Quality for 'cloud natives': what changes when your systems are complex and distributed?

Sarah Wells
Technical Director for Operations & Reliability, The Financial Times
@sarahjwells

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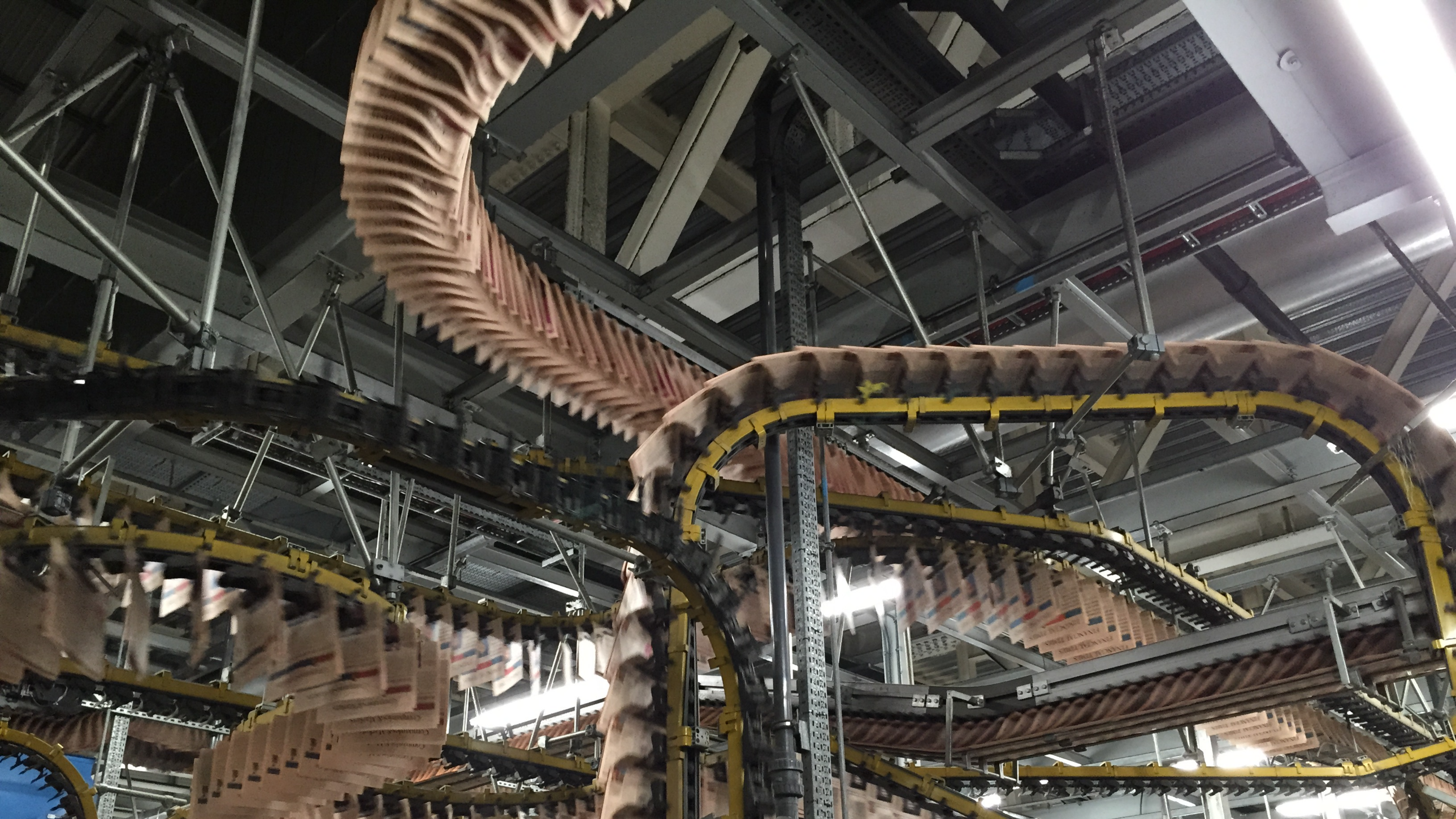

US government shutdown

Trump signs bill to end US government shutdown

Temporary measure does not include border wall funds demanded by president

- Flight delays hit major US airports amid shutdown
- Unpaid US federal workers should take out loans, says Wilbur Ross

US government shutdown

Trump outplayed over government shutdown

President forced to concede over wall funding, but tough negotiations await both parties

“Experiment” for most organizations really means “try”

Linda Rising
Experiments: the Good, the Bad and the Beautiful

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How quickly can you spin up an MVP?

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fbFcfTest Category: `feature` Expiry: April 4, 2019 (60 days left) permalink	@[illegible] @[illegible] ft-next-ammit	Off	Control 5 6
fcfABTest Referrer model A/B test for first click free users Category: `feature` Expiry: April 23, 2019 (79 days left) permalink	@[illegible] @[illegible] ft-next-ammit	Off	Control 1 2
headlineTesting A/B test for headlines Category: `feature` Expiry: February 28, 2019 (25 days left) permalink	@[illegible] ft-next-ammit flag-fixing-posse	Off	Control Variant1 Variant2

We're able to do this because we adopted a cloud-native architecture

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"microservices (n,pl): an efficient device for transforming business problems into distributed transaction problems"

@drsnooks

Distributed systems fail in new and interesting ways

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Application Error

Secure | https://www.ft.com/?edition=uk

Date Duration Calcul | Google Translate | User List Manager | superintendent | User Guide - BlackBe | FT.com Product Supp | Logout- FT.com | Holidays and observ | What Is My IP Addre | LOGIN : myPayroll.pl

FINANCIAL TIMES

HOME WORLD UK COMPANIES MARKETS OPINION WORK & CAREERS LIFE & ARTS Sign I

Sorry

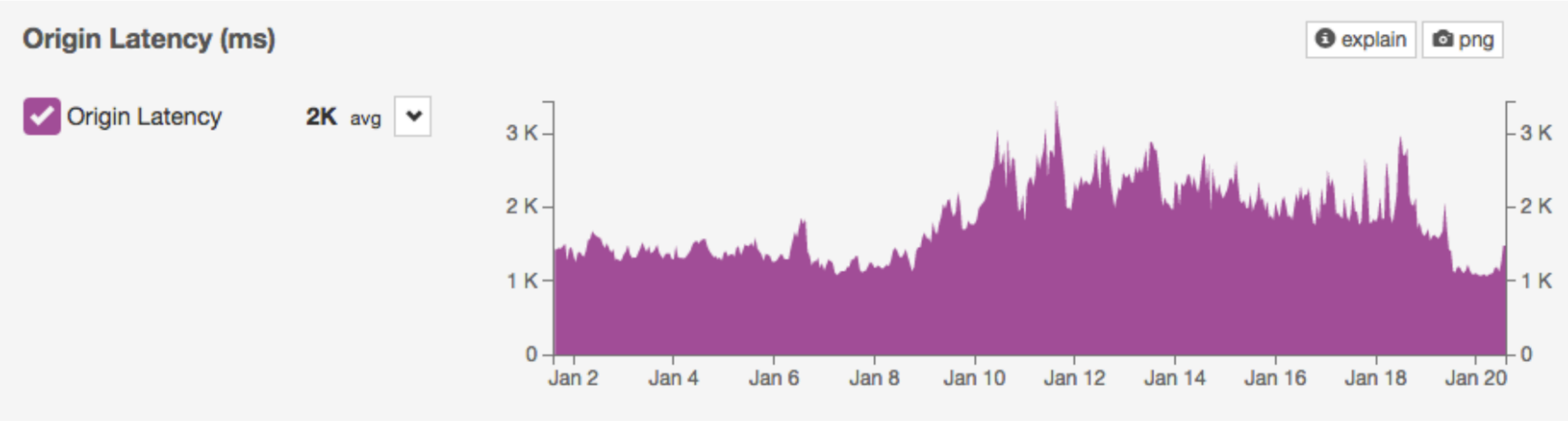
The page you are trying to access is temporarily unavailable. Please wait a moment and try again.

For help please visit help.ft.com.

We apologise for any inconvenience.

Customer reports of receiving 503 responses ('Sorry' page), primarily when trying to access article pages. Several reports came from Hong Kong, one from Pune (India) and one from Singapore, isolating the problem to Asia.

Consulting Fastly graphs showed that Origin Latency in the Asia region had increased quite sharply.



SHARKS ARE EATING THE INTERNET IN VIETNAM

Undersea cables are being mistaken for food

China

Turkey urges China to shut detention camps

Ministry of foreign affairs condemns camps after musician's death, breaking the country's silence with bold statement on Xinjiang

- Week ahead: China trade talks, US budget deadline, earnings
- Global economy: Why central bankers blinked
- Goodyear warns of 2019 challenges after earnings miss

The Big Read

Gene editing: agritech's fight to shape the food we eat

Eurozone economy

Europe turns on spending taps as austerity ends

Bloc embraces fiscal stimulus to combat sharp economic slowdown

Premier League

Premier League turns to US in hunt for CEO

Top British choices have all turned down job of running major world sporting competition

Nigeria

Nigeria president faces perceptions of poll frailty

Supporters say Muhammadu Buhari is 'guiding force' but question his resilience

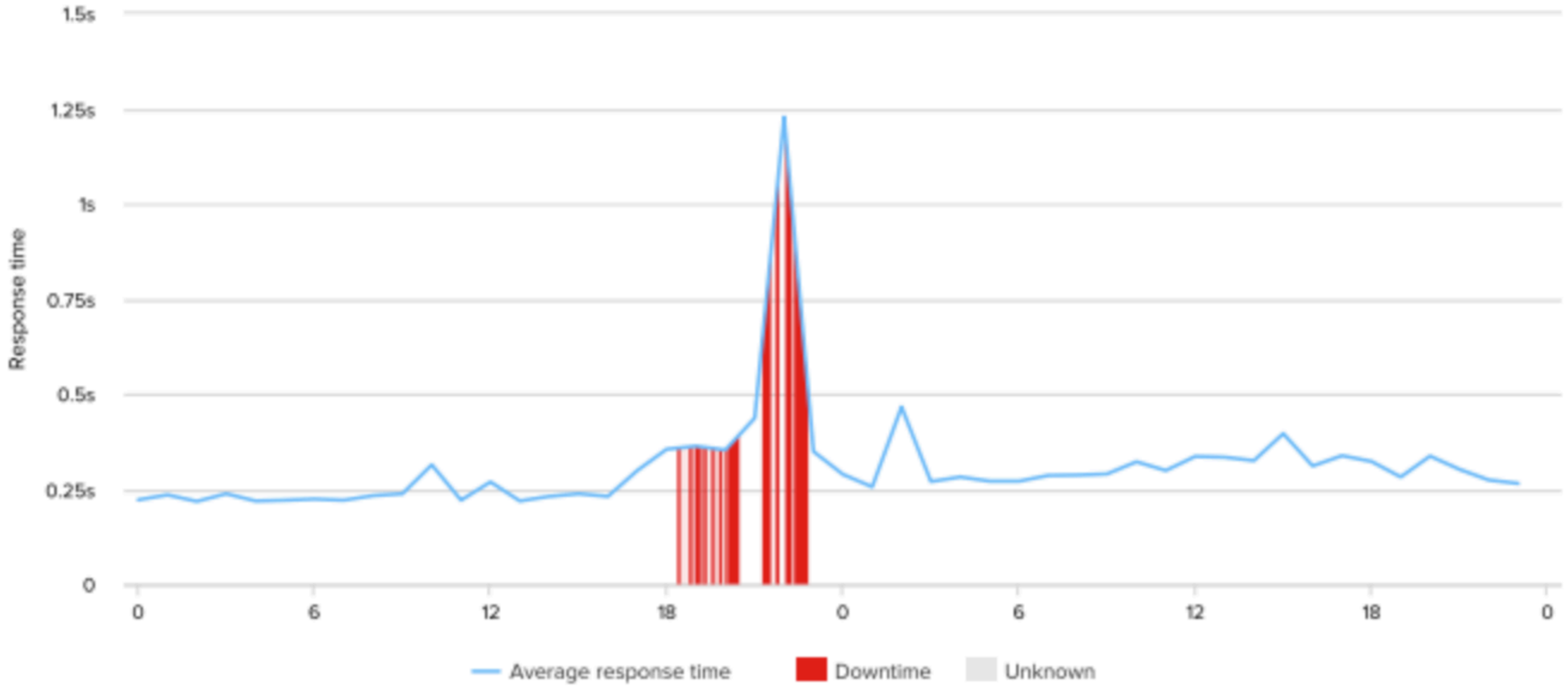
FTfm

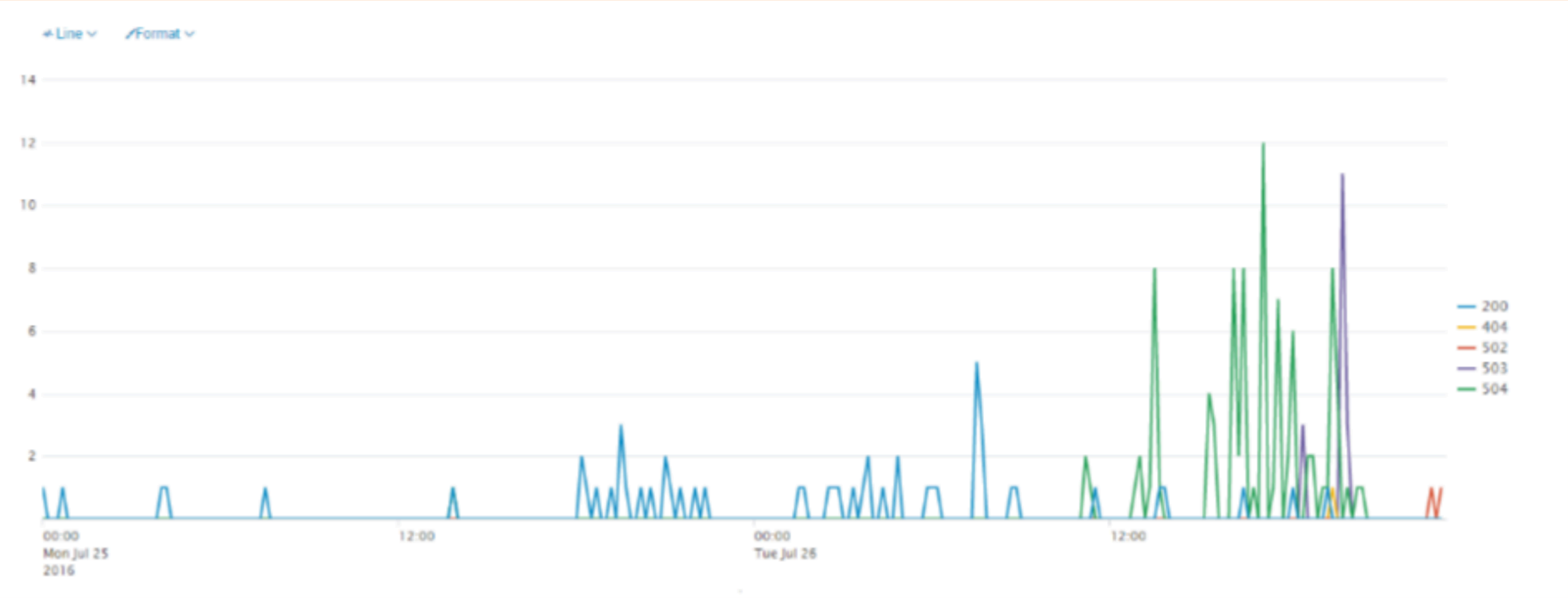
EU governments provide Brexit relief for asset managers

Crucial concessions let UK companies continue serving European clients

Response time

Downtime	Outages	Uptime	Max resp. time	Min resp. time	Avg resp. time
1h51m	21	96.15%	1.23s	218ms	302ms




Line
Format
14
12
10
8
6
4
2
00:00
Mon Jul 25
2016
12:00
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Tue Jul 26
12:00
200
404
502
503
504

We need to change how we approach quality

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We need to test in production

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Cloud native: an introduction

Testing in production

Optimising for fixing things fast

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Cloud native: an introduction

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What IS cloud native?

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It’s definitely about “the cloud”

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Cloud native means building things to **benefit** from the cloud not just **run** on it

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Infrastructure as a service

Infrastructure as a service

Automation

Infrastructure as a service

Automation

Continuous Delivery

Infrastructure as a service

Automation

Continuous Delivery

Microservices

Infrastructure as a service

Automation

Continuous Delivery

Microservices

Containers & Orchestration

Infrastructure as a service

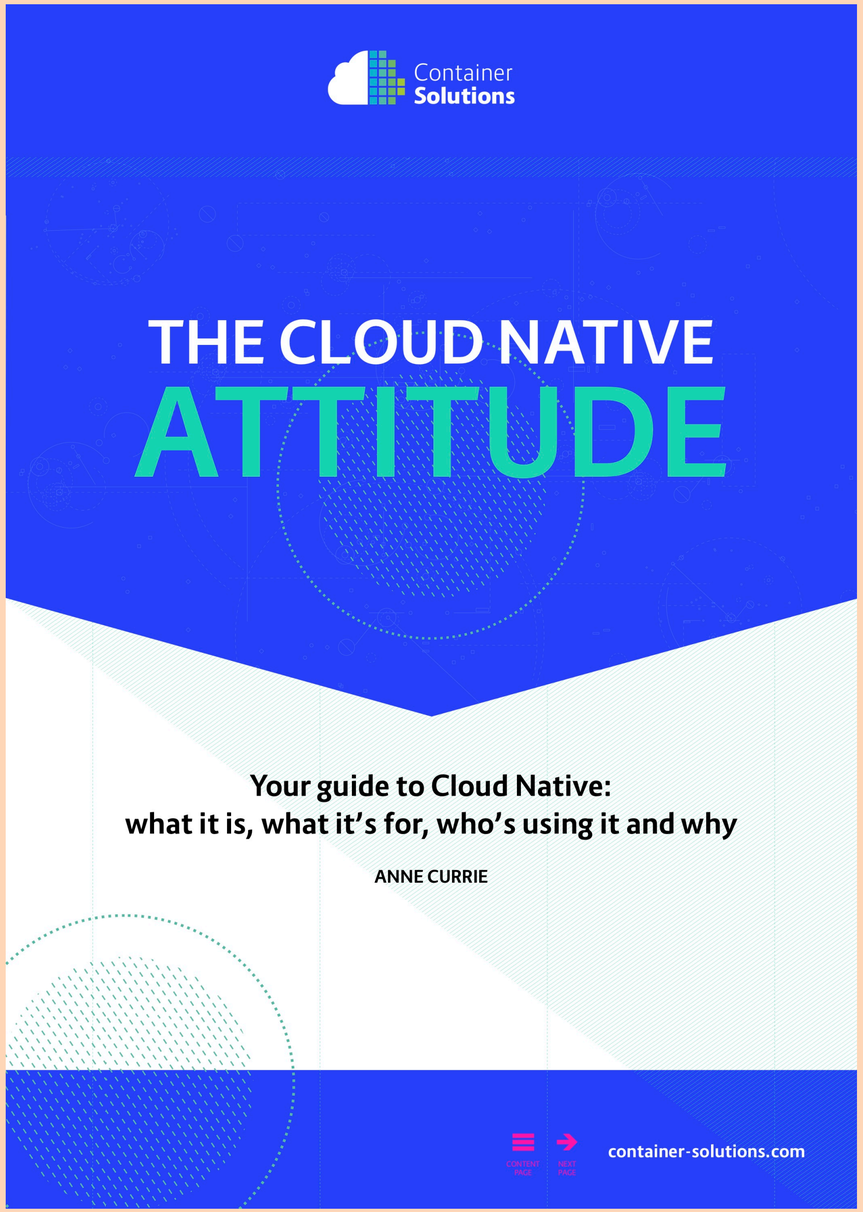
Automation

Continuous Delivery

Microservices

Containers & Orchestration

Software as a Service



Download at: https://info.container-solutions.com/introduction-to-cloud-native

Sounds complicated?

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Why adopt it?

“Cloud native technologies enable software developers to build great products faster” - the CNCF

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Making small releases, quickly and frequently

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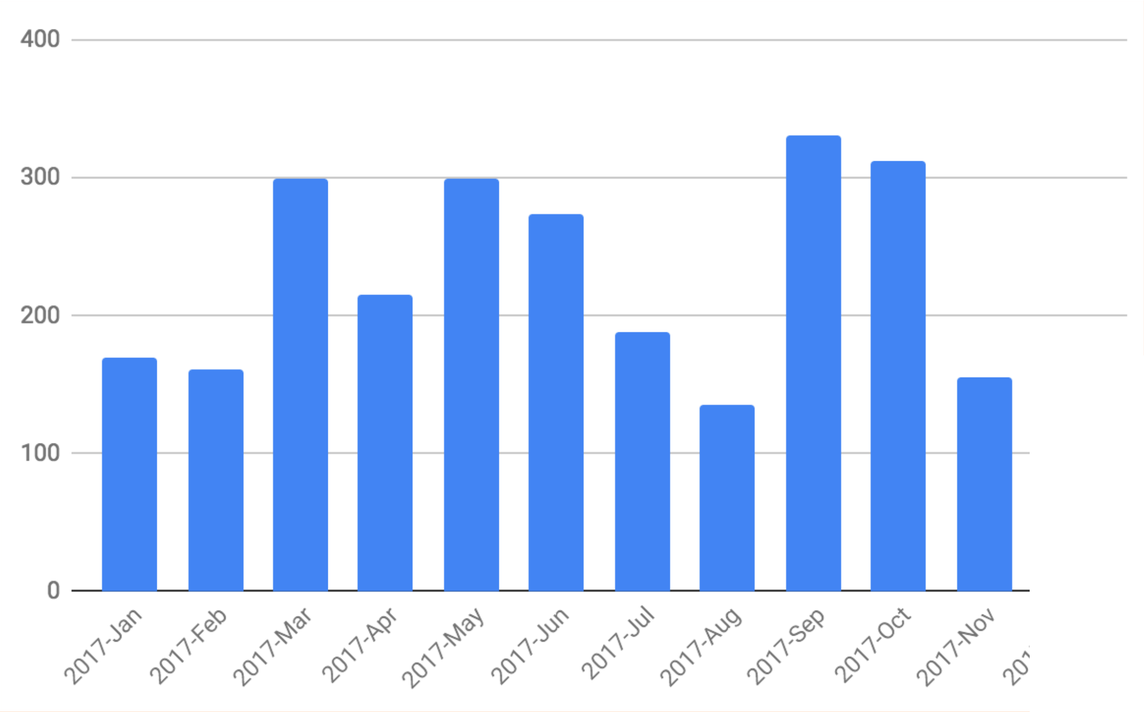
400
300
200
100
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2017-Jan
2017-Feb
2017-Mar
2017-Apr
2017-May
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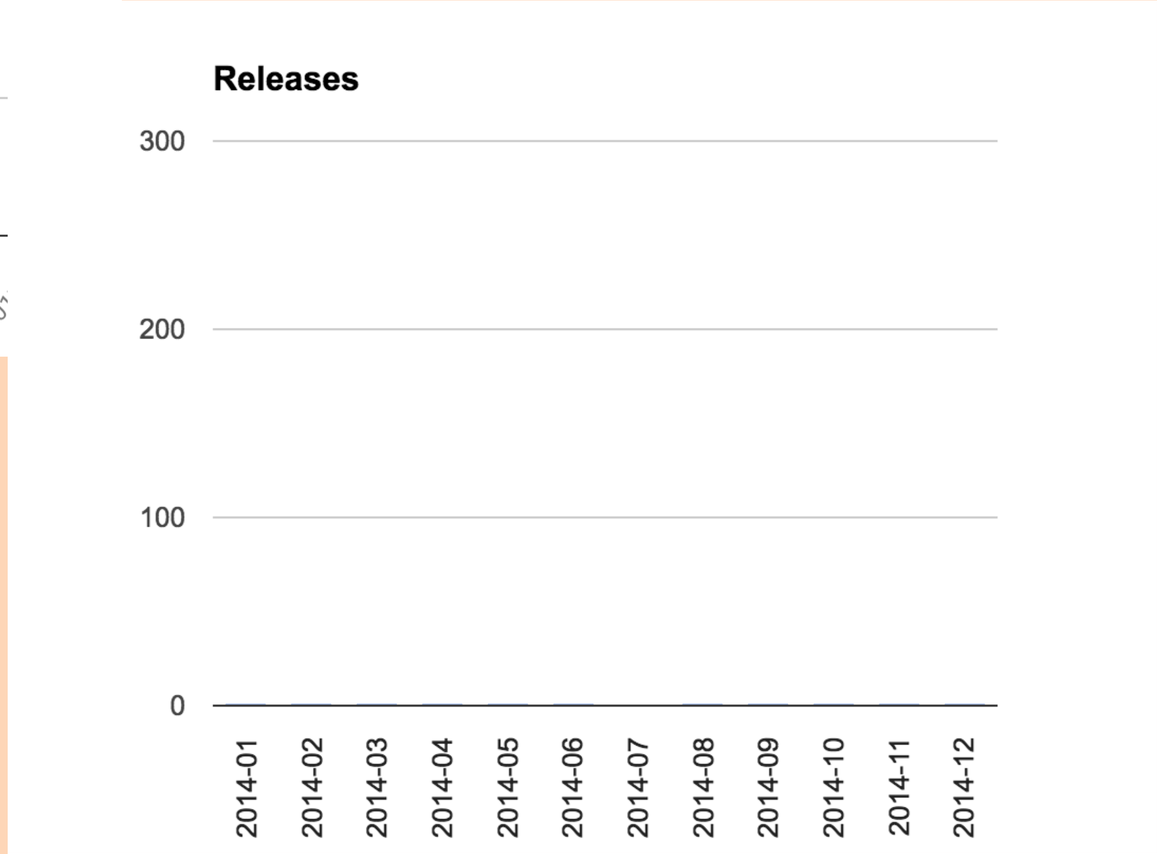
2017-Jul
2017-Aug
2017-Sep
2017-Oct
2017-Nov


Releases
300
200
100
0
2014-01
2014-02
2014-03
2014-04
2014-05
2014-06
2014-07
2014-08
2014-09
2014-10
2014-11
2014-12

You can’t experiment when you do 12 releases a year

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Small changes are much easier to understand

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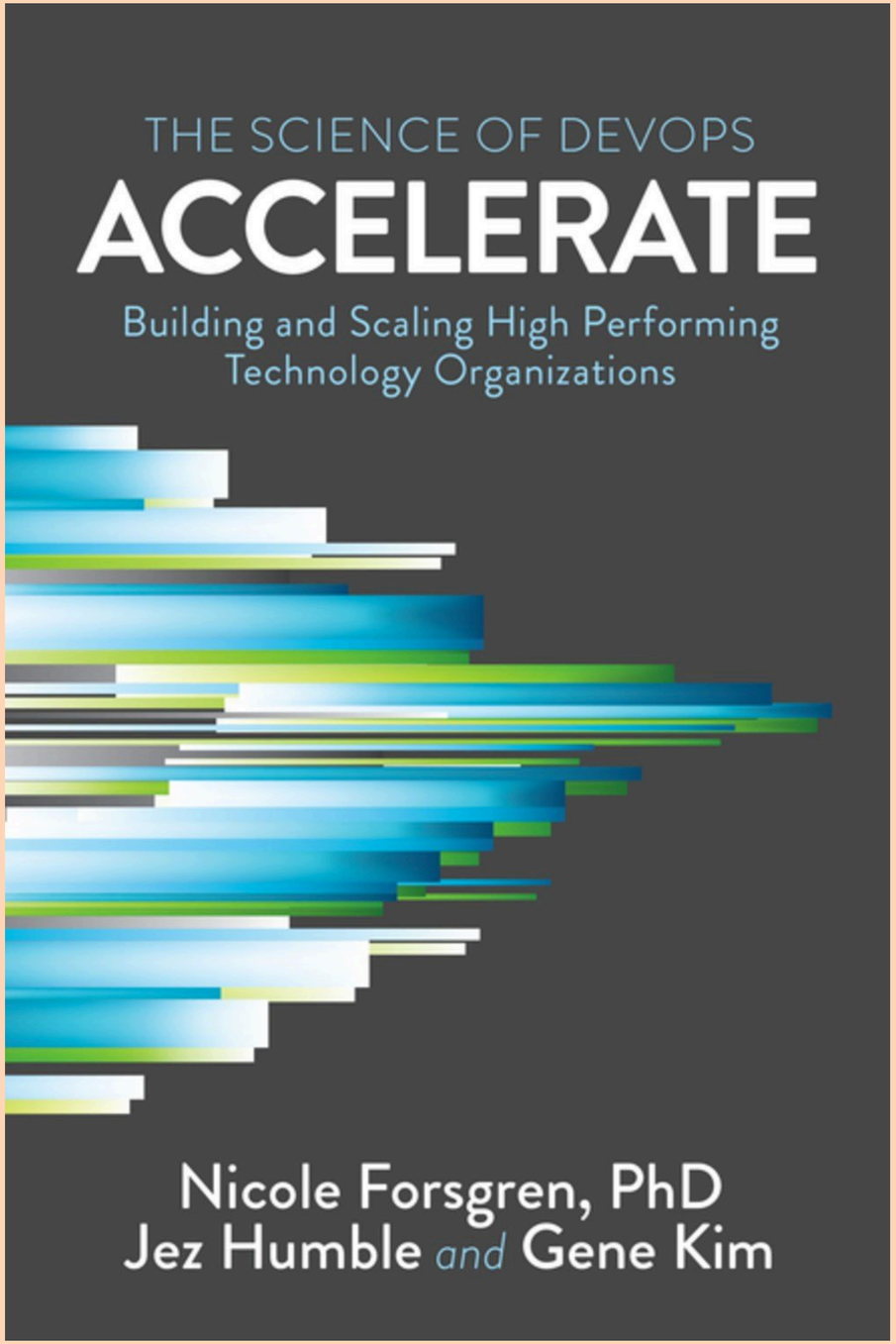

The more often you release, the lower your failure rate for those releases

~15% failure rate vs < 1% failure rate

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You don’t have to choose between speed and stability

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Why does the focus for testing change?

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The kind of testing you do when you release once a month doesn't work when you release 10 times a day

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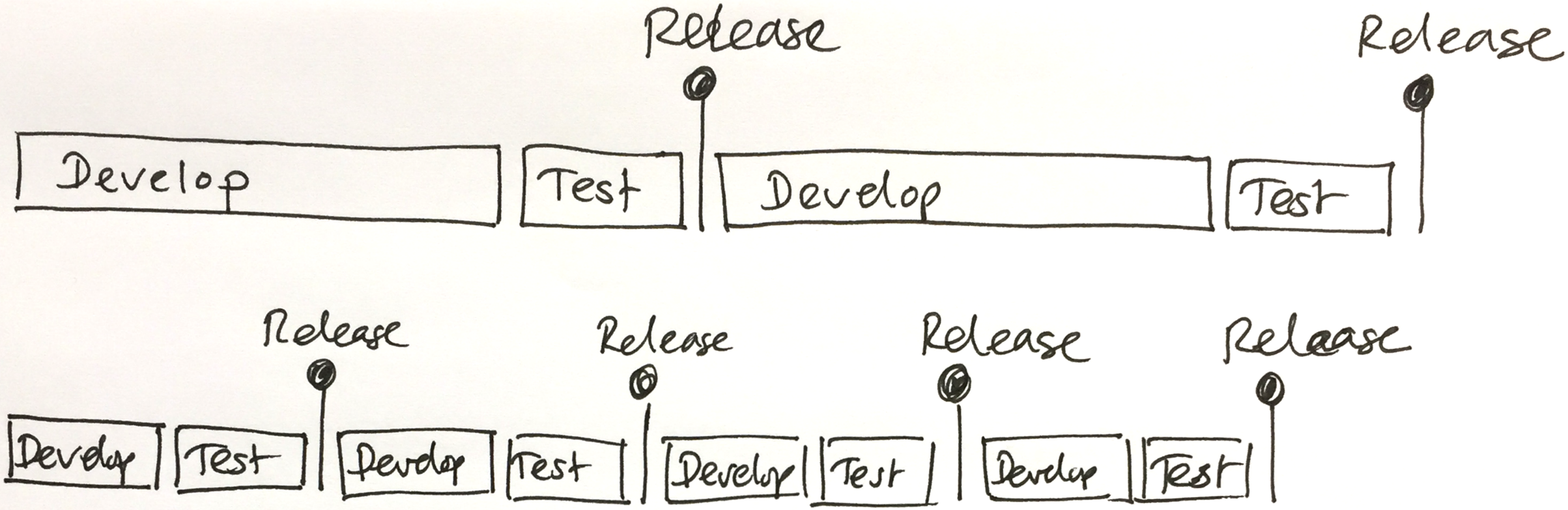
Release
Release
Develop
Test
Develop
Test


Release
Release
Develop
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Develop
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Develop
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Develop
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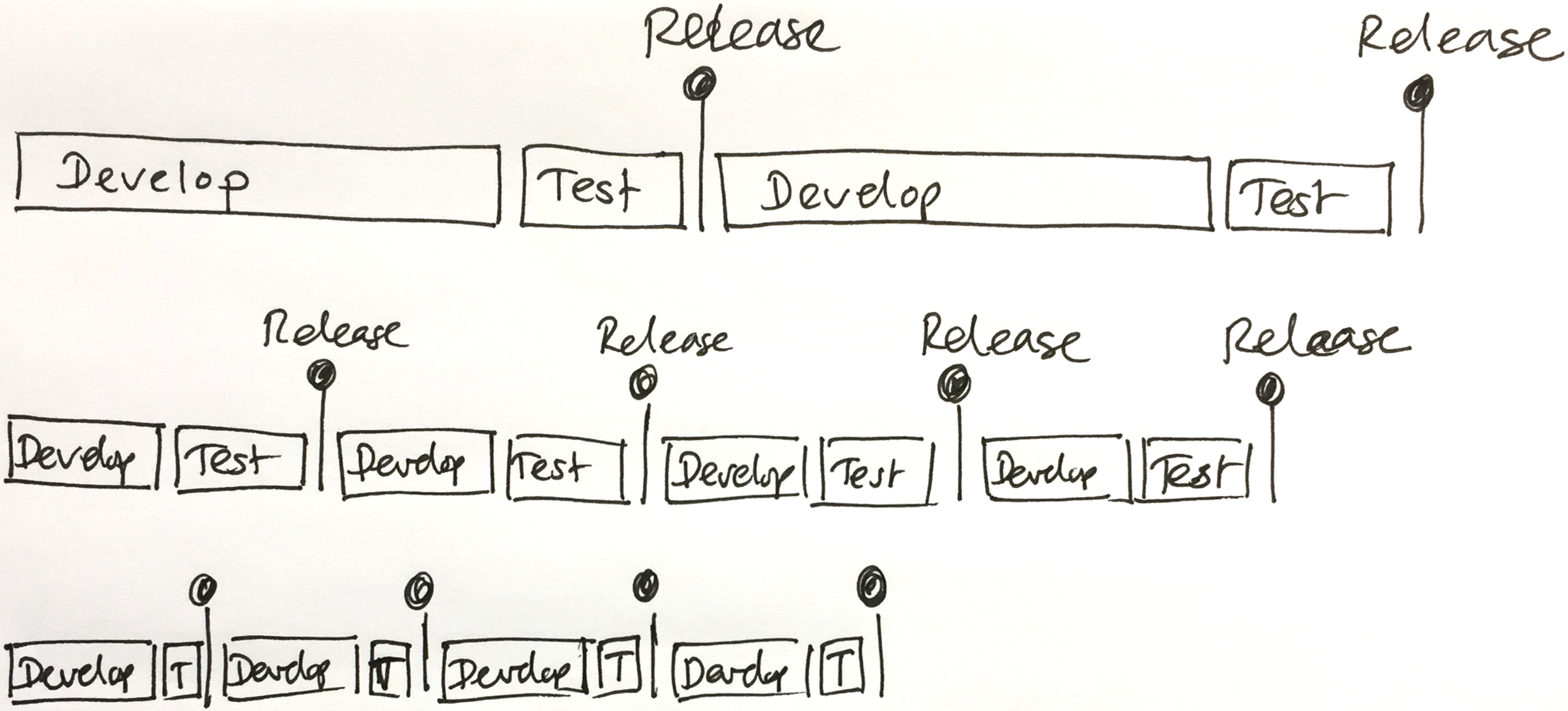
Develop
Test
Develop
Test


Release
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Develop
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“Not wrong long”

Sally Goble

https://www.theguardian.com/info/developer-blog/2016/dec/04/perfect-software-the-enemy-of-rapid-deployment

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“We’re not a nuclear power station or a hospital”

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Cloud native: an introduction

Testing in production

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Pre-release testing

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We should still be writing automated tests for the service

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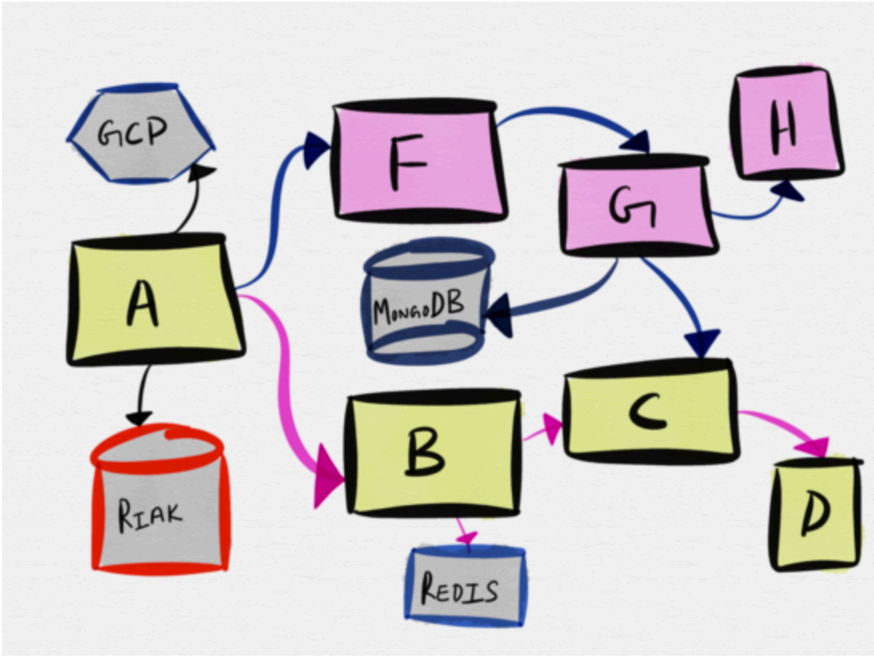
Consider the following topology—a very plausible example of a microservice architecture.



Service A's interaction with service B involves service B talking to Redis and service C. However, the smallest *unit* to be tested really is ***service A's interaction with service B***, and the easiest way to test that interaction is by spinning up a fake for service B and testing service A's interaction with the

Cindy Sridharan: https://medium.com/@copyconstruct/testing-microservices-the-sane-way-9bb31d158c16

Don’t try to regression test the whole system

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Acceptance tests running locally pushes developers towards a ‘full stack on your laptop’

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You end up with a distributed monolith

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Test fixtures can be brittle

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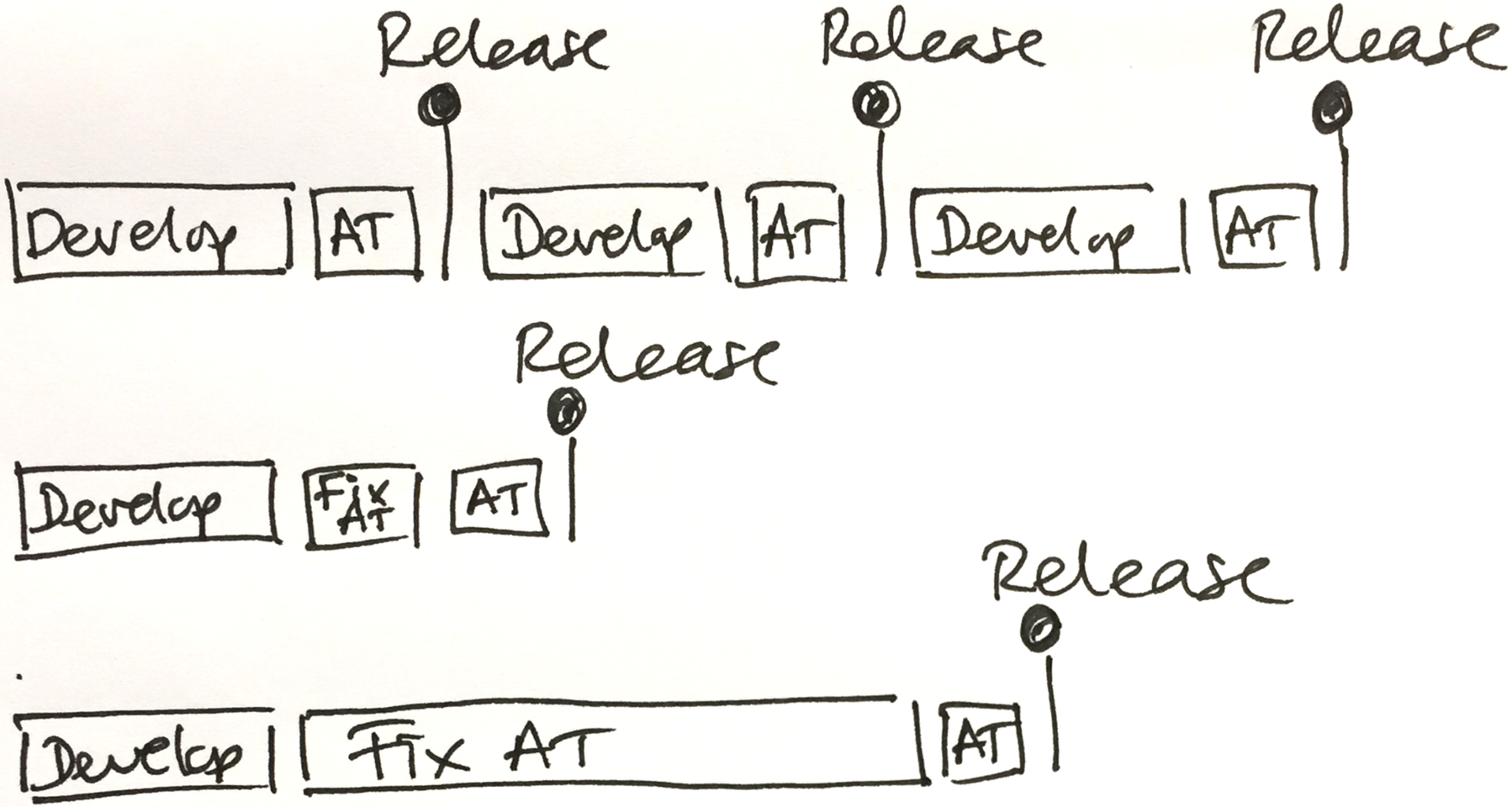
Release
Release
Release
Develop
AT
Develop
AT
Develop
AT
Release
Develop
Fix AT
AT
Release
Develop
Fix AT
AT

A 30 minute code change took 2 weeks to get the acceptance tests working

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Almost all the time, the code was fine, the tests were broken

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Learn from the pain!

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Shifting right?

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Introduce synthetic monitoring

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This replaced our acceptance tests

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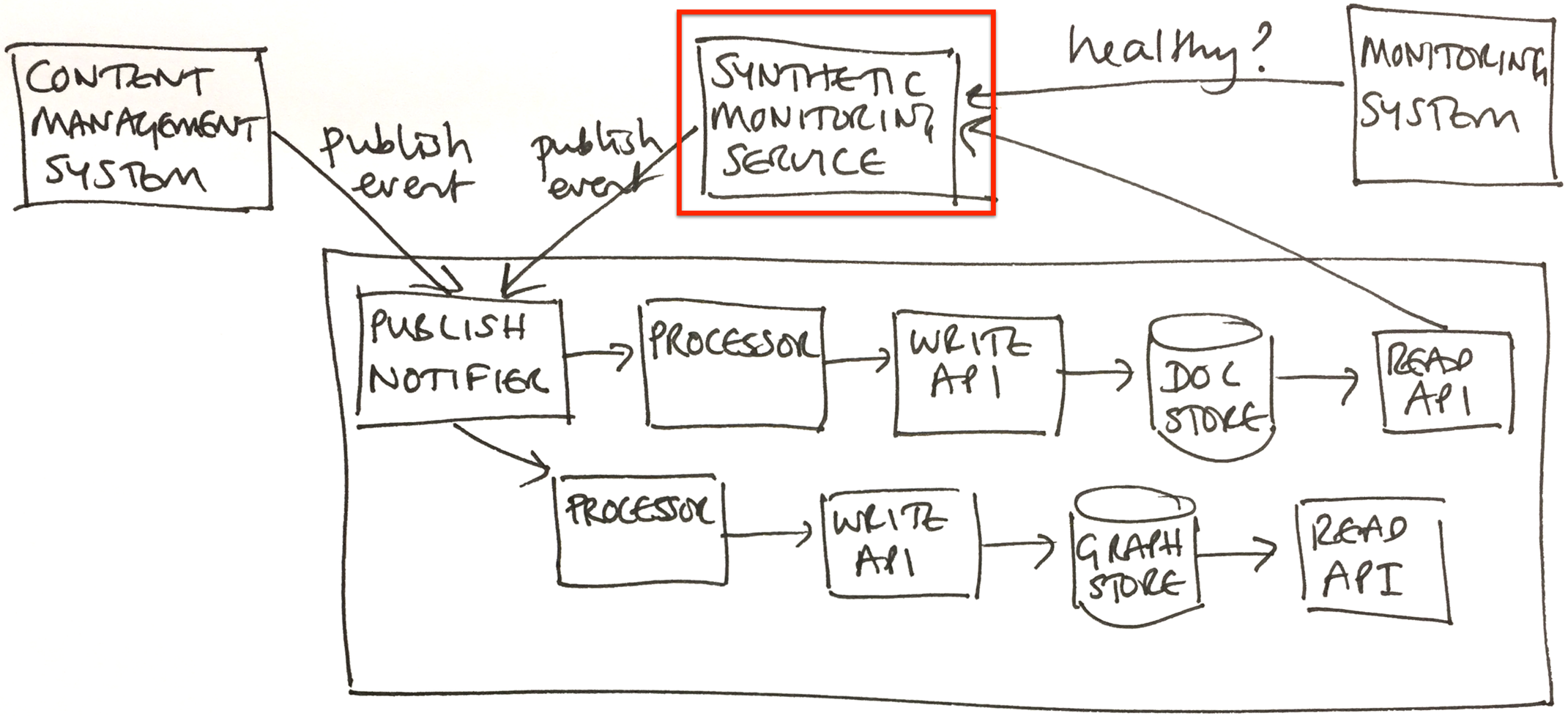
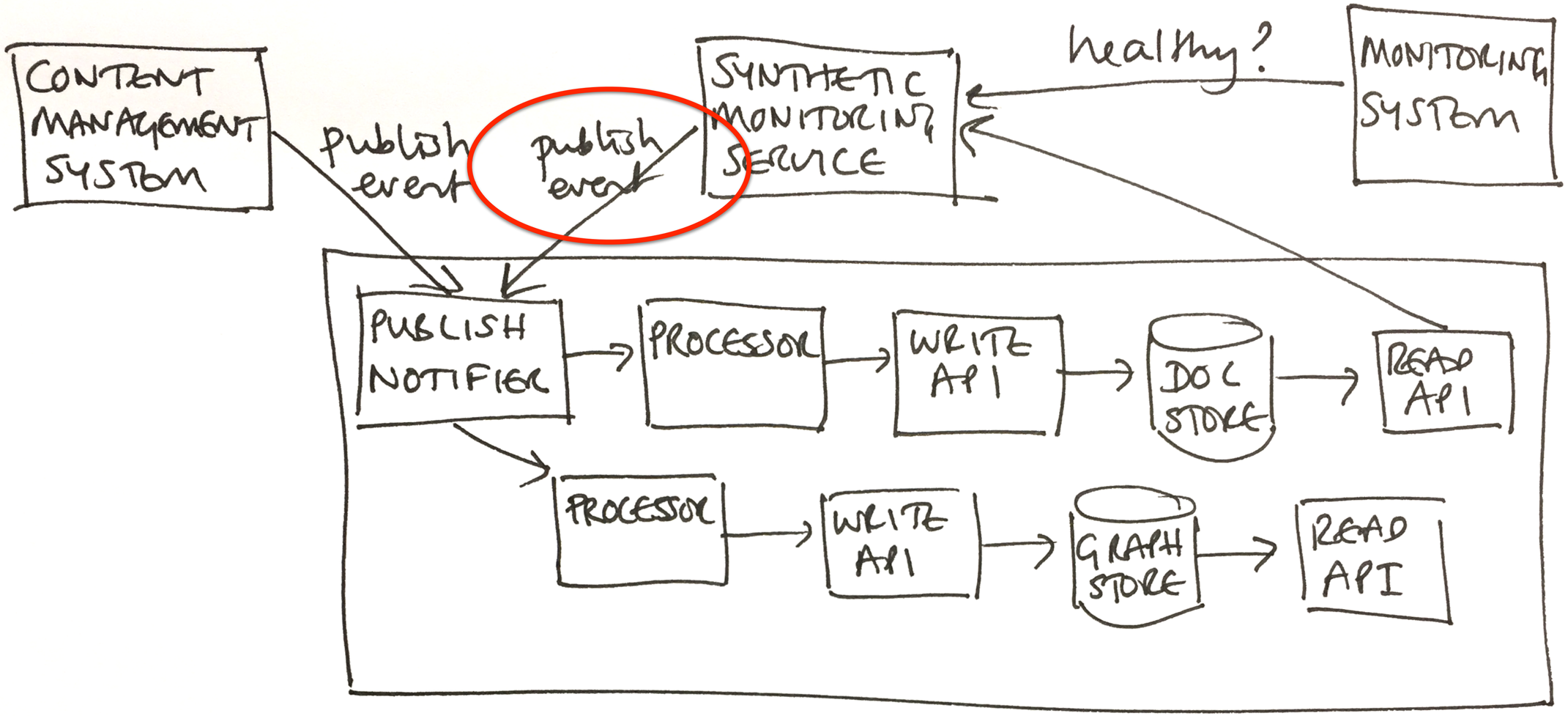
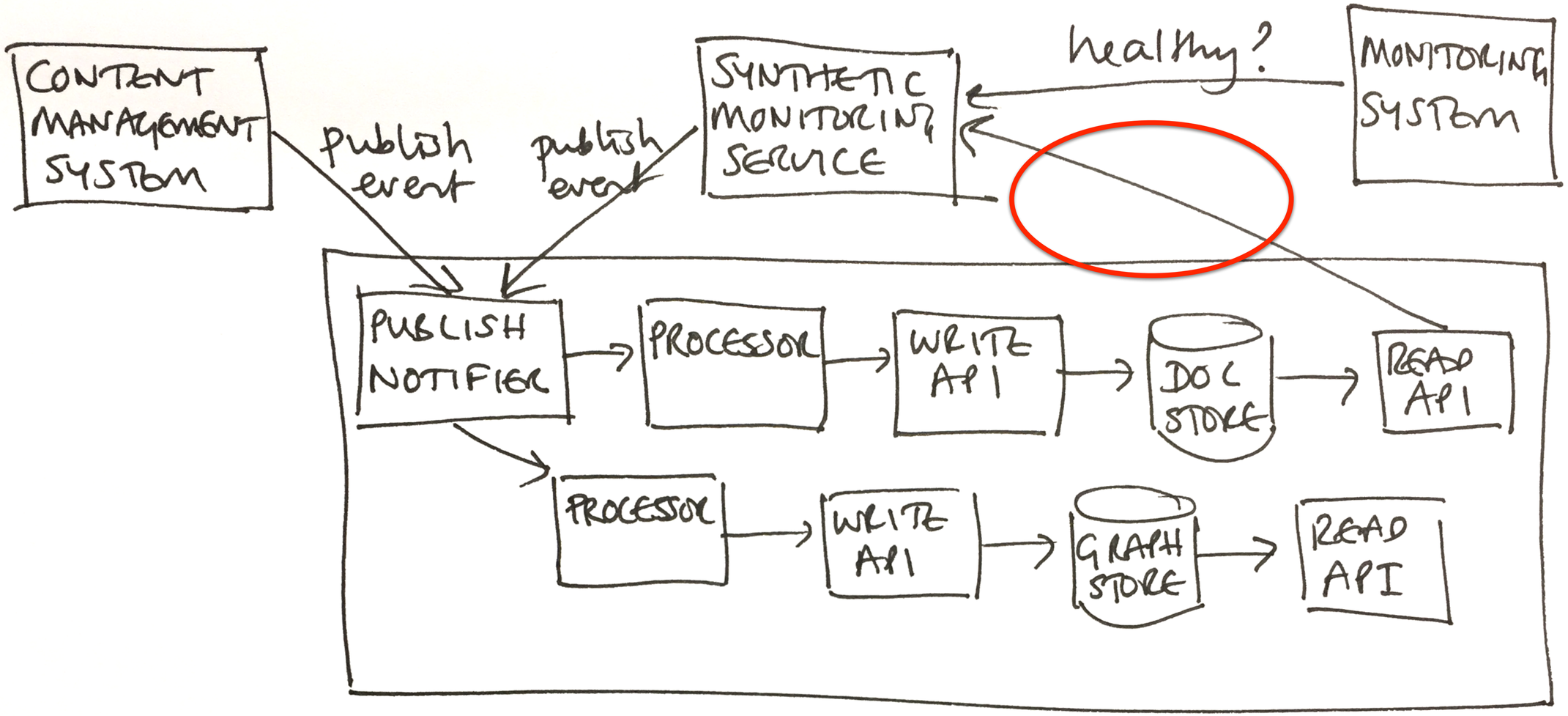
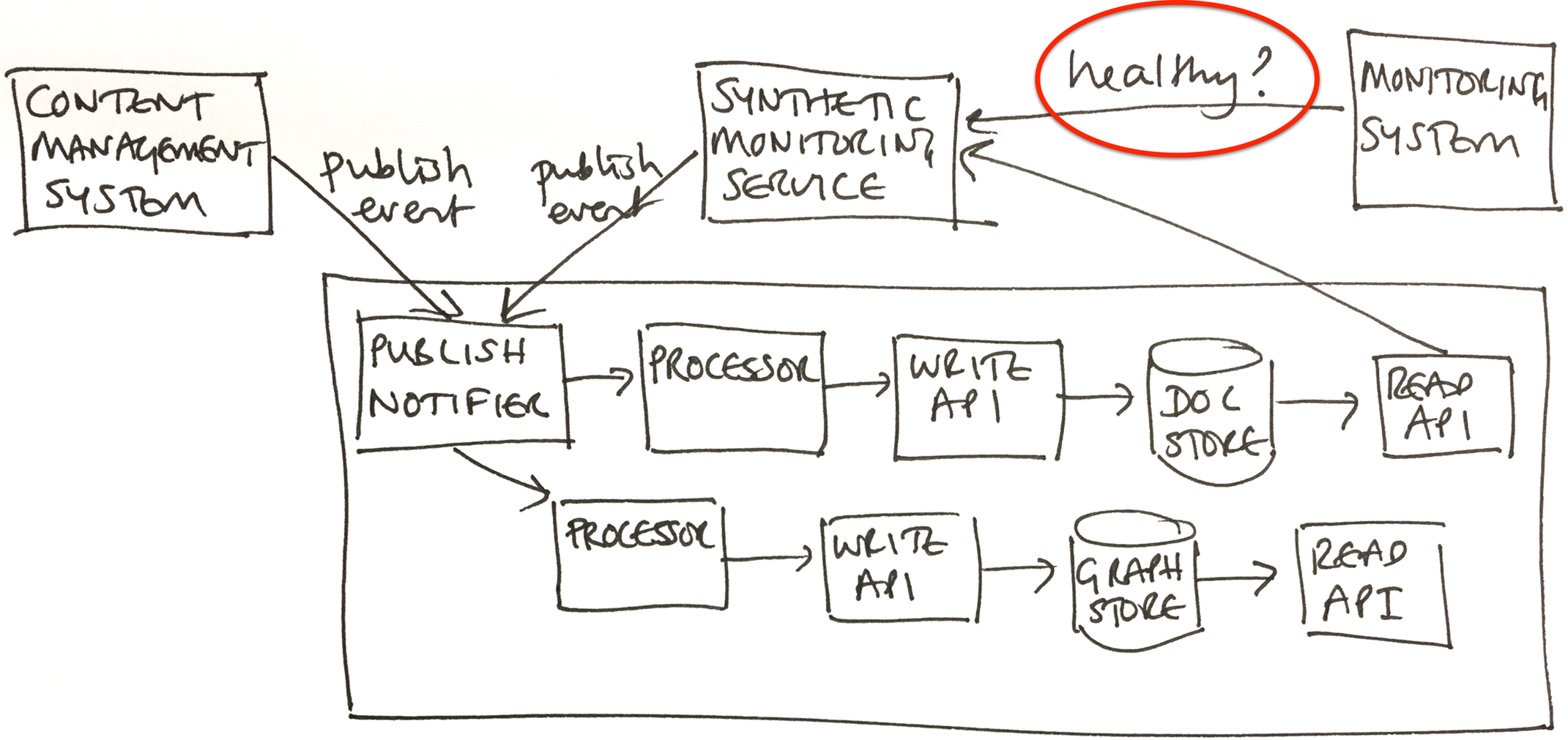

CONTENT MANAGEMENT SYSTEM
publish event
publish event
SYNTHETIC MONITORING SERVICE
healthy?
MONITORING SYSTEM
PUBLISH NOTIFIER
PROCESSOR
WRITE API
DOC STORE
READ API
PROCESSOR
WRITE API
GRAPH STORE
READ API


CONTENT MANAGEMENT SYSTEM
publish event
publish event
SYNTHETIC MONITORING SERVICE
healthy?
MONITORING SYSTEM
PUBLISH NOTIFIER
PROCESSOR
WRITE API
DOC STORE
READ API
PROCESSOR
WRITE API
GRAPH STORE
READ API


CONTENT MANAGEMENT SYSTEM
publish event
publish event
SYNTHETIC MONITORING SERVICE
healthy?
MONITORING SYSTEM
PUBLISH NOTIFIER
PROCESSOR
WRITE API
DOC STORE
READ API
PROCESSOR
WRITE API
GRAPH STORE
READ API


CONTENT MANAGEMENT SYSTEM
publish event
publish event
SYNTHETIC MONITORING SERVICE
healthy?
MONITORING SYSTEM
PUBLISH NOTIFIER
PROCESSOR
WRITE API
DOC STORE
READ API
PROCESSOR
WRITE API
GRAPH STORE
READ API

No data fixtures required

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Also helps us know things are broken even if no user is currently doing anything

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Make sure you know if things are working in production

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Our editorial team is inventive

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What does it mean for a publish to be ‘successful’?

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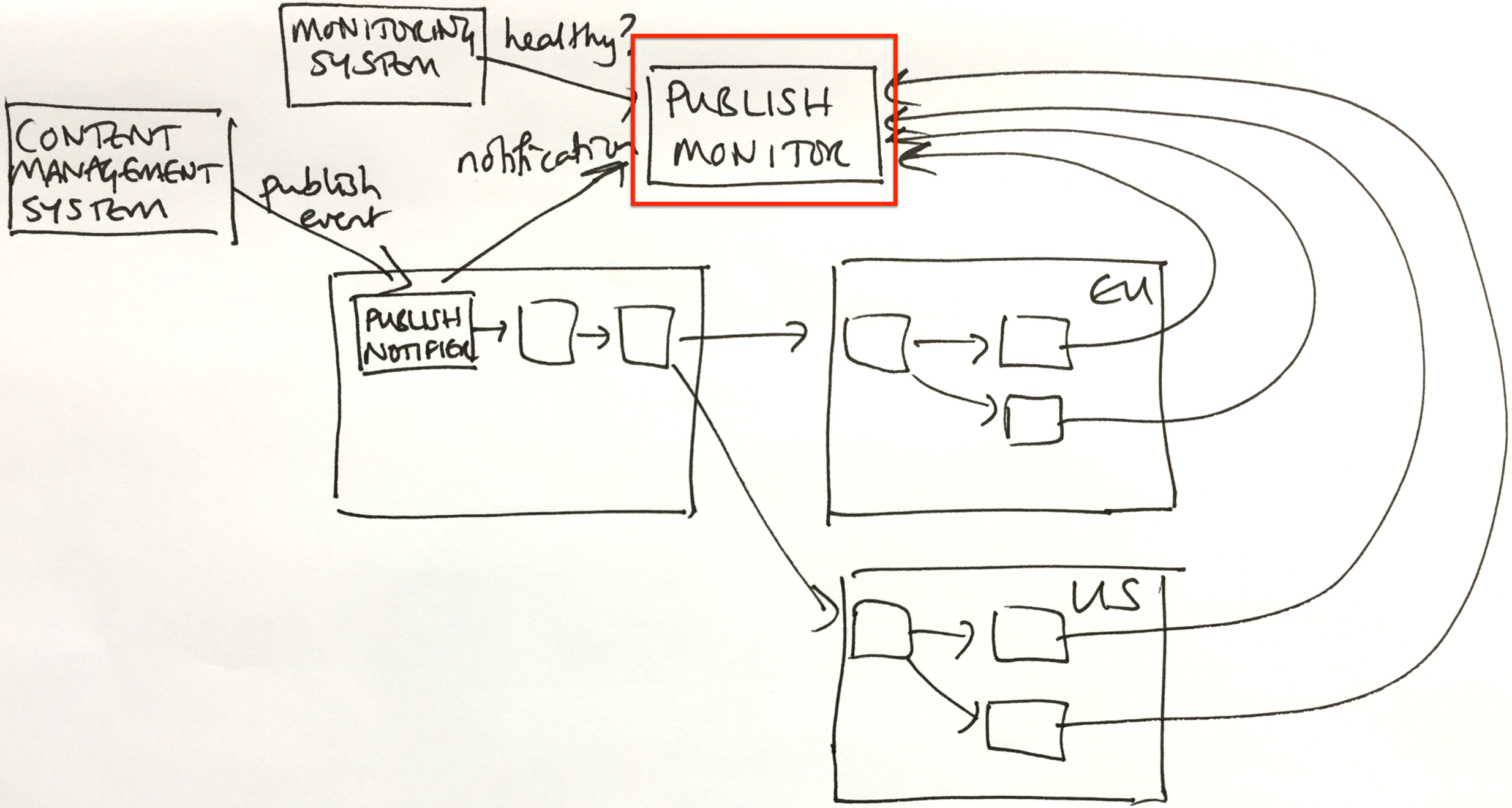
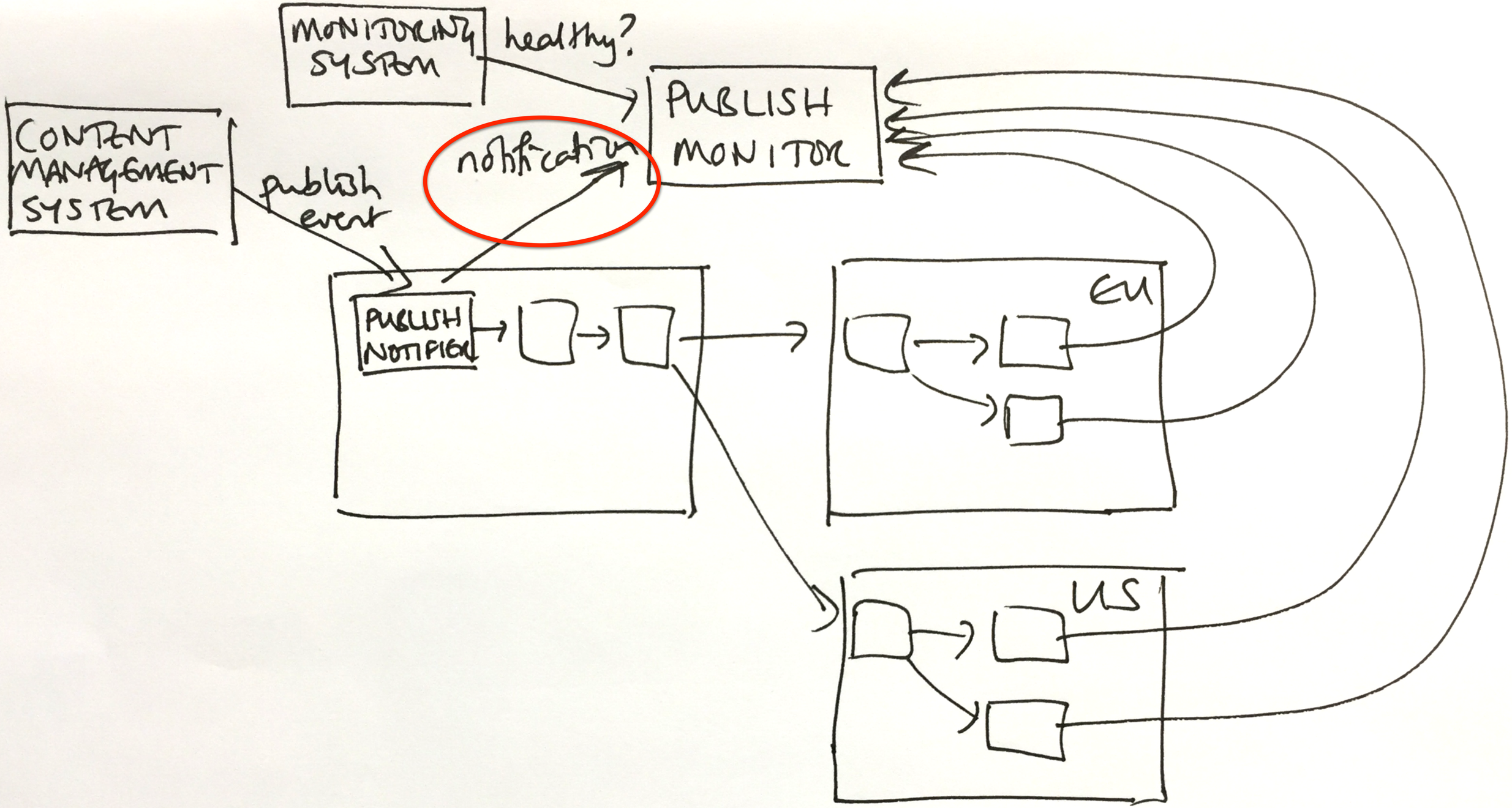
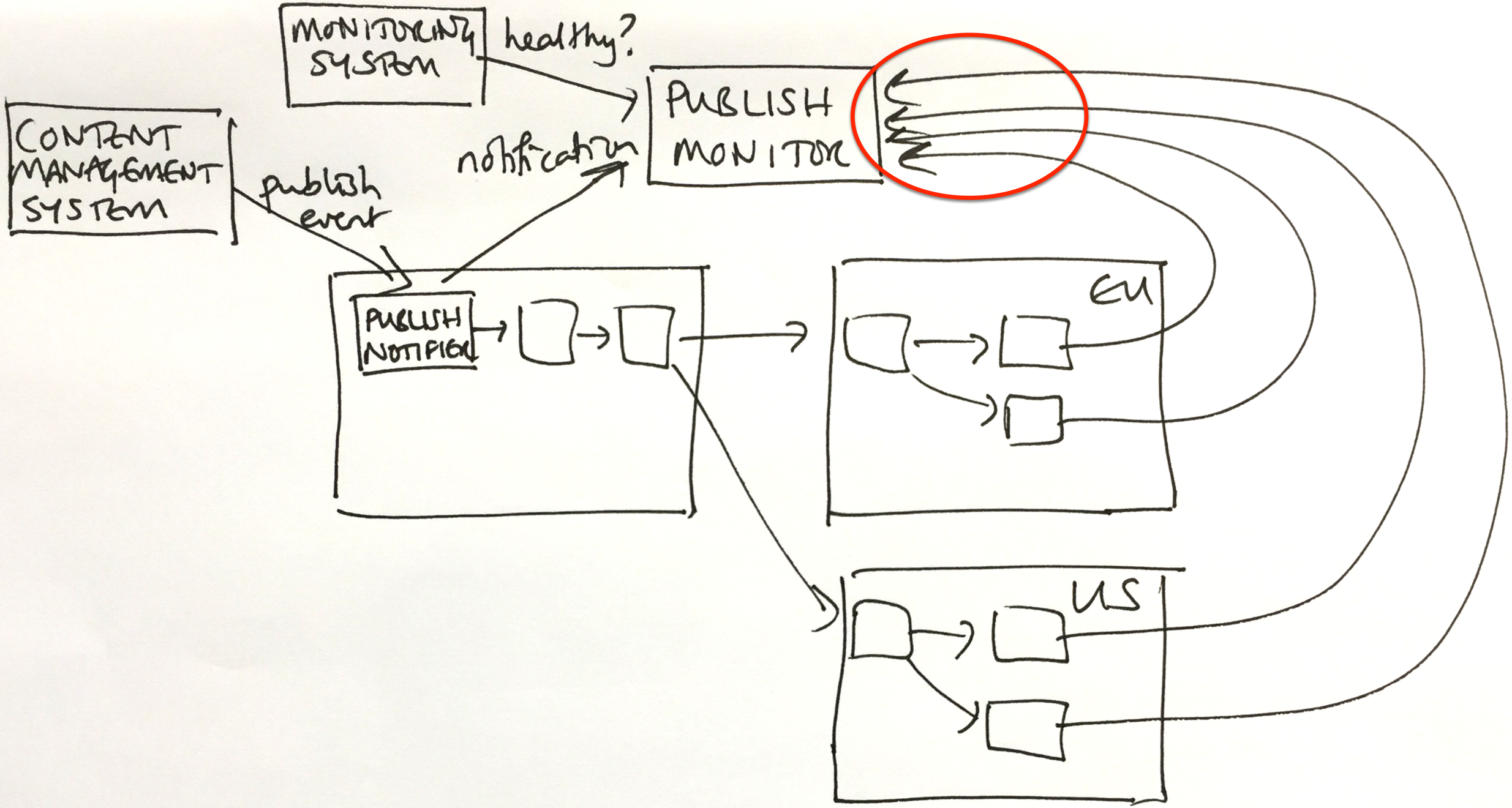
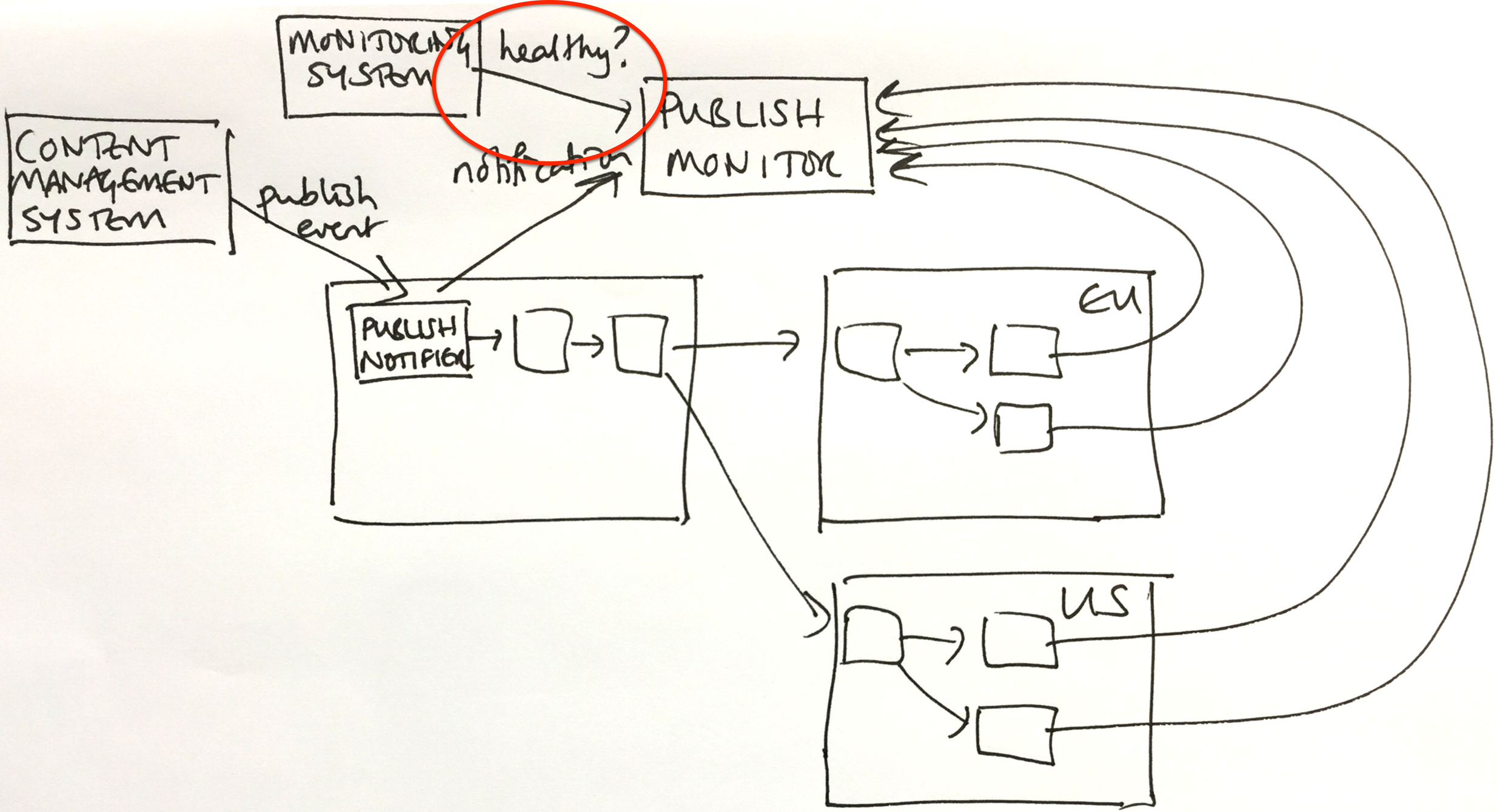

MONITORING SYSTEM
healthy?
PUBLISH MONITOR
CONTENT MANAGEMENT SYSTEM
publish event
notification
PUBLISH NOTIFIER
EU
US


MONITORING SYSTEM
healthy?
PUBLISH MONITOR
CONTENT MANAGEMENT SYSTEM
publish event
notification
PUBLISH NOTIFIER
EU
US


MONITORING SYSTEM
healthy?
PUBLISH MONITOR
CONTENT MANAGEMENT SYSTEM
publish event
notification
PUBLISH NOTIFIER
EU
US


MONITORING SYSTEM
healthy?
PUBLISH MONITOR
CONTENT MANAGEMENT SYSTEM
publish event
notification
PUBLISH NOTIFIER
EU
US

Define a contract

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Contract testing for key interfaces

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Simple documentation is a start

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in the family

the EU

AN HOUR AGO

investors reacted to jittery markets

Climate change

Germany set to phase out coal-fired power stations by 2038

Special commission calls for €40bn support package to ease green transition

Kenneth C. Griffin

Ken Griffin: from near wipeout to record $238m homeowner

Hedge fund boss traded his way from Harvard dorm to most expensive property in US

Gucci Group NV

Gucci owner Kering faces €1.4bn Italian tax bill

Luxury group disputes long-expected claim on 'the grounds and the amount'

Technology sector

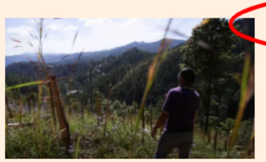
Facebook looks to integrate WhatsApp, Instagram and Messenger

Social media group plan to create 'Whatstabook' system linking all platforms

US politics & policy

Trump adviser Roger Stone charged in Mueller probe

Seven counts include witness-tampering and making false statements



Special Report **FT Rethink**

Video: Climate change forcing farmers to flee Honduras

Thousands of Central Americans are heading to the United States in the migrant caravan due to climate change.

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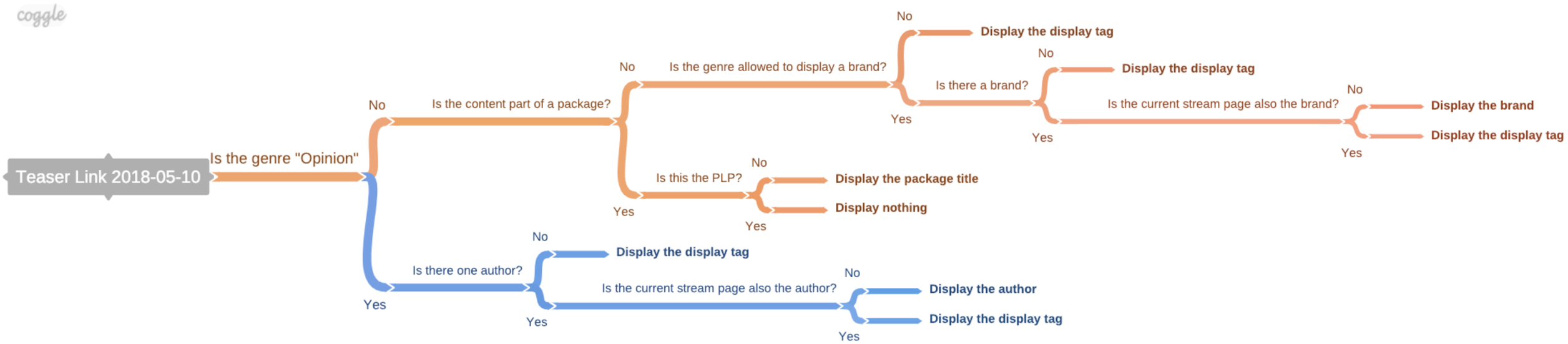
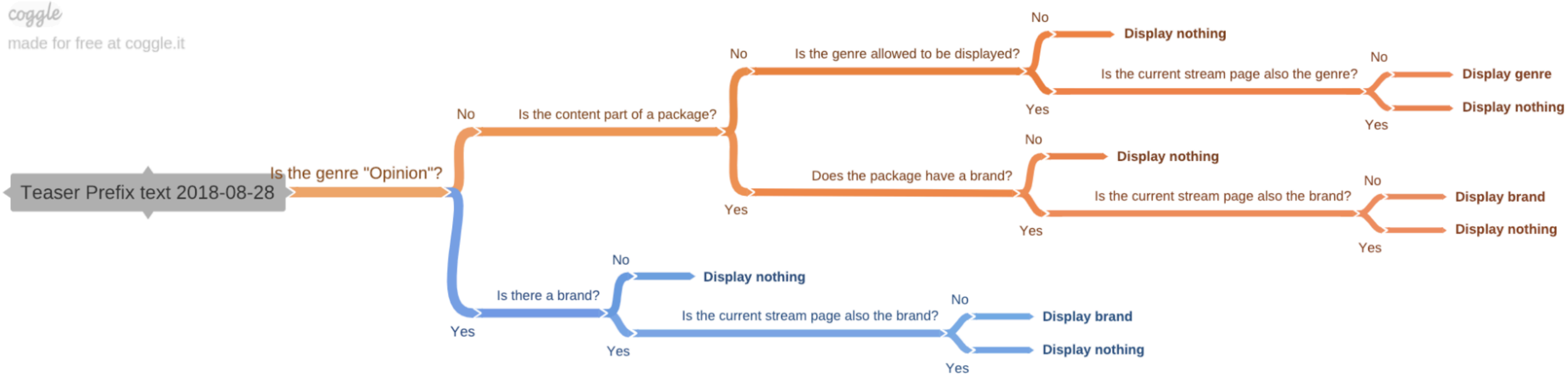
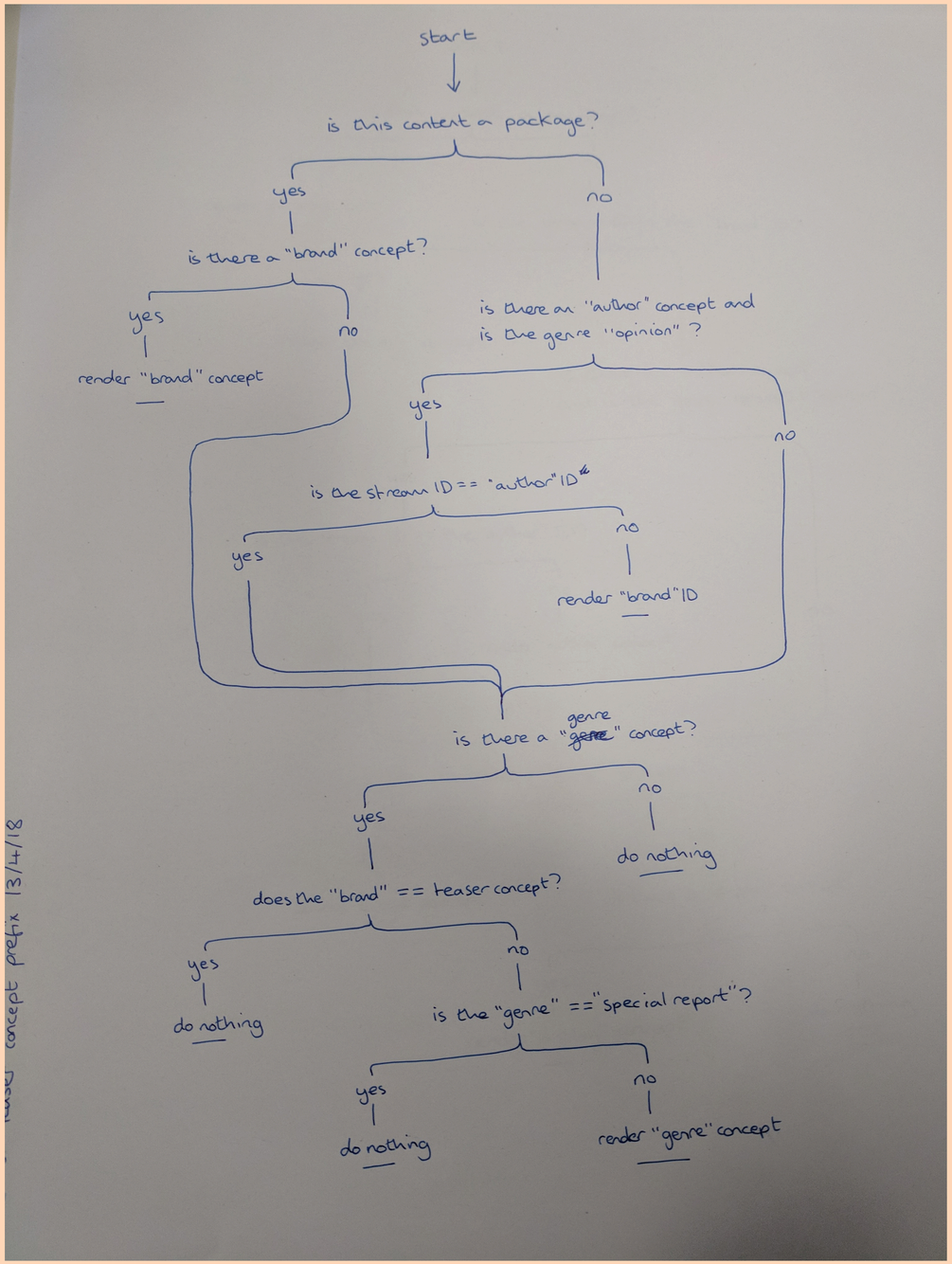
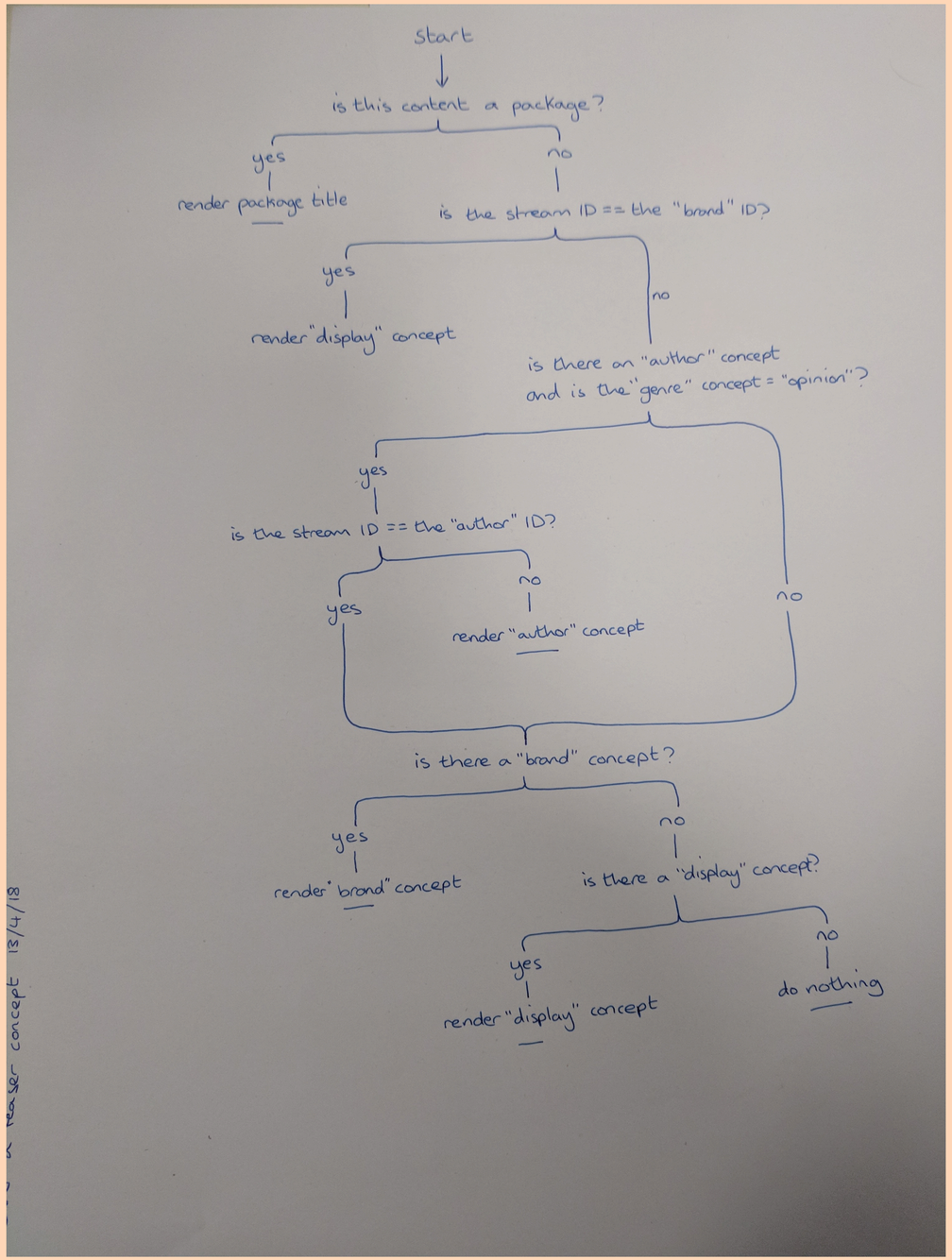
Feedback





created by Matt Hinchliffe (https://github.com/i-like-robots)


start
is this content a package?
yes
no
is there a "brand" concept?
yes
no
render "brand" concept
is there an "author" concept and is the genre "opinion"?
yes
no
is the stream ID == "author" ID
yes
no
render "brand" ID
is there a "genre" concept?
yes
no
do nothing
does the "brand" == teaser concept?
yes
no
do nothing
is the "genre" == "special report"?
yes
no
do nothing
render "genre" concept


start
is this content a package?
yes
no
render package title
is the stream ID == the "brand" ID?
yes
no
render "display" concept
is there an "author" concept and is the "genre" concept = "opinion"?
yes
no
is the stream ID == the "author" ID?
yes
no
render "author" concept
is there a "brand" concept?
yes
no
render "brand" concept
is there a "display" concept?
yes
no
render "display" concept
do nothing

Separate releasing code from releasing functionality

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Feature flags

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adTargetingUserApi Use the Ads API to retrieve user-related targeting data for advertising Category: `operational` Expiry: April 2, 2019 (58 days left) permalink	@[illegible] @[illegible] @[illegible] ft-next-ammit advertising-dev	On	On Off
b2bSubscribersCohort Cohort for targeting B2B subscribers Category: `operational` Expiry: May 22, 2019 (108 days left) permalink	@[illegible] ft-next-ammit	Cohort On	On Off

Canary releases

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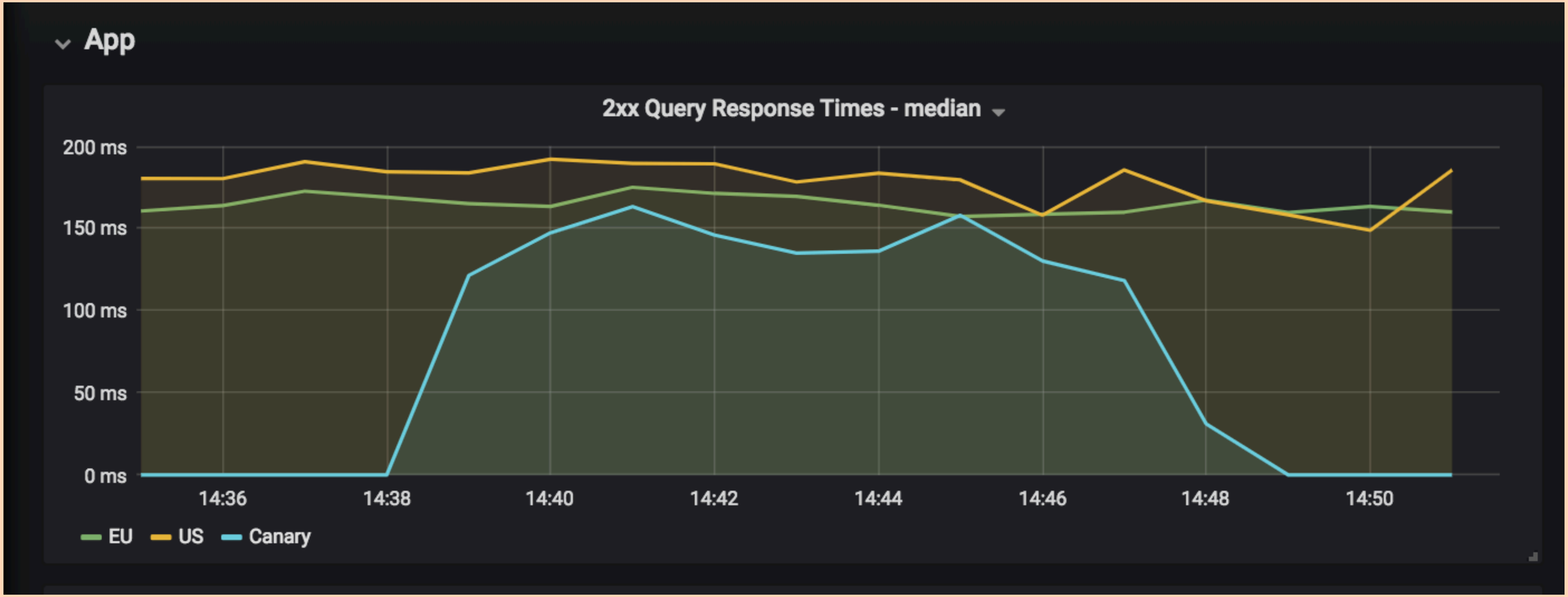
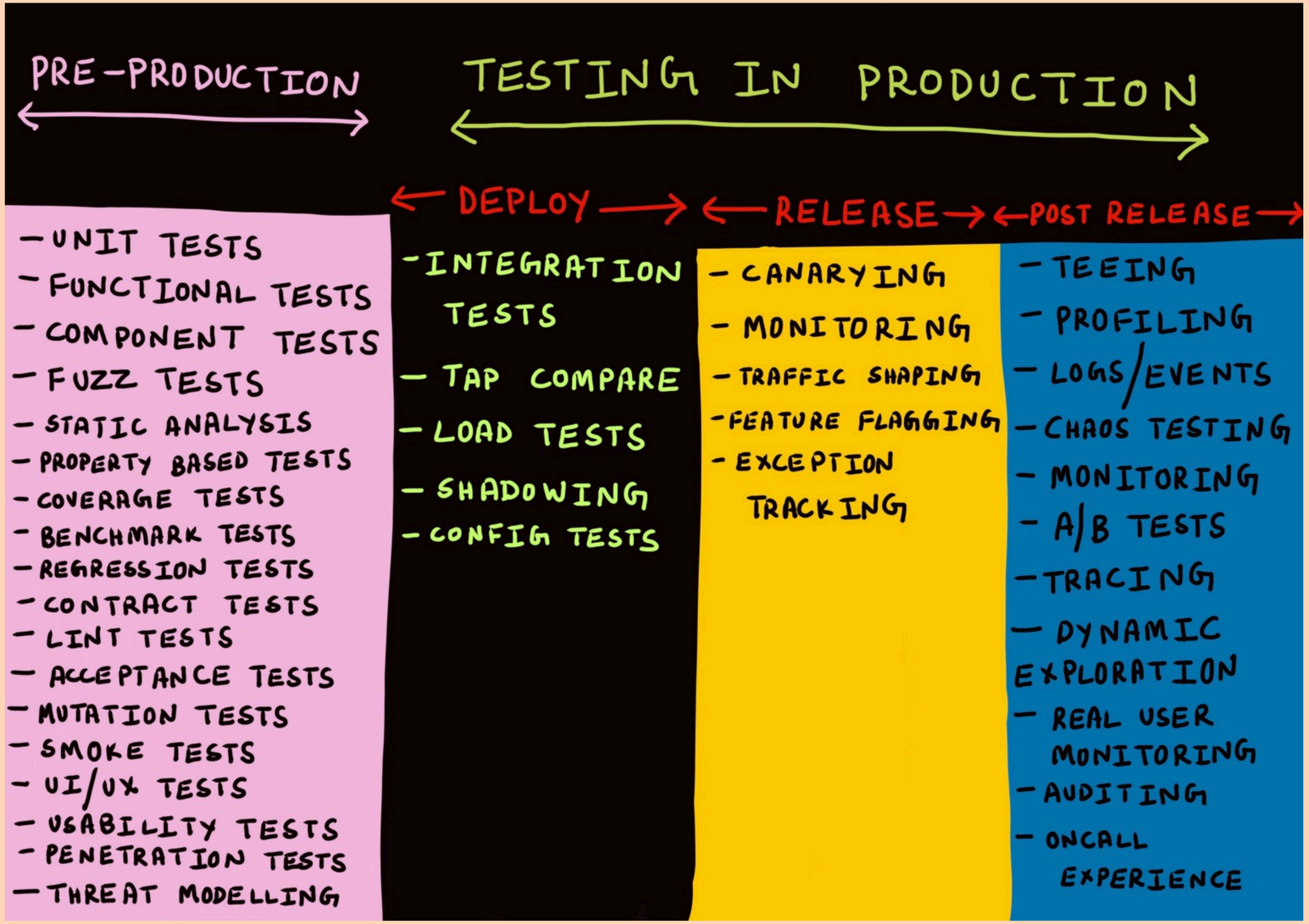

App
2xx Query Response Times - median
200 ms
150 ms
100 ms
50 ms
0 ms
14:36
14:38
14:40
14:42
14:44
14:46
14:48
14:50
EU
US
Canary



Cindy Sridharan: https://medium.com/@copyconstruct/testing-in-production-the-safe-way-18ca102d0ef1

Cloud native: an introduction

Testing in production

Optimising for fixing things fast

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Mitigate first

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FT

Make sure you can work out what's going on

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Log aggregation

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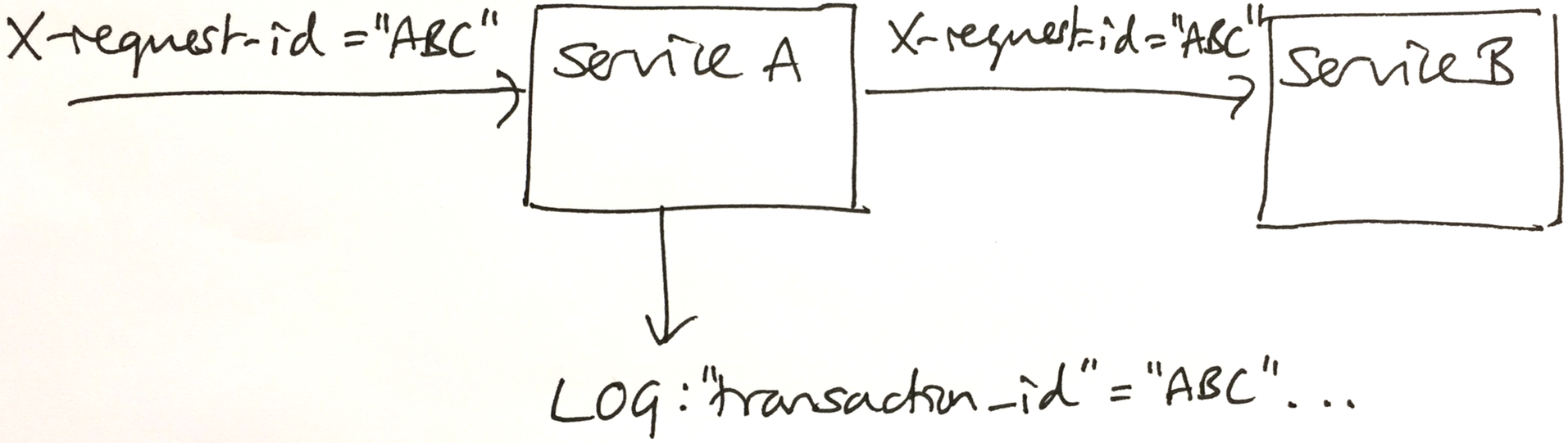
X-request-id = "ABC"
Service A
X-request-id = "ABC"
Service B
LOG: "transaction_id" = "ABC"...

transaction_id="SYN_ABC"

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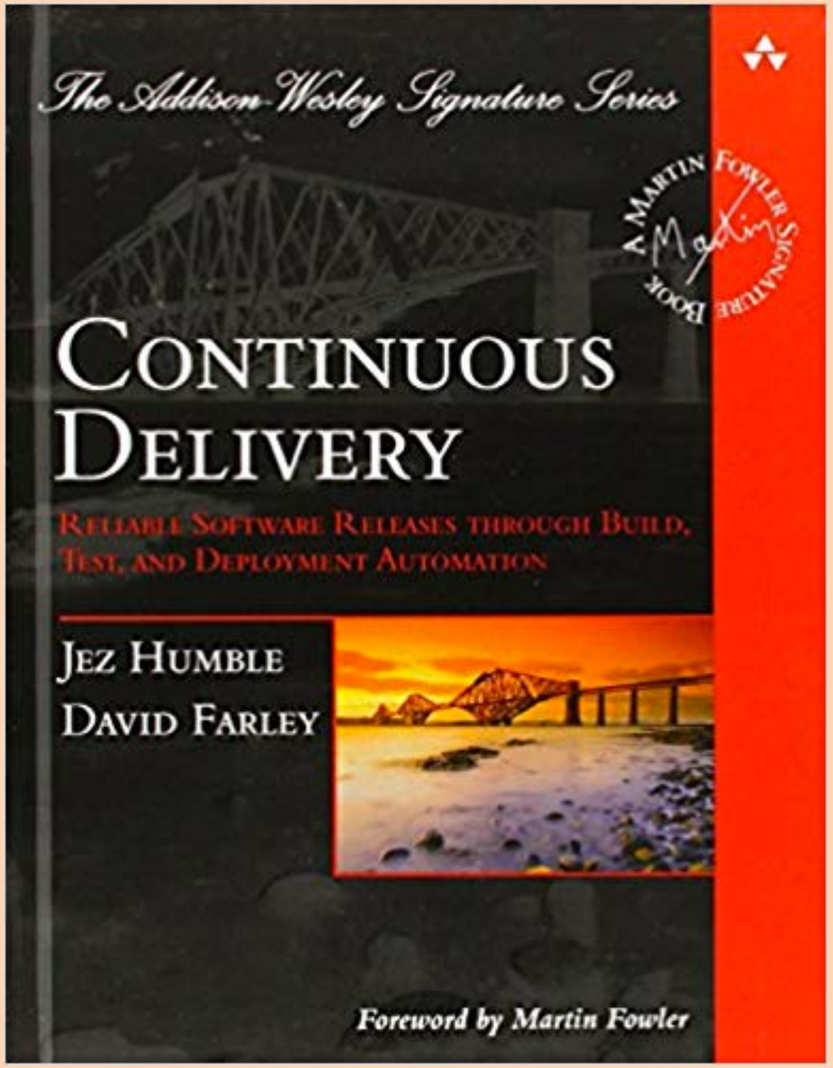
FT

Practice



"If it hurts, do it more frequently, and bring the pain forward."

Failovers, database restores

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Chaos engineering

https://principlesofchaos.org/

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Understand your steady state

Look at what you can change - minimise the blast radius

Work out what you expect to see happen

Run the experiment and see if you were right

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Use the skills you already have

Good QAs understand the features of the system

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Chaos engineering uses the same skills as exploratory testing - “hmm, I wonder what will happen if I do this?”

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Work on operational stuff too

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Cloud native: an introduction

Testing in production

Optimising for fixing things fast

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What worked before doesn’t work so well for cloud native

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Focus on delivering maximum value to your users while minimising the times when things are broken or unavailable

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Understand where the QA mindset has the most impact

Use synthetic monitoring
Use clever monitoring
Make sure logs are aggregated
With tracing of events
Practice things
Chaos engineering IS exploratory testing!

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Thank you!

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