

Domain Service Aggregators



A Structured Approach to
Microservice Composition

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INTRO

Based on a true story...



How do you build Microservices?



*You stand on the shoulders of
giants*

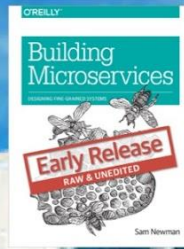


James Lewis

<http://www.thoughtworks.com/insights/blog/microservices-nutshell>
<http://www.se-radio.net/2014/10/episode-213-james-lewis-on-microservices>

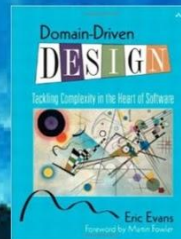
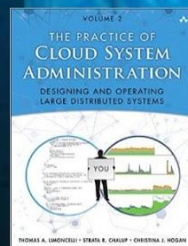
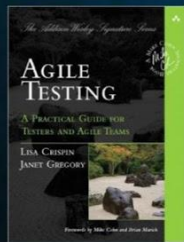
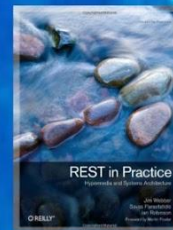
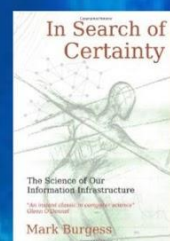
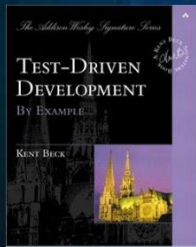
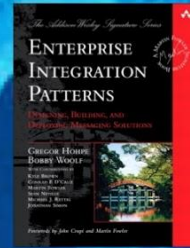
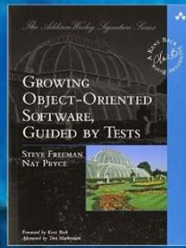
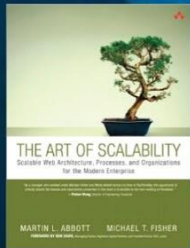
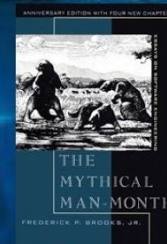
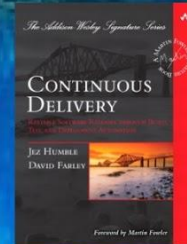
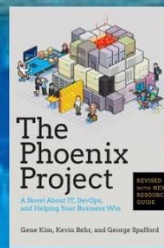
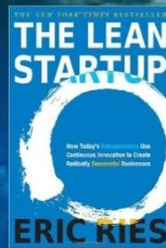
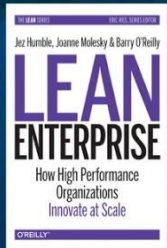
“Microservices Iceberg”



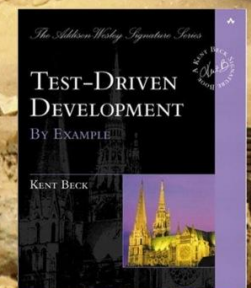
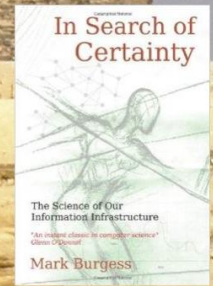
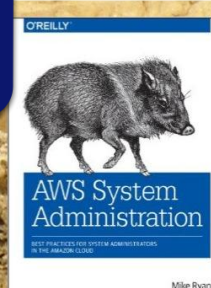
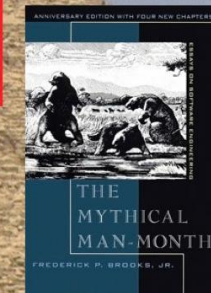
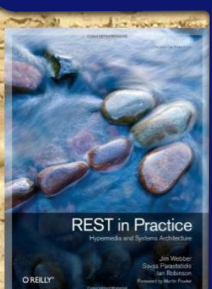
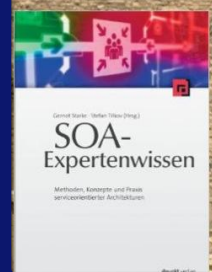
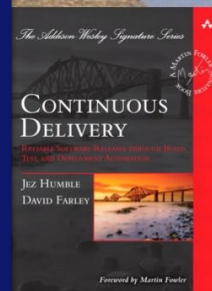
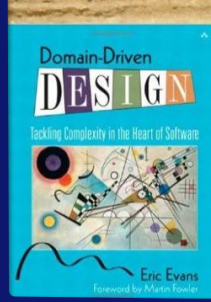
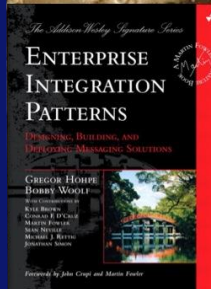
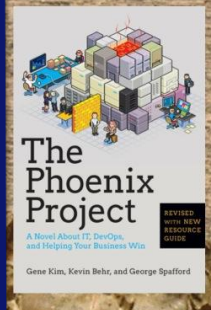
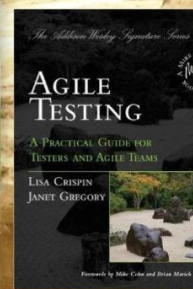
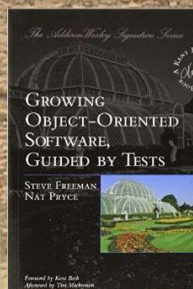
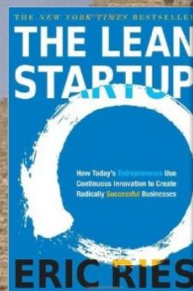
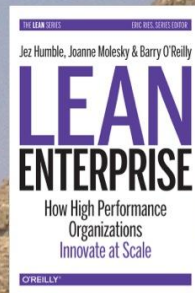
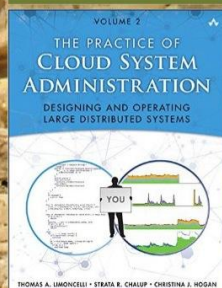
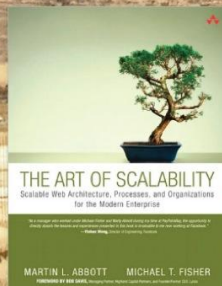
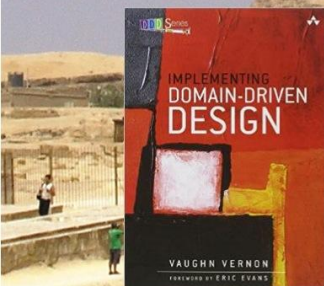


“Microservices Iceberg”

“Microservices Iceberg”



“Firm Foundations”



Home

A - Z

Settings



Coronation Street
Friday 14 Nov 7.30pm



Downton Abbey
Sunday 9 Nov 9pm



itv **I'm A Celebrity... Get Me Out of Here!**
Sunday 16 Nov 9pm



The Only Way is Essex
Wednesday 12 Nov 10pm



Emmerdale
Thursday 13 Nov 7pm



Law & Order: Special Unit
Thursday 12 Nov 10pm



Benidorm
Sunday 13 Nov 7pm

Evolving our Architecture

It is difficult to understand / change our current television catchup services. We want to replace them.

Our core systems are also difficult to change and do not scale well but we are not ready to replace them yet.

*Isolate and protect the core systems.
Build Microservices.
Use REST.*



1. DOMAIN SERVICES

Building Blocks for a Microservices Architecture



Catalogue

Schedule

Licencing

Images

Home

A - Z

Settings



Downton Abbey

Series 3 - Episode 5 Sun 30 Sept 10.15pm 7 days left

Maggie Smith, Hugh Bonneville and Elizabeth McGovern star in a glittering period drama following the lives of the aristocratic...

G Contains strong language

30:00 15:00



5 more episodes

Guidance

Video

Catalogue

Schedule

Licencing

Guidance

Video

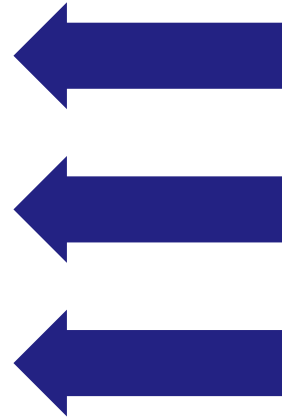
Images

A set of Bounded Contexts

Organisational Boundaries work best

High Cohesion, Loose Coupling

Think Resource Oriented



/catalogue/episodes/123456

```
{  
  "synopsis" : "Maggie Smith, Hugh Bonneville and  
Elizabeth McGovern star in a glittering period  
drama following the lives of the aristocratic Crawley  
family on their estate, Downton.",  
  "orderInSeries" : 2,  
  "orderInProgramme" : 23  
}
```

Catalogue

REST

/guidance/episodes/123456

```
{  
  "restricted" : true,  
  "message" : "Contains Strong Language"  
}
```

Guidance

/licencing/licences?episode=123456

```
{
  "_embedded": {
    "licences": [
      {
        "platform": "samsung",
        "startDate": "2013-01-04T19:30:00Z",
        "endDate": "2013-01-11T19:30:00Z"
      }
    ]
  }
}
```

REST

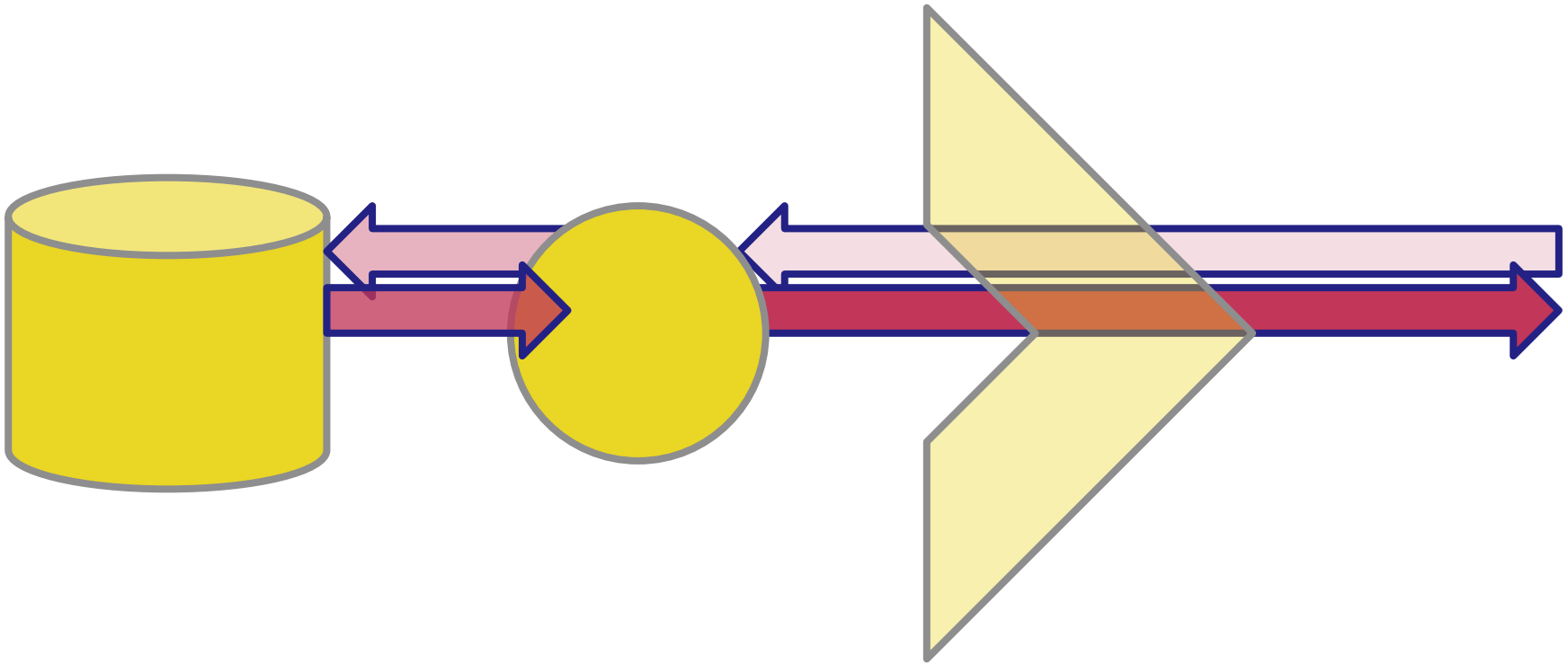
Licencing

External Caching on a Domain

Legacy System

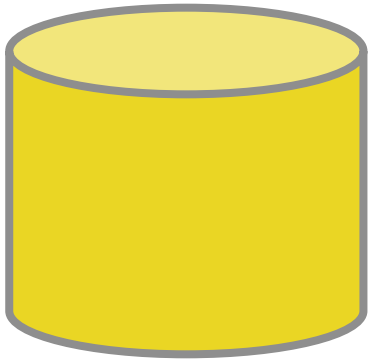
Microservice

Varnish Cache

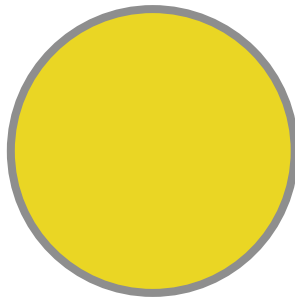


External Caching on a Domain

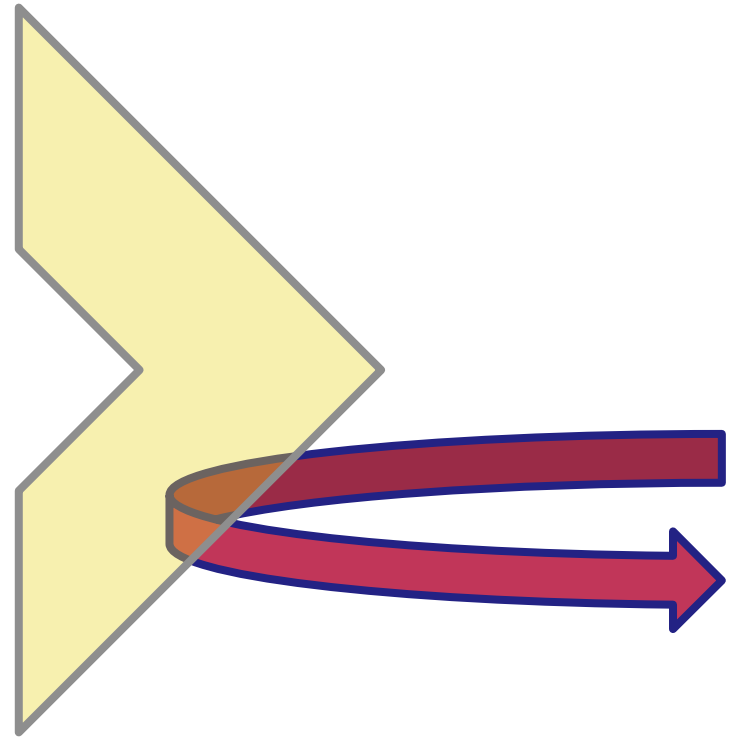
Legacy System



Microservice



Varnish Cache

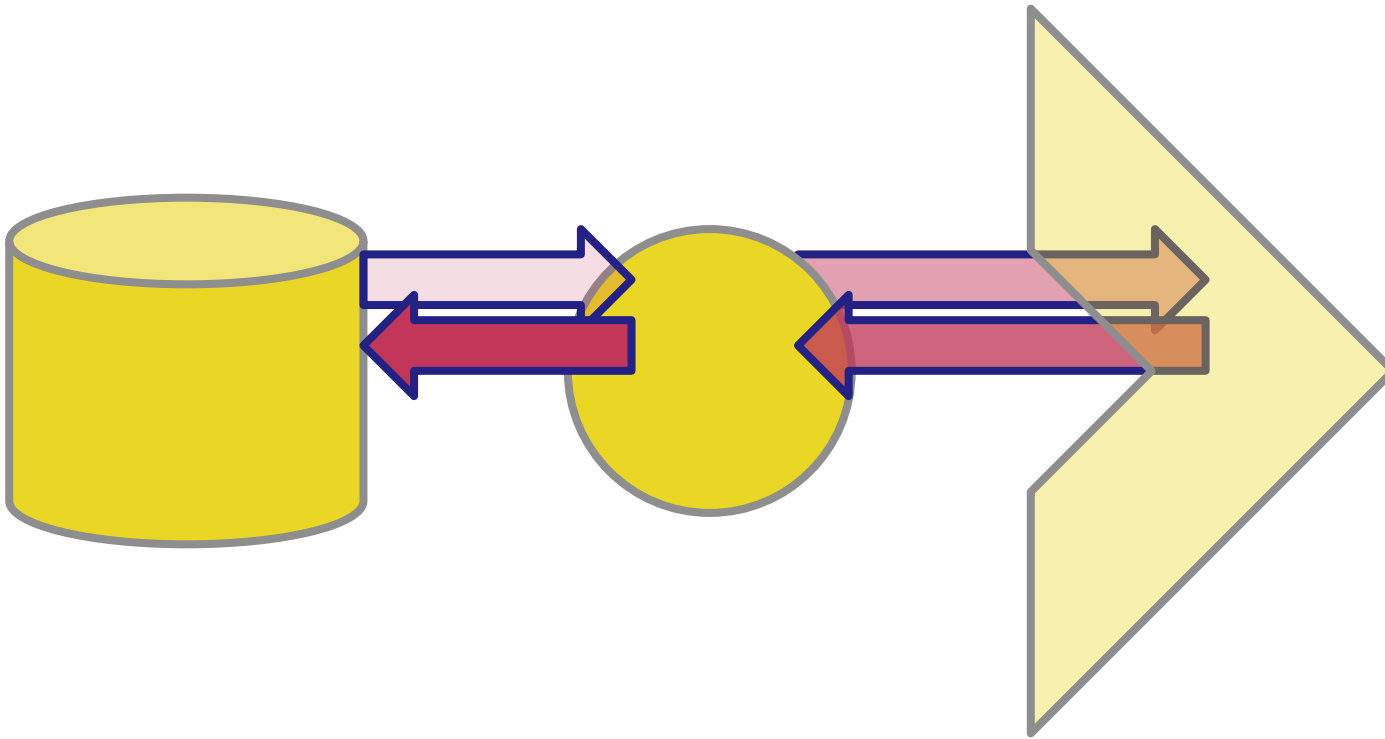


Invalidating External Caching on a Domain

Legacy System

Microservice

Varnish Cache

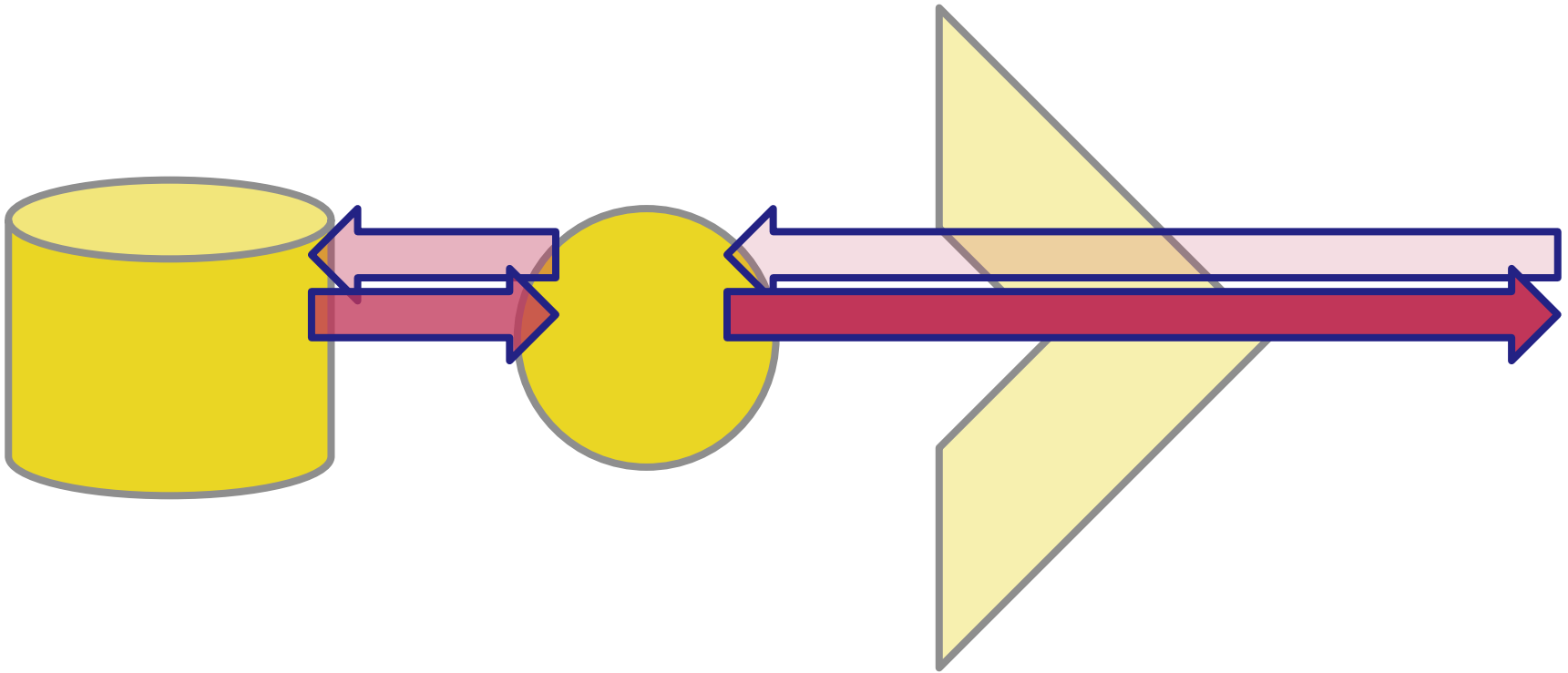


Invalidating External Caching on a Domain

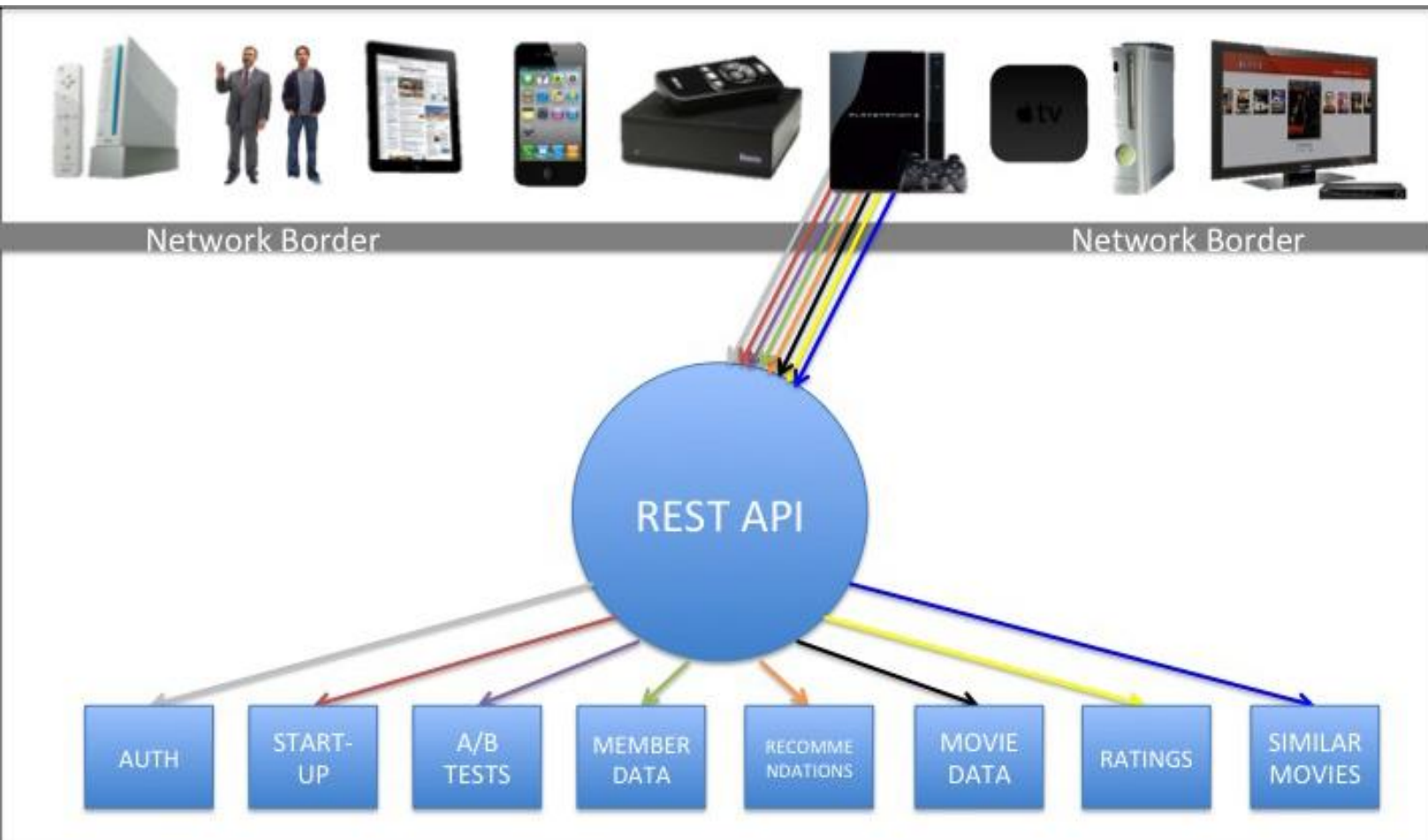
Legacy System

Microservice

Varnish Cache



The Netflix API Gateway Pattern



<http://techblog.netflix.com/2012/07/embracing-differences-inside-netflix.html>

<https://github.com/Netflix/zuul/wiki>

Vendor API Gateways - The ESBs of Tomorrow?

“Build "mash-ups" and composite services by orchestration or aggregation of existing APIs and web services.”



“Customizable API composition and virtualization capabilities.”



API Gateway (formerly CA Layer 7 API Gateway)



Successes



Bounded Contexts



Resource Oriented



Anti-Corruption Layers



Compromises



Ignored Underlying Data Sources



API Gateway can become a monolith

2.

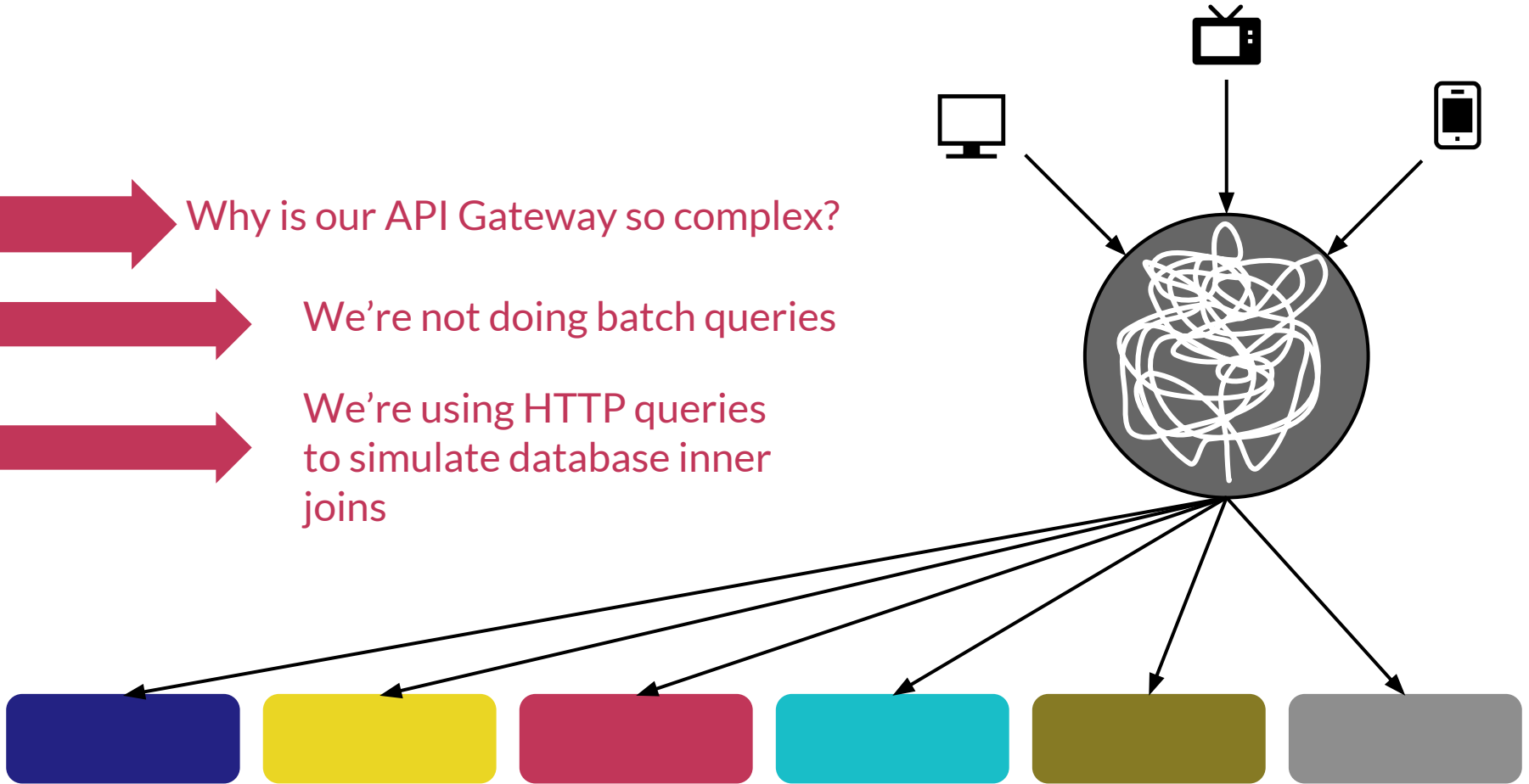
THE WRONG WAY

of Scaling Aggregation

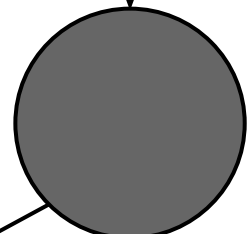
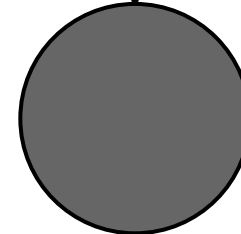
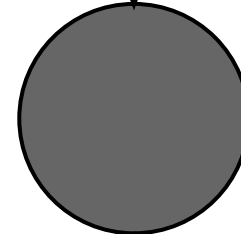


API Gateway

- Why is our API Gateway so complex?
- We're not doing batch queries
- We're using HTTP queries to simulate database inner joins



VOD Aggregation Service



Video On Demand Aggregation



client specific integrations
separated

new VOD Service gets datastore

less HTTP calls

exploit appropriate
datastore query tools

VOD Service populated by events

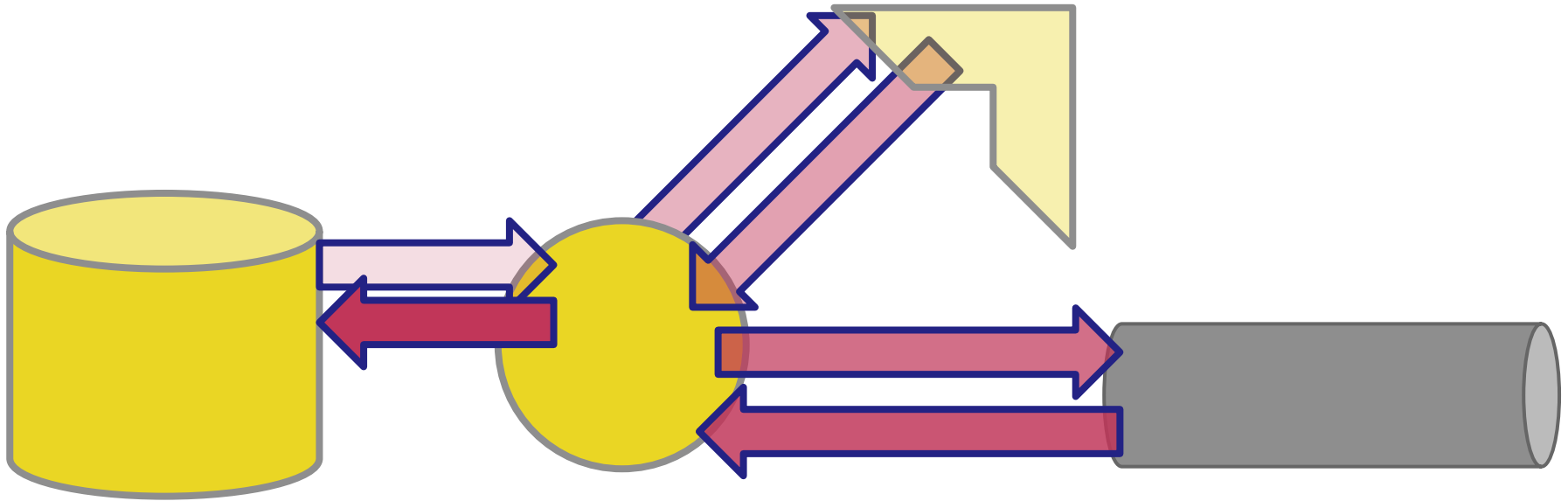
Publishing Updated Events

Legacy System

Microservice

Varnish Cache

SQS / AMQP



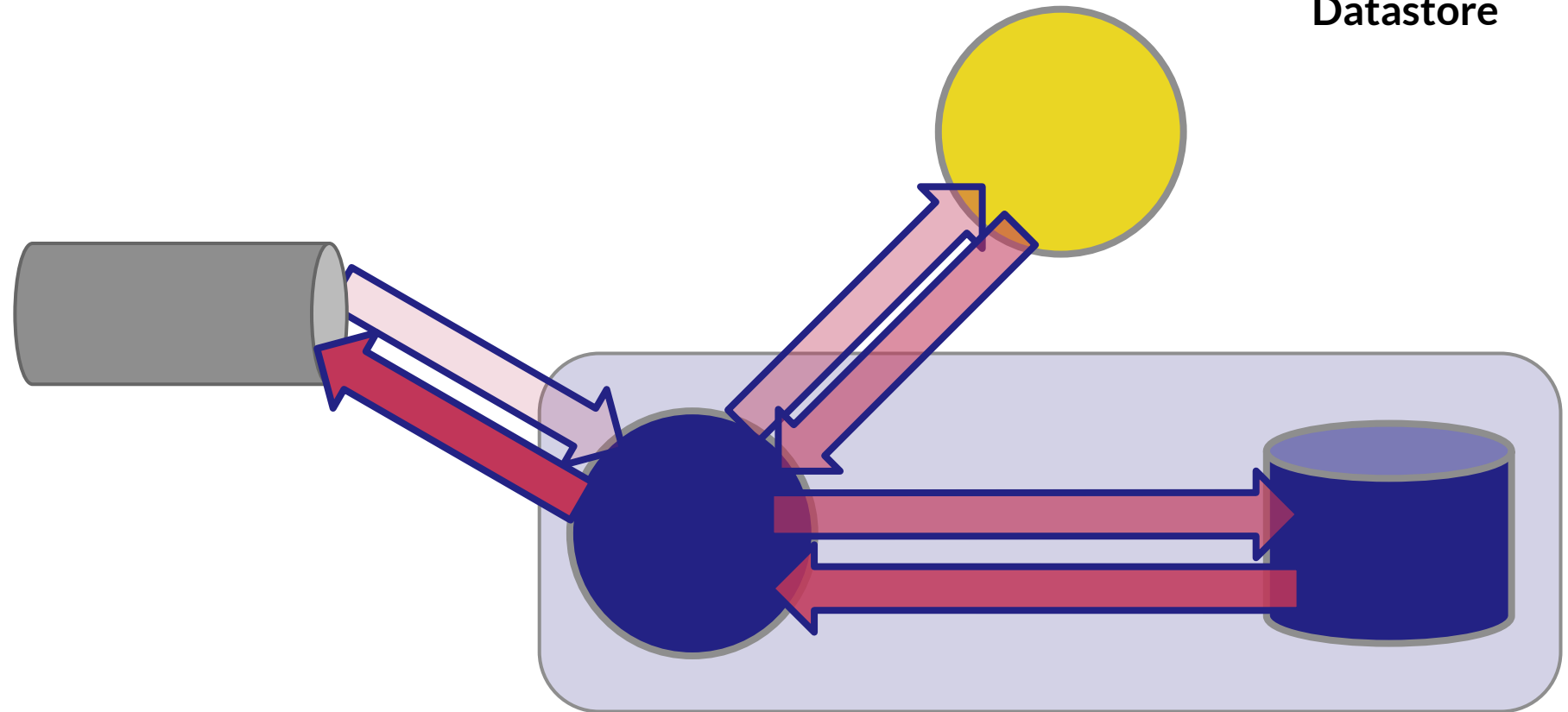
Consuming Updated Events

SQS / AMQP

Aggregation
Service

Domain
Service

Aggregation
Service
Datastore



Domain Service and Aggregator Service compared

Domain Service

Like a single DB table

Consistent

Modified by Human
Commands

Long lived datastore

Aggregation Service

Like a DB projected view

Eventually Consistent

Modified by Domain
Update Events

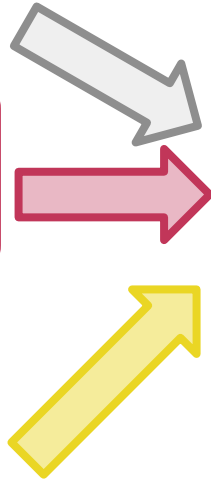
Ephemeral
datastore

Aggregated Resource Model

```
{  
  "synopsis" : "Maggie Smith,  
  Hugh Bonneville and Elizabeth  
  McGovern star in a glittering  
  period drama [...]"
```

```
{  
  "restricted" : true, [...]
```

```
{  
  "_embedded": {  
    "licences": [  
      {  
        "platform": "samsung",  
        "startDate" : [...]
```



/vod/ios/episodes?channel=ITV&
q=Downton&grouping=alphabetical

```
{  
  "_embedded": {  
    "productions": [  
      {  
        "synopsis" : "Maggie Smith, Hugh  
        Bonneville and Elizabeth McGovern star in a  
        glittering period drama [...]",  
        "restricted" : true,  
        "startDate" : [...],
```

VOD

Successes



Client Integration separated from Service Aggregation



“Inner Join” HTTP Calls eliminated



Query logic delegated to specialist datastore

Compromises



High Coupling between Aggregator and Domain Services



Aggregator must be updated if Domain Services Change

3. THE RIGHT WAY

of Scaling Aggregation

Catalogue

Schedule

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A - Z

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Downton Abbey

Series 3 - Episode 5 Sun 30 Sept 10.15pm 7 days left

Maggie Smith, Hugh Bonneville and Elizabeth McGovern star in a glittering period drama following the lives of the aristocratic...

G Contains strong language

30:00 15:00



5 more episodes

Guidance

Availability

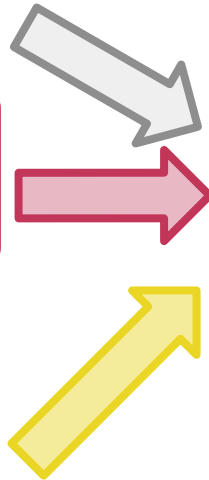
Video

HATEOAS

```
{  
  "synopsis" : "Maggie Smith,  
  Hugh Bonneville and Elizabeth  
  McGovern star in a glittering  
  period drama [...]"
```

```
{  
  "restricted" : true, [...]
```

```
{  
  "_embedded": {  
    "licences": [  
      {  
        "platform": "samsung",  
        "startDate" : [...]
```

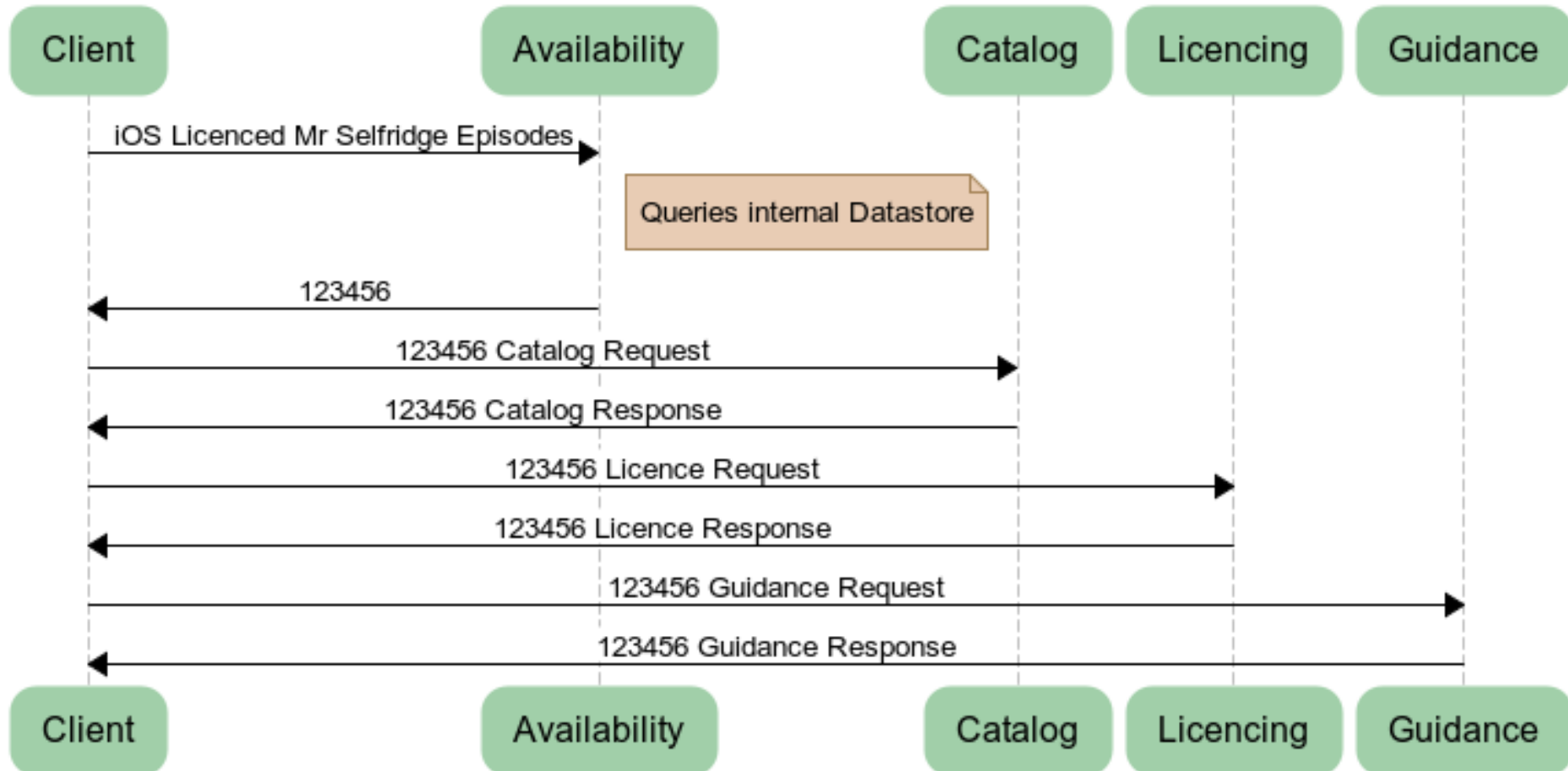


/vod/ios/episodes?channel=ITV&
q=Downton&grouping=alphabetical

```
{  
  "_embedded": {  
    "productions": [  
      {  
        "episodeId" : 123456,  
        "available" : true,  
        "_links": {  
          "catalogue": {  
            "href": "/catalogue/episodes/123456",  
          },  
          "guidance": {  
            "href": "/catalogue/guidance/123456",  
          },  
          [...]
```

Availability

Availability Request Sequence



Successes

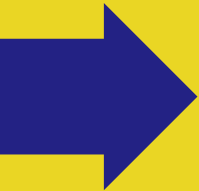


Identified a new and highly cohesive domain

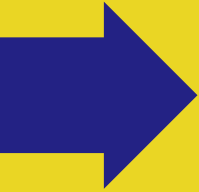


Decoupled domain services from domain aggregator

Compromises



We've pushed some duplicated logic back into API Gateways



A challenge for Consumer Contract Testing

4. VERSIONING

What aggregation can teach us about it

/catalogue/v1/episodes/123456

Catalogue

/vod/ios/v1/episodes?channel=ITV&q=Downton&grouping=alphabetical

```
{
  "_embedded": {
    "productions": [
      {
        "_links": {
          "catalogue": {
            "href": "/catalogue/v1/episodes/123456",
            [...]
          }
        }
      }
    ]
  }
}
```

Availability

Don't Version your APIs

Version the Host

HTTP GET:

`https://v1.api.itv.com/catalogue/episodes/123456`

Accept: application/hal+json

Require a Custom Version Header

HTTP GET:

`https://api.itv.com/catalogue/episodes/123456`

Api-Version: 1

Accept: application/hal+json

Require a Version Request Parameter

HTTP GET:

`https://api.itv.com/catalogue/episodes/123456?version=1`

Accept: application/hal+json

Require a Version in the Accept Header Media Type

HTTP GET:

`https://api.itv.com/catalogue/episodes/123456`

Accept: application/vnd.itv.ctv.production.v1+hal+json

HTTP GET:

`https://api.itv.com/catalogue/episodes/123456`

Accept: application/vnd.itv.ctv.production+hal+json;version=1



Web browser makes a standard request

HTTP GET:
`https://api.itv.com/catalogue/episodes/123456`
`Accept: text/html;q=0.9,image/webp,*/*;q=0.8`



Give it html

HTTP GET:
`https://api.itv.com/catalogue/episodes/123456`
`Content-Type: text/html; charset=utf-8`

This is the text/html version of the response for the platform API request that you made.

If you want a machine readable JSON response, please be sure to set one of the following Accept headers:

"application/vnd.itv.ctv.production.v1+hal+json; charset=UTF-8".

API Description

Will return the most recent playable production of the most popular [size:15] programmes. The results are not filtered because broadcaster parameter [broadcaster:ITV] has the rights for all channels. Valid broadcasters are [ITV,STV,UTV,UNKNOWN].

```
{
  "_embedded": {
    "productions": [
      {
        "productionId": "1/0694/8568#001",
        "channel": "ITV",
        "programmeId": "1/0694",
        "programmeTitle": "Coronation Street",
        "duration": "30 mins",
        "broadcastDateTime": "Monday 2 Feb 8.30pm",
        "synopsis": "David's worst nightmare becomes real. Chesney confesses to Sinead.",
        "availabilityWindow": "28 days left",
        "moreEpisodesLabel": "21 more episodes",
        "_links": {
          "image": {
            "href": "http://mercury.itv.com/DotCom/production/image?q={quality}&format={image_format}&w={width}&h={height}&productionId=1",
            "templated": true
          }
        }
      },
    ]
  }
}
```

■

IN SUMMARY



Let the system design emerge during development

You may need to think more about how you compose your core Domains

Mix your Architectural Styles

Watch out for that monolith coming back!



Thanks!

Any questions?

You can find me at:
@caoilte_oconnor
me@caoilte.org

Credits

Thanks to:

- ▷ Presentation template by [SlidesCarnival](#)
- ▷ Photography by [Daniel Mayer](#), [Leighton Dann](#) and “[Pere](#)”
- ▷ Icons by [Webalys](#) and [Pixabay](#)

