@MIKEGEHARD, @PIVOTAL

MONOLITH -> MICROSERVICES
A GUIDED ADVENTURE

ABOUT ME

- Working with clients to migrate legacy monoliths -> microservices
- Worked on the Spring Cloud Services team
- Trying not to be a Chief Principal Senior Consultant Scientist

ABOUT YOU

- Have a monolith that needs migrating?
- Actively migrating a monolith?
- Building microservices net new?
- This talk has a little bit for all of you…

AGENDA

- Where did these ideas come from?
- Which comes first?
- What is the path?

BACKGROUND

TWEETS 1,362 | FOLLOWING 166 | FOLLOWERS 440 | LIKES 191

Barinek
@barinek

Boulder, CO
Joined October 2008

Tweets | Tweets & replies | Media

Barinek @barinek · Jul 16
this one is beyond misspelling abbey today - just realized the range finder I've been using forever is in meters. ugh ;(

1

https://twitter.com/barinek

HTTP://WWW.APPCONTINUUM.IO/

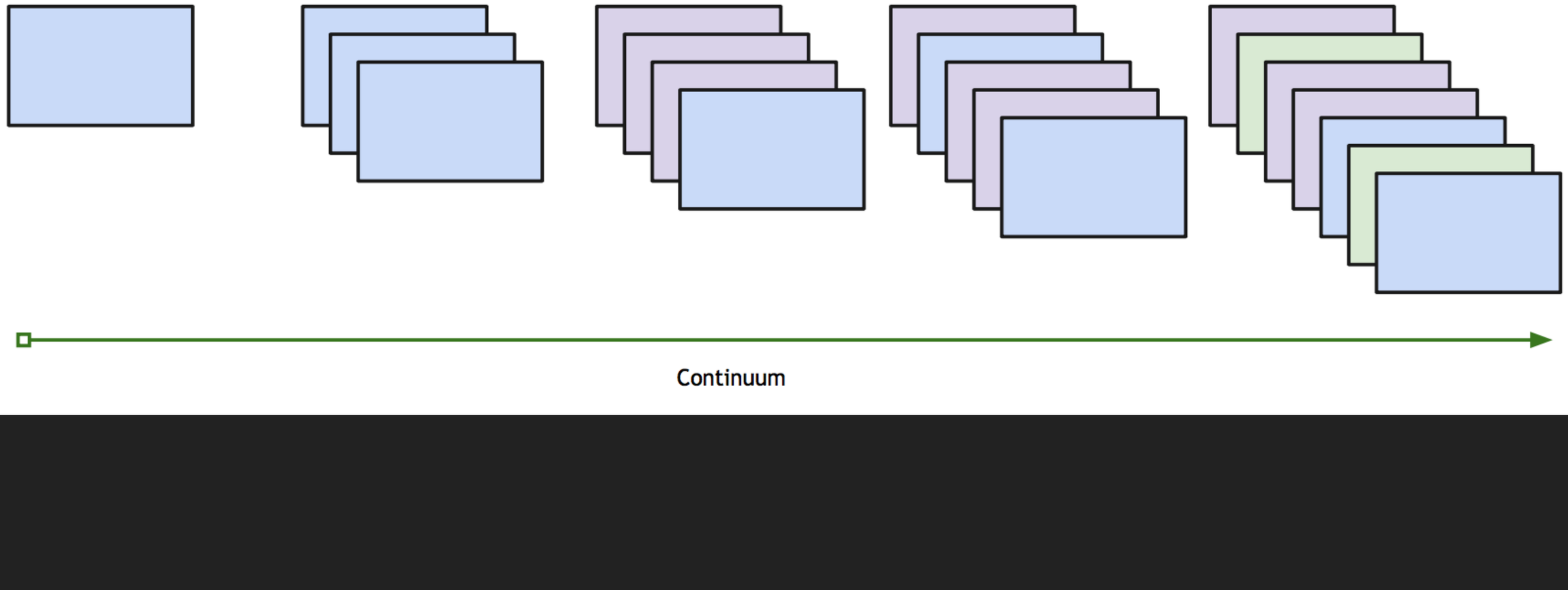
Unstructured

Namespace

Application + Libraries

Applications + Libraries

Applications + Libraries + Services



Continuum

TWEETS 17.3K | FOLLOWING 1,893 | FOLLOWERS 8,235 | LIKES 2,563

Simon Brown
@simonbrown

Author (leanpub.com/b/software-arc…), award-winning speaker, trainer, coder, creator of C4 software architecture model, founder of @structurizr.

Tweets | Tweets & replies | Media

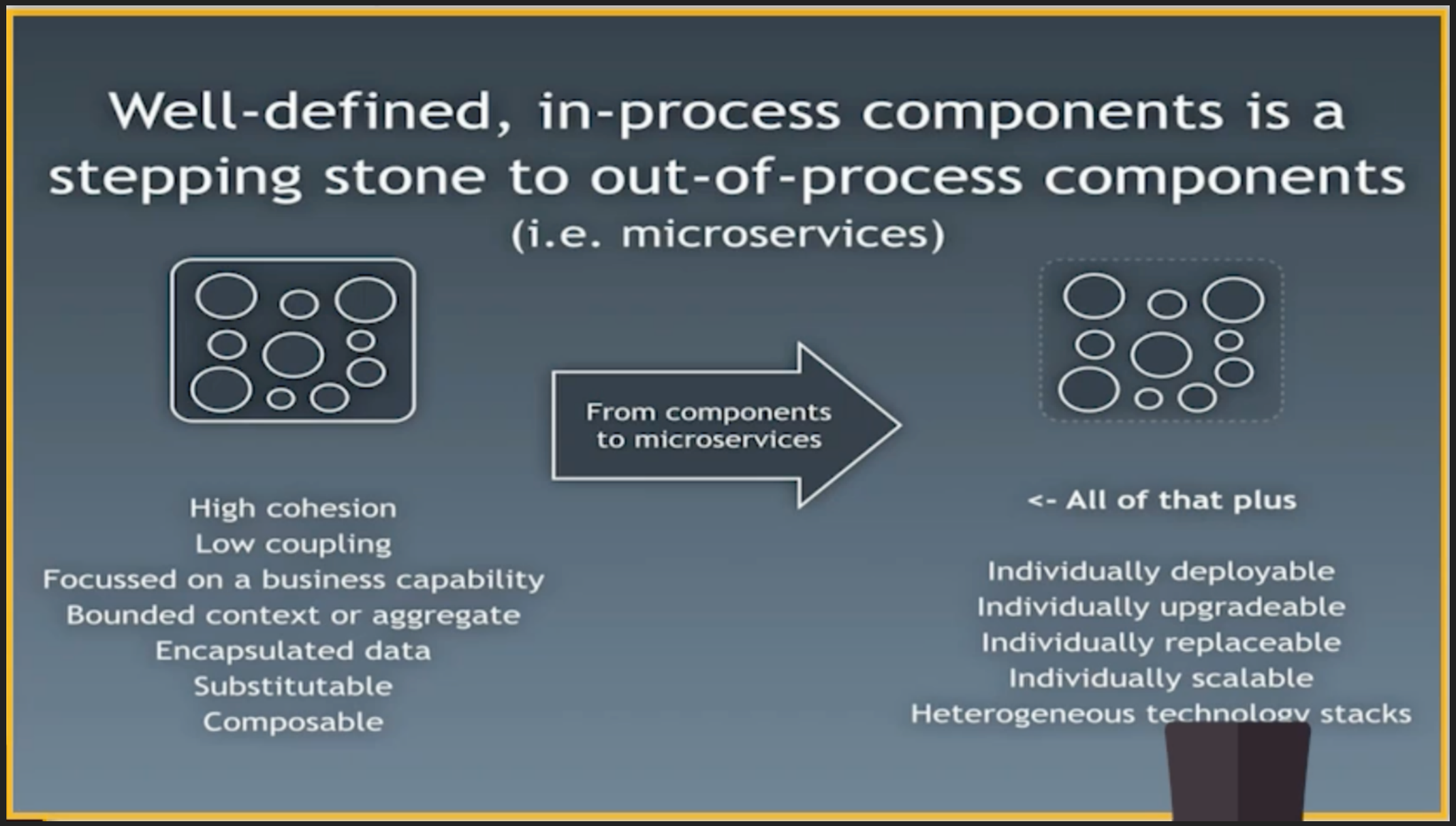
Pinned Tweet

Simon Brown @simonbrown · Jun 28

If you're looking for information about my #c4model … this is a good place to start ->

https://twitter.com/simonbrown

MODULAR MONOLITH



NOTICE ANY SIMILARITIES?

THIS SHOULD NOT BE REVOLUTIONARY

WHICH COMES FIRST?

Kent Beck
@KentBeck

Follow

any decent answer to an interesting question begins, "it depends..."

RETWEETS 429

FAVORITES 263

10:45 AM - 6 May 2015

MONOLITH OR MICROSERVICES

IT DEPENDS...

HTTP://WWW.APPCONTINUUM.IO/

Unstructured

Namespace

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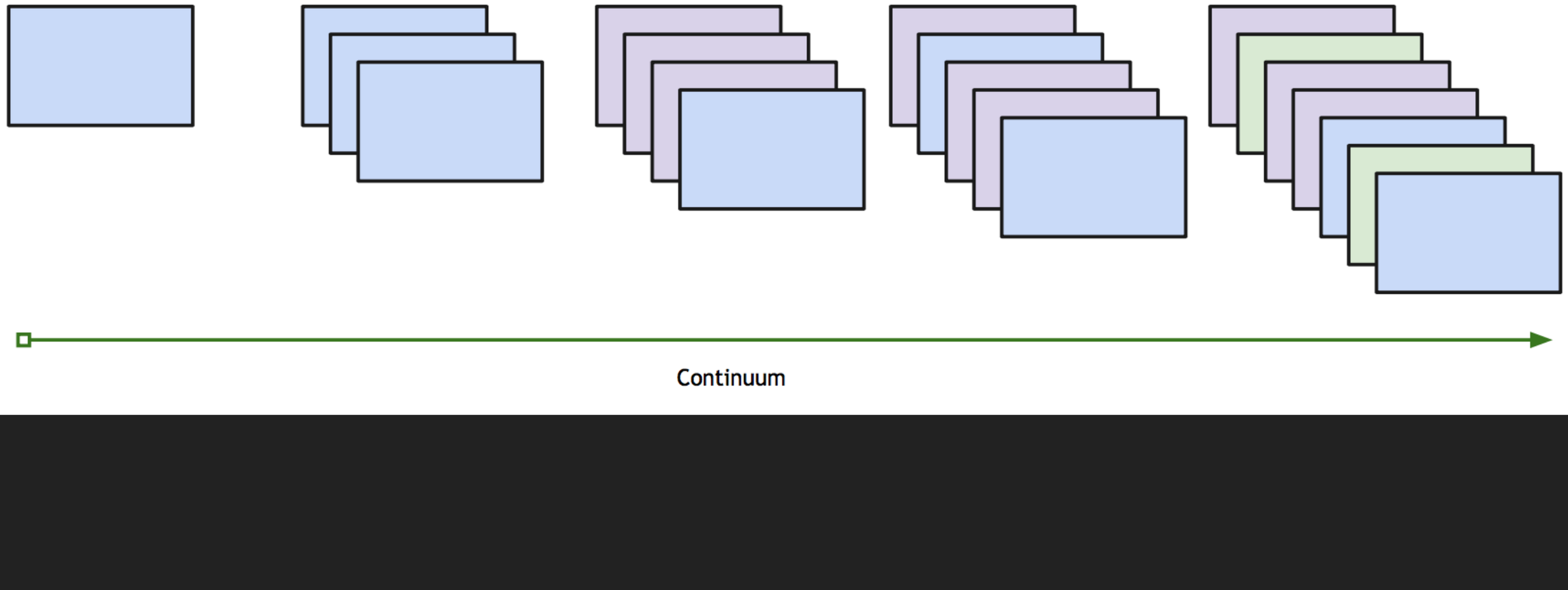
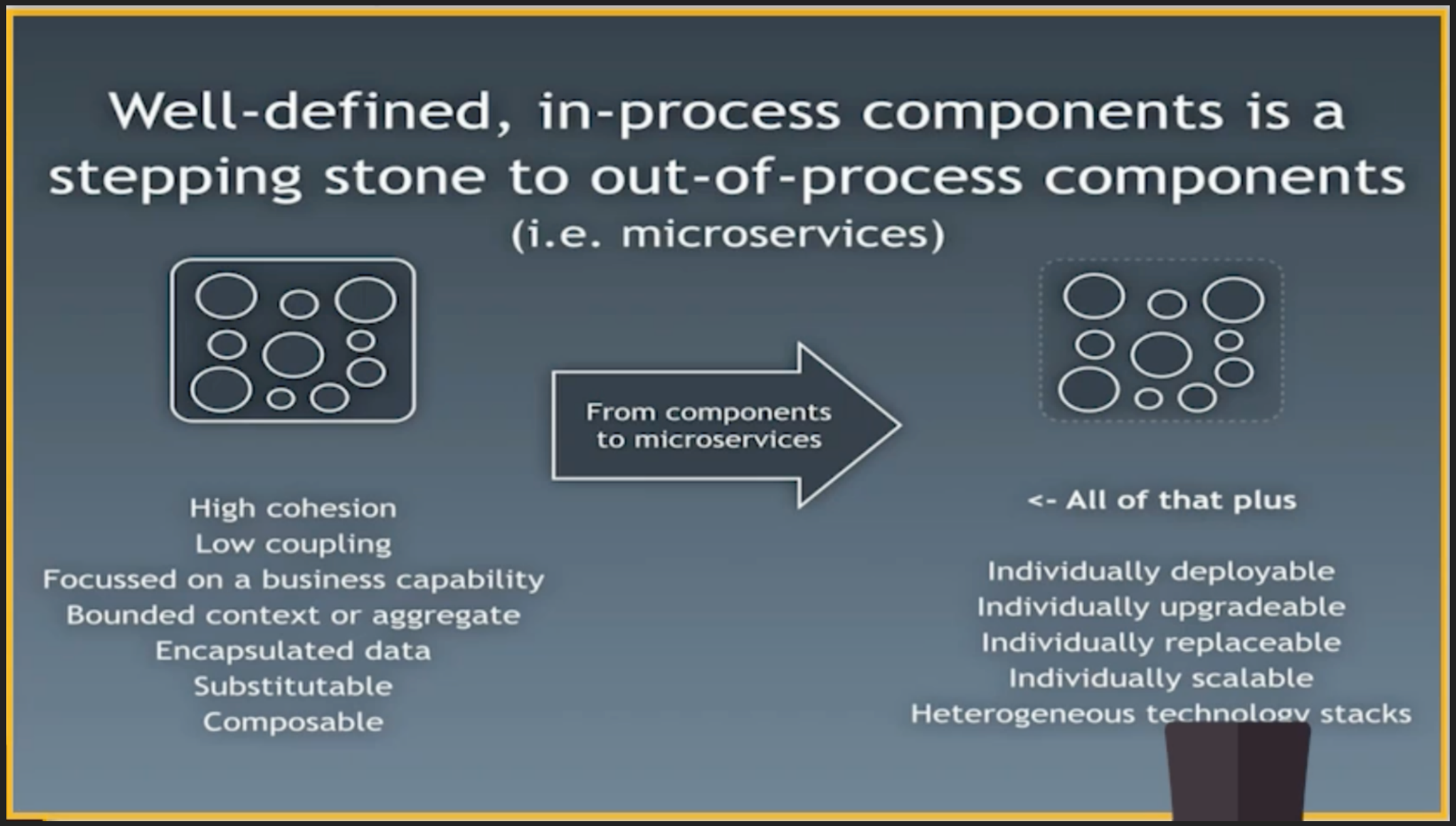
Applications + Libraries + Services



Continuum

MODULAR MONOLITH



TEXT

IF YOU CAN'T BUILD A WELL STRUCTURED MONOLITH, WHAT MAKES YOU THINK YOU CAN BUILD A WELL STRUCTURED SET OF MICROSERVICES?

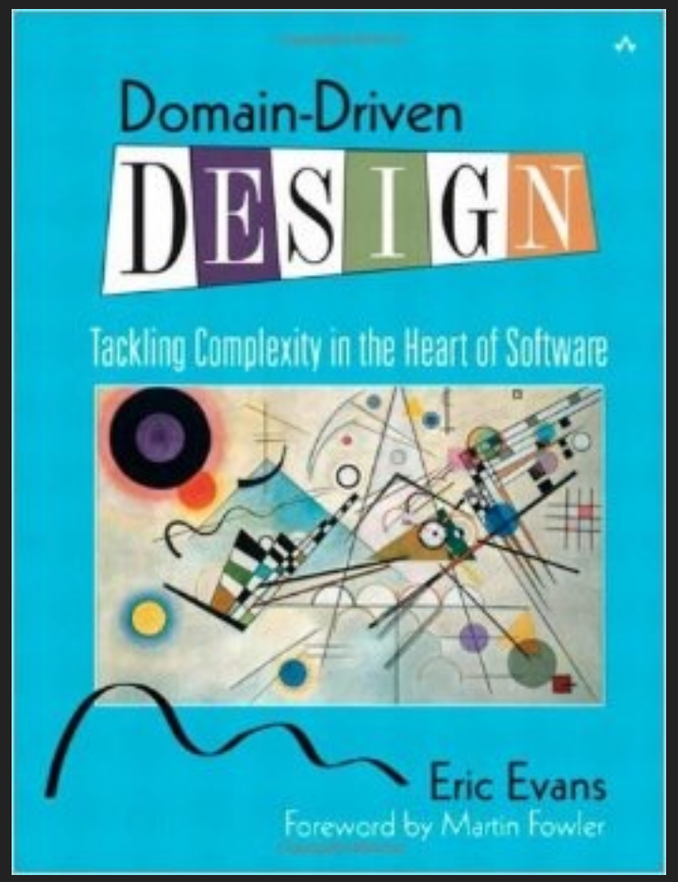
UNKNOWN

WINNER?

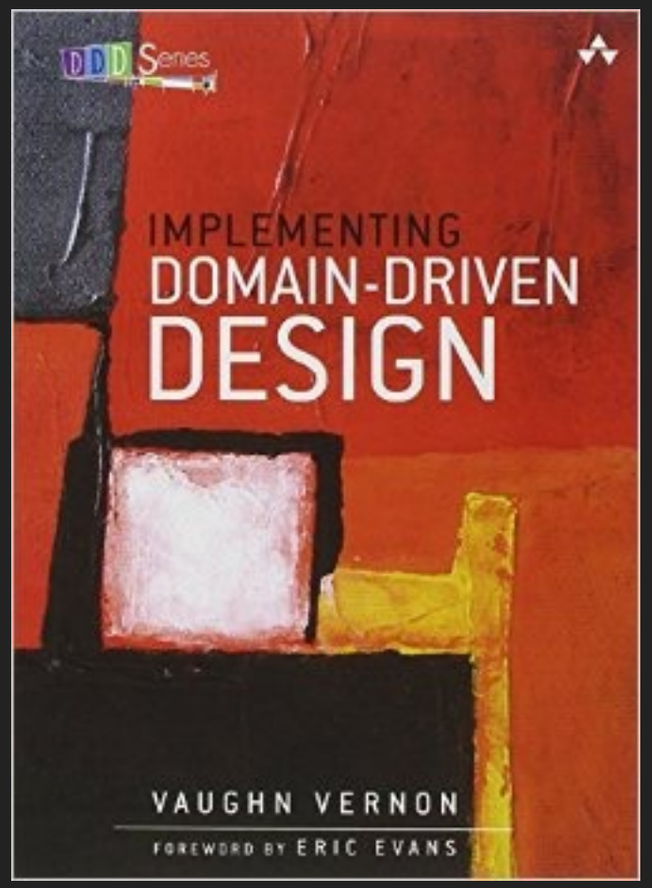
WELL STRUCTURED MONOLITH

BOUNDARIES?

BOUNDED CONTEXTS


Domain-Driven
DESIGN
Tackling Complexity in the Heart of Software
Eric Evans
Foreword by Martin Fowler

2003


DDD Series
IMPLEMENTING
DOMAIN-DRIVEN
DESIGN
VAUGHN VERNON
FOREWORD BY ERIC EVANS

2013

SOUND FAMILAR?

HOW DO I GET THERE?

GOALS

- Migrate a monolith that was in production, making money, to a more sustainable solution for the future.
- Architect for scalability of app in the future.
- Allow multiple teams to deliver business value quickly.
- Allow for addition of resources without overcrowding.

CURRENT STATE

- API servers
- Multiple clients, including JavaScript front end
- Some dead code
- Lack of comprehensive, current API tests

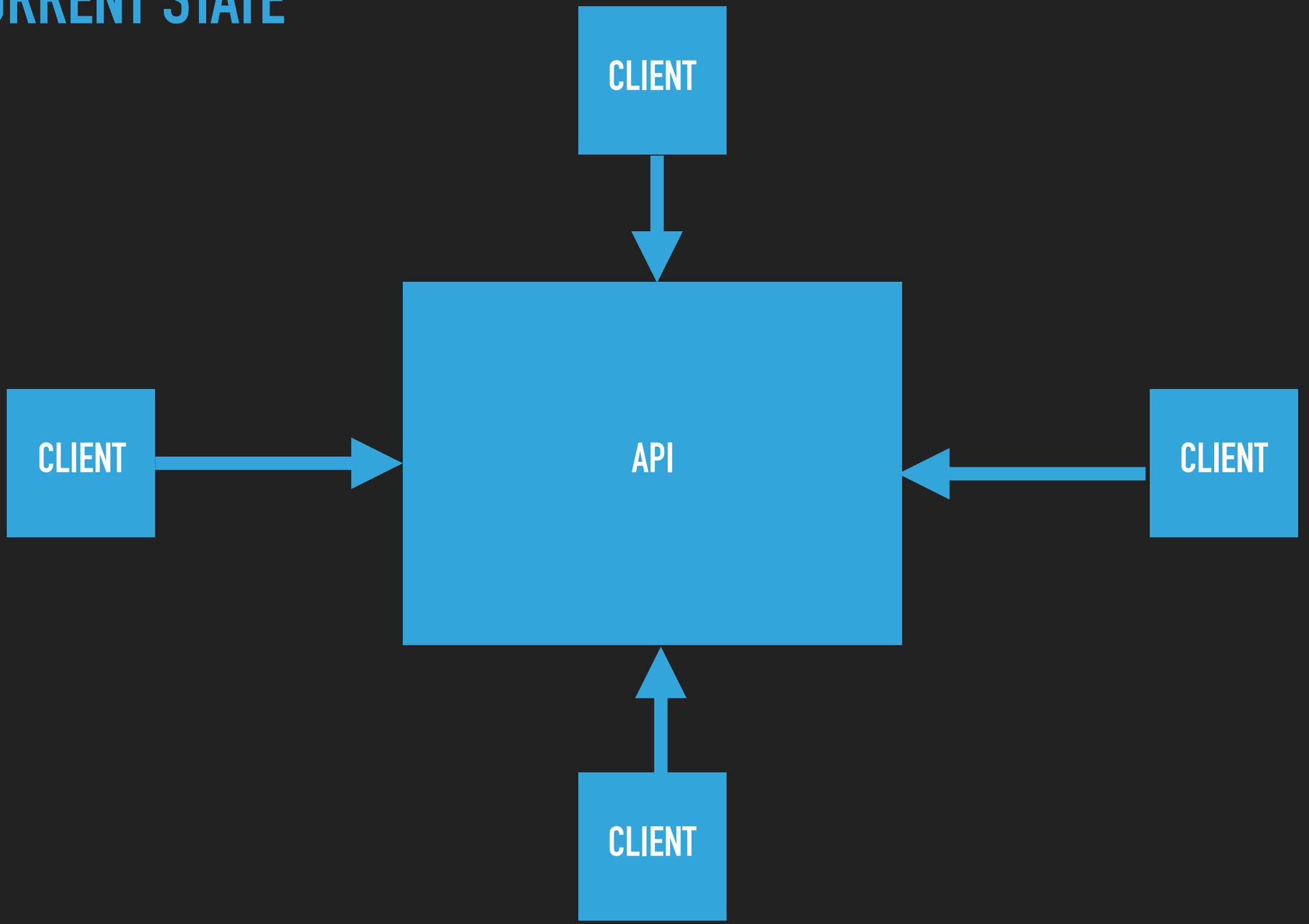
WHERE DO WE START?


SAFETY
FIRST

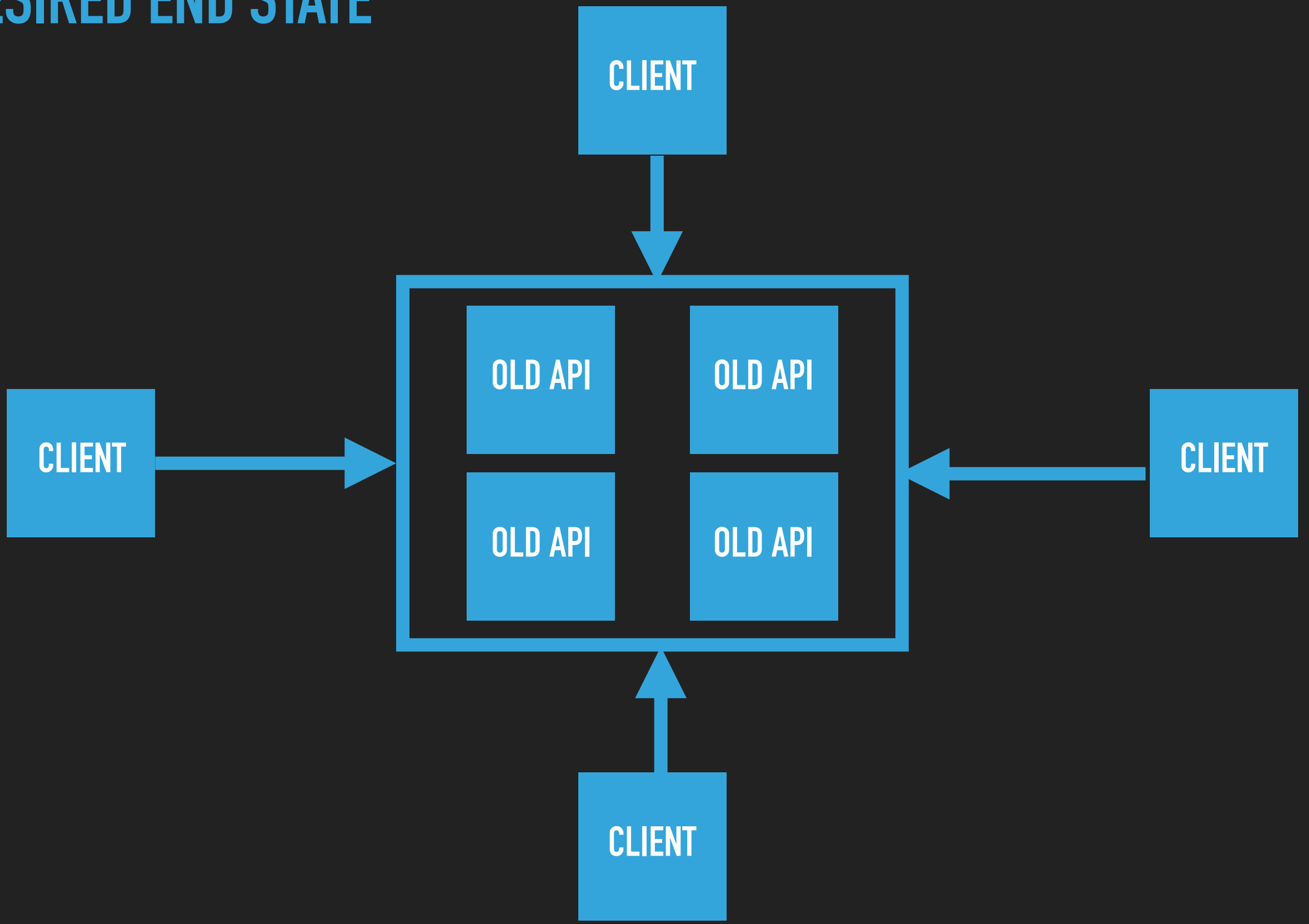
STEP 1: API LEVEL TESTS

GOAL: VALIDATE YOU DON'T BREAK ANY CLIENT FACING BEHAVIOR WHILE MIGRATING

CURRENT STATE

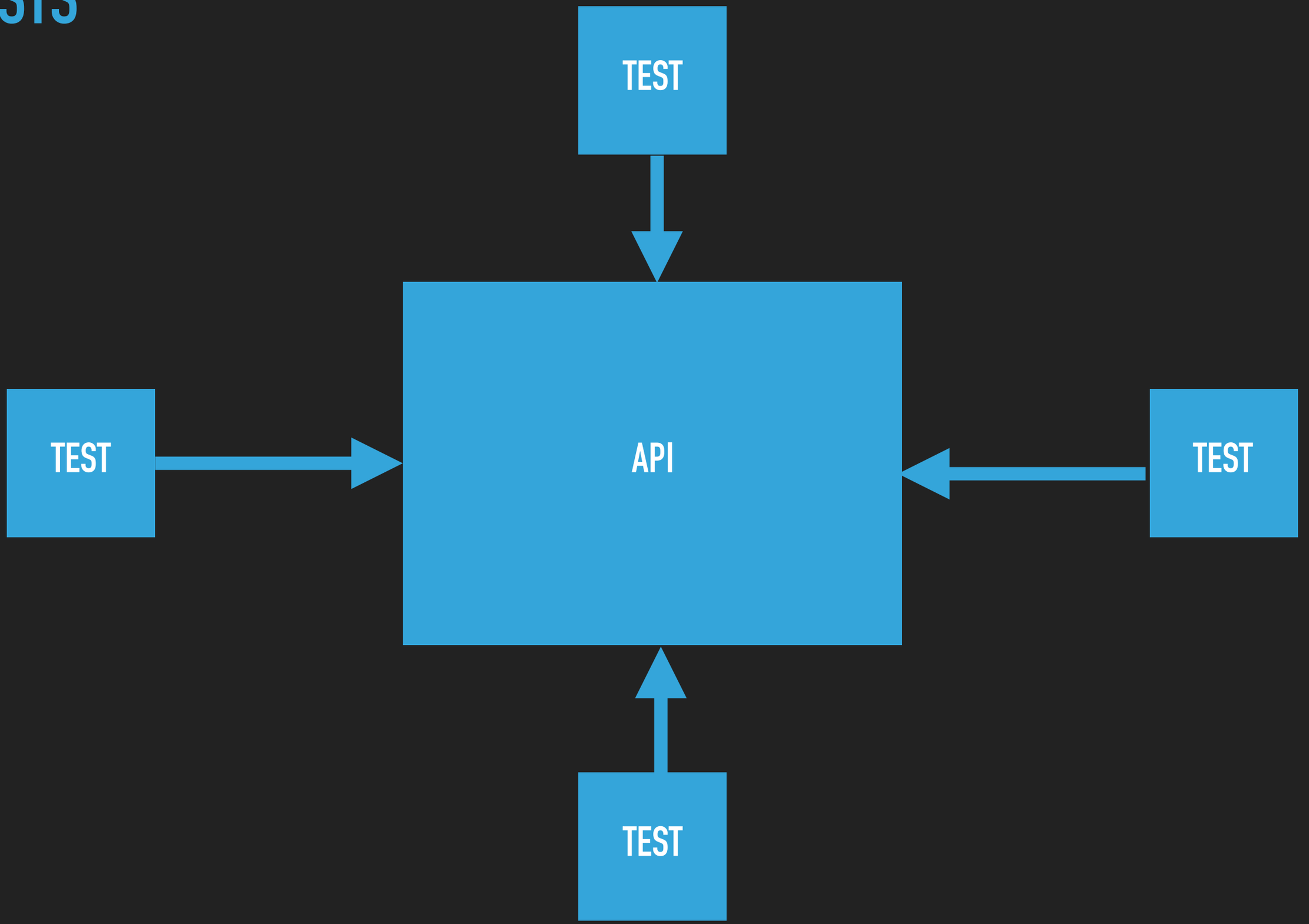


DESIRED END STATE



WHAT STAYED THE SAME?

TESTS



HTTPS://GITHUB.COM/REALESTATE-COM-AU/PACT

realestate-com-au / **pact**

Watch 54

Enables consumer driven contract testing, providing a mock service and DSL for the consumer project, and interaction playback and verification for the service provider project.

RESULT: YOU NOW KNOW WHEN YOU HAVE BROKEN USER FACING BEHAVIOR BEFORE YOU GO INTO PRODUCTION

STEP 2: ARRANGE APPLICATION SO YOU CAN SEE YOUR DOMAIN

GOAL: BEGIN TO UNDERSTAND WHAT BOUNDED CONTEXTS EXIST

```
○ → tree app
app
├── controllers
|   ├── application_controller.rb
|   ├── orders_controller.rb
|   └── users_controller.rb
├── helpers
|   ├── application_helper.rb
|   ├── order_helper.rb
|   └── user_helper.rb
└── models
    ├── order.rb
    └── user.rb

3 directories, 8 files
```

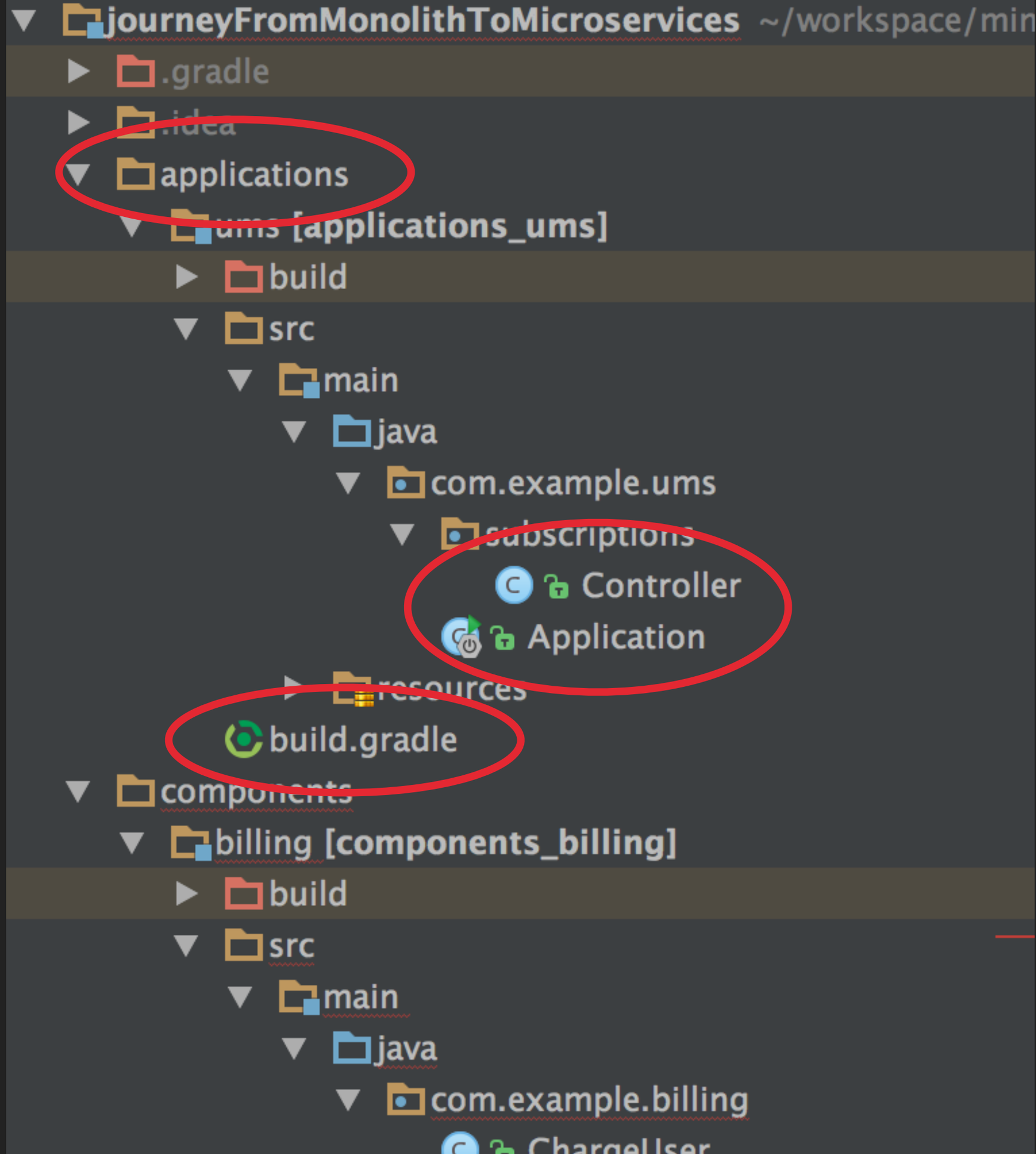
```
○ → tree src/main/java/
src/main/java/
└── com
    └── example
        └── myApplication
            ├── WebApplication.java
            ├── order
            |   ├── Order.java
            |   └── OrderController.java
            └── user
                ├── User.java
                └── UserController.java

5 directories, 5 files
```

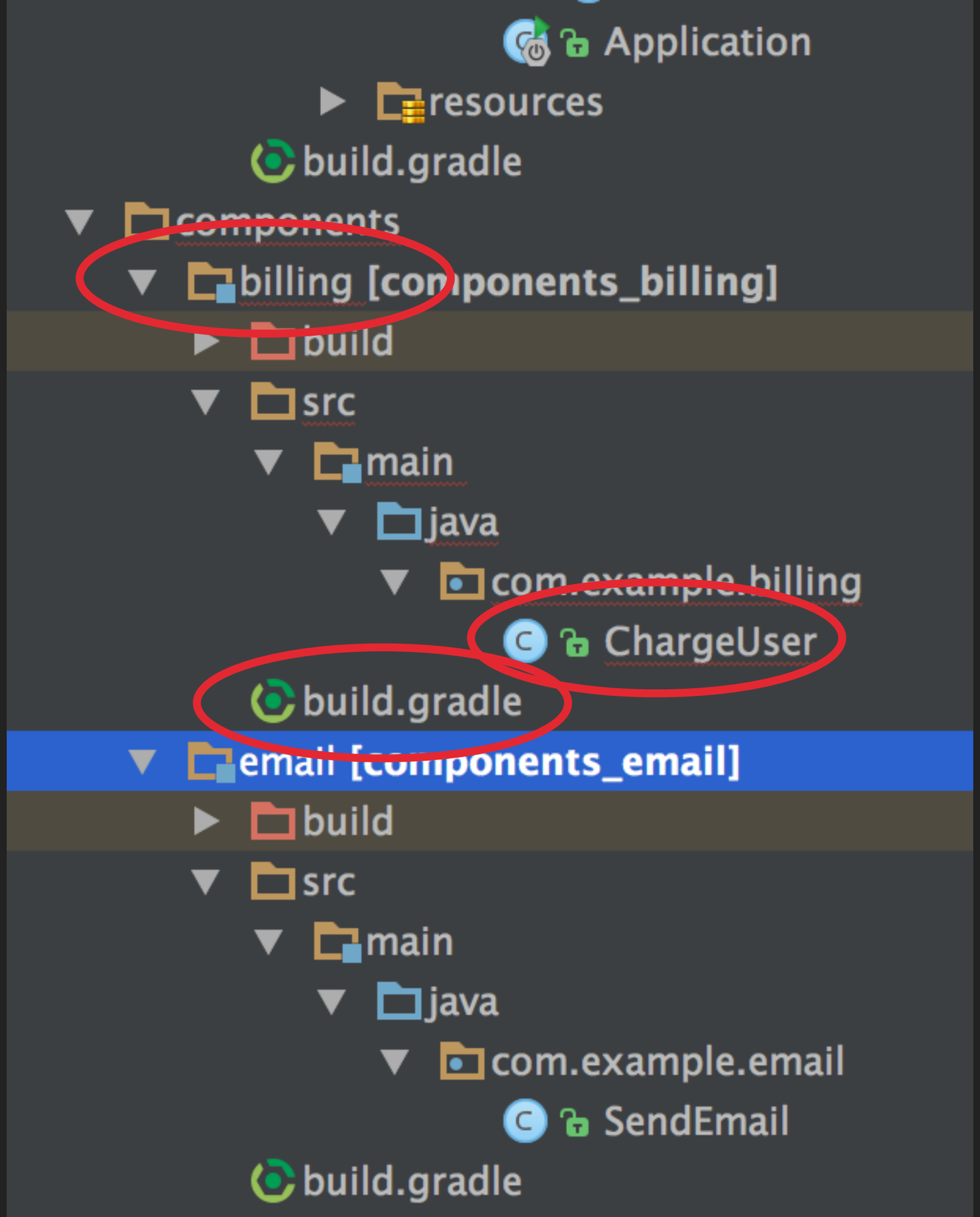
STEP 2: ARRANGE APPLICATION SO YOU CAN SEE YOUR DOMAIN

- Minimizes the number of directories where changes happen.
- Less costly to experiment with/evolve bounded contexts.
- Delaying architecture decisions.

STEP 3: BREAK OUT COMPONENTS

GOAL: GIVE MORE SPACE IN THE CODEBASE AND SOLIDIFY DEPENDENCIES/BOUNDARIES.


journeyFromMonolithToMicroservices ~/workspace/min
.gradle
.idea
applications
ums [applications_ums]
build
src
main
java
com.example.ums
subscriptions
Controller
Application
resources
build.gradle
components
billing [components_billing]
build
src
main
java
com.example.billing


Application
resources
build.gradle
components
billing [components_billing]
build
src
main
java
com.example.billing
ChargeUser
build.gradle
email [components_email]
build
src
main
java
com.example.email
SendEmail
build.gradle

WHAT ABOUT DATABASES?

- Application manages?
- Component manages?
- “It depends…”

RULE: MIGRATIONS ONLY TOUCH ONE TABLE.

WHY?

STEP 3: BREAK OUT COMPONENTS

- More room in the codebase for multiple teams.
- Strict boundaries between framework code and domain code.
- Moving closer to microservices without the overhead of multiple processes.
- Stopping here gives you a lot of benefits without overhead of microservices.

STEP 4: PROMOTE YOUR FIRST MICROSERVICE

GOAL: IT DEPENDS...

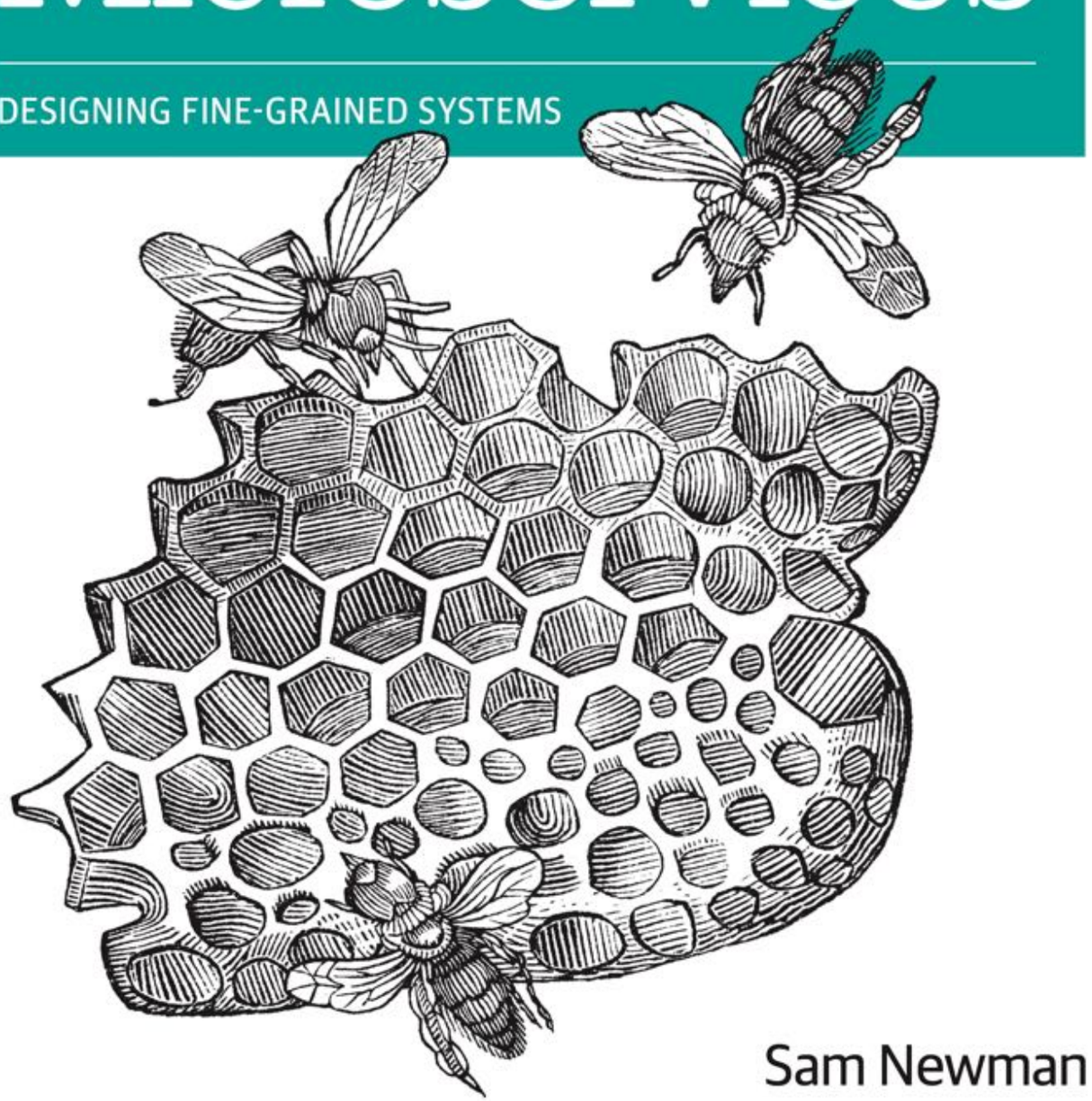
WHY EXTRACT A MICROSERVICE?

- Scaling a certain bounded context becomes an issue.
- You want to deploy one bounded context more frequently.
- Many, many other reasons that I won't cover here.

O'REILLY®

Building Microservices

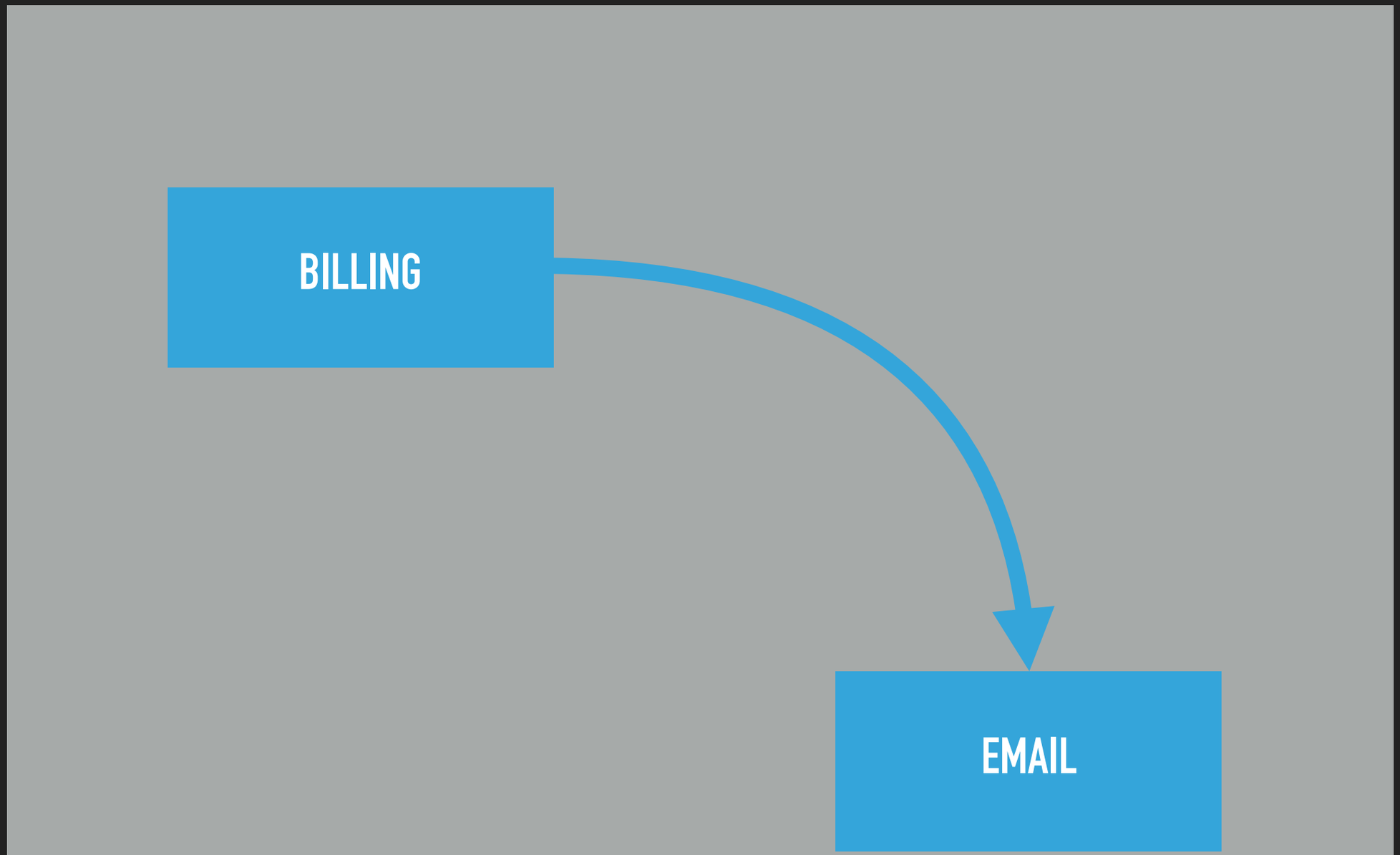
DESIGNING FINE-GRAINED SYSTEMS

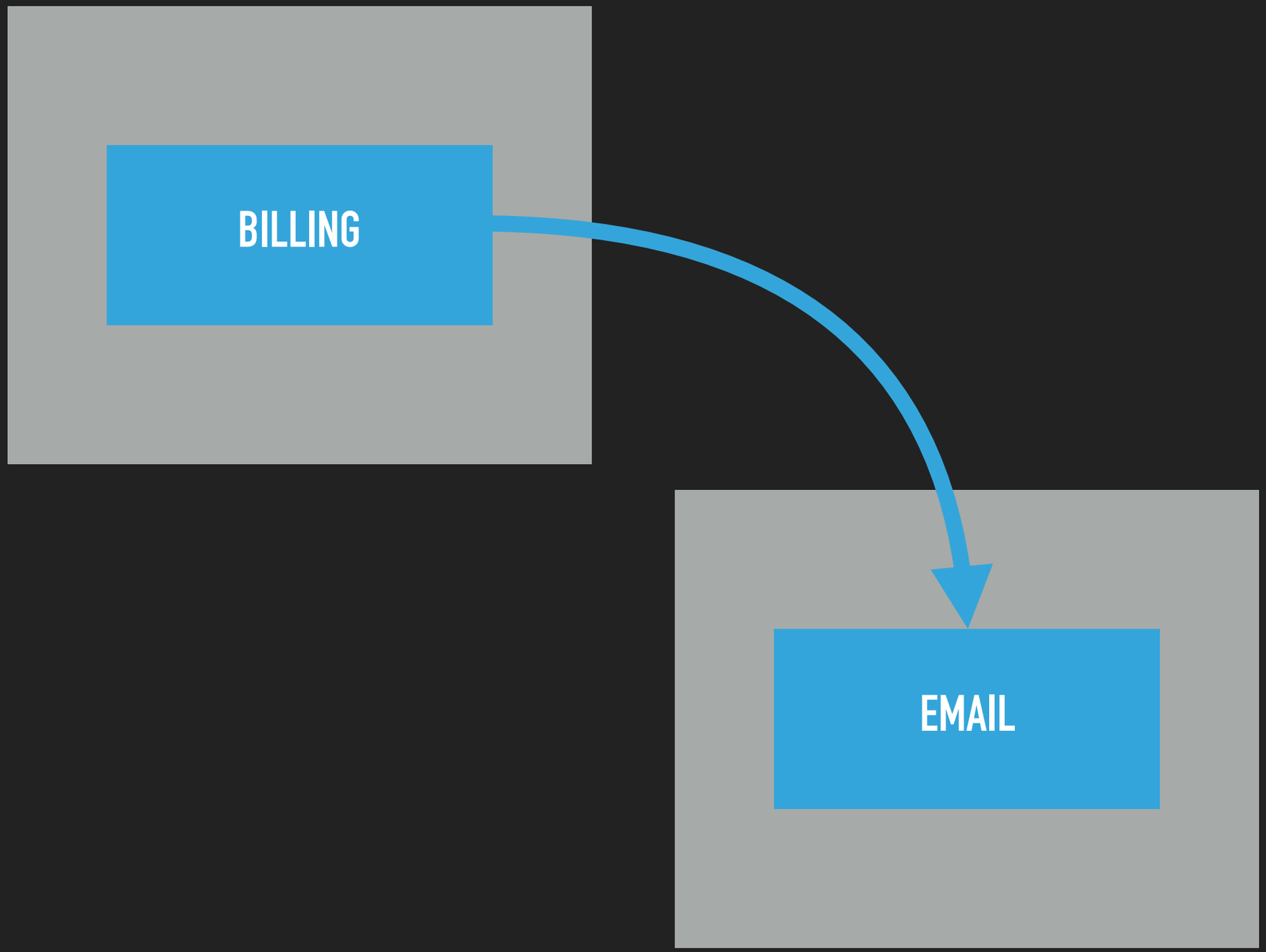


Sam Newman

WHY NOT EXTRACT A MICROSERVICE?

- Cost of managing the service outweighs the benefits.
- Dysfunctional communication patterns in the org
- Many, many other reasons that I won't cover here.

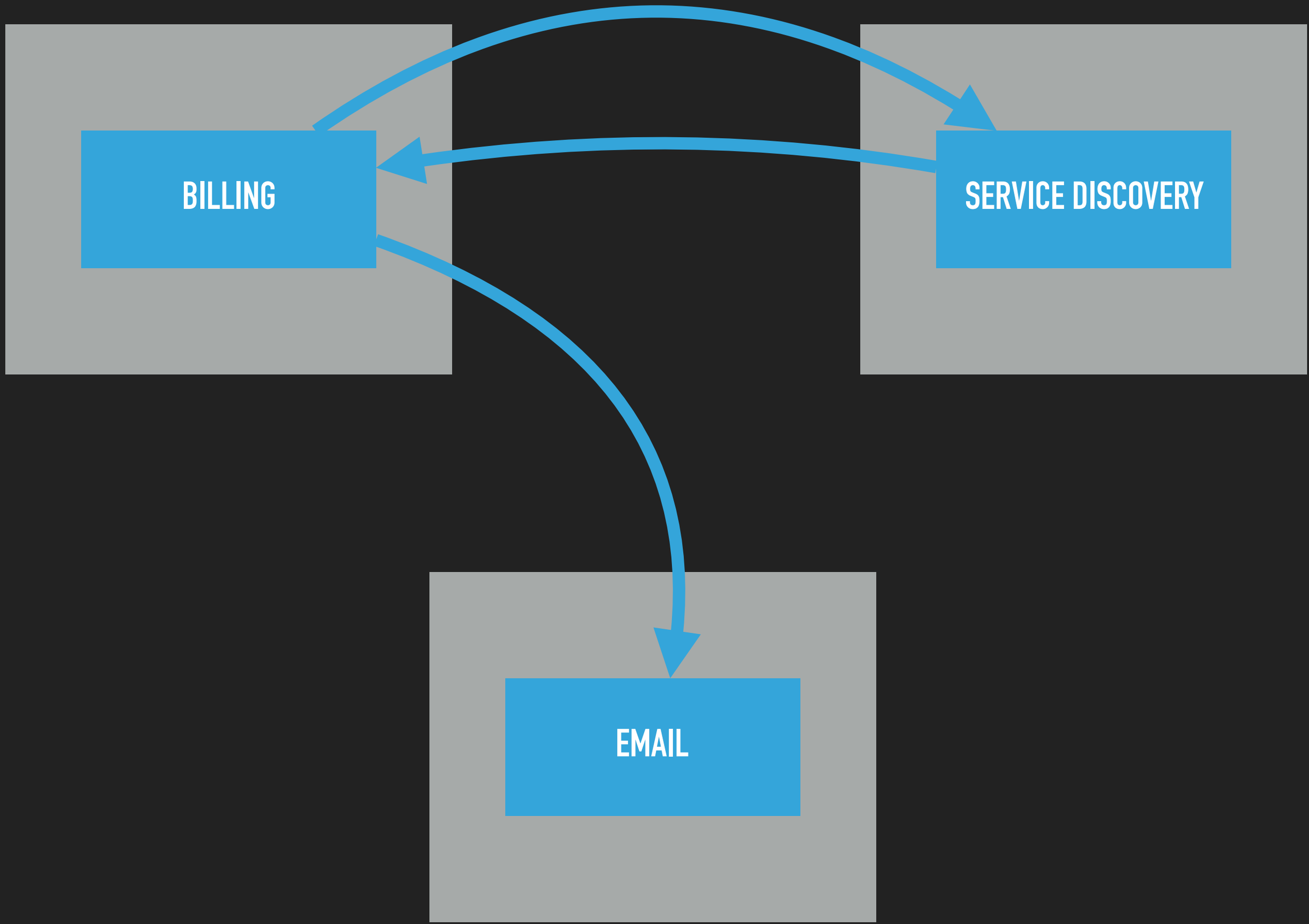

BILLING
EMAIL


BILLING
EMAIL

STEP 4: EXTRACT YOUR FIRST MICRO SERVICE

- Congratulations you now have a distributed system!!!
- And with that distributed system come new costs:
  - Billing now needs to know how to contact the email service.
  - Network communication between billing and email will fail at some point.

GOAL: ABSTRACT LOCATION AND QUANTITY OF SERVICE INSTANCES

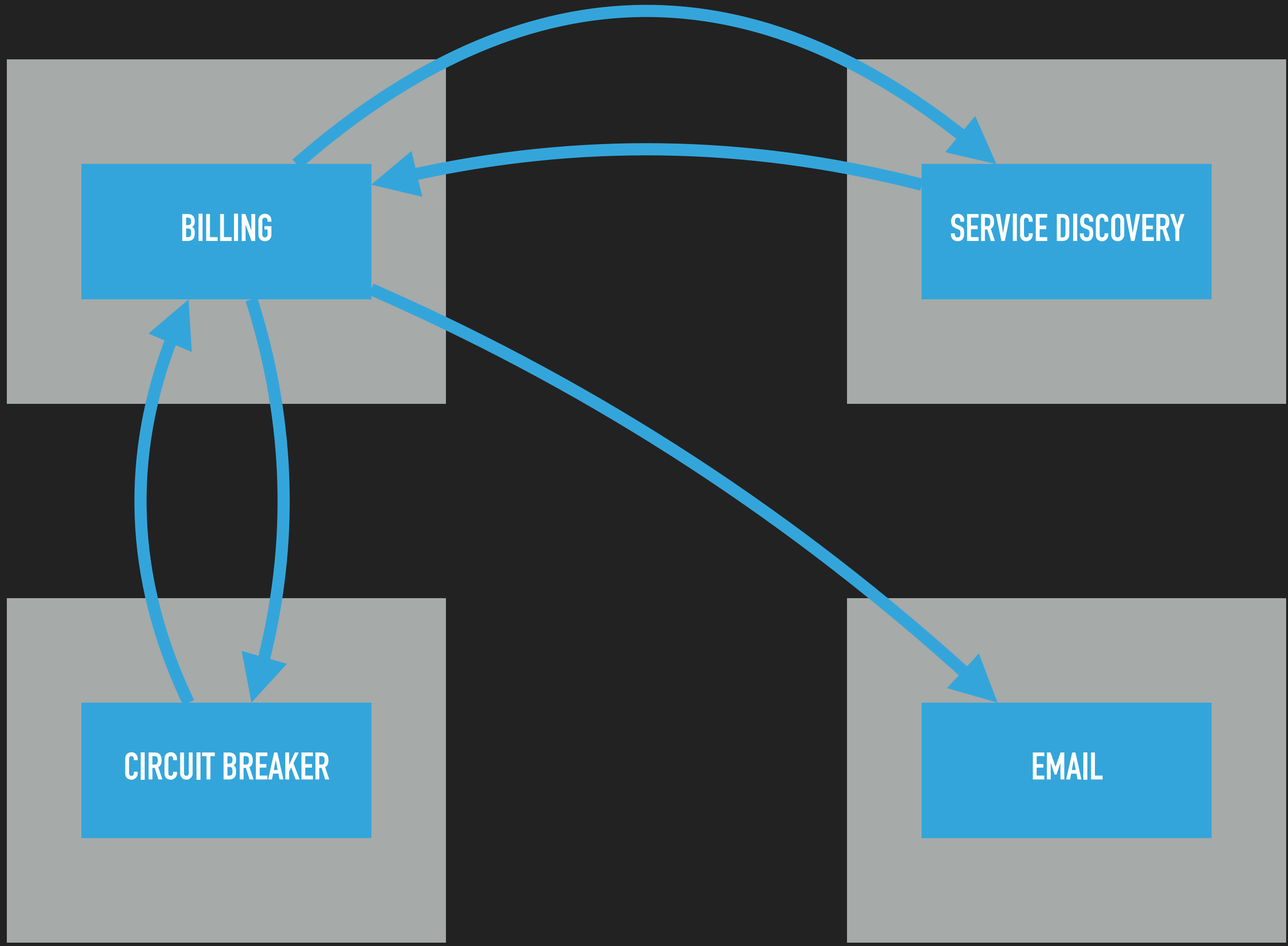

BILLING
SERVICE DISCOVERY
EMAIL

SERVICE DISCOVERY

- Service calls are most loosely coupled to location and number of instances.
  - Client side load balancing can reduce number of network calls.
- But there is an additional applications to run and monitor.

CIRCUIT BREAKER

GOAL: PROTECT AGAINST CASCADING FAILURES THAT CAUSE SYSTEM DOWNTIME


BILLING
SERVICE DISCOVERY
CIRCUIT BREAKER
EMAIL

CIRCUIT BREAKERS

- Increased resiliency of system when the network or a service fails...because they will.
- Increased visibility of health of system as a whole.
- But there is an additional applications to run and monitor.

CONGRATULATIONS YOU ARE THE PROUD OWNER OF A SET OF MICROSERVICES!!

NEXT STEPS

- Break out more microservices as necessary.
- Change up the communication interface...maybe use a message queue?
- Don't do anything and continue to make money.
- The choice is up to you!

SOURCE CODE

- https://github.com/mikegehard/journeyFromMonolithToMicroservices (Java)
- https://github.com/mikegehard/user-management-evolution-kotlin (Kotlin)

@MIKEGEHARD, @PIVOTAL

THANK YOU!
QUESTIONS?