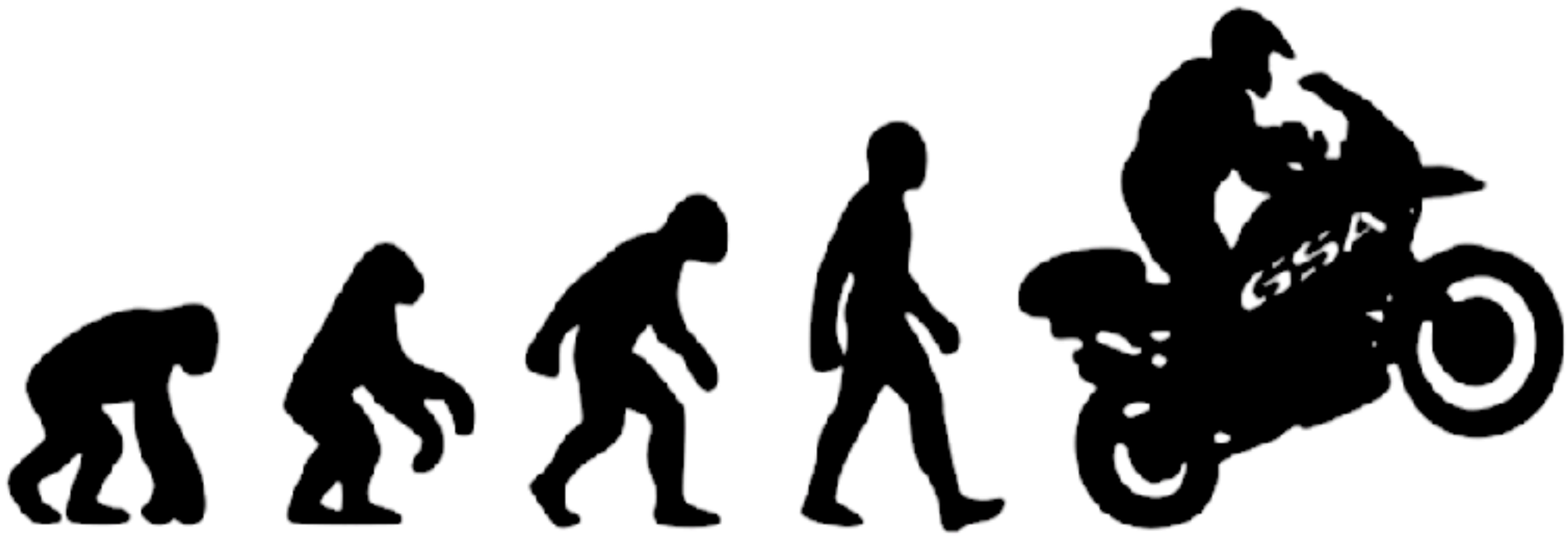
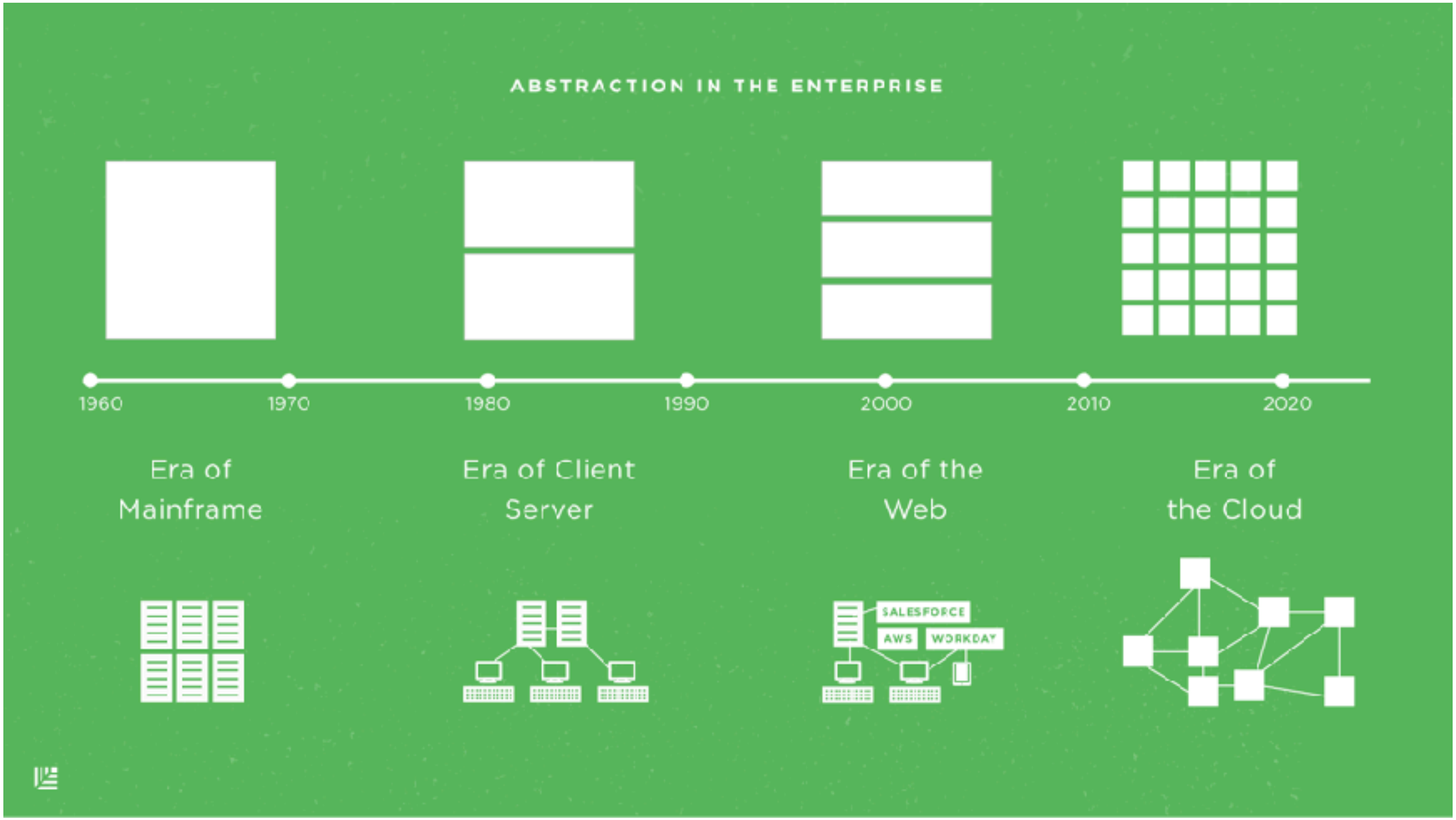
Evolution of Architecture



@somkiat

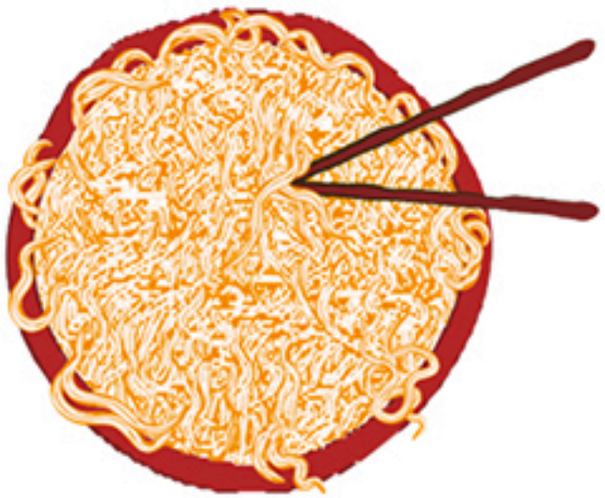
Evolution of Architecture



Developer’s perspective

1990s and earlier

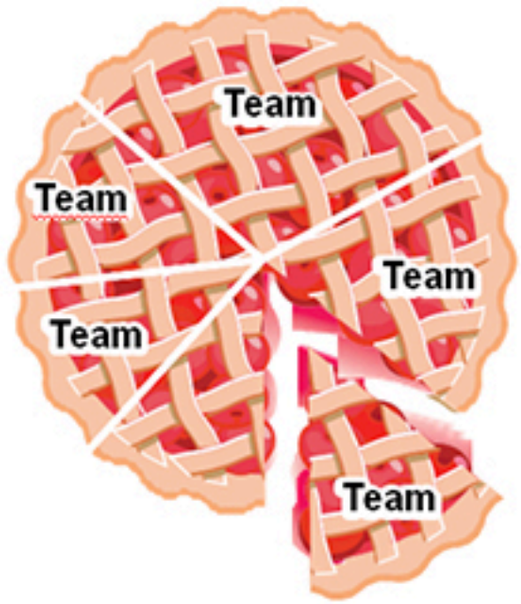
Pre-SOA (monolithic)
Tight coupling



For a monolith to change, all must agree on each change. Each change has unanticipated effects requiring careful testing beforehand.

2000s

Traditional SOA
Looser coupling



Elements in SOA are developed more autonomously but must be coordinated with others to fit into the overall design.

2010s

Microservices
Decoupled

Developers can create and activate new microservices without prior coordination with others. Their adherence to MSA principles makes continuous delivery of new or modified services possible.

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1990s and earlier

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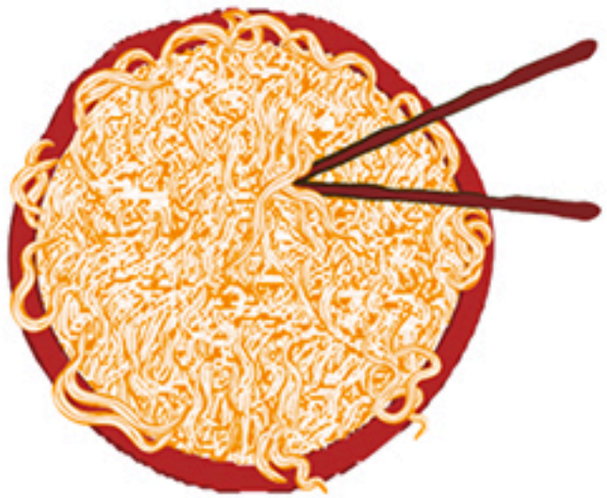
Tight coupling



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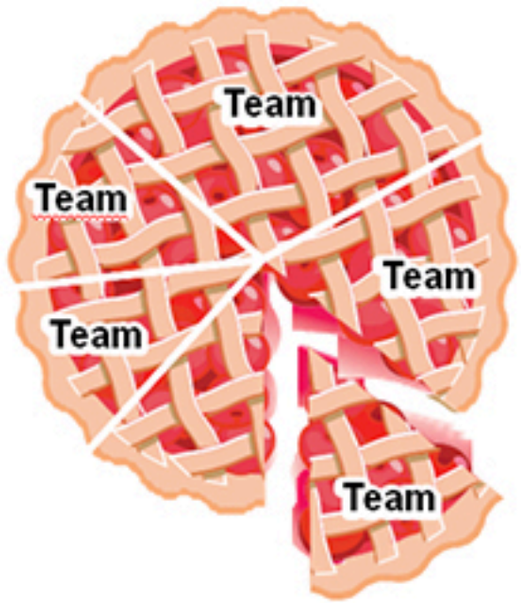

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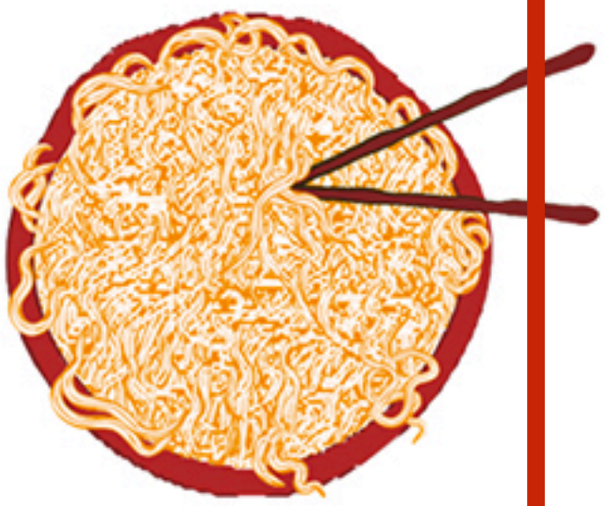

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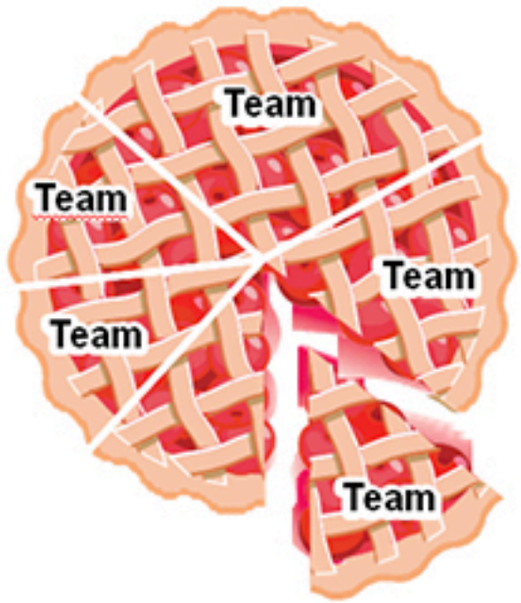

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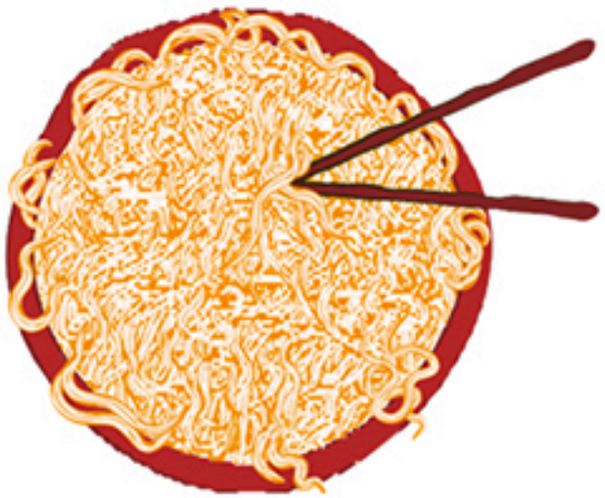

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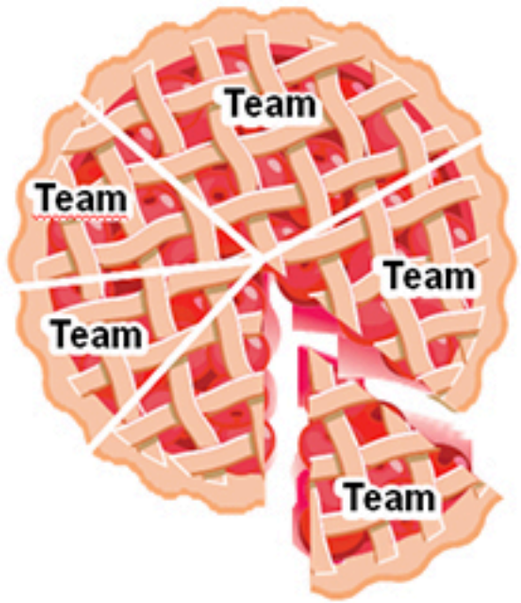
2000s

Traditional SOA
Looser coupling



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2010s

Microservices
Decoupled

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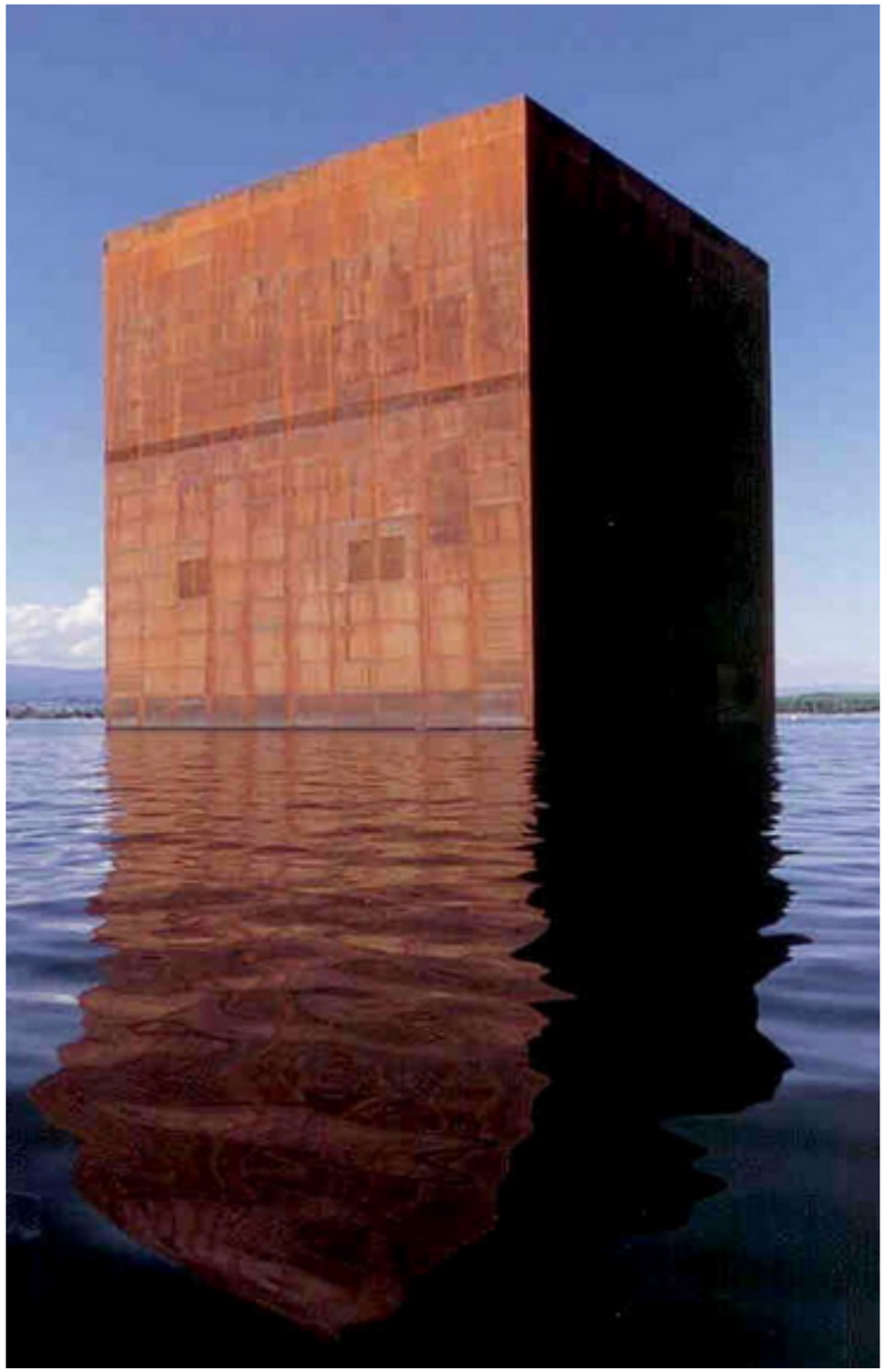
Evolution of services

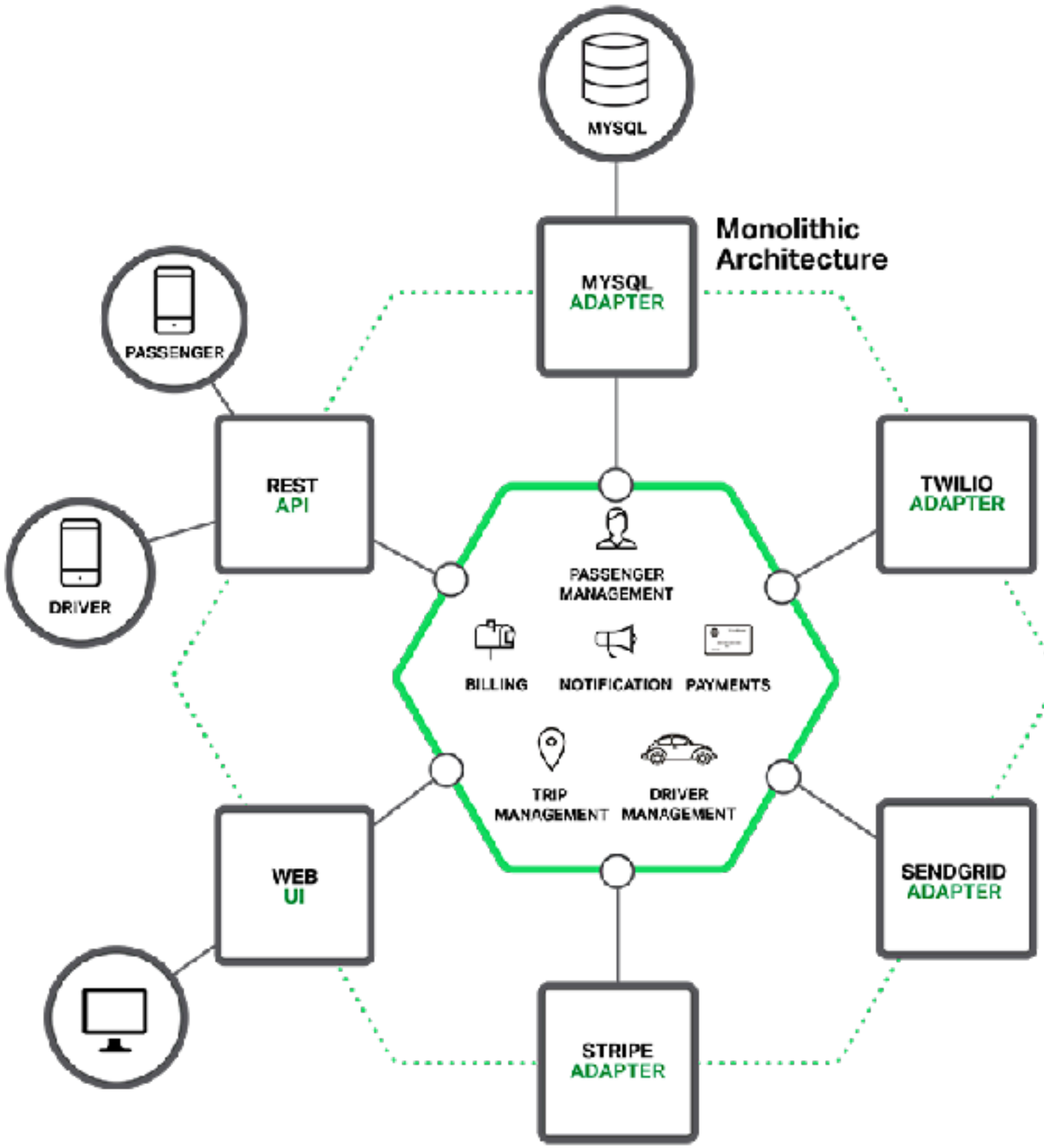
1990s and earlier	2000s	2010s
Coupling		
Pre-SOA (monolithic)	**Traditional SOA**	**Microservices**
Tight coupling	Looser coupling	Decoupled

Monolith

Monolith



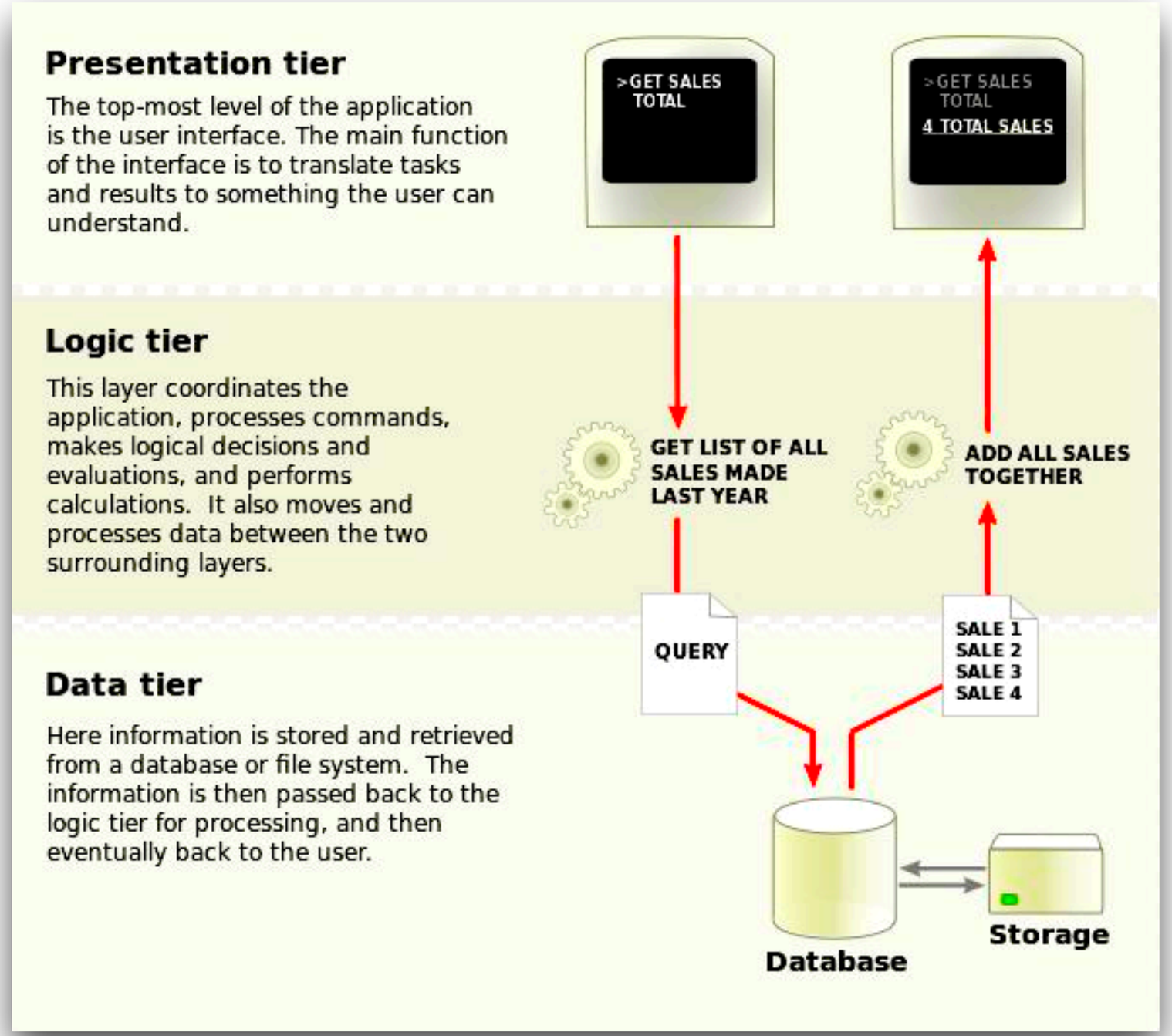
Monolith


MYSQL
Monolithic
Architecture
MYSQL
ADAPTER
PASSENGER
REST
API
TWILIO
ADAPTER
DRIVER
PASSENGER
MANAGEMENT
BILLING
NOTIFICATION
PAYMENTS
TRIP
MANAGEMENT
DRIVER
MANAGEMENT
WEB
UI
SENDGRID
ADAPTER
STRIPE
ADAPTER

N-tiers

N-tiers

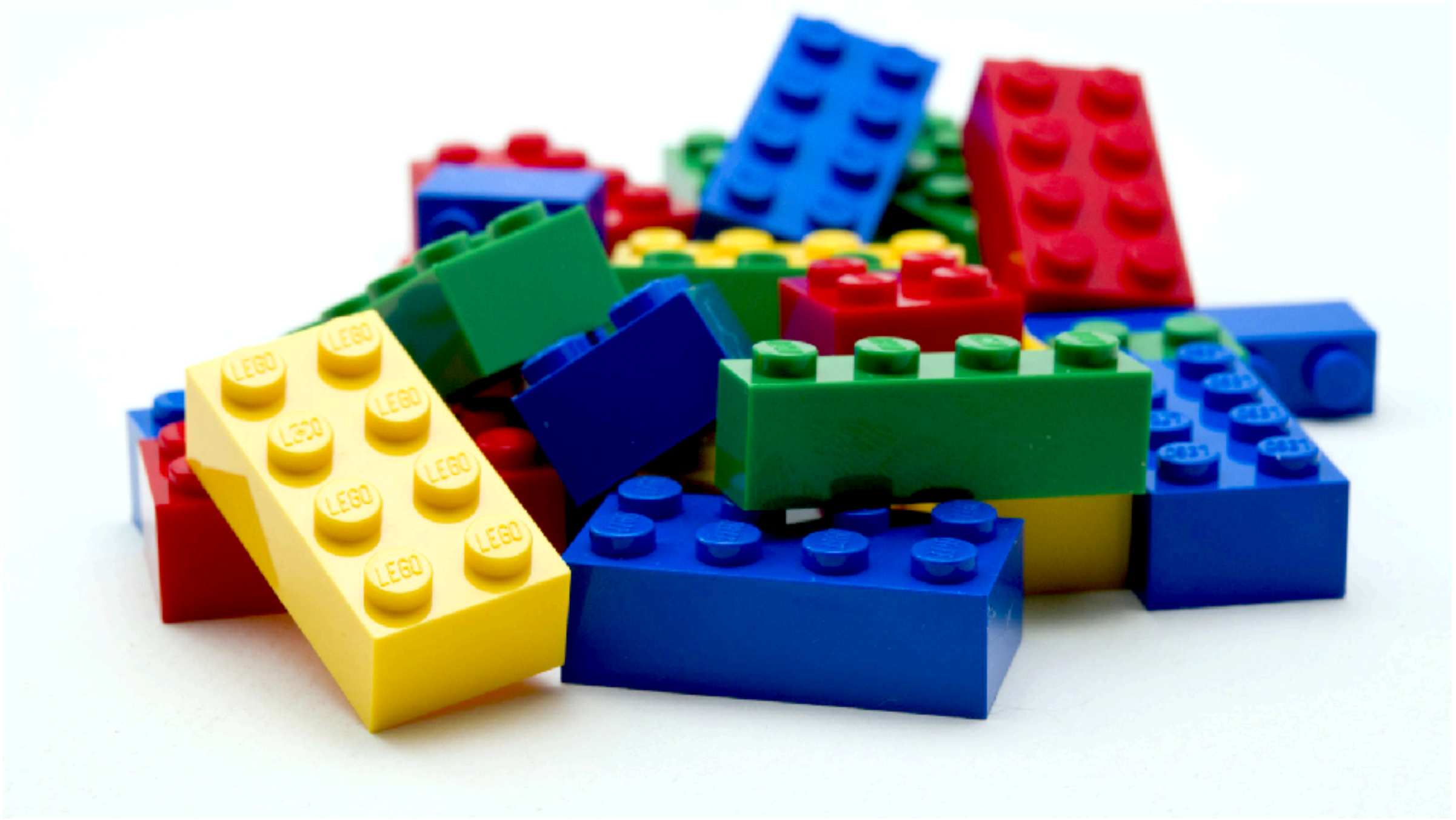
N-tiers


Presentation tier
The top-most level of the application is the user interface. The main function of the interface is to translate tasks and results to something the user can understand.
>GET SALES TOTAL
>GET SALES TOTAL
4 TOTAL SALES
Logic tier
This layer coordinates the application, processes commands, makes logical decisions and evaluations, and performs calculations. It also moves and processes data between the two surrounding layers.
GET LIST OF ALL SALES MADE LAST YEAR
ADD ALL SALES TOGETHER
Data tier
Here information is stored and retrieved from a database or file system. The information is then passed back to the logic tier for processing, and then eventually back to the user.
QUERY
SALE 1
SALE 2
SALE 3
SALE 4
Database
Storage

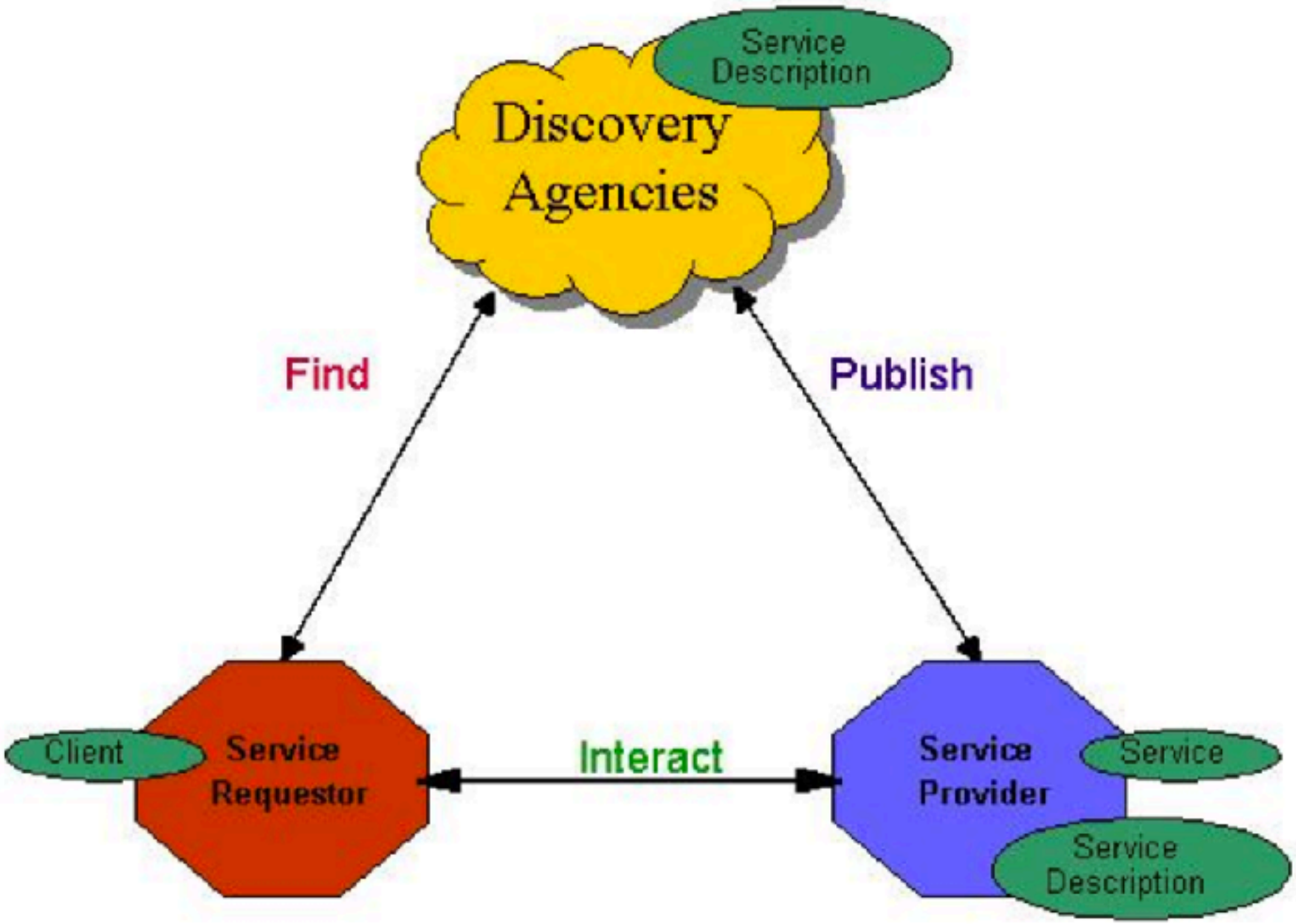
SOA

Service **O**riented **A**rchitecture

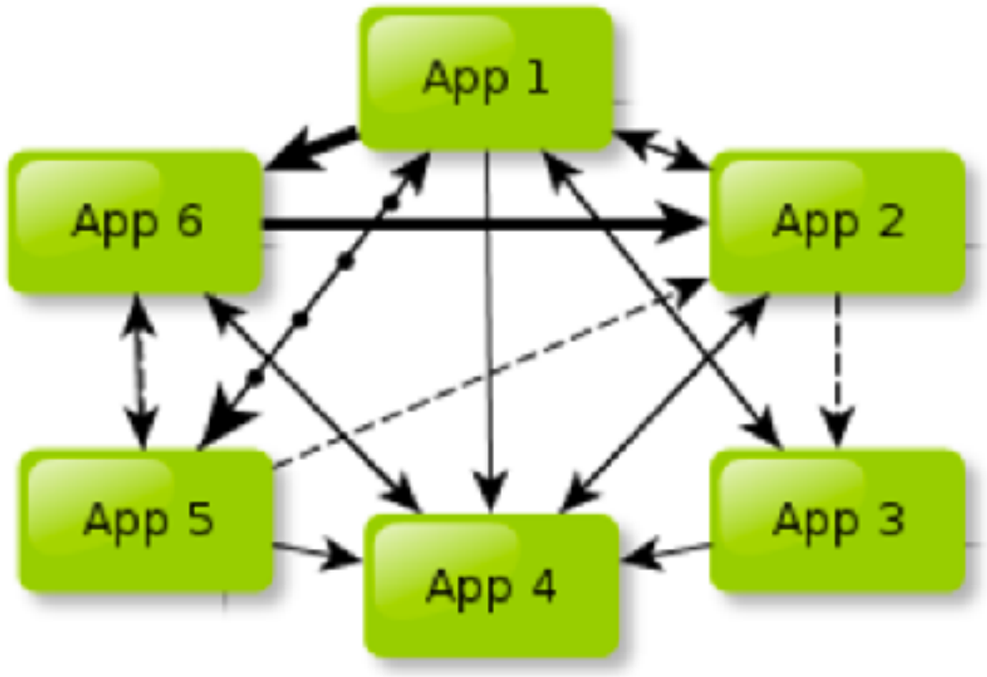
SOA



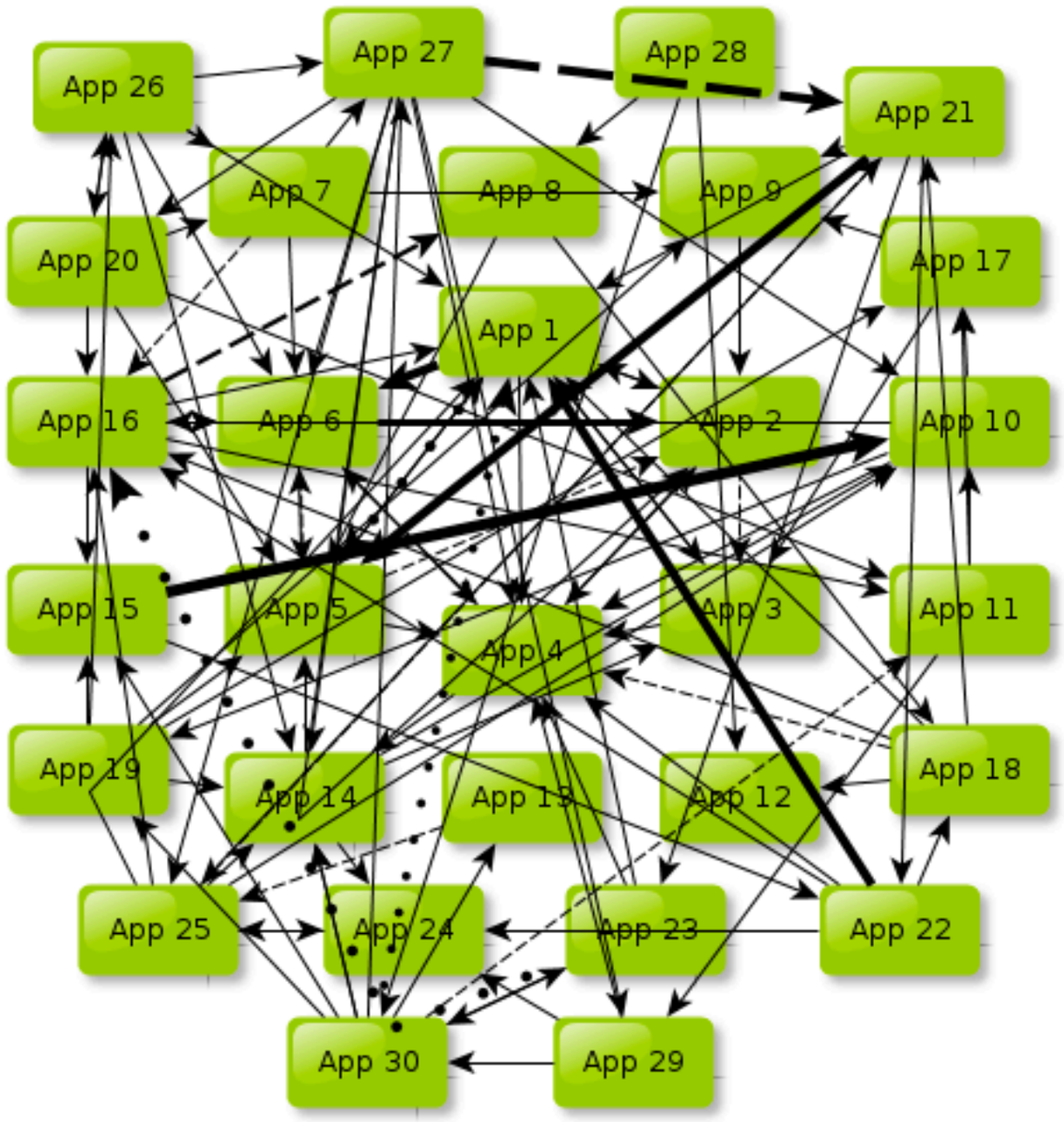
SOA


Service Description
Discovery Agencies
Find
Publish
Client
Service Requestor
Interact
Service Provider
Service
Service Description

SOA ?

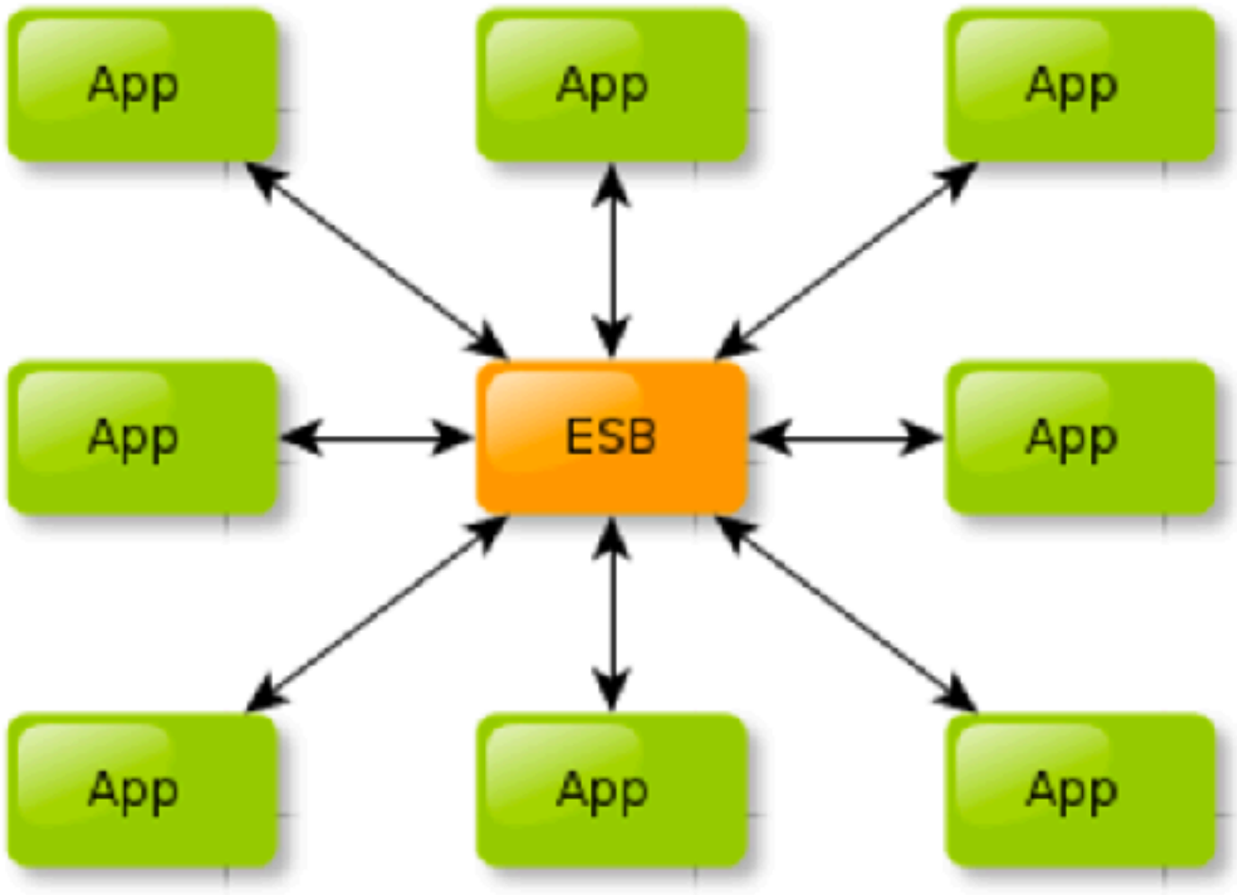


SOA ?

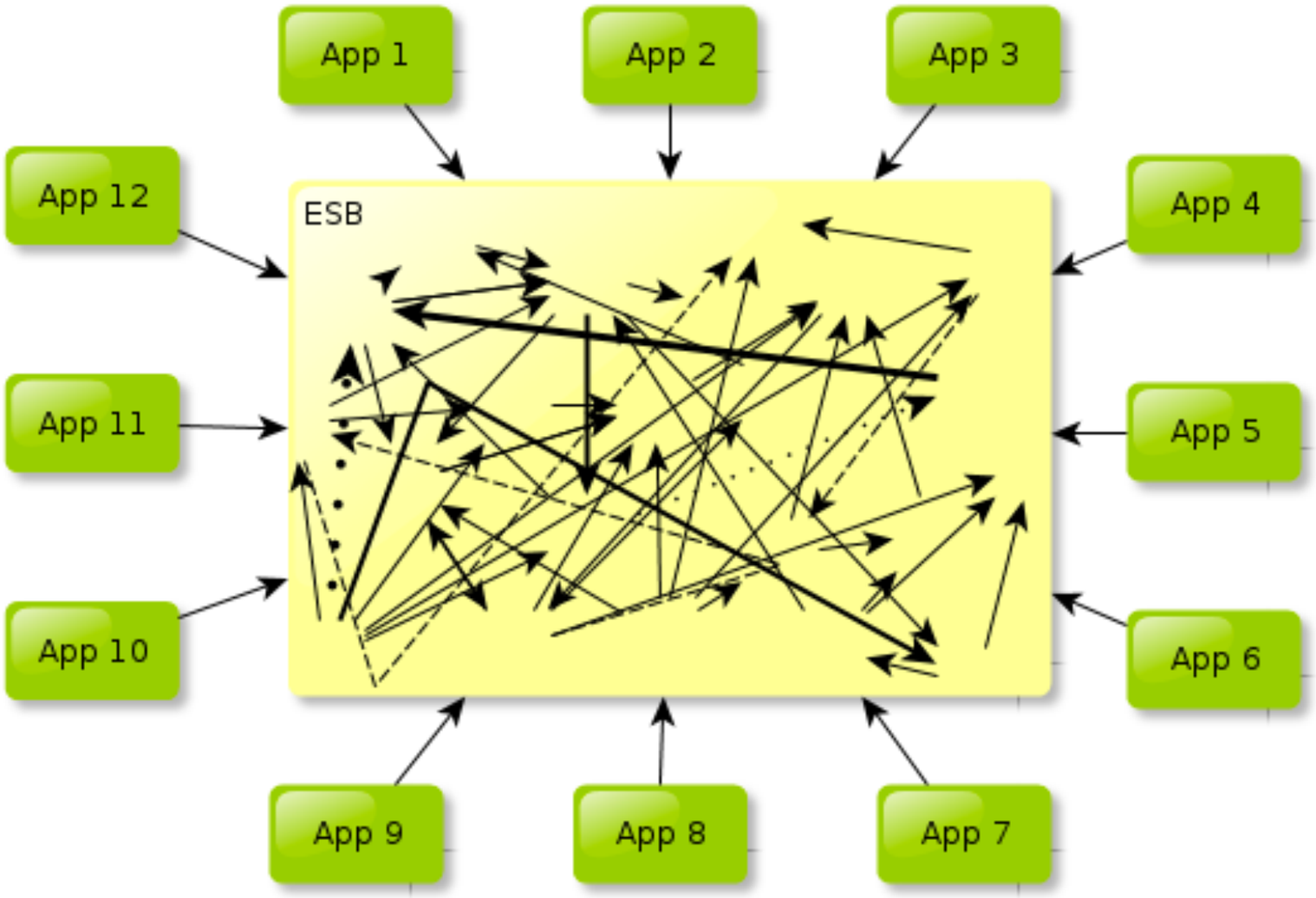

App 26
App 27
App 28
App 21
App 7
App 8
App 9
App 20
App 17
App 1
App 16
App 6
App 2
App 10
App 15
App 5
App 3
App 11
App 4
App 19
App 14
App 13
App 12
App 18
App 25
App 24
App 23
App 22
App 30
App 29

Solution ?

SOA with ESB



SOA with ESB

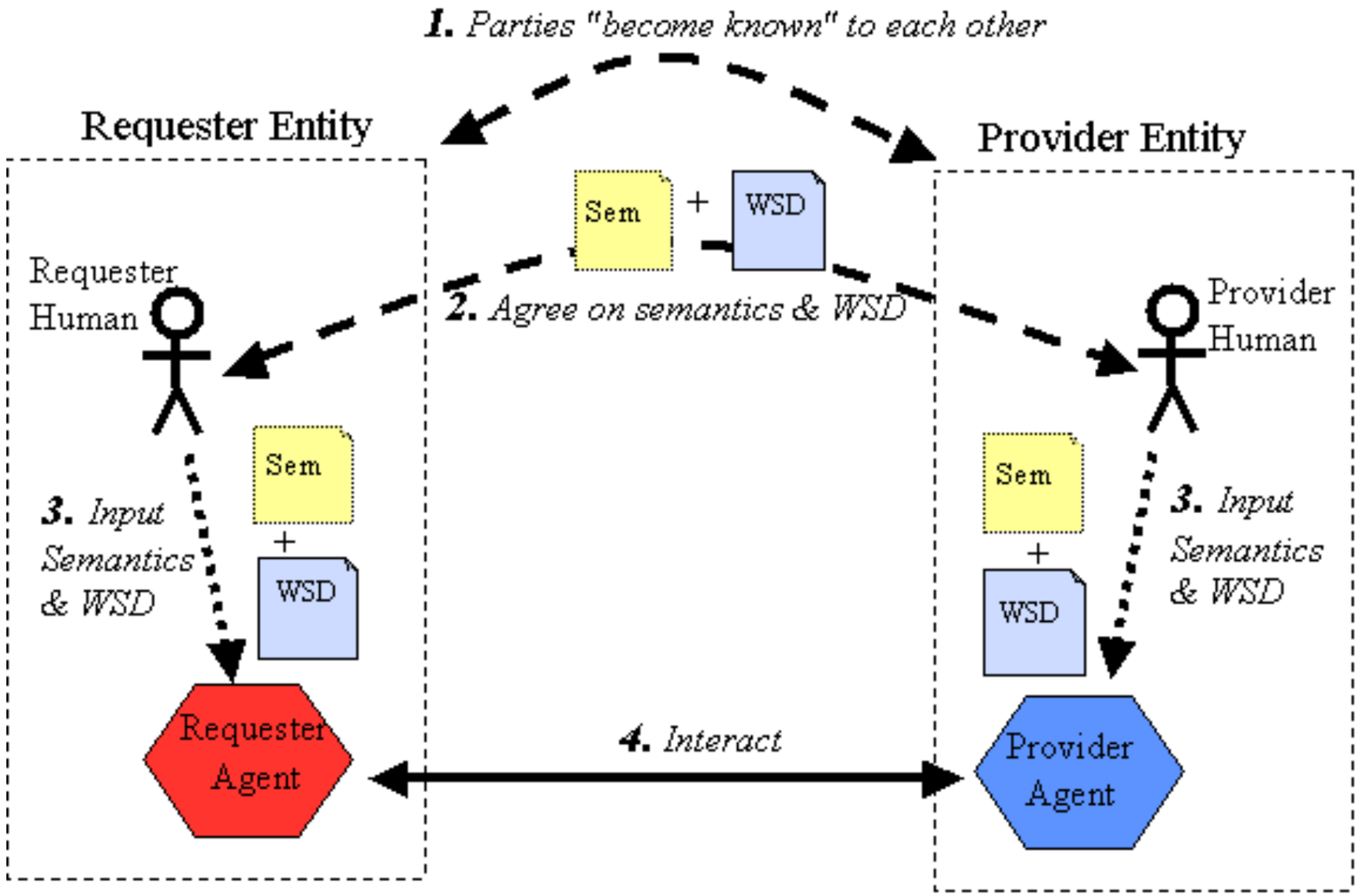

App 1
App 2
App 3
App 12
ESB
App 4
App 11
App 5
App 10
App 6
App 9
App 8
App 7

ESB

Enterprise Service Bus

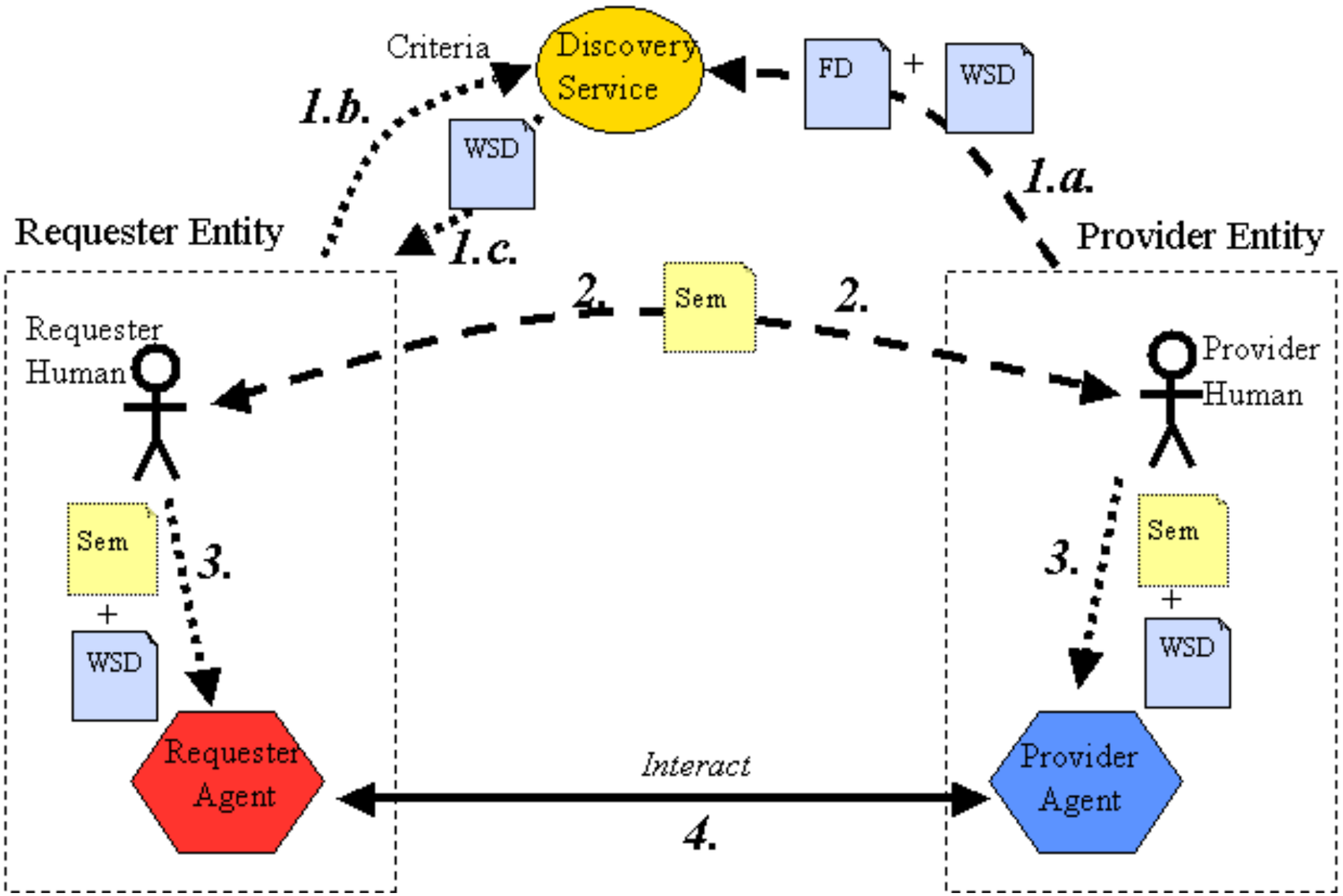
WebService

WebService



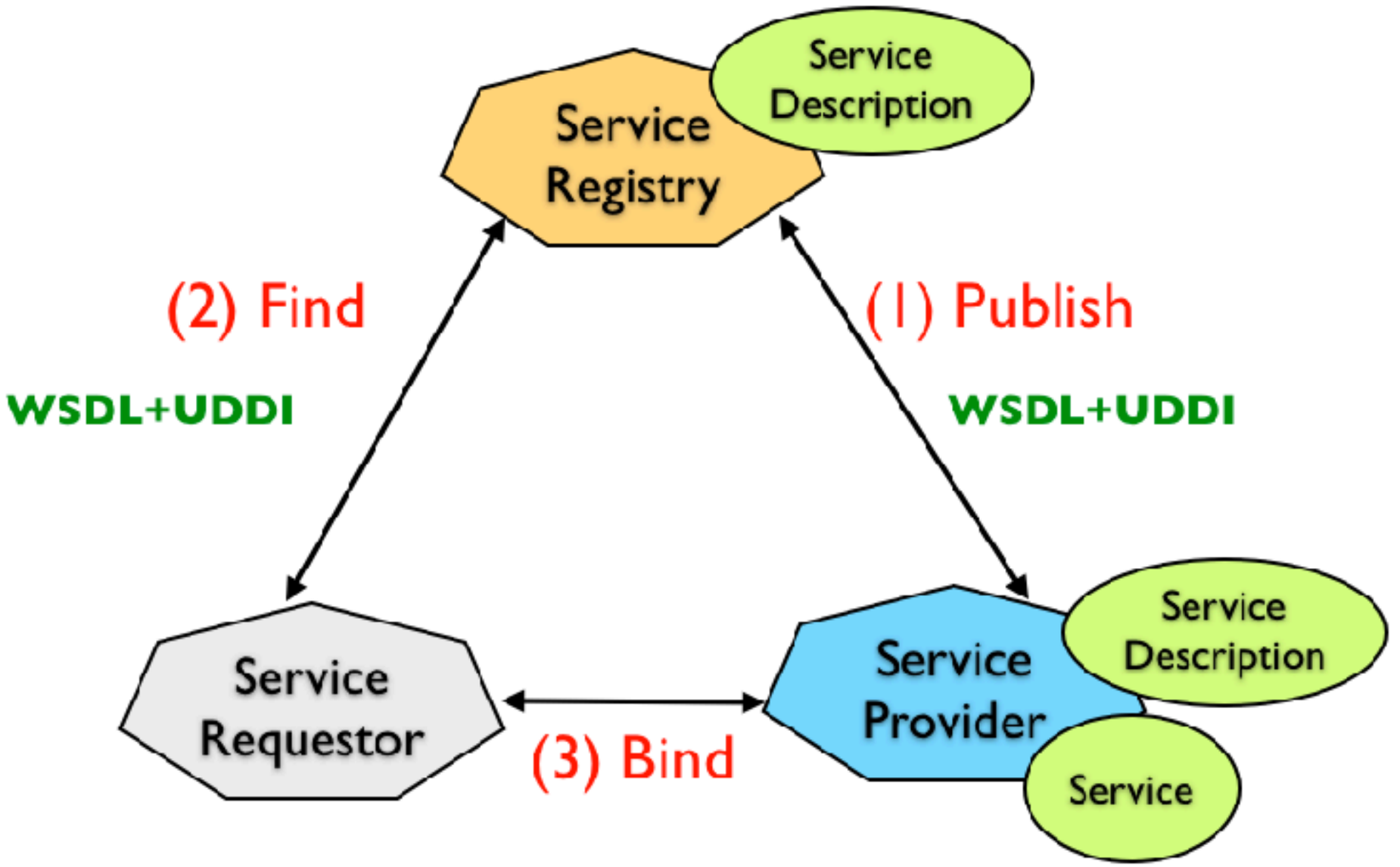
https://www.w3.org/TR/ws-arch

Service Discovery



https://www.w3.org/TR/ws-arch

WebService


Service Description
Service Registry
(2) Find
WSDL+UDDI
(1) Publish
WSDL+UDDI
Service Requestor
(3) Bind
Service Provider
Service Description
Service

WebService

WSDL

UDDI

SOAP

WebService

Web**S**ervice **D**escription **L**anguage

Universal **D**escriptor **D**iscovery **I**ntegration

Simple **O**bject **A**ccess **P**rotocol

REST API

REpresentational **S**tate **T**ransfer

REST

Consider "Martin Lawrence" as your data

SOAP

Data + SOAP Standards

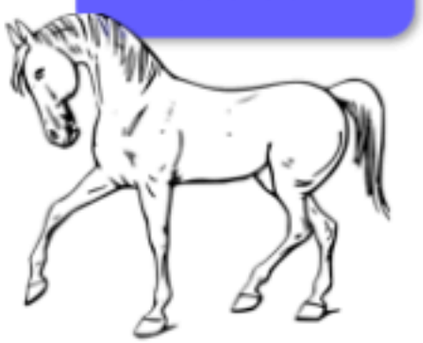
Your data sent to SERVER would become huge as Big mama

REST

Rest is like sending the DATA as such

REST

HTTP



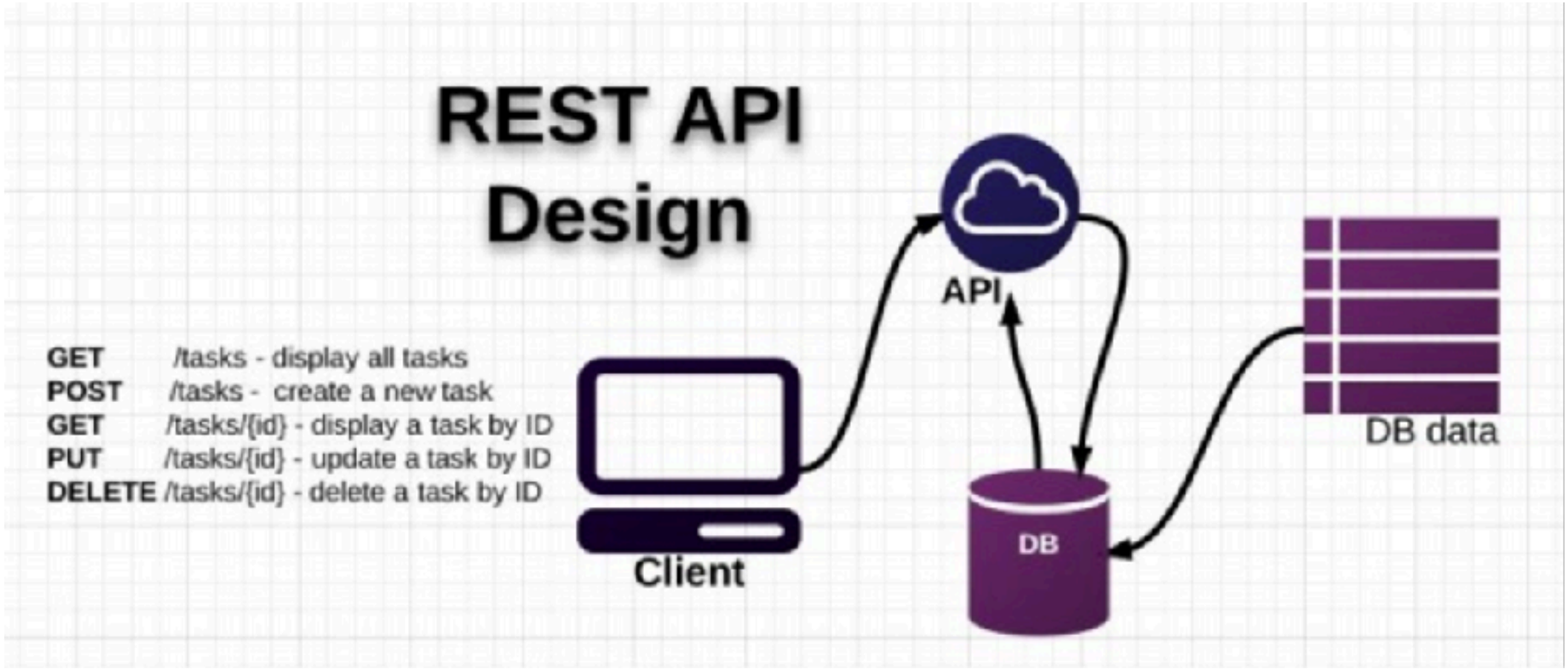
REST

Rides directly on HTTP. Plain and simple. In reality, this is all you need to send data from point A to point B and get the required response. Catch: Until something that represents a service contract is put in to place, it's kinda "anything goes".

SOAP

The coach is your SOAP envelope: it wraps your data. Main strength is the presence of a contract: the WSDL. Gives you the "comfort" of easily generating artifacts. Catch: look at the complexity and added weight.

REST


REST API
Design
GET /tasks - display all tasks
POST /tasks - create a new task
GET /tasks/{id} - display a task by ID
PUT /tasks/{id} - update a task by ID
DELETE /tasks/{id} - delete a task by ID
Client
API
DB
DB data

Monolith

N-tier

SOA/
WebService

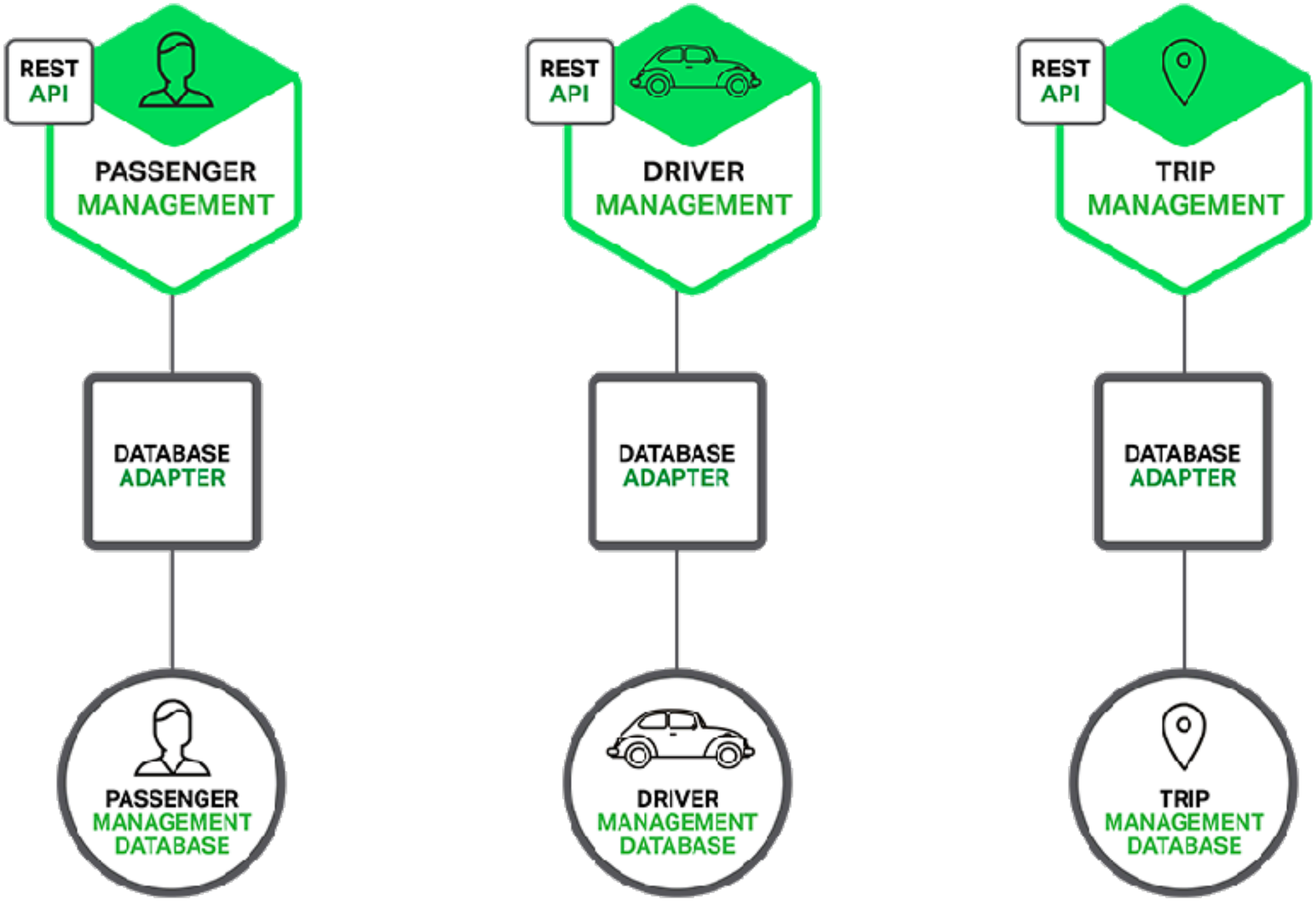
REST API

Microservice

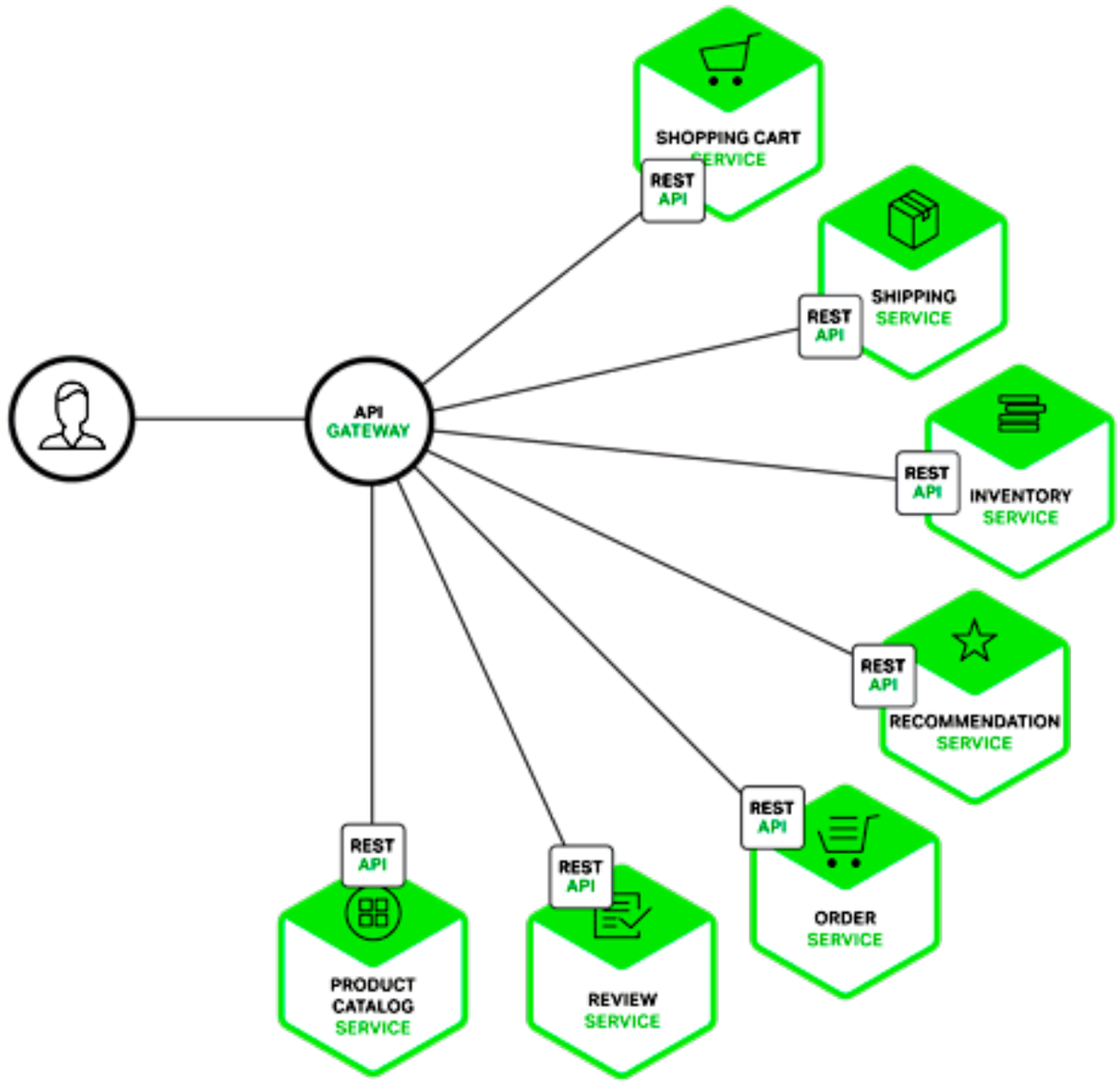
Microservice

not a silver bullet

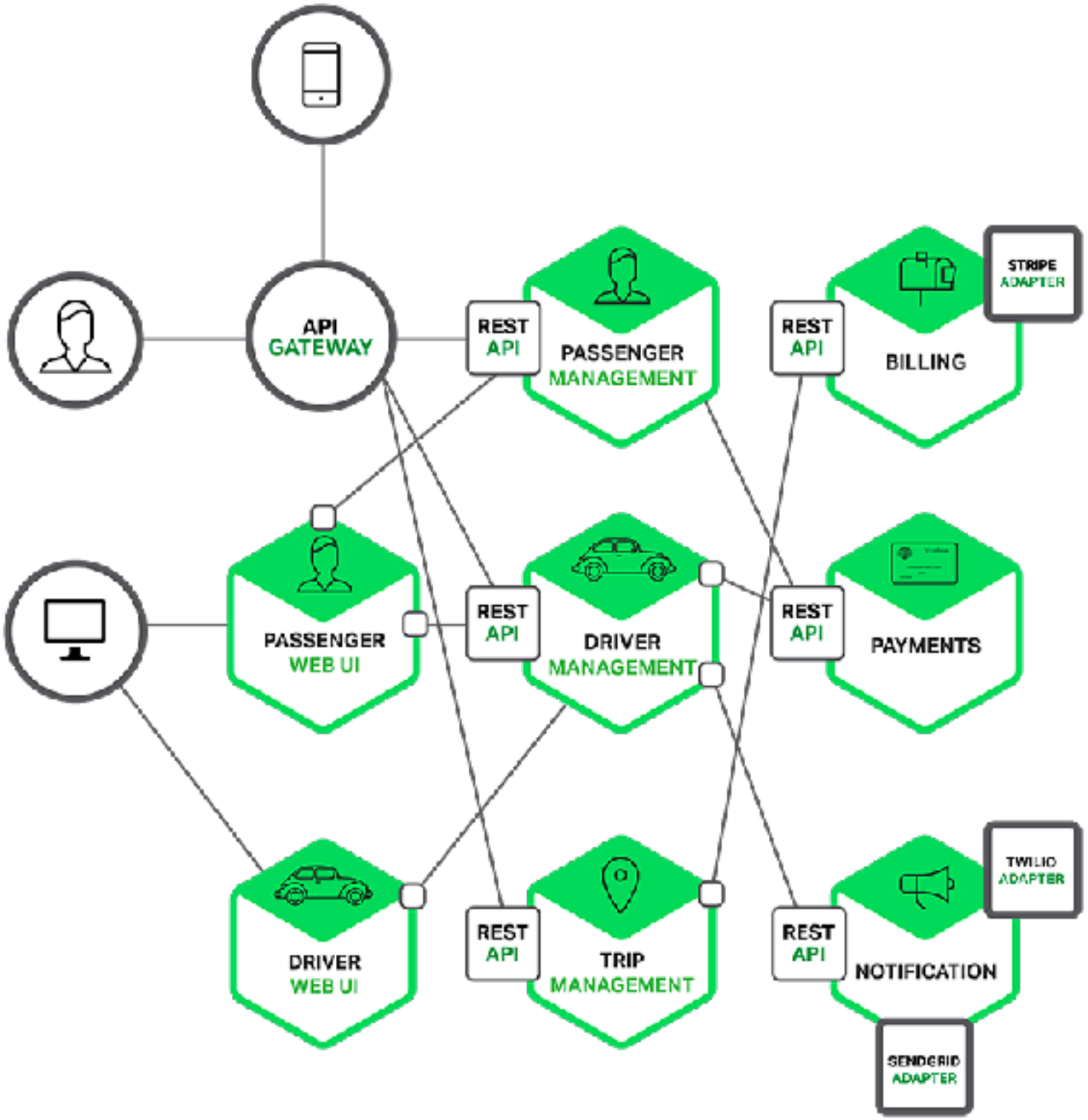
Microservice



Microservice



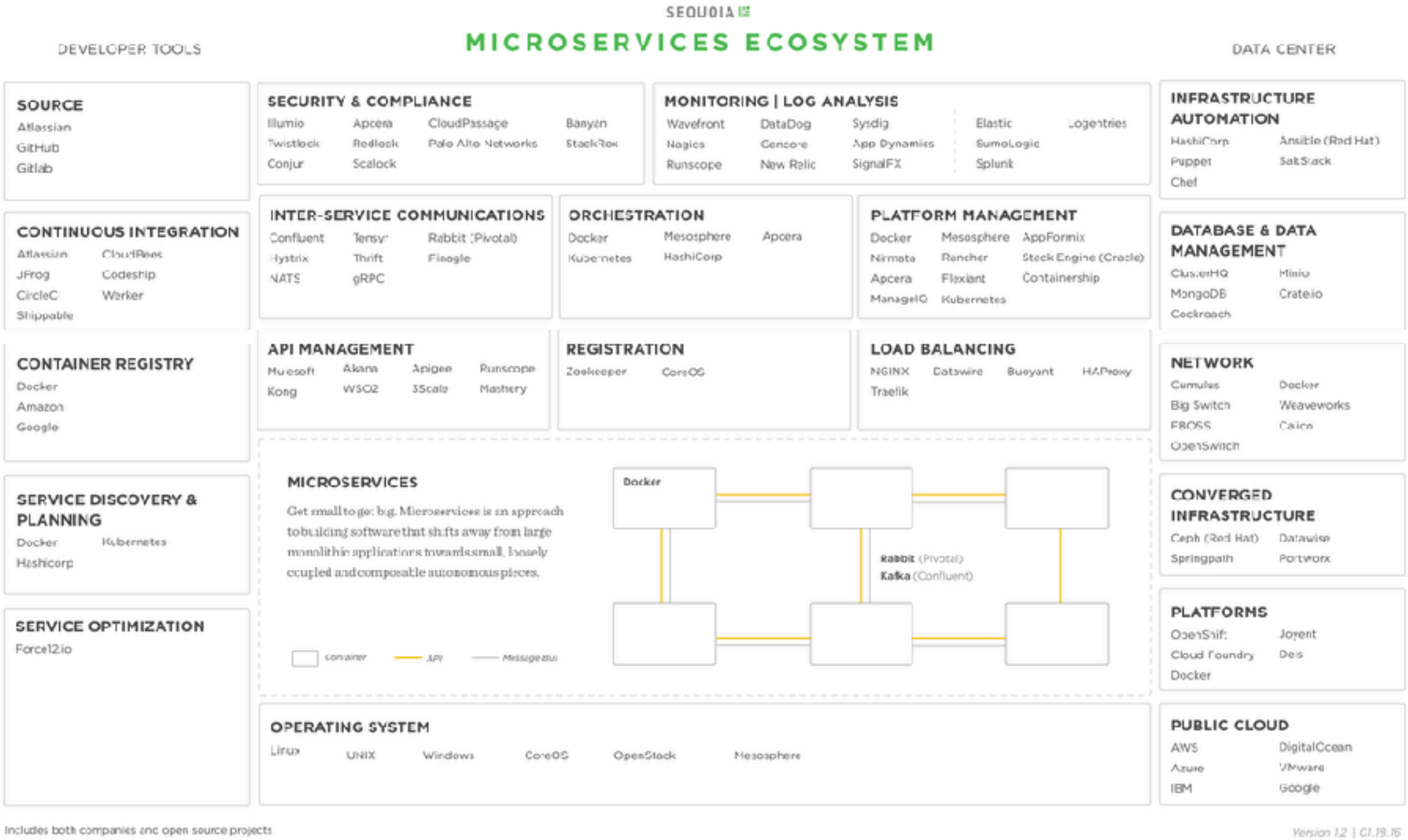
Microservice



Pros & Cons

?

Microservice Ecosystem



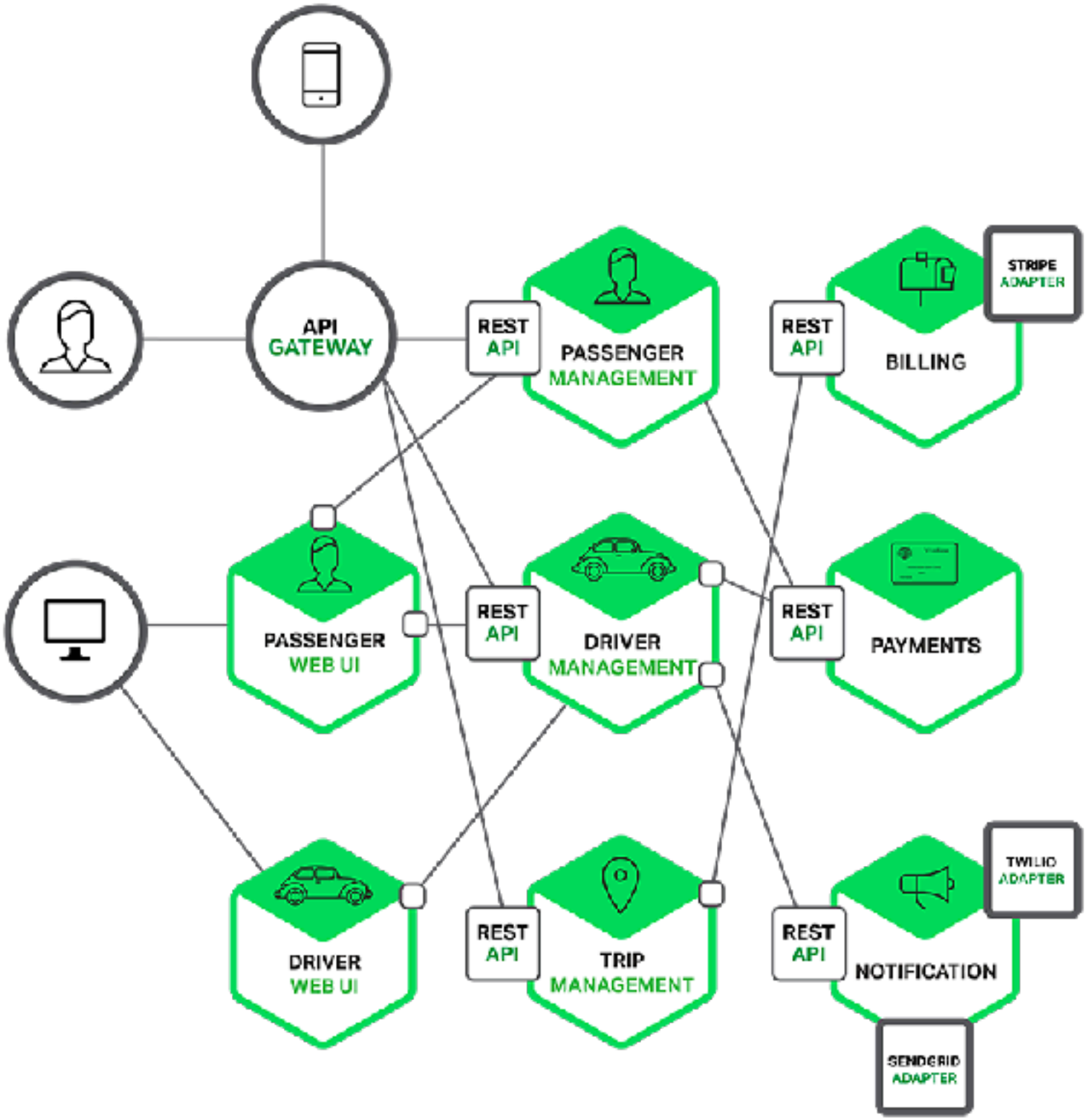
https://twitter.com/mcmiller00/status/690894999370633216

Serverless

FaaS

Function as a Service

Microservice

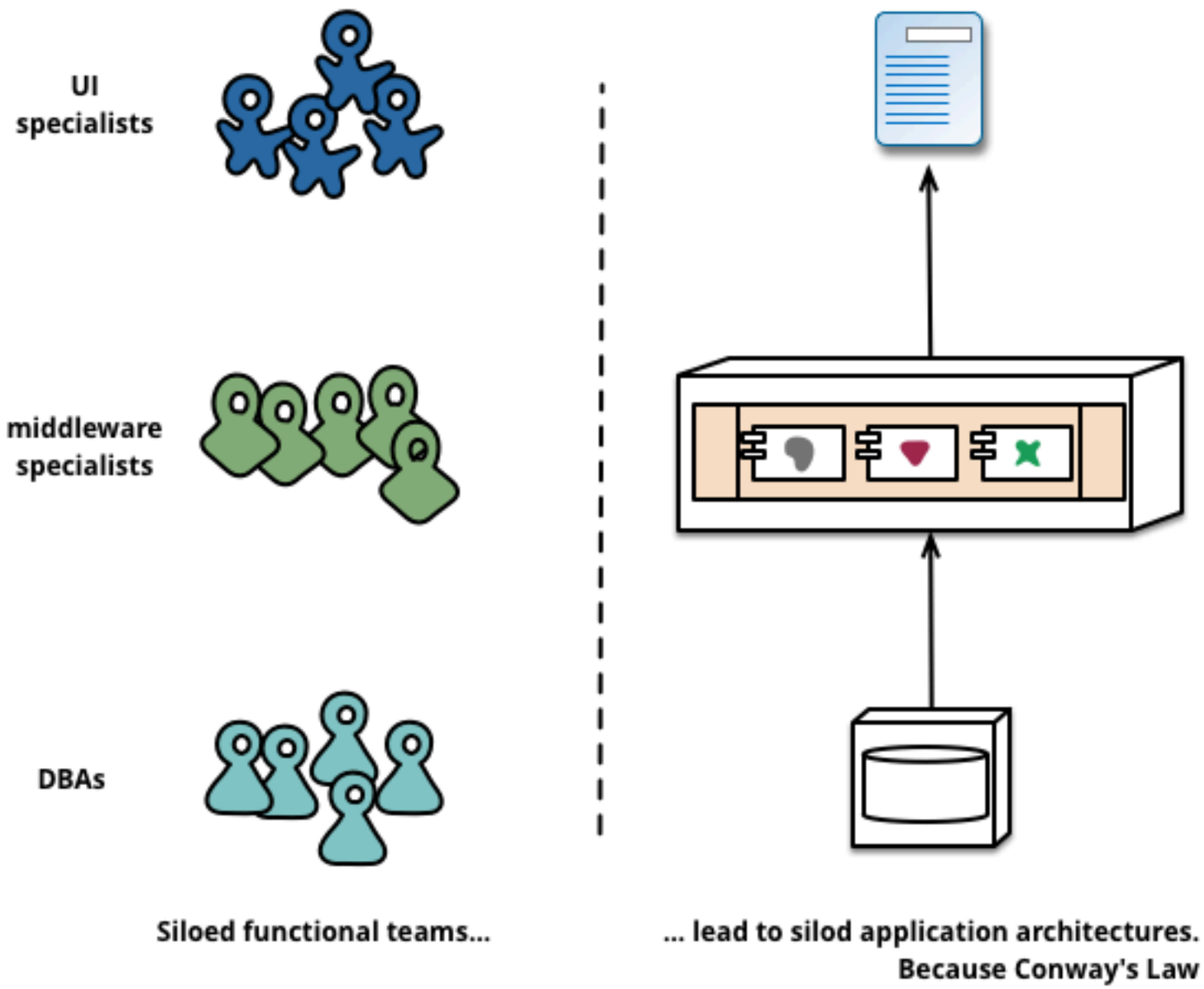


Design Microservice ?

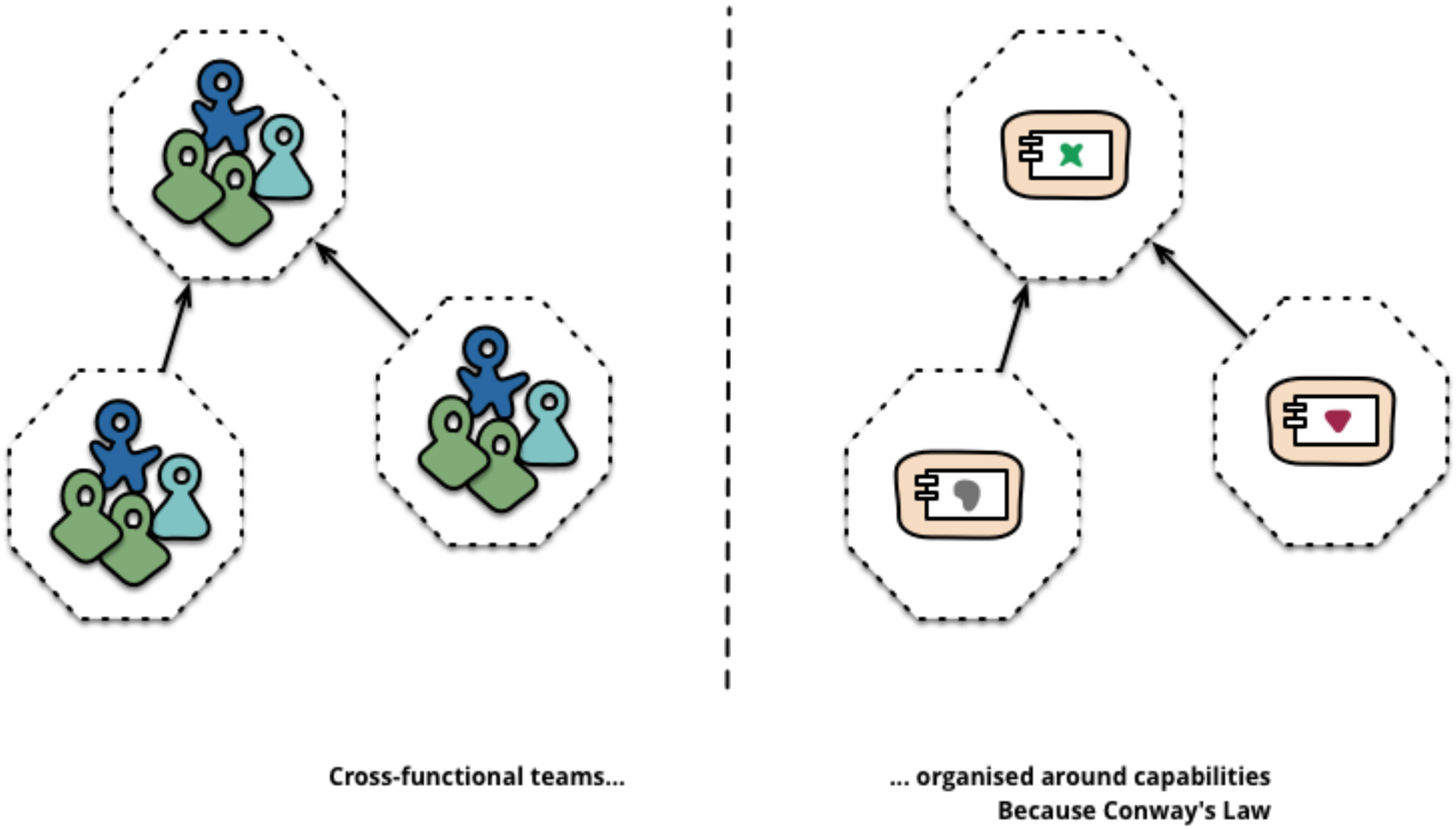
Design for failure

Evolutionary design

Implementation ?



https://martinfowler.com/articles/microservices.html



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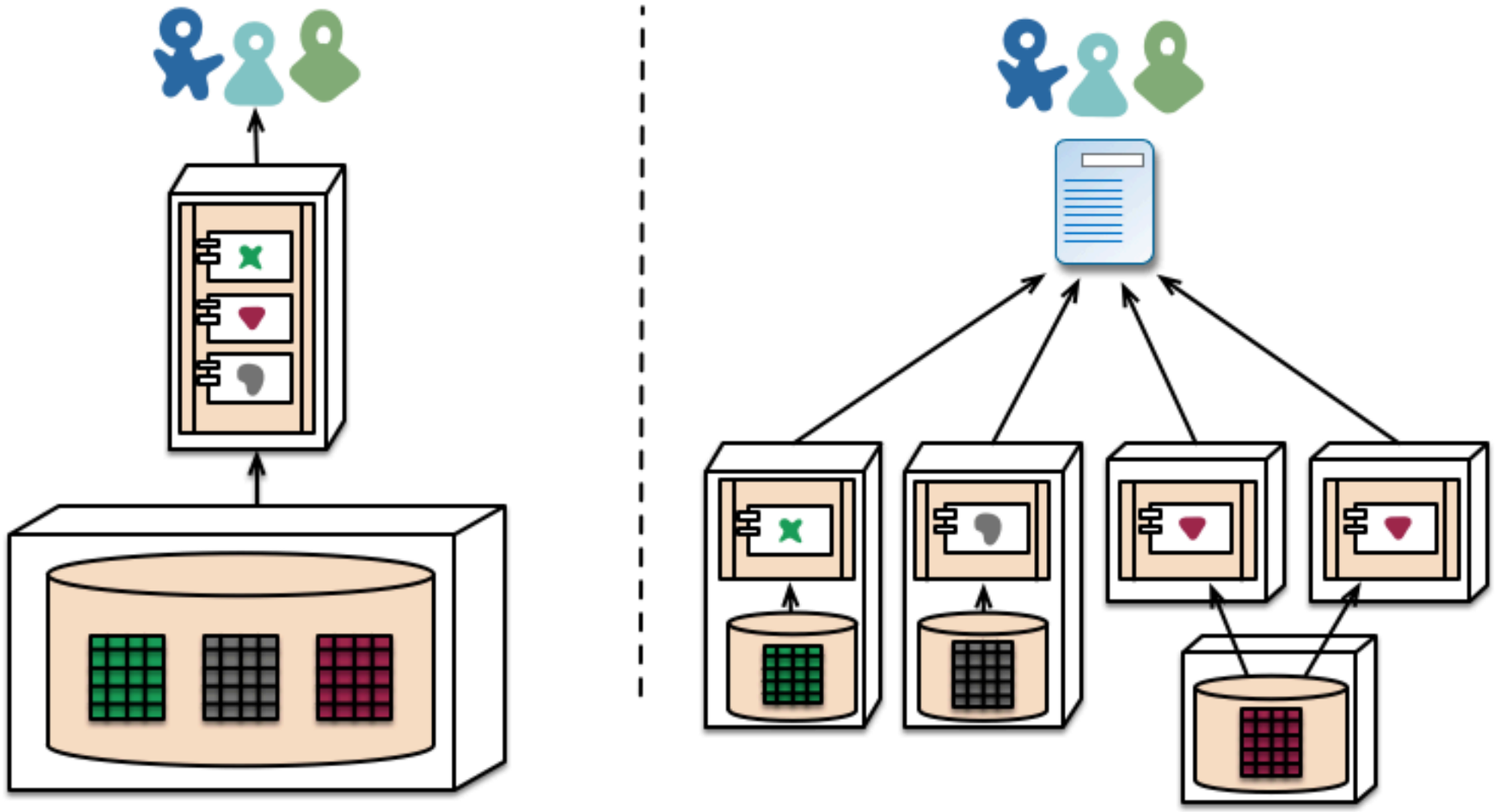
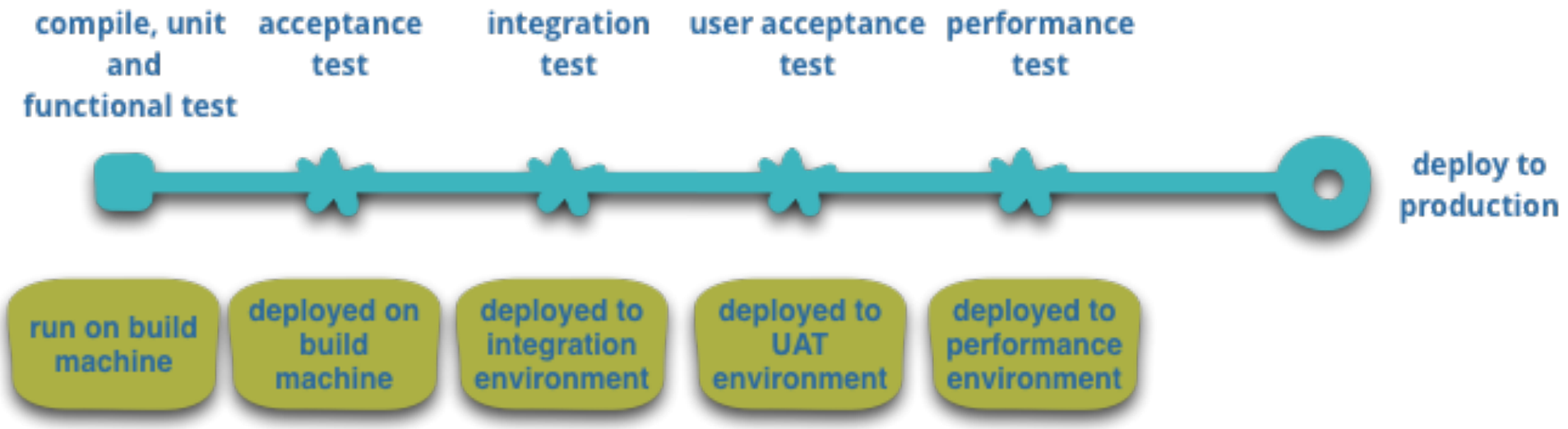


monolith - single database

microservices - application databases

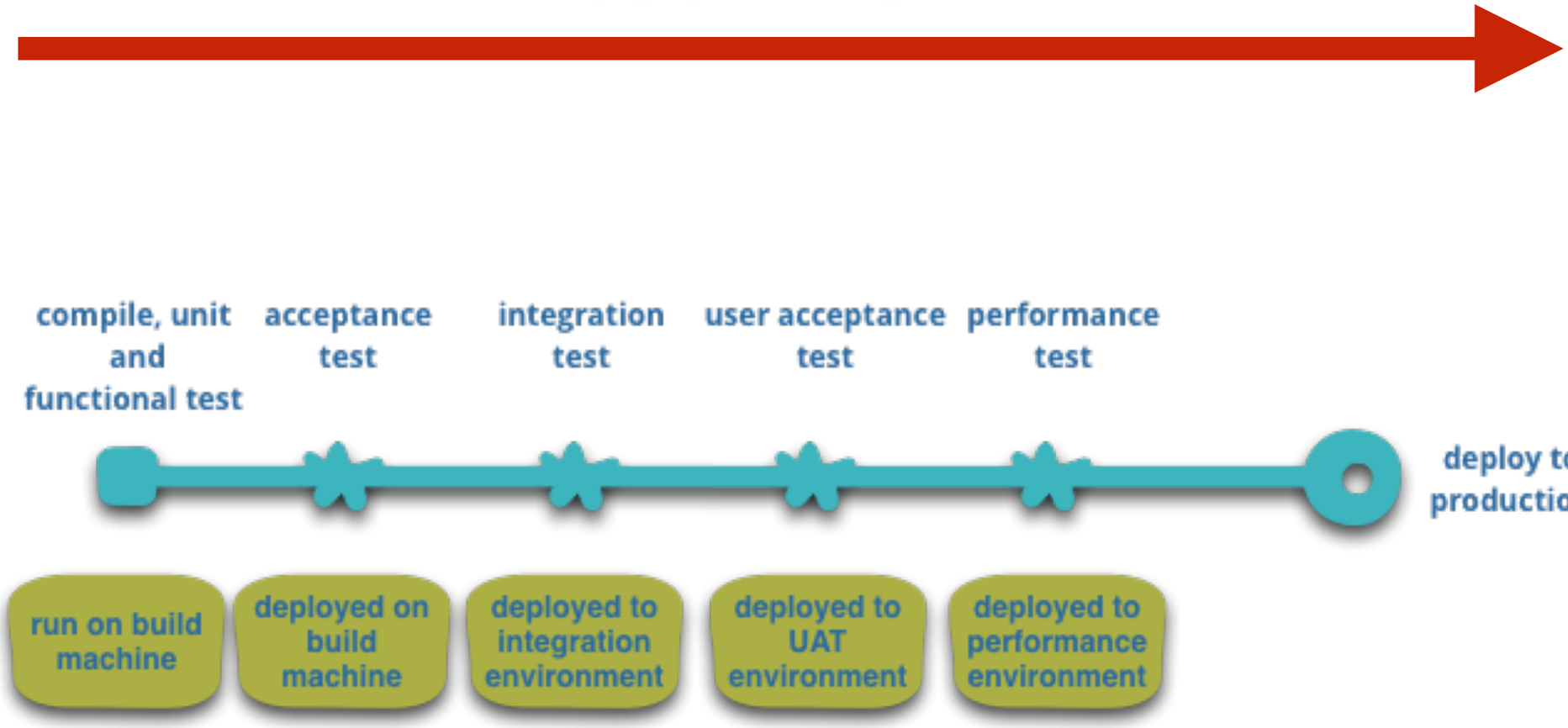
https://martinfowler.com/articles/microservices.html

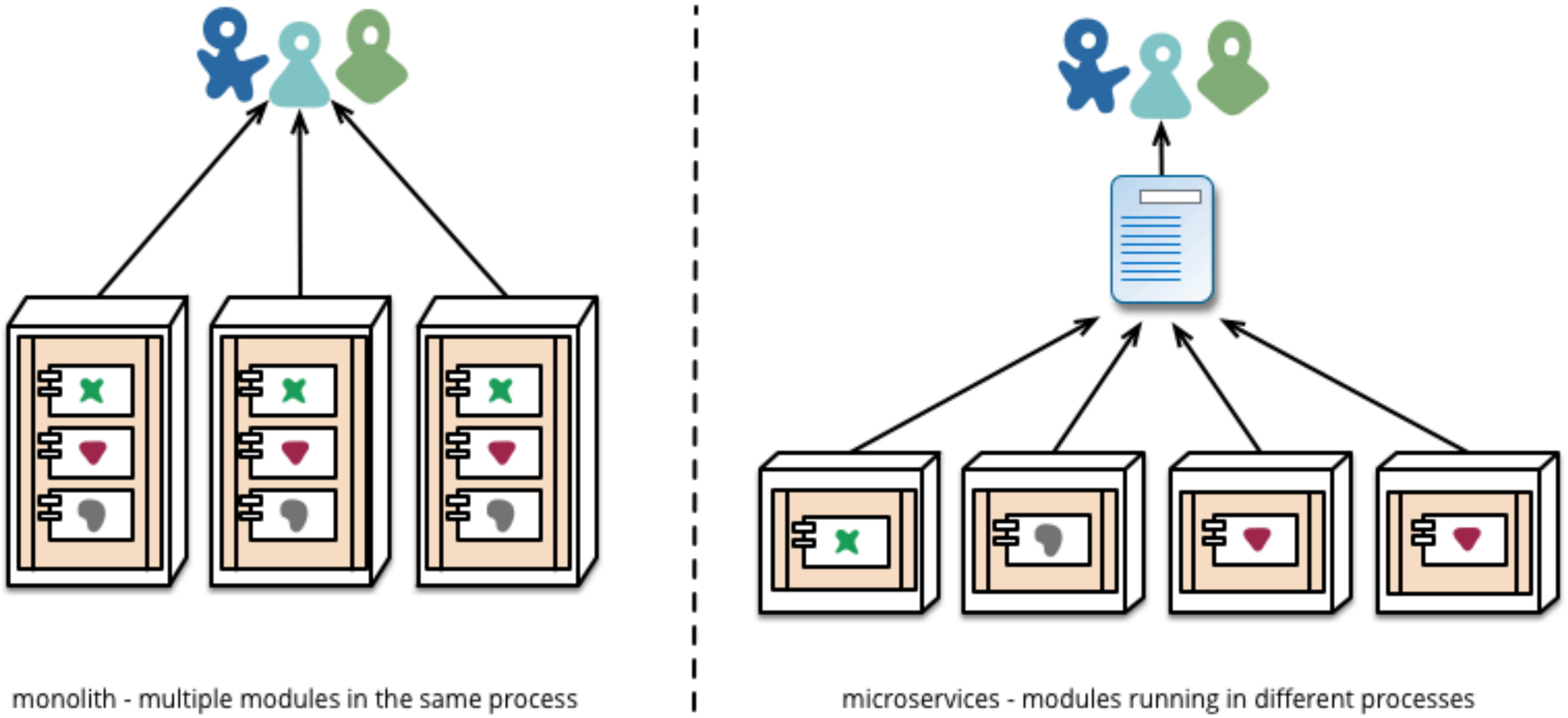
Deployment ?



https://martinfowler.com/articles/microservices.html

Lead time ?


compile, unit and functional test
acceptance test
integration test
user acceptance test
performance test
deploy to production
run on build machine
deployed on build machine
deployed to integration environment
deployed to UAT environment
deployed to performance environment

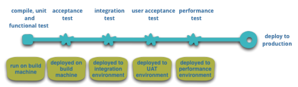


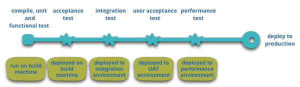
monolith - multiple modules in the same process

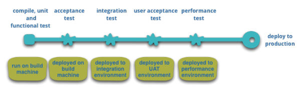
microservices - modules running in different processes

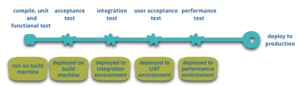
https://martinfowler.com/articles/microservices.html

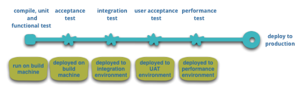
Reduce Lead time ?



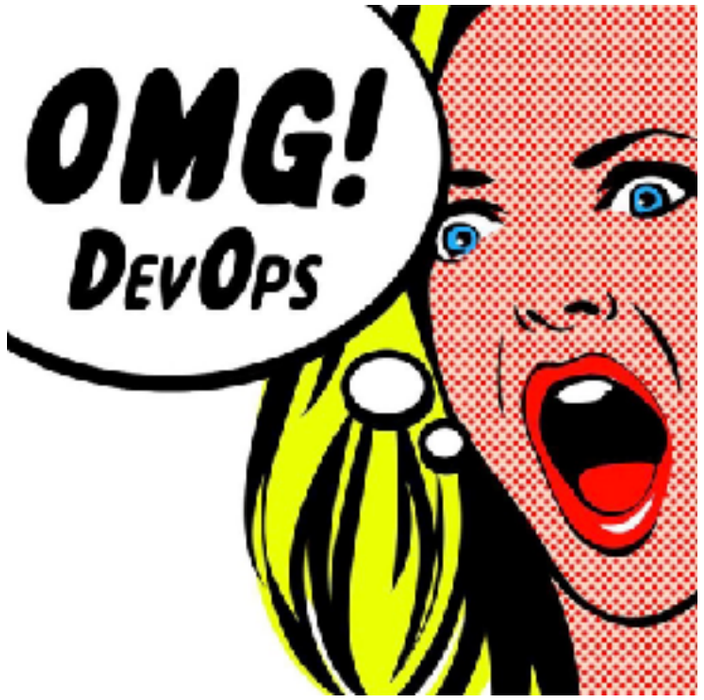








Containerization ?


OMG!
DevOps


docker
SWARM


docker


kubernetes


MESOS

Monitoring ?

Visualization ?

Tracing ?

Alert and Notification ?

Performance ?

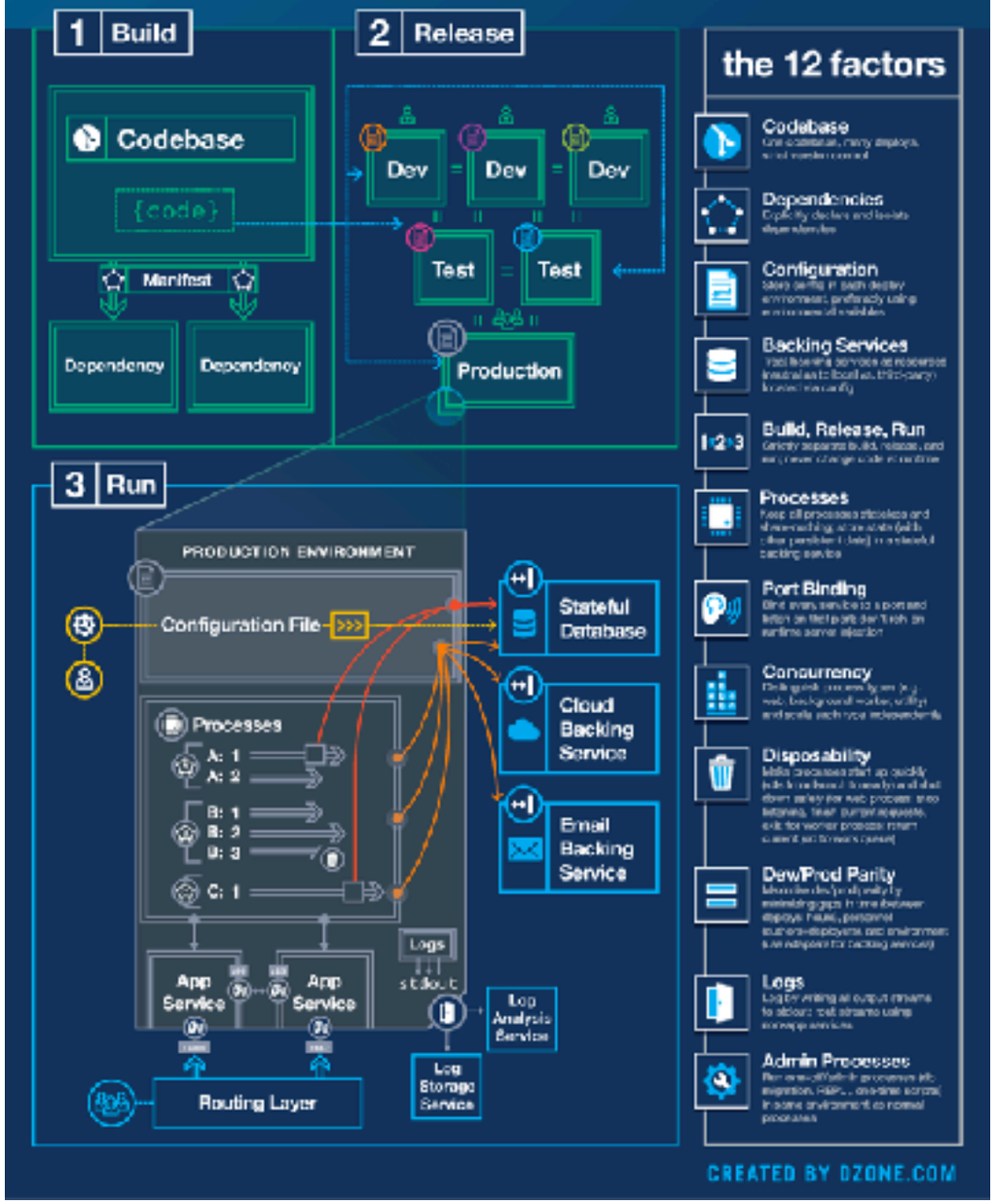
Security ?

What’s next ?

https://12factor.net/

The 12-Factor App

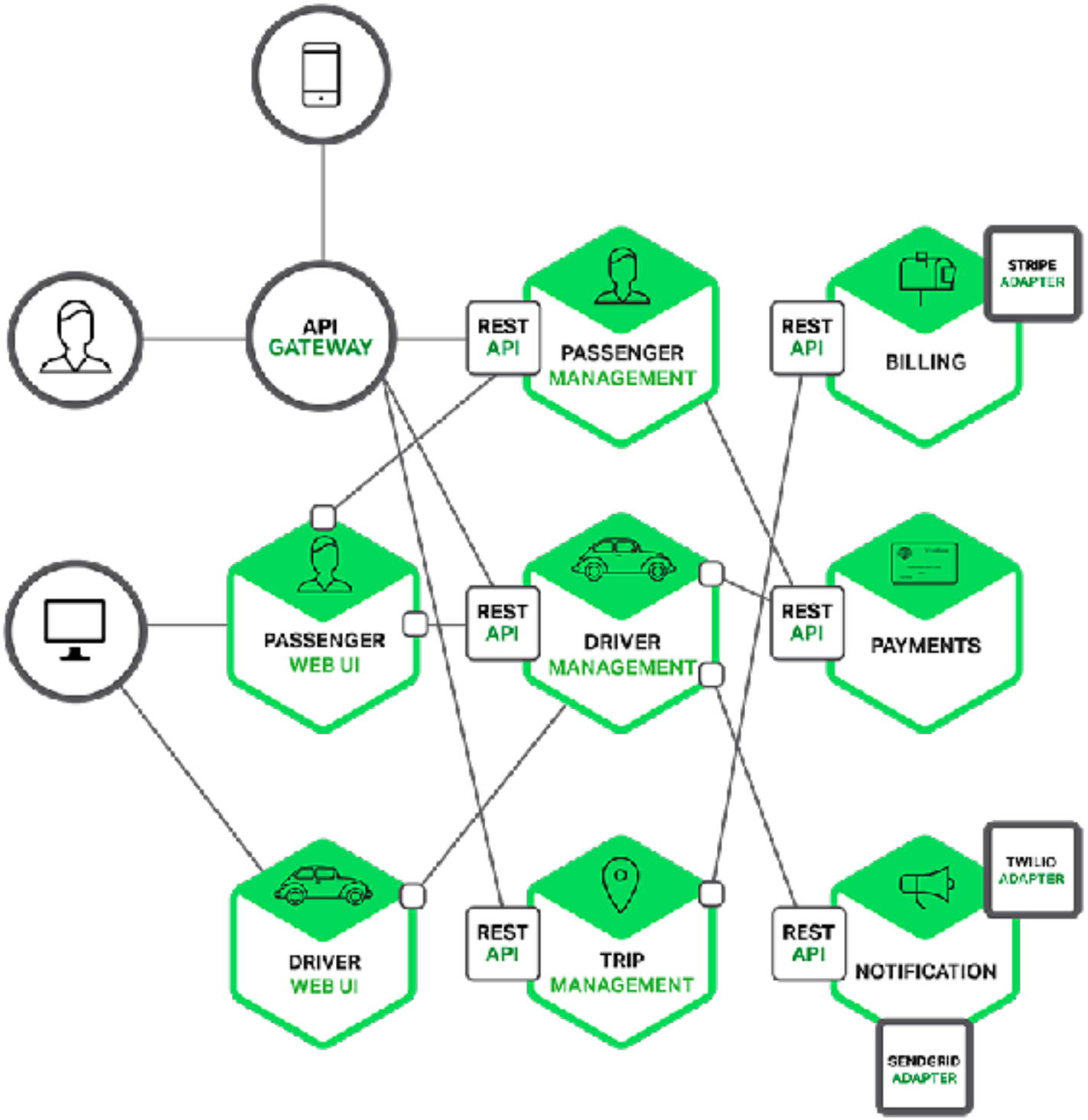
Modern web applications run in heterogeneous environments, scale elastically, update frequently, and depend on independently deployed backing services. Modern application architectures and development practices must be designed accordingly. The PaaS-masters at Heroku summarized lessons learned from building hundreds of cloud-native applications into the twelve factors visualized below.



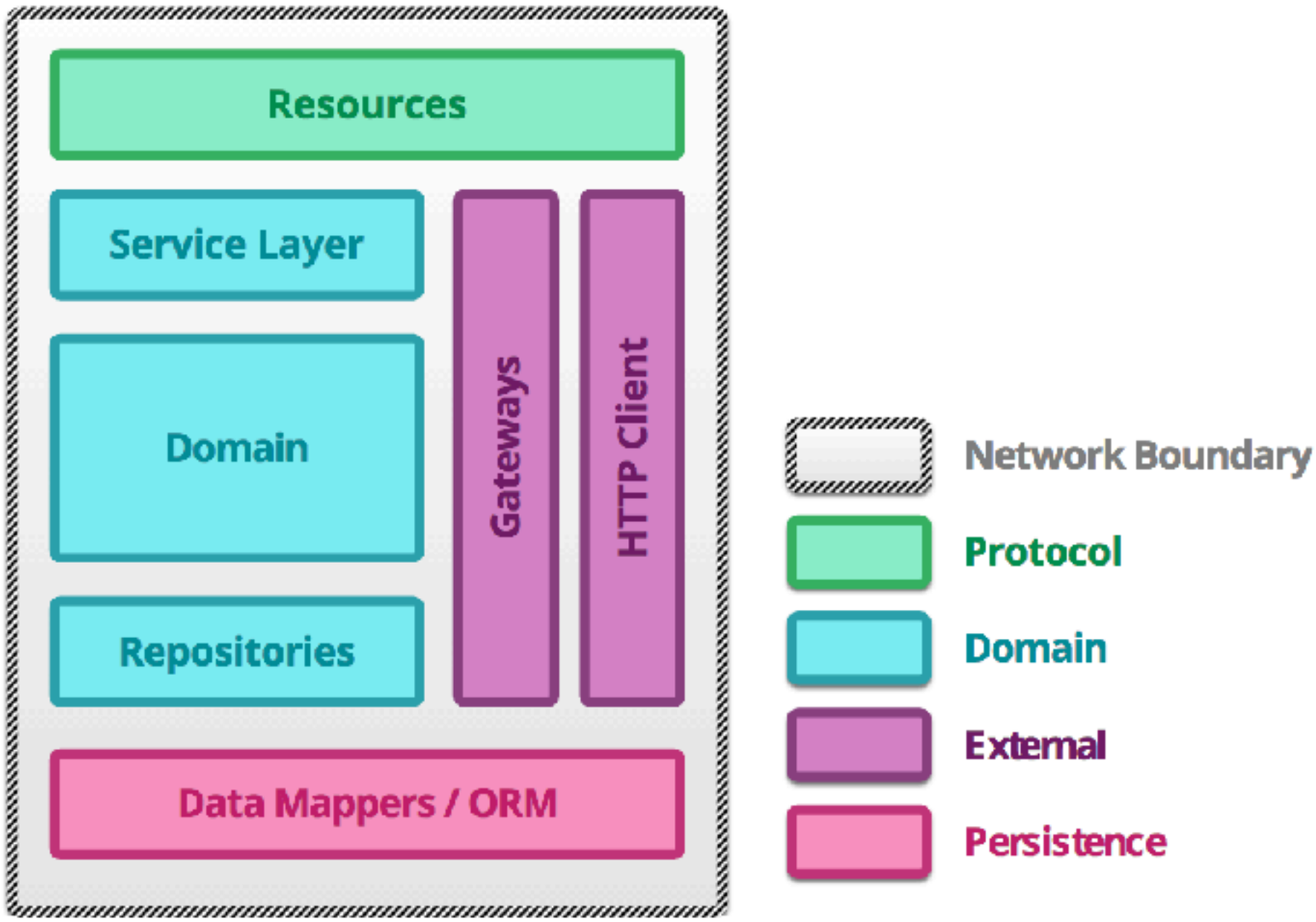
Testing ?

https://martinfowler.com/articles/microservice-testing

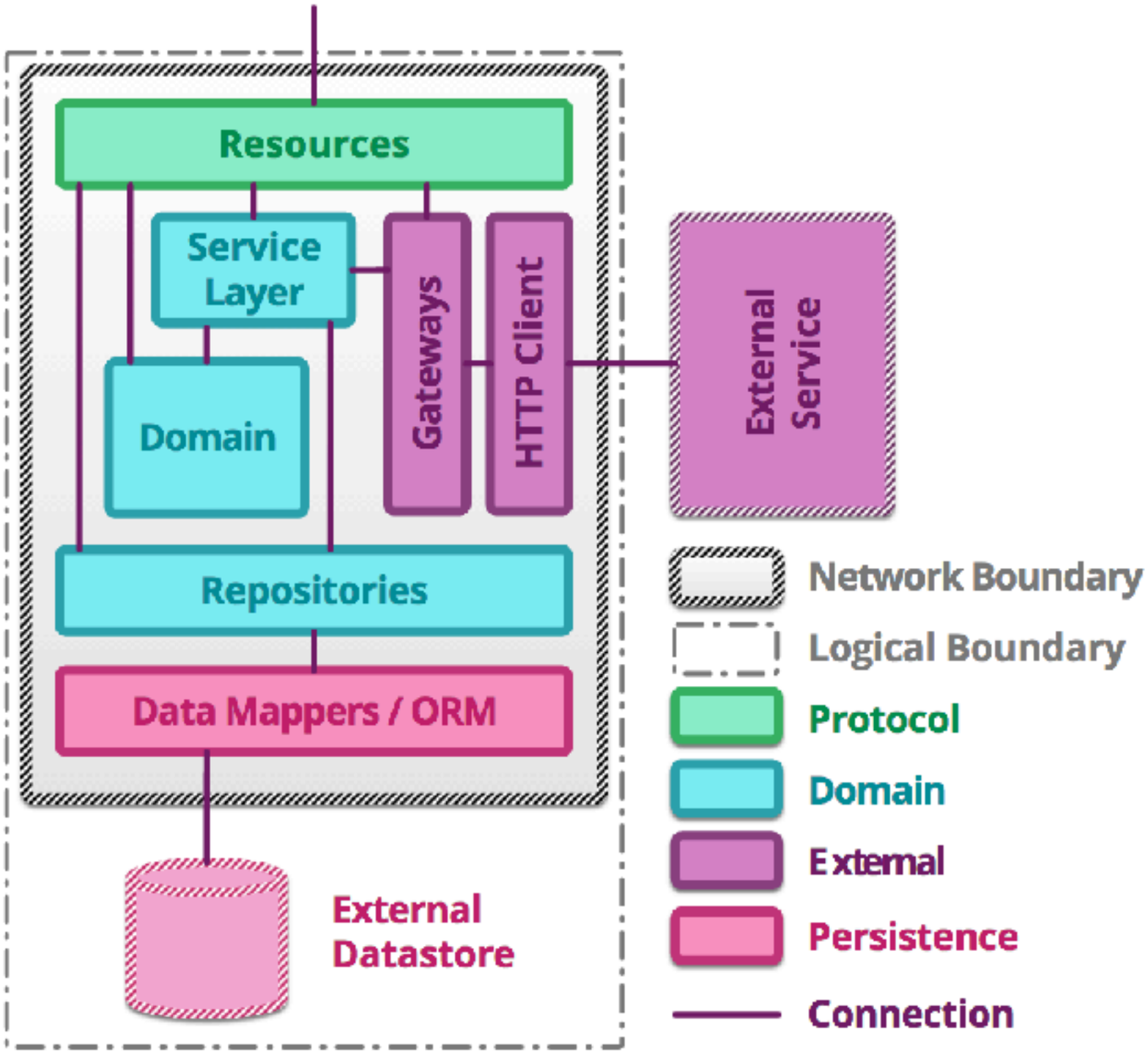
Microservice



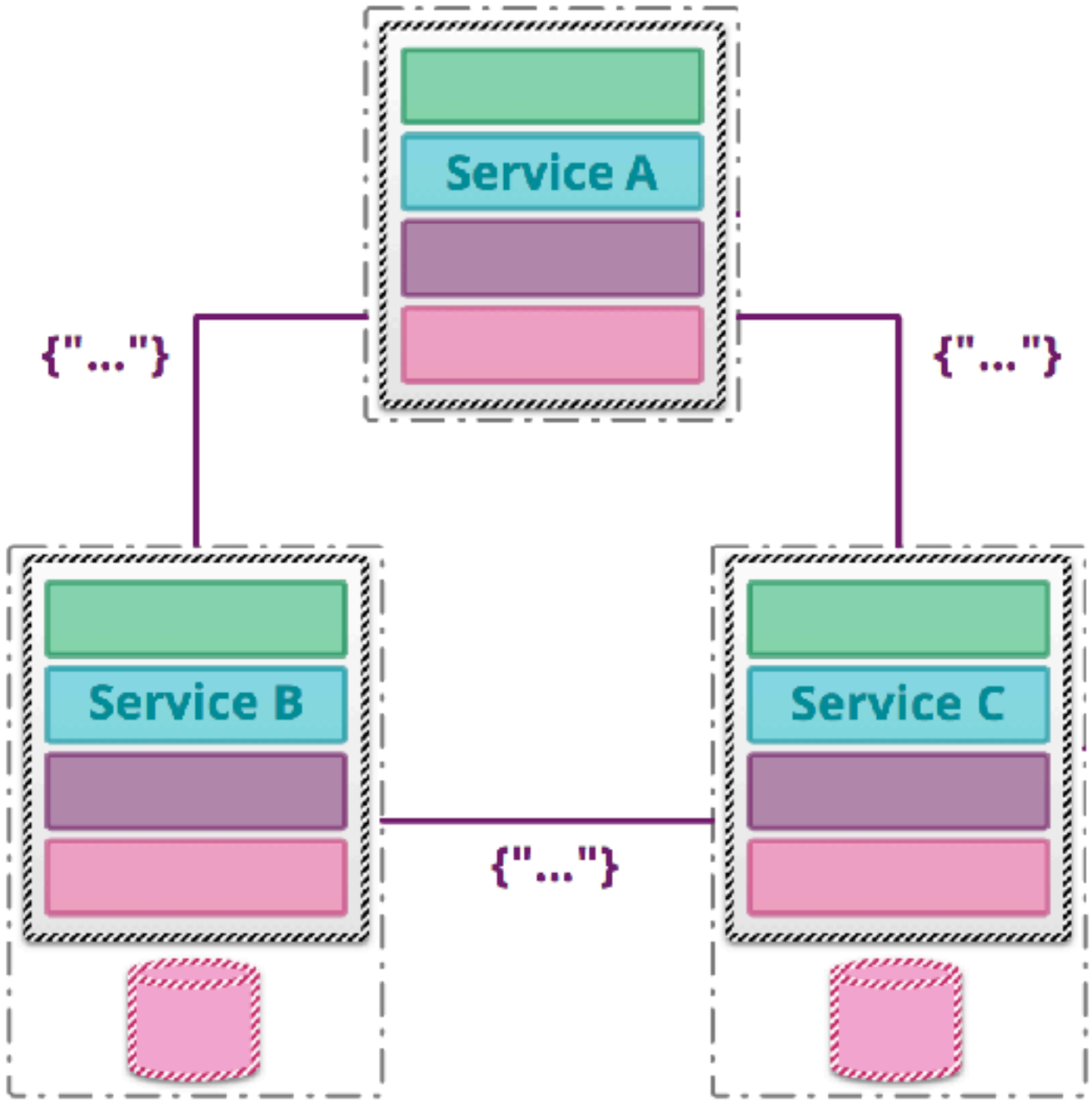
Microservice



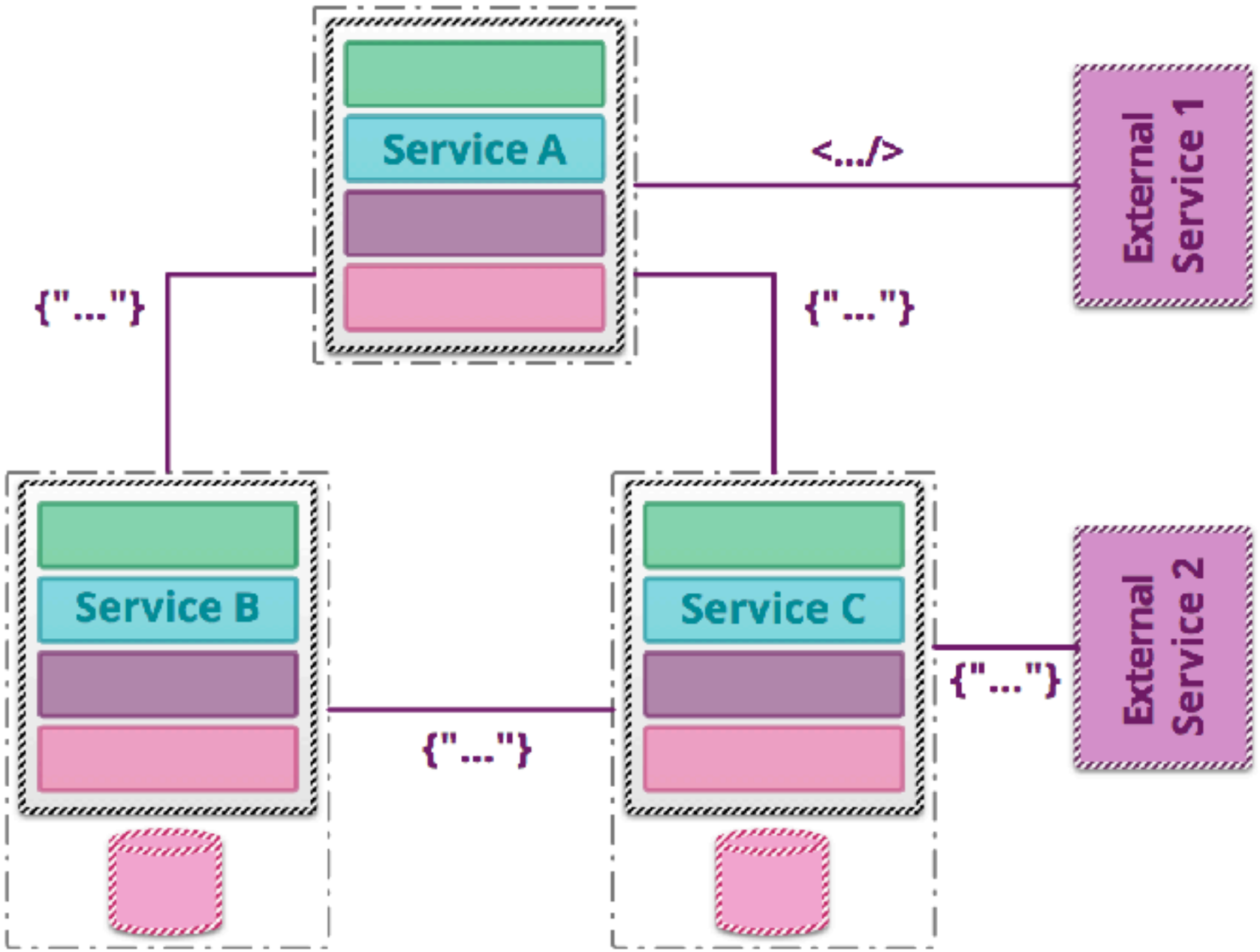
Microservice



Microservice(s)



Microservice(s)



Testing strategies ?

Unit

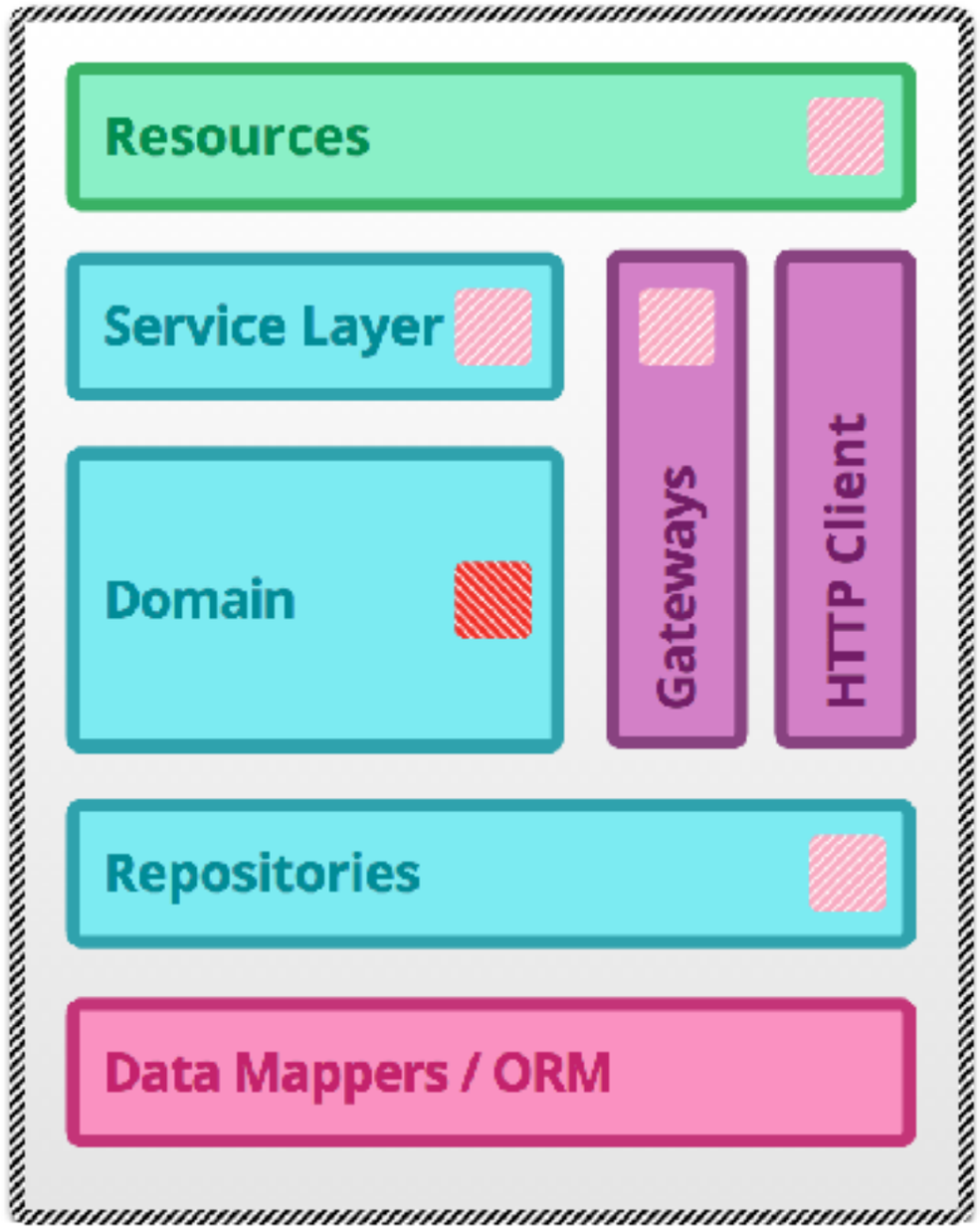
Integration

Component

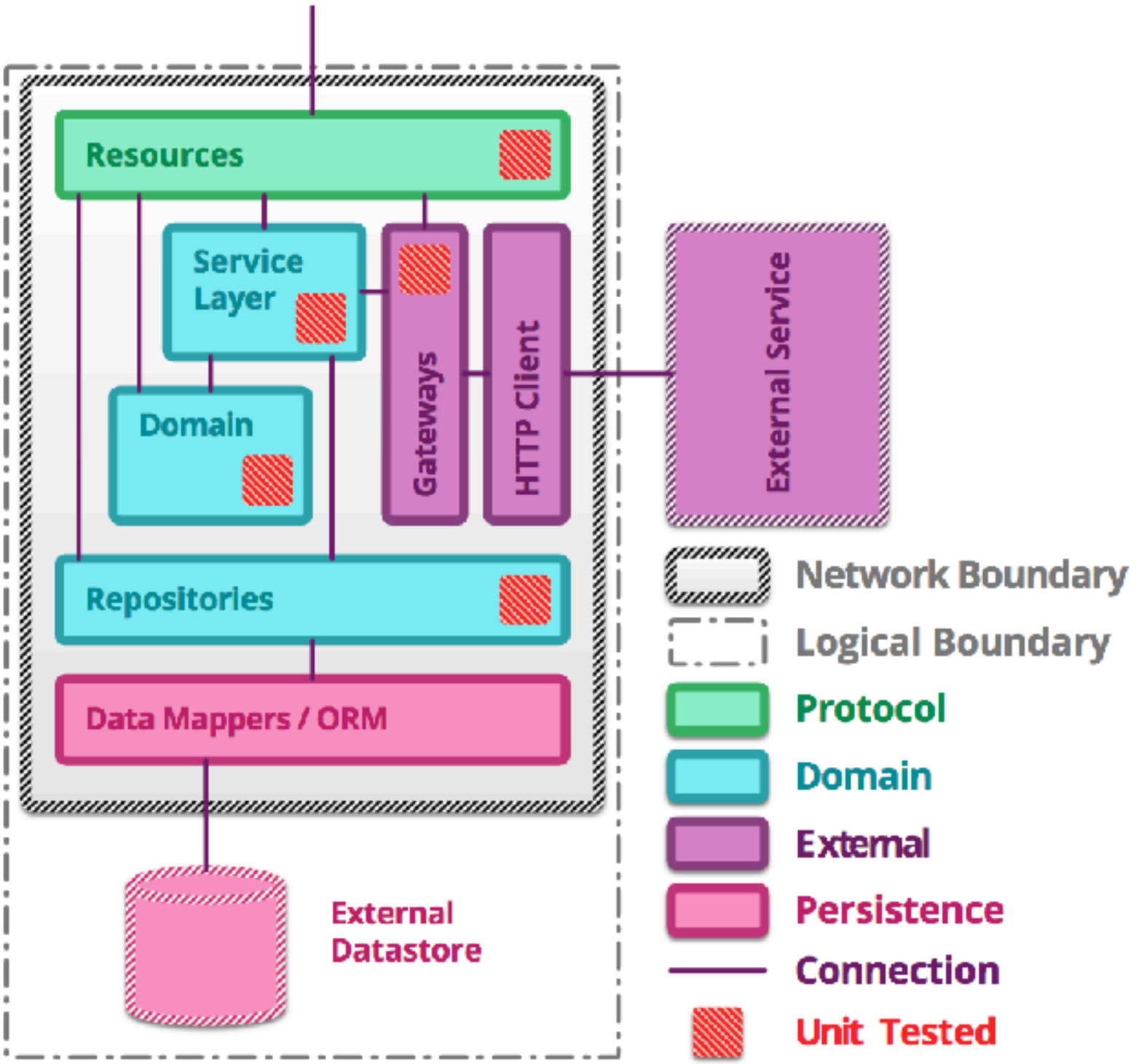
Contract

End-to-end

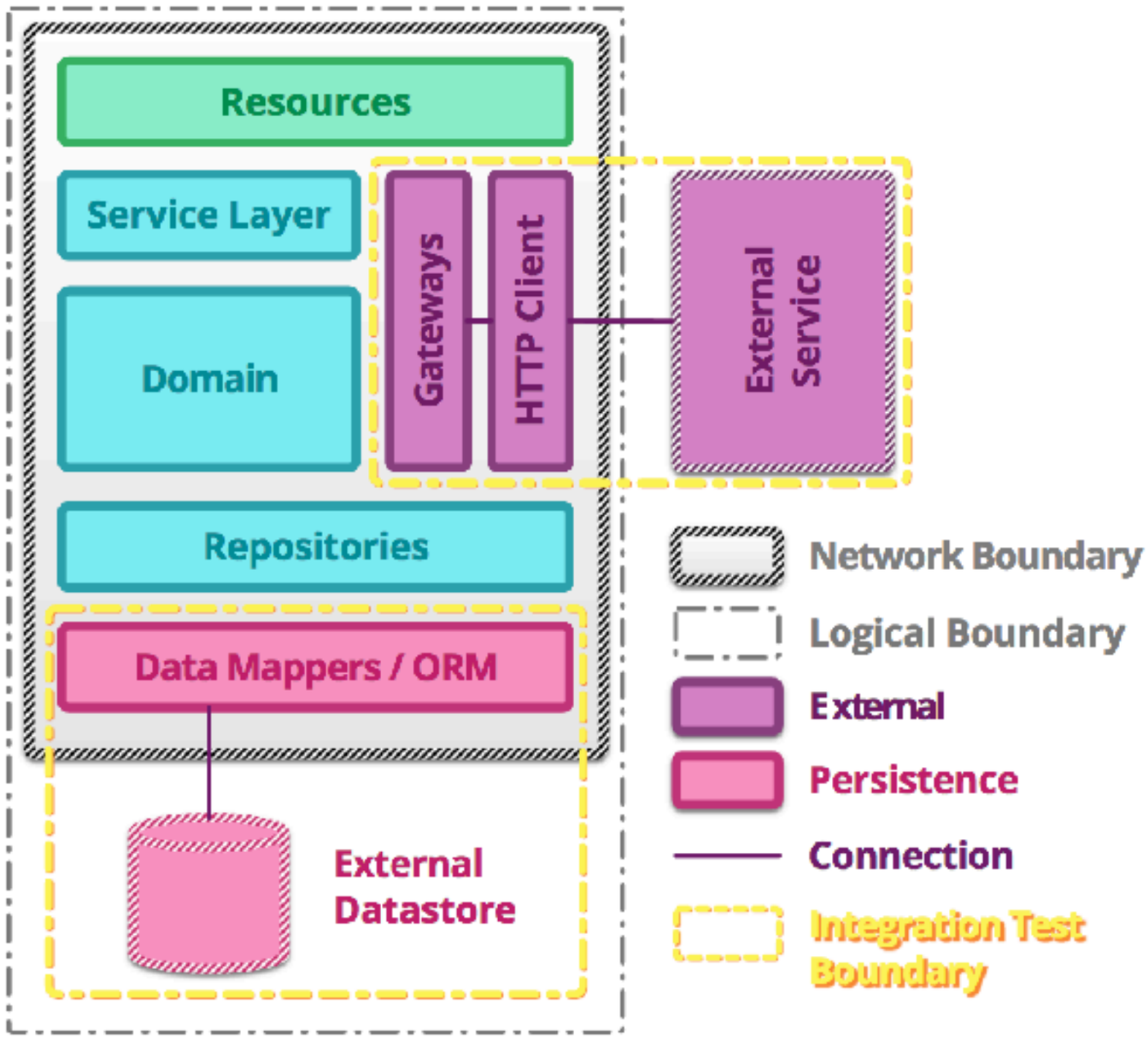
Unit testing



Unit testing not guarantee about the **behavior** of system


Resources
Service Layer
Domain
Repositories
Data Mappers / ORM
External Datastore
Gateways
HTTP Client
External Service
Network Boundary
Logical Boundary
Protocol
Domain
External
Persistence
Connection
Unit Tested

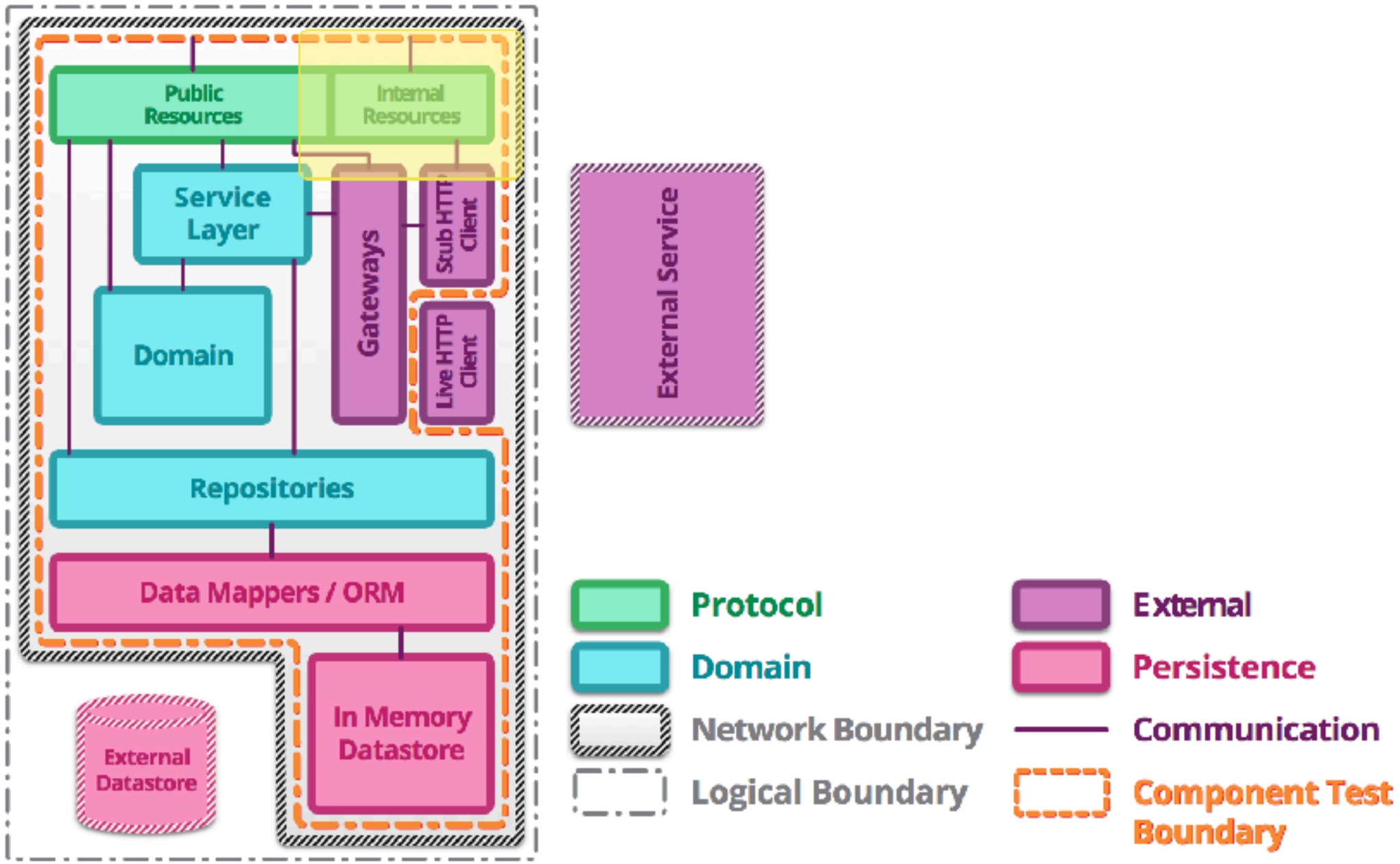
Integration testing



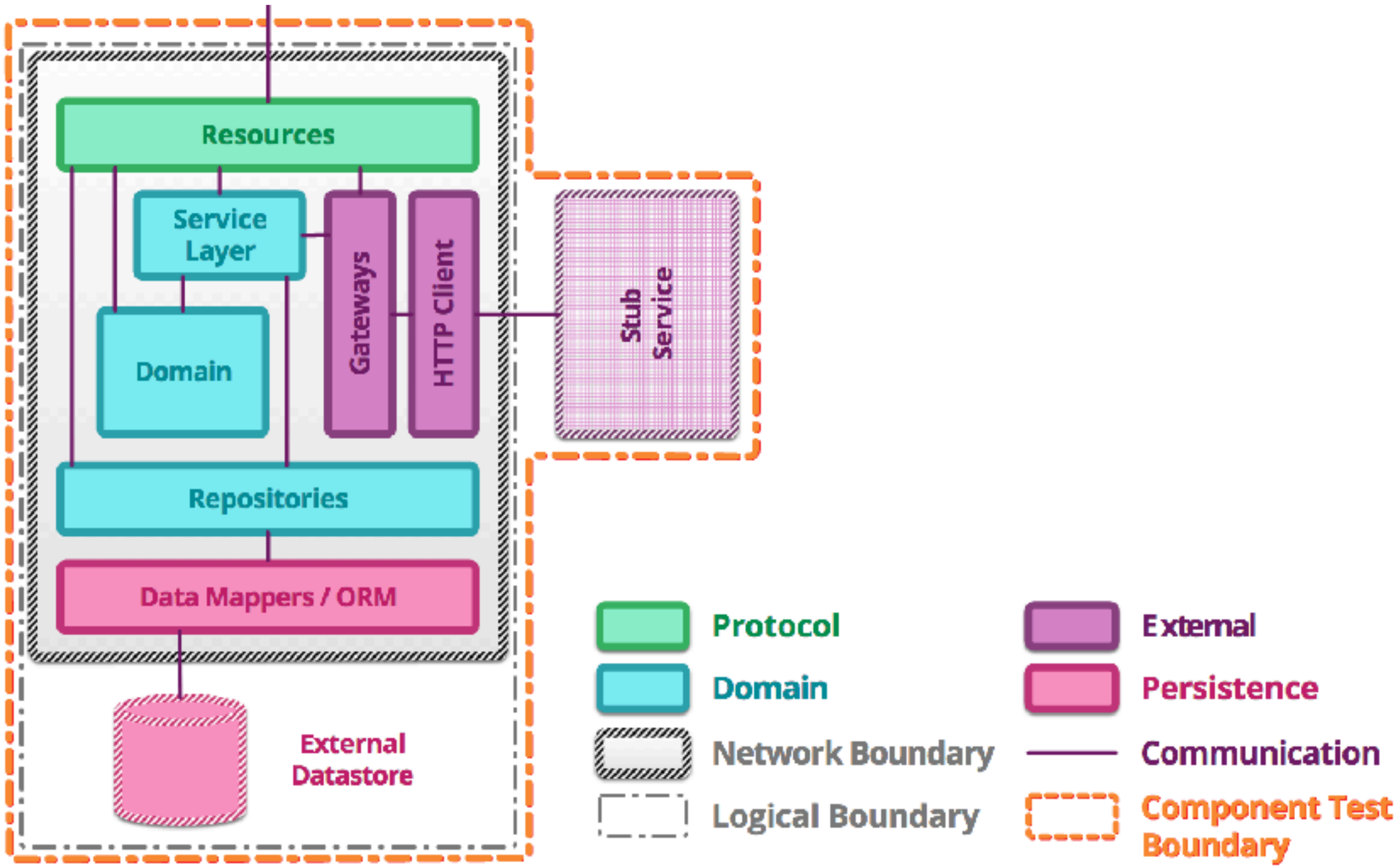
No confidence about

biz requirement are satisfied

Component testing

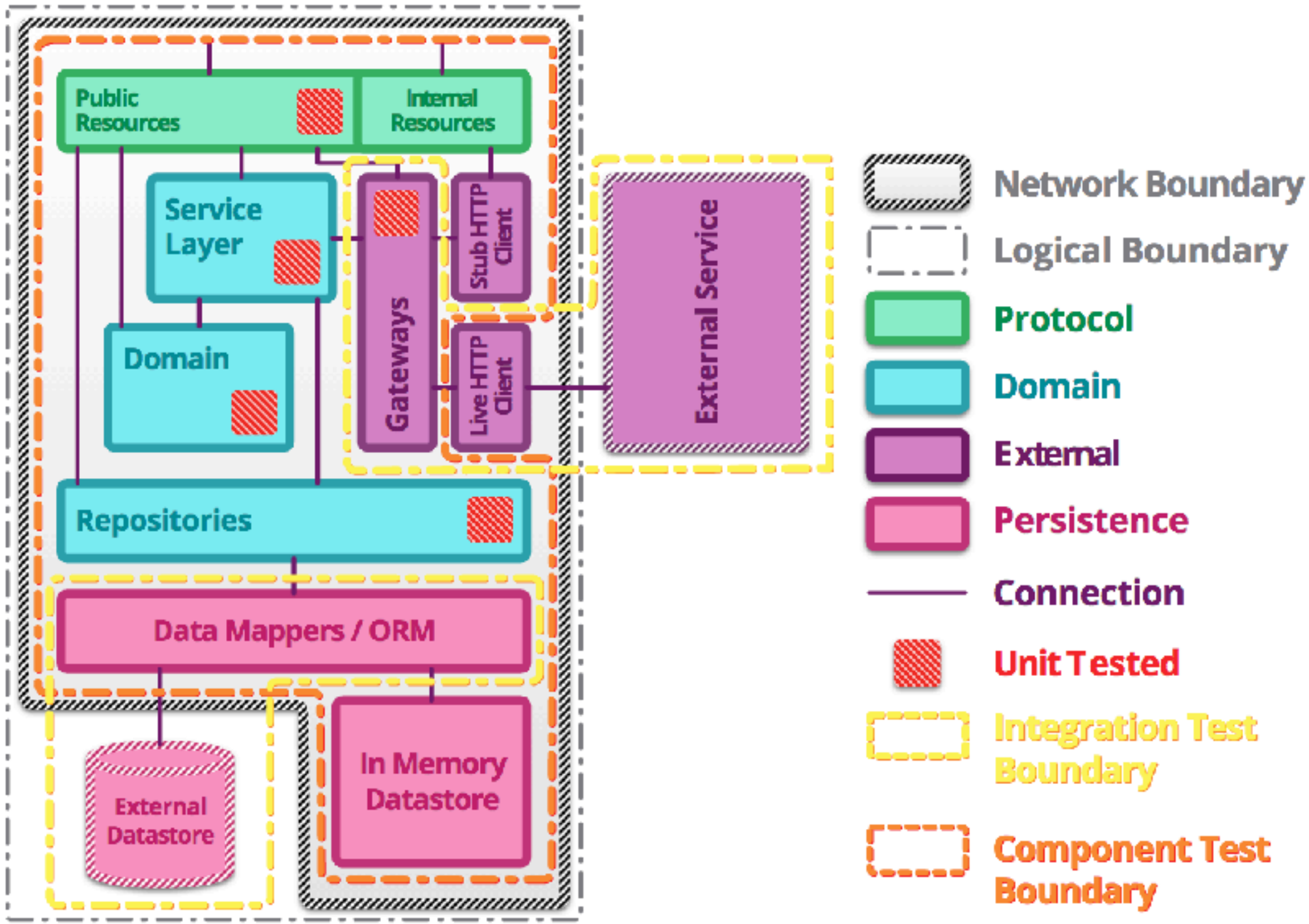


Component testing



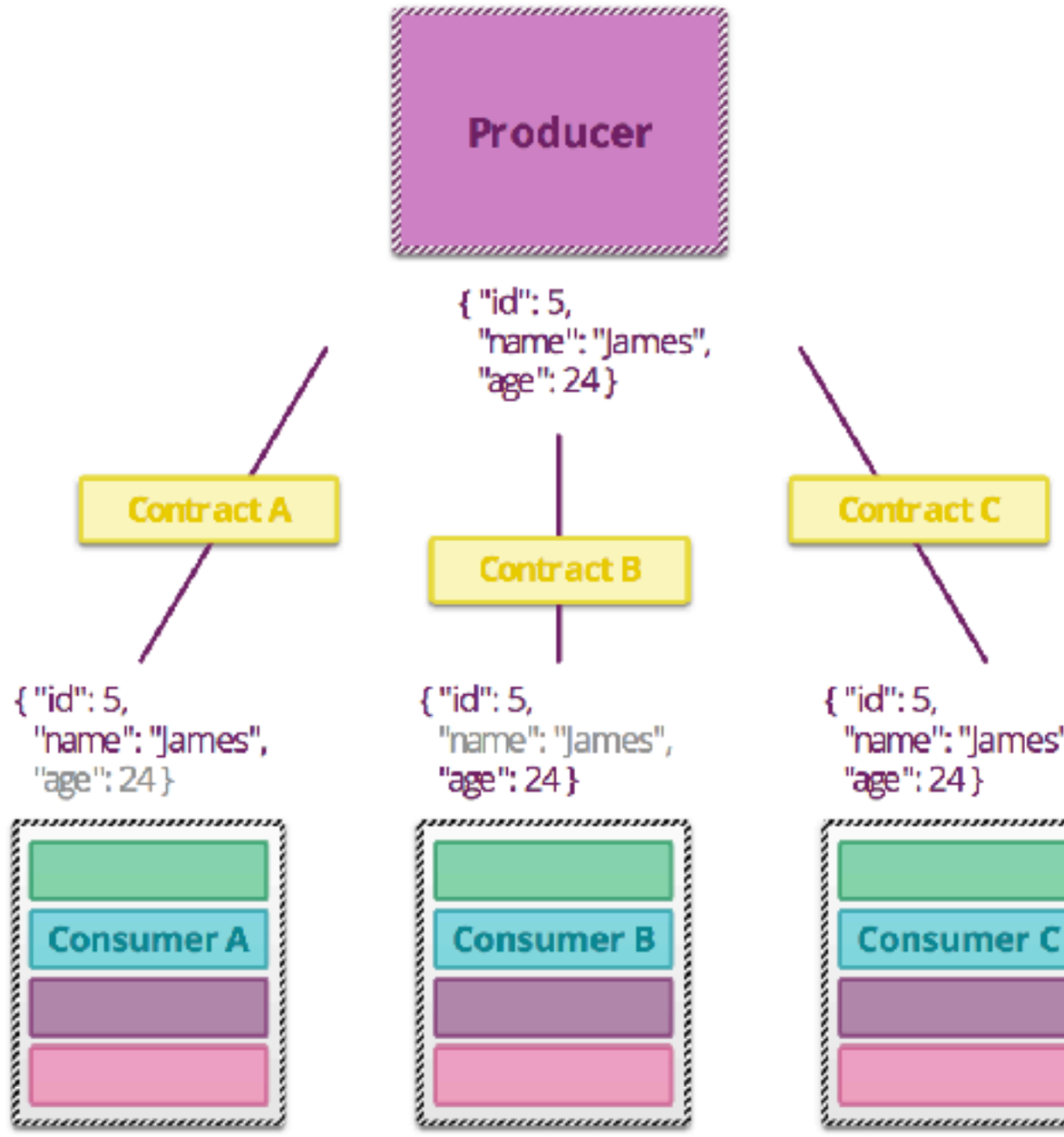
More high coverage

More confidence

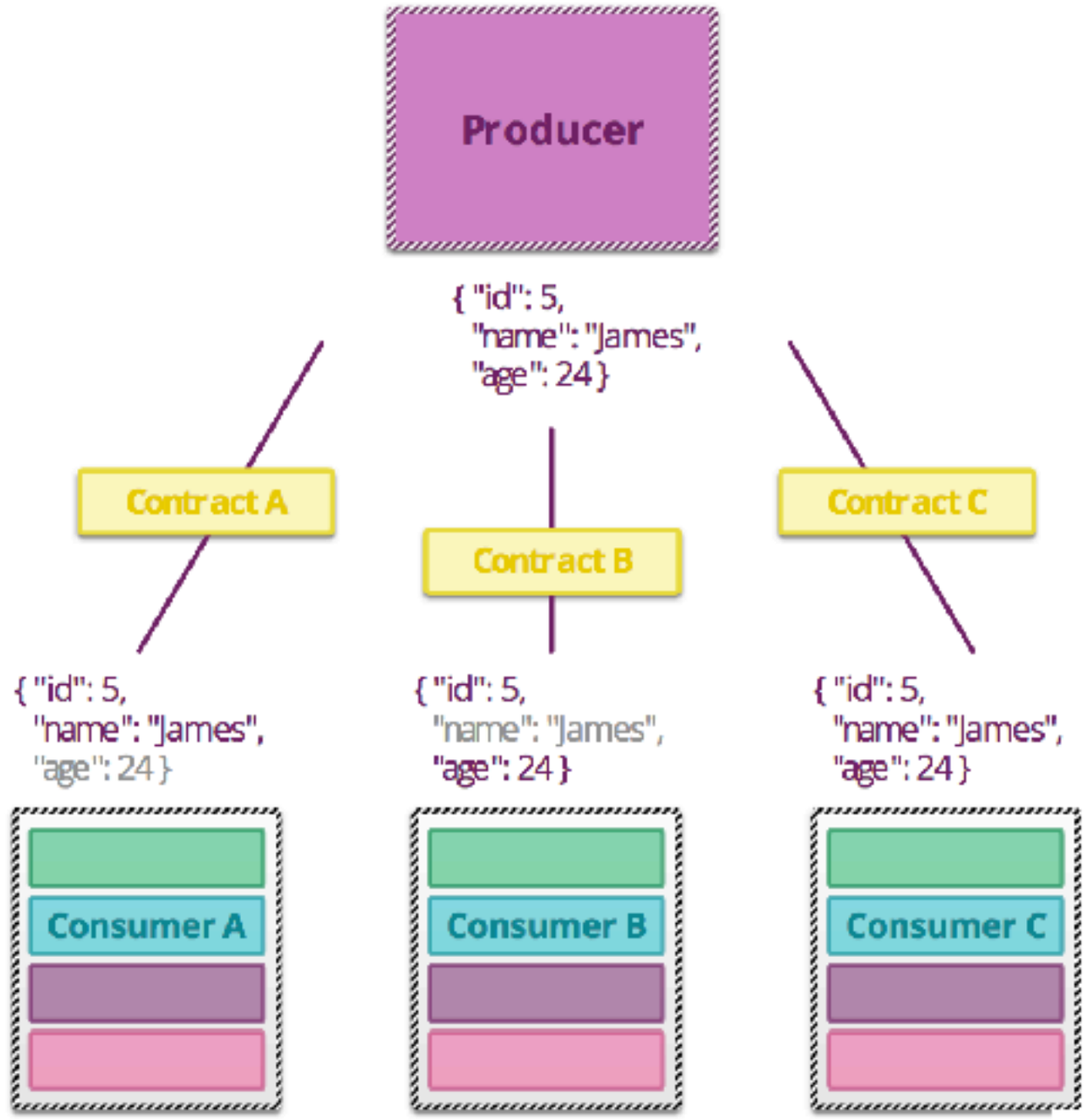

Public Resources
Internal Resources
Service Layer
Domain
Repositories
Gateways
Stub HTTP Client
Live HTTP Client
External Service
Data Mappers / ORM
External Datastore
In Memory Datastore
Network Boundary
Logical Boundary
Protocol
Domain
External
Persistence
Connection
Unit Tested
Integration Test Boundary
Component Test Boundary

More tests ?

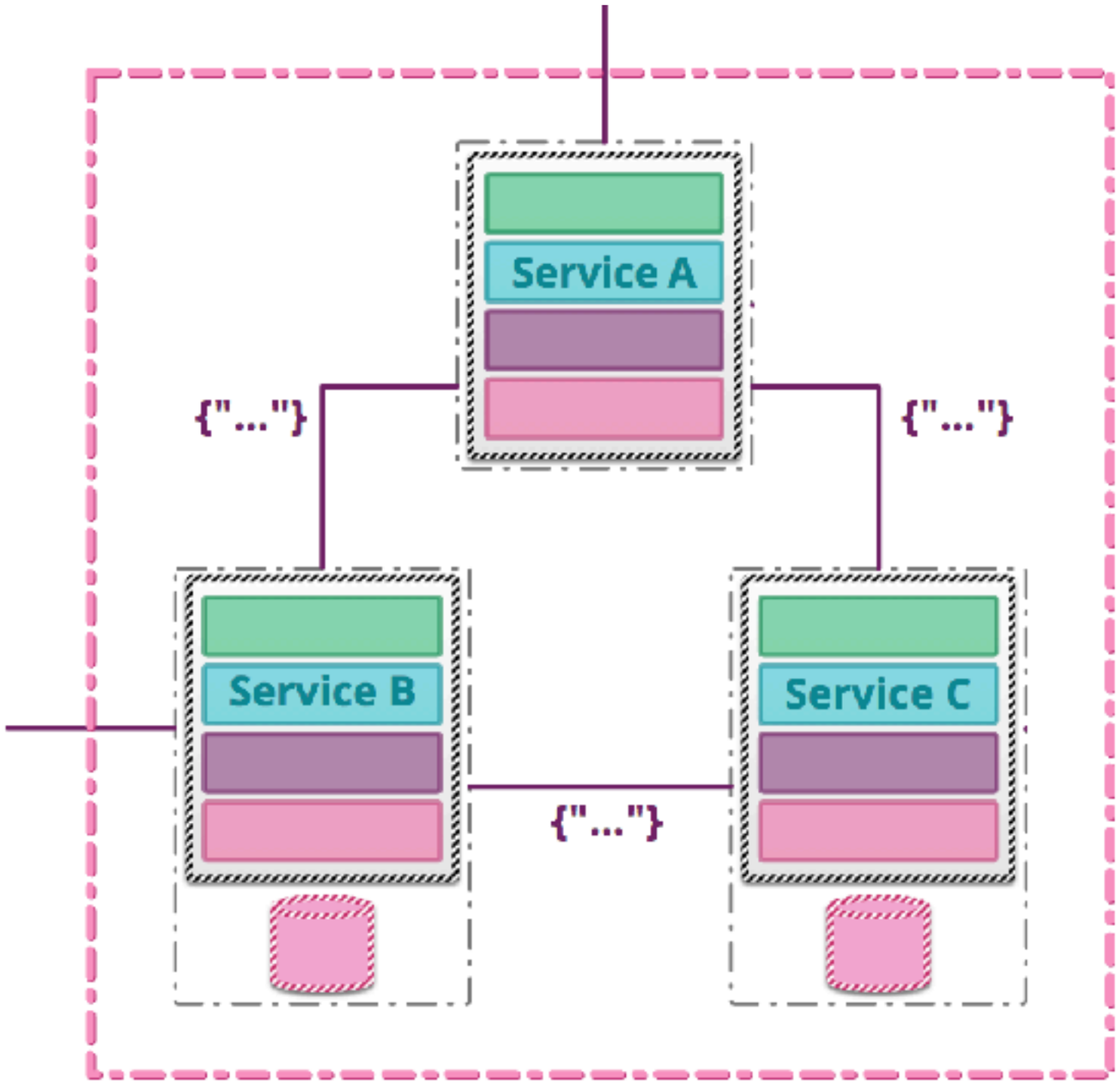
Usage ?


Producer
{ "id": 5,
"name": "James",
"age": 24 }
Contract A
Contract B
Contract C
{ "id": 5,
"name": "James",
"age": 24 }
{ "id": 5,
"name": "James",
"age": 24 }
{ "id": 5,
"name": "James",
"age": 24 }
Consumer A
Consumer B
Consumer C

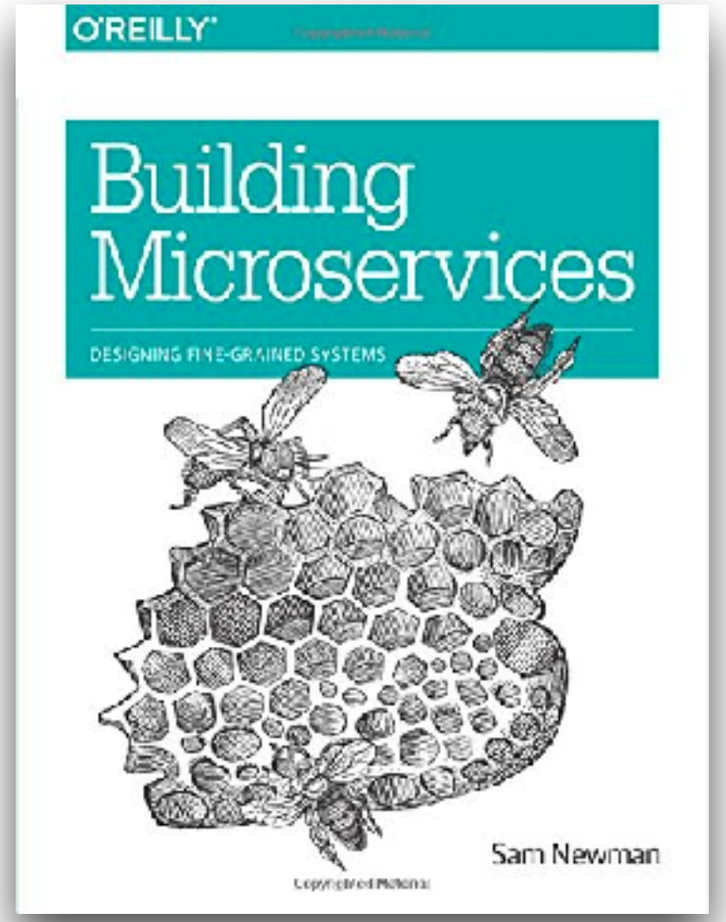
Contract testing

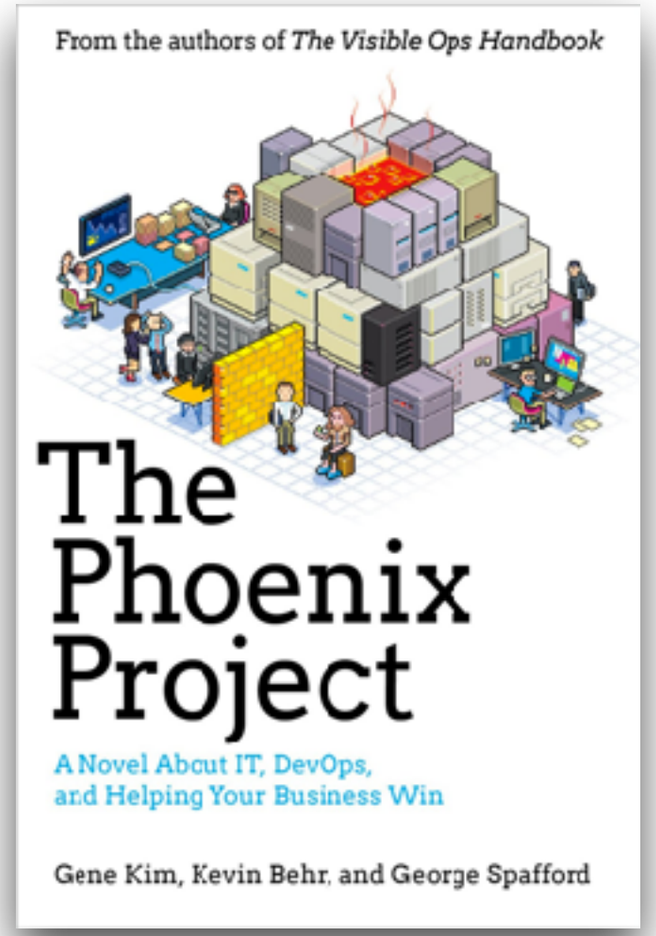


End-to-end testing



Resources ?


O'REILLY
Building Microservices
DESIGNING FINE-GRAINED SYSTEMS
Sam Newman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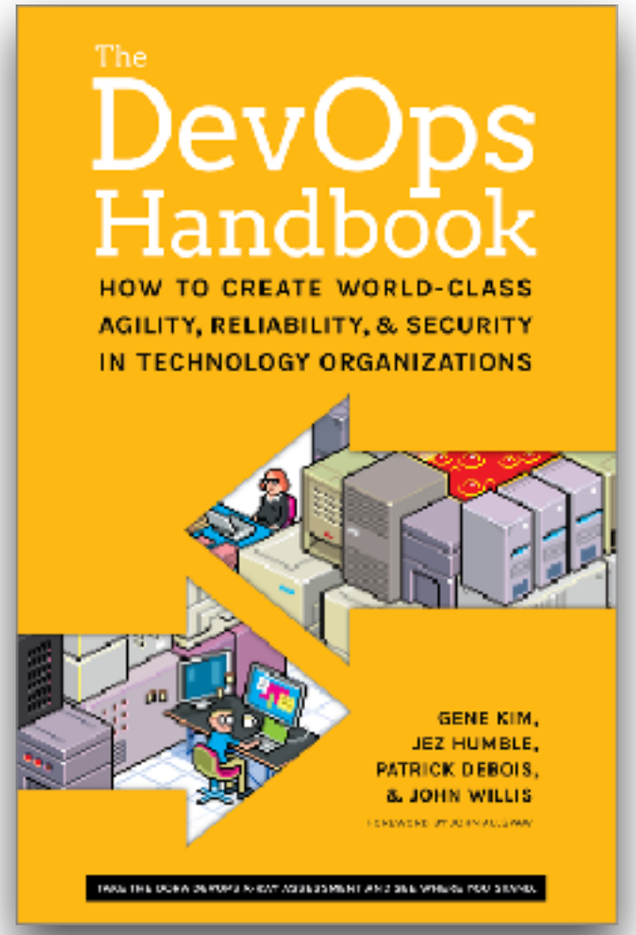
The DevOps Handbook
HOW TO CREATE WORLD-CLASS AGILITY, RELIABILITY, & SECURITY IN TECHNOLOGY ORGANIZATIONS
GENE KIM, JEZ HUMBLE, PATRICK DEBOIS, & JOHN WILLIS