0.0001999960007998
THE STARS GROUP
Ian Thomas | @anatomic | QCon London 2020

#FEARLESS
BARCLAYS
#SpiritoftheGame
BARCLAYS PREMIER LEAGUE
BARCLAYS CHAMPIONS 2014/15
uptonsteel.com
BBC RADIO LEICESTER
THE STARS GROUP

5000/1
THE STARS GROUP
Ian Thomas | @anatomic | QCon London 2020

The unthinkable has become reality and we're facing paying out the sort of liability that you joke about at the start of the season

Sandro Di Michele, referencing Leicester City's 2016 Premier League Win

The unthinkable has become reality

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Designing a Real-Time Global Sportsbook (From Scratch!)

Ian Thomas – Senior Principal Engineer

THE STARS GROUP

What is a Sportsbook?

TRADING

SPORTSBOOK

FRONT-END

TRADING

- TRADING FEEDS
- SPORT FEEDS
- TRADING ENGINE
- MANAGEMENT TOOLS
- RISK MANAGEMENT
- BET MANAGEMENT

SPORTSBOOK

- CATALOGUE
- OPPORTUNITIES
- PLACEMENT
- RESULTING
- SETTLEMENT
- BET HISTORY
- TRANSLATIONS
- CASH OUT

FRONT-END

- RESPONSIVE WEB APP
- NATIVE IOS APP
- NATIVE ANDROID APP
- CDN / WAF
- BFFs
- CMS

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The Lifecyle Of A Bet

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The technical challenges of sports betting at scale

Ian Thomas | @anatomic | QCon London 2020

Sports betting...

- Is highly transactional
- Has a constantly changing catalogue of products
- Has lots of customers browsing at the same time
- Doesn't always have predictable traffic profiles
- Relies on millisecond accurate pricing to avoid big losses
- Has a massive responsibility to protect customers
- And ...

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Big sporting events don’t wait for you to be ready!

They can vary wildly in popularity and it only takes England to get to a semi-final or Harry Kane to play to have a huge impact on our live services.

The sooner you start to code, the longer the program will take

Roy Carlson – University of Wisconsin

The Grand National & Cheltenham

Cheltenham Festival

Four days of racing

Consistently high traffic

Accumulators increase liabilities

No clash with football

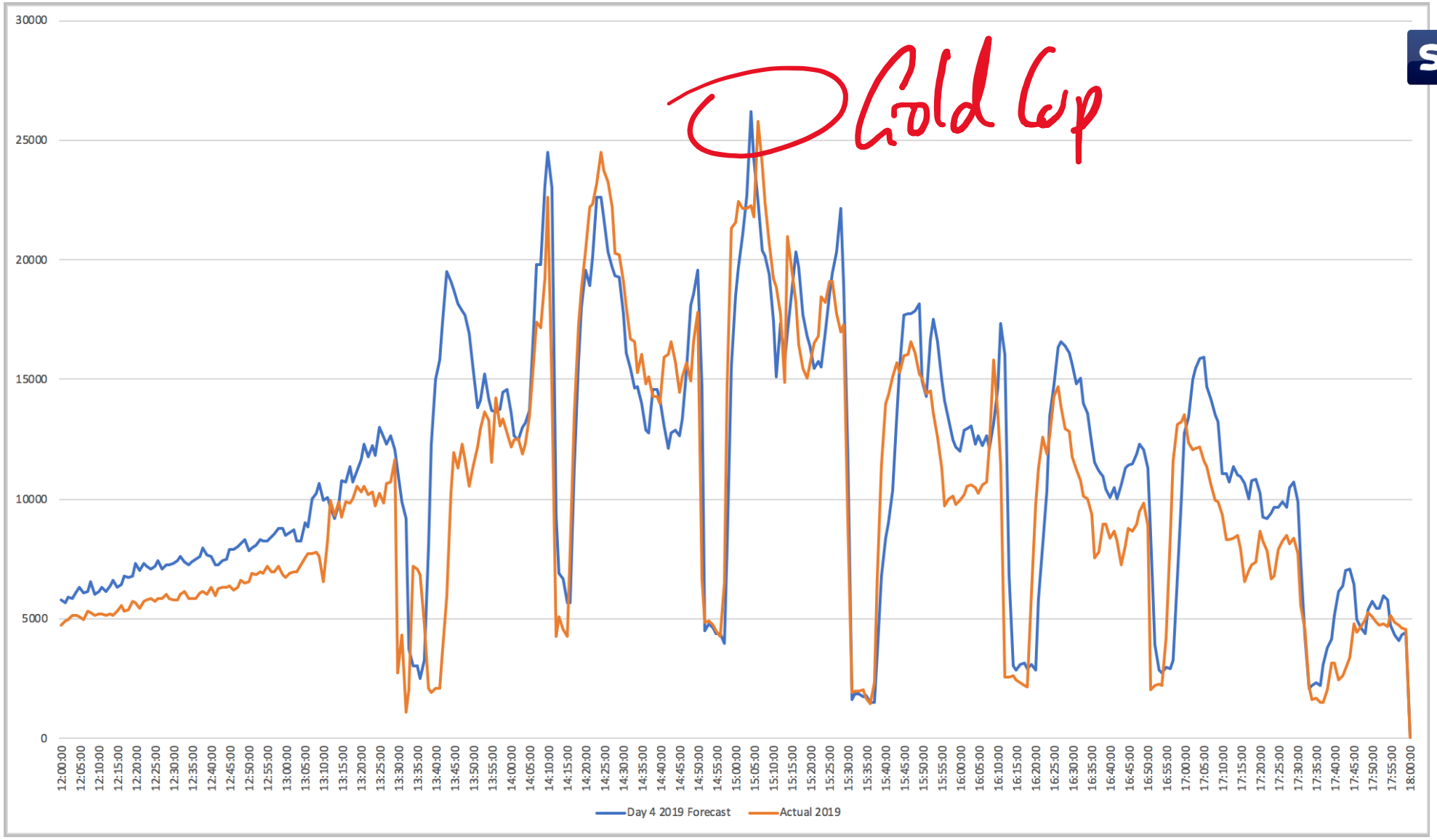
The Grand National

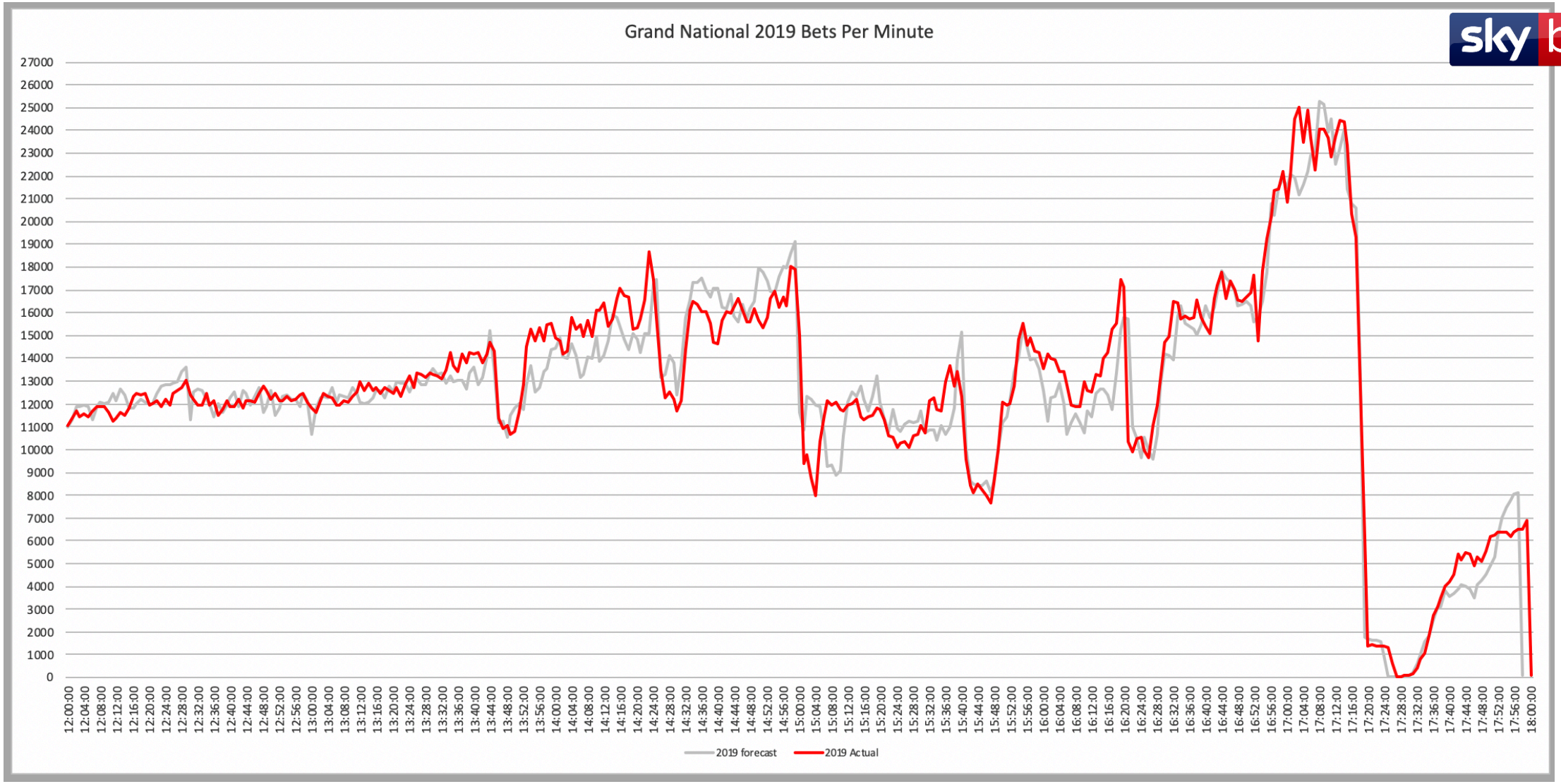
Single race

Highest peak of bets per second

Complete lottery!

Full day of football matches


Gold Cup
30000
25000
20000
15000
10000
5000
0
Day 4 2019 Forecast
Actual 2019


Grand National 2019 Bets Per Minute
sky bet
27000
26000
25000
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
12:00:00
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12:12:00
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12:44:00
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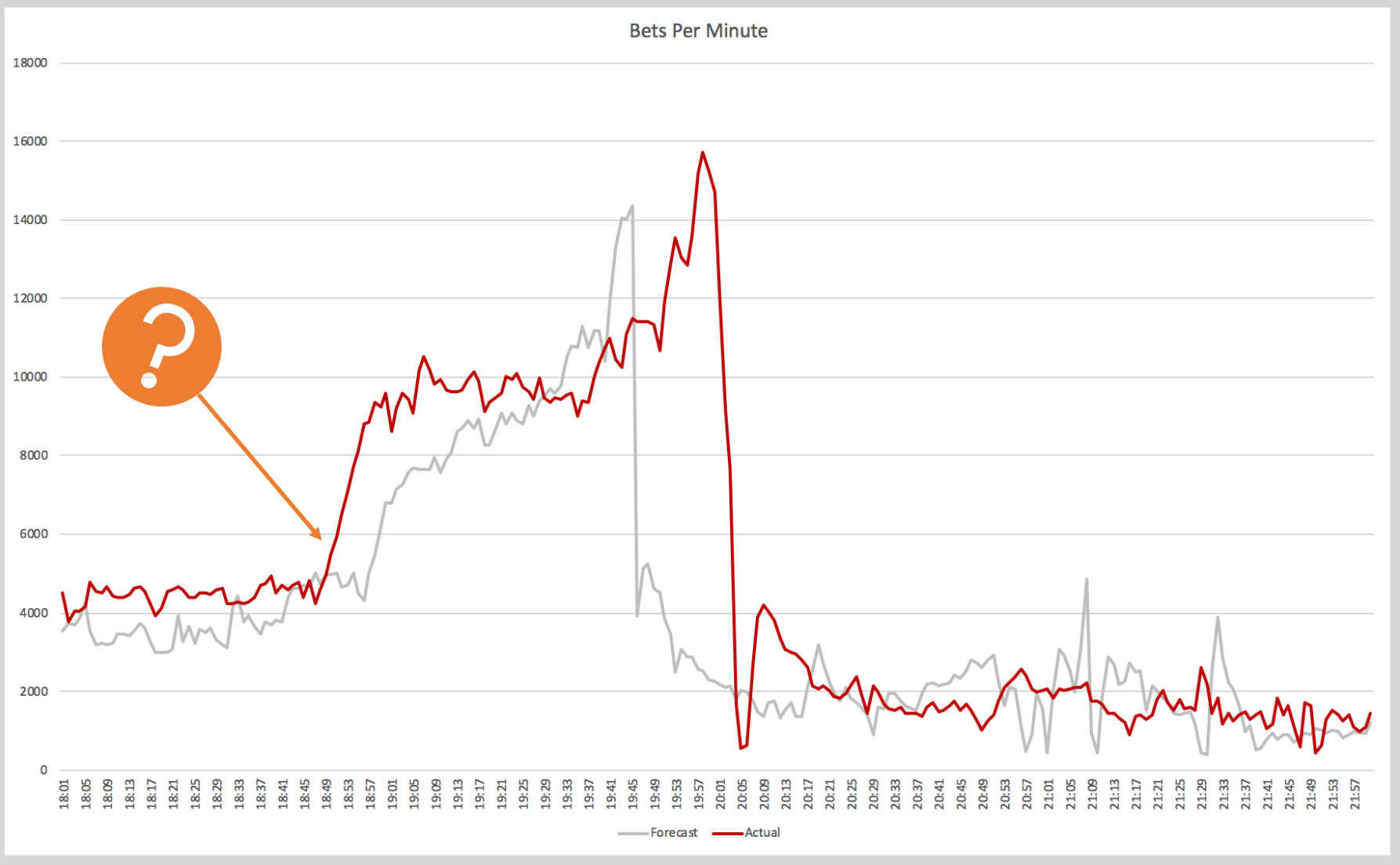
18:00:00
2019 forecast
2019 Actual

Champions League Final


Bets Per Minute
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
18:01 18:05 18:09 18:13 18:17 18:21 18:25 18:29 18:33 18:37 18:41 18:45 18:49 18:53 18:57 19:01 19:05 19:09 19:13 19:17 19:21 19:25 19:29 19:33 19:37 19:41 19:45 19:49 19:53 19:57 20:01 20:05 20:09 20:13 20:17 20:21 20:25 20:29 20:33 20:37 20:41 20:45 20:49 20:53 20:57 21:01 21:05 21:09 21:13 21:17 21:21 21:25 21:29 21:33 21:37 21:41 21:45 21:49 21:53 21:57
Forecast
Actual

High Frequency of Writes

sky bet
sky BET
BETTI
HAM

Arsenal vs Everton

Sunday 23rd February 2020

110

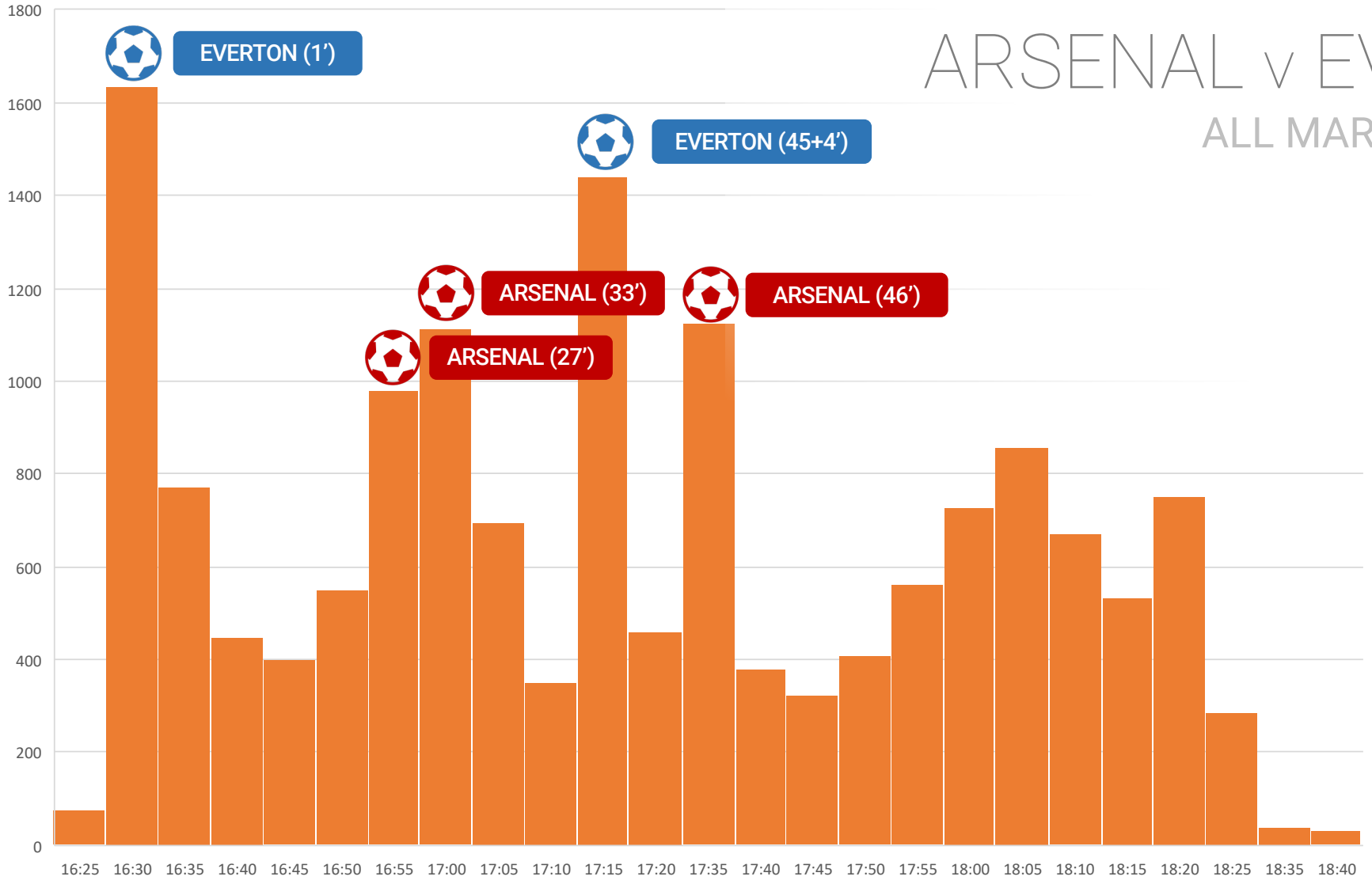
Match Betting market updates

15,622

total market updates

ARSENAL v EVERTON

ALL MARKET UPDATES
23/02/2020



248,865

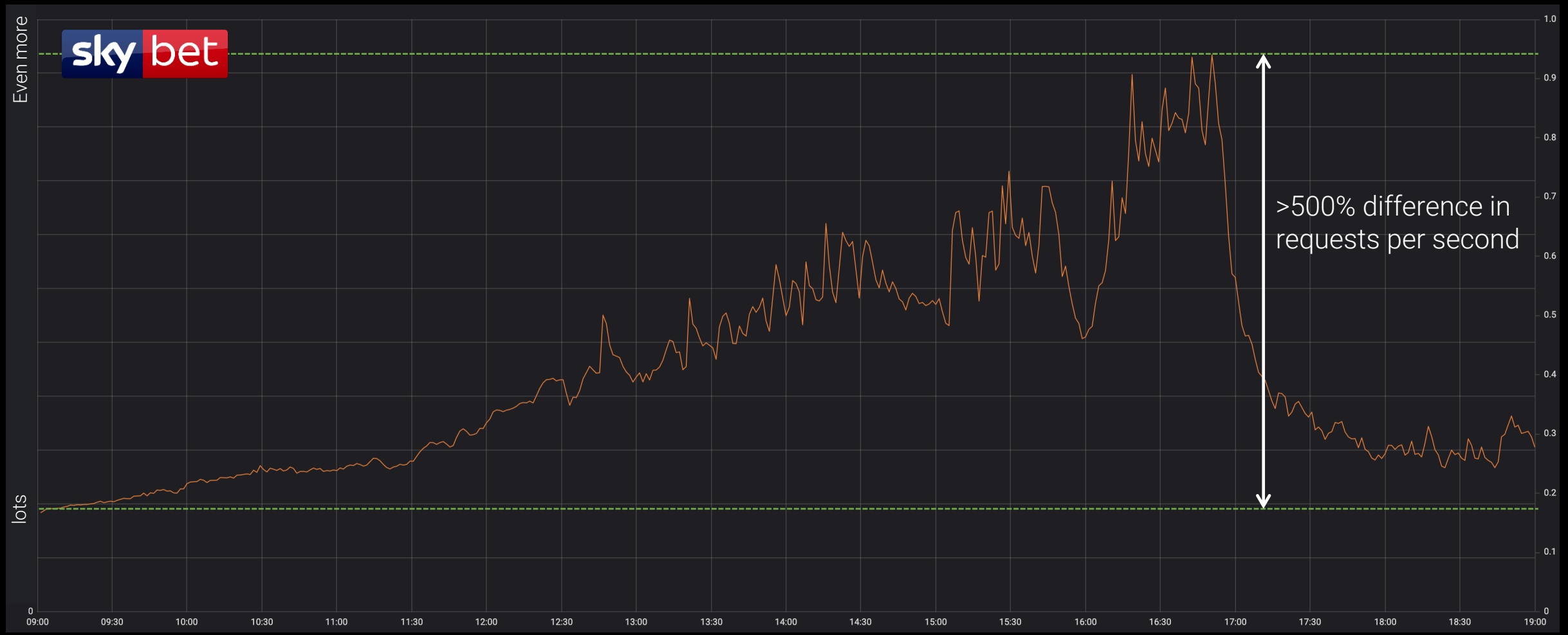
Sporting events being traded*

*Matches counted at 16:15 03/03/2020

Add in lots of customers

Sky Bet is the largest bookmaker in the UK by customer volume and The Stars Group has more than 111 million customers, worldwide

HTTP Requests Per Second



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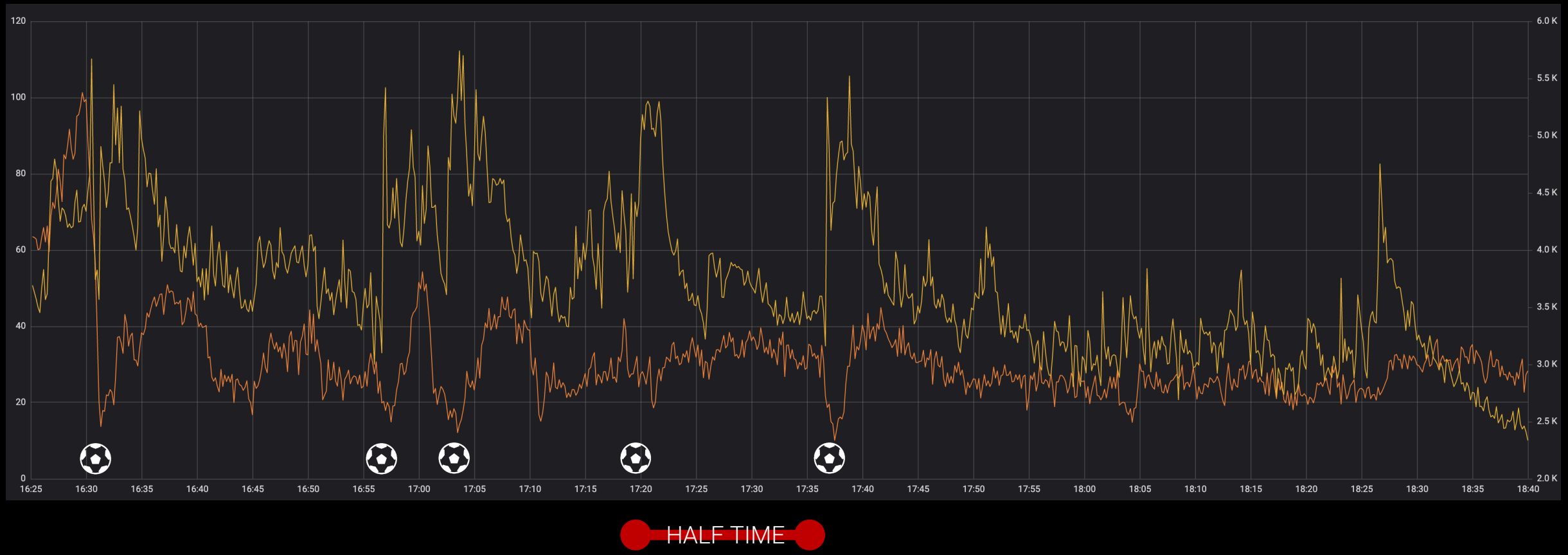
Bets Per Second

THE STARS GROUP

Back to Arsenal vs Everton


120
100
80
60
40
20
0
6.0 K
5.5 K
5.0 K
4.5 K
4.0 K
3.5 K
3.0 K
2.5 K
2.0 K
16:25
16:30
16:35
16:40
16:45
16:50
16:55
17:00
17:05
17:10
17:15
17:20
17:25
17:30
17:35
17:40
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17:50
17:55
18:00
18:05
18:10
18:15
18:20
18:25
18:30
18:35
18:40
HALF TIME

Our new challenge

The creation of Group Sports & Trading Platforms (GSTP) tribe

Global Product

- Multi-Brand
- Multi-License
- Multi-Platform
- Multi-Currency
- Multi-Language
- Oh My

POKERSTARS
SPORTS

We think we have acquired the best teams globally in online betting. We have the team that built the leading online betting brand in the UK...

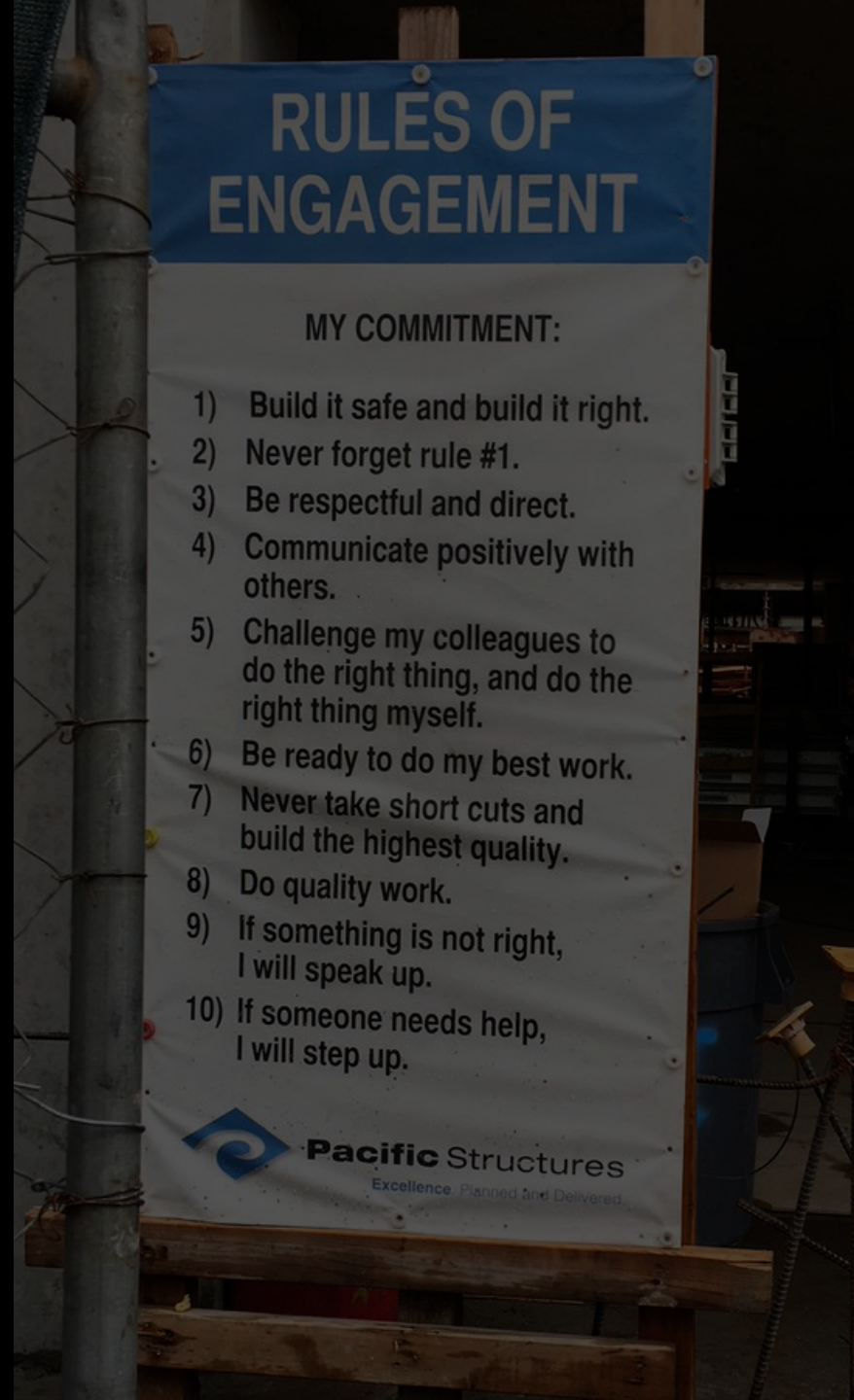
Rafi Ashkenazi – CEO of The Stars Group

Where do you start?

Start With Principles

THE STARS GROUP

- Decoupled
- Small
- Reliable
- Secure
- Scalable
- Resilient
- Trustworthy



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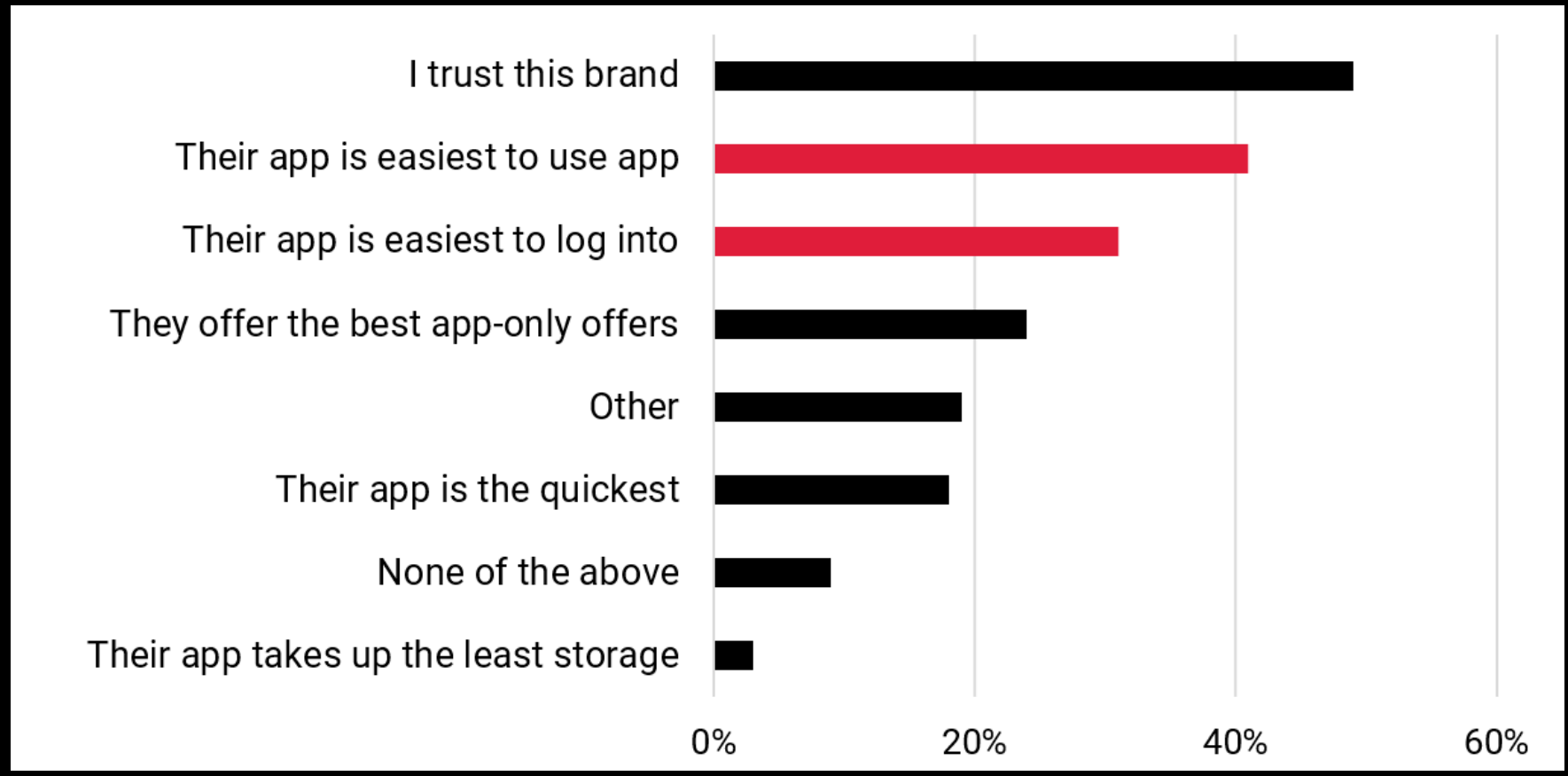
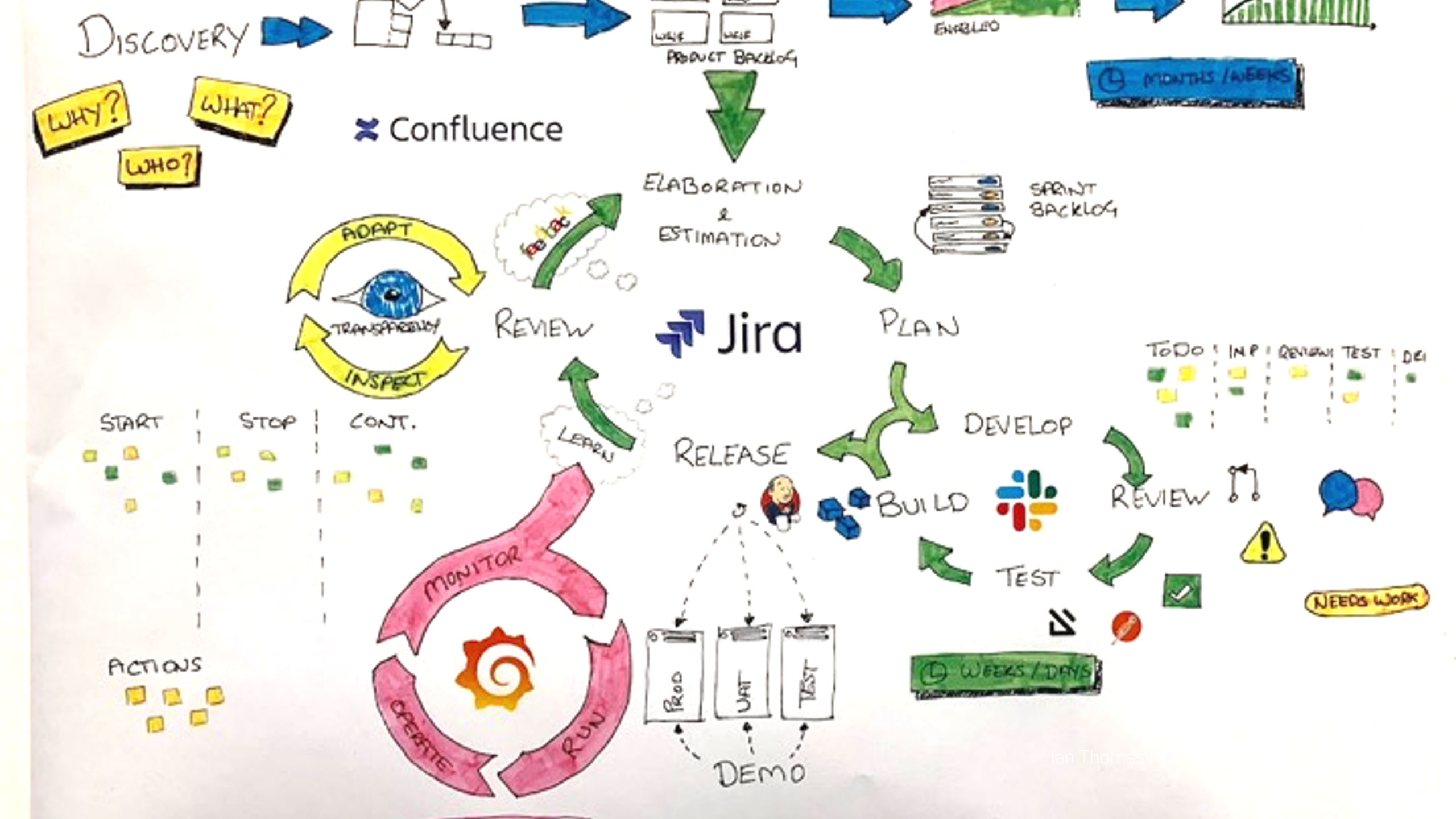
What are your main reasons for preferring a certain betting app over others?



THE STARS GROUP


DISCOVERY
WHY?
WHAT?
WHO?
Confluence
PRODUCT BACKLOG
ENABLERS
MONTHS / WEEKS
ELABORATION & ESTIMATION
SPRINT BACKLOG
ADAPT
TRANSPARENCY
INSPECT
feedback
REVIEW
Jira
PLAN
LEARN
RELEASE
DEVELOP
BUILD
REVIEW
TEST
NEEDS WORK
WEEKS / DAYS
TODO
IN P
REVIEW
TEST
DEI
START
STOP
CONT.
ACTIONS
MONITOR
OPERATE
RUN
PROD
UAT
TEST
DEMO

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Monolith or Microservices?

1. Almost all the successful microservice stories have started with a monolith that got too big and was broken up

2. Almost all the cases where I've heard of a system that was built as a microservice system from scratch, it has ended up in serious trouble.

Martin Fowler - MonolithFirst

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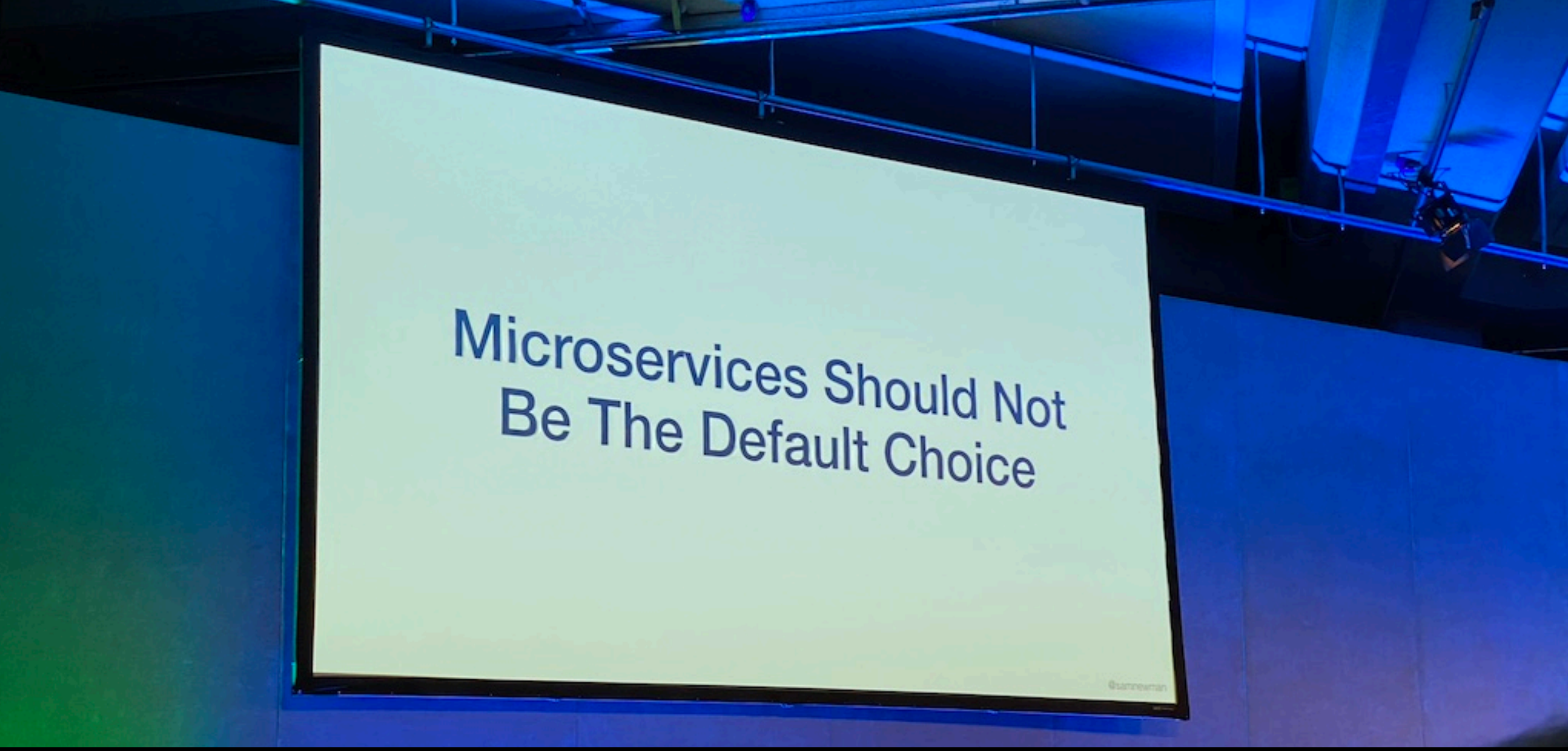
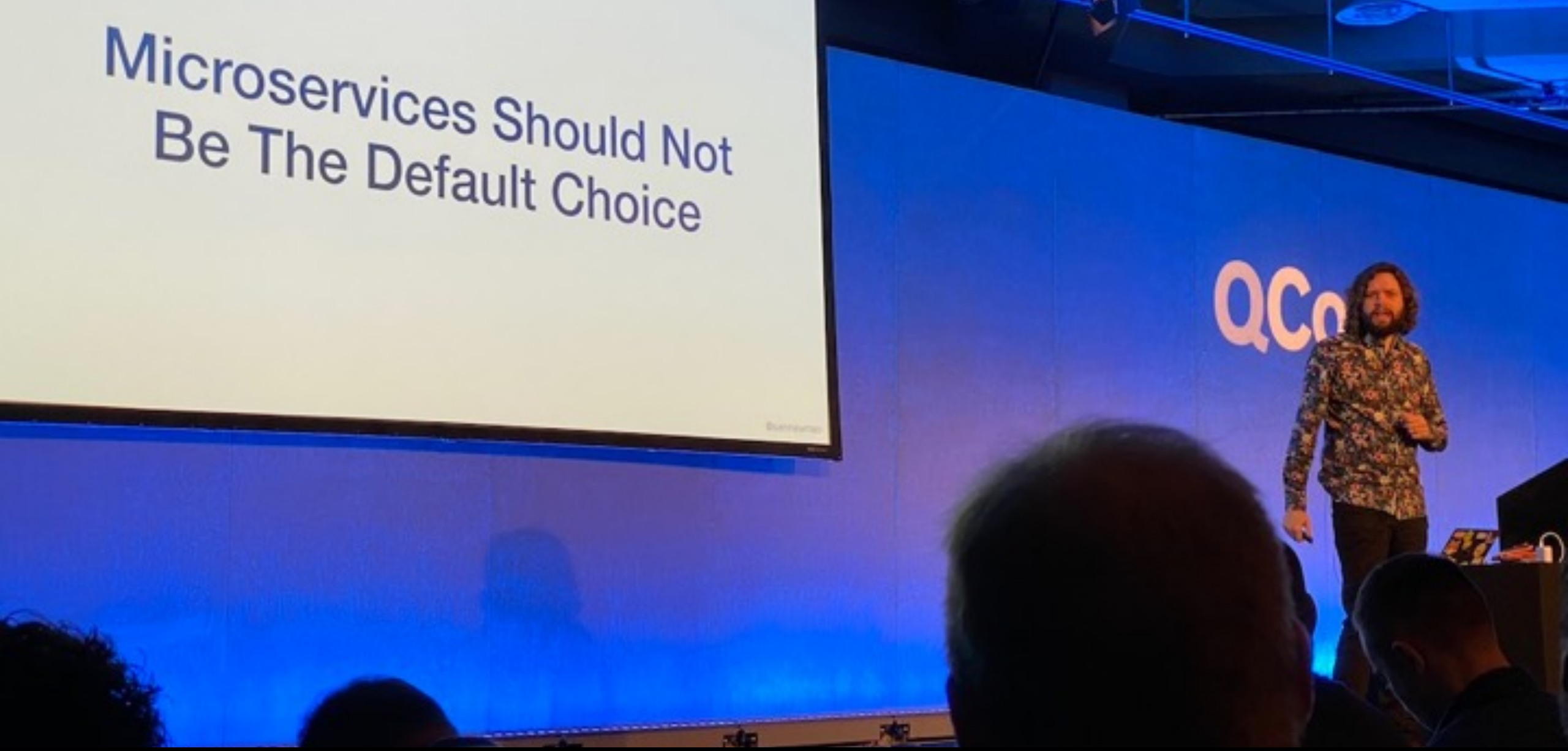

Microservices Should Not
Be The Default Choice

Monolith or Microservices?

Guess which option we chose...


Microservices Should Not
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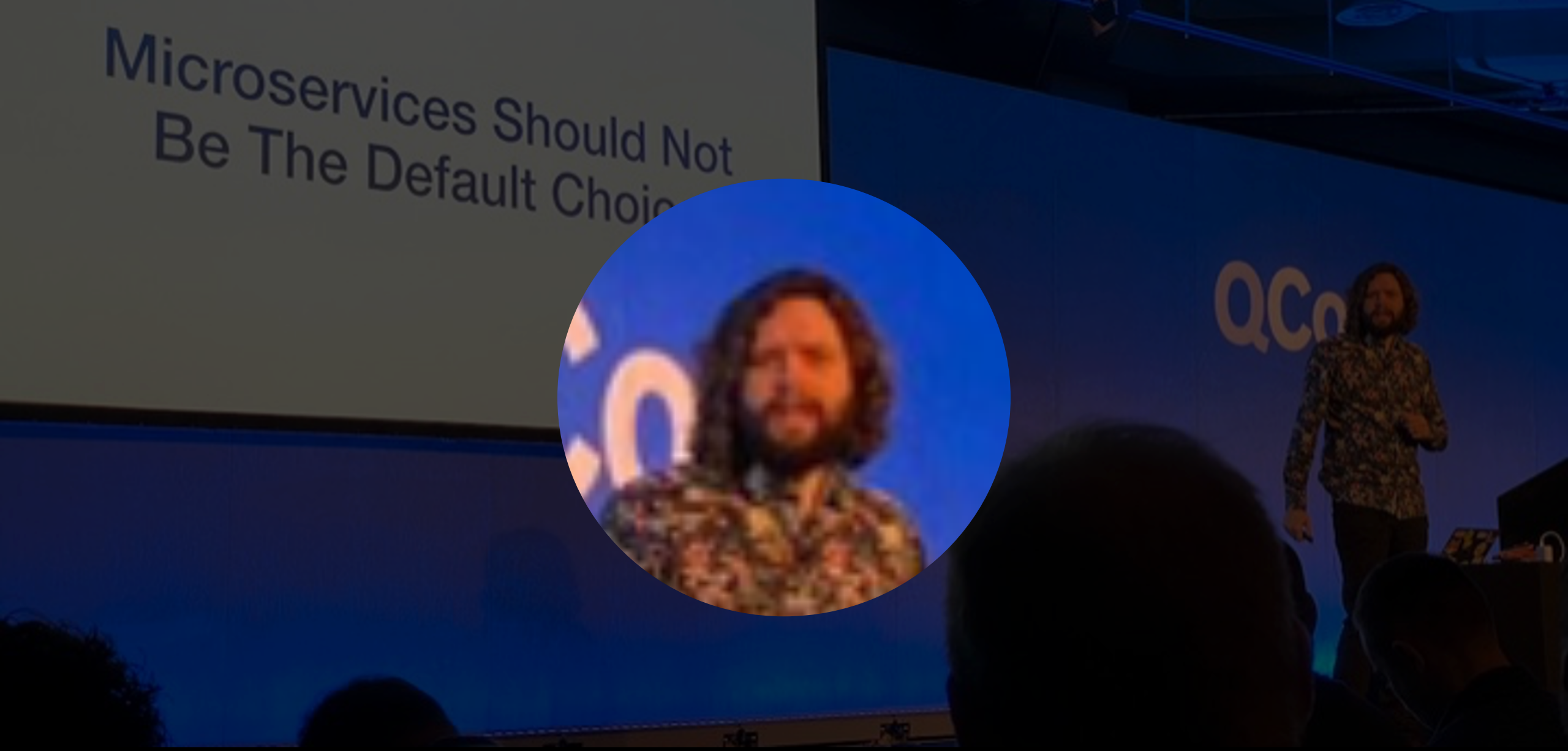

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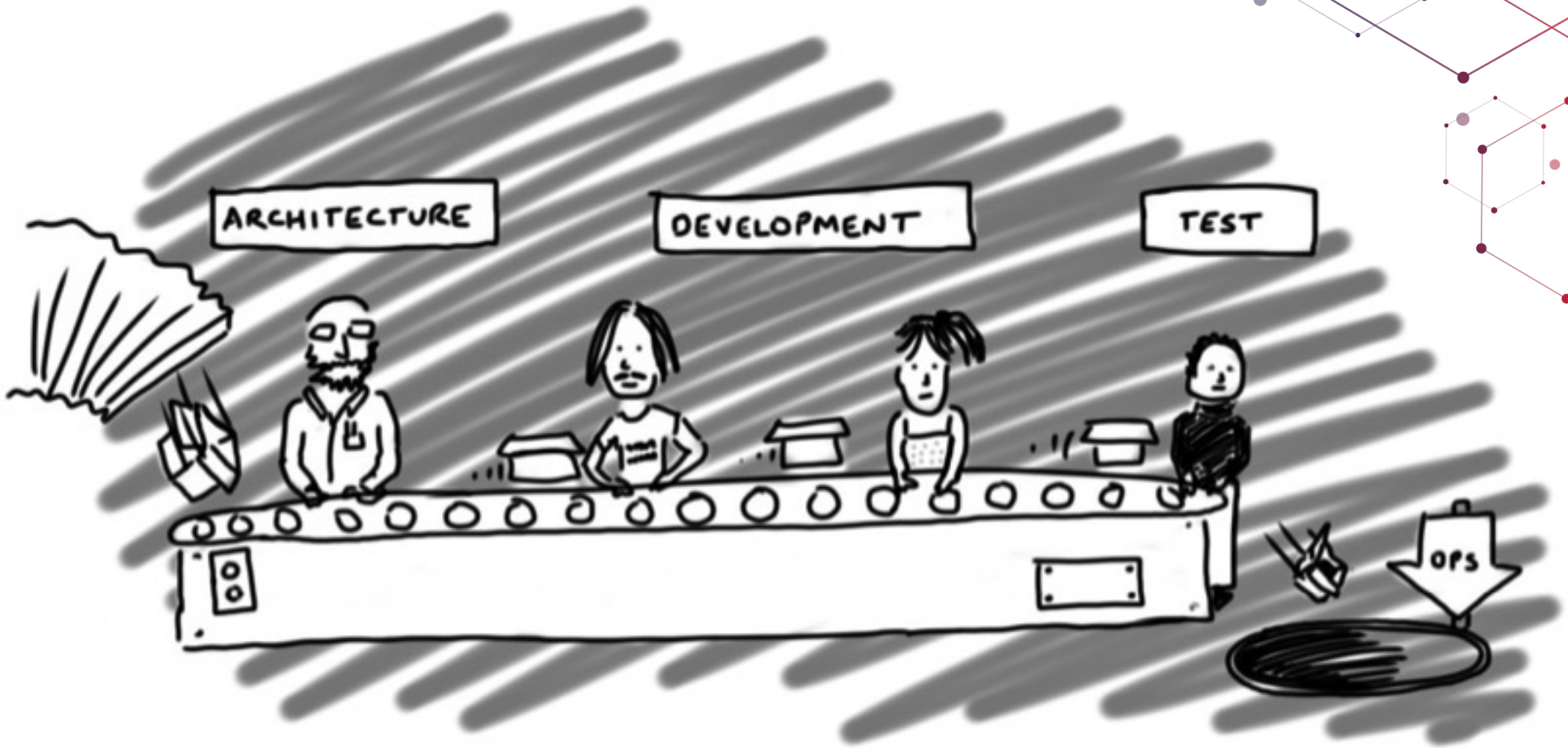
How do we avoid the MicroservicesPremium?



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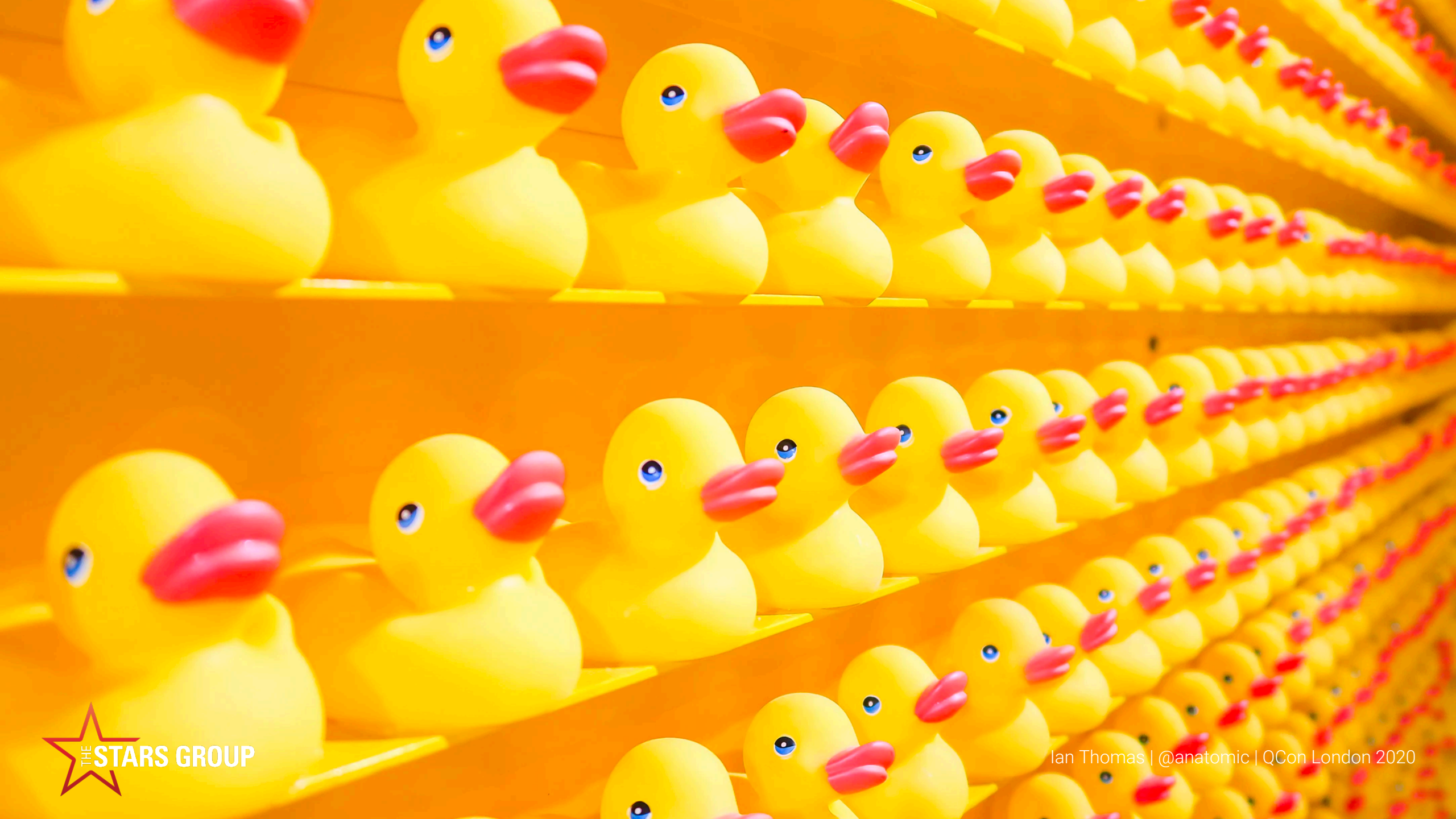

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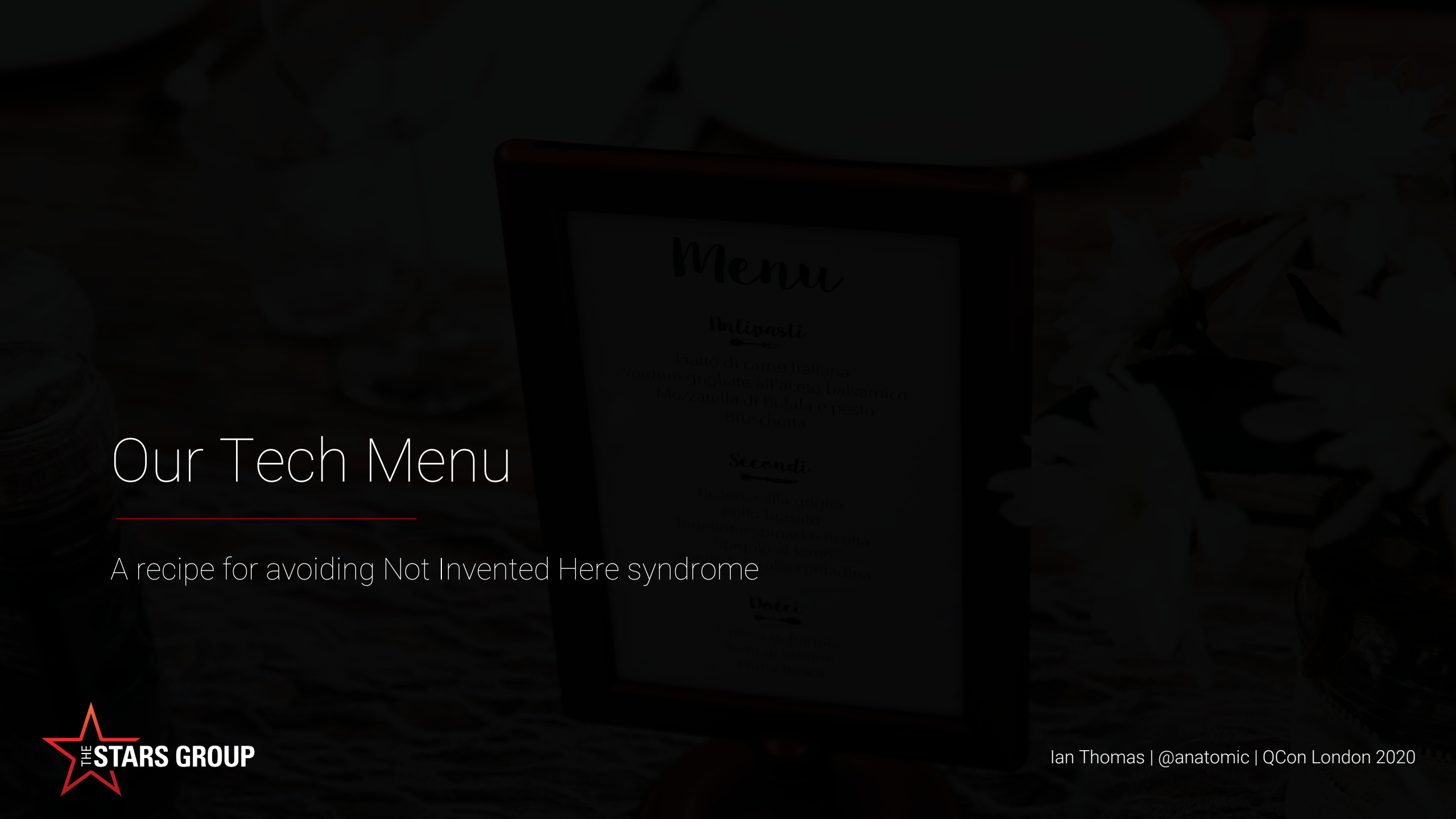
GSTP has elected to form an SRE team, to remove from squads the burden of day-to-day running of their better constructed services, in the model of Google

GSTP SRE Team Principles

THE STARS GROUP

THE STARS GROUP



Our Tech Menu

A recipe for avoiding Not Invented Here syndrome

THE STARS GROUP

Programmers like to write code

We are in the restaurant business, not the recipe business

Richard “Drinky” Drinkwater (paraphrasing The Cathedral & The Bazaar)

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Alex Lambert
@alambert

Follow

so, you avoid vendor lock-in by building your own. and then later realize you still have vendor lock-in, but you're the vendor, and there are no other customers. oops.

6:53 PM - 29 Jan 2018

1,504 Retweets **3,641** Likes

41 1.5K 3.6K

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Tech Menu

Kotlin

kafka

kubernetes

Prometheus

spring
boot

Grafana

GraphQL

React

Socket

Swift

PostgreSQL

TS

THE STARS GROUP

Original image by Luc Viatour / www.Lucnix.be

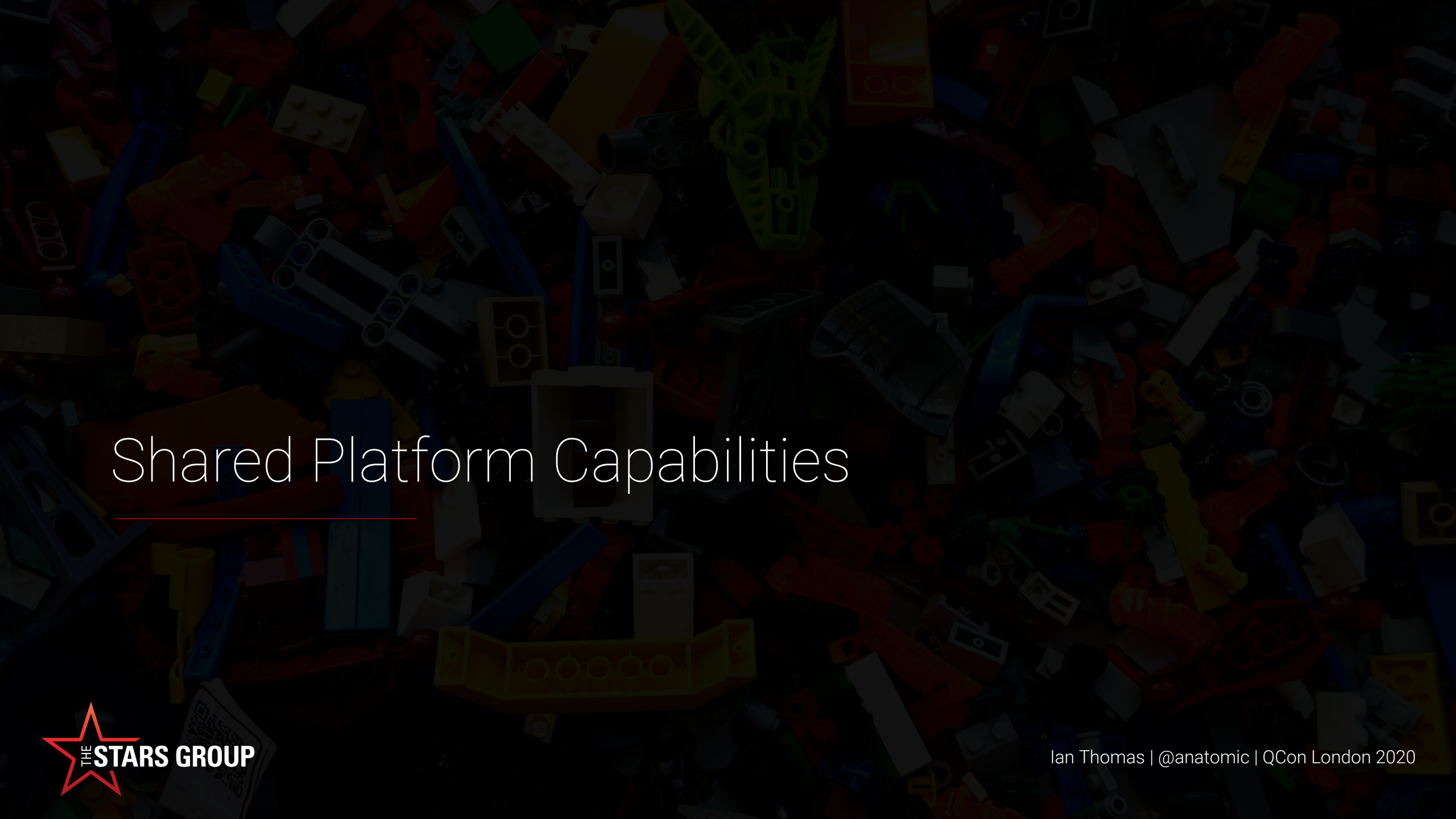
LET A 1,000 FLOWERS BLOOM. THEN
RIP 999 OF THEM OUT BY THE ROOTS.

28 September 2015

APOLLO

GraphQL

THE STARS GROUP



Shared Platform Capabilities

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Tech Menu

Kotlin

kafka

kubernetes

Prometheus

spring
boot

Grafana

GraphQL

React

Socket

Swift

PostgreSQL

TS

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spring boot
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- CMS

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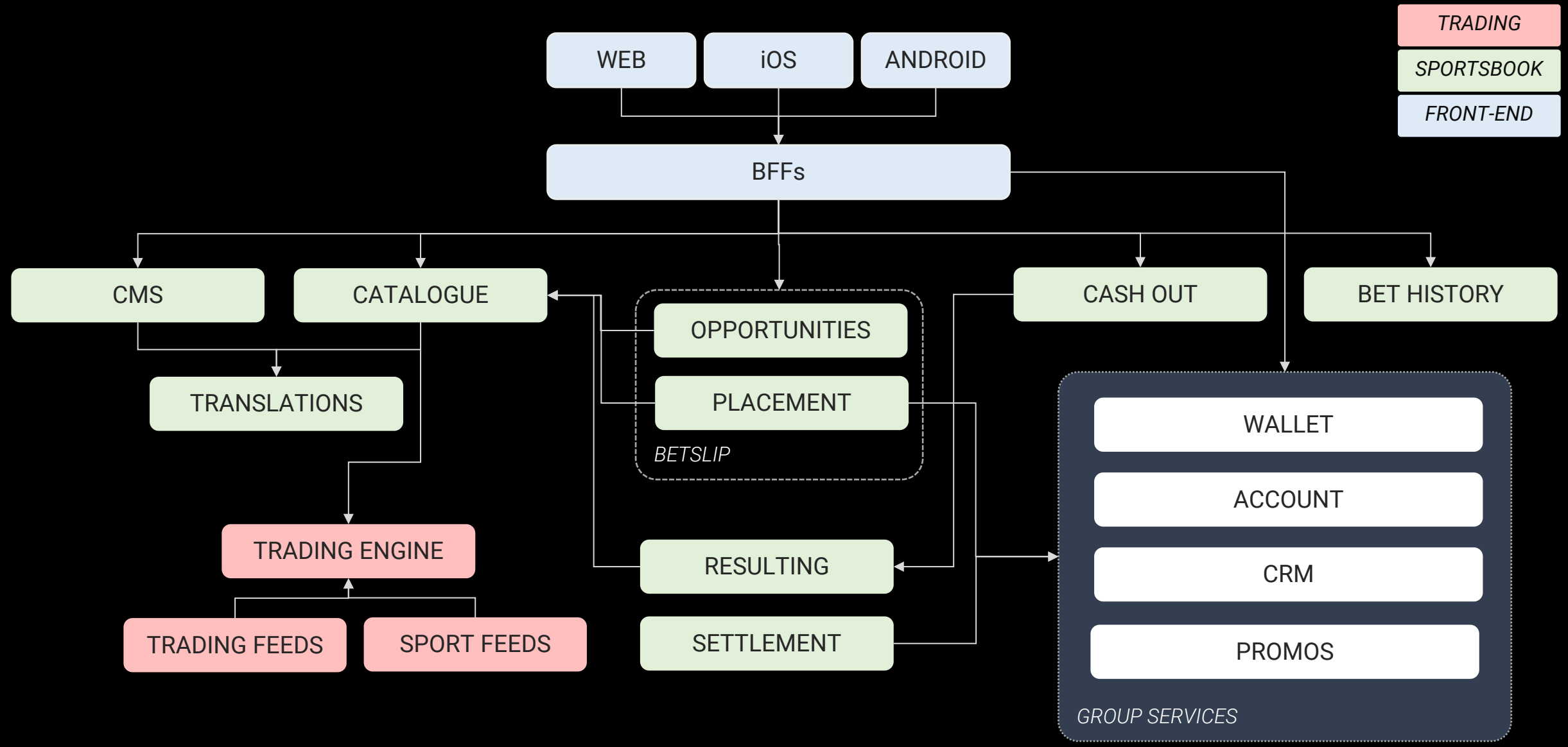

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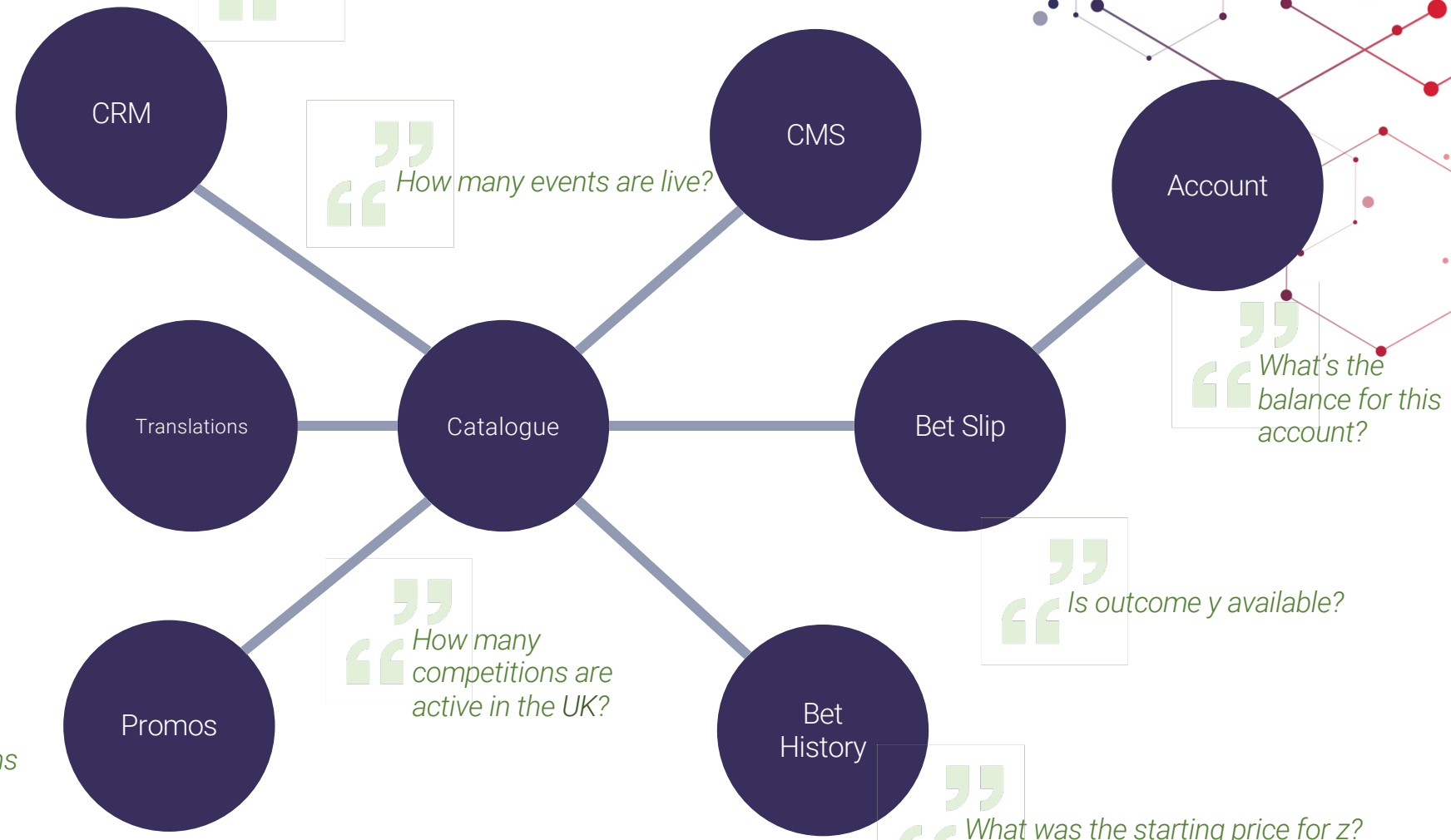
From Orchestration To Streaming Data

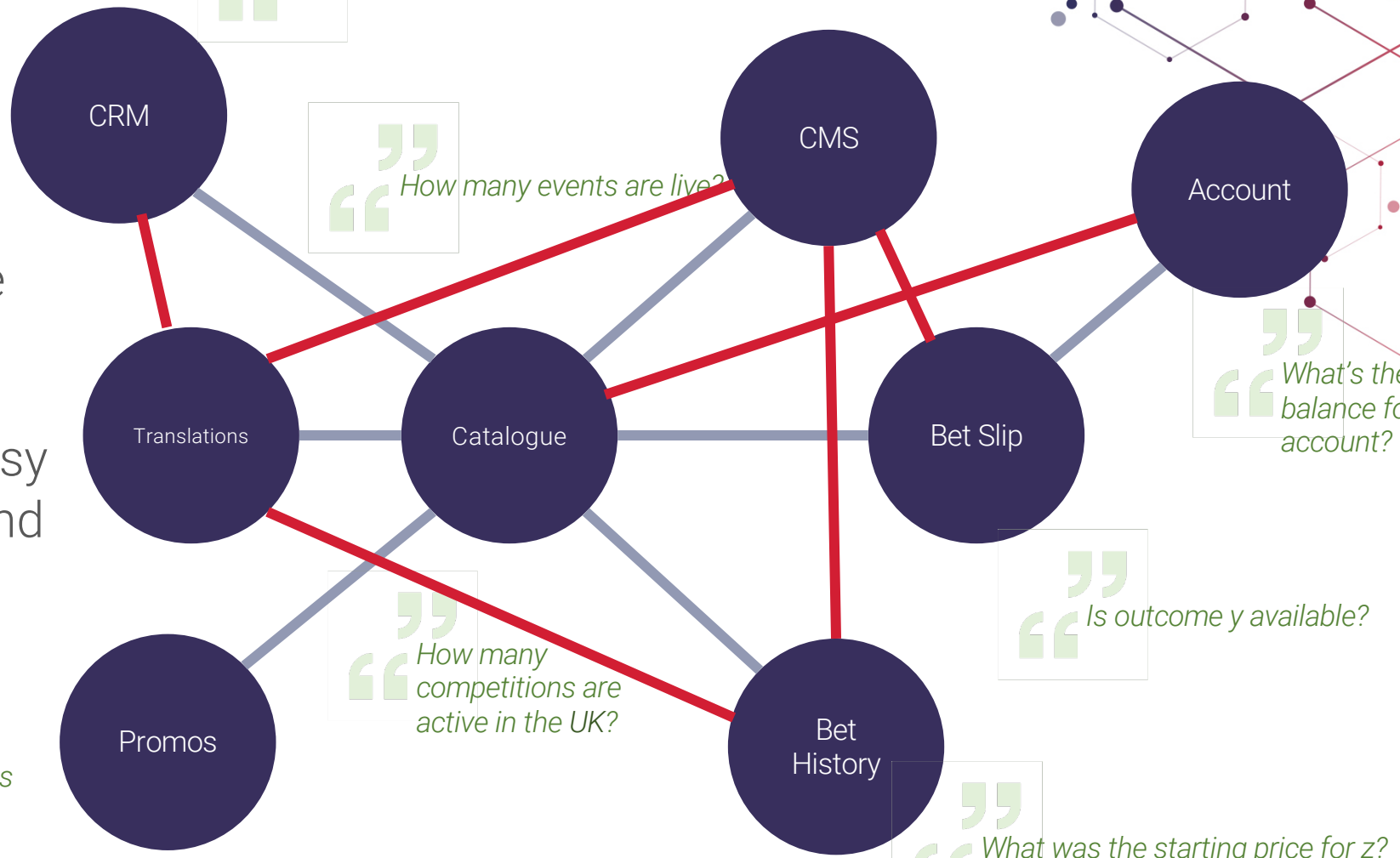
Ian Thomas | @anatomic | QCon London 2020

In a microservice ecosystem, services own data, but services also depend on data from other services.



THE STARS GROUP

To access this data, the simplest approach is to expose it via APIs. This can quickly lead to messy coupling, bottlenecks and scaling nightmares



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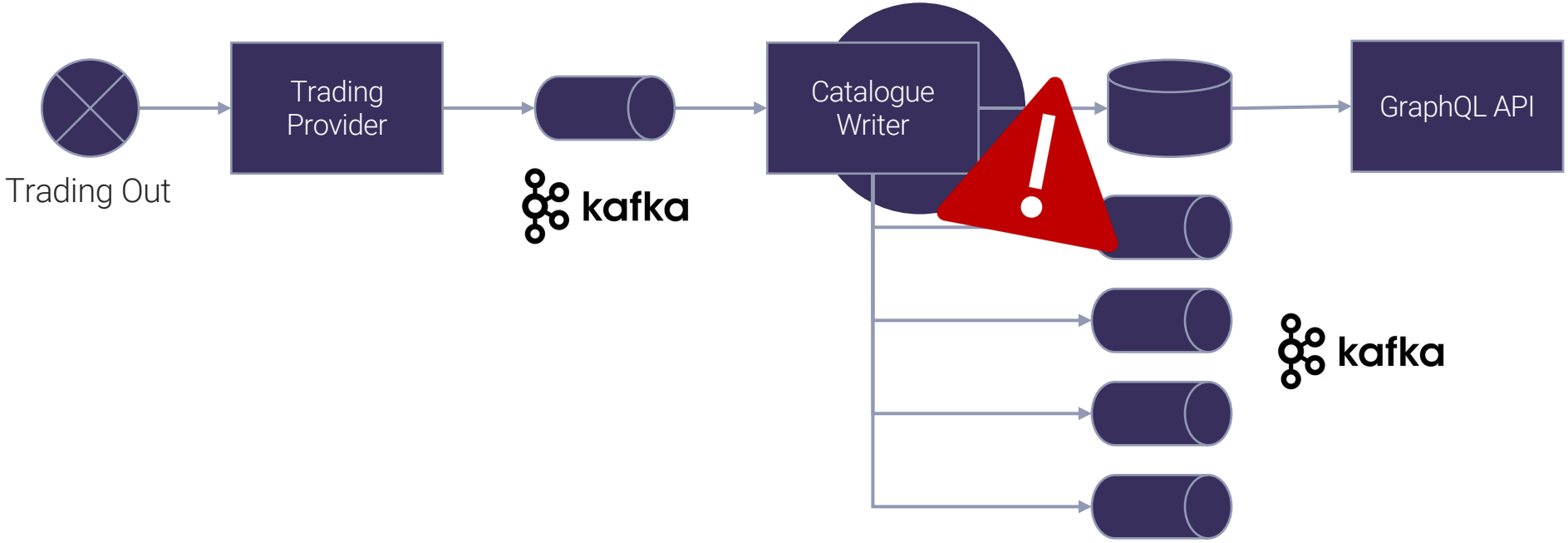
Kafka as a source of truth

Catalogue projection and real-time updates

Ian Thomas | @anatomic | QCon London 2020

Knowledge of the event hierarchy is a fundamental requirement for most of our services.



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The truth is the log. The database is a cache of a subset of the log. That cached subset happens to be the latest value of each record and index value from the log.

Pat Helland – Immutability Changes Everything (2015)

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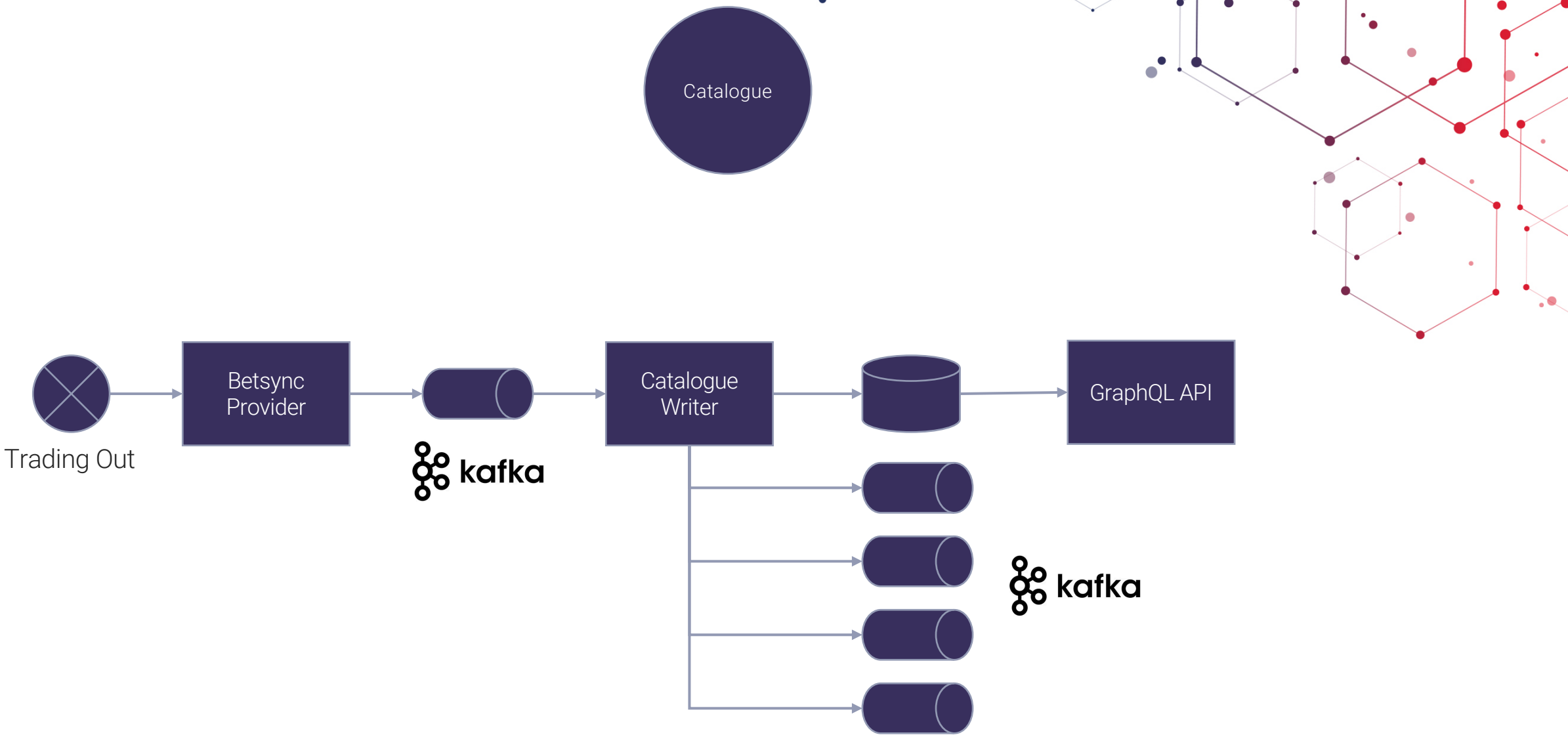
Kafka Connect & Kafka Streams

Migrating to a streaming backbone

Ian Thomas | @anatomic | QCon London 2020



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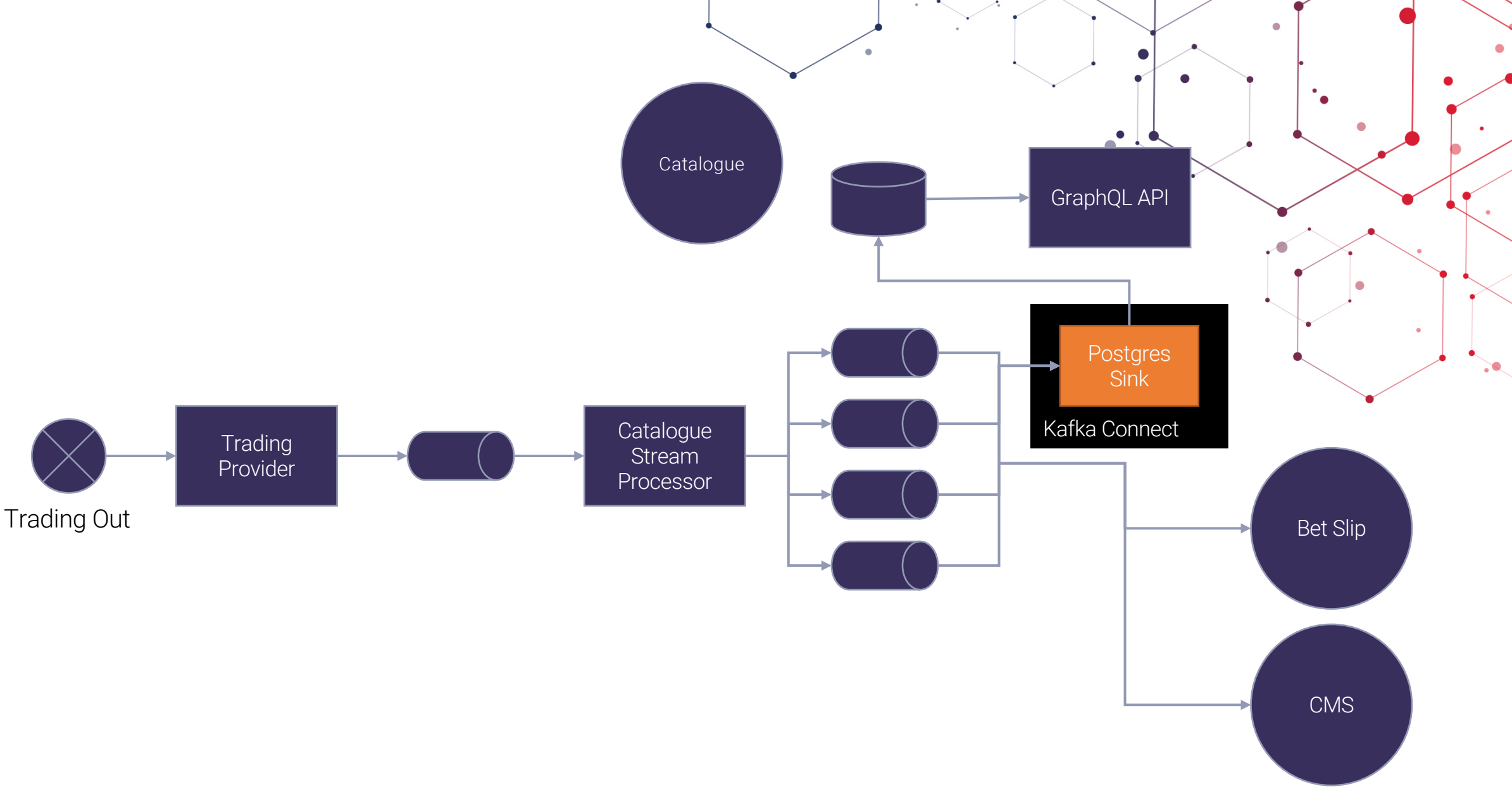
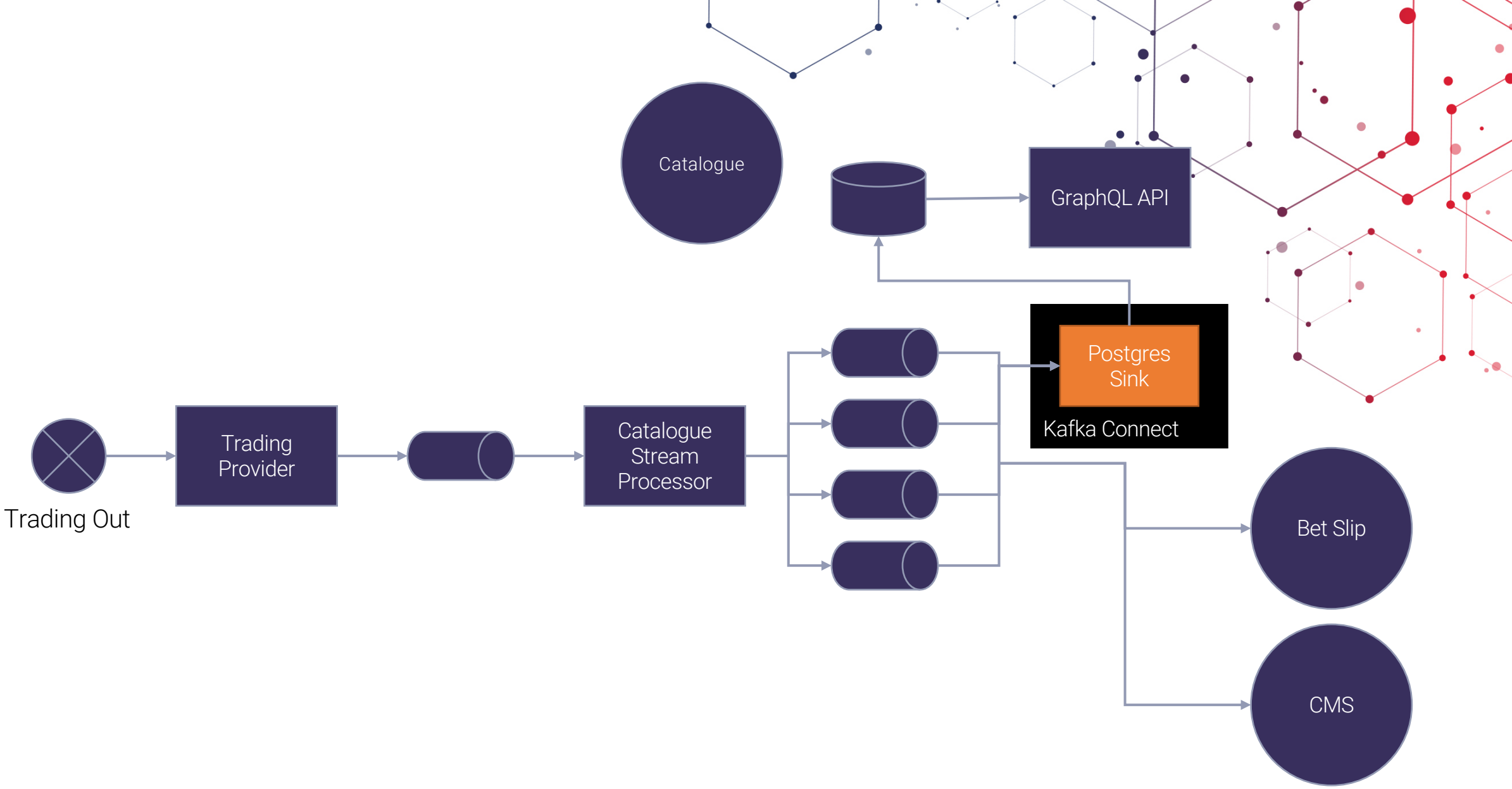


THE STARS GROUP



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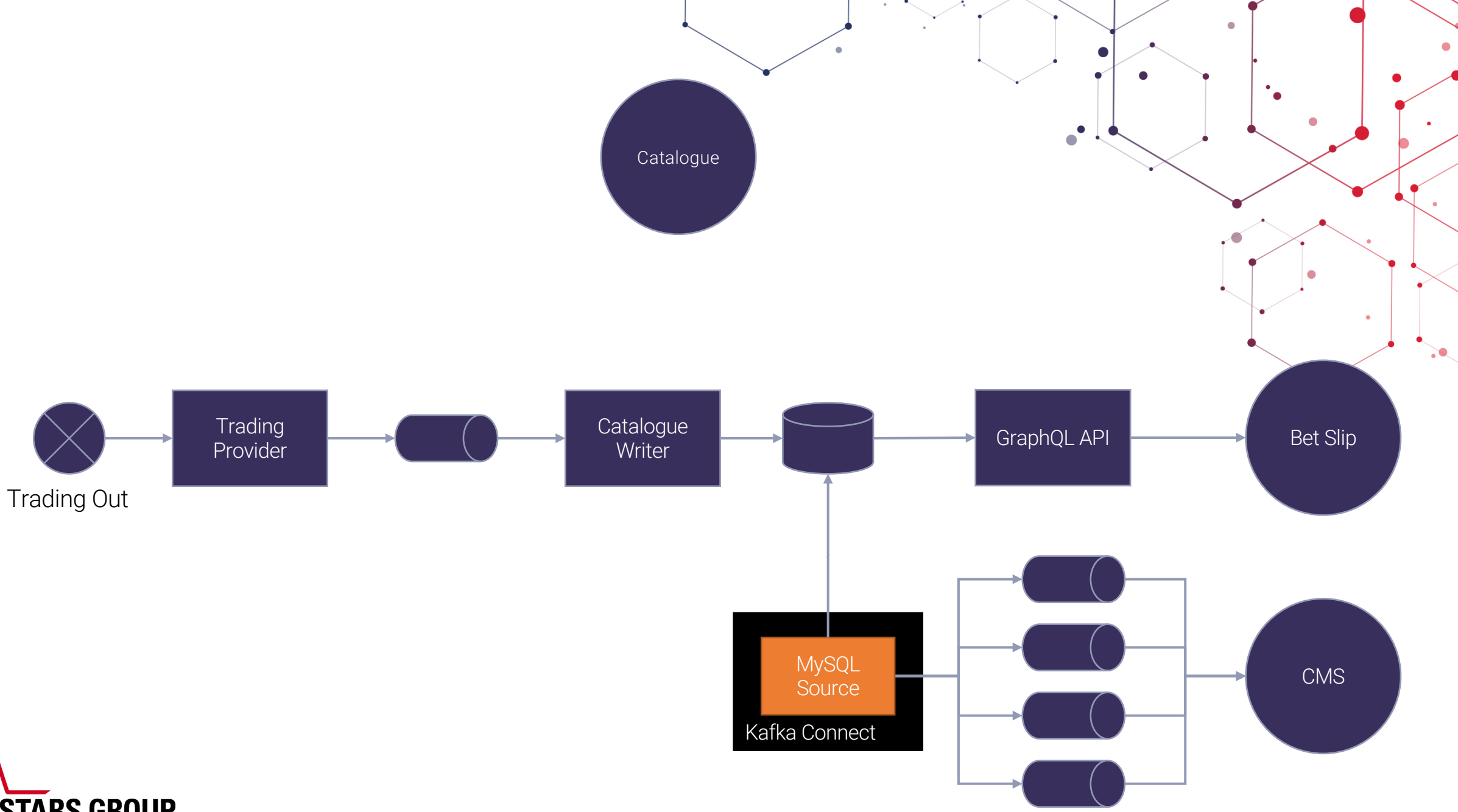
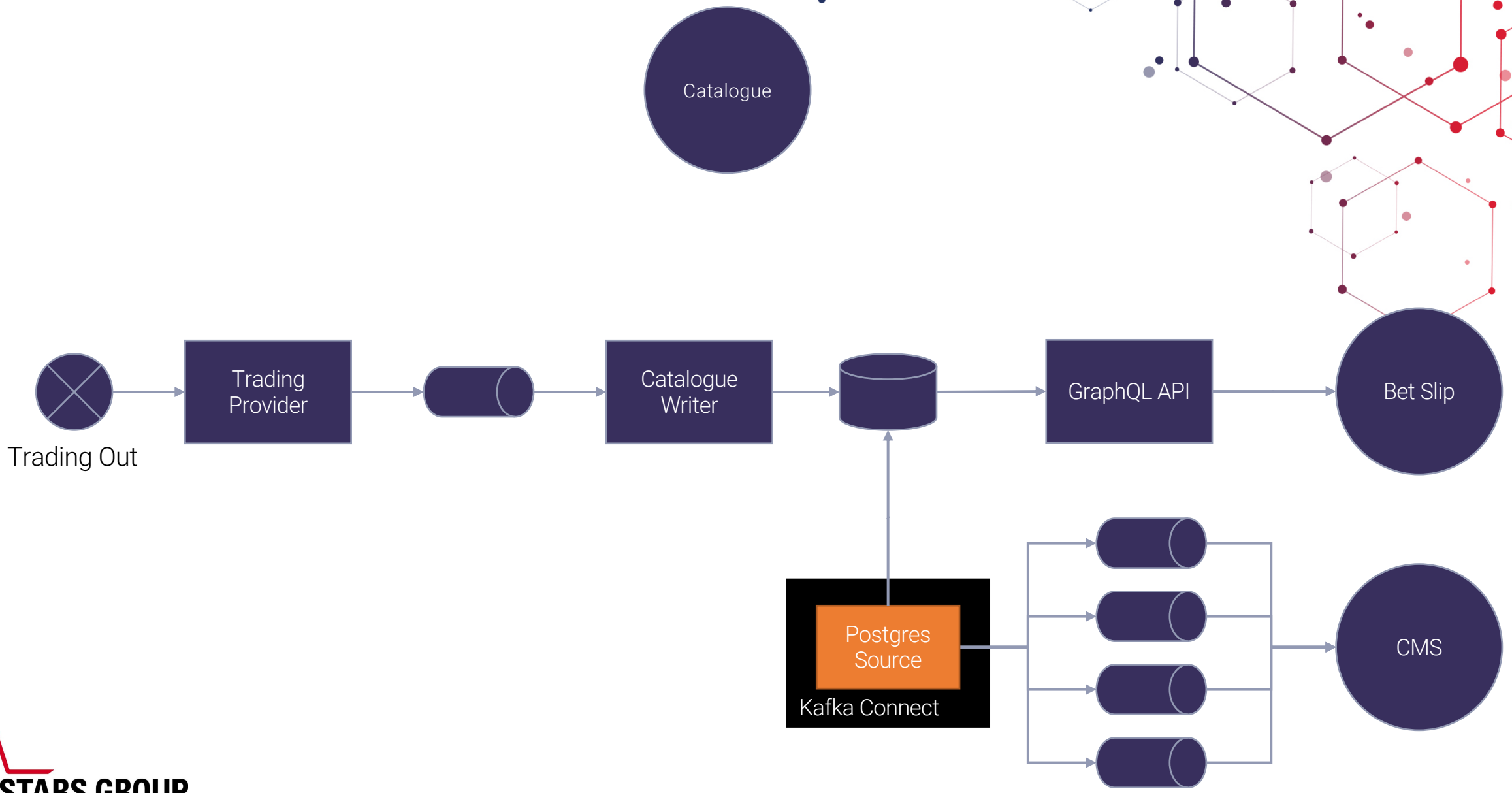


THE STARS GROUP



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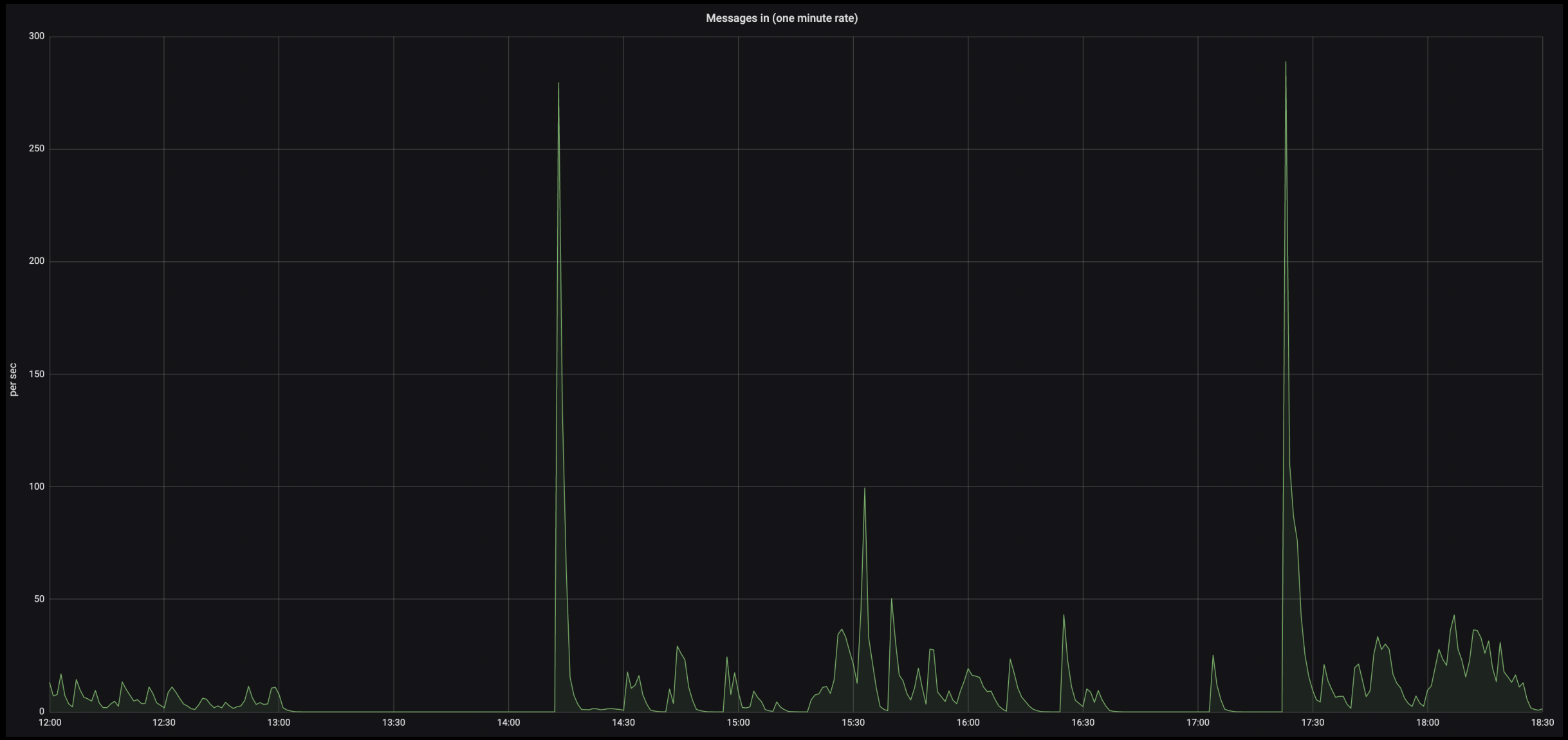
Kafka Connect Operational Issues

How the service mesh broke our data contracts

Ian Thomas | @anatomic | QCon London 2020



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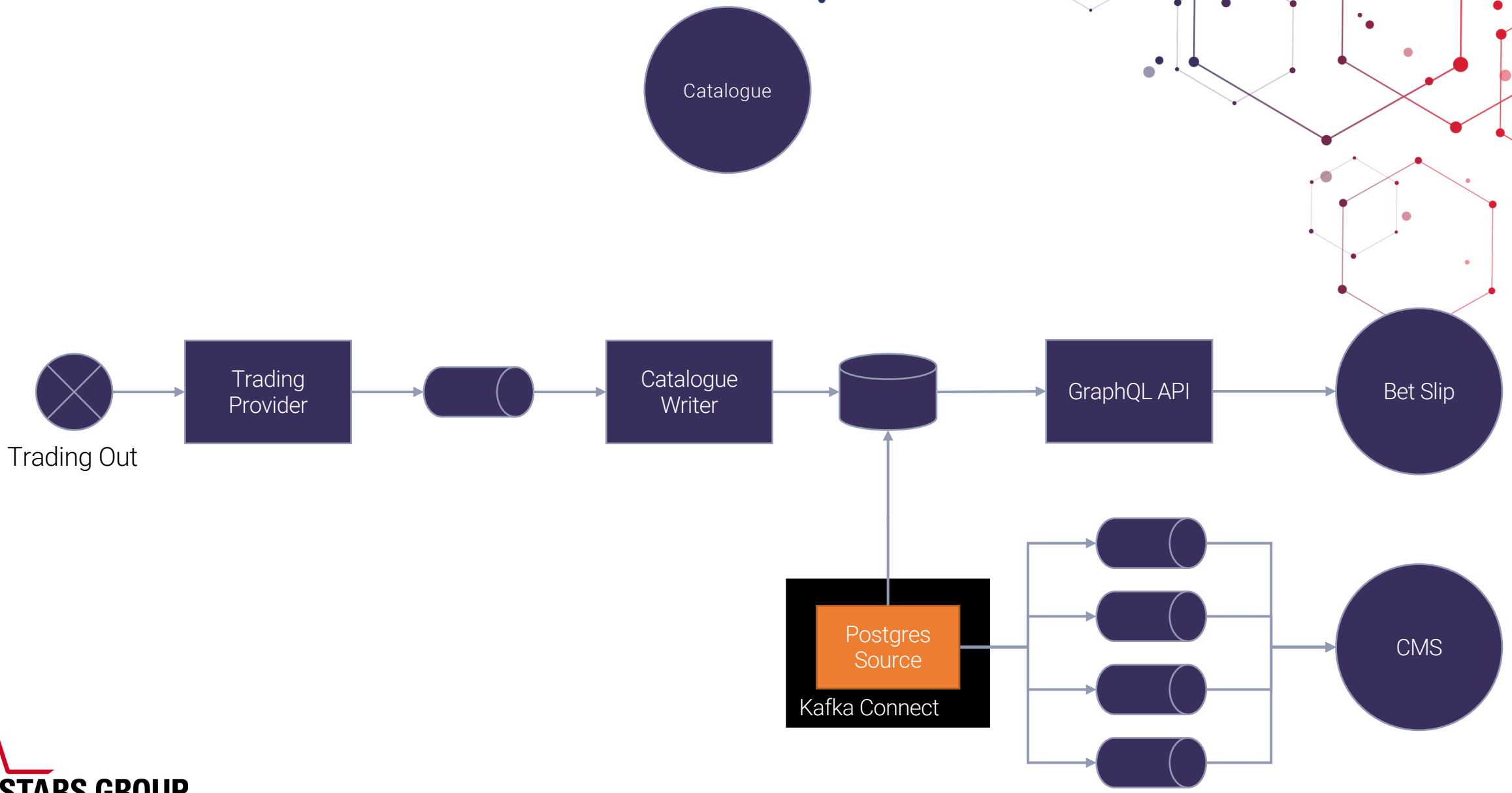
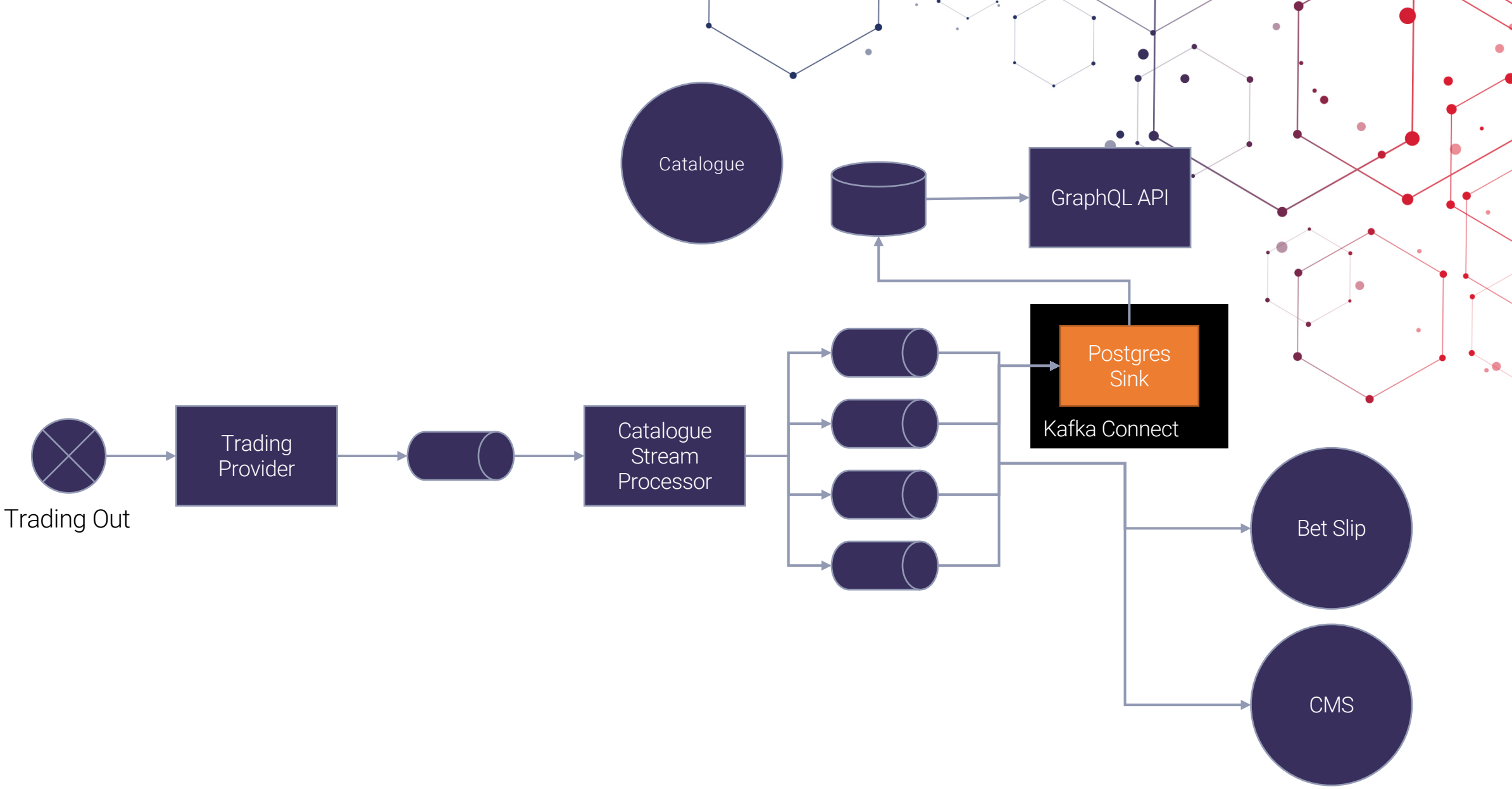


THE STARS GROUP



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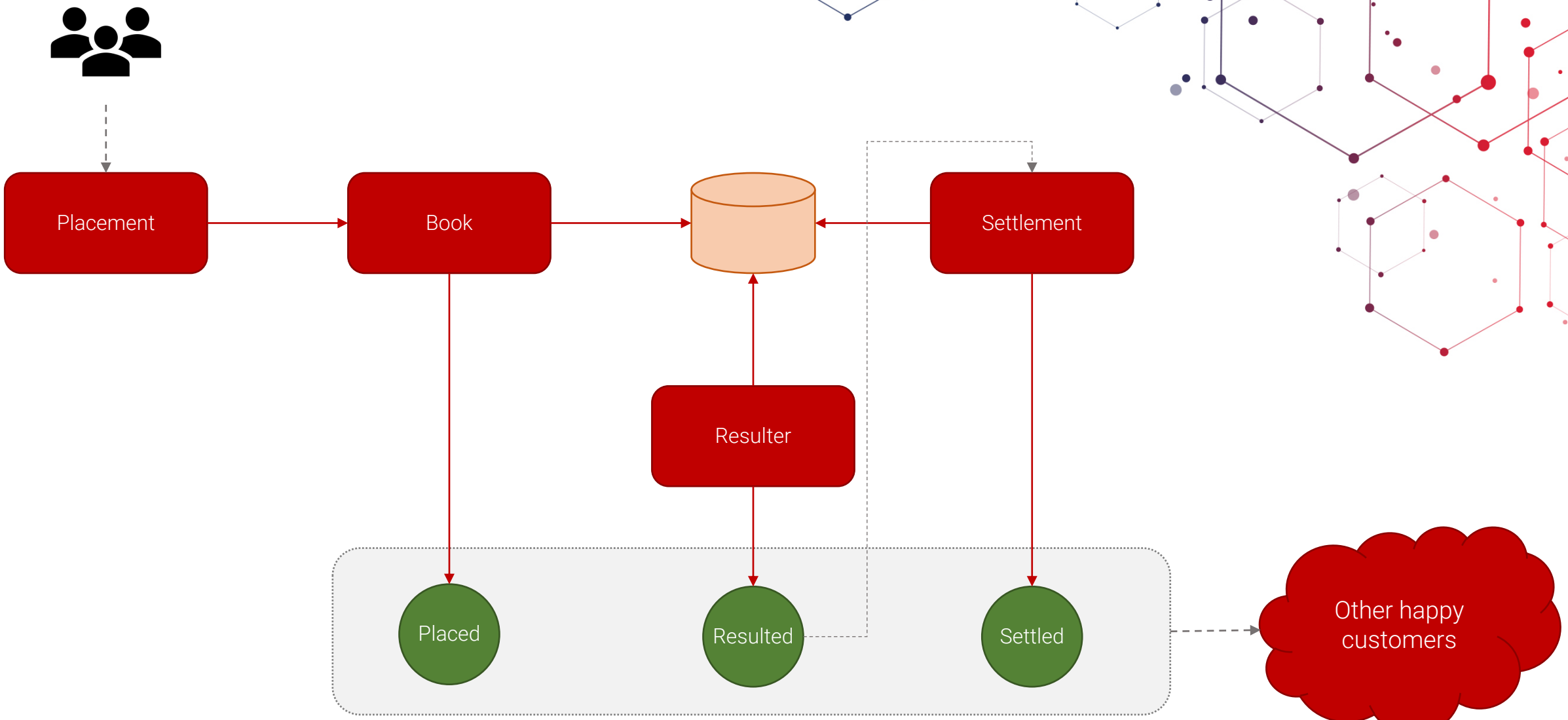
Kafka as a source of truth

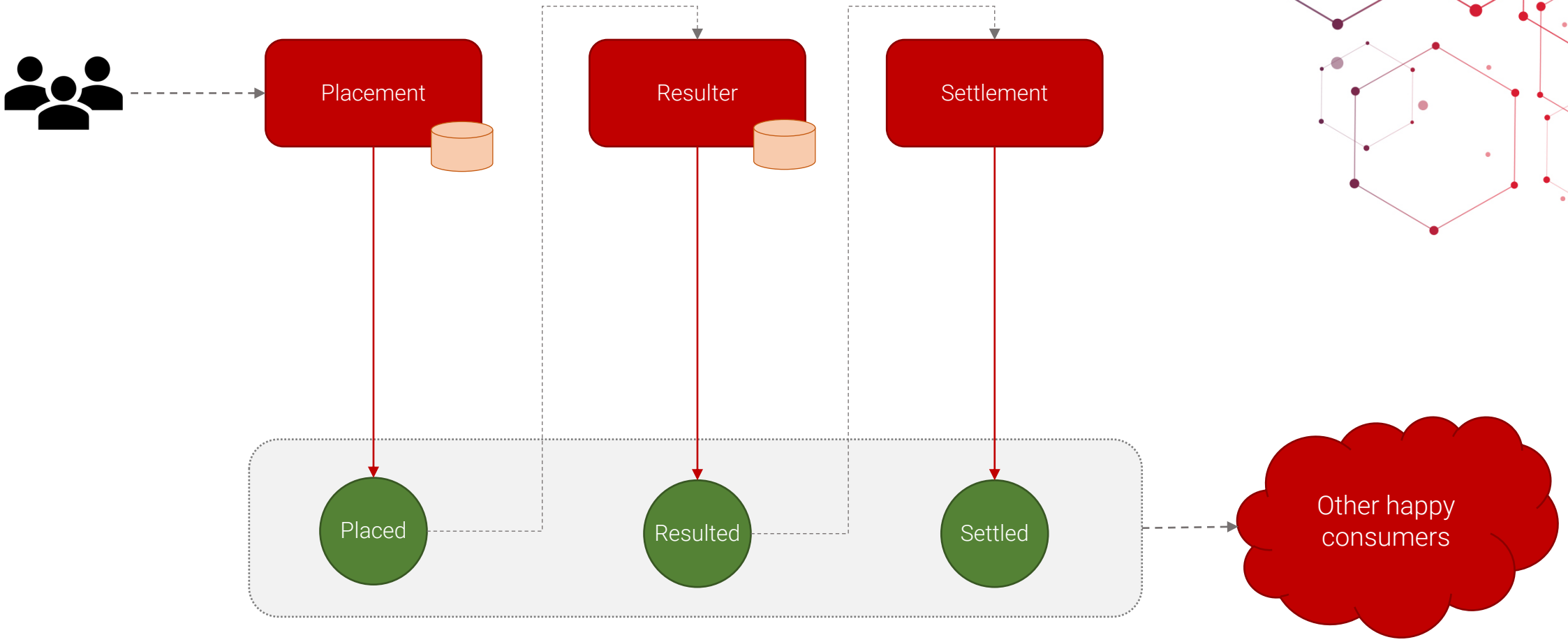
Managing the bet lifecycle

Ian Thomas | @anatomic | QCon London 2020



Bet lifecycle topic

THE STARS GROUP



Bet lifecycle topic

THE STARS GROUP

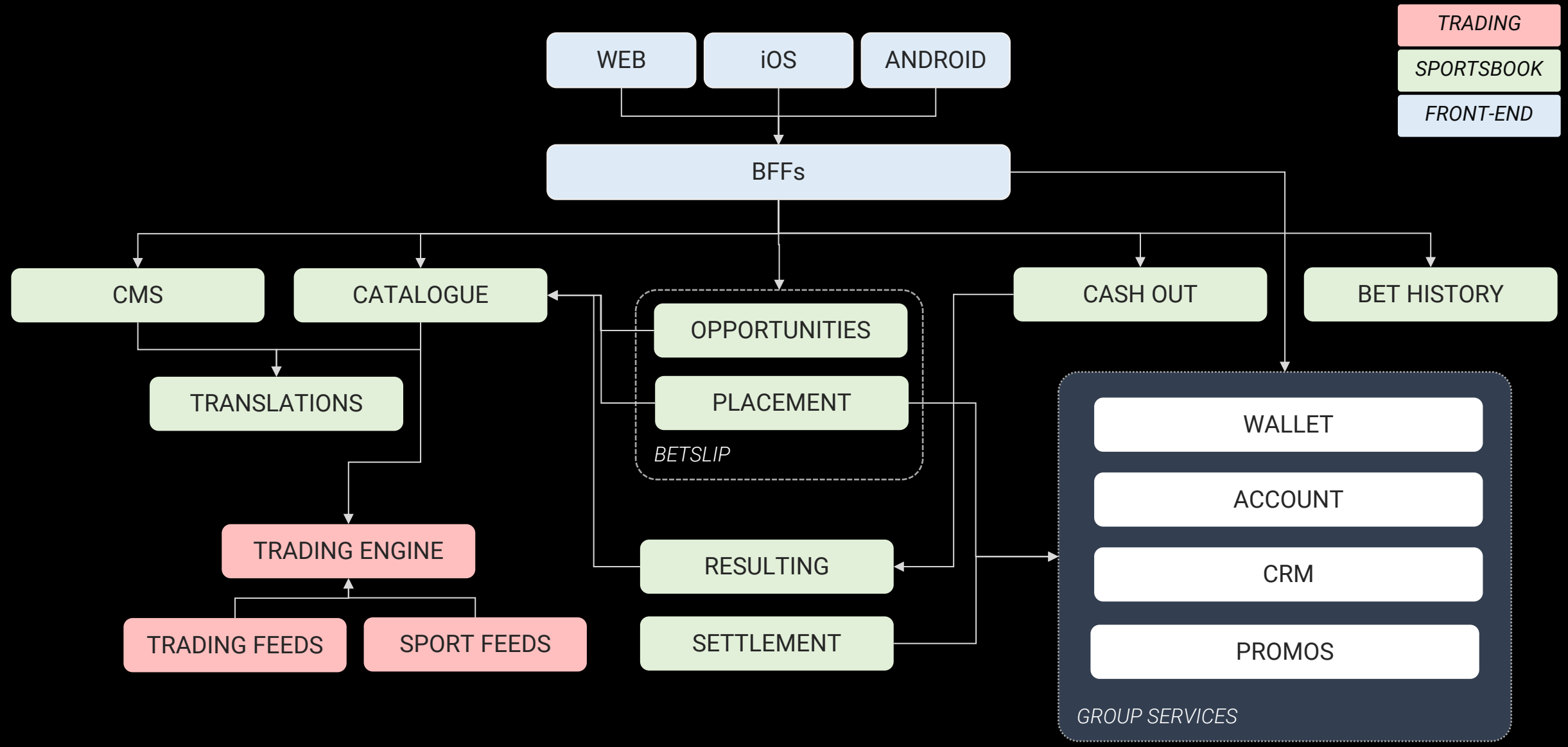
THE STARS GROUP

Ian Thomas
@anatomic

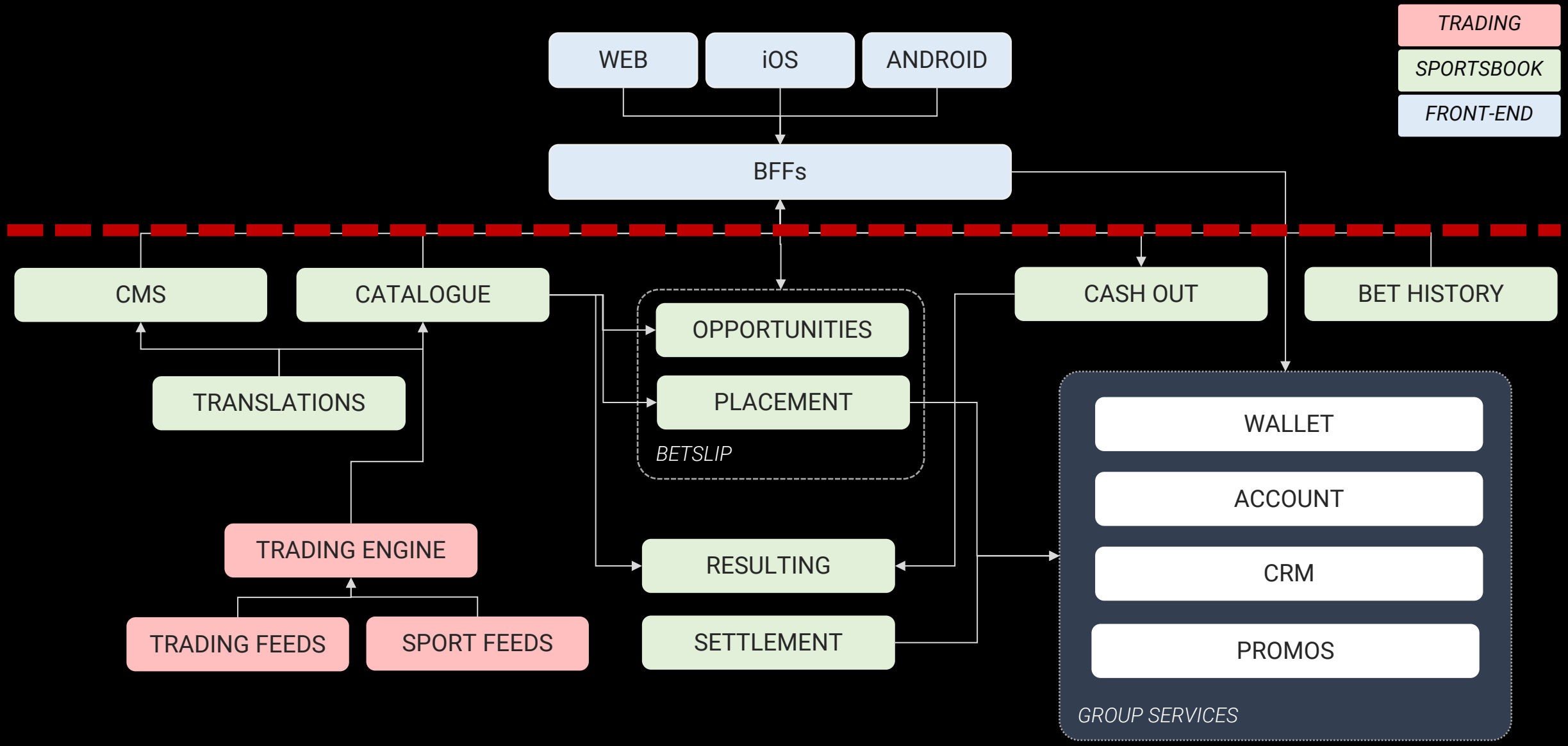
If you're running jvm apps in Kubernetes, make sure you are setting max heap size appropriately. By default, Java 12 only allocates 25% of your container's RAM so you may end up requesting more resources than you really need (or will use). XX:MaxRAMPercentage is what you need!

6:42 PM · Jan 29, 2020 from Leeds, England · Twitter for iPhone

THE STARS GROUP



THE STARS GROUP



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Micro-Frontends

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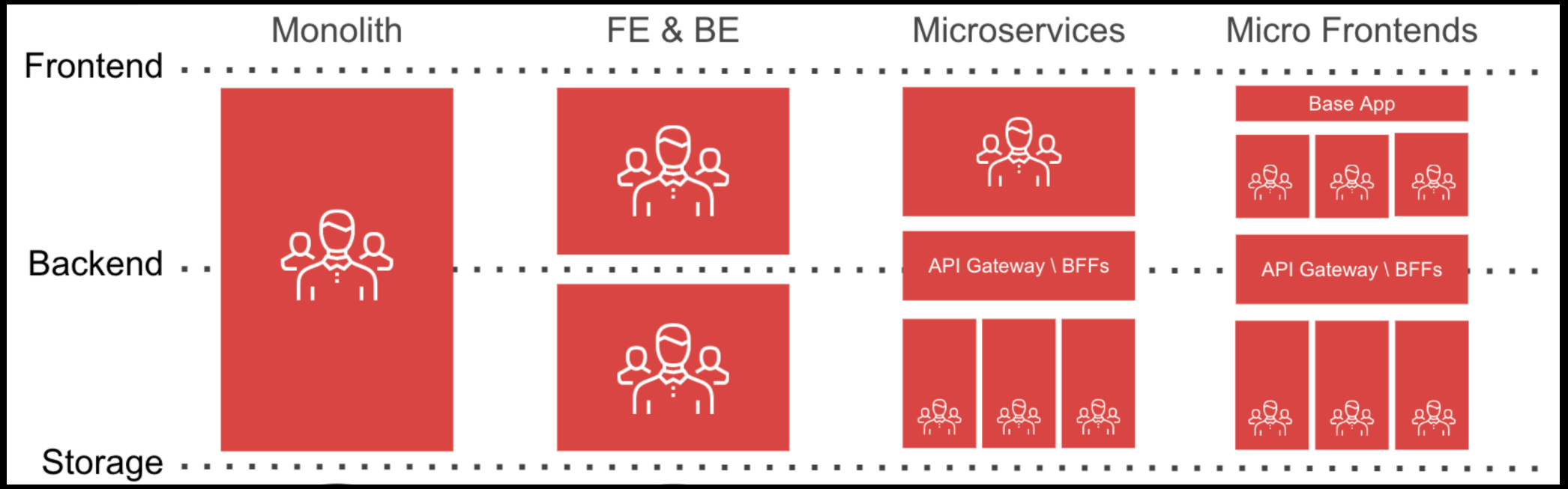

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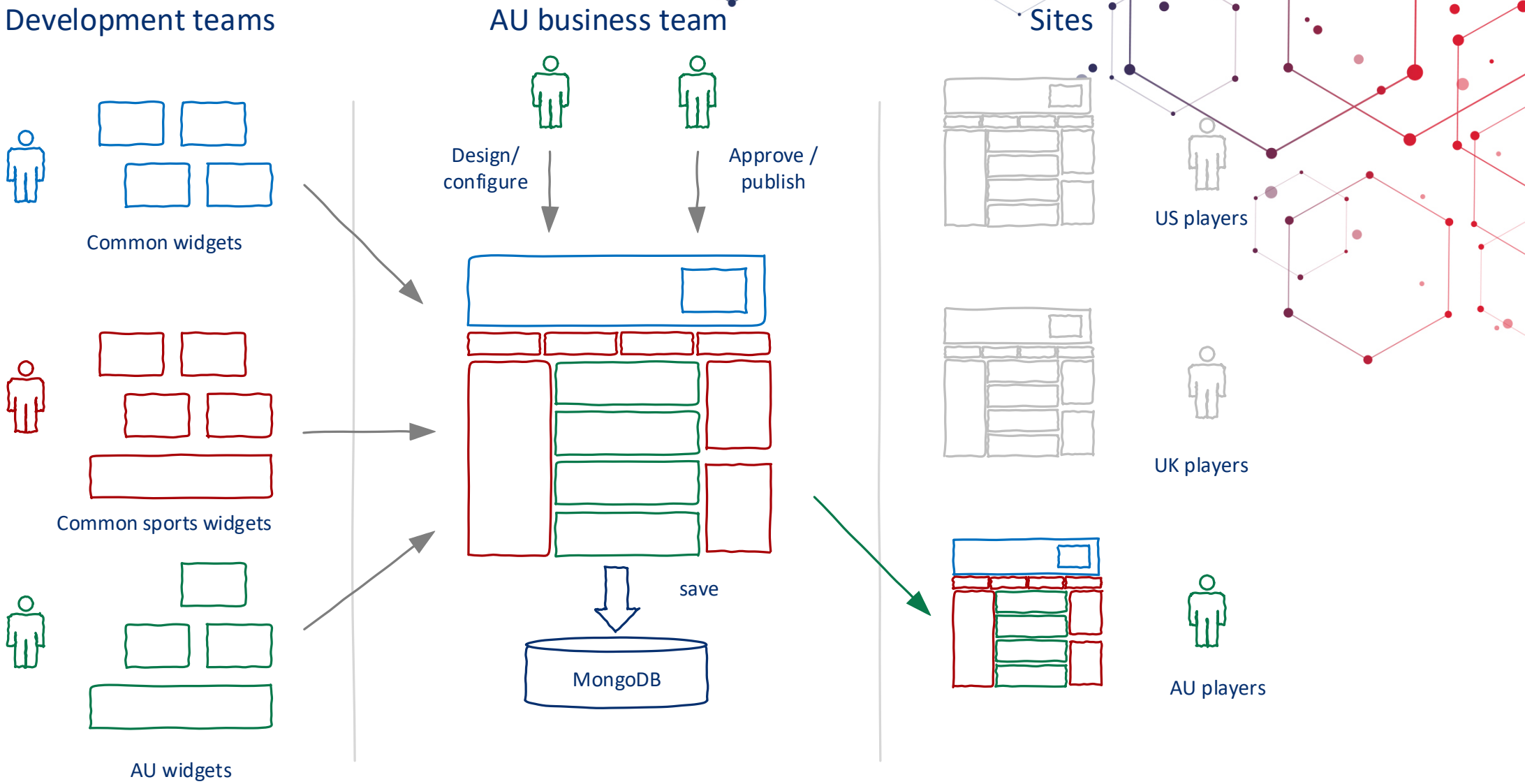
Development teams
AU business team
Sites
Common widgets
Common sports widgets
AU widgets
Design/
configure
Approve /
publish
save
MongoDB
US players
UK players
AU players

Backend For Frontend

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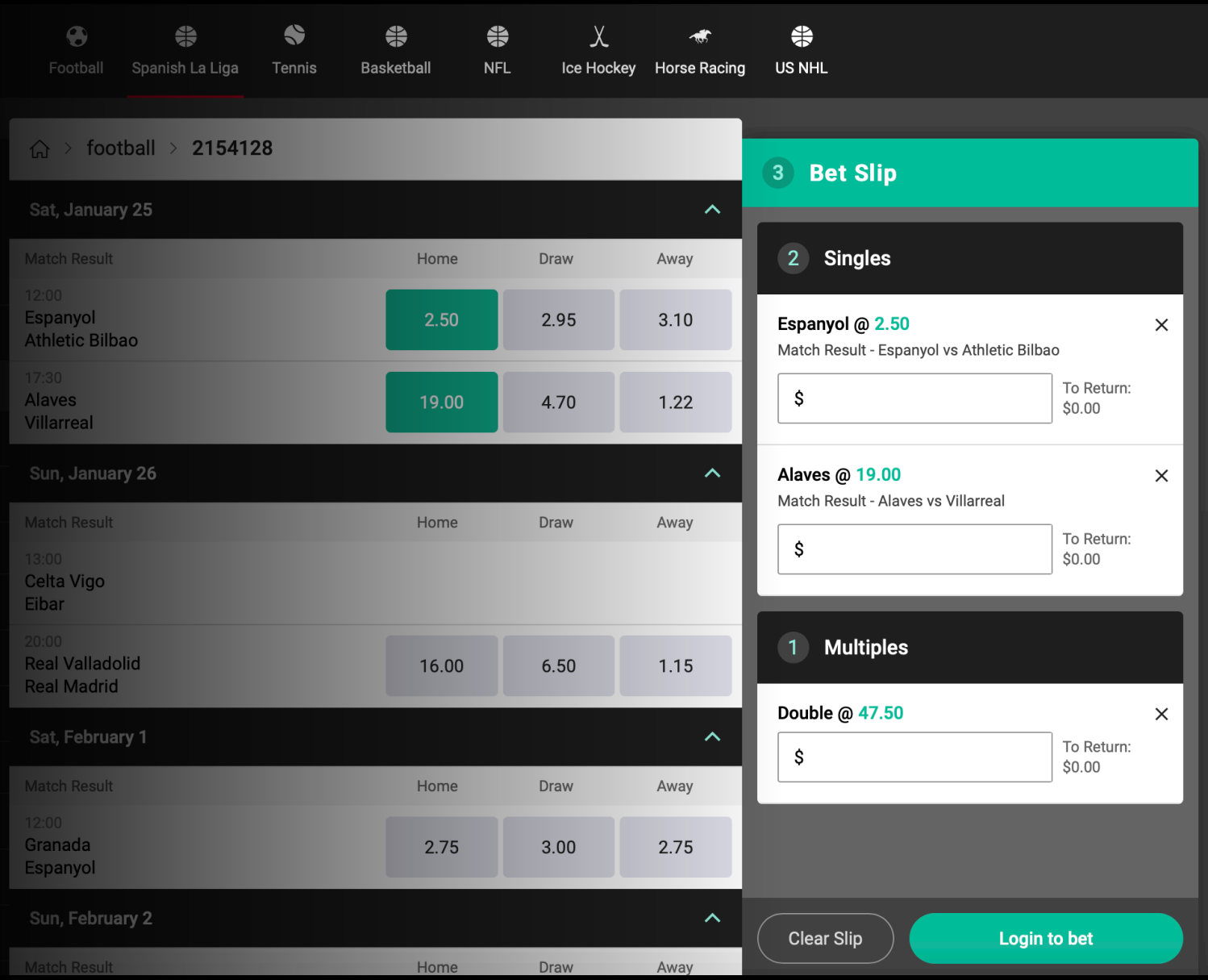
Responsive Web



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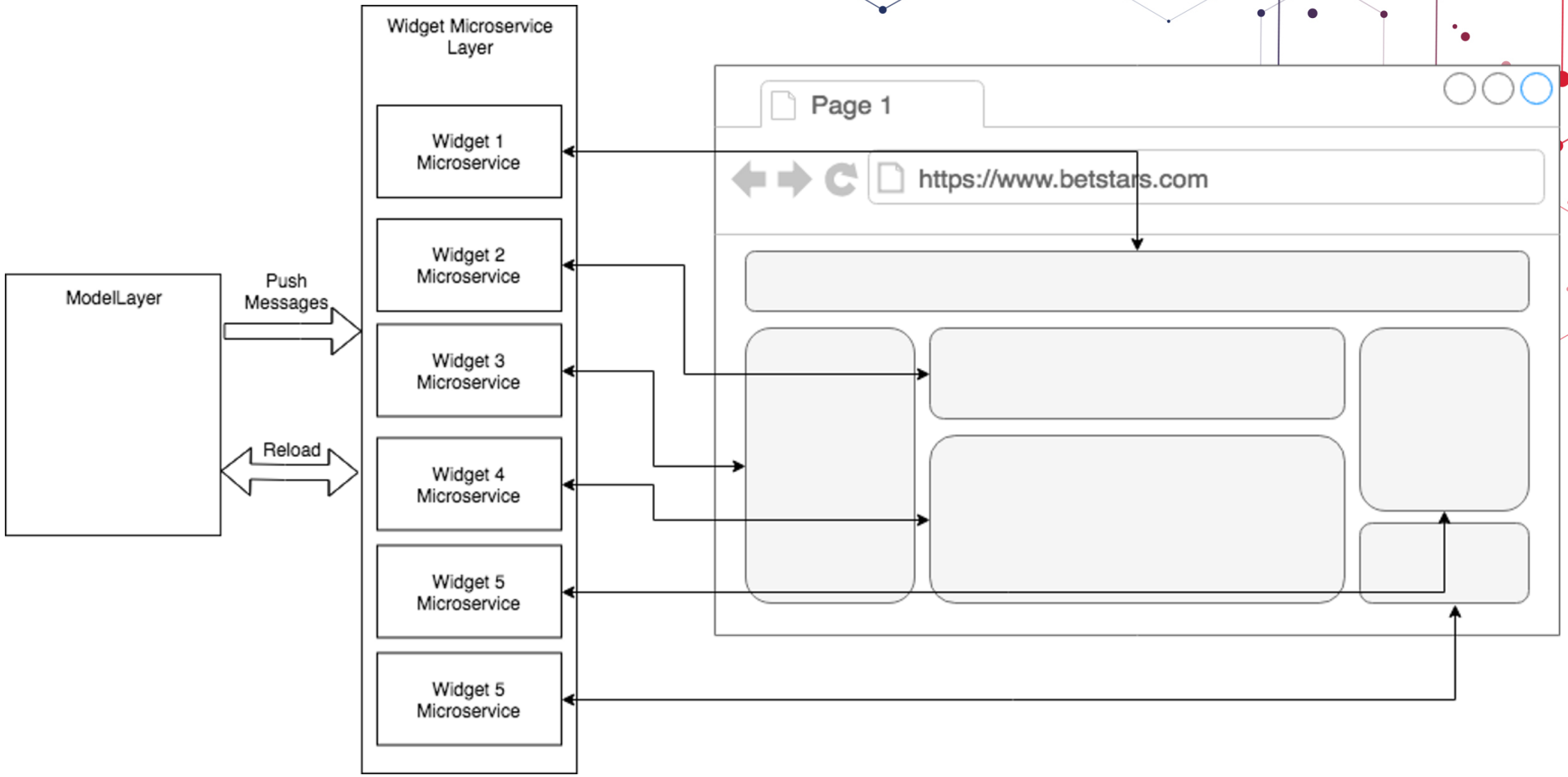
Champions League
European Football Acca
Home
Offers
My Bets
Gaming
Account
Week 15 Gridiron Live
College Football Futures
9:41
POKERSTARS SPORTS
£31.50
Football
NBA
Tennis
UFC
Top Events
Liverpool v Genk
Today 20:00 - Champions League
8/13 Home
3/1 Draw
17/4 Away
Featured
FOXBET
$31.50
NFL
NBA
Tennis
UFC
Top Events
Arizona Cardinals @

Native



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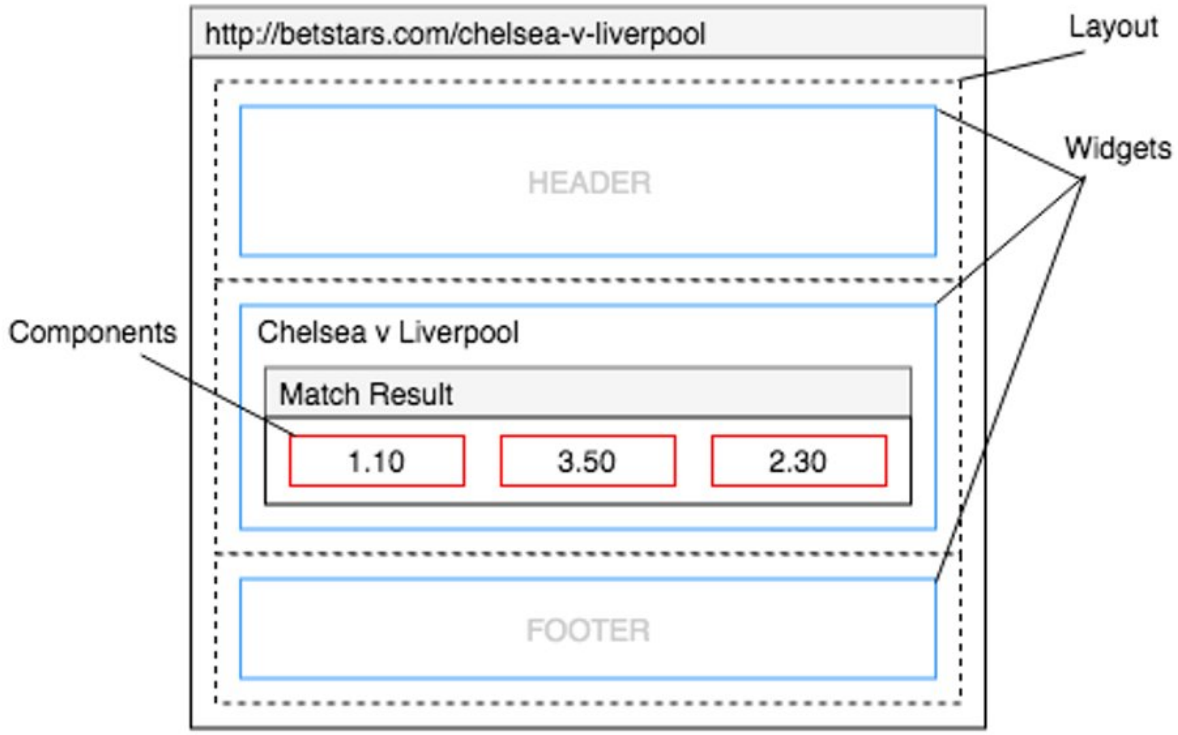
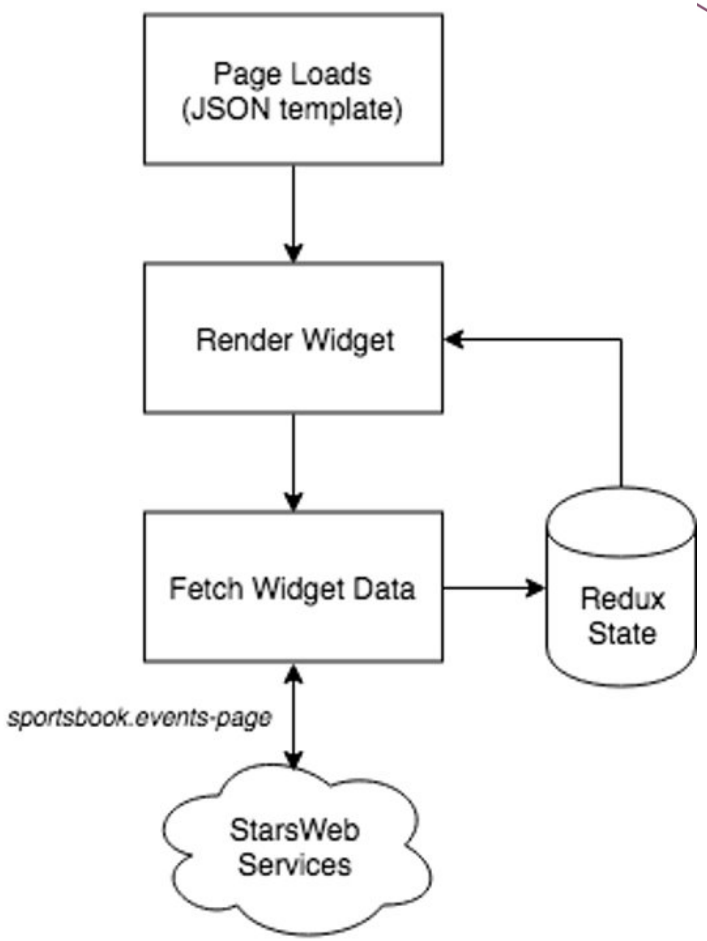
Page Composition



Widget Flow



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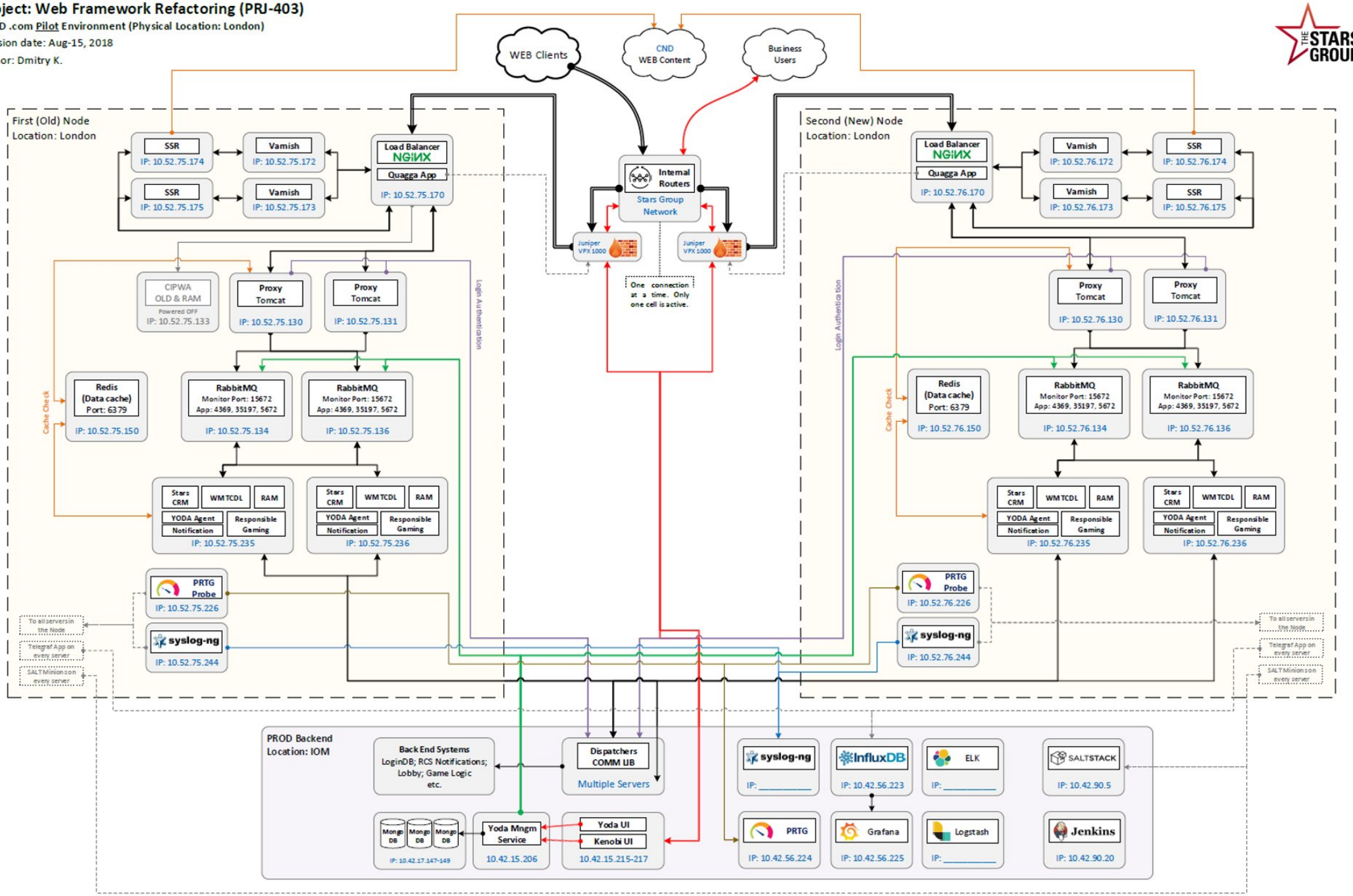
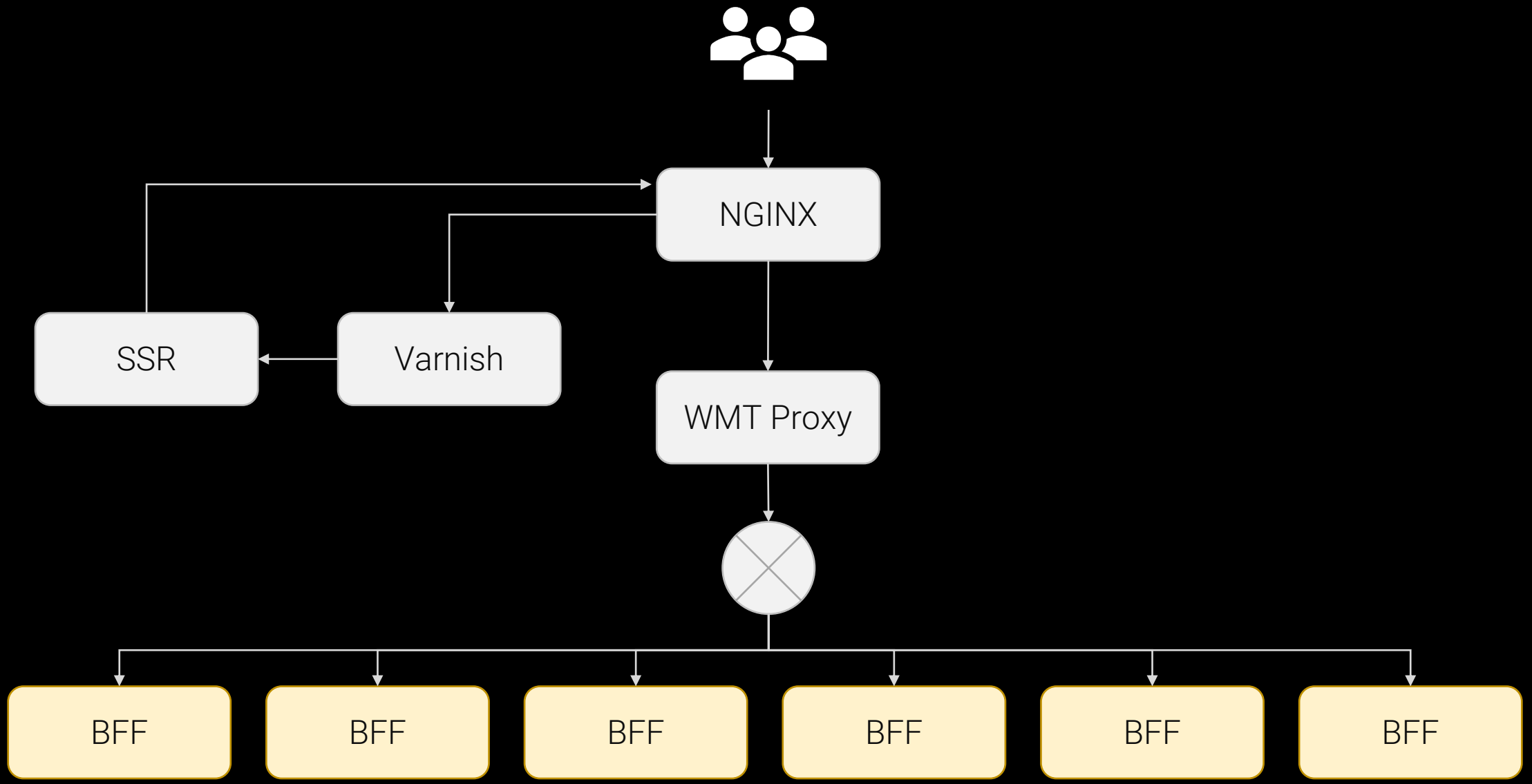
Project: Web Framework Refactoring (PRJ-403)

PROD .com Pilot Environment (Physical Location: London)

Revision date: Aug-15, 2018

Author: Dmitry K.





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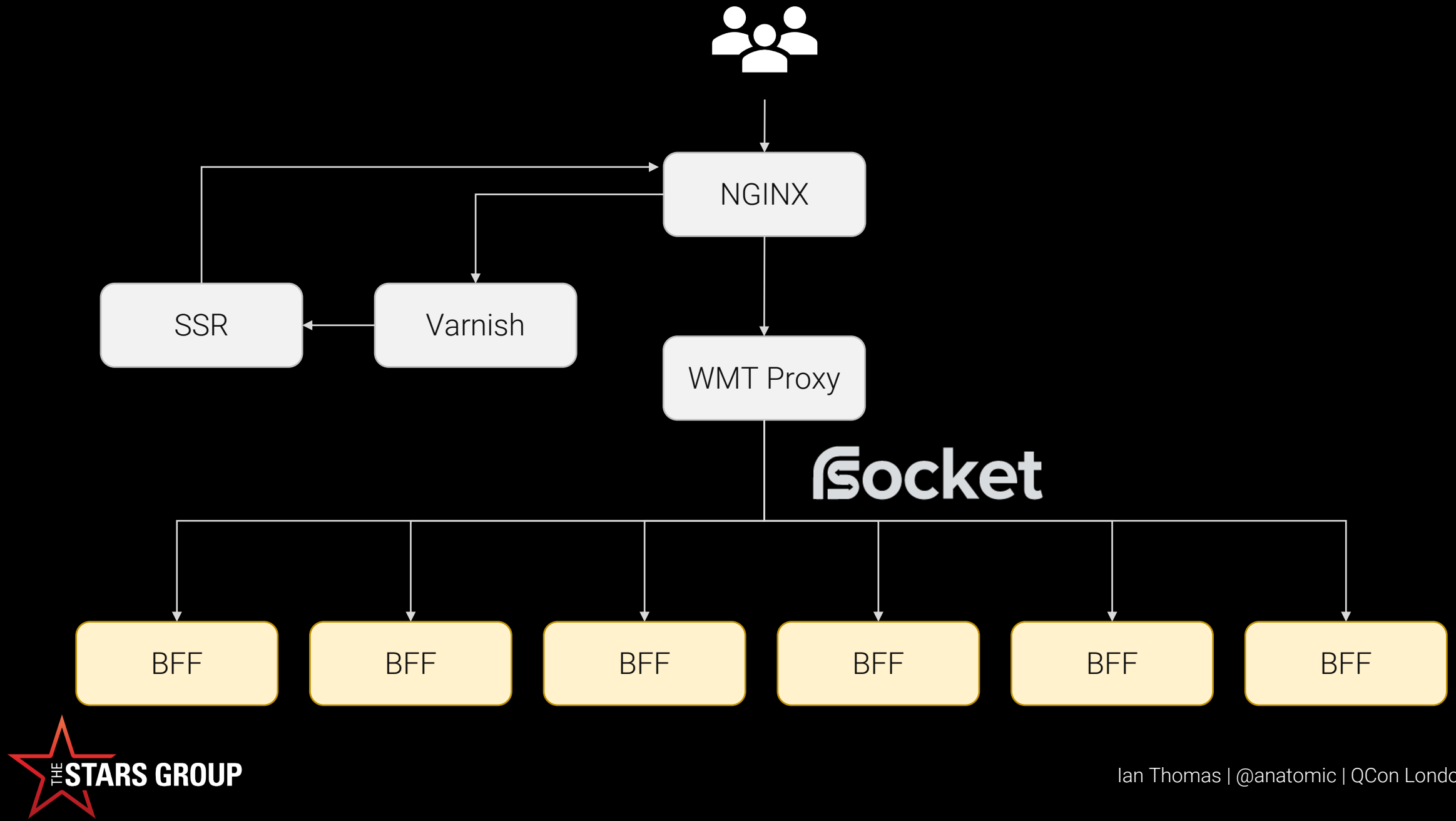

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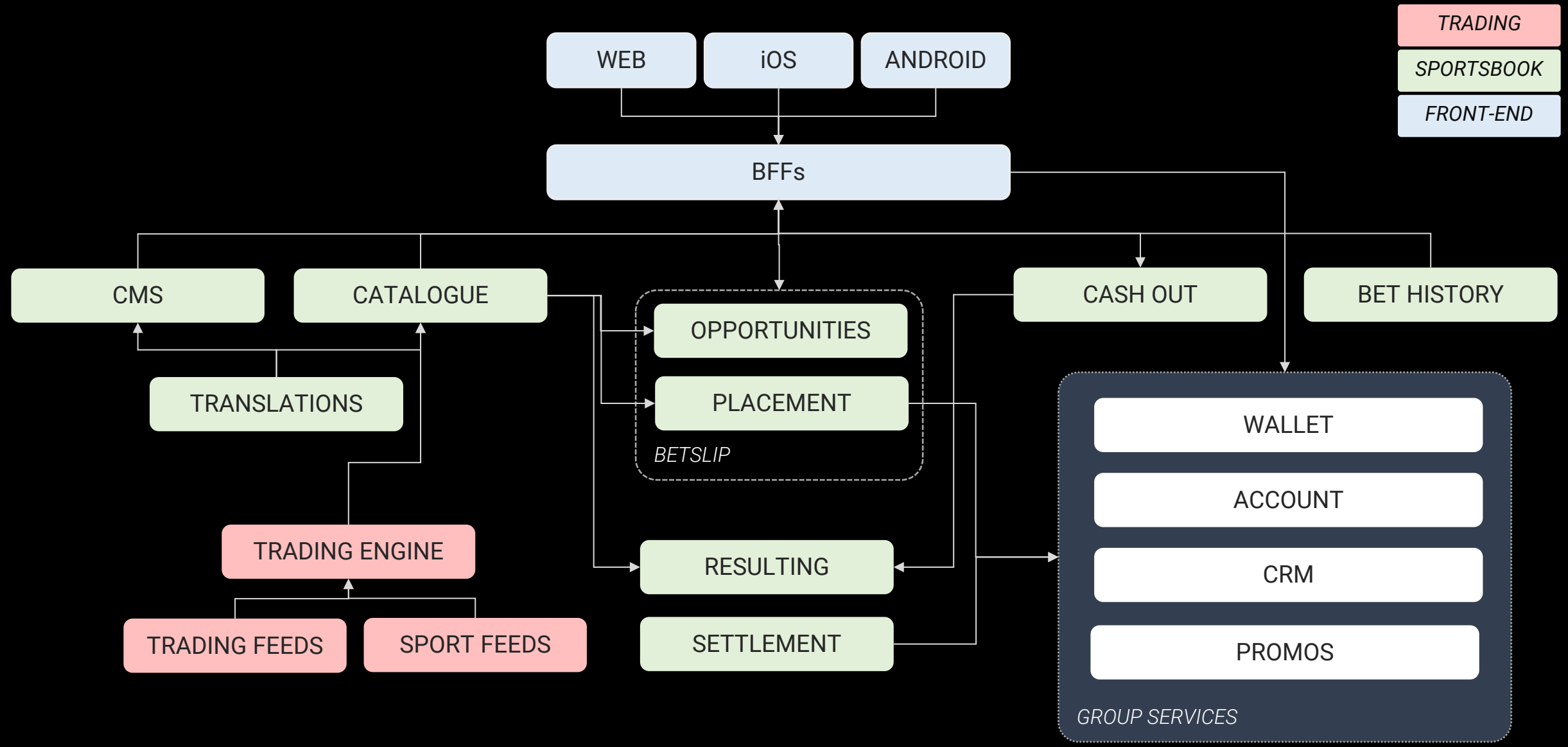

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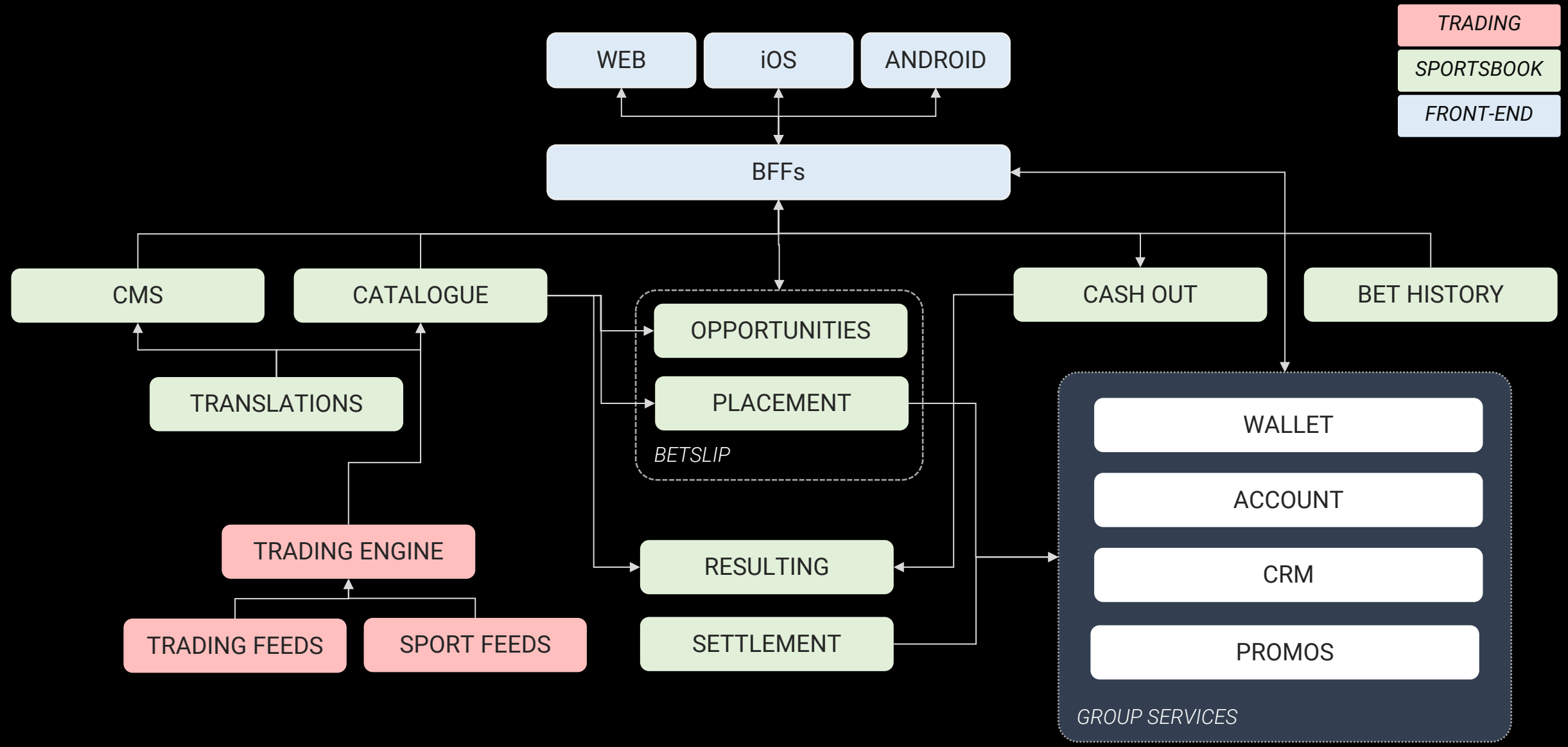

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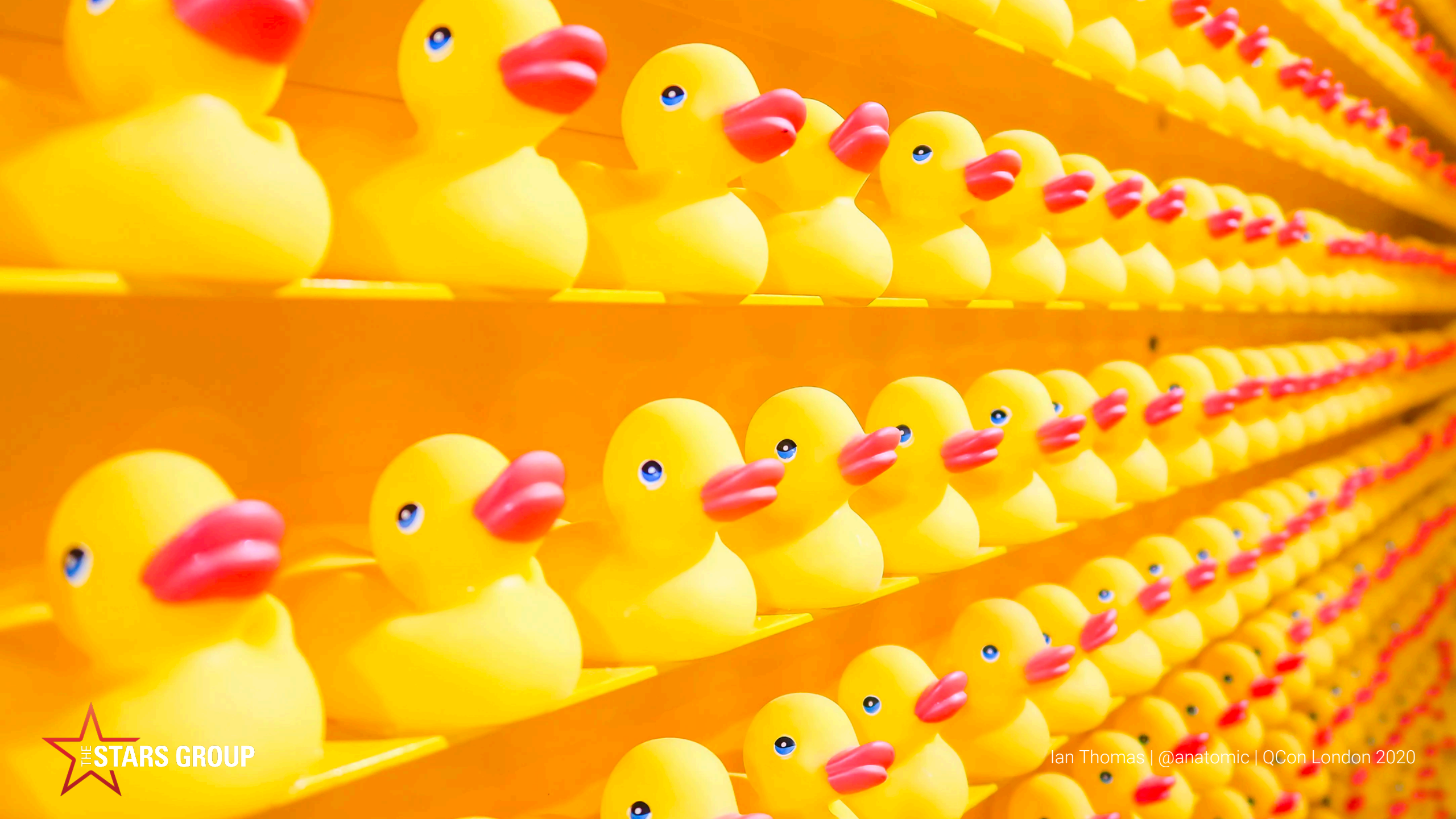

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Designing a Real-Time Global Sportsbook (From Scratch!)

Ian Thomas – Senior Principal Engineer

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