Take 2: Evolving Microservice Architectures

Andrew Hart – Platform Director, SeatGeek Open

Children's Mercy Park
RULES AND REGULATIONS
SeatGeek
TOYOTA

SPORTING
MLS WORKS
FOLLOW US ON TWITTER

Children's Mercy Park
BUD LIGHT

BESLUIT

SeatGeek

MLS
SeatGeek
OFFICIAL TICKETING PARTNER OF MLS

KANSAS CITY
SPORTING
TM
SeatGeek

Children's Mercy Park
ivy
SPORTING
MLS WORKS
FOLLOW US ON TWITTER

Microservices made this **POSSIBLE**.

Who has a

MICROSERVICE ARCHITECTURE?

Who **WANTS TO HAVE** a microservice architecture?

“You probably already have a microservice architecture **whether you want one or not**”

CHANGE

Technology

Technology, **scale**

Technology, scale, **organization**

How can a microservice architecture **HELP?**

EVOLUTIONARY architecture

organized around **CAPABILITIES**

MORE than (just) architecture

Architecture, **DEVOPS**

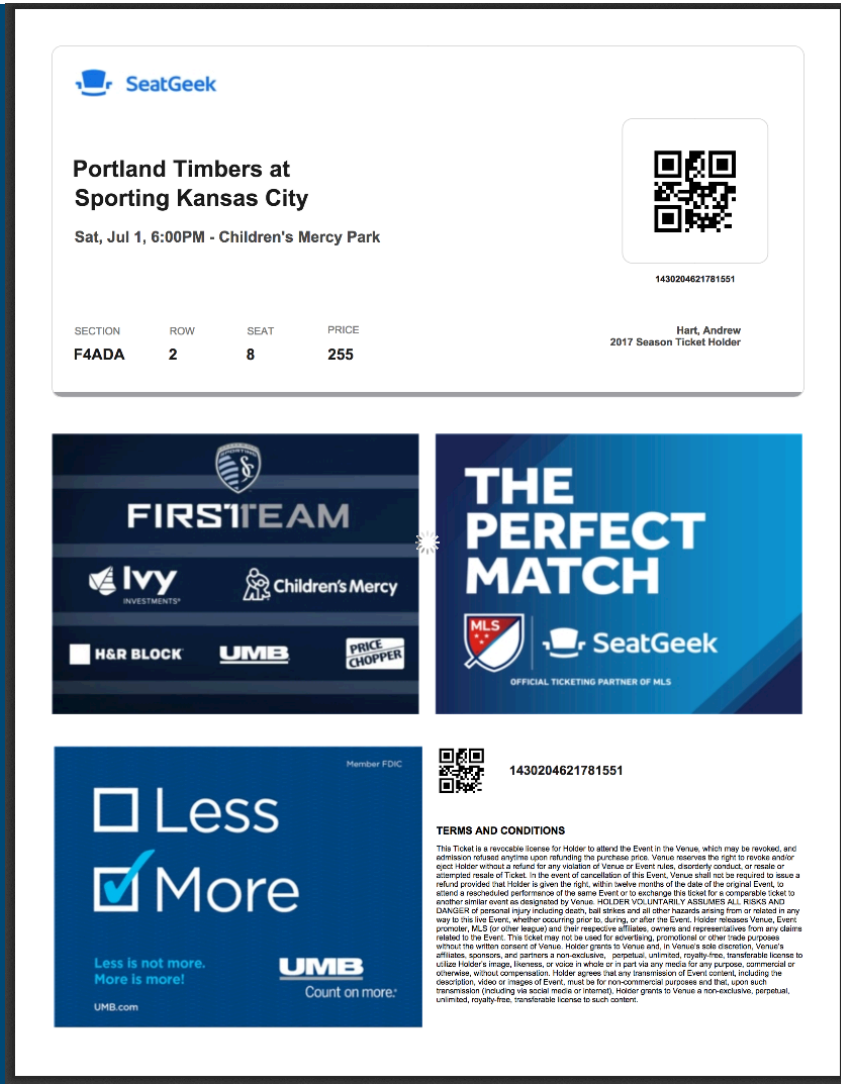
Architecture, devops, **CULTURE**

Architecture

Atomic **COMPONENTS**

HARD to get this right

Here is an event ticket



NEW YORK
BASEBALL CLUB
World Championship
Game 1955
ADMIT
1
GRAND GRANDSTAND
$3.00

20 2014
BABY SHOWER
Aris Flairmare
403 WEST SOUTH BROADWAY
BRING GEAR
RECEIVE YOUR TICKETS

Take me out to the ballgame
Play Ball!

LOS ANGELES
ANGELS
Chavez Ravine Home Of The Angels
THU. MAY 10 1962
FIELD BOX
EST. PR. $3.27
FED. TAX .23
TOTAL $3.50
YELLOW
MAY 10
ANGELS
$3.50
1962

Take me out to the ballgame
Play Ball!

UPPER BOX
AMERICAN LEAGUE BASEBALL NATIONAL LEAGUE
ALL STAR GAME
CLEVELAND MUNICIPAL STADIUM
JULY 13
JULY 13
JULY 13
1954
UPPER BOX
$6.00
ENTER GATE C

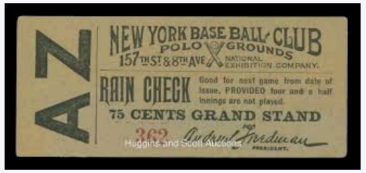
YANKEE STADIUM
161ST STREET & RIVER AVENUE
Tuesday
JULY 11 1939
ALL★STAR★GAME
NATIONAL LEAGUE
VS
AMERICAN LEAGUE
RAIL BOX RESERVED SEAT
Total $1.65
LOWER $1.65
ALL STAR GAME
JULY 11, 1939

D. C. STADIUM
ALL STAR GAME
AMERICAN LEAGUE
15
NATIONAL LEAGUE
ADMIT ONE
RAIN CHECK
TUESDAY
JULY
10
1962
1:00 P.M.
LOWER BOX
$8.00
THE SENATORS, INC.
Ajents
LOWER BOX $8.00

BIRTHDAY
TIMOTHY LUEKEN

WE'RE STEPPING UP TO THE PLATE!
PLEASE JOIN US ON OUR FIELD OF DREAMS
AS
CRYSTAL BIRD
PITCHES HER DEBUT TO DRIVER TO
WARDE RECKER
CATCH THE ACTION LIVE ON
SAT SEPT 1 2012 1:05PM
BUSCH STADIUM
700 CLARK AVENUE
ST. LOUIS, MISSOURI
PARKING AVAILABLE IN PARKING LOT A
RECEPTION

ADMIT ONE
SIXTH
BIRTHDAY
BASH!


NEW YORK BASE BALL CLUB
POLO GROUNDS
157TH ST & 8TH AVE.
NATIONAL EXHIBITION COMPANY.
RAIN CHECK
Good for next game from date of issue, PROVIDED four and a half innings are not played.
75 CENTS GRAND STAND

SOUL the DATE
MORGAN & JESSE

DETROIT
74
RAIN CHECK $5.00
JUNE
25
1974
FIELD BOX
2 DD2 6

ADMIT ONE
ALL-STAR
BABY SHOWER
PATRICIA & STEVEN
Little Rookie

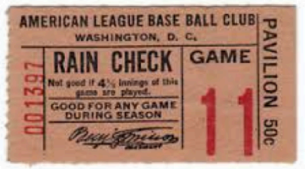
ALL-STAR
BABY SHOWER
PATRICIA & STEVEN
Little Rookie
ADMISSION

2014 RICE BASEBALL
SEASON TICKET BOOK

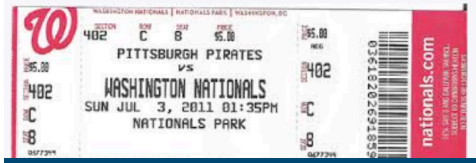
PRINT AT HOME TICKETS
BASEBALL

CAVALCADE OF BASEBALL
ADMIT ONE
AUSPICES OF
NATIONAL BASEBALL CENTENNIAL COMMISSION
1839
1939
Doubleday Field
Cooperstown, N.Y.
PRICE $2.20
Sec. 3
Row D
No. 12

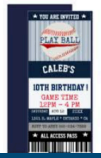
Batter Up

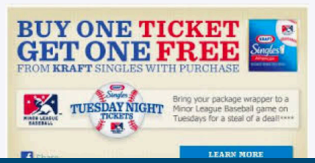

AMERICAN LEAGUE BASE BALL CLUB
WASHINGTON, D. C.
RAIN CHECK
GAME
11
PAVILION
50c
GOOD FOR ANY GAME DURING SEASON

BABY SHOWER
340 × 270

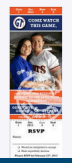

PITTSBURGH PIRATES
VS
WASHINGTON NATIONALS
SUN JUL 3, 2011 01:35PM
NATIONALS PARK
nationals.com

FINNEGAN


PLAY BALL
CALEB'S
10TH BIRTHDAY!


BUY ONE TICKET
GET ONE FREE
FROM KRAFT SINGLES WITH PURCHASE
TUESDAY NIGHT TICKETS
LEARN MORE

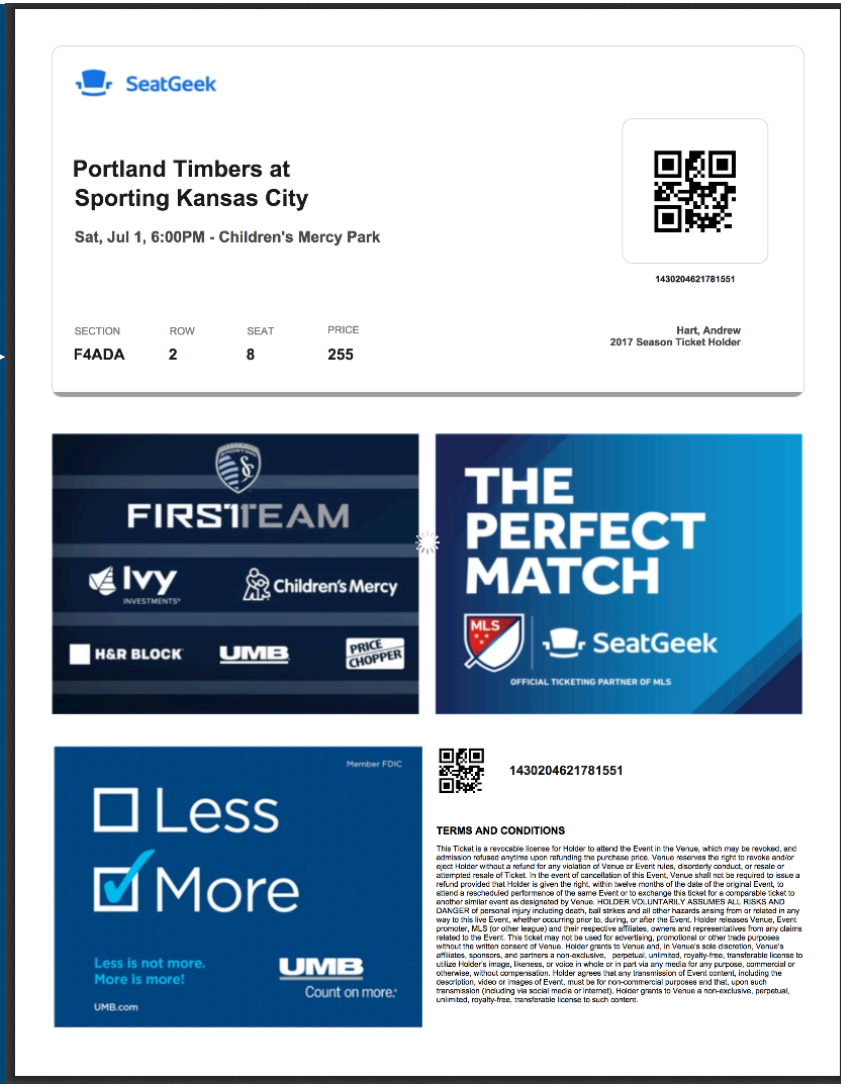
WORLD'S CHAMPIONSHIP GAMES
SHIBE PARK
RAIN CHECK
RETAIN THIS CHECK



WORLD'S CHAMPIONSHIP
1921 GAMES 1921
Admit to
Bleachers
Admission
$1.10
RAINCHECK
3528

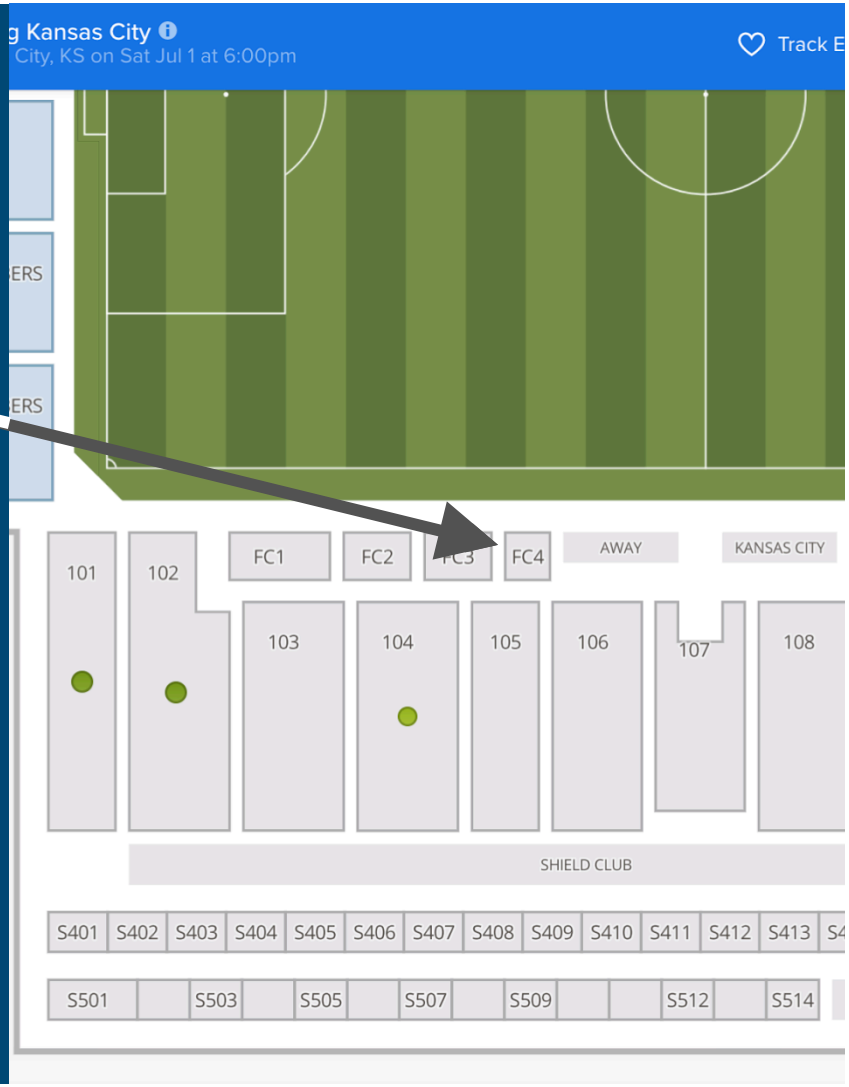
What section is this?

"**F4ADA**"

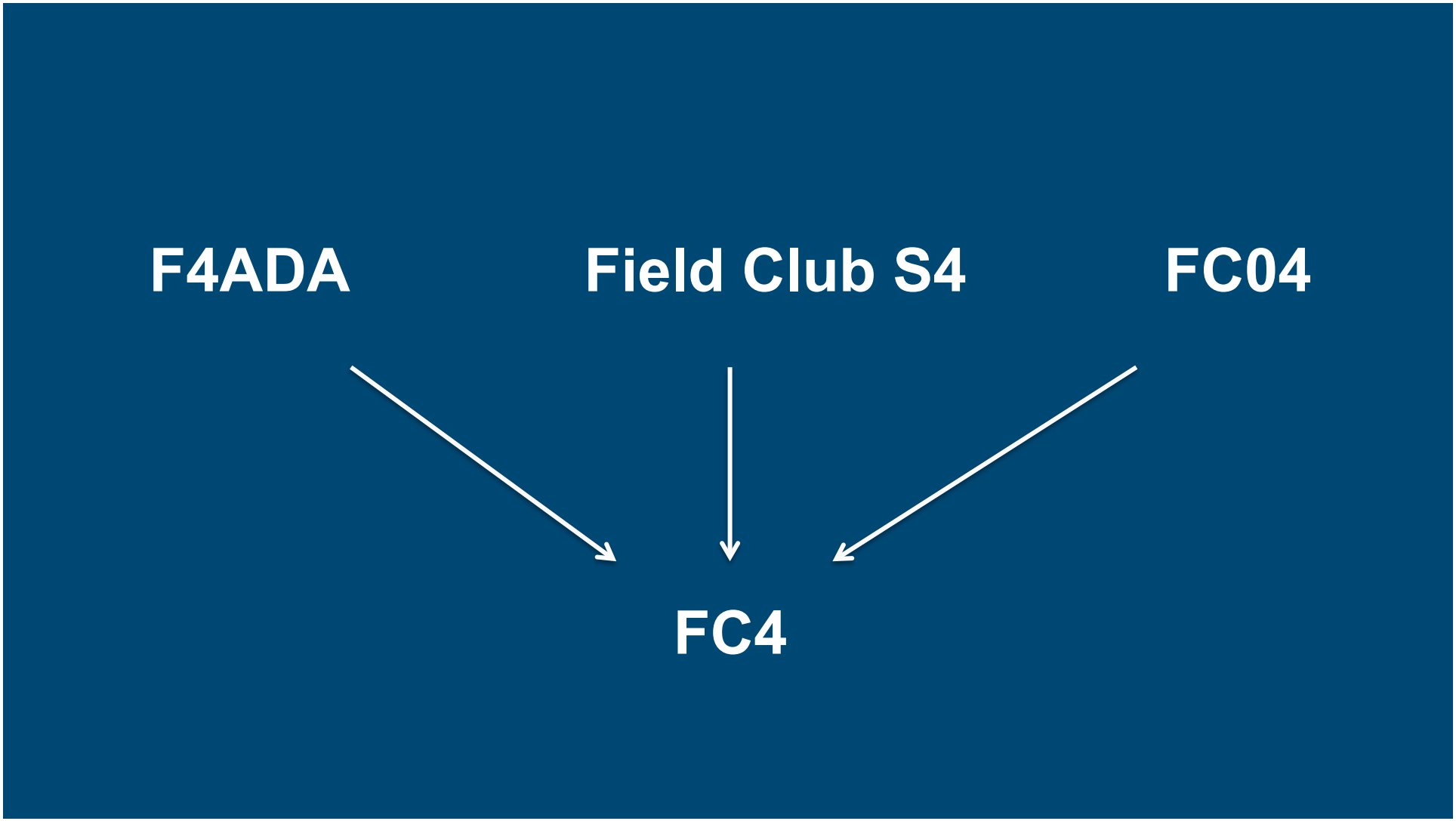


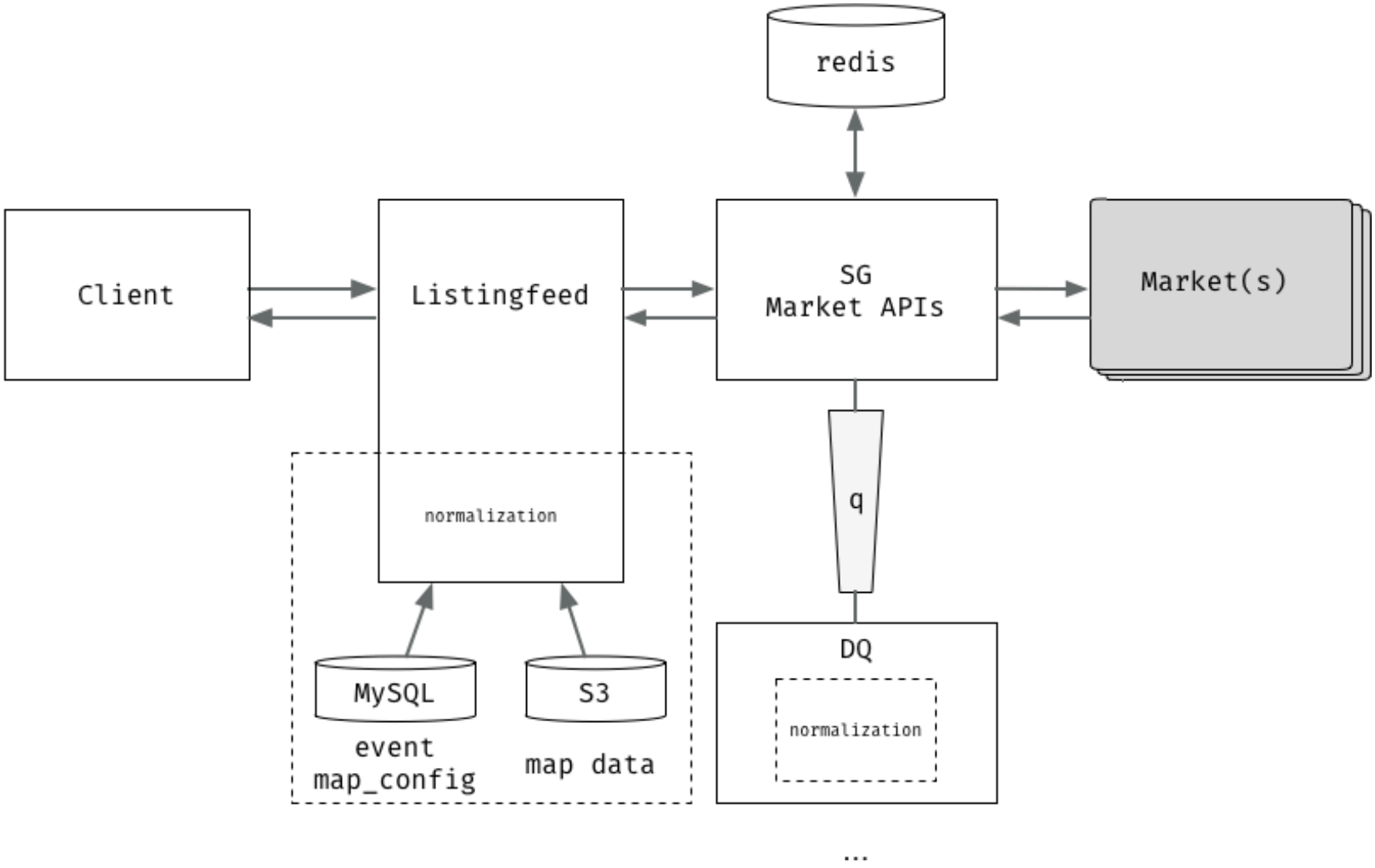
It's this one…

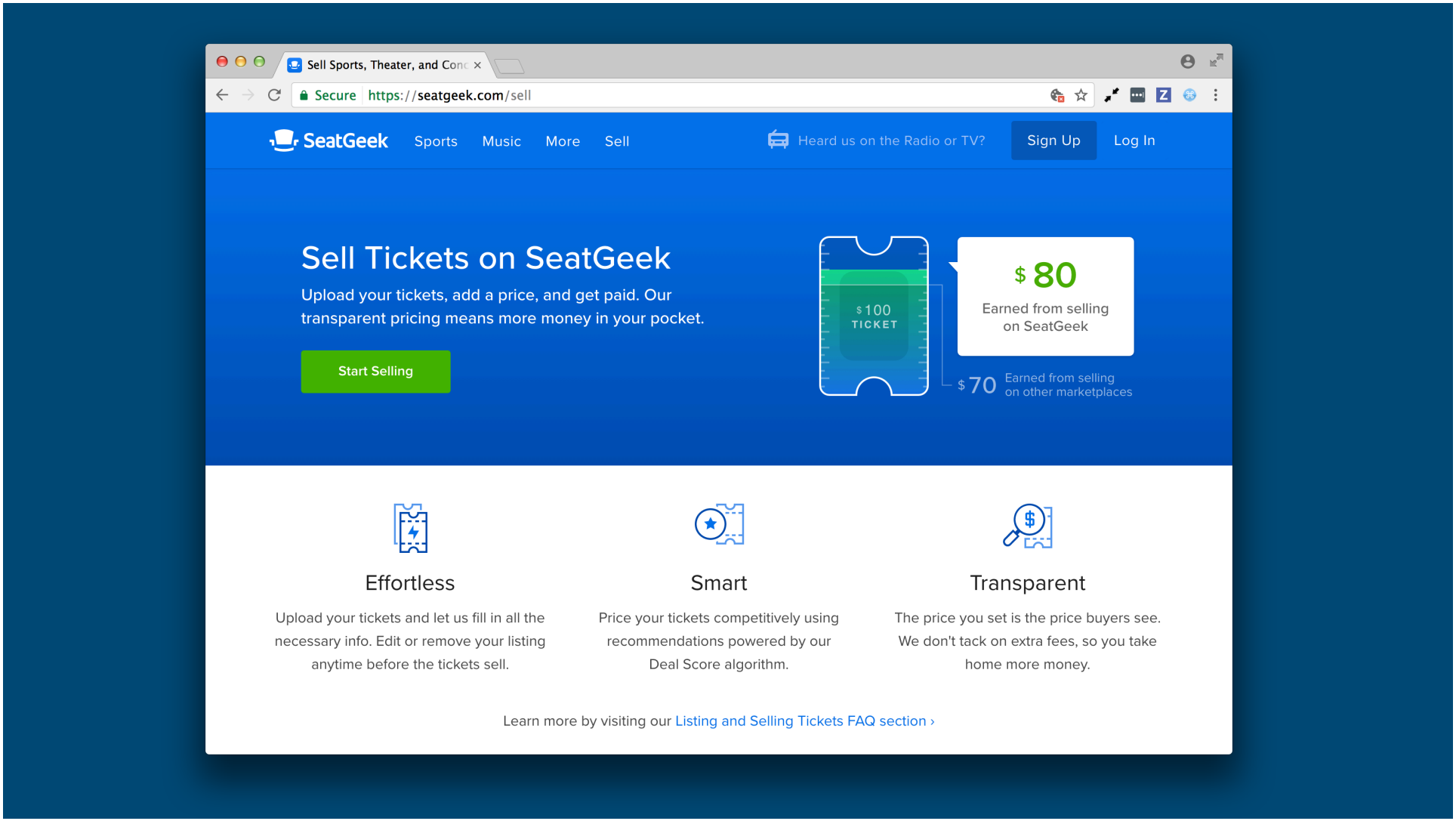
"FC4"

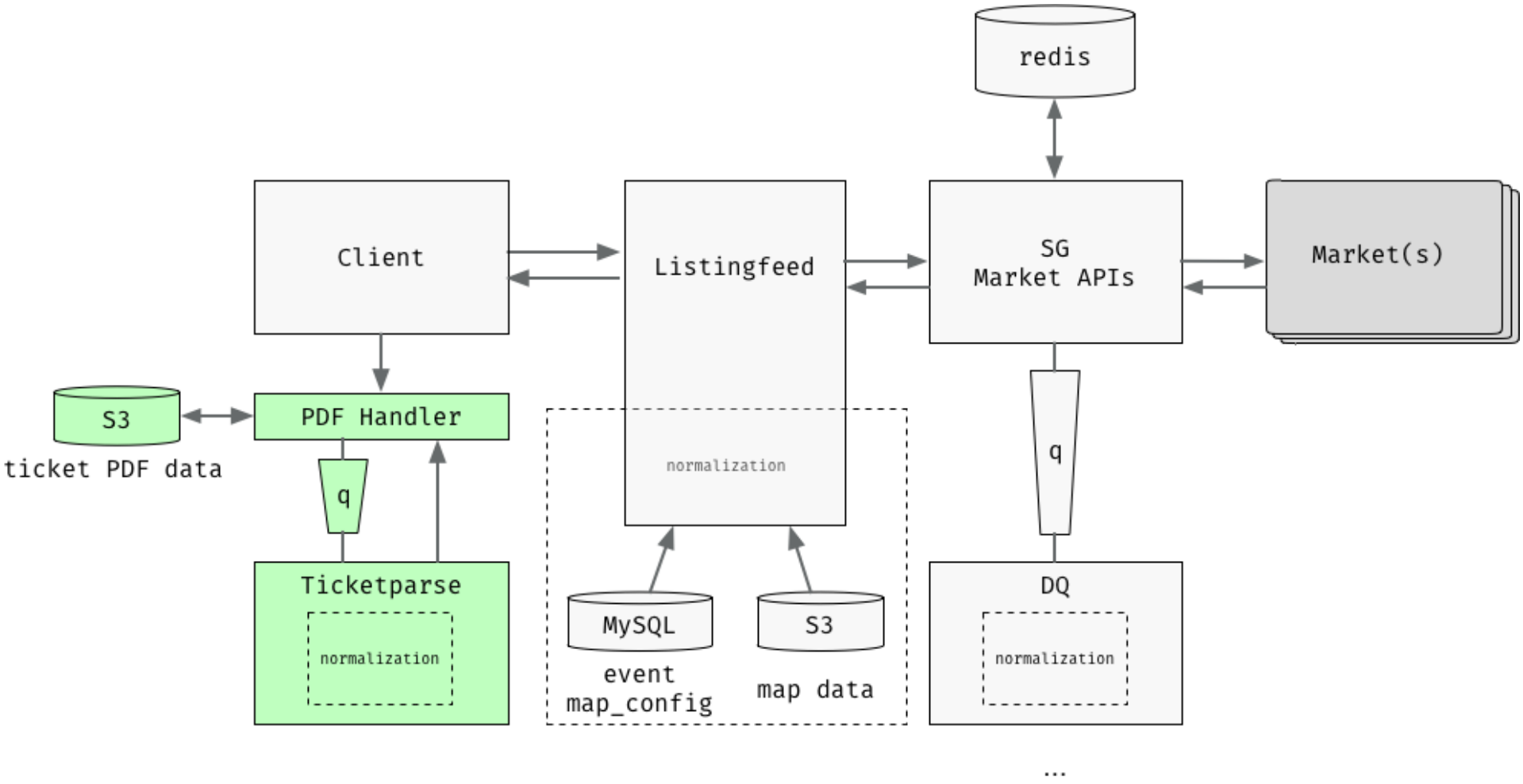


NORMALIZATION


F4ADA
Field Club S4
FC04
FC4


redis
Client
Listingfeed
SG
Market APIs
Market(s)
normalization
q
MySQL
S3
event
map_config
map data
DQ
normalization
...


Sell Sports, Theater, and Conc
Secure https://seatgeek.com/sell
SeatGeek
Sports
Music
More
Sell
Heard us on the Radio or TV?
Sign Up
Log In
Sell Tickets on SeatGeek
Upload your tickets, add a price, and get paid. Our transparent pricing means more money in your pocket.
Start Selling
$100 TICKET
$ 80
Earned from selling on SeatGeek
$ 70
Earned from selling on other marketplaces
Effortless
Upload your tickets and let us fill in all the necessary info. Edit or remove your listing anytime before the tickets sell.
Smart
Price your tickets competitively using recommendations powered by our Deal Score algorithm.
Transparent
The price you set is the price buyers see. We don't tack on extra fees, so you take home more money.
Learn more by visiting our Listing and Selling Tickets FAQ section ›


redis
Client
Listingfeed
SG
Market APIs
Market(s)
S3
ticket PDF data
PDF Handler
normalization
q
q
Ticketparse
normalization
MySQL
S3
event
map_config
map data
DQ
normalization
...

DUPLICATE the functionality?

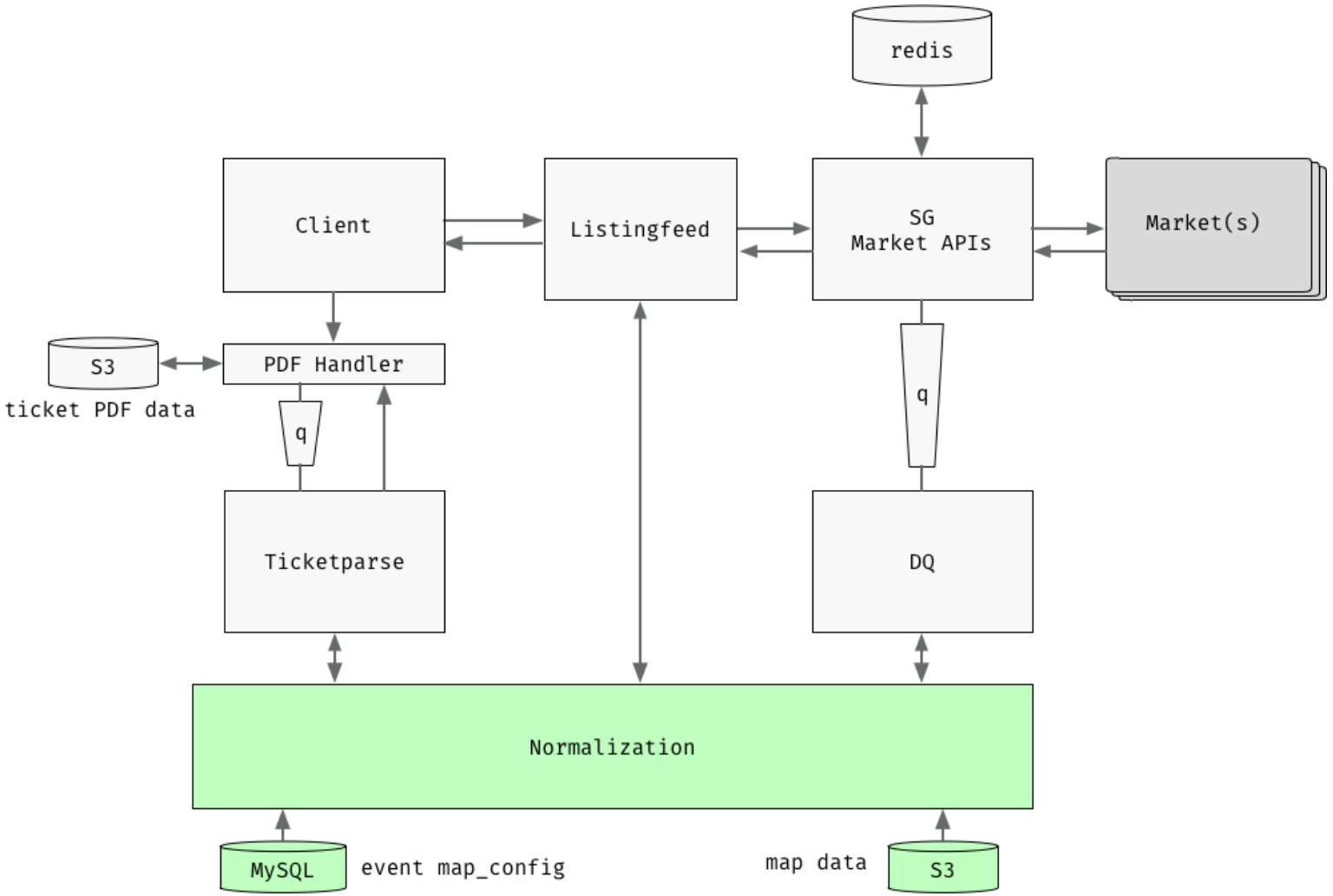
Duplicate the capability?

PROMOTE the capability to a component?

Duplicate the capability?

Promote the capability to a component?

RE-IMPLEMENT the interface?


redis
Client
Listingfeed
SG
Market APIs
Market(s)
S3
ticket PDF data
PDF Handler
q
q
Ticketparse
DQ
Normalization
MySQL
event map_config
map data
S3

avoid **DUPLICATING CAPABILITIES**

between components

Assumptions **WILL CHANGE** over time

Think about **CAPABILITIES**

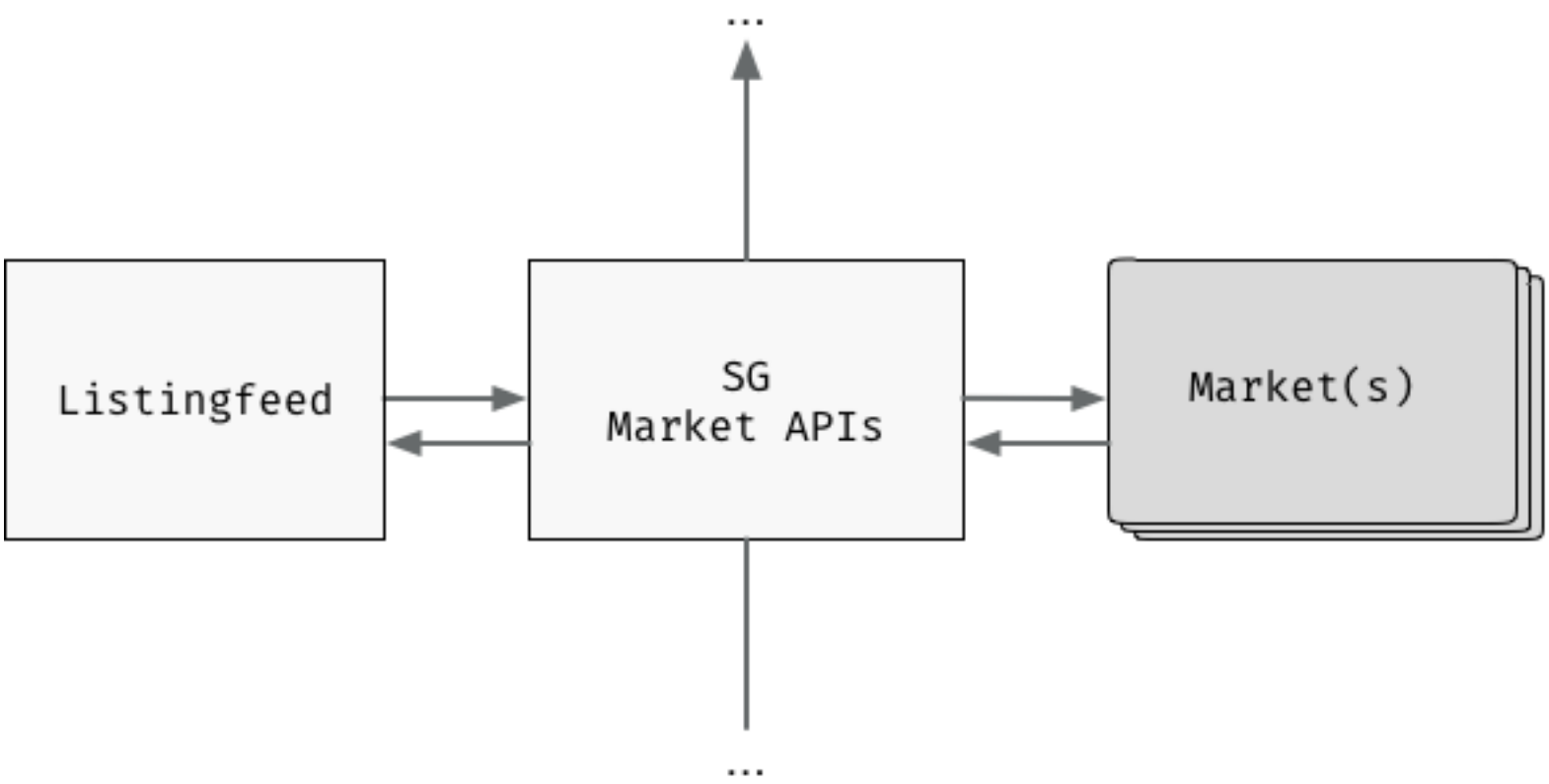
Consider the **RELATIVE COST**

SCALE

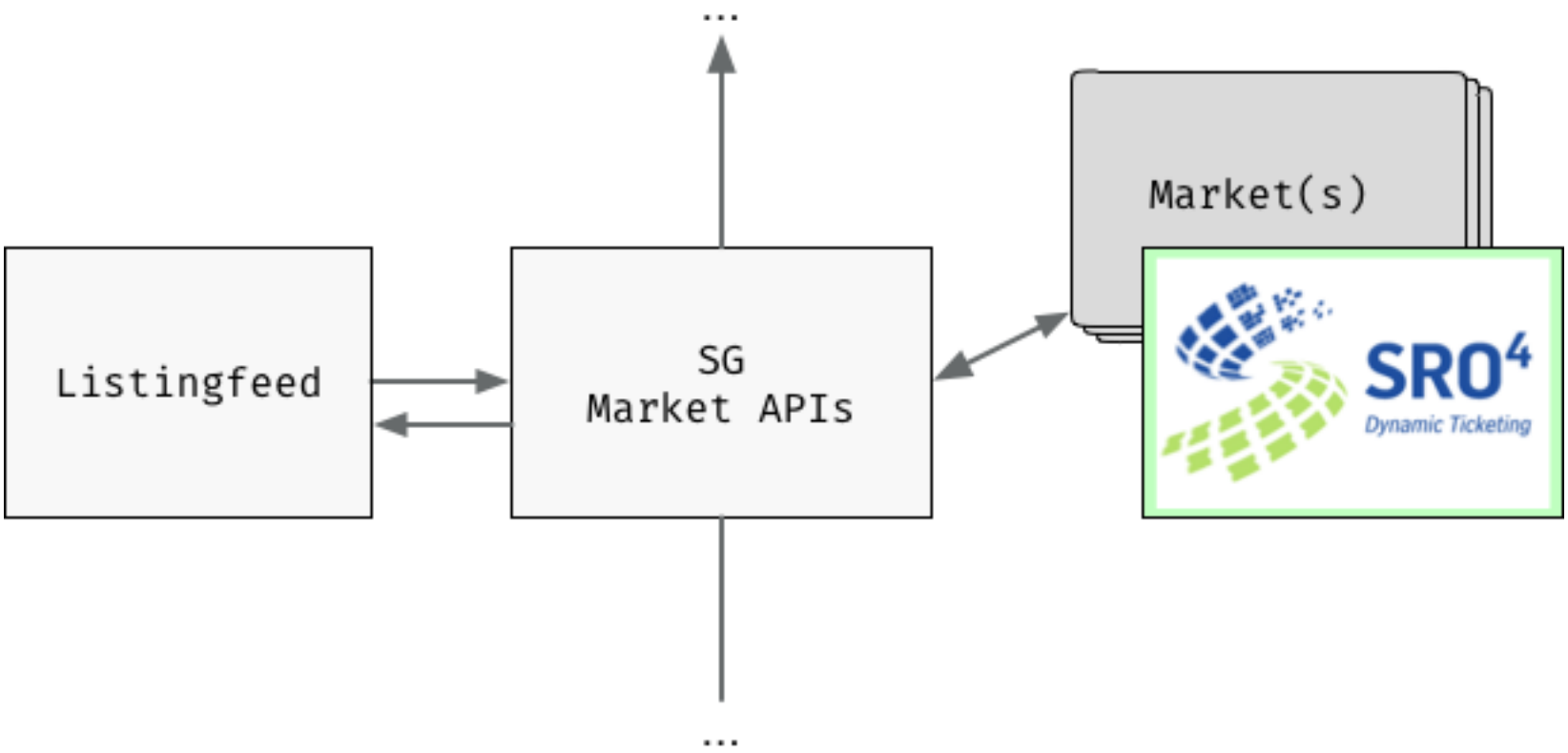
Microservice Architecture

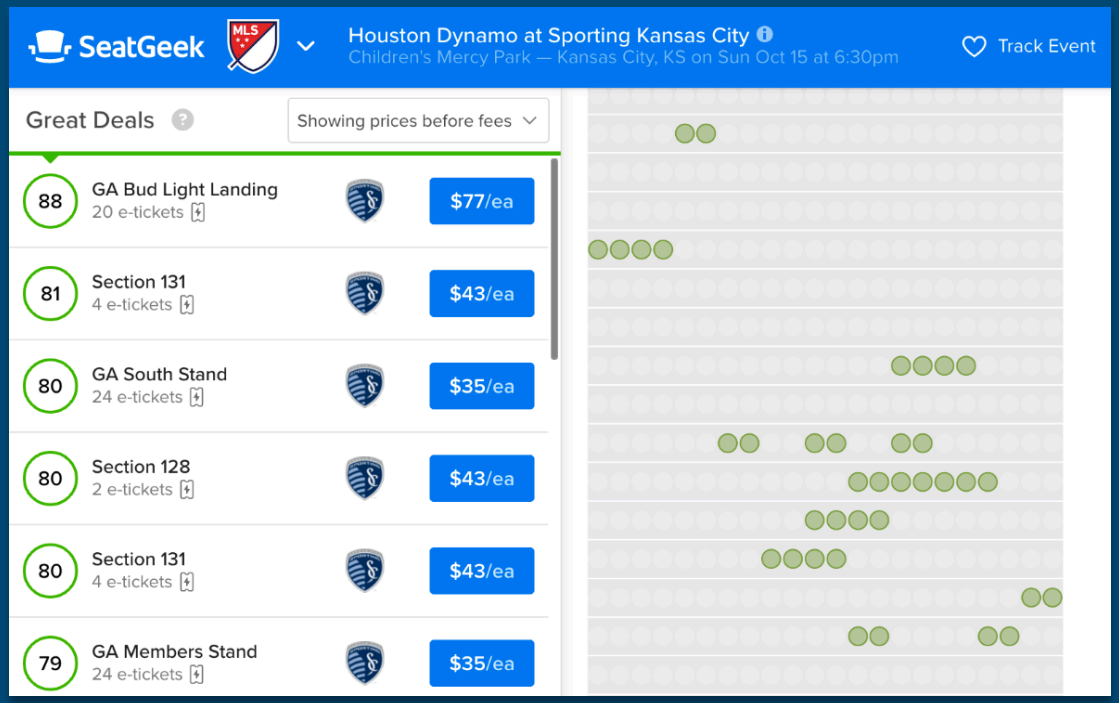
$\Rightarrow$

"IT WILL JUST WORK"


...
Listingfeed
SG
Market APIs
Market(s)
...

Watch out, Ticketmaster: SeatGeek spends $56 million on TopTix


...
Market(s)
Listingfeed
SG
Market APIs
SRO4
Dynamic Ticketing
...


SeatGeek
MLS
Houston Dynamo at Sporting Kansas City
Children's Mercy Park — Kansas City, KS on Sun Oct 15 at 6:30pm
Track Event
Great Deals
Showing prices before fees
88
GA Bud Light Landing
20 e-tickets
$77/ea
81
Section 131
4 e-tickets
$43/ea
80
GA South Stand
24 e-tickets
$35/ea
80
Section 128
2 e-tickets
$43/ea
80
Section 131
4 e-tickets
$43/ea
79
GA Members Stand
24 e-tickets
$35/ea

ALL THE SEATS
01
02
03

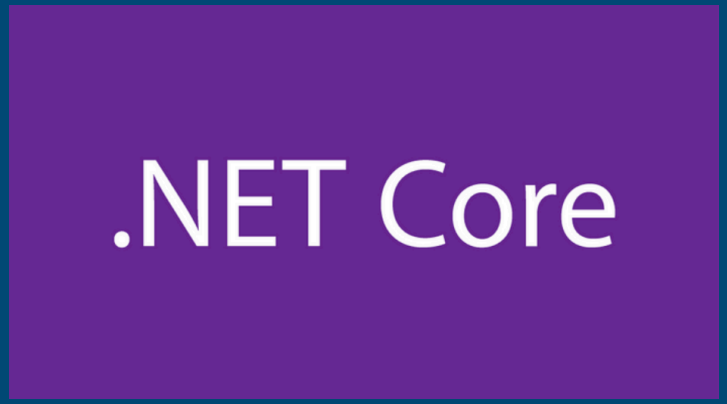
30-50MB XML (SOAP) messages

+

Dynamically Typed Python Libraries

=

SeatGeek's first steps with



17:16 **Eric Waller** 193,338 lines of auto-generated C# (edited)

20:42 **Cody Wright** Nice. A lot of work to get it to compile?

22:08 **Eric Waller** Not really, it turns out MS released a tool specifically For generating WCF clients for dotnet core

It's using soap/xml though, not the binary format

I started looking into it after messing around with the large response handling in zeep

After realizing that no matter what you do, parsing 50MB of XML is going to be painful

ENCAPSULATE the SOAP

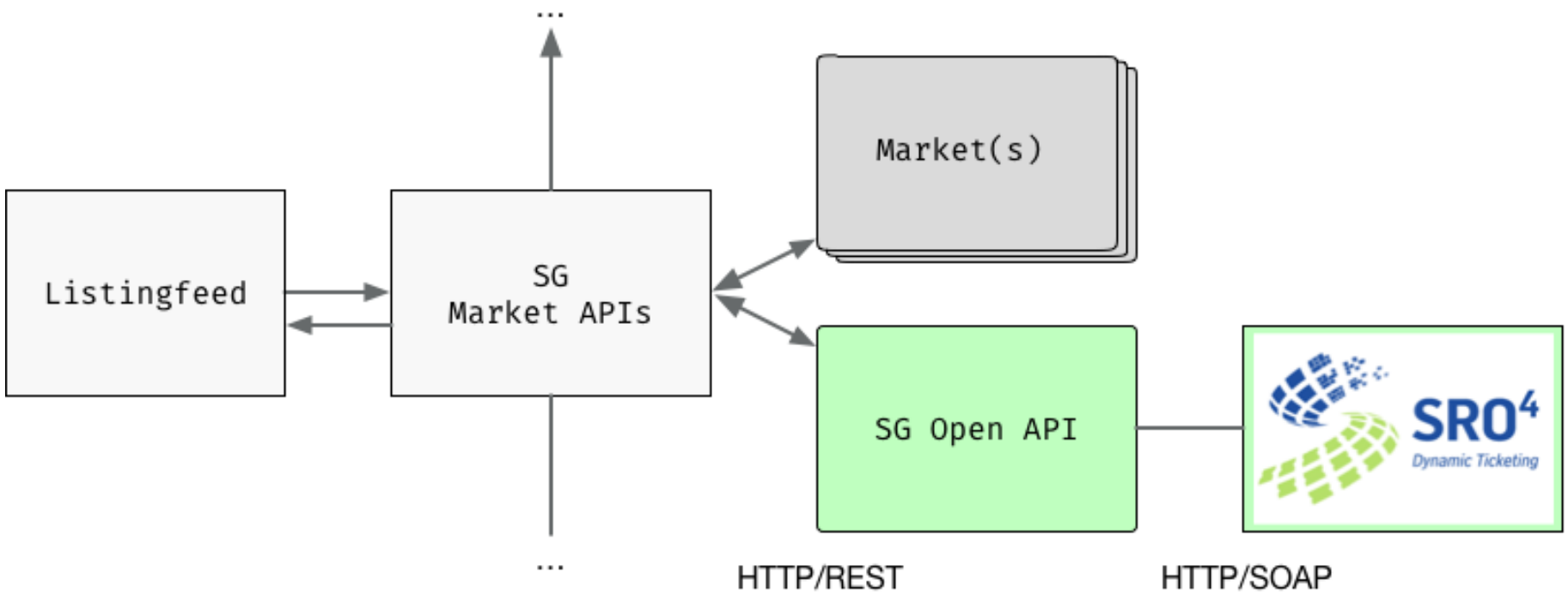
Encapsulate the SOAP,

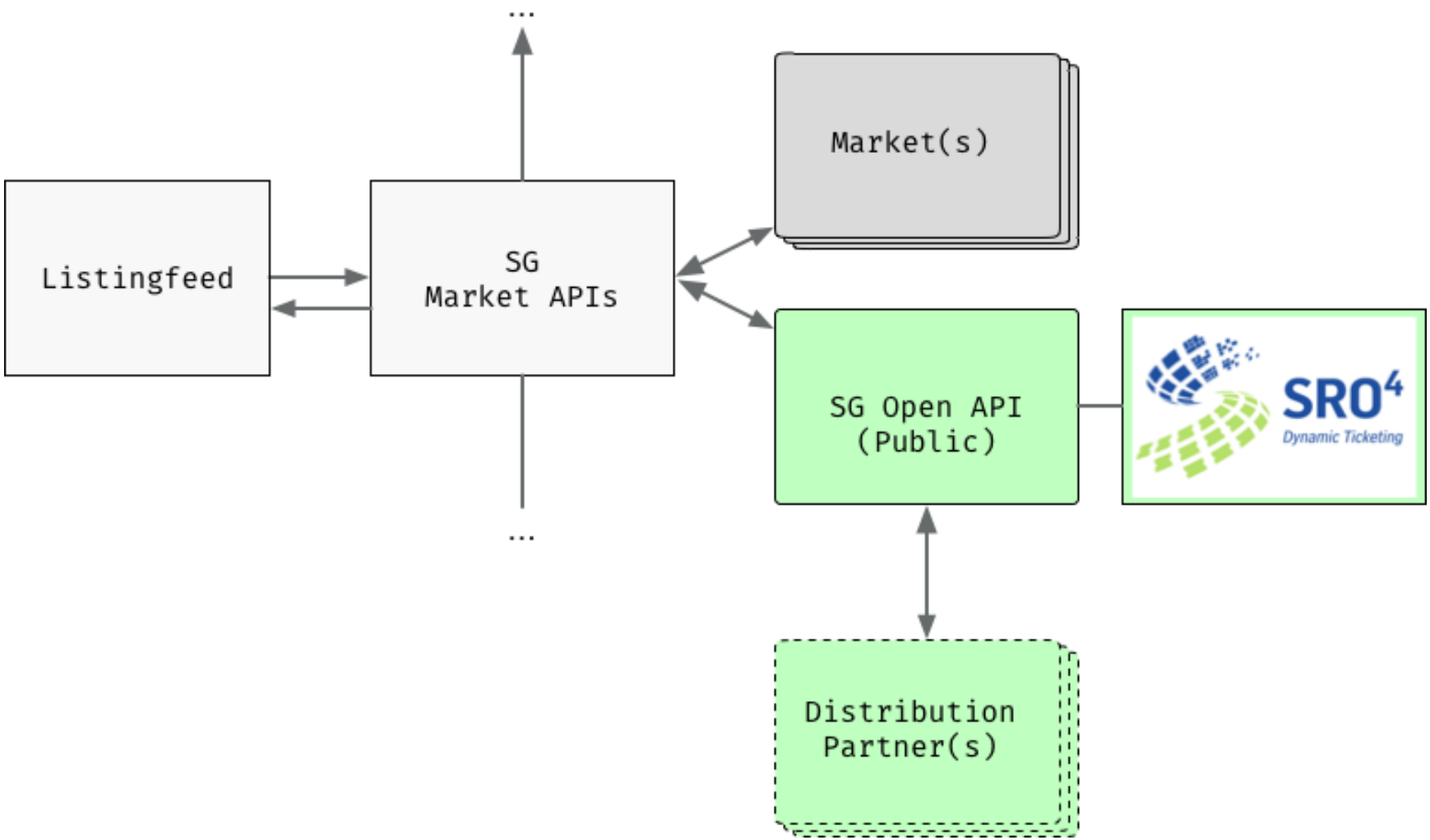
INTERPRET the messages

Encapsulate the SOAP,

Interpret the messages,

Present a **STANDARD INTERFACE**


...
Market(s)
Listingfeed
SG
Market APIs
SG Open API
SRO4
Dynamic Ticketing
...
HTTP/REST
HTTP/SOAP


...
Market(s)
Listingfeed
SG
Market APIs
SG Open API
(Public)
SRO4
Dynamic Ticketing
...
Distribution
Partner(s)

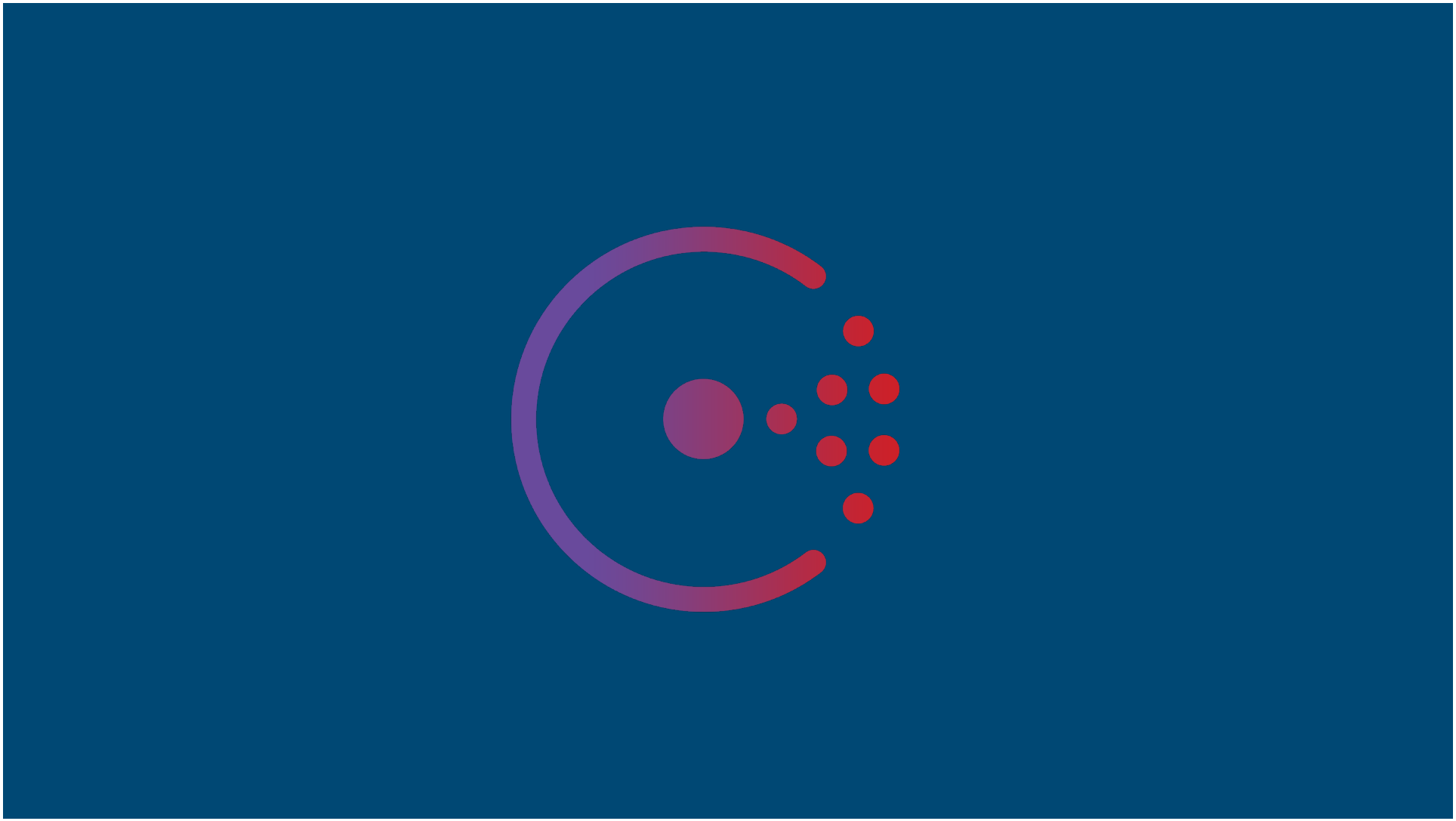
Capacity planning is **IMPORTANT**

Devops

Microservice architecture **<3 PAAS**

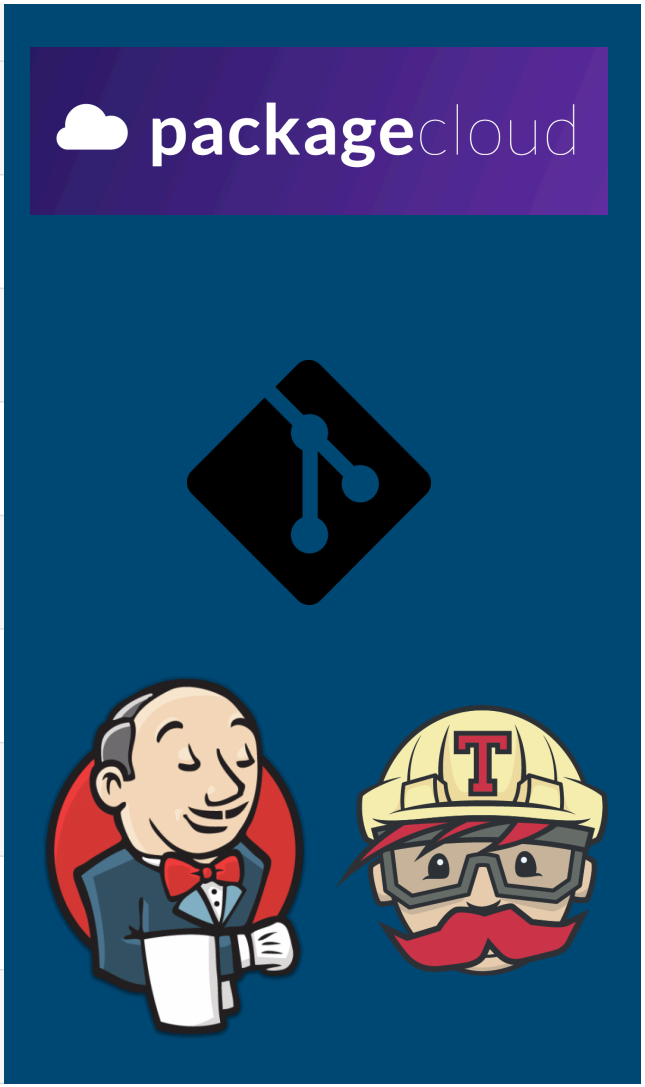
SeatGeek operates an **Internal PAAS**

AWS



Task Runs

SUCCES	#15838: fab staging deploy BRANCH=list-hydration-refactor	api	c5557bc5	list-hydration-refactor	Compare	Invalid date
FAILED	#15836: fab staging deploy BRANCH=list_hydration_refactor	api		list_hydration_refactor	Compare	Invalid date
SUCCES	#15815: fab staging deploy BRANCH=es_optimizations_1	api	80489b20	es_optimizations_1	Compare	Redeploy this commit Invalid date
FAILED	#15808: fab staging deploy BRANCH=es_optimizations_1	api	80489b20	es_optimizations_1	Compare	Invalid date
FAILED	#15804: fab staging deploy BRANCH=es_optimizations_1	api	80489b20	es_optimizations_1	Compare	Invalid date
SUCCES	#15782: fab production deploy	api	9d52423b	master	Compare	Redeploy this commit Invalid date
SUCCES	#15757: fab production deploy	api	4cb26bbf	master	Compare	Redeploy this commit Invalid date
SUCCES	#15754: fab production deploy	api	da052001	master	Compare	Redeploy this commit Invalid date
SUCCES	#15743: fab production deploy	api	6f39a8d8	master	Compare	Redeploy this commit Invalid date



INDEPENDENT
deployments

MINIMAL
coordination

NO
machine-local state

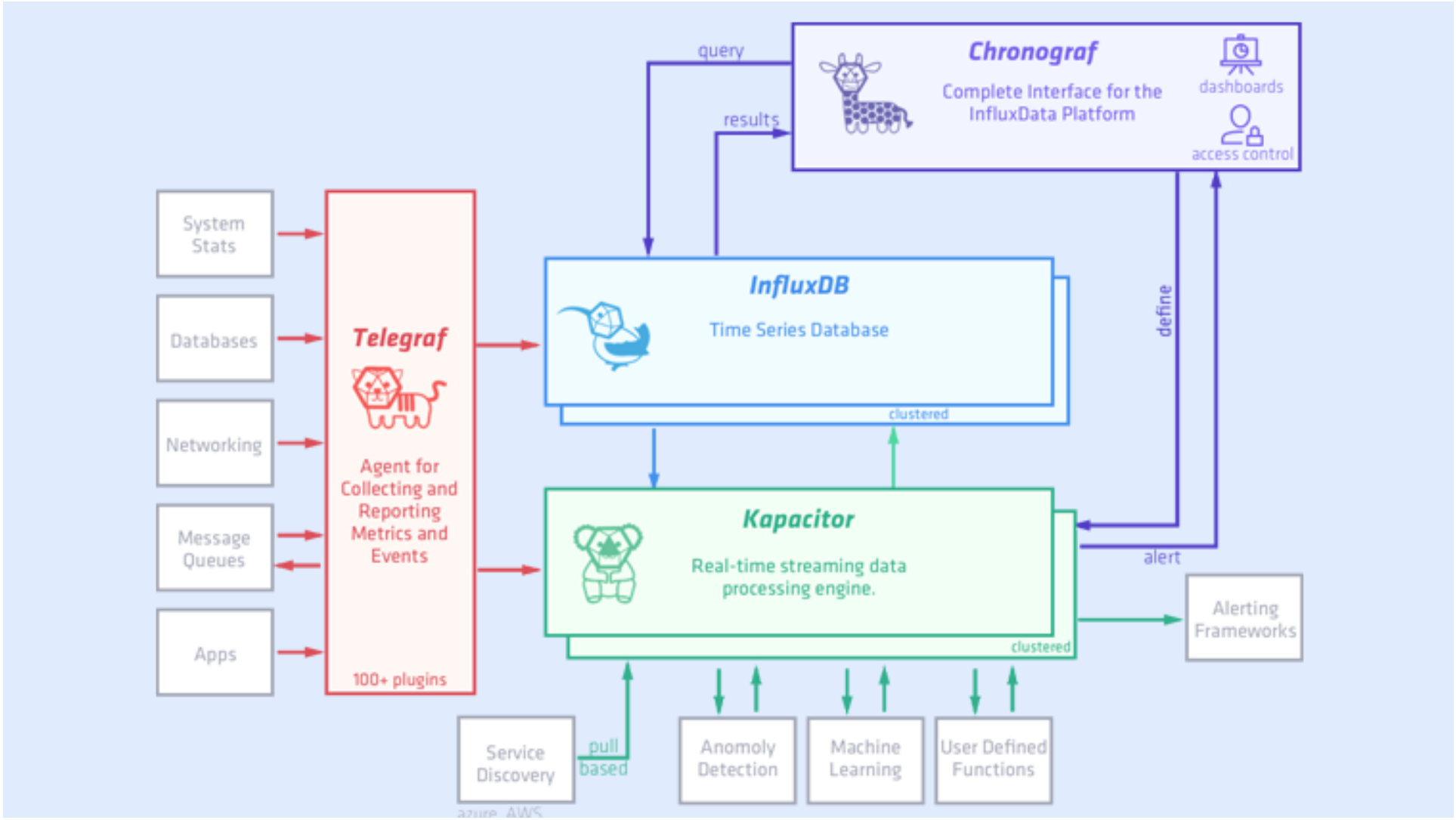
```
{
  "build-command": ". $PWD/.virtualenv/bin/activate &&
$PWD/.virtualenv/bin/pip install -r requirements.txt
--exists-action=w --disable-pip-version-check",
```

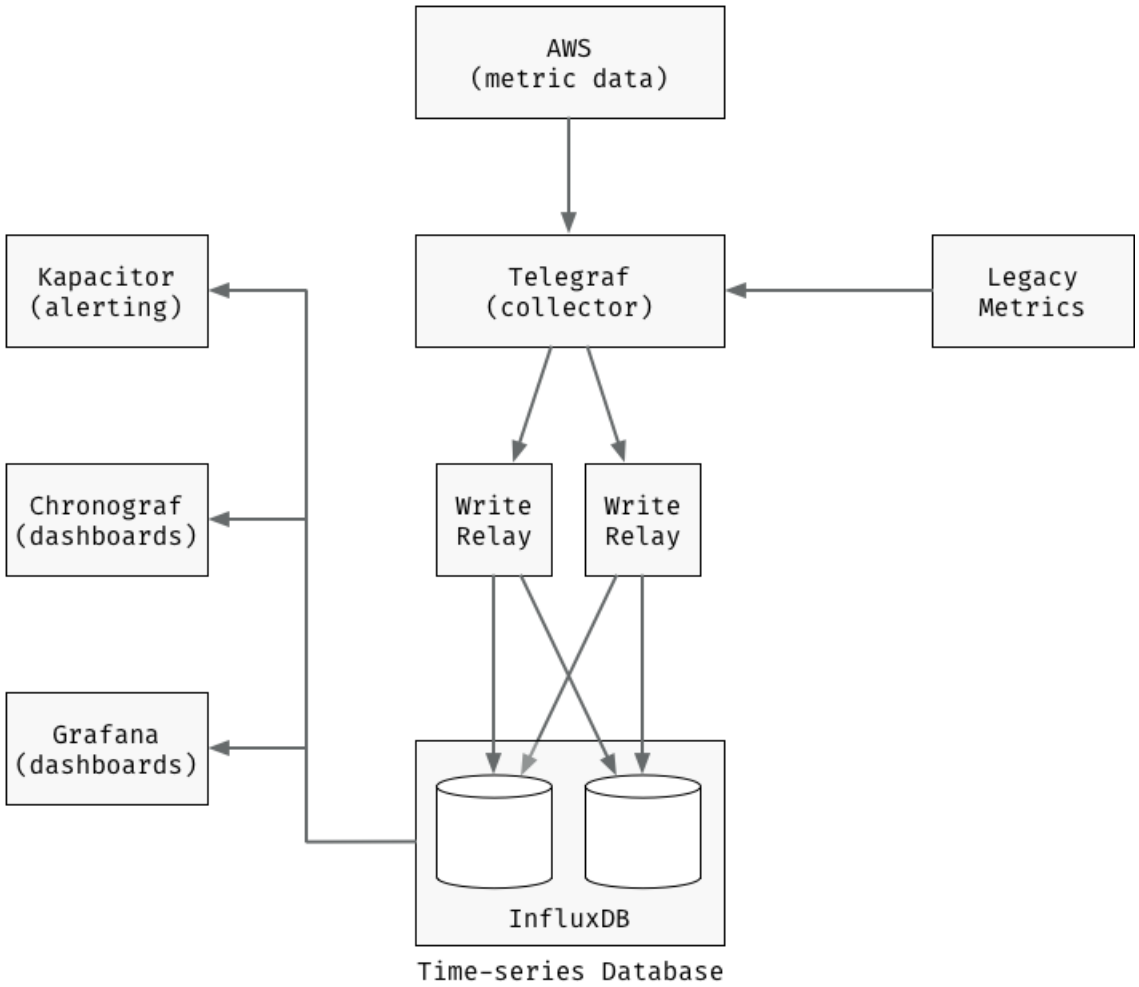
```
{
  "build-command": "mkdir -p $PWD/.dotnet-home && export
HOME=$PWD/.dotnet-home && dotnet restore SGO_API && dotnet
publish SGO_API -c Release",
```

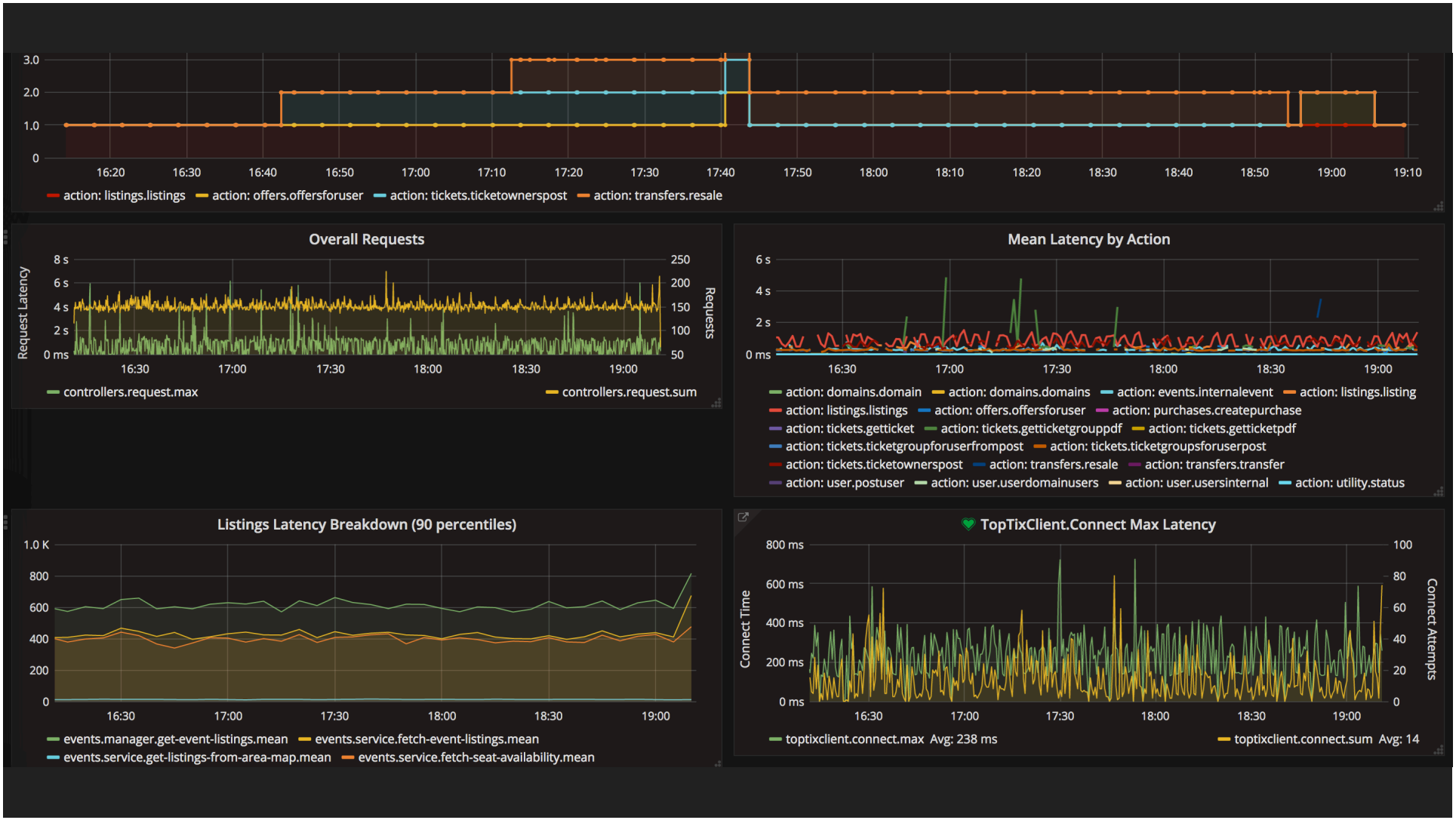
PAAS infrastructure simplifies

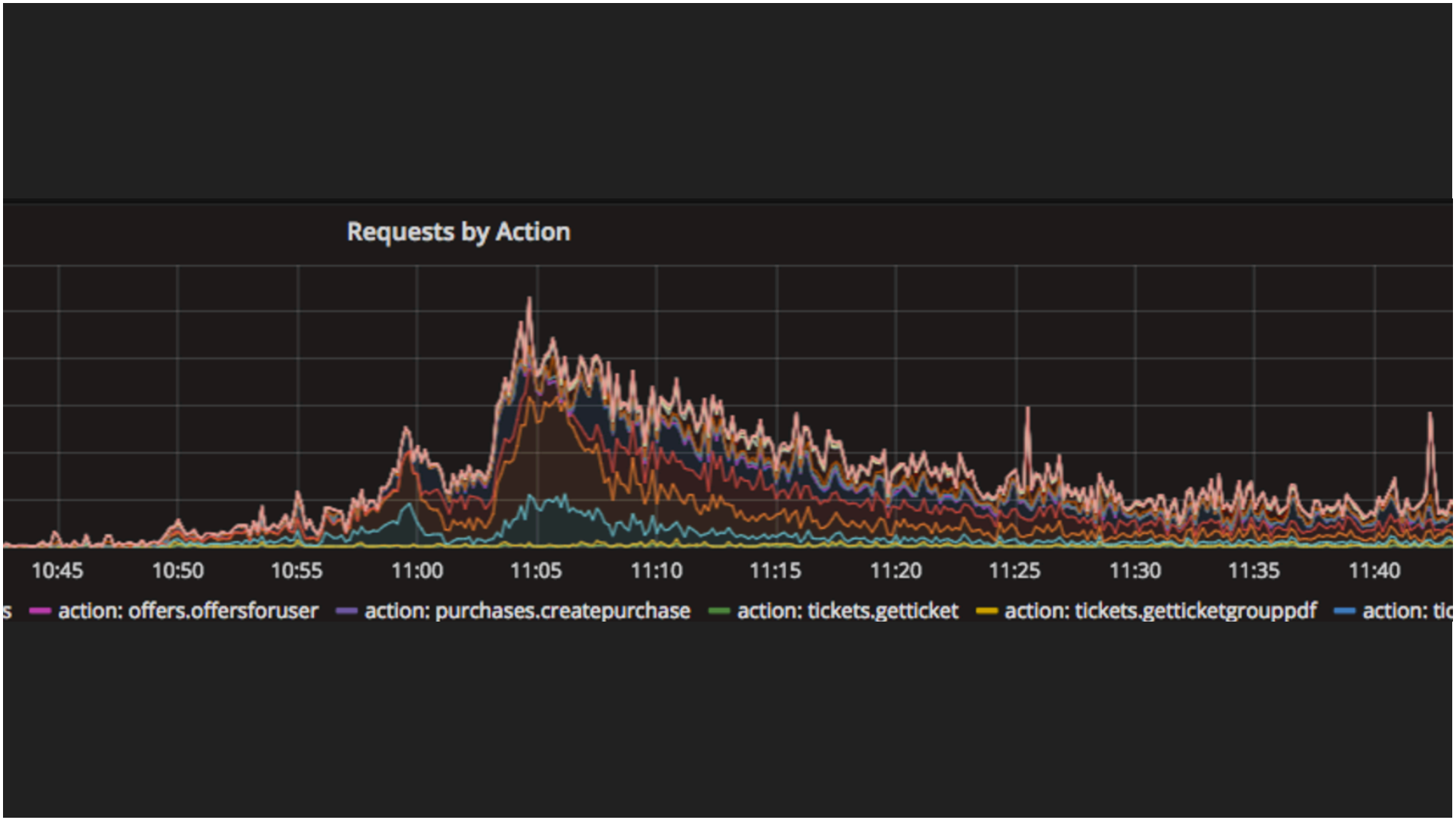
EVOLVING a microservice architecture

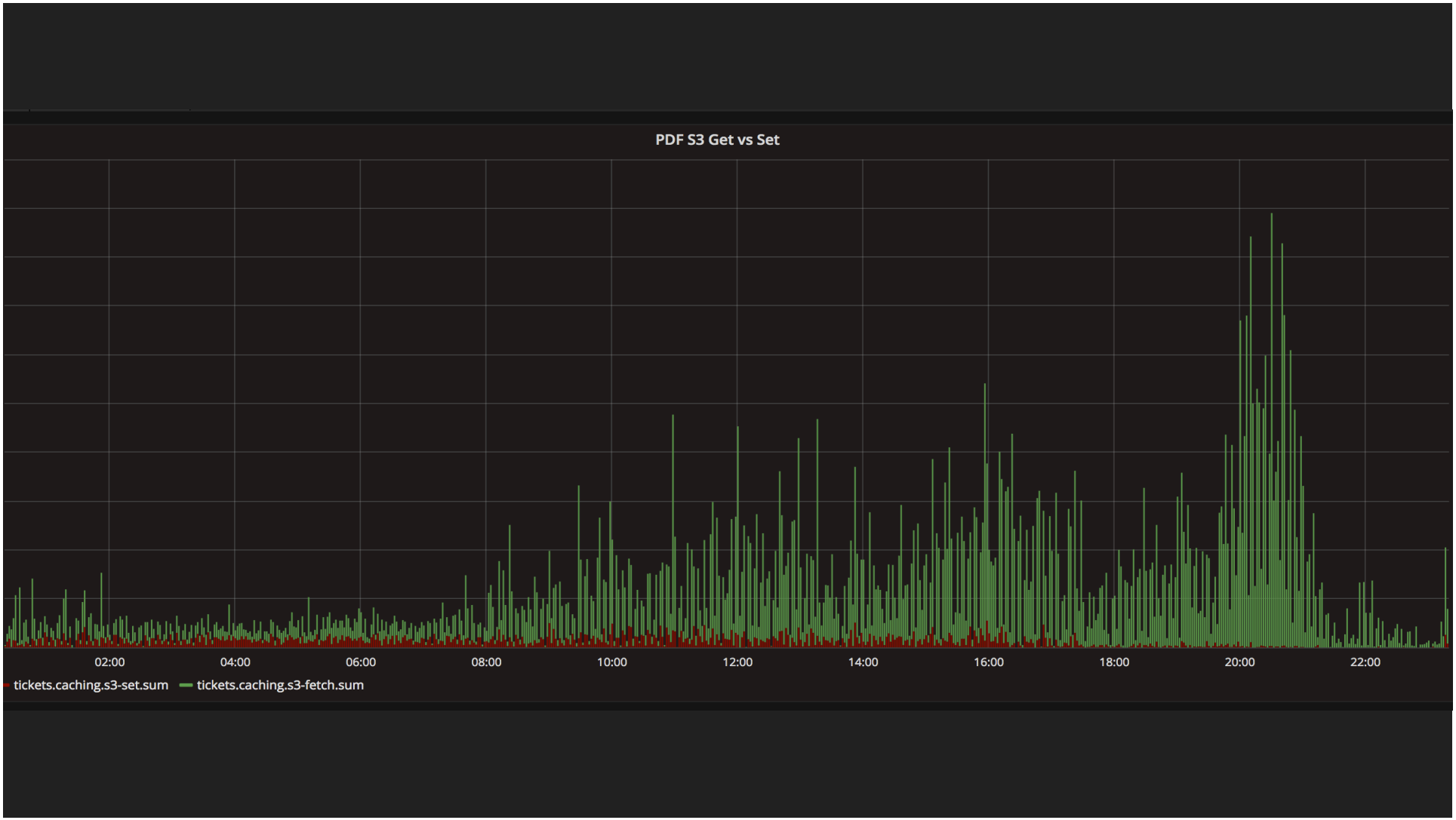
MONITORING


query
results
Chronograf
Complete Interface for the InfluxData Platform
dashboards
access control
System Stats
Databases
Networking
Message Queues
Apps
Telegraf
Agent for Collecting and Reporting Metrics and Events
100+ plugins
InfluxDB
Time Series Database
clustered
define
Kapacitor
Real-time streaming data processing engine.
clustered
alert
Alerting Frameworks
Service Discovery
azure, AWS
pull based
Anomoly Detection
Machine Learning
User Defined Functions


AWS
(metric data)
Kapacitor
(alerting)
Telegraf
(collector)
Legacy
Metrics
Chronograf
(dashboards)
Write
Relay
Write
Relay
Grafana
(dashboards)
InfluxDB
Time-series Database


3.0
2.0
1.0
0
16:20
16:30
16:40
16:50
17:00
17:10
17:20
17:30
17:40
17:50
18:00
18:10
18:20
18:30
18:40
18:50
19:00
19:10
action: listings.listings
action: offers.offersforuser
action: tickets.ticketownerspost
action: transfers.resale
Overall Requests
Request Latency
8 s
6 s
4 s
2 s
0 ms
250
200
150
100
50
Requests
16:30
17:00
17:30
18:00
18:30
19:00
controllers.request.max
controllers.request.sum
Mean Latency by Action
6 s
4 s
2 s
0 ms
16:30
17:00
17:30
18:00
18:30
19:00
action: domains.domain
action: domains.domains
action: events.internalevent
action: listings.listing
action: listings.listings
action: offers.offersforuser
action: purchases.createpurchase
action: tickets.getticket
action: tickets.getticketgrouppdf
action: tickets.getticketpdf
action: tickets.ticketgroupforuserfrompost
action: tickets.ticketgroupsforuserpost
action: tickets.ticketownerspost
action: transfers.resale
action: transfers.transfer
action: user.postuser
action: user.userdomainusers
action: user.usersinternal
action: utility.status
Listings Latency Breakdown (90 percentiles)
1.0 K
800
600
400
200
0
16:30
17:00
17:30
18:00
18:30
19:00
events.manager.get-event-listings.mean
events.service.fetch-event-listings.mean
events.service.get-listings-from-area-map.mean
events.service.fetch-seat-availability.mean
TopTixClient.Connect Max Latency
Connect Time
800 ms
600 ms
400 ms
200 ms
0 ms
100
80
60
40
20
0
Connect Attempts
16:30
17:00
17:30
18:00
18:30
19:00
toptixclient.connect.max Avg: 238 ms
toptixclient.connect.sum Avg: 14


Requests by Action
10:45
10:50
10:55
11:00
11:05
11:10
11:15
11:20
11:25
11:30
11:35
11:40
action: offers.offersforuser
action: purchases.createpurchase
action: tickets.getticket
action: tickets.getticketgrouppdf


PDF S3 Get vs Set
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
tickets.caching.s3-set.sum
tickets.caching.s3-fetch.sum

Ubiquitous service monitoring can help identify operational risks

Culture

ALIGNMENT

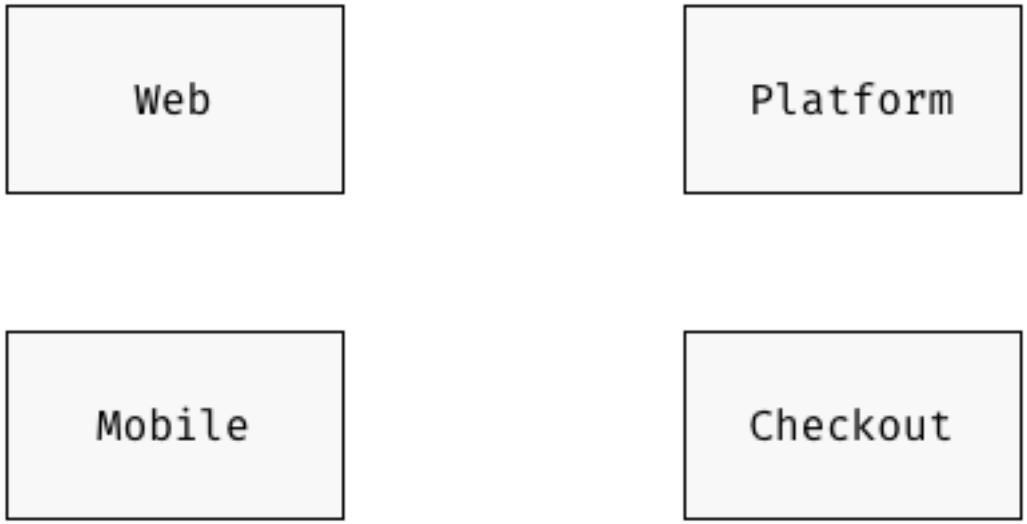
"organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations"

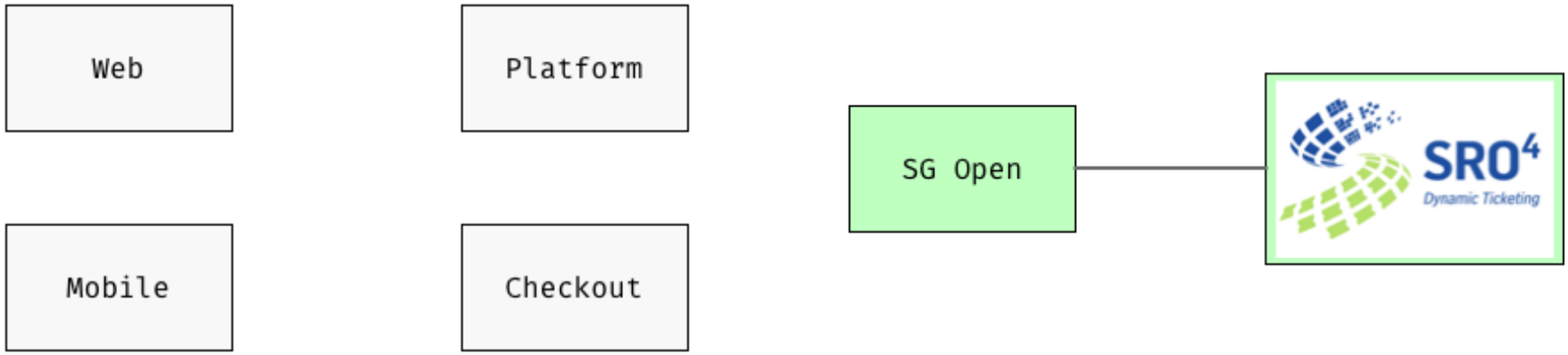
Melvin Conway, 1968

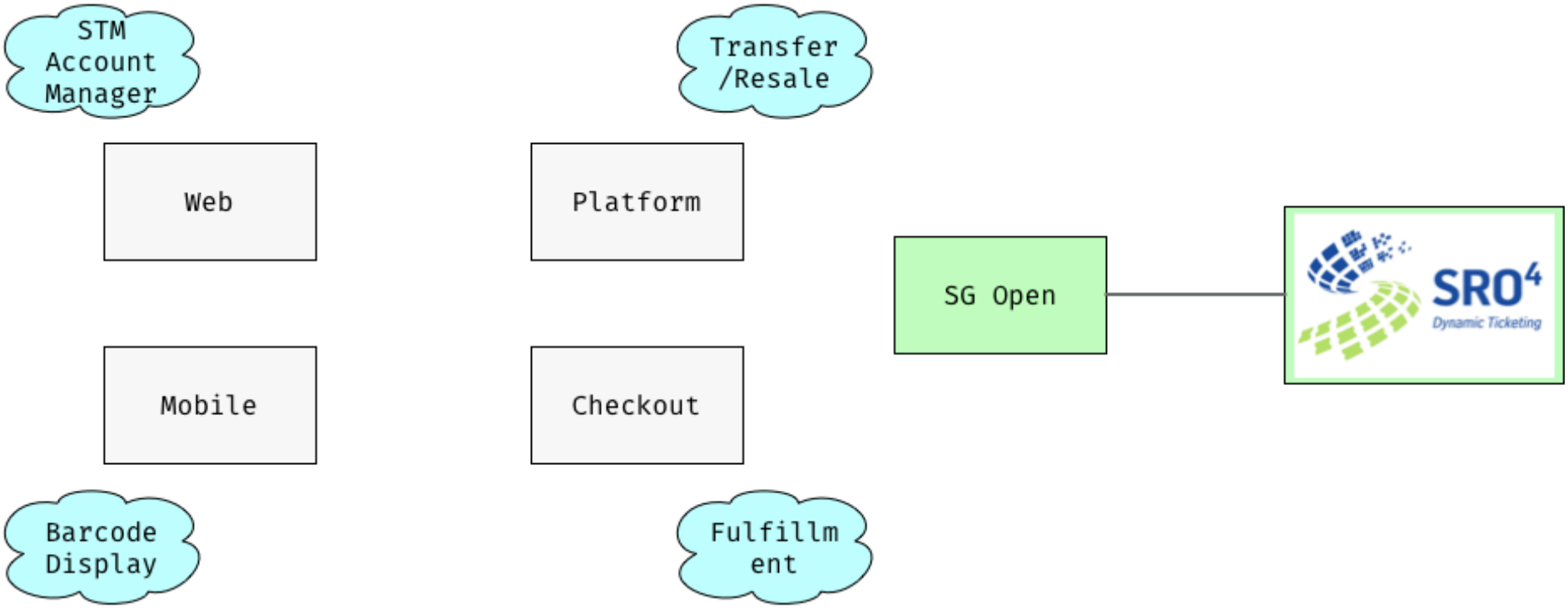
SeatGeek **MISSED** a few internal deadlines

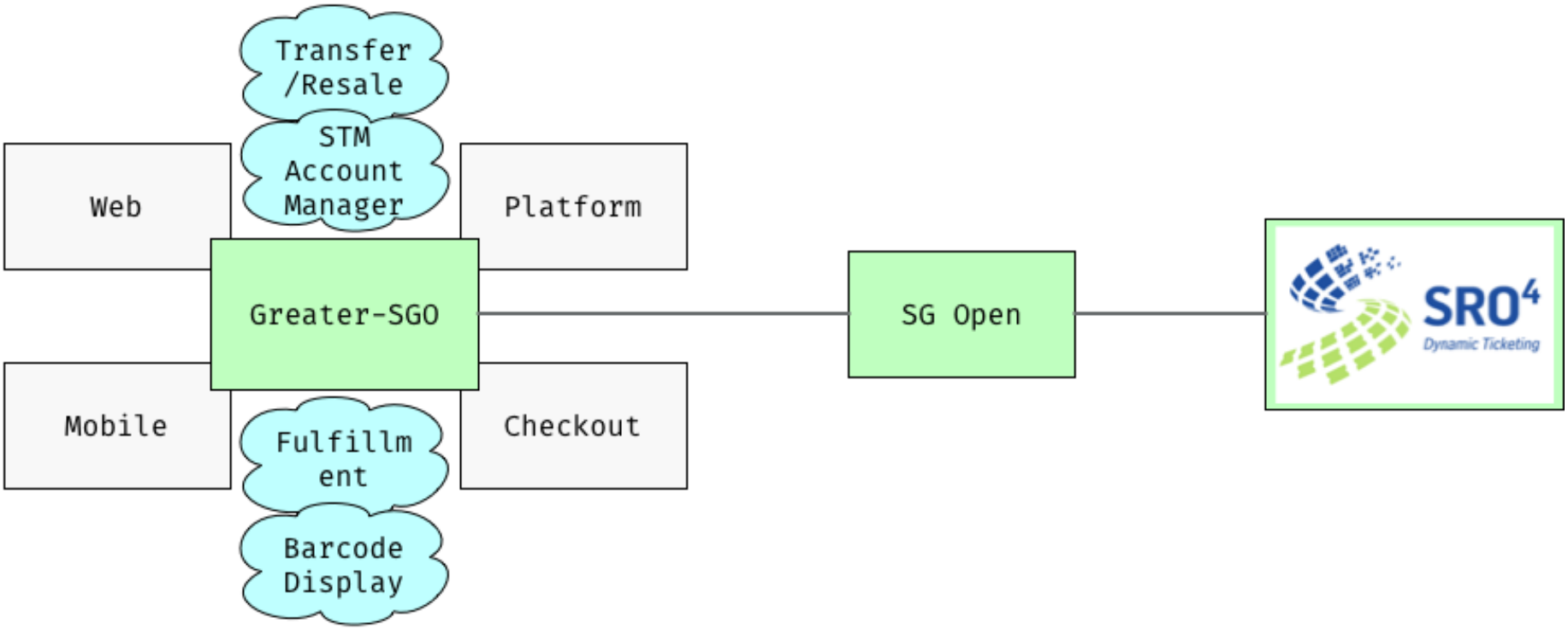
Team structure

DID NOT REFLECT (desired) **CAPABILITIES**


Web
Platform
Mobile
Checkout


Web
Platform
Mobile
Checkout
SG Open
SRO4
Dynamic Ticketing


STM Account Manager
Transfer /Resale
Web
Platform
SG Open
SRO4
Dynamic Ticketing
Mobile
Checkout
Barcode Display
Fulfillment


Transfer /Resale
STM Account Manager
Web
Platform
Greater-SGO
SG Open
SRO4
Dynamic Ticketing
Mobile
Checkout
Fulfillment
Barcode Display

Evolving an architecture might require re-evaluating

ORGANIZATIONAL RESPONSIBILITIES

DOCUMENTATION

KNOWLEDGE lives with teams

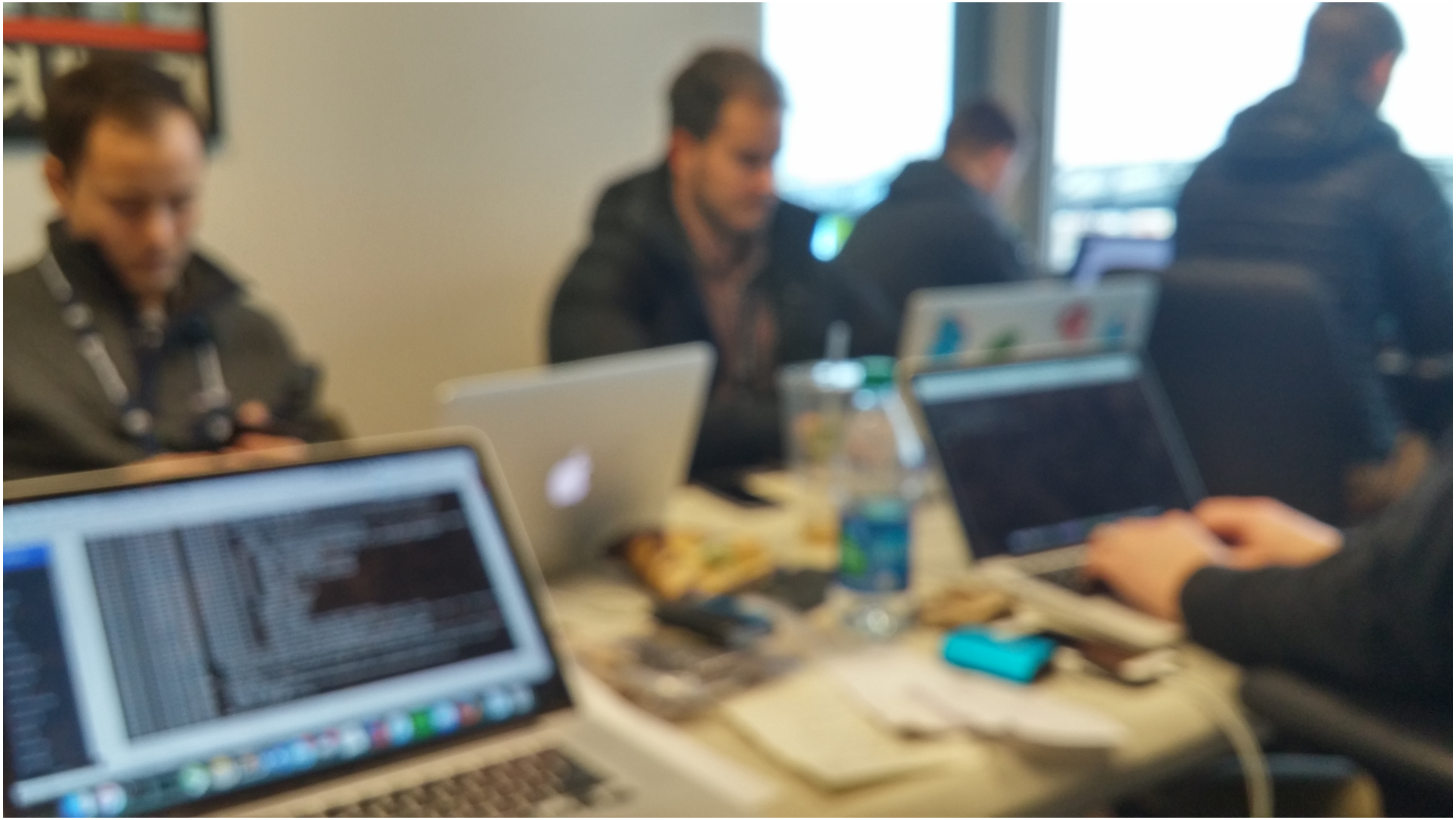
Teams **CHANGE** over time

Documentation needs to be

"HIGHLY AVAILABLE"

Back to March 11, 2017…

SPORTING
MLS WORKS
FOLLOW US ON TWITTER



Children's Mercy Park
ivy
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KC

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TOYOTA
H&R BLOCK
BUSINESS
MASS ST
MOB
Continental TIRE
adidas
ADVOCARE
SeatGeek
O'ER THE LAND OF THE FREE AND THE HOME OF THE BRAVE
MY GAME IS FAIR PLAY

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