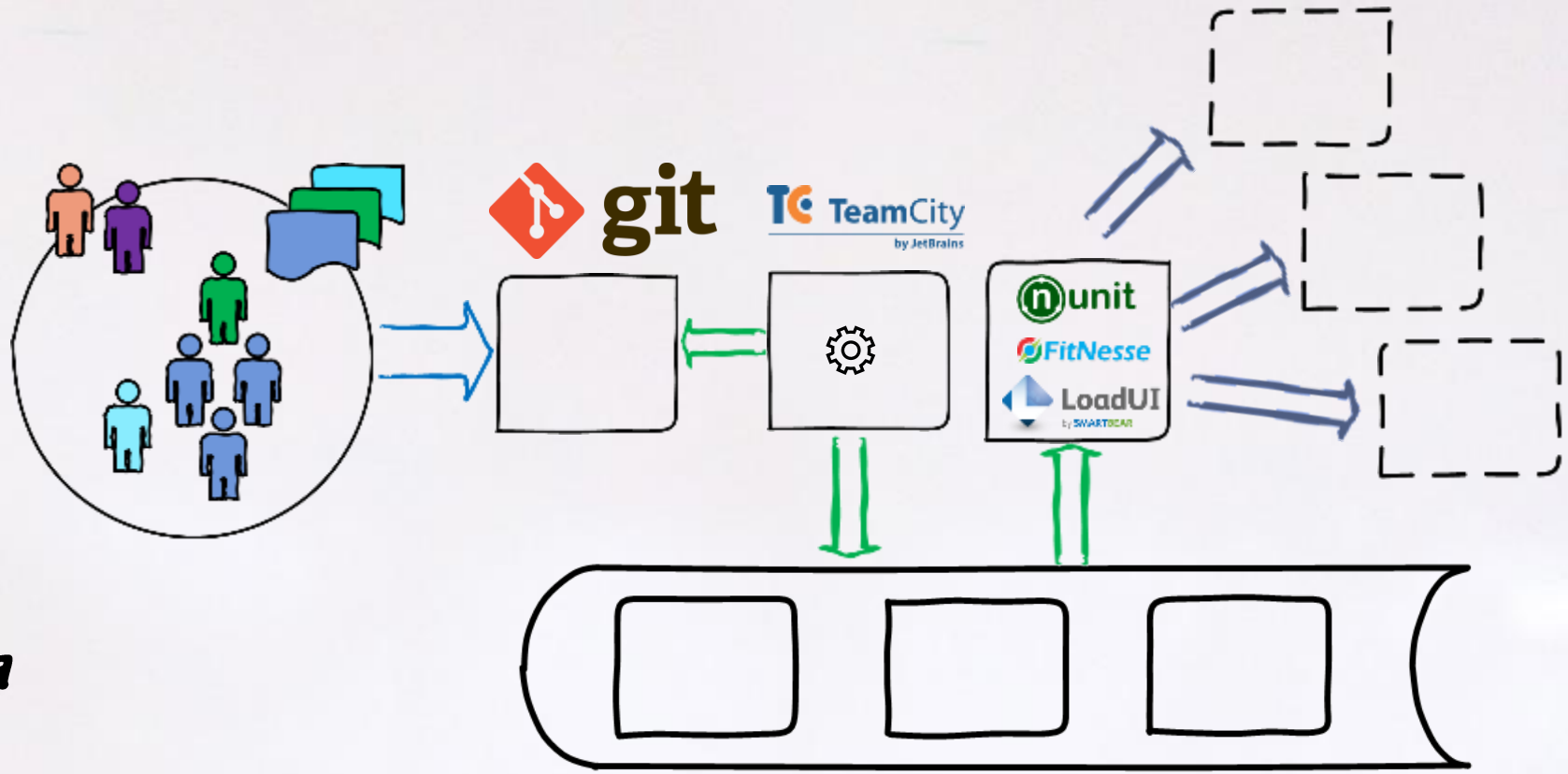


From "Characteristics of a Microservice"- Martin Fowler
http://goo.gl/AZwucZ

Infrastructure Automation

What?

Characteristics



From "Characteristics of a Microservice"-
Martin Fowler
http://goo.gl/AZwucZ

puppet

CHEF
CODE CAN

Bamboo

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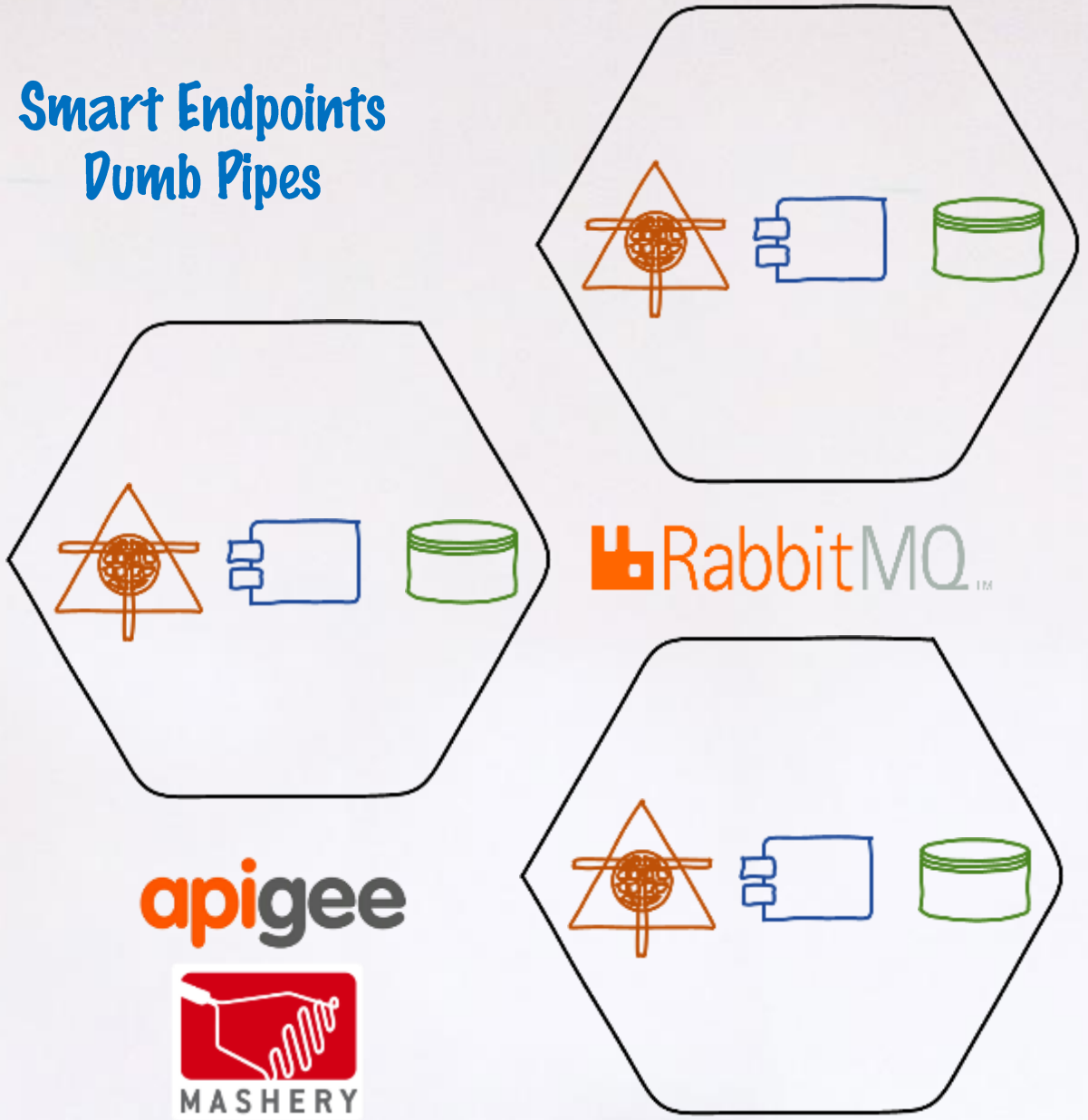
What?

Characteristics

Smart Endpoints
Dumb Pipes



RabbitMQ

apigee

MASHERY

From "Characteristics of a Microservice"- Martin Fowler
http://goo.gl/AZwucZ

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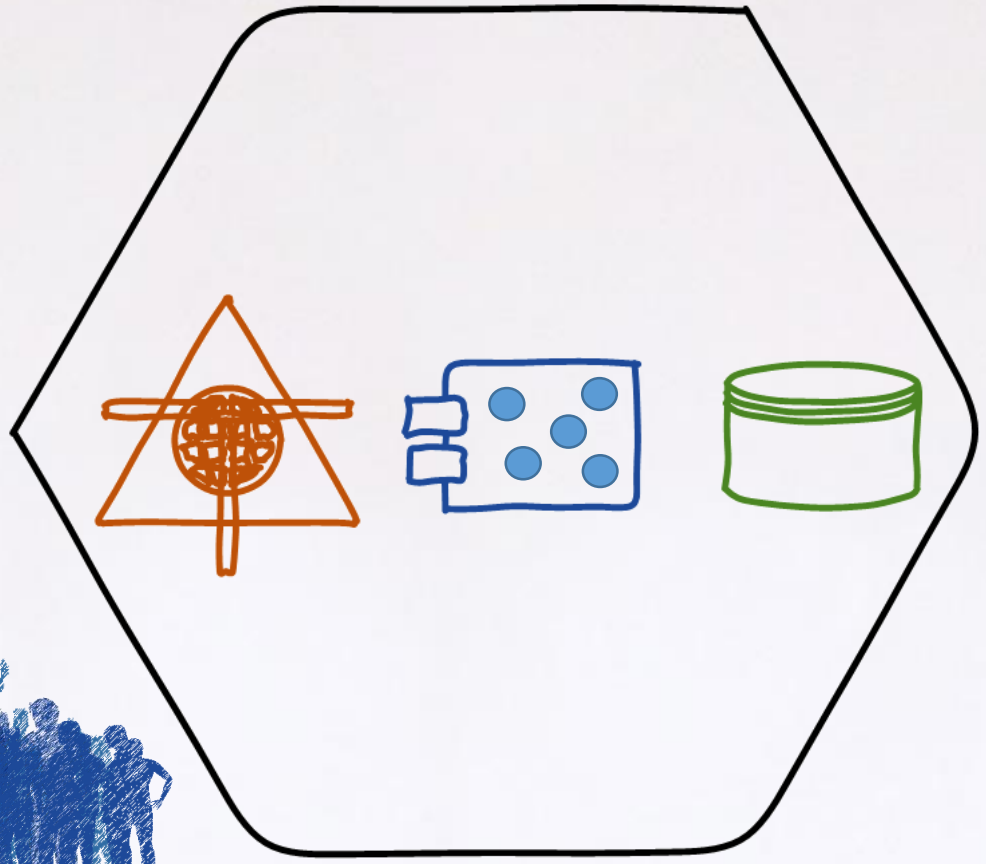
Evolutionary Design

What?

Characteristics



From "Characteristics of a Microservice"- Martin Fowler
http://goo.gl/AZwucZ

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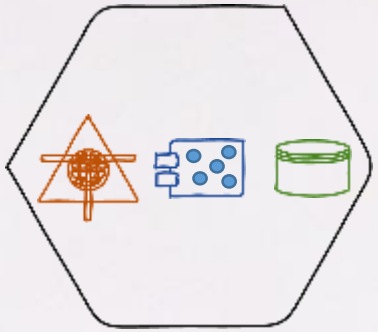
What?

Characteristics

Microservices

- Componentization via Services
- Organized around business capabilities



Agile Practices

- Products not Projects
- Decentralization (governance, data)
- Evolutionary Design

From "Characteristics of a Microservice"- Martin Fowler
http://goo.gl/AZwucZ

DevOps

- Infrastructure Automation Smart Endpoints, Dumb Pipes

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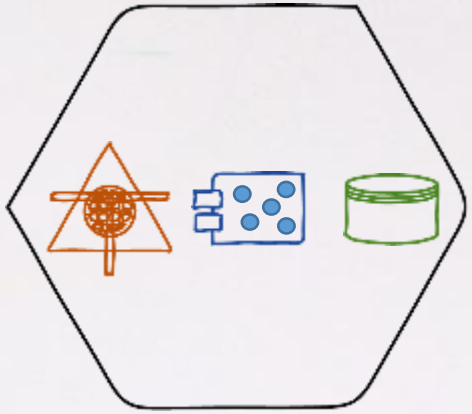
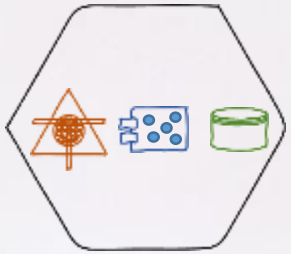
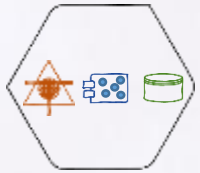
What?

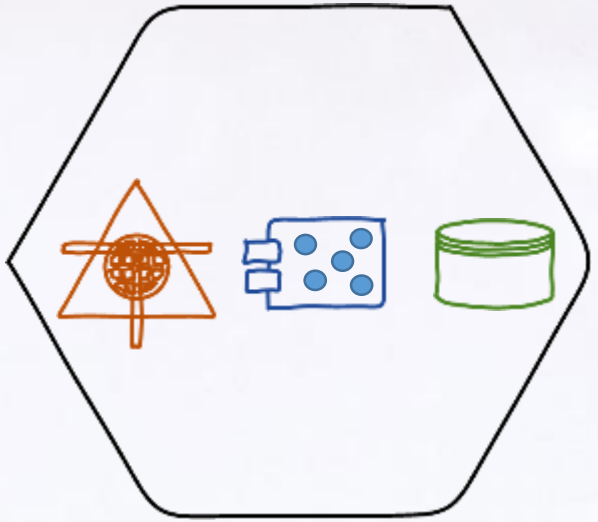
How Big is a Microservice?

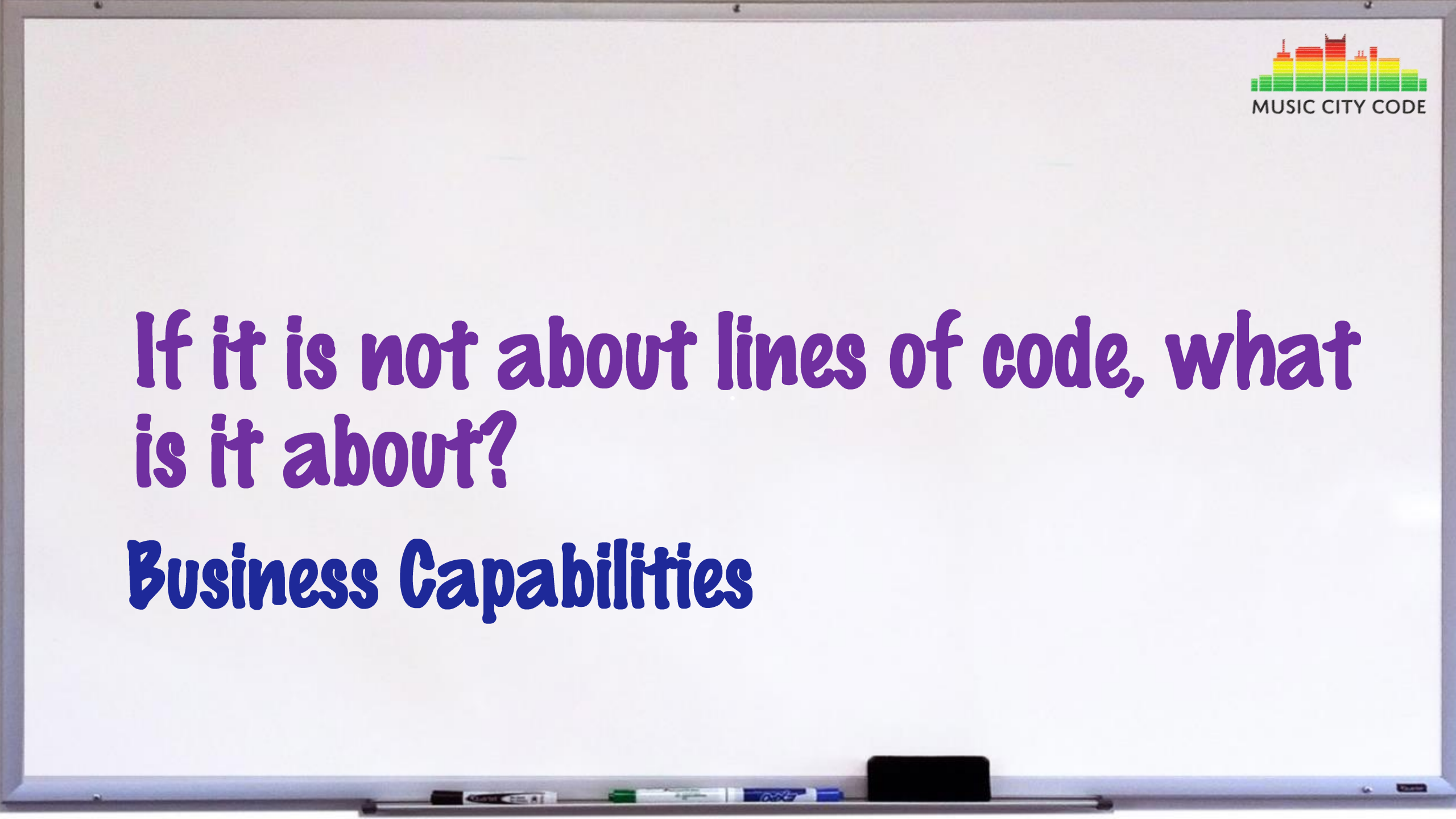
It's **not** about lines of code!










MUSIC CITY CODE
If it is not about lines of code, what is it about?
Business Capabilities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Why Use Microservices?
Benefits and breaking some myths about microservices

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Why?

The Benefits of Microservices

- Better than Monoliths
- Easy to
  - Understand
  - Enhance
  - Test
  - Deploy
- Resilience
  - Low impact on other services
- Autonomy of Teams
  - Decentralized Governance

Independent Scale

Flexibility

Loose Coupling
Tight Cohesion

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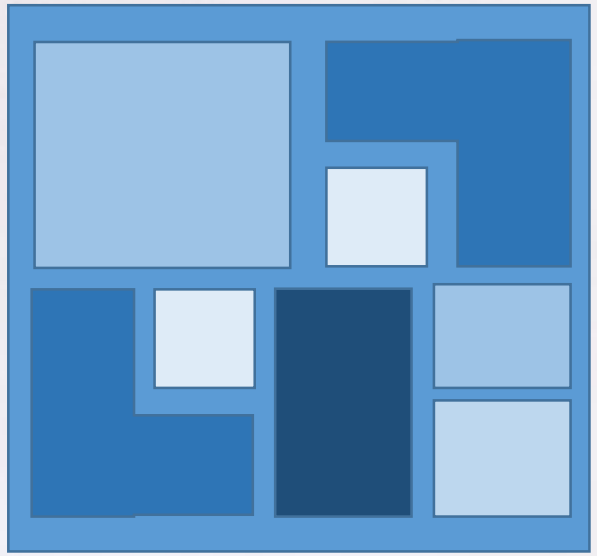
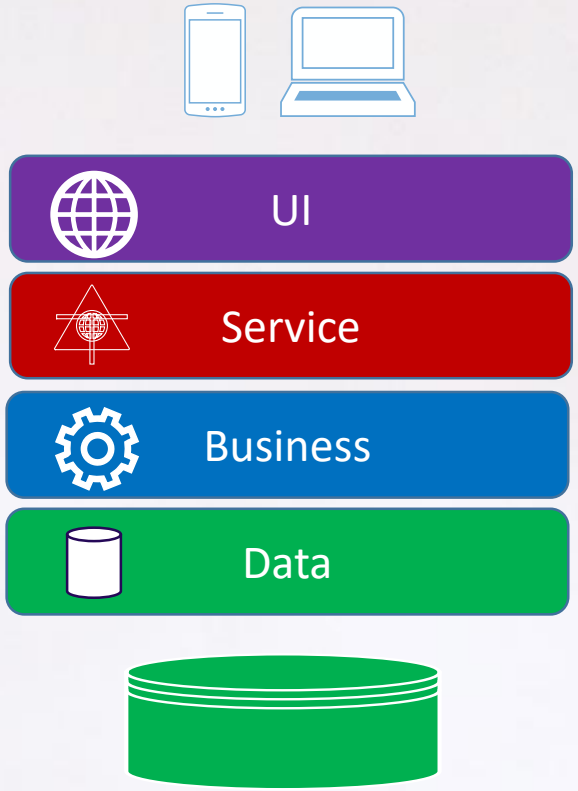
Why?

Monolith versus Microservices

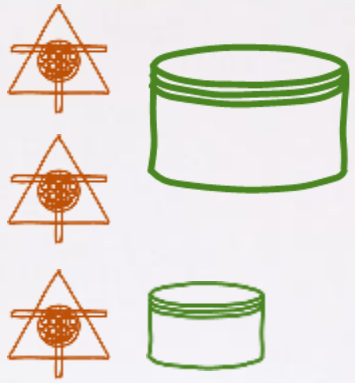


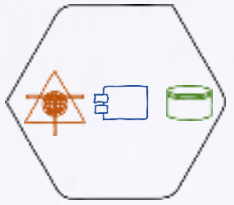
Monolithic Architecture



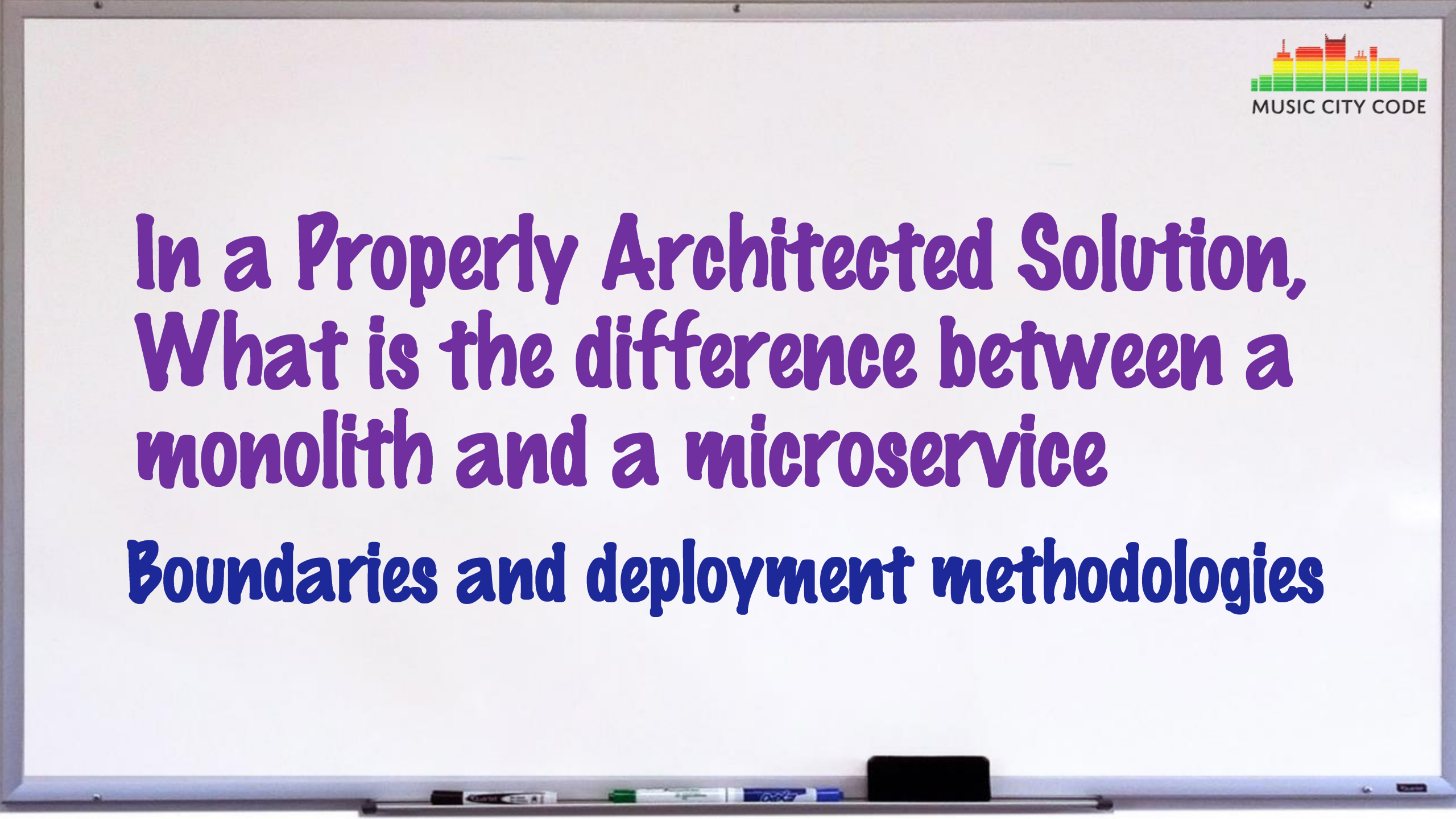
Layered Architecture

SOA





Microservice Architecture


MUSIC CITY CODE
In a Properly Architected Solution, What is the difference between a monolith and a microservice
Boundaries and deployment methodologies

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Why?

Microservices are Easy

- Easy to Understand
- Easy to Enhance
- Easy to Test
- Easy to Deploy

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Why?

Microservices are Easy

Item	Microservice	Monolith
Lines of Code	500	1,000,000
Easier to understand	✓	A*
Easier to enhance	✓	
Easier to test	✓	
Easier to deploy	✓	

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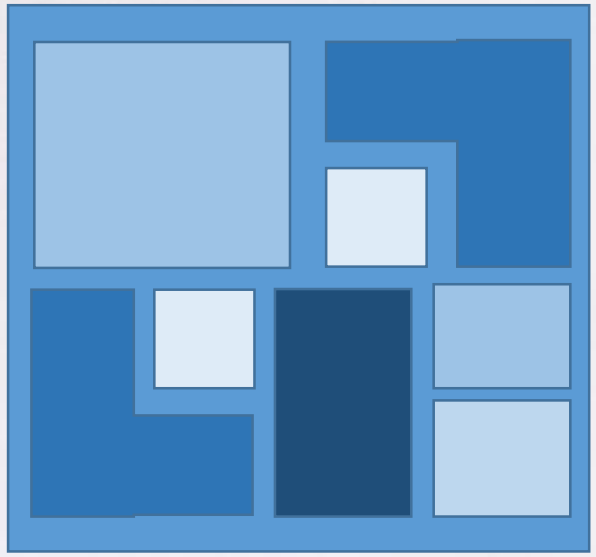
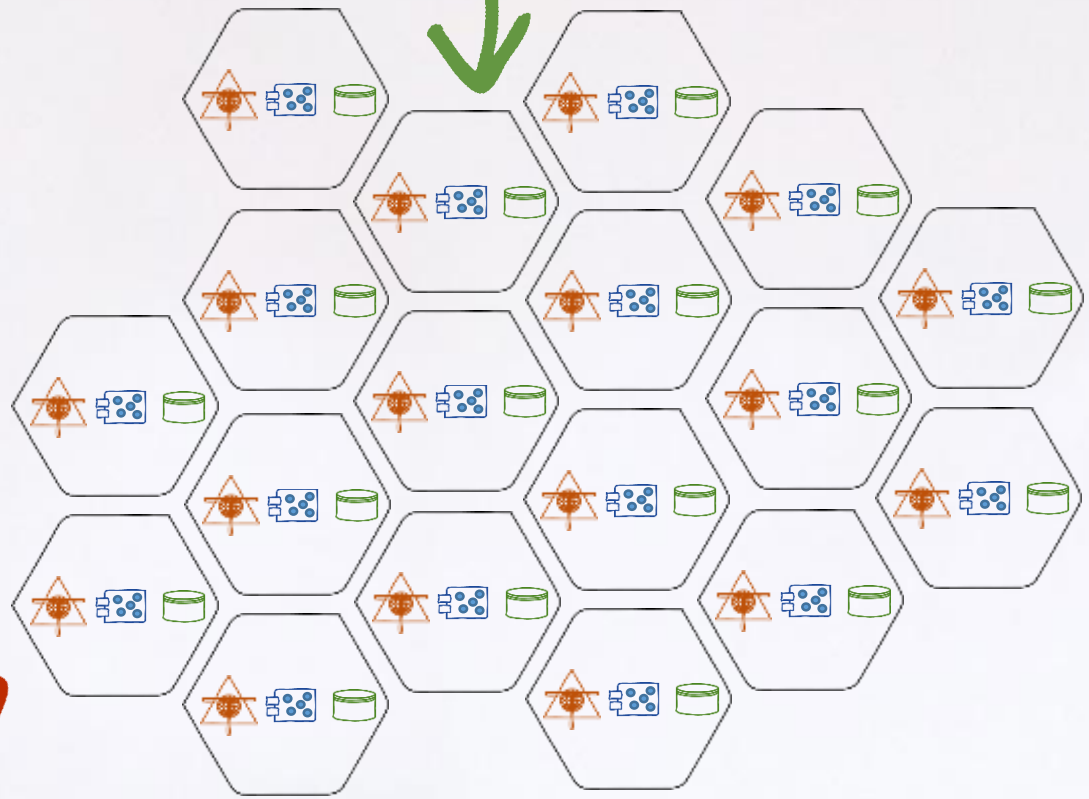
Why?

Microservices are Easy



This is not easy

This is easy



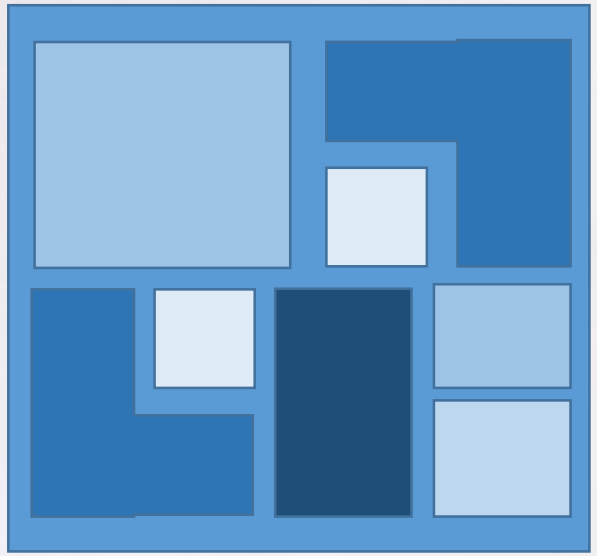
Inner Complexity

Outer Complexity

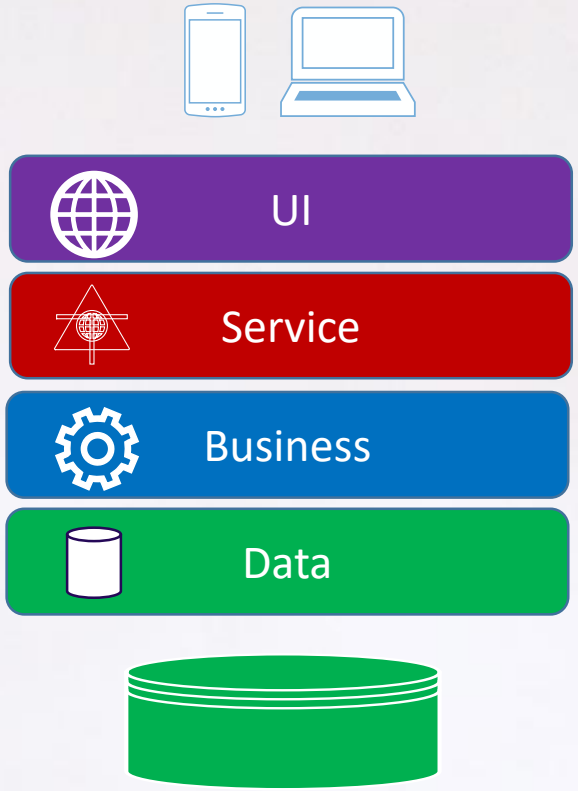
TY CODE

Sidebar

Complexity

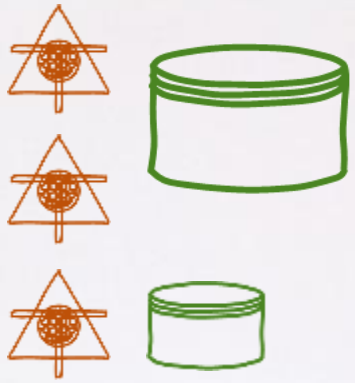


Monolithic Architecture

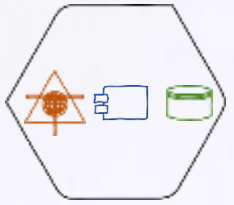


Layered Architecture

SOA



Microservice Architecture



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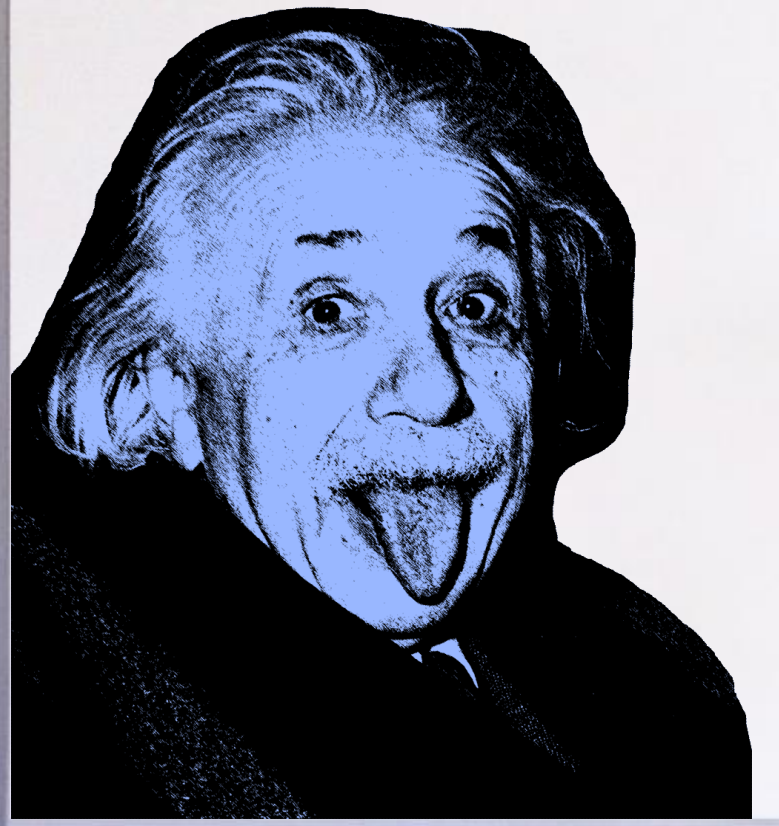
Why?

Microservices are Easy



Energy cannot be created or destroyed, it can only be changed from one from to another.

– Albert Einstein

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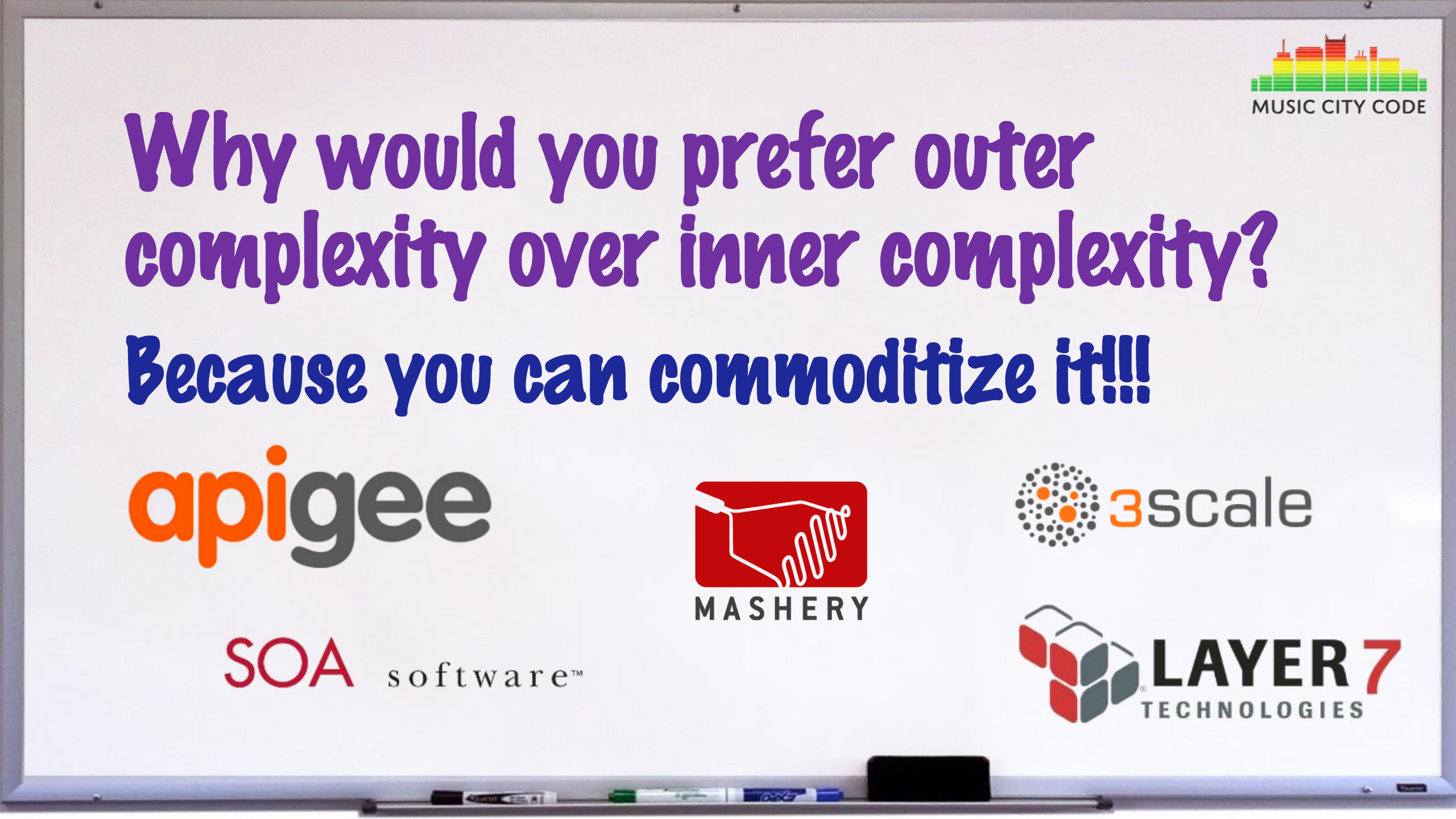
Why?

Microservices are Easy

Complexity cannot be destroyed, it can only be changed from one from to another.

– Gregory A. Beamer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Why would you prefer outer complexity over inner complexity?
Because you can commoditize it!!!
apigee
MASHERY
3scale
SOA software™
LAYER 7 TECHNOLOGIES

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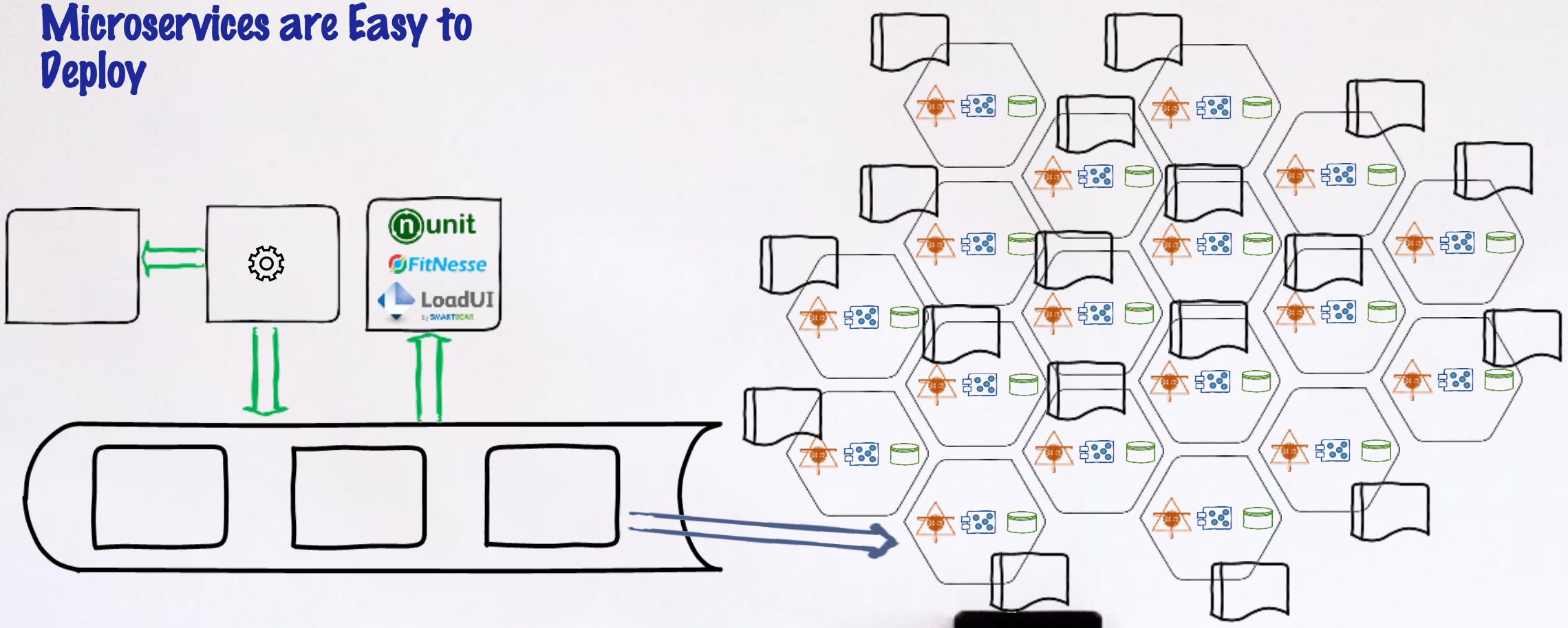
Why?

Microservices are Easy to Deploy



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Why spend all that time automating?

Because your ops people have better things to do

Because you can commoditize it!!!

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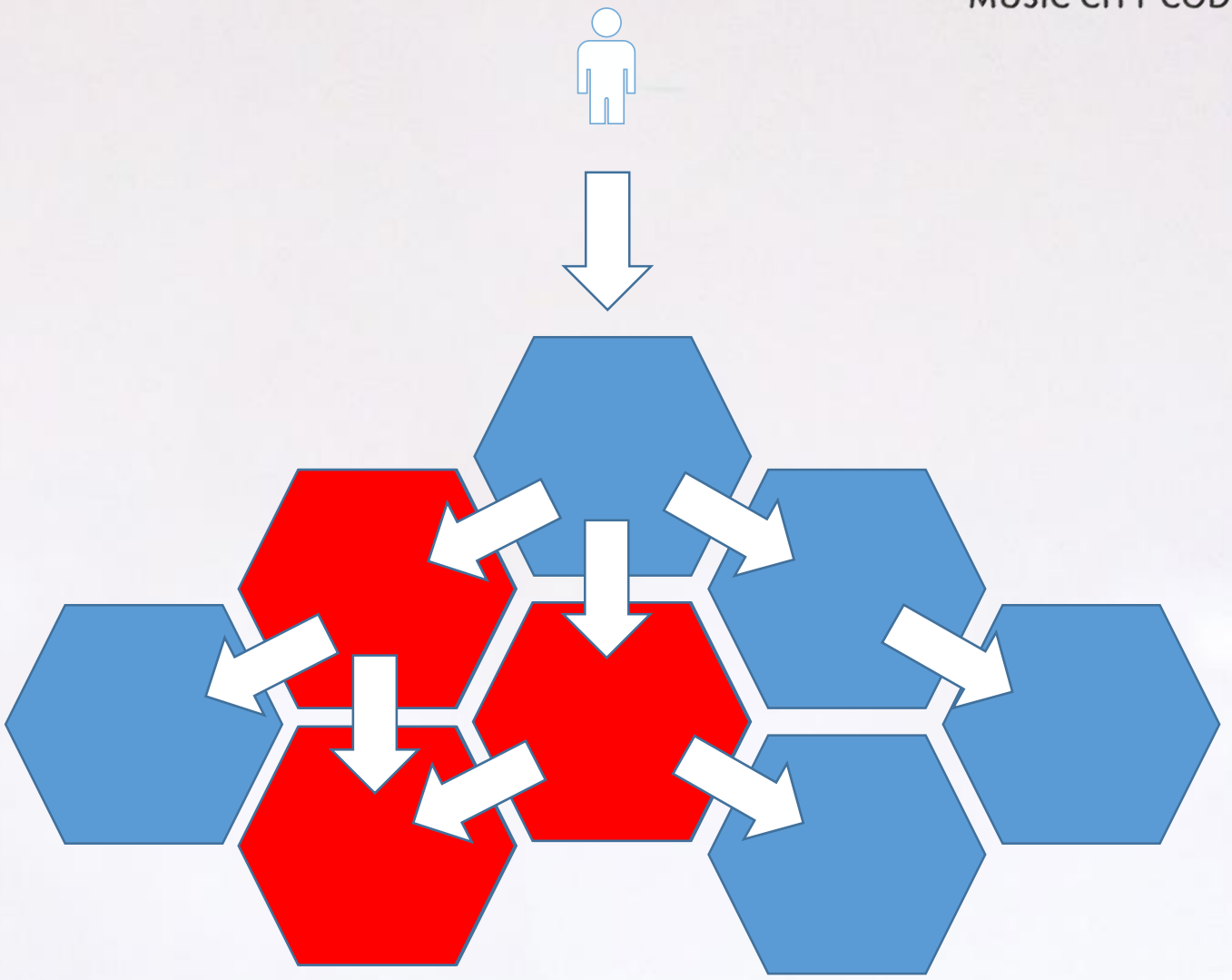
Why?

Resilience

Low Impact on Other Services



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How do you insure low impact on other services?

kubernetes by Google

docker

AppDynamics

apigee

Because you can commoditize

... and WORLD PEACE!

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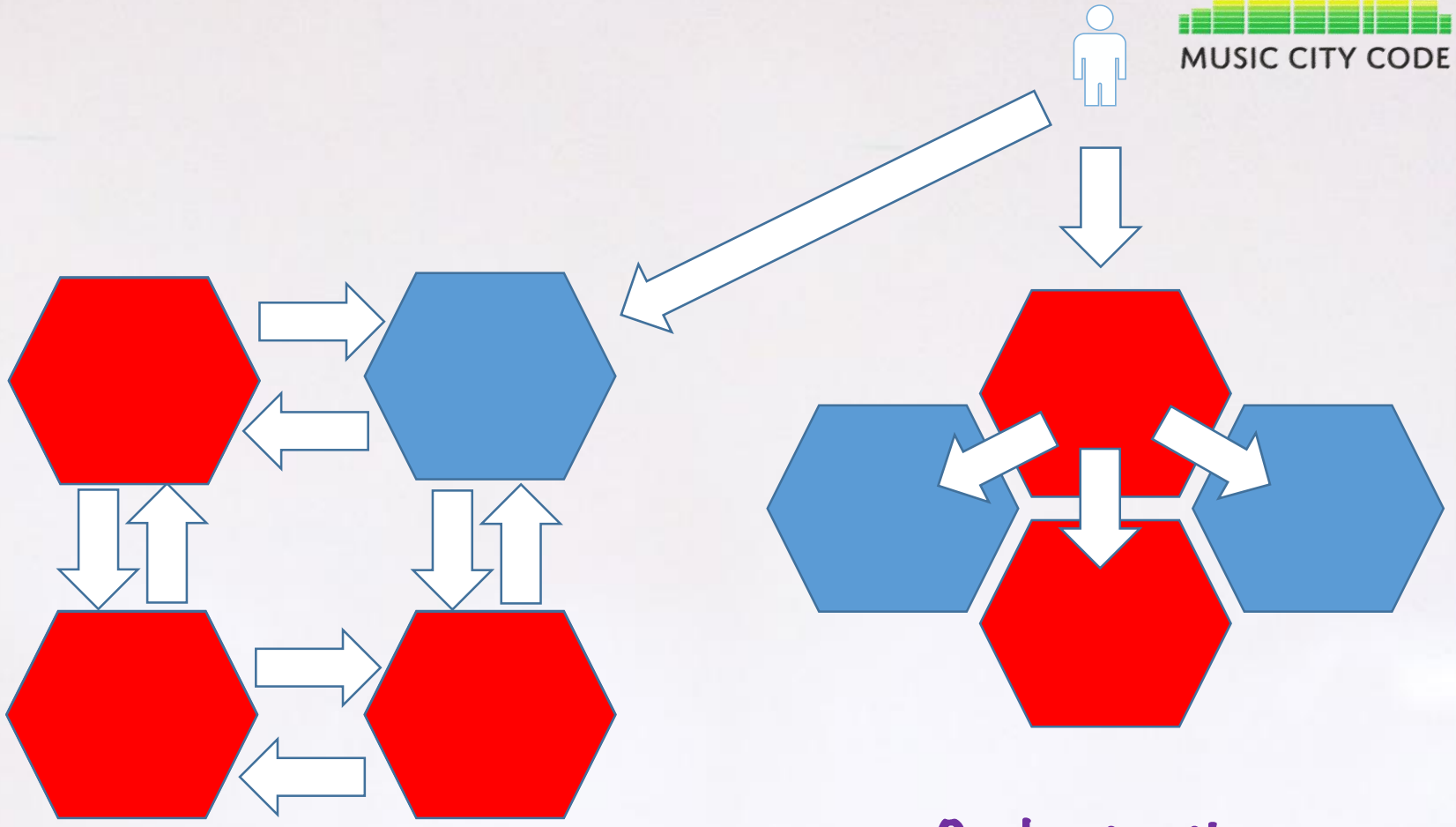
Why?

Resilience



Choreography

Orchestration

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Which is a better pattern: orchestration or choreography?

Which is better: A hammer or a screwdriver?

Hammers SUCK!!!

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Why?

Autonomy of Teams


C#


SQL Server


Python


PHP


F#


Mongo DB


Oracle


Java


Couch

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What do you call an organization with hundreds of microservices & every new technology known to man?

Bankrupt!

What?

Silver Bullet or Hot Air?

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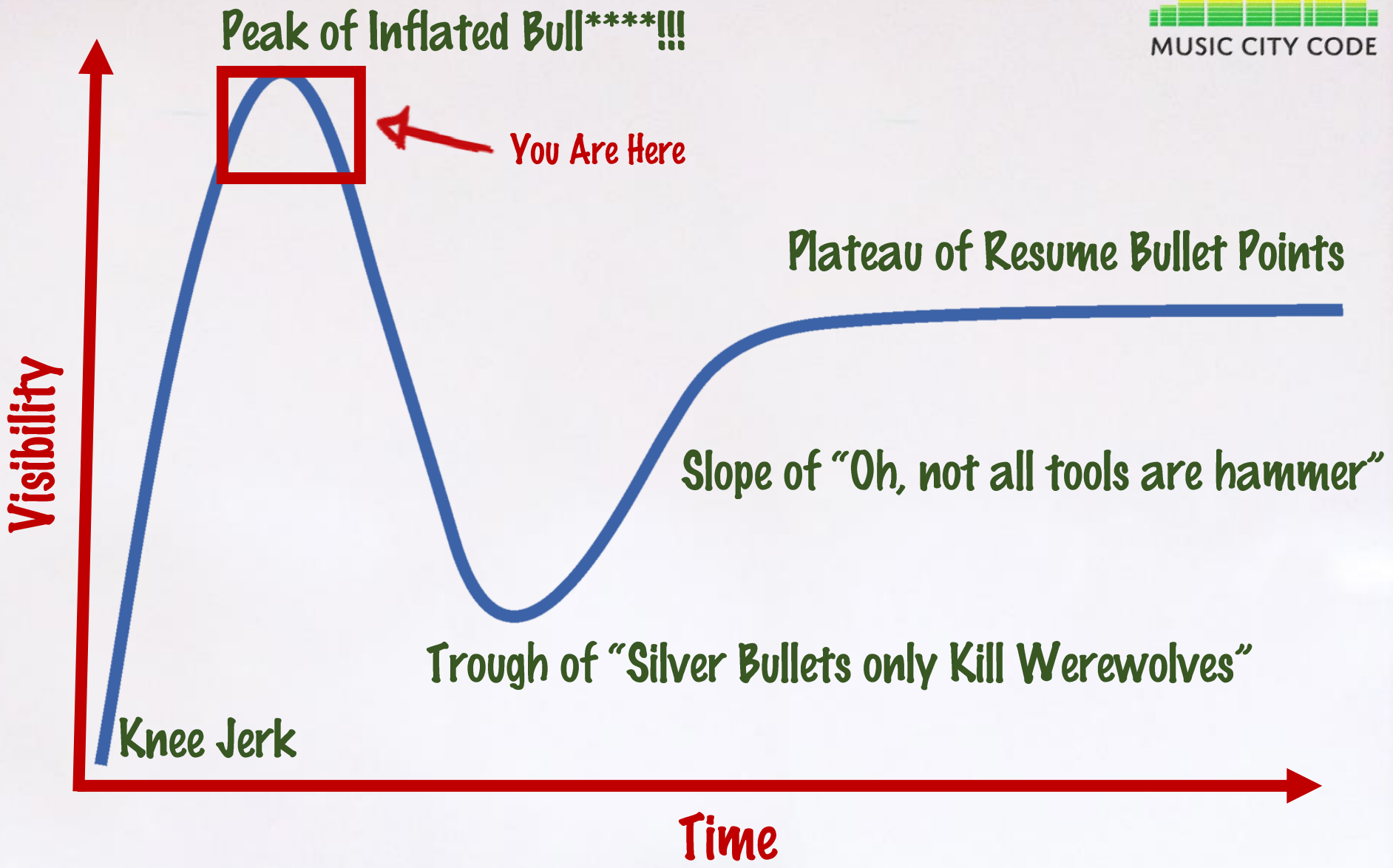
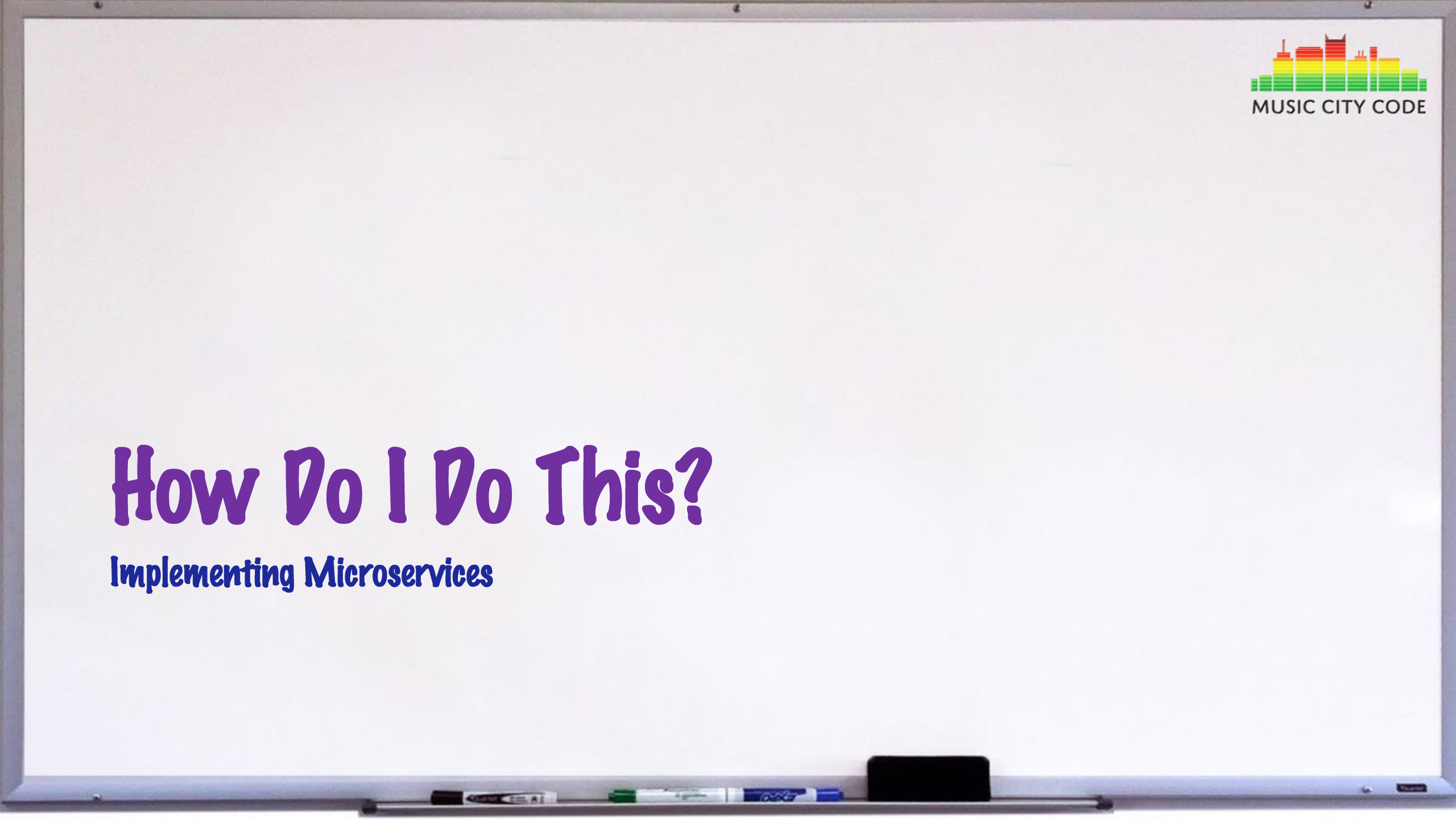
MUSIC CITY CODE

What?

Silver Bullet or Hot Air?




MUSIC CITY CODE
How Do I Do This?
Implementing Microservices

CASA Development Model

Core AS Application

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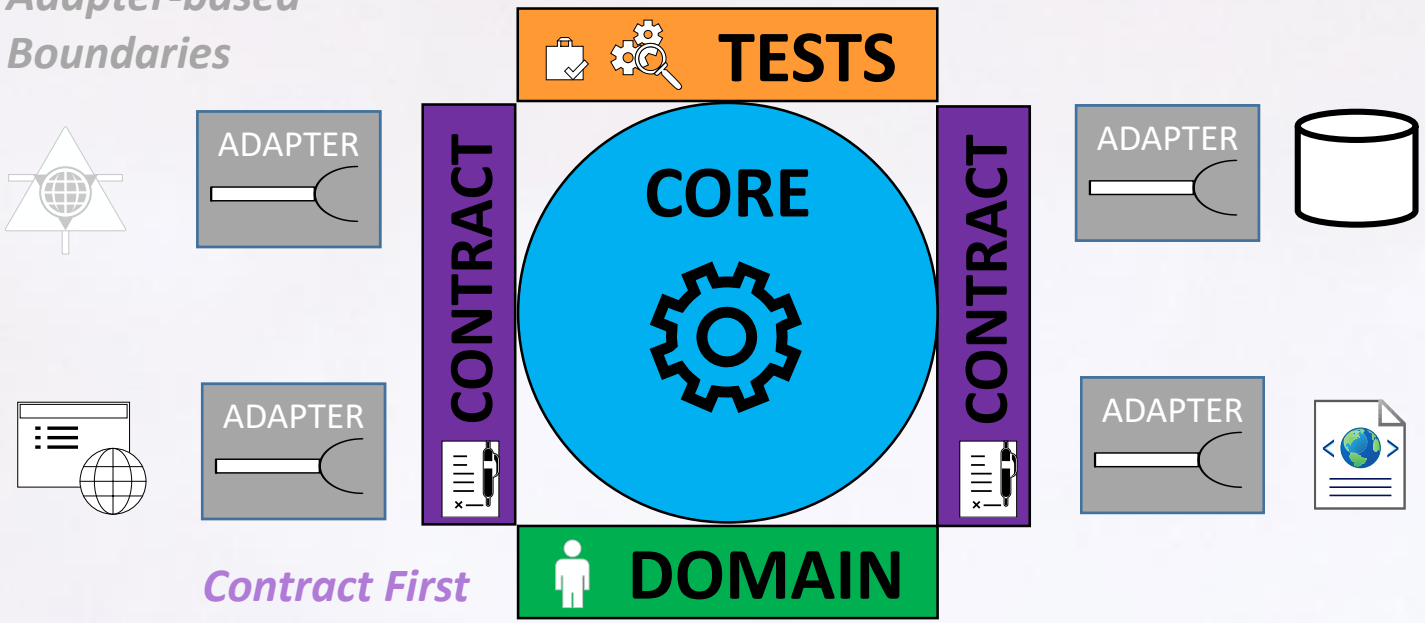
How?

Organize Your Code

Test Driven/ Test Early Approach

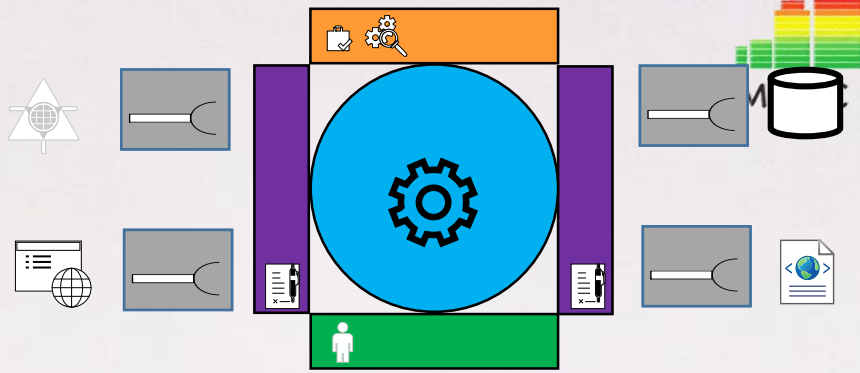
TDD *BDD* *ATDD*

Adapter-based Boundaries



Contract First Development

Domain Driven Design



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Solution Explorer

Search Solution Explorer (Ctrl+;)

Solution 'Microservices.Template' (13 projects)

- Core
  - Microservice.Template.Core
  - Microservice.Template.Core.Contracts
  - Core.txt
- Domain
  - Microservices.Template.Domain.Exceptions
  - **Microservices.Template.Domain.Models**
  - Domain.txt
- Framework
  - Framework.DependencyInjection
  - Framework.txt
- Persist
  - Microservice.Template.Persist.Contracts
  - Microservice.Template.Persist.Sql
  - Persist.txt
- Present
  - MicroserviceTemplate.Present.Web
  - Present.txt

- Service
  - Microservice.Template.Service
  - Service.txt
- Test
  - Accept
  - Integ
    - Microservice.Template.Core.Test.Integ
    - Microservice.Template.Persist.Sql.Test.Integ
    - test.integ.txt
  - Spec
  - Unit
    - Microservice.Template.Core.Test.Unit
    - MicroserviceTemplate.Present.Web.Test.Unit
    - test.unit.txt
  - Test.txt

Solution Explorer | Team Explorer | Class View

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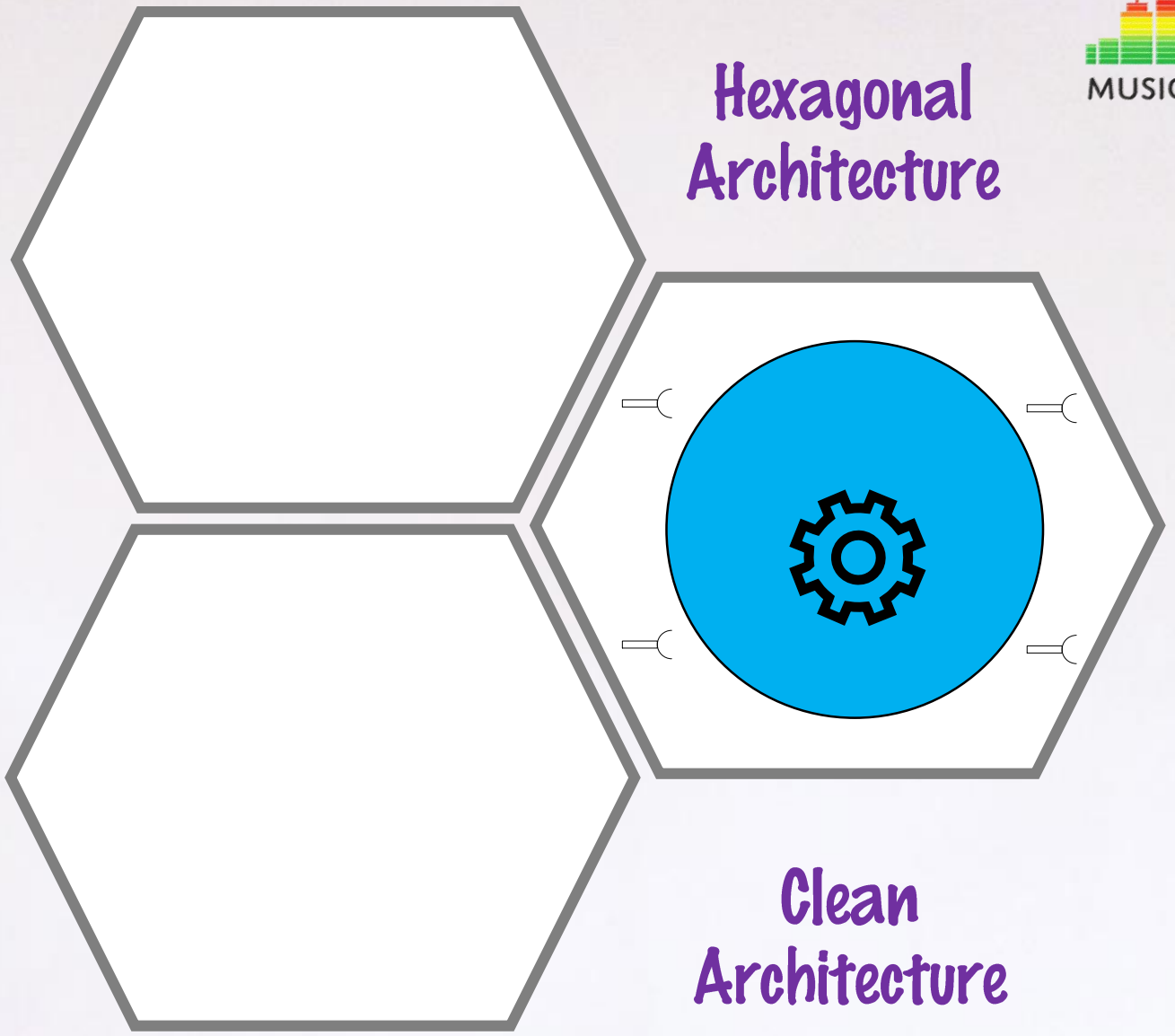
How?

Organize Your Code



Hexagonal Architecture

Clean Architecture

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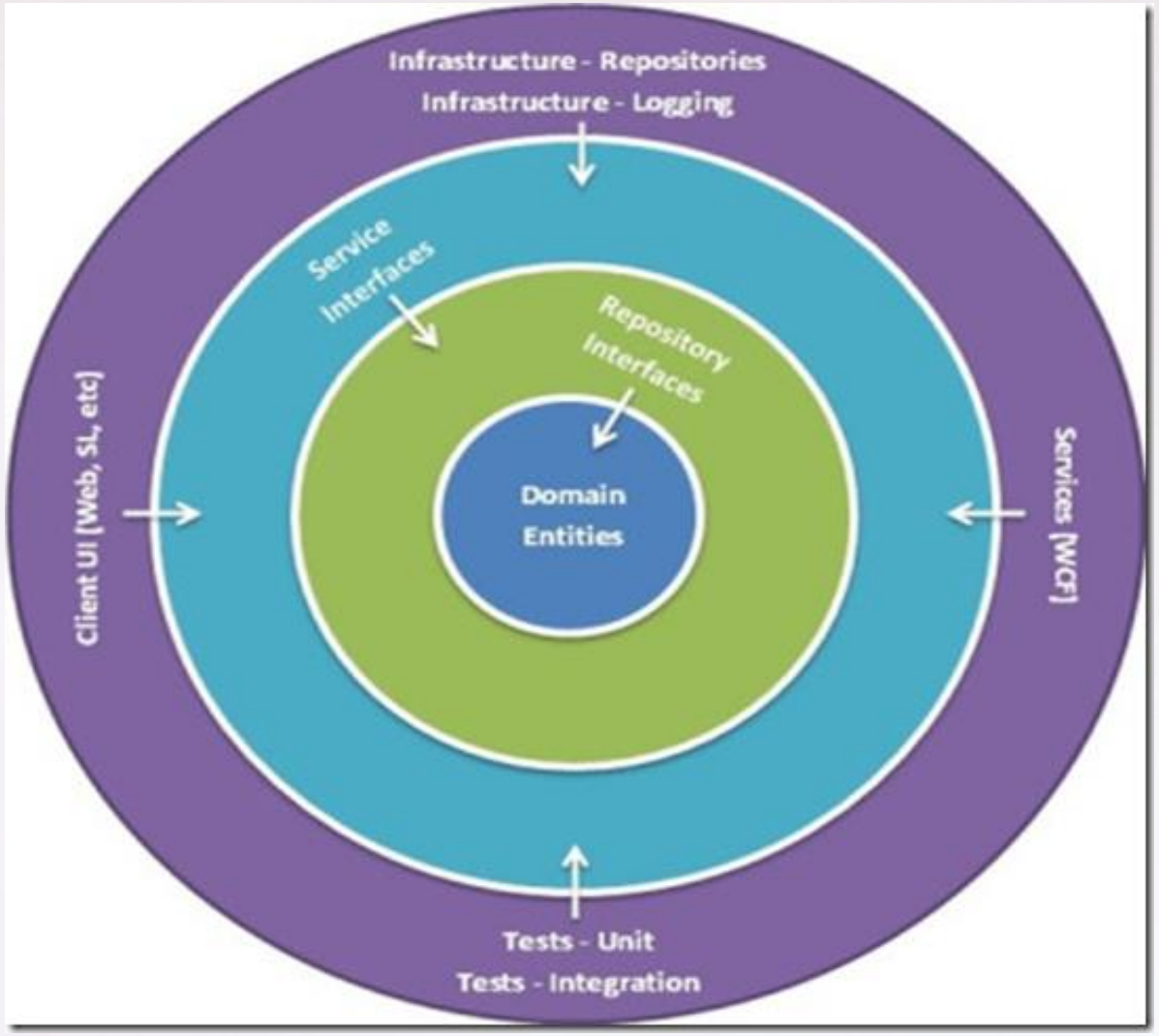
How?

Organize Your Code



CASA Development Model

Core AS Application

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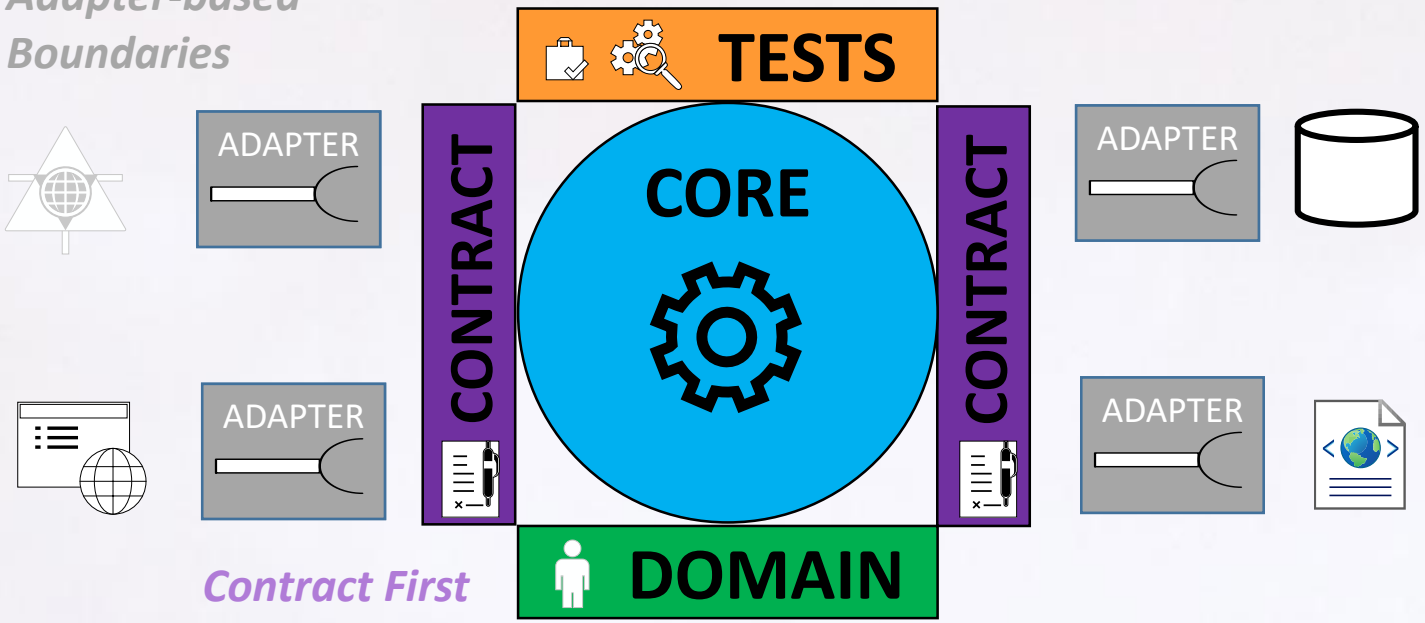
How?

Organize Your Code

Test Driven/ Test Early Approach

TDD *BDD* *ATDD*

Adapter-based Boundaries



Contract First Development

Domain Driven Design

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How?

Best Practices & Patterns

- SOLID Design Principles
  - You know these right?
- Domain Driven Design
  - State Objects
  - Core Business Logic
  - Other Concerns
- Contract First Development
  - Customer Driven Contracts

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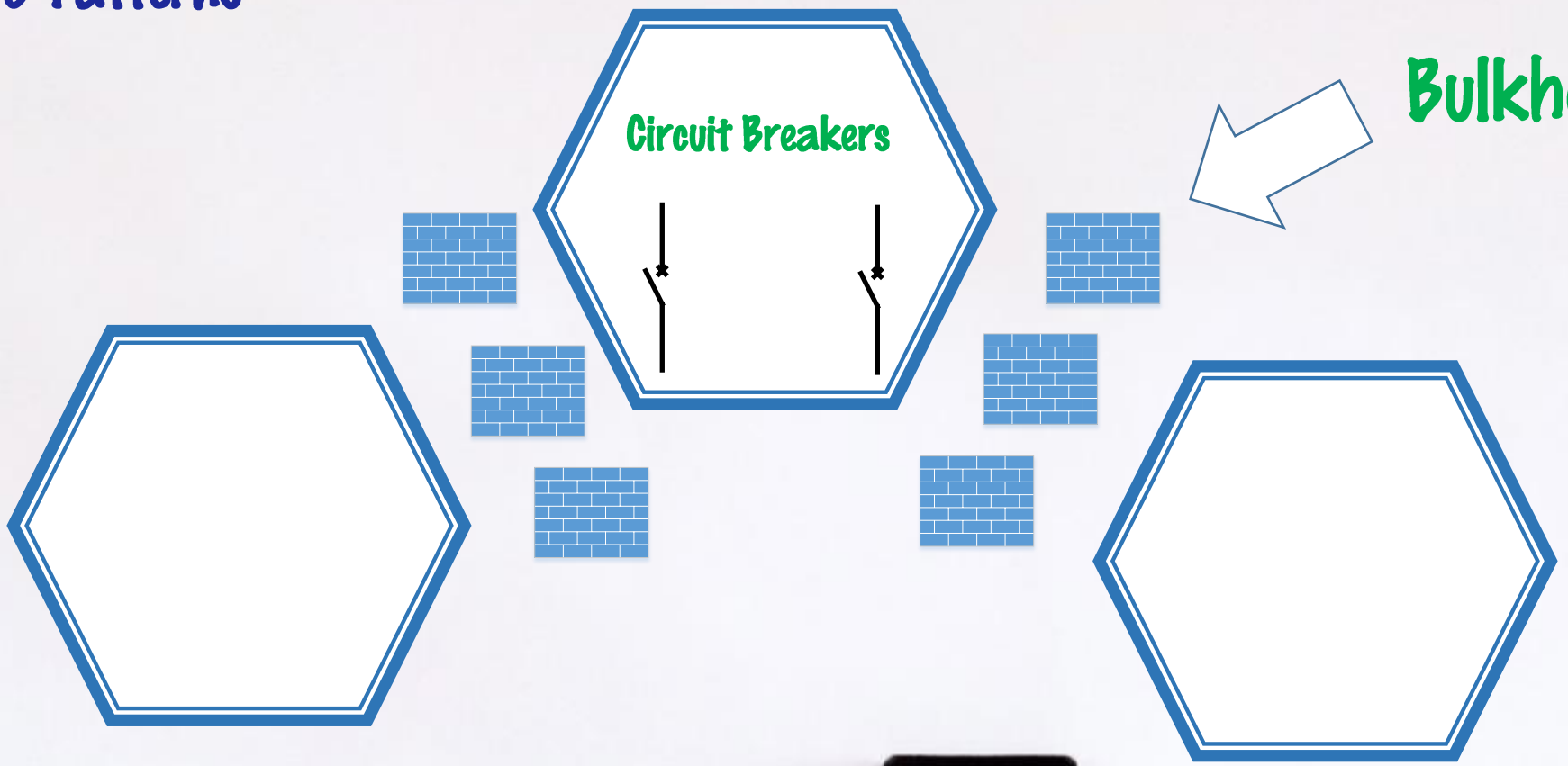
How?

Best Practices & Patterns

- Circuit Breakers
- Bulkheads



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How?

Organize Around Capabilities

- What is a Capability?

Any business function that can be coded as a stand alone

Any business function that can easily be handed off to another team

Any business function that can be handled by another company

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How?

Organize Around Capabilities

- Which of these are capabilities?

Shopping Cart?

Purchase Path?

Company Catalog?

User Access?

Database Access?

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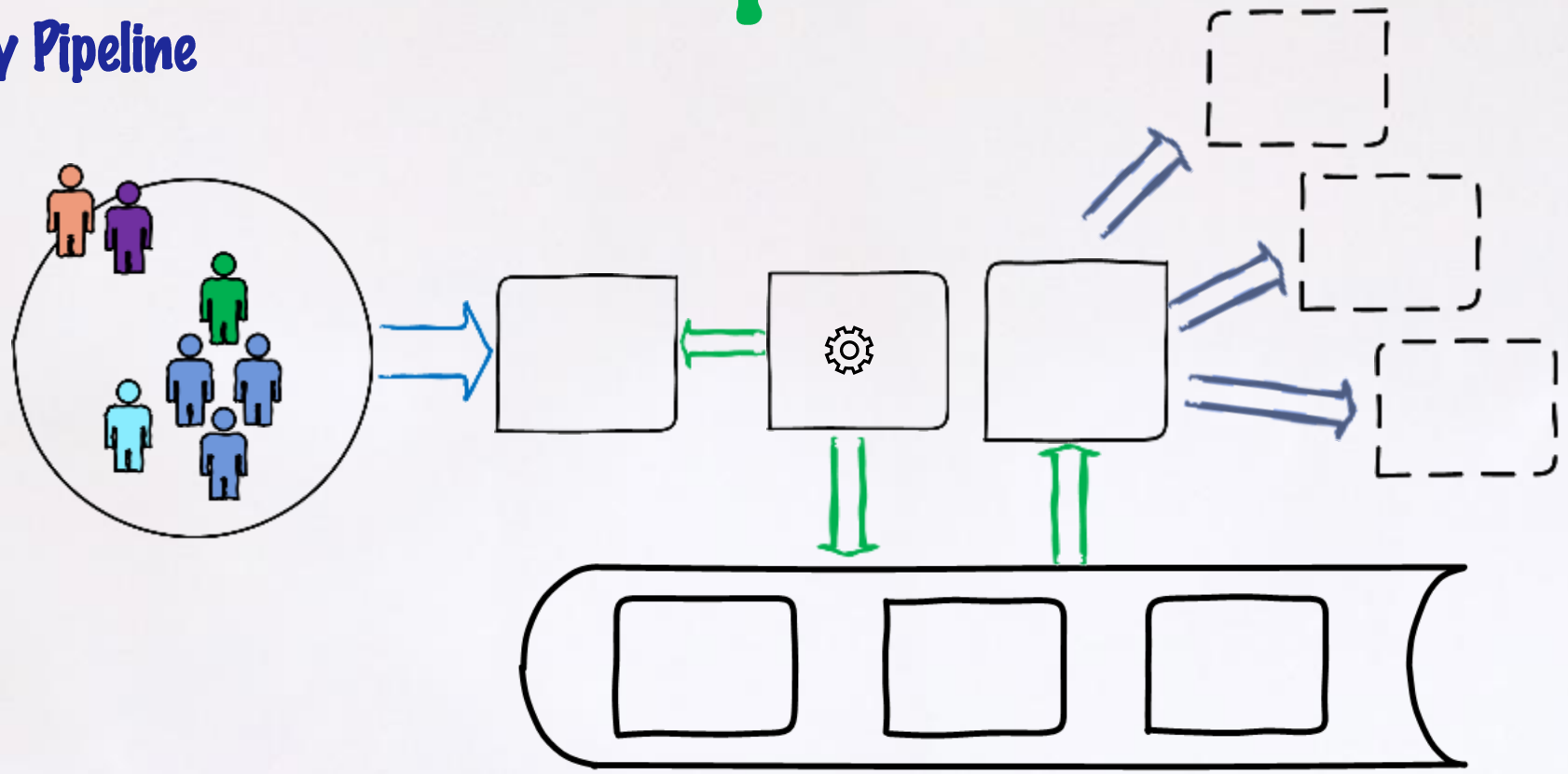
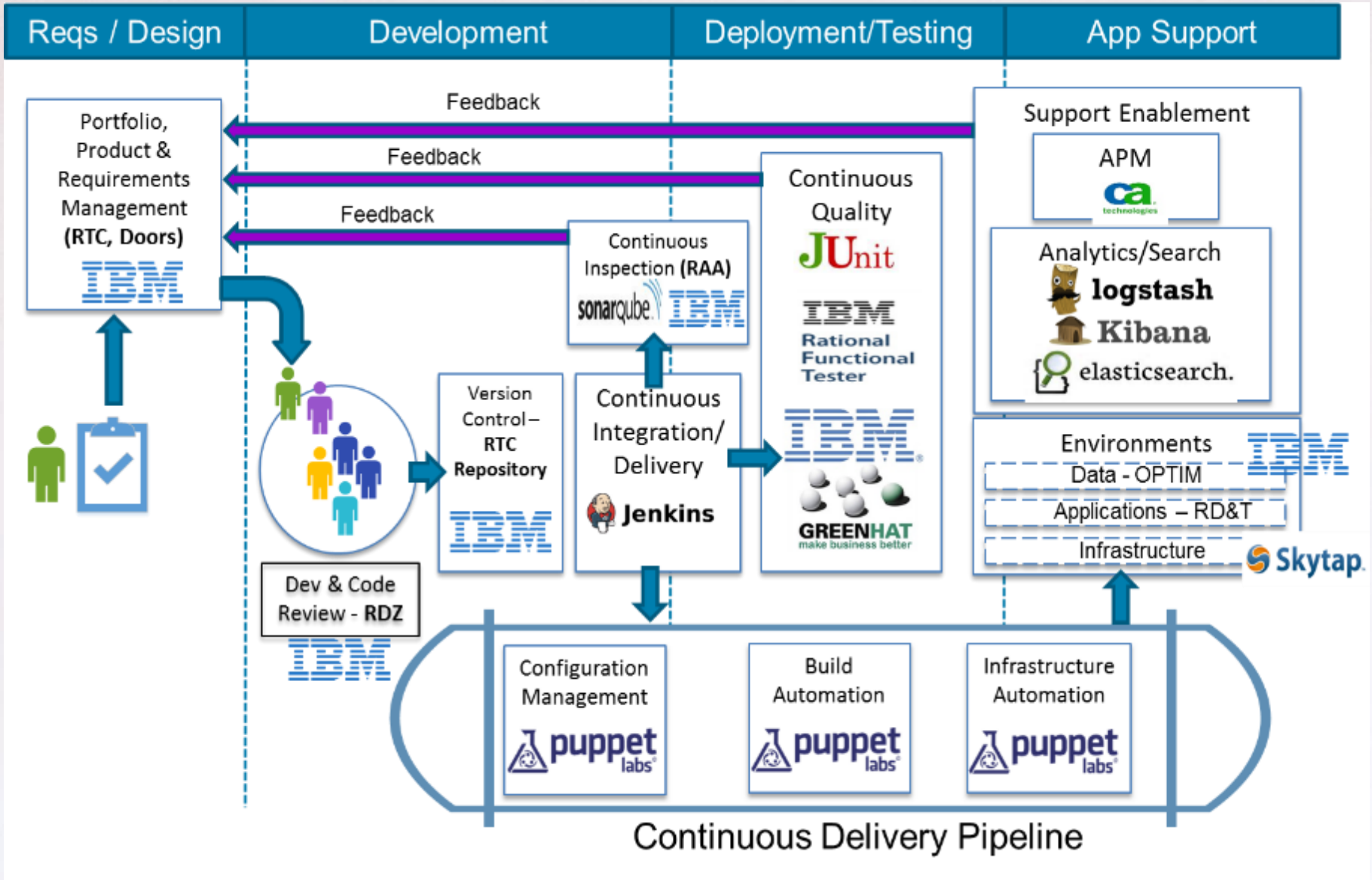
DevOps

How?

Automate the Delivery Pipeline





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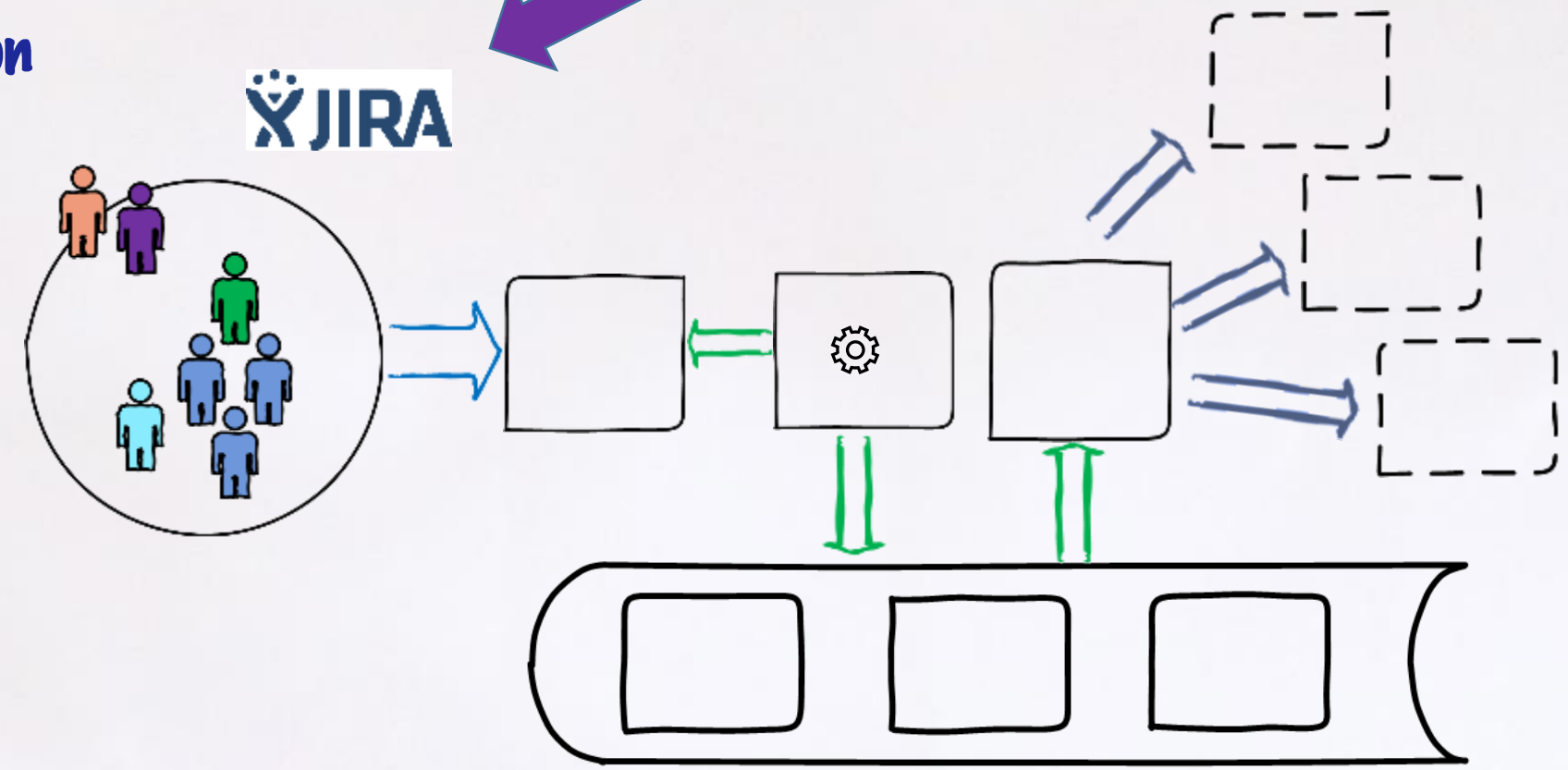
How?

Monitor Your Solution



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How?

Abstracting Service Boundaries

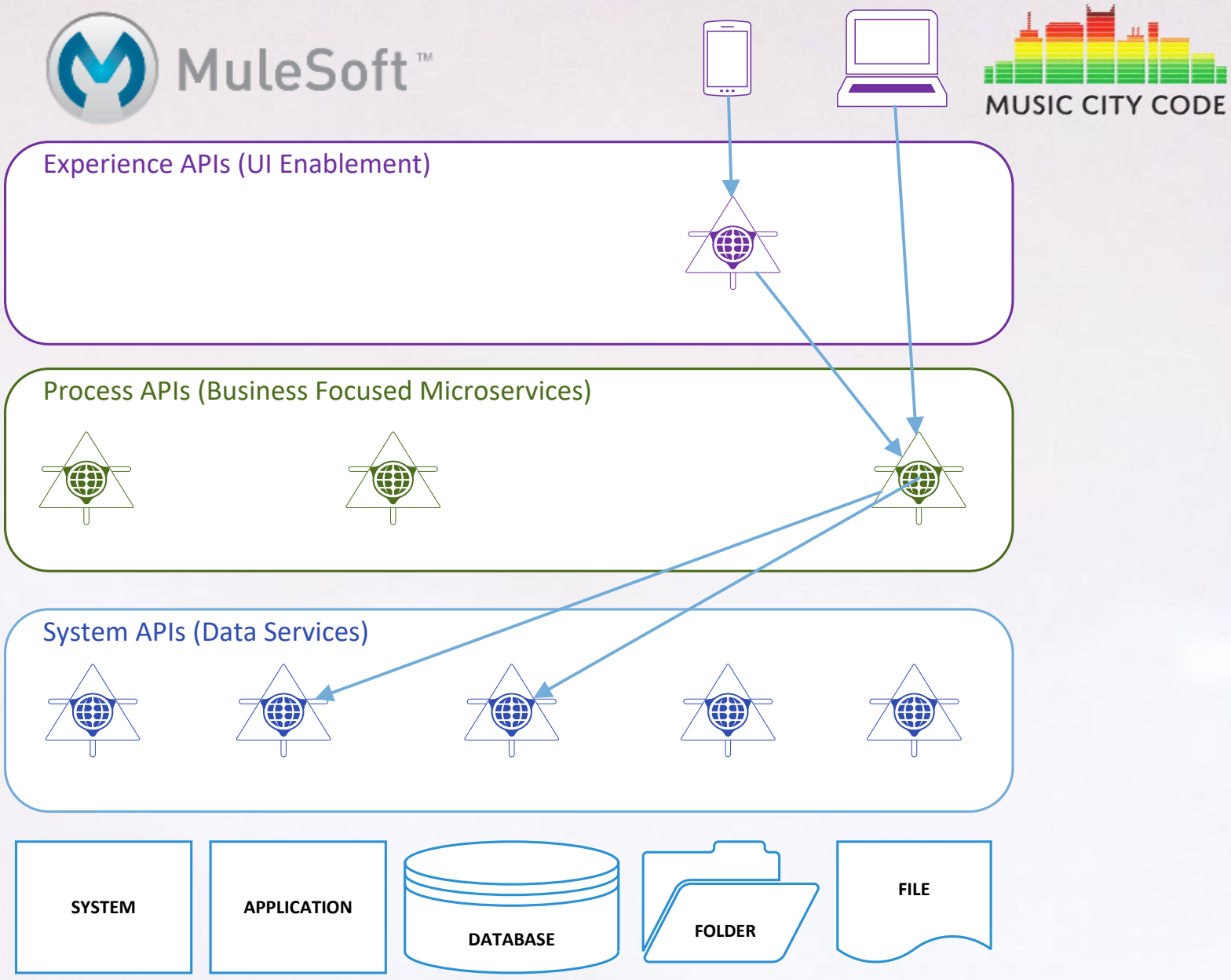
- How do we abstract?
  - API Management
  - Message Queueing

Stay in the room for Shawn's talk (NEXT) to learn more about abstraction with an event-driven approach

How?

Abstract

- No ESB, right?



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Here in the Real World

Inspired by Real Events

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Real World

Determining Services: Decomposition

Let's Make Asssumptions

- We are a board game company
- We recently completed a kickstarter
- The game is selling
- We need to go beyond the kickstarter and sell on our own

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Shopping Cart

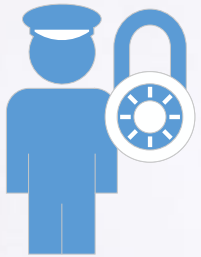
Real World

Determining Services: Decomposition

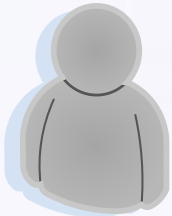
Shopping Cart

Item Lookup

Wish Lists



Security



User

Payment

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Real World

Determining Services: Decomposition

What if we are green field?

- Same Process
  - Gather Requirements (stories?)
  - Find business capabilities

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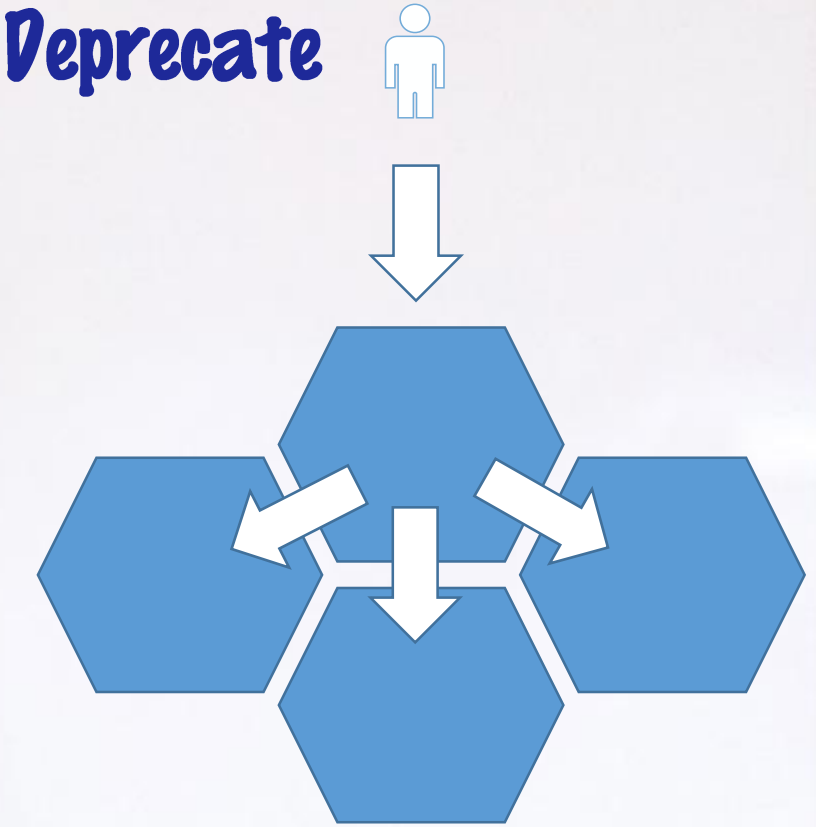
Real World

Determining Services: Decomposition

What if I have larger services?

- Orchestrate and Deprecate



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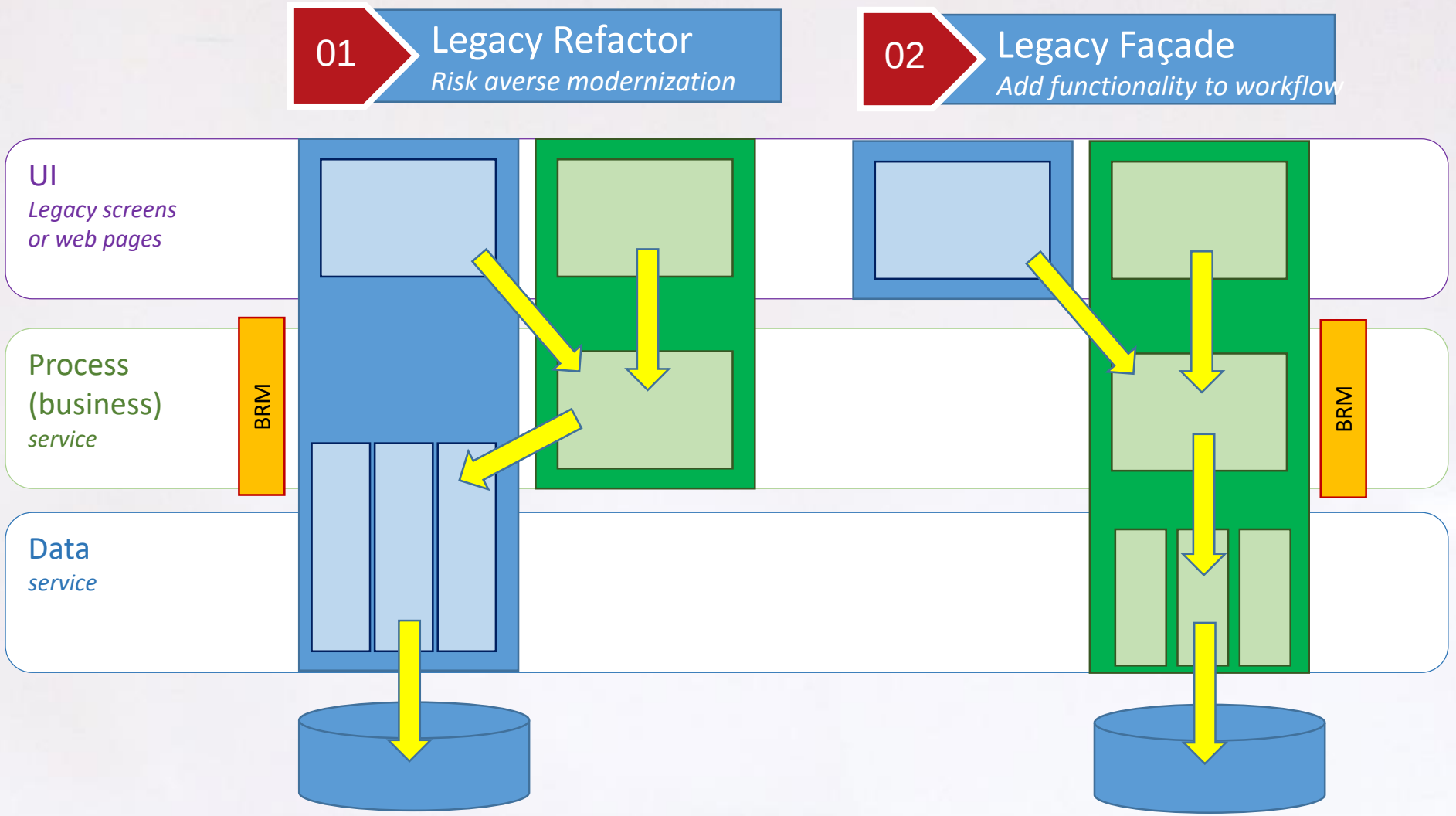
Real World Legacy Modernization



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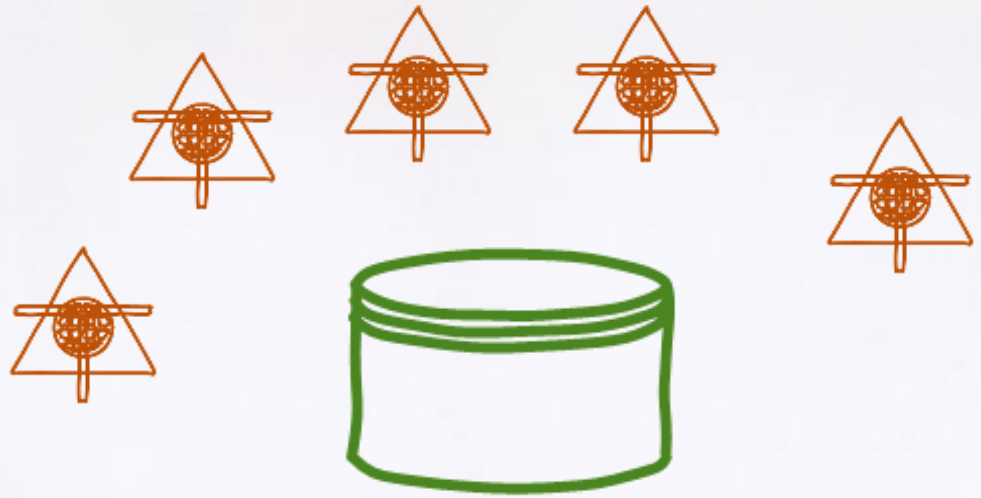
Real World

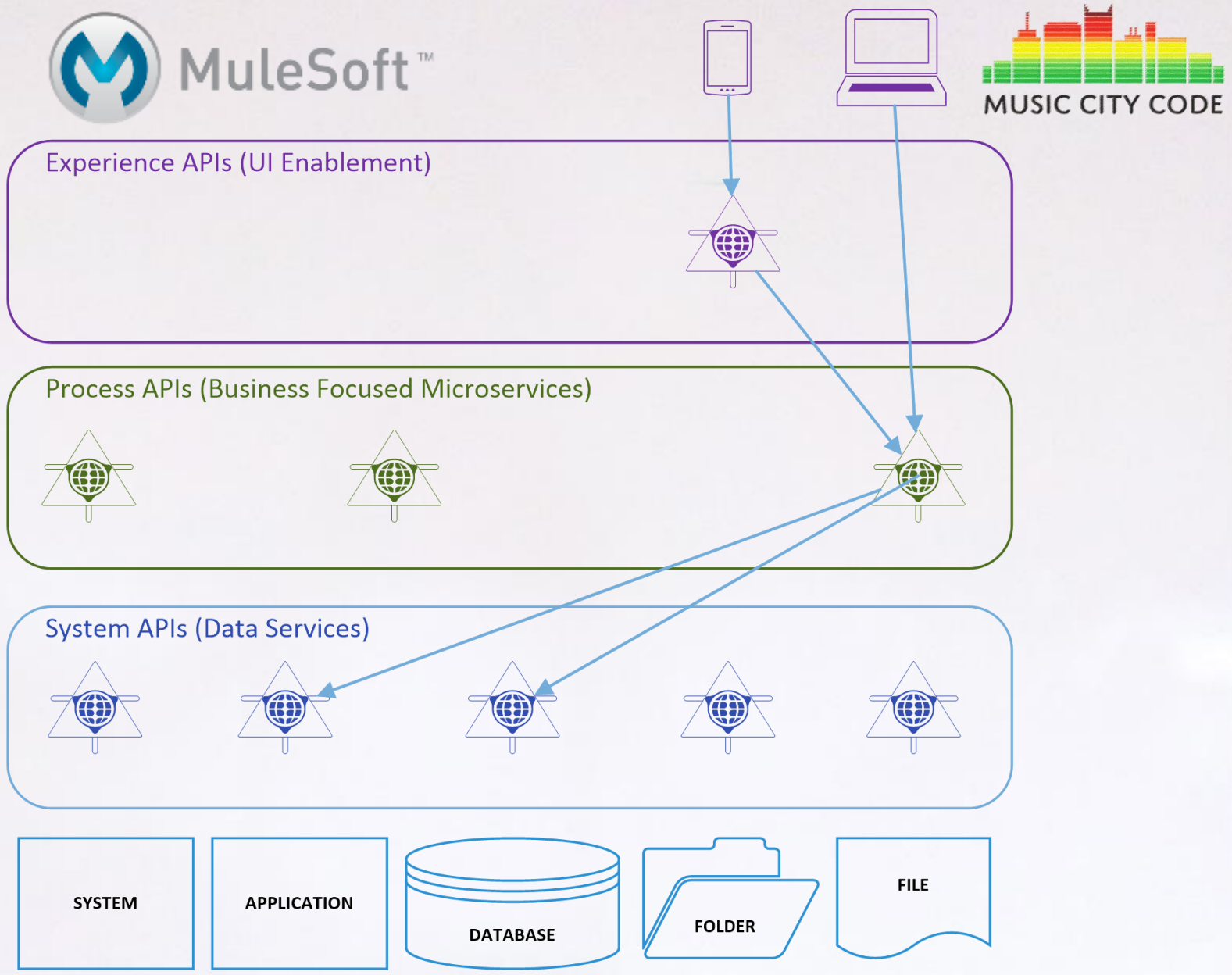
Data Focused Microservices

- Don't do this!!!



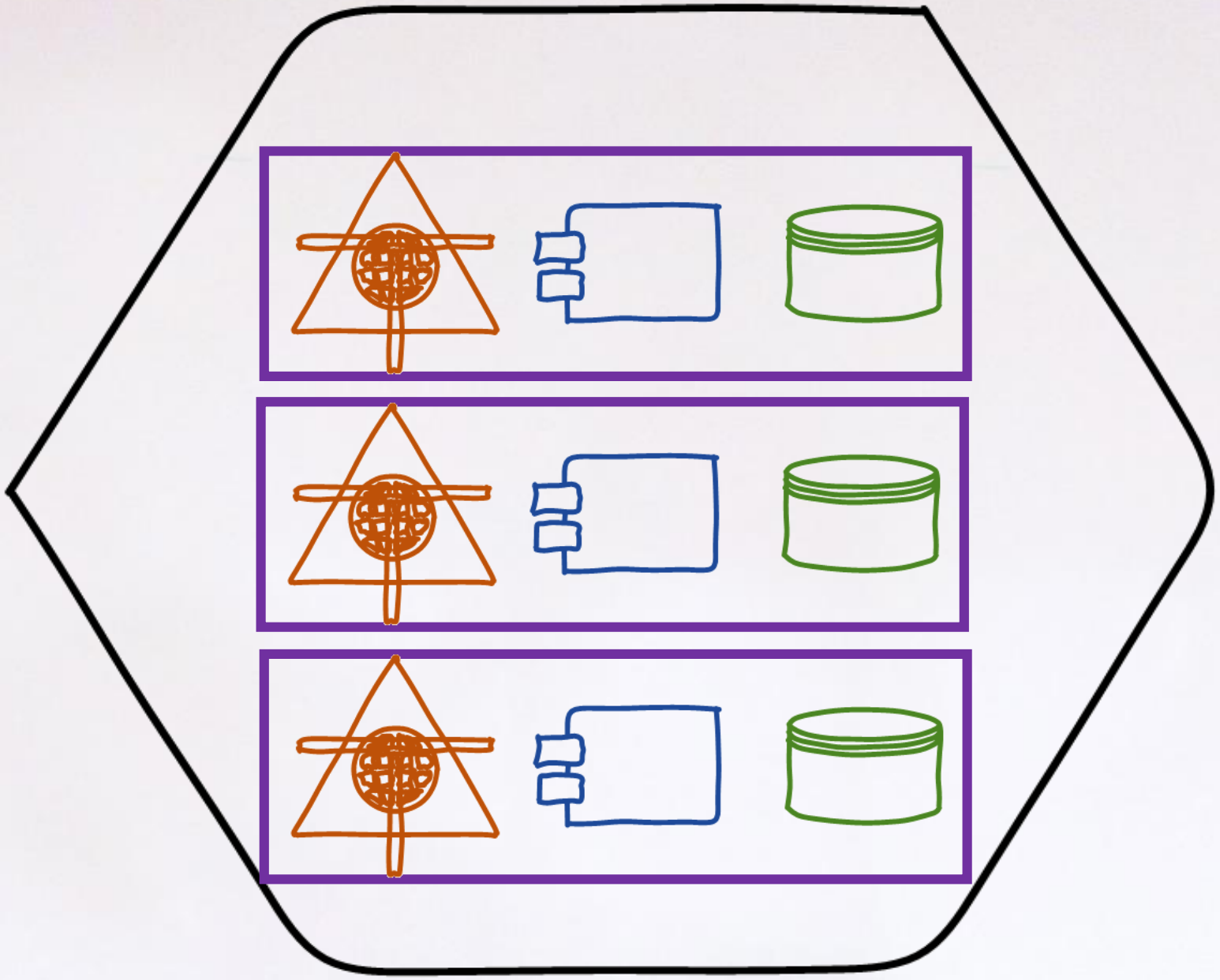
Real World

Data Focused Microservices



Real World

Scaling



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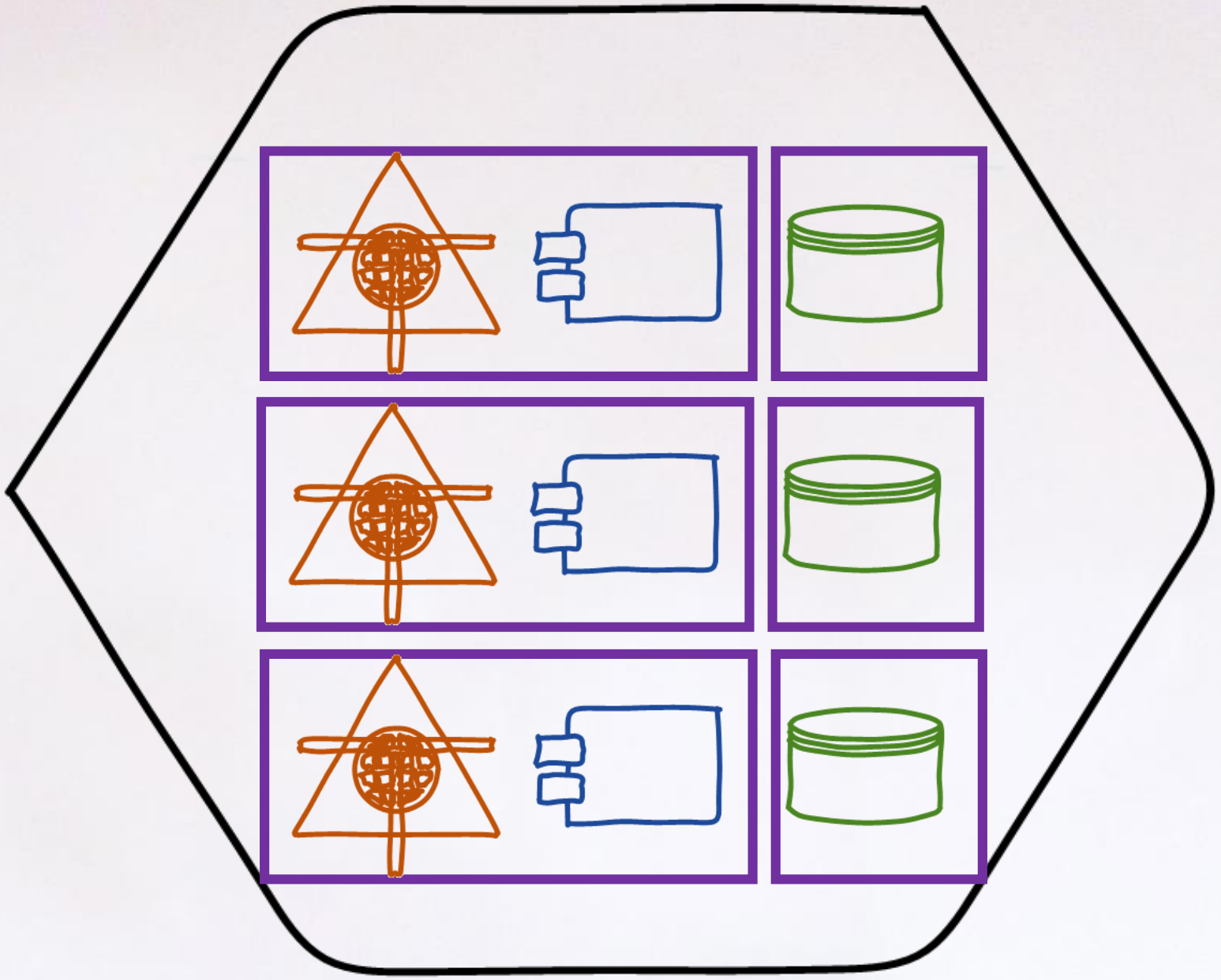
Real World

Scaling



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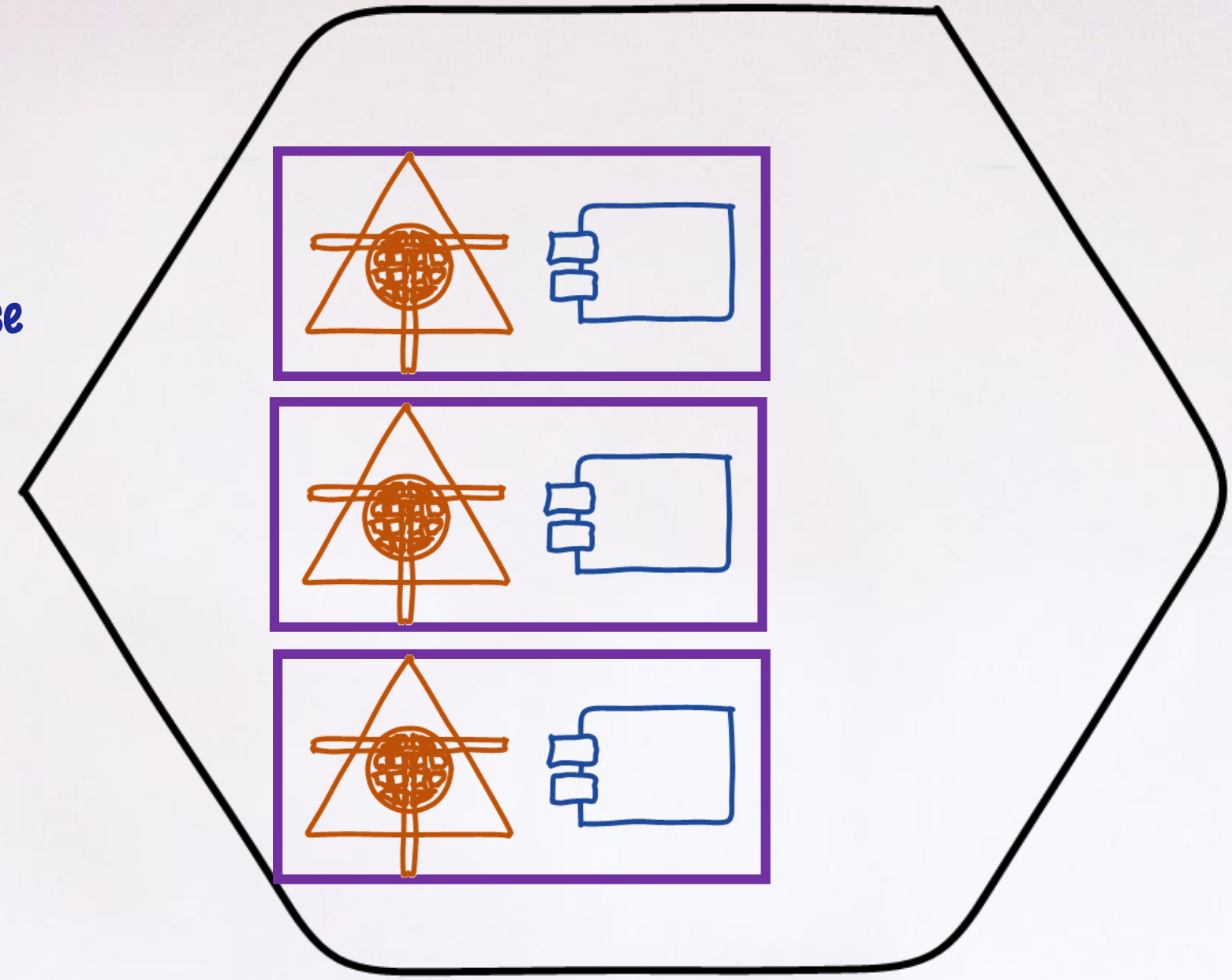
Real World

Central Database



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MUSIC CITY CODE

Real World

Central Database

Best Practices

- A single microservice owner for each table – if possible
- All access through the microservice

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Real World

Other Notes

- In a purist environment, you will have to consolidate the data at some point
- Be prepared to introduce Master Data concepts
- How do you eat an elephant?
  - One bite at a time

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Other Random Bull****!!!

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MICROSERVICES

Lessons from the Trenches

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