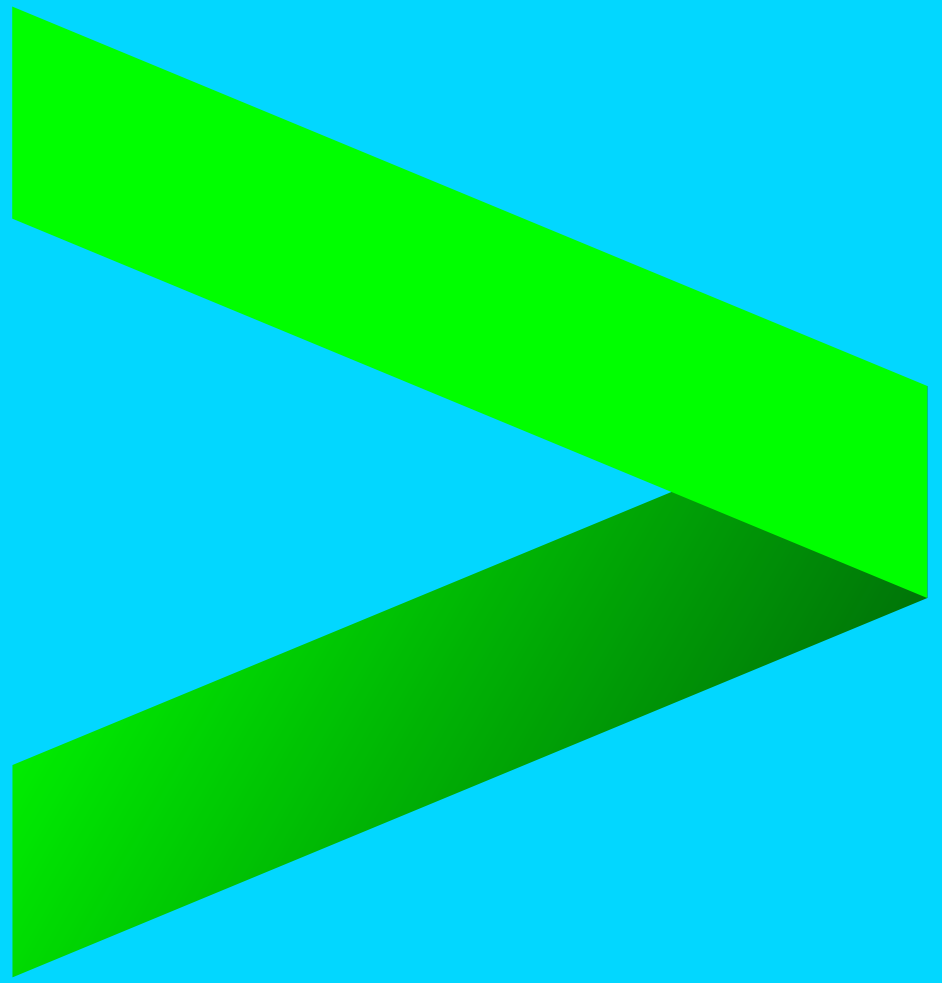
# AGILE AND AUTOMATION CONCLAVE 2018

## Monolith to Microservices

Incremental & Iterative transformation

Mohammed Shuaib Mumtaz



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#Microservices,
#Evolutionary Design,
#DevOps

# AGENDA

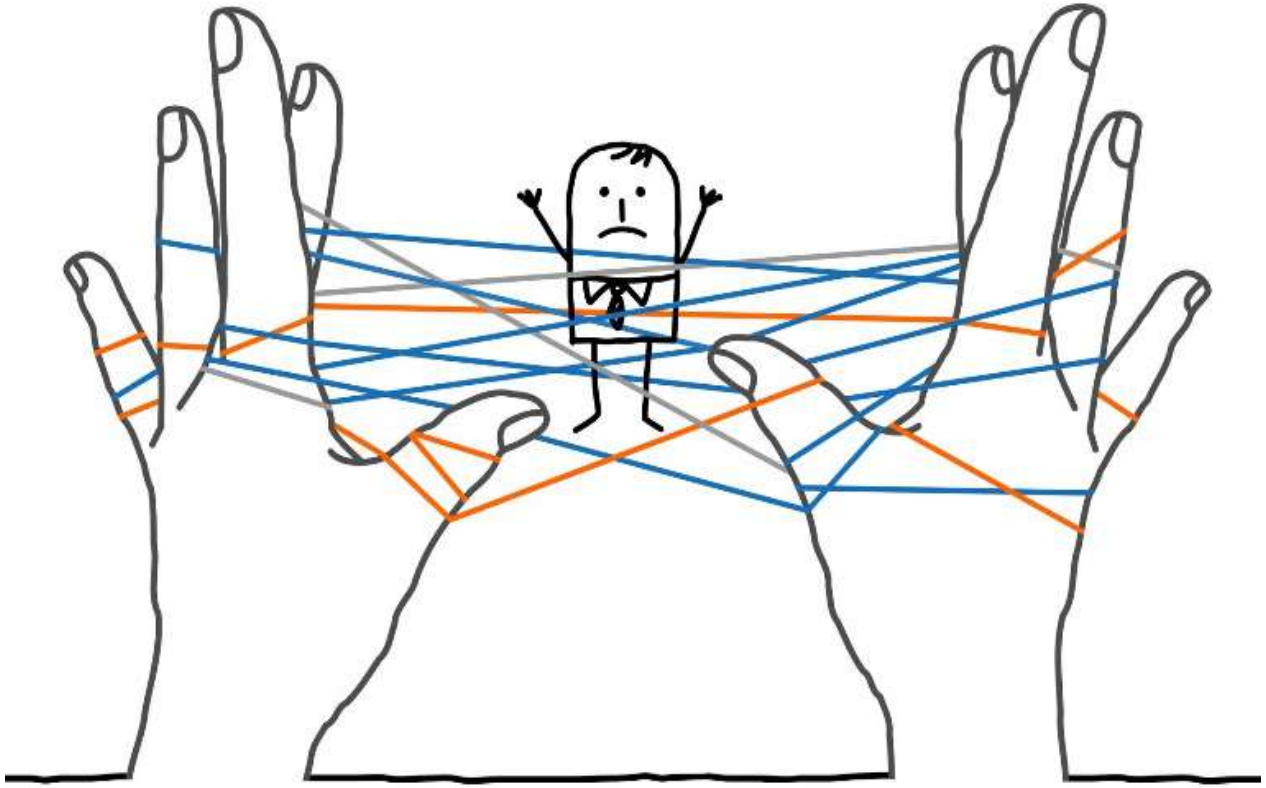
- Monolith Application Issues and Challenges
- Decomposition - Key Patterns and Concepts
- Systematic Refactoring Strategy
- Case Study
- Demo and Code Walk Through
- Q&A

# The Need

- Why is there a need to convert a fully functional running monolithic application to Microservices ?
- Is the conversion worth the pain and effort?
- Should I be converting all my applications to Microservices

# Issues with Monolithic Applications

| | |
|---|---|
| Gets bigger and bigger | Everything is shared (coupled) |
| Change is discouraged | Side effect accompany change |
| Scaling is challenging | Architectural changes are impossible |
| Steep Learning Curve | Longer time-to-market |



# How to Decompose Big, Scary Monolith Application ?


**Using Refactoring approach:**

- Branch by abstraction
- Strangulation
- Feature Toggles
- …

Best Done Incrementally !

# Branch By Abstraction

Make a large-scale change to a software system in gradual way

Release the system regularly while the change is still in-progress.

Create an abstraction layer between the desired changes and the remainder of the application

Enable evolutionary design of the application architecture while preserving the cadence of value delivery

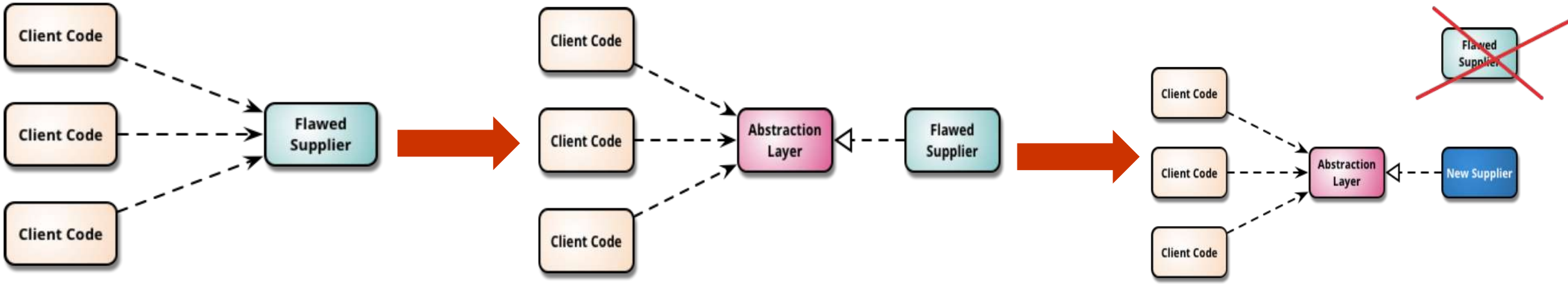
Decouple design lead time from release lead time

# Branch By Abstraction Pattern

**STEP 1 –** Identify the Component to Replaced

**STEP 2 –** Create an Abstraction Layer & Refactor the System to use Abstraction Layer

**STEP 3 -**Remove the old implementation



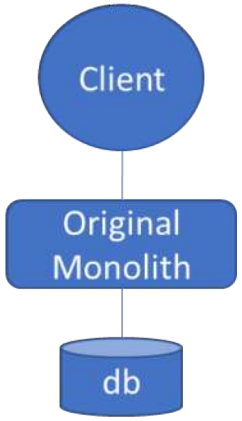

**Key benefit :** Code is working at all times throughout the re-structuring, thus enabling continuous delivery

*Excerpt from Source at: https://martinfowler.com/bliki/BranchByAbstraction.html*

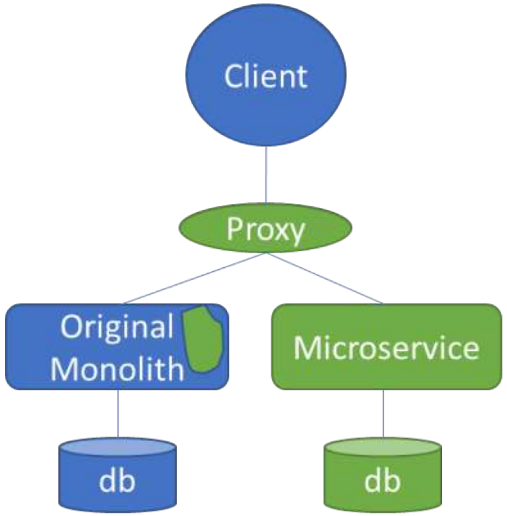
# Straggler Pattern

- Create a new system around the edges of the old one and letting it grow slowly until the old system is strangled

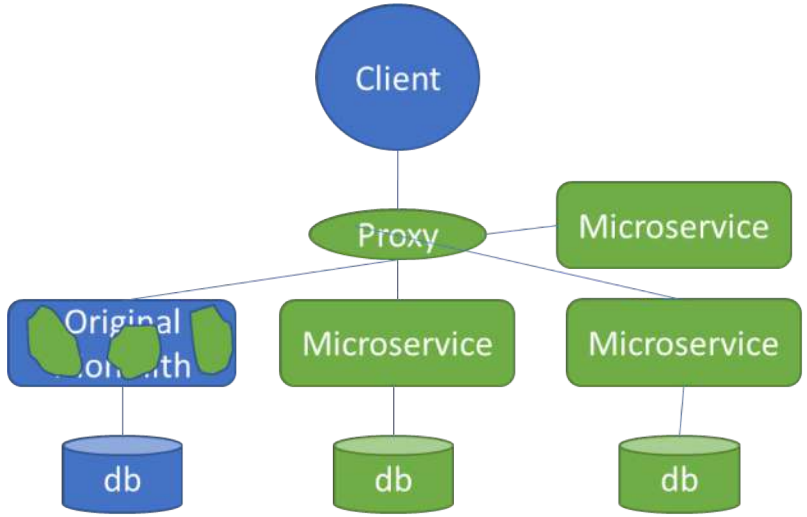
**Transform** – Create a parallel microservice




**Co-exist** – Incrementally redirect the traffic from the legacy to microservice



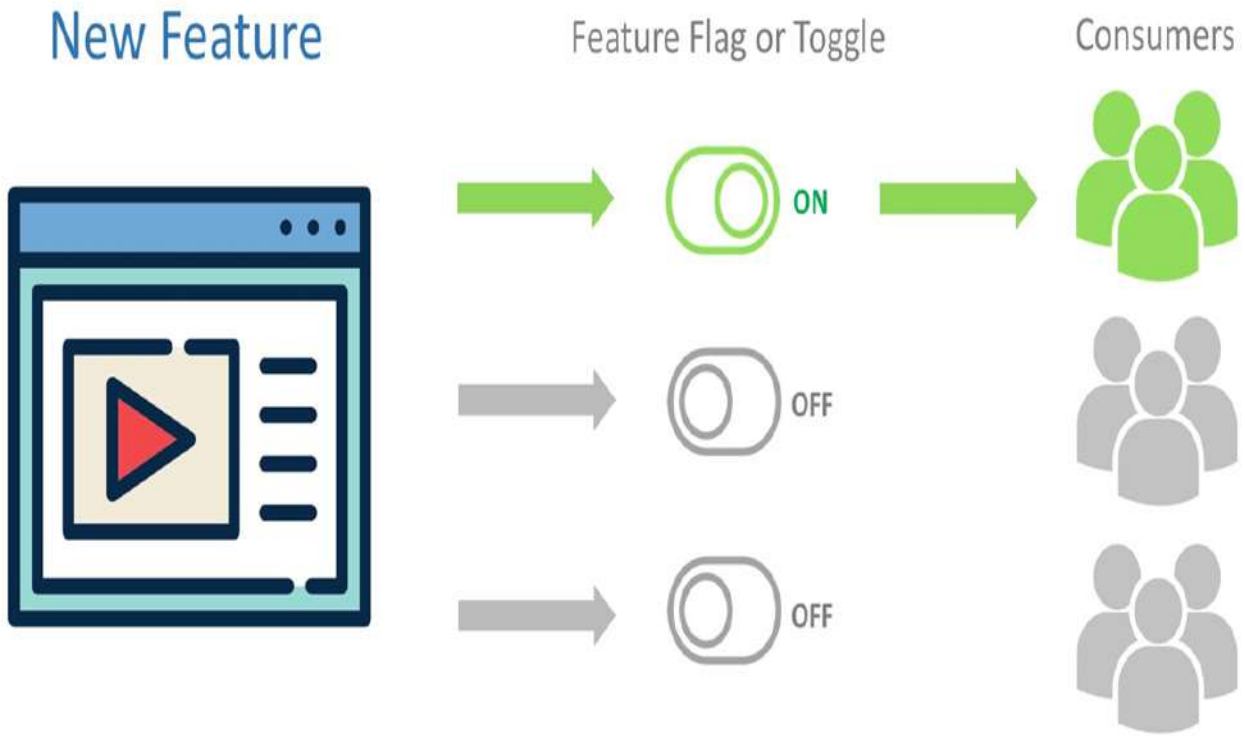

**Eliminate** –eliminate the legacy module



# Feature Toggles Pattern

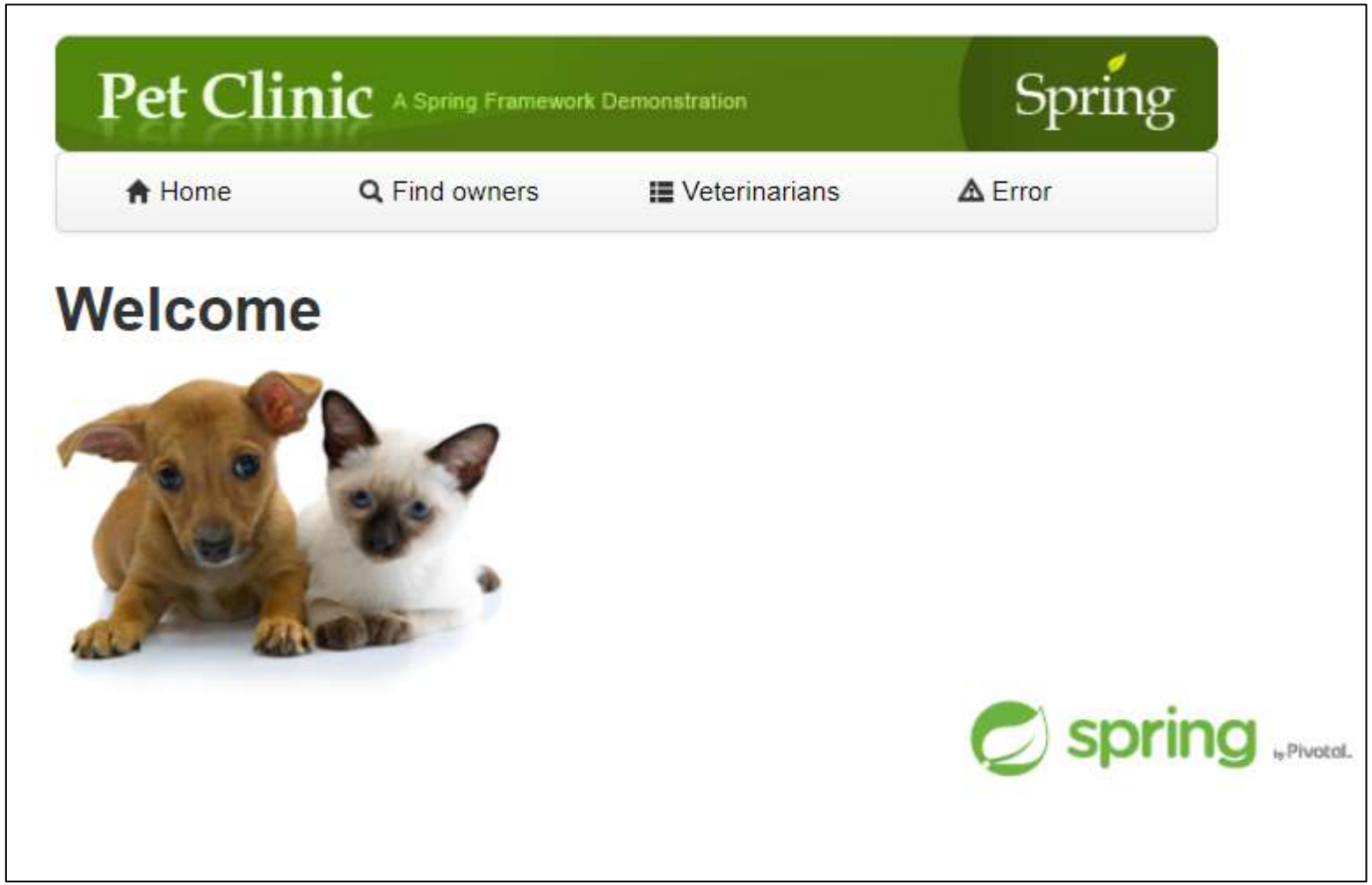
Uses:

- Allows continuous delivery of small increments to production
- Reduces branching-merging overheads
- Helps deliver new functionality to users rapidly but safely
- Dynamically controlling system behavior
- With canary deployments  which allow developers to have features incrementally tested by a small set of users

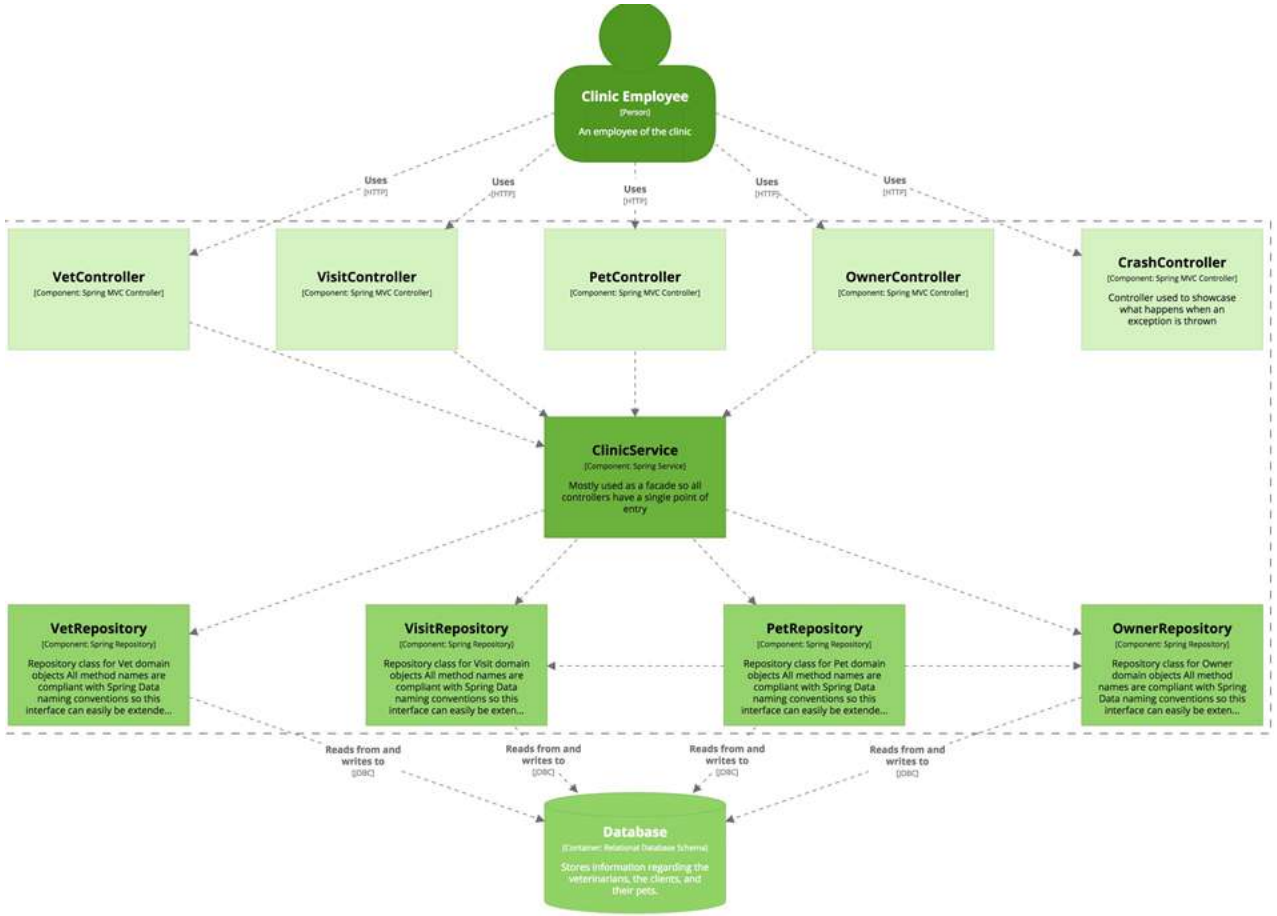


# Steps to Take from Monolith to Microservices

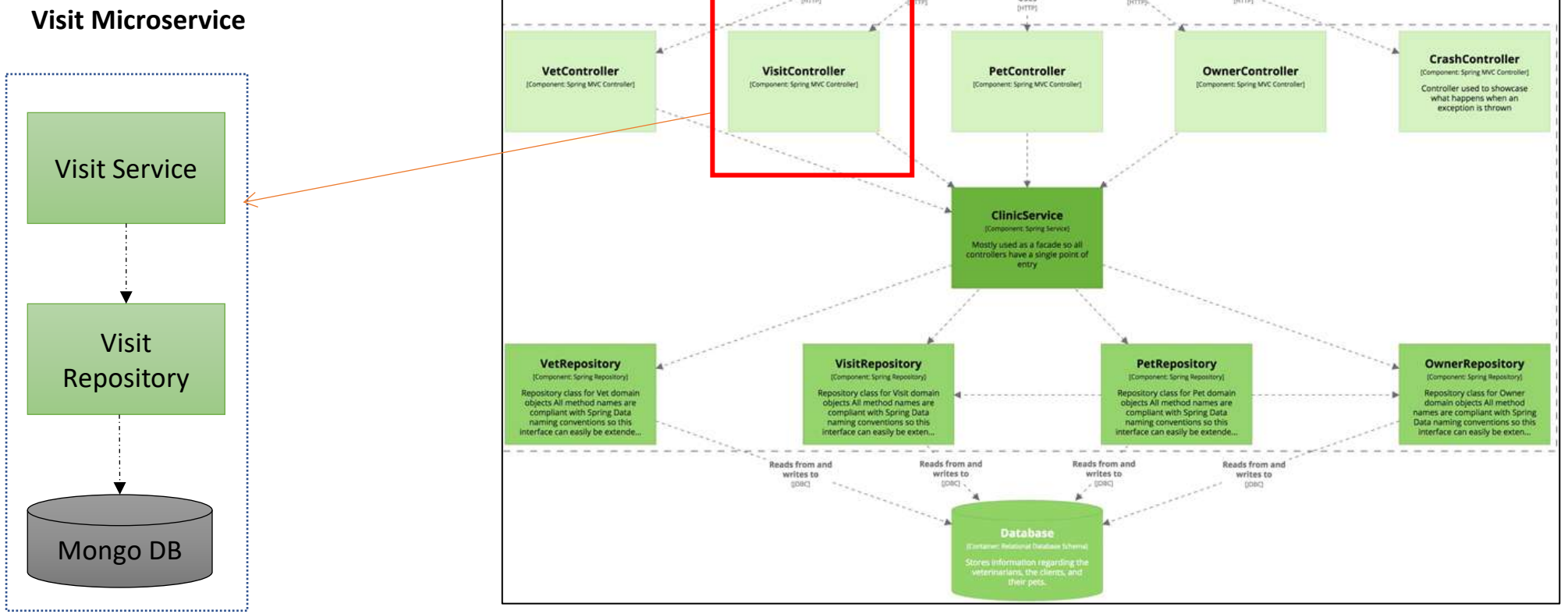
# Case Study Pet Clinic App



# As-is Architecture review - Component Diagram



# To Be Architecture - Component Diagram



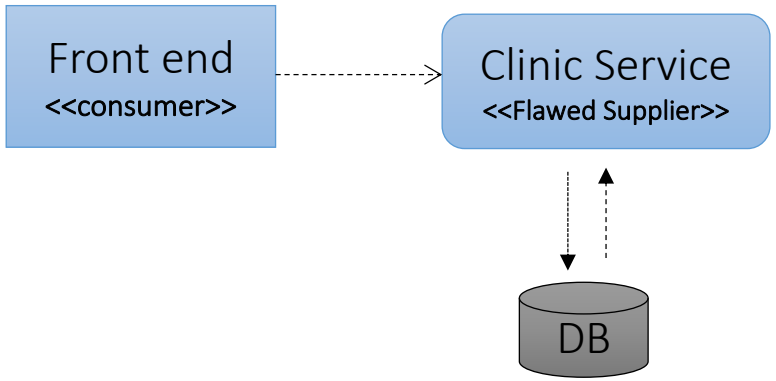
# Steps to Take from Monolith to Microservices

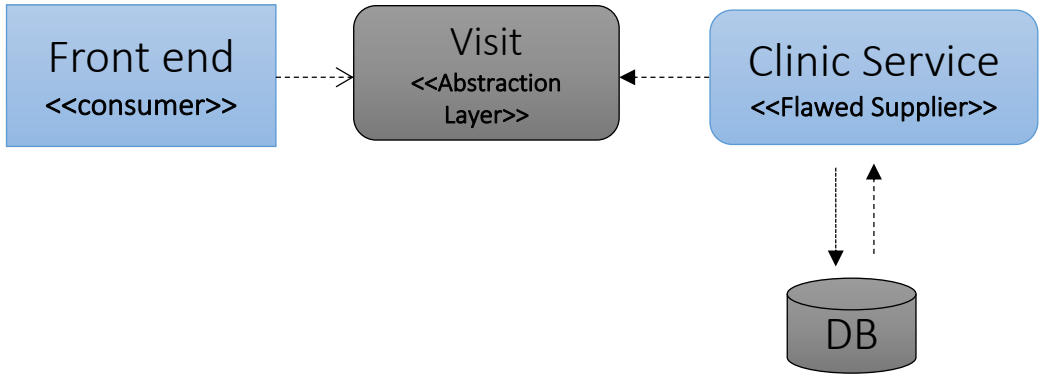
**Step 1**

- Identifying What Needs to be Migrated to Microservices
- Start with the least complex modules in the legacy system that will have the greatest benefits.

**Step 2**

- Apply Branch By Abstraction Pattern
- Introduce an abstraction layer in front of the old component
- Leave the old legacy code as is

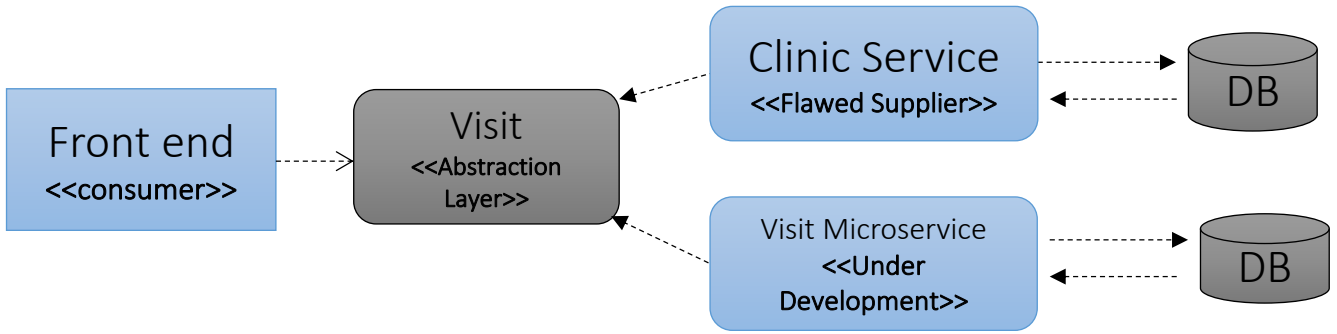


# Steps to Take from Monolith to Microservices

**Step 3**

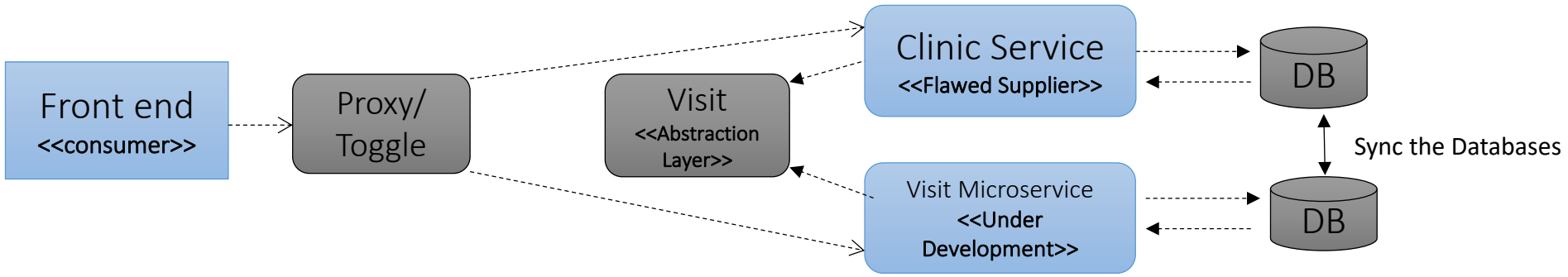
- Apply Strangulate Pattern
- Create a parallel microservices implementation for the identified modules
- Create an independent Database for each Microservice



# Steps to Take from Monolith to Microservices

## Step 4

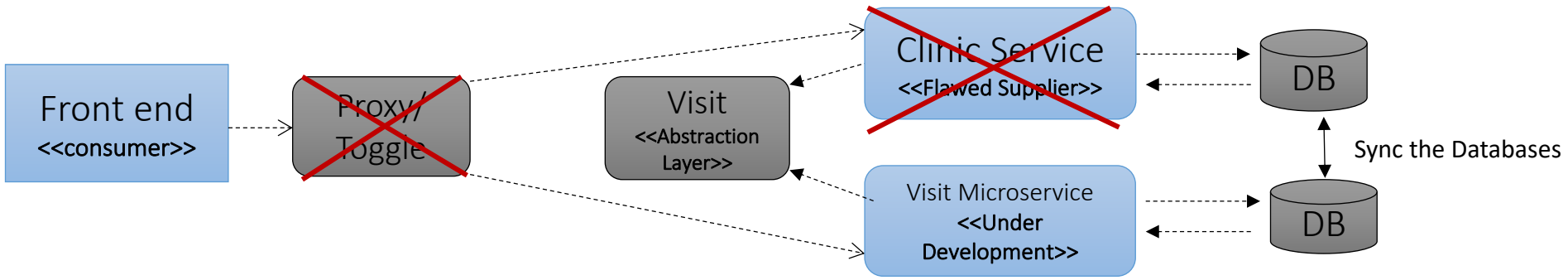
- Apply the toggle Pattern
- Introduce a run-time configuration toggle behind the abstraction layer
- Deploy the refactored code in production
- Incrementally redirect the traffic from the legacy module to the newly created microservice
- Sync the database of Legacy module and Microservice
- We can dynamically revert to the old component in the event of a failure



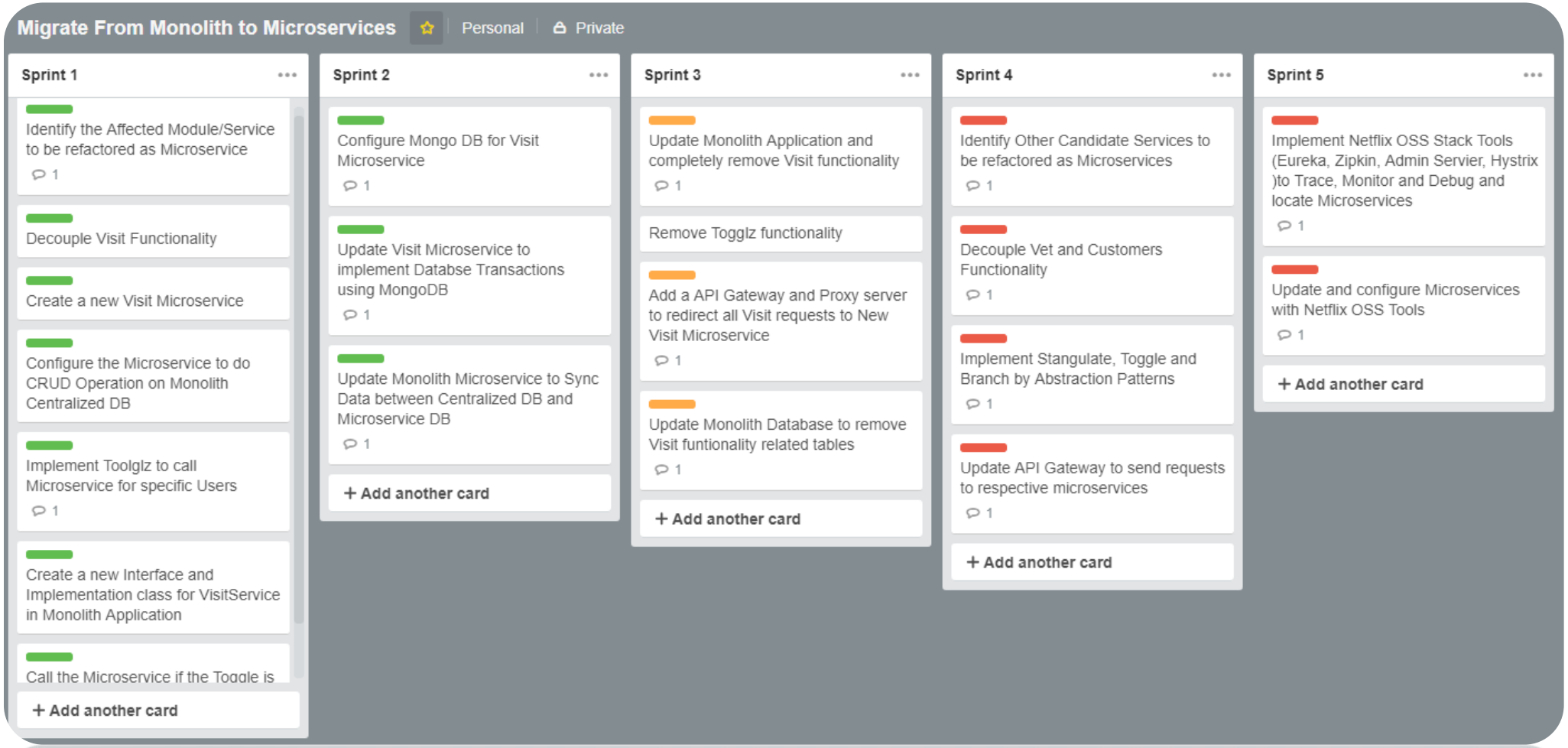
# Steps to Take from Monolith to Microservices

## Step 5

- When development and Testing is complete, and the traffic is completely redirected to the microservice, eliminate the legacy module and refactor code and Database to delegate to the new component



# Monolith to Microservices Journey



# Code Walk Through

# References

- Pet Clinic App Source Code: https://github.com/spring-projects/spring-petclinic
- Branch By Abstraction Pattern : https://martinfowler.com/bliki/BranchByAbstraction.html
- Strangulation Pattern : https://www.martinfowler.com/bliki/StranglerApplication.html
- Feature Toggles Pattern : https://martinfowler.com/articles/feature-toggles.html
- https://thenewstack.io/from-monolith-to-microservices/

# Q&A