Breaking Down Monoliths using GraphQL

Presenter: David Lucas

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Who am I ?

- Over 25 years in software industry
- Working with Java since 1998
- JetBrains introduced me to Kotlin
- Server Side Kotlin Enthusiast since 2017
- Extensive production deployments
- Extensive distributed development

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Who am I ?

- 2022 Promoted from Dad to Gramps

Goals

- Challenges with Monoliths / Polyliths
- So you decided on a MicroService?
- RESTing on Gateways
- Thinking in GraphQL
- DEMO
- Summary
- FREE STUFF:
  give away a few parting gifts

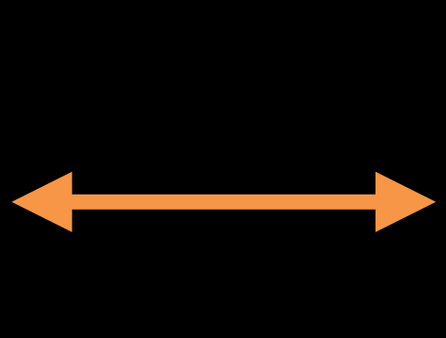
Challenges with Monoliths

(mono=one lith=stone)

Uluru or Ayers Rock, Australia
largest monolith in the world
1,142 foot high and 5.8 miles circumference

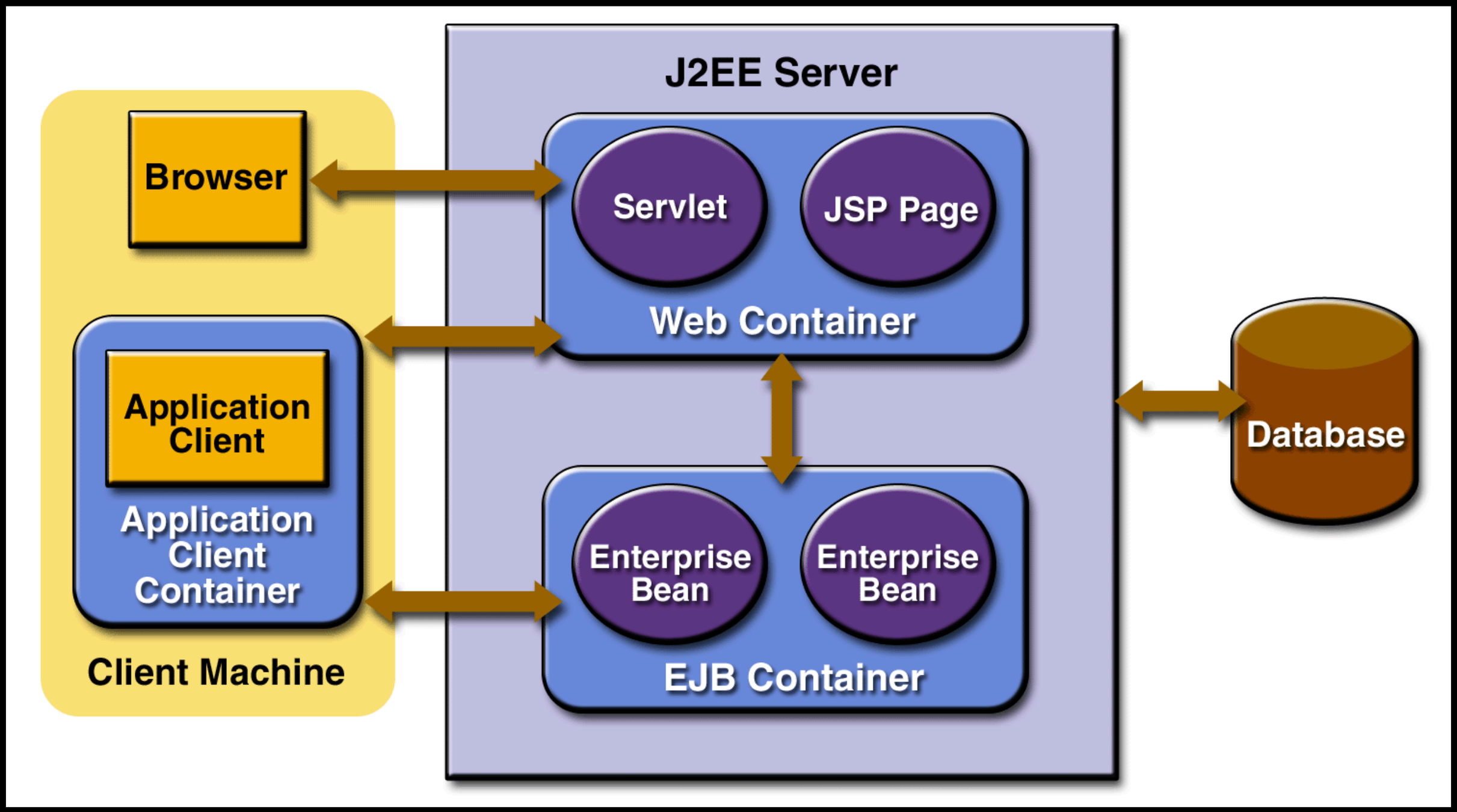
Challenges with Monoliths

Macroservice (internalized applications)



Challenges with Monoliths

Application Server mimics Mainframes



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Challenges with Monoliths

- One instance of processing power
- Centralized Processing Logic and Data
- Lots of Interprocess Communications
- Traditional Mainframe
- Early Application Servers
  weblogic / websphere / jboss / tomcat
- User Interface Generated by Server

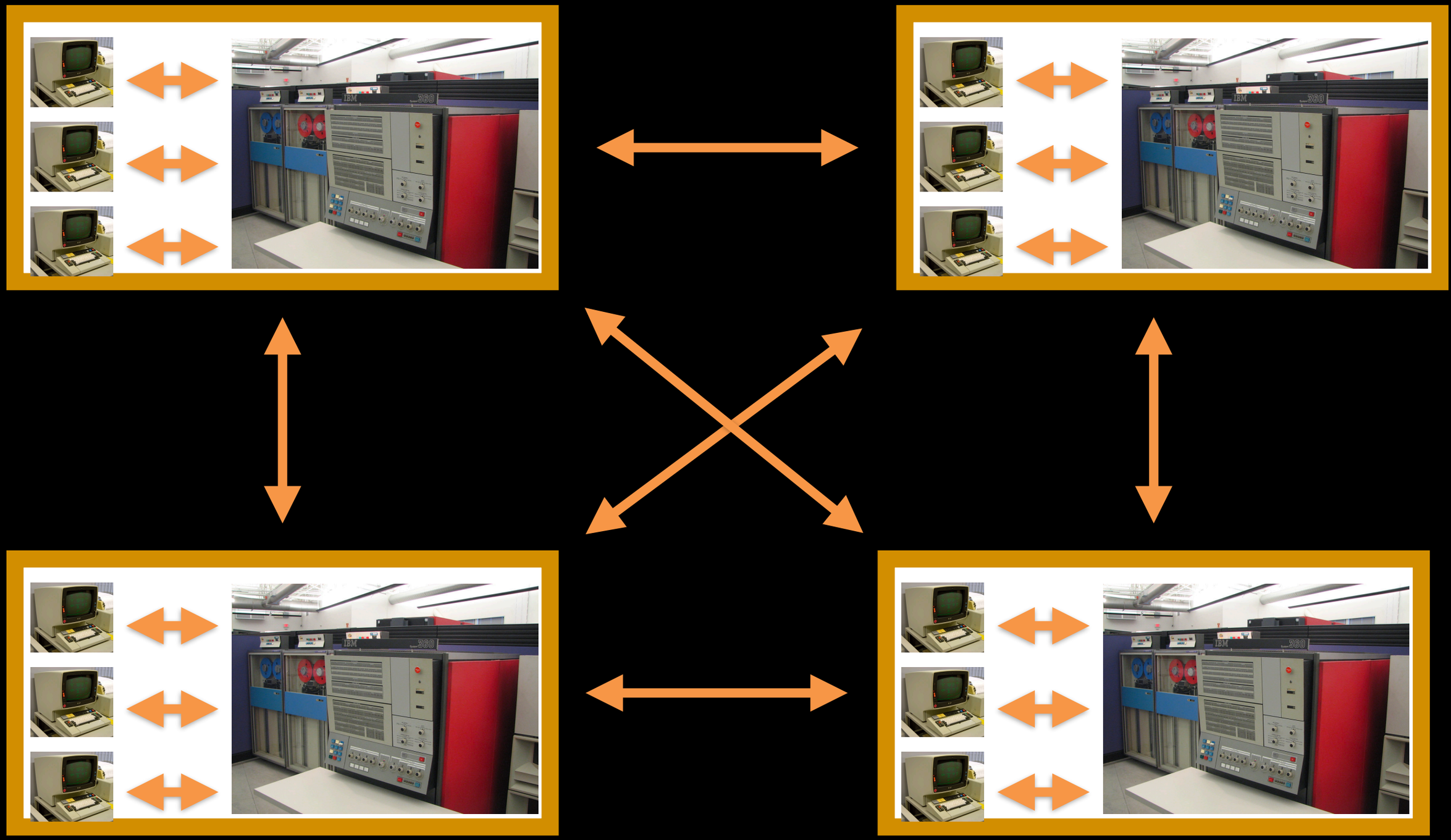
What about Polyliths?

(poly=many lith=stone)

Stonehenge, prehistoric monument, Wiltshire, England, outer ring of stones, each around 13 feet high by 7 feet wide, weighing 25 tons

Challenges with Polyliths

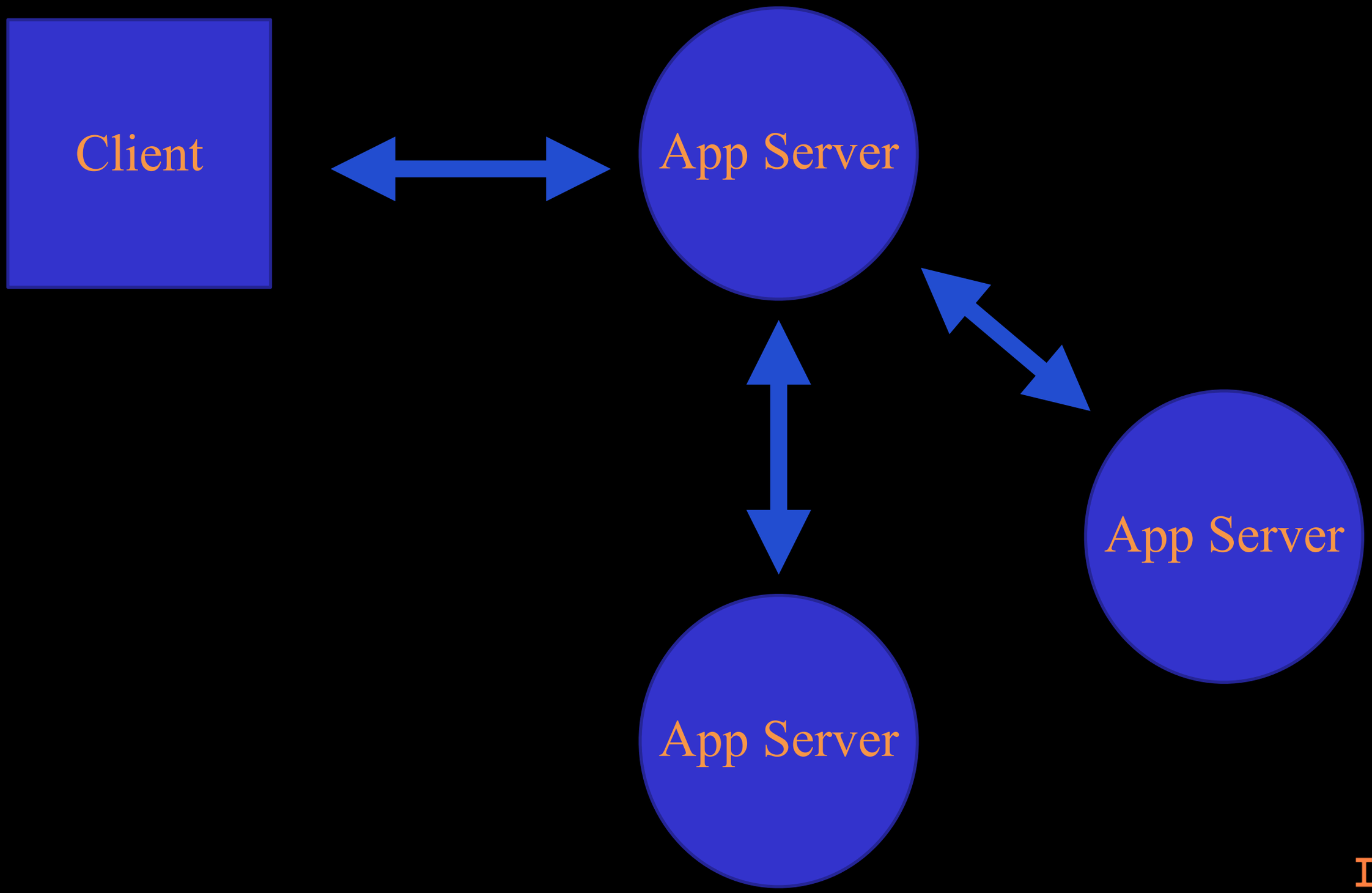
(distributed macroservices?)



Distributed System

- Multiple Large instances of processing power
- De-centralized Processing Logic
- Lots of Intra-process Communications
- Traditional Mainframe Network
- Distributed Models
  VTAM / *DCE / CORBA / DCOM*
- User Interface Remotes to distributed server

Cheaper Hardware brought about Distributed Services



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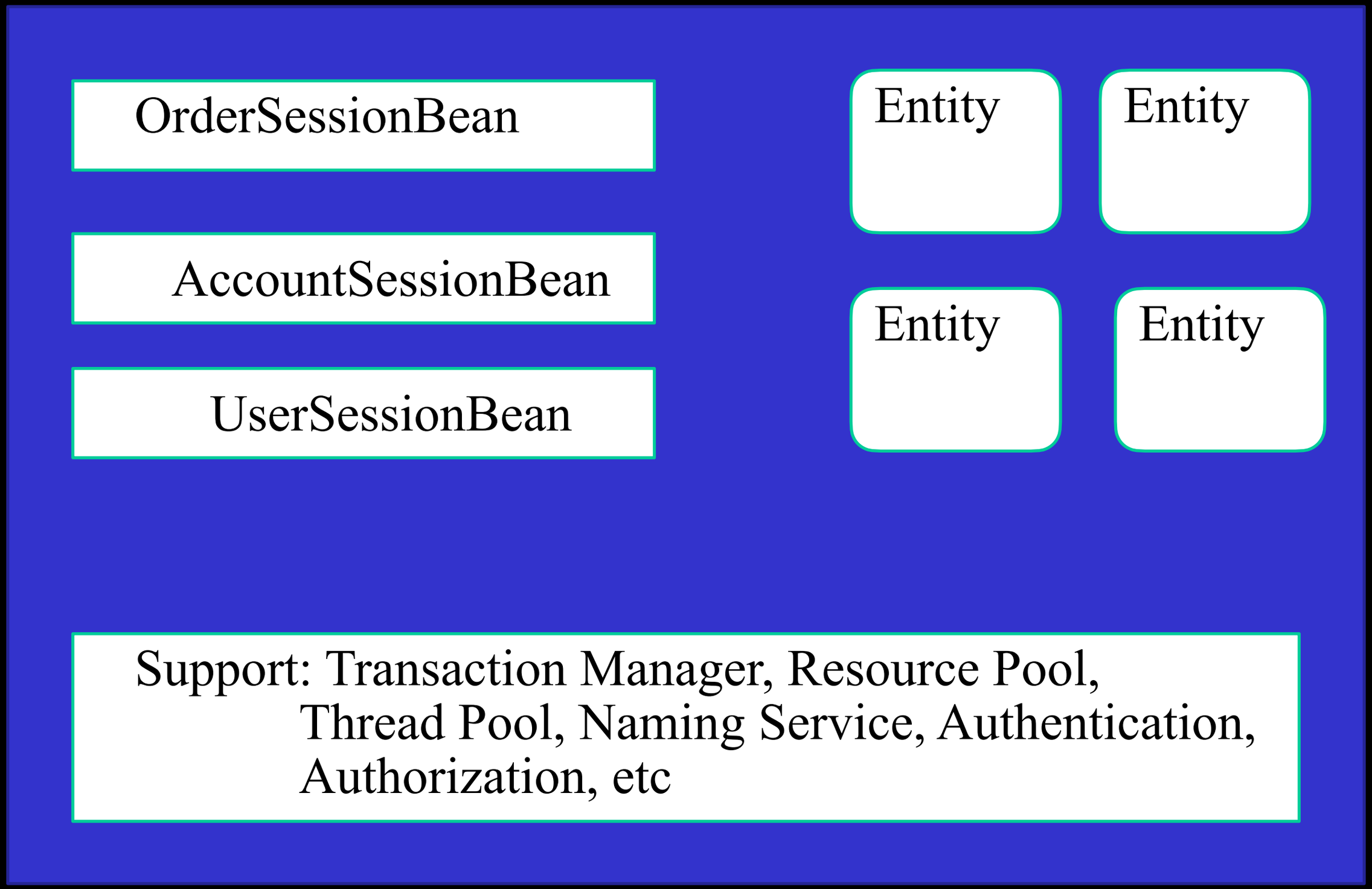
Inside The App Server



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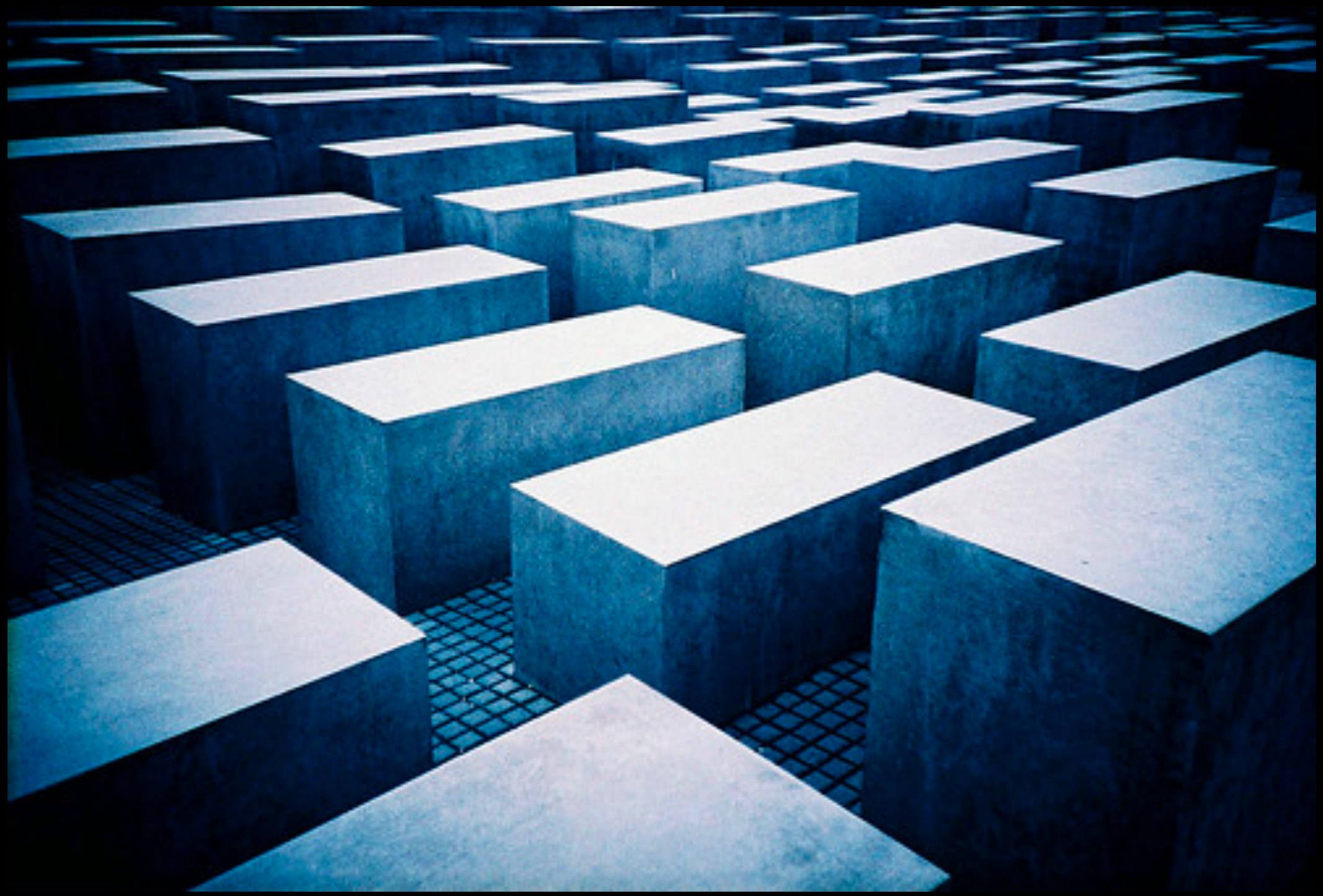
Scaling The Monolith



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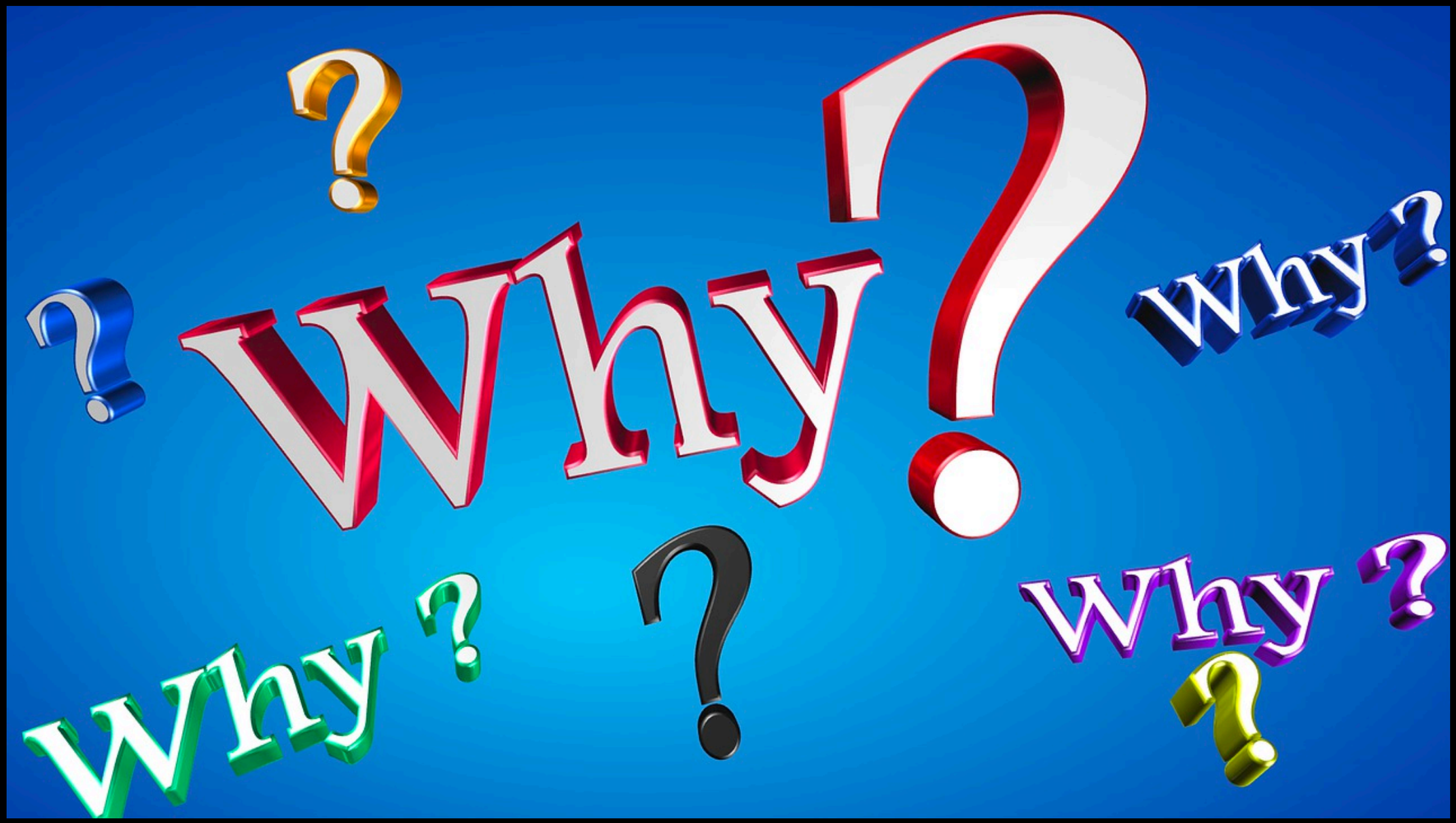
Challenges with Scaling Monoliths

- scale vertically, add memory / cpu for entire application server
- scale horizontally, duplicate physical / vm server
- Leverage Load Balancer for Traffic
- Must design for Failover

So you want to do Microservices?



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So you want to do Microservices?

Trading One Problem for Another?

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So you want to do Microservices?

- Do you have…
  - developers with skillset ?
  - organization ready for the change?
  - business alignment of organization to teams?
  - are you ready to commit ?
  - what kind of feedback loop do you have?

So you want to do Microservices?

How much code do you have ?

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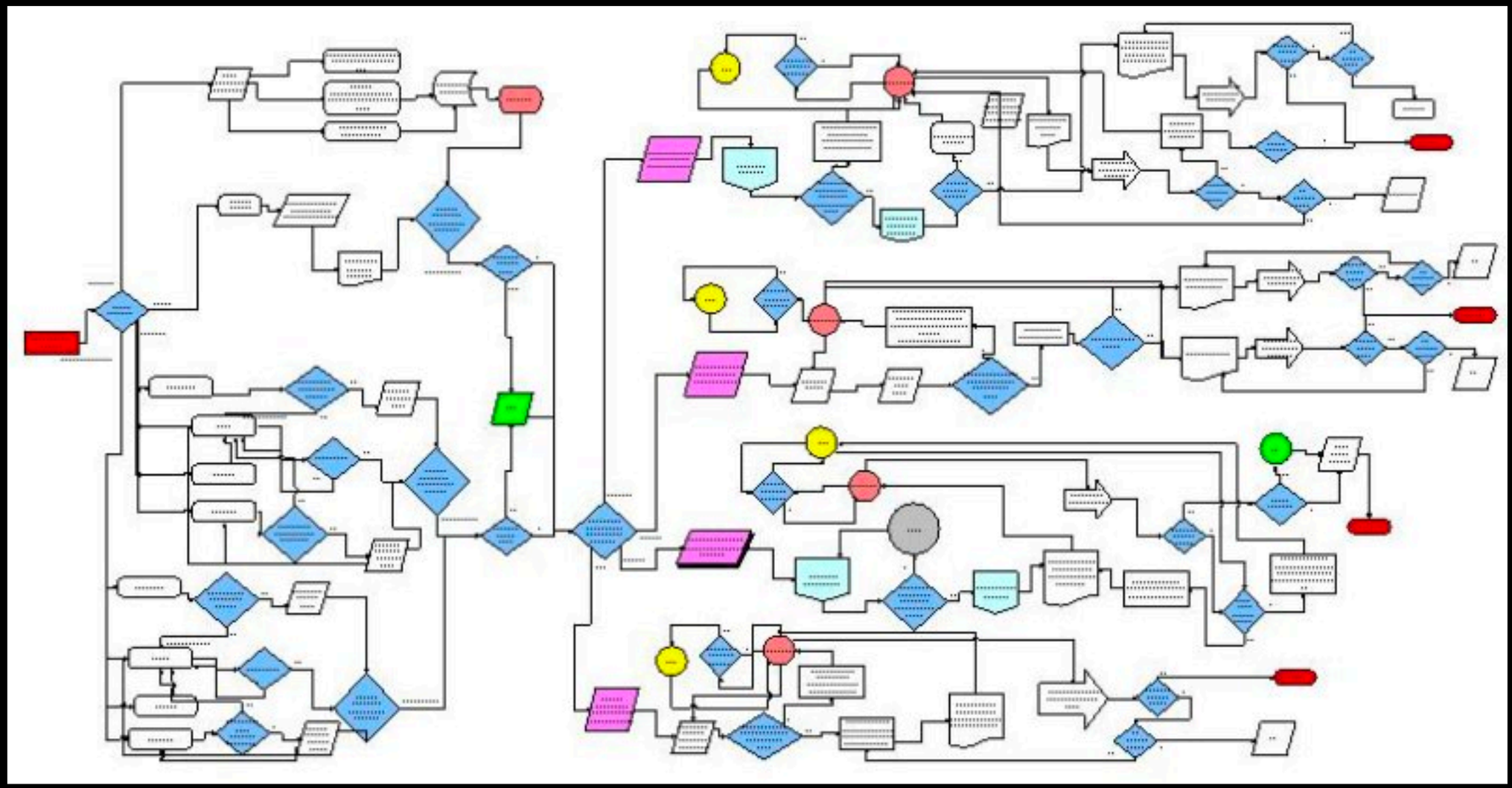
So you want to do Microservices?



What is your process like ?
Are you ready to change ?

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So you want to do Microservices?

- Need to scale certain components
- Need to isolate by domain context
- Need to shrink cpu / memory footprint
- Need to deploy for reliability and scalability
- Need to use cheaper virtual machines
- Need faster release cycle
- Did someone say cloud ?

So you want to do Microservices?

out with the unused bulky features

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Lite Solutions

- Strip out unused things (2PC TxMgr)
- Strip out distributed lookups (JNDI/NS)
- Simplify use of HTTP over proprietary
- HTTP Client to HTTP Server

- CGI / Scripting / Servlets
- Spring Components over EJBs
- Web Applications (client/server)

REST vs GraphQL

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REST vs GraphQL

- REST …
  - typically schema-less (OpenAPI)
  - leverages HTTP features (GET Cache)
  - many different flavors (ie HateOAS)
  - easier to develop
  - harder to debug
  - model is obscure based on endpoints

REST vs GraphQL

- GraphQL …
  - is typed, well defined in / out
  - control the response
  - unified domain model
  - one or more services can be leverage without front end knowing
  - better Fit for CQRS
  - aggregates can be dangerous

And so you decided to go with GraphQL…

Who is using GraphQL ?

ediket
eventOne
EXPERT360
FAIR CONSULTING GROUP
hudl
INSTANA
intuit
KLM
Fairfax Media
FILEJET
FORWARD NETWORKS
generation tux
Kyma
Loggi
lyft
Magento
GetNinjas
GitHub
Goalify
graphcms
Meta
Nash Tech.
NBC
New Relic
Northflank
one medical
PayPal
stackshare
GraphCDN
SUPPLY.com
PLURALSIGHT
Rakuten
ResearchGate
SALSIFY
swapcard
THE GUILD
The New York Times
Travaux.com
satispay
ScreenCloud
serverless
shopify
Vazco
wayfair
Werkspot

https://graphql.org/users/

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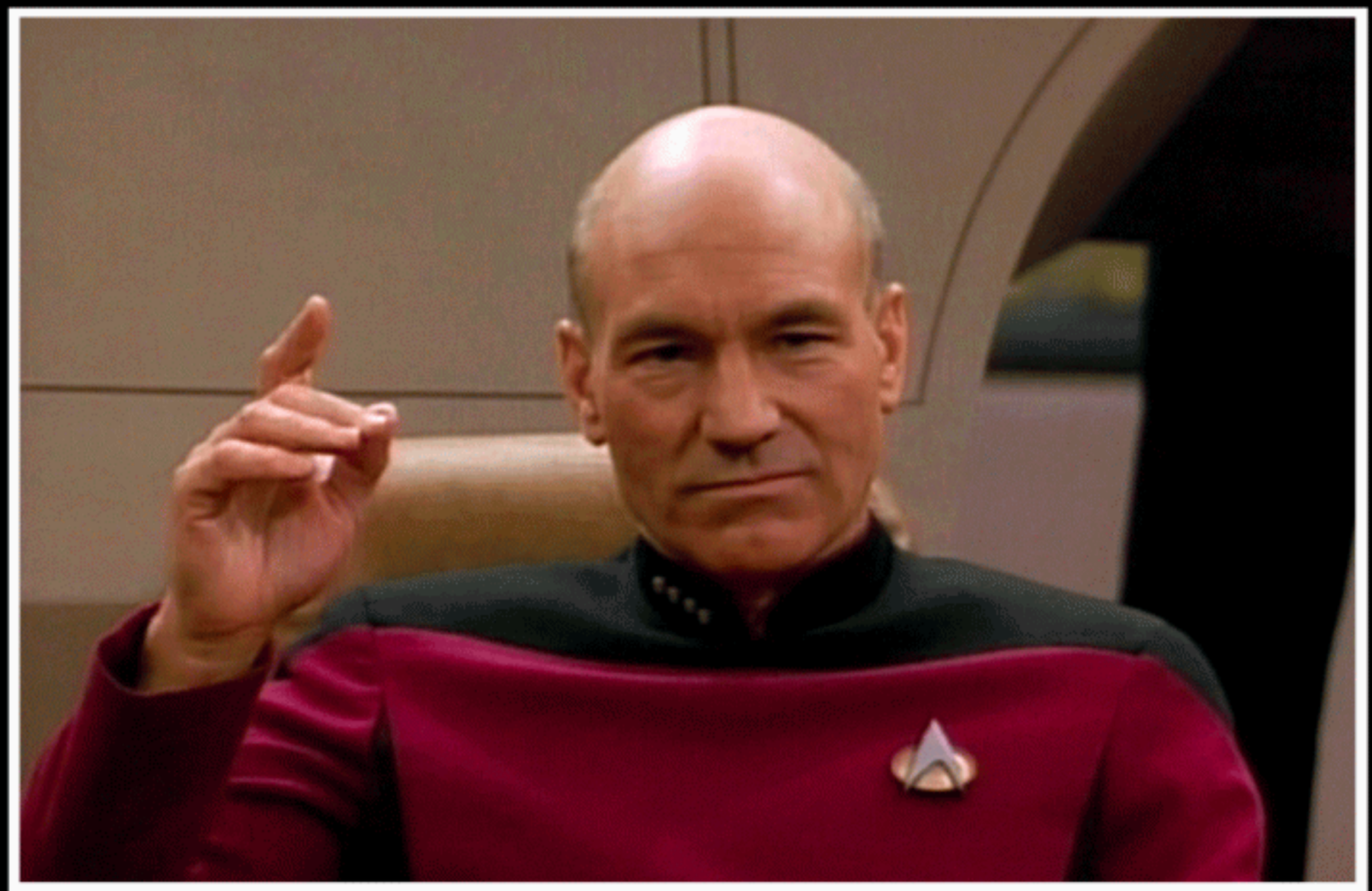
Lets Do Microservices



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MAKING IT SO

Time to Pick ?

- Choose Team
- Choose Cloud or Virtualization Provider
- Choose Dev Language and Framework
- Choose partners inside or outside org

Time to Pick ?

- Needs to support REST and GraphQL
- Pick one with OAuth2 Support
- Lite: Quarkus, Ktor, Vert.x, Micronaut
- Spring most complete for transitioning

Time to Pick ?

- Existing REST?
  - Consider API Gateway to map GraphQL endpoints to OpenAPI endpoints

- No REST
  - Go directly to GraphQL

Time to Pick ?

- API Gateway Options with GraphQL
  - Tyk
  - RapidAPI
  - WSO2 API
  - Sensedia
  - Manual Mapping
  - Cloud API Gateways starting to support

Time to Pick ?

- Federated vs Stitched Schema
  - Federated combines different schema in a registry that the “router” uses to map to services
  - Stitched is same thing but manually done

Time to Pick ?

- Federated GraphQL
  - Apollo
  - RapidAPI
  - WSO2 API
  - Sensedia
  - Manual Mapping

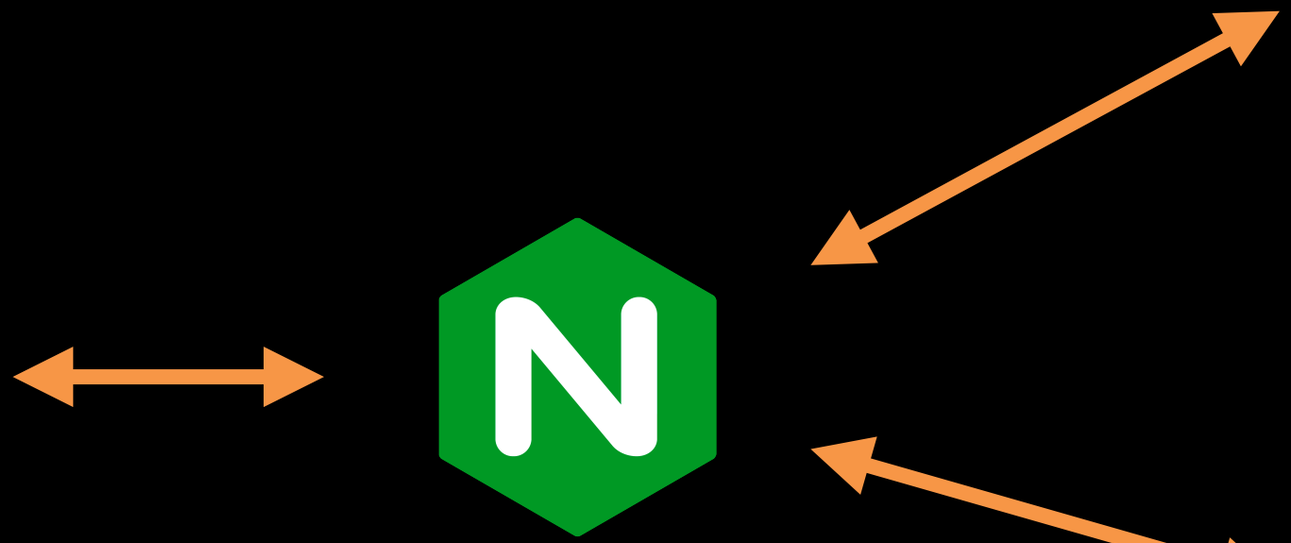
Time to Pick ?

- API Gateway Options
  - Should consume open api / swagger
  - Should consume GraphQL schema
  - Should help mapping (UI vs text)

- How BIG is your set of endpoints ?

- Are you wasting time mapping instead of moving to destination GraphQL ?

API Gateway: Before



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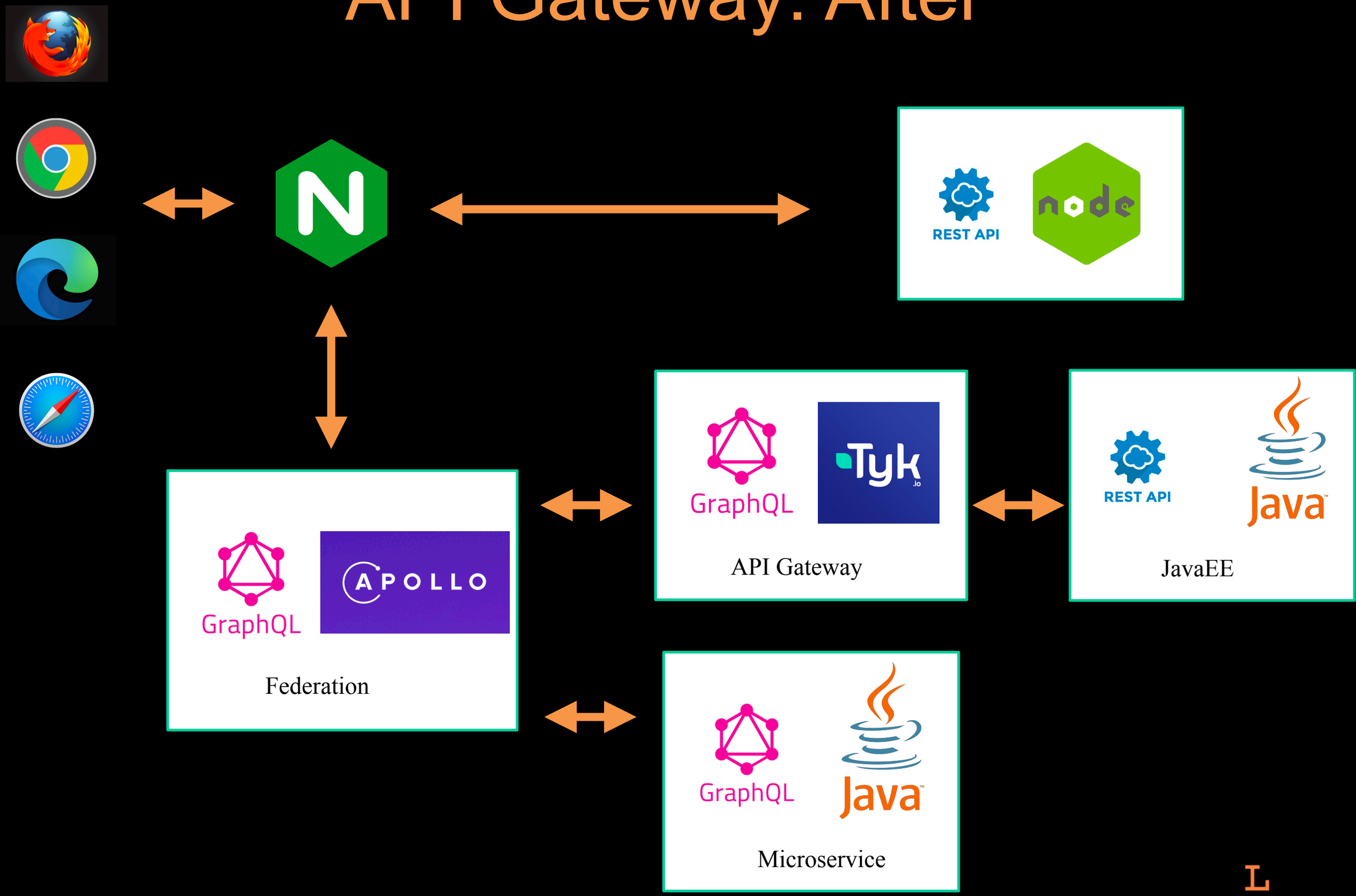
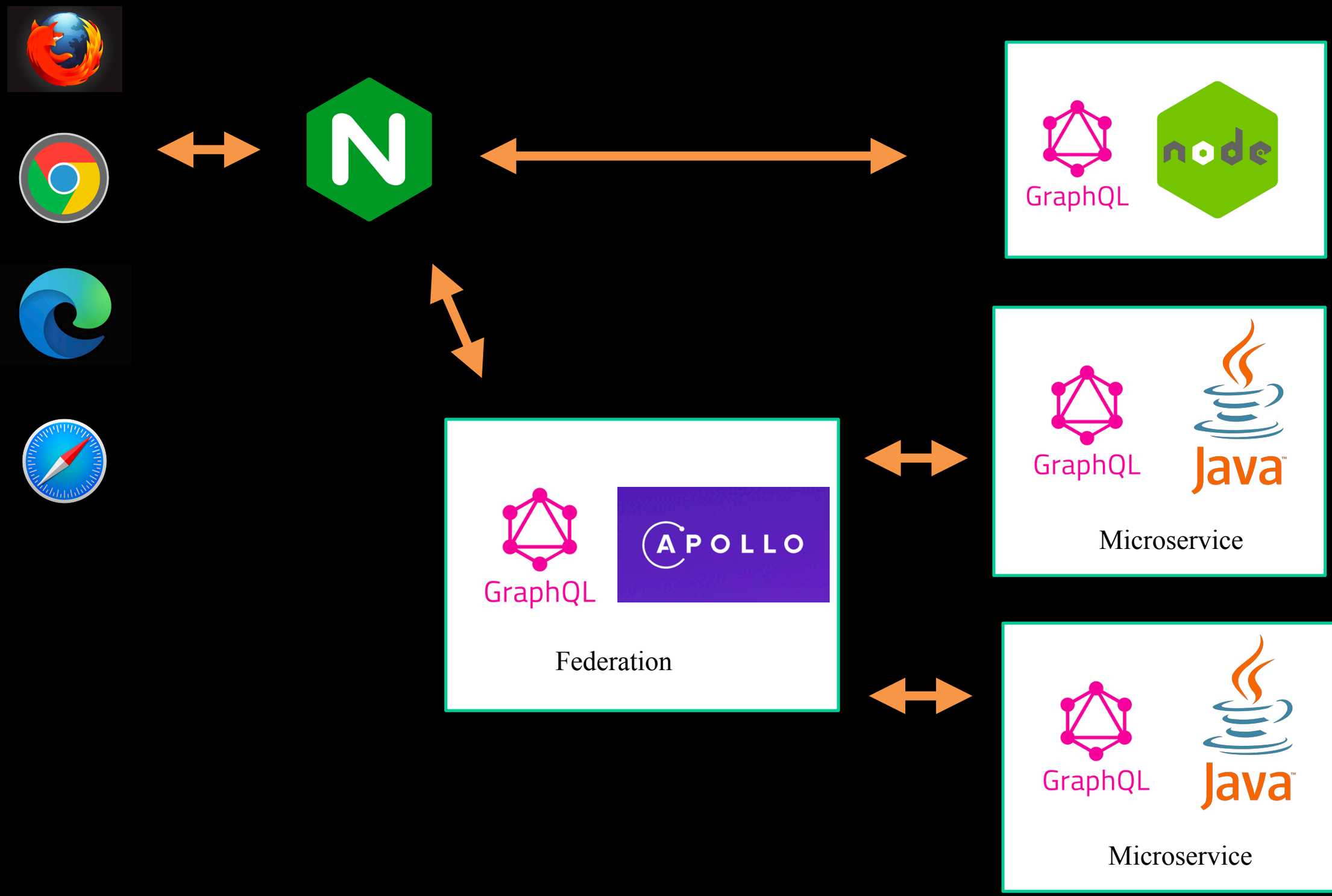
API Gateway: After



GraphQL Everywhere



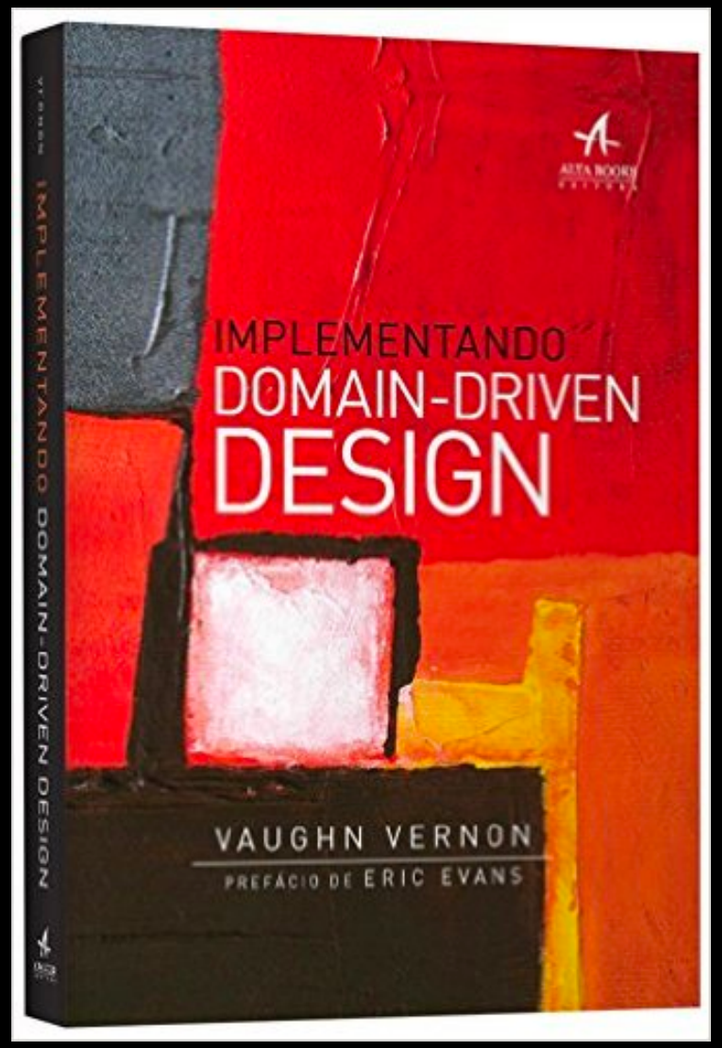
Microservices to the Rescue?

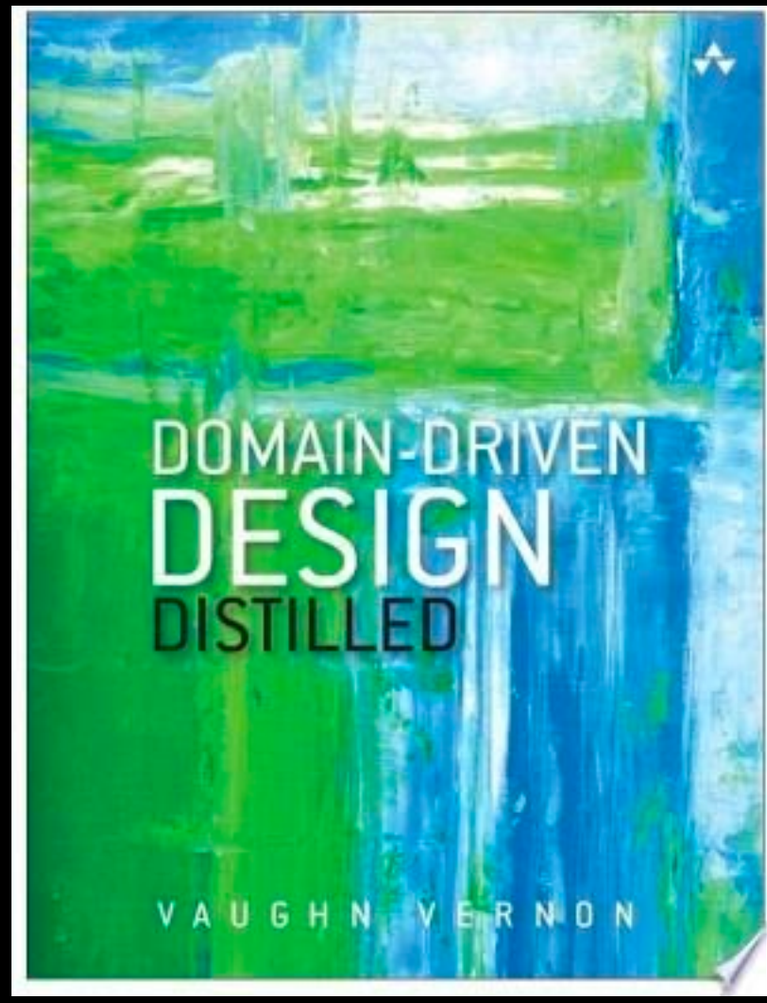
- First Separate Domains inside the Monolith
  - Controller
  - Service
  - Model Objects
  - Adapter
  - Producers / Consumers
  - Repository / DAO

Microservices to the Rescue?

- Isolated Domain Context (DDD)
- CQRS to avoid 2PC TxMgmt
  (command query responsibility segregation)
- Exclusive Persistence Control
- Event Processing replaces batch

Microservices to the Rescue?





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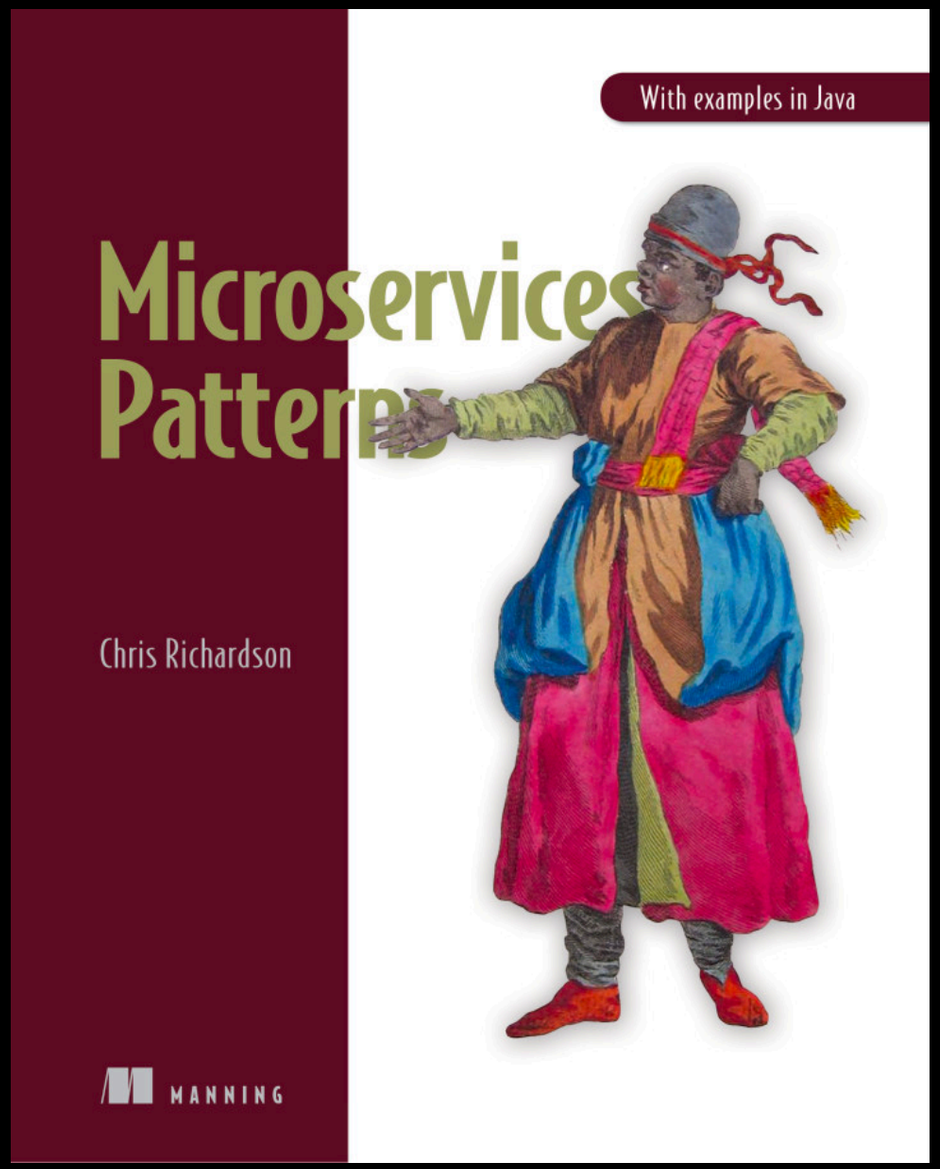
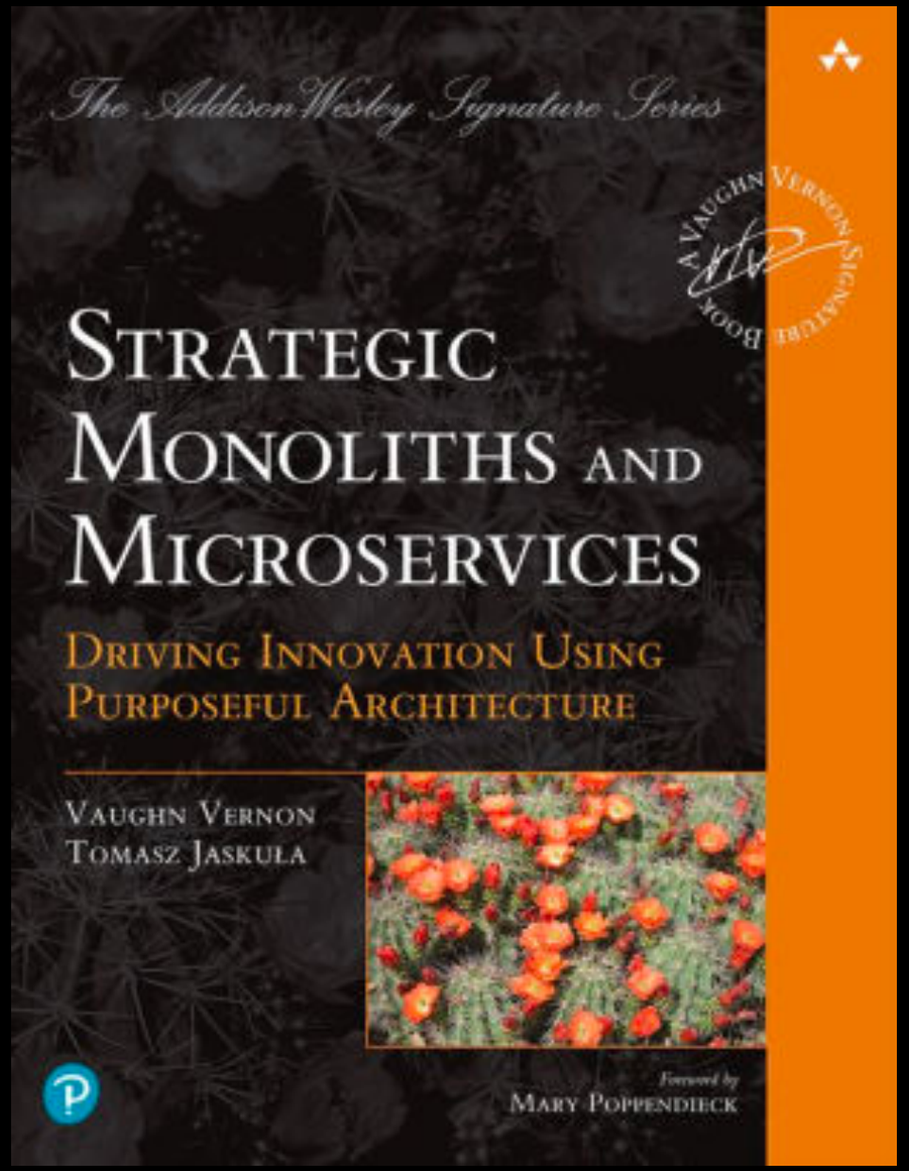
Microservices to the Rescue?





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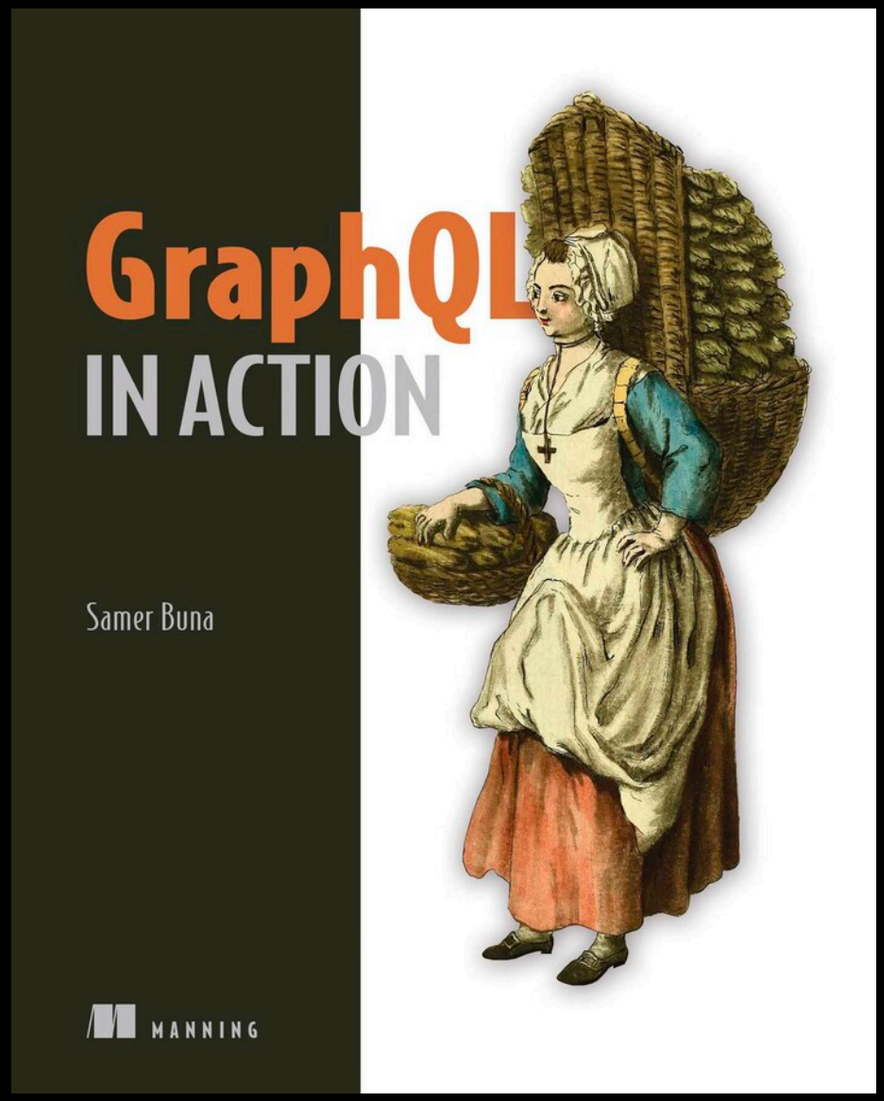
Microservices to the Rescue?



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Open API

- Leverage OpenAPI on existing REST endpoints
- Creates useable specification to generate client and server code

Open API

api-controller

POST `/api/account/brokerage`

Parameters | Try it out

No parameters

Request body required | application/json

Example Value | Schema


```
{
  "accountId": "string",
  "userId": "string",
  "accountName": "string",
  "accountType": "BANK",
  "updatedOn": "2023-01-13T19:04:42.304Z",
  "planType": "QUALIFIED",
  "fundUnitList": [
    {
      "accountId": "string",
      "fundCode": "string",
      "unit": 0
    }
  ]
}
```


Responses

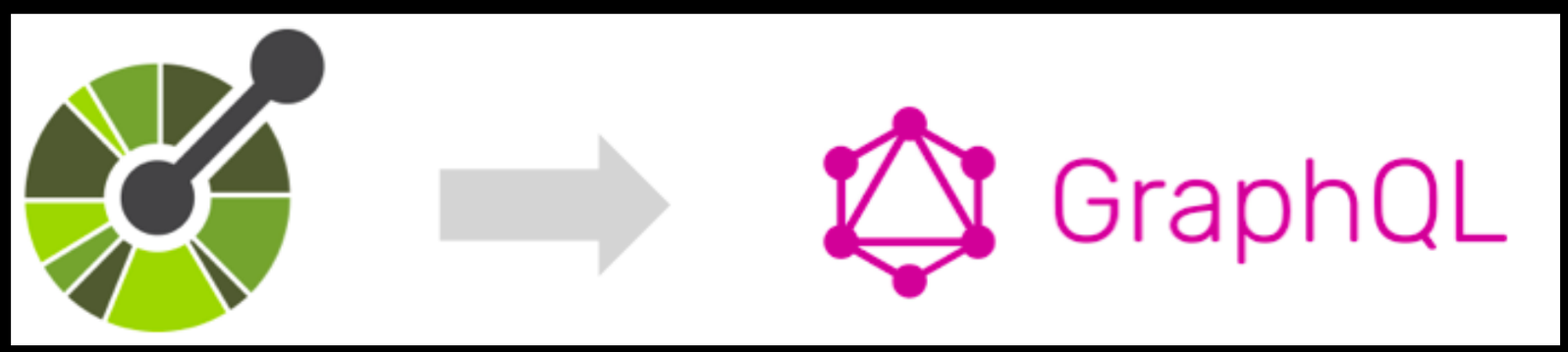
Code	Description	Links
200	OK Media type: */* Controls Accept header.	*No links*

Open API

- Creating GraphQL from REST Open API
  - https://github.com/IBM/openapi-to-graphql/tree/master/packages/openapi-to-graphql-cli

  - npm i -g openapi-to-graphql-cli

  - openapi-to-graphql-cli $DIR/account-swagger-openapi-3.0.1.json $DIR/pricing-swagger-openapi-3.0.1.json --save ./combined-rest.graphql
  -



Demo

- Example GraphQL to REST
  - Identify Swagger / OpenAPI Schema
  - Export and Conversion to GraphQL
  - Manually Map Schema to URL Mapping

Demo

- DEMO of Tyk Dashboard
- https://youtu.be/PEwG8F8PxUs?t=250

Demo

- Showing some GraphQL

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MicroService Summary

- Moving from Monolith to MicroService
  not an easy task
- You need to commit and invest
  if you want success
- REST is still an option, talk to the UI team

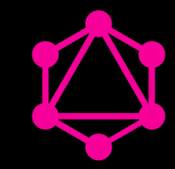
GraphQL Tips

- Input Types do not support inheritance well
- Code Generation can conflict with naming
- Share models intentionally, not by mistake
  - Name space conflicts can break schema
  - Consider Each Service Prefix Model Objects
- Be careful with Aggregation,
  you can accidentally bring down the server
- Document aggregates and limit them
- Pagination is still a challenge with nesting
  - Consider passing a cursor or use offset/limit
  - Try and use paging context with aggregates

GraphQL Tips

- Versioning is a myth, it is live, avoid doing it
  - If you must, use a gateway and version path
  - Do not keep more than one prior release
  - Better to Deprecate and Remove over time
  - Changes should be additive

Resources



- https://microservices.io
- https://vaughnvernon.com
- https://spring.io/projects/spring-graphql

- https://www.graphql-java.com
- https://opensource.expediagroup.com/graphql-kotlin/docs/
- https://developers.facebook.com/docs/graph-api/
- https://docs.github.com/en/graphql
- https://graphql.org

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Questions ?

https://github.com/lseinc/cm23-break-monoliths-with-graphql.git

Don’t forget to fill
out the survey!

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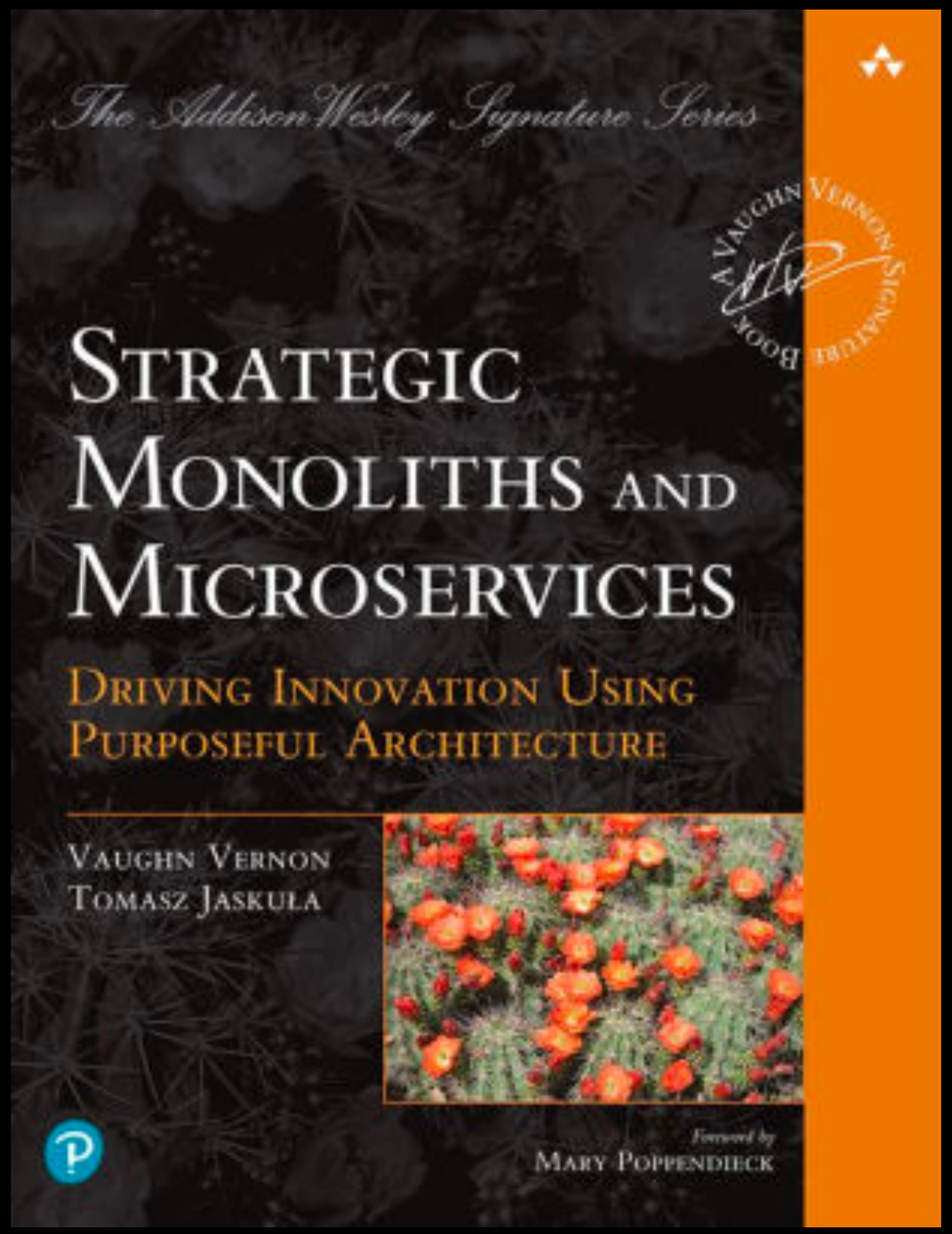
Gift Giveaway



Don’t forget to fill out the survey!

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Thank You !

https://github.com/lseinc/cm23-break-monoliths-with-graphql.git


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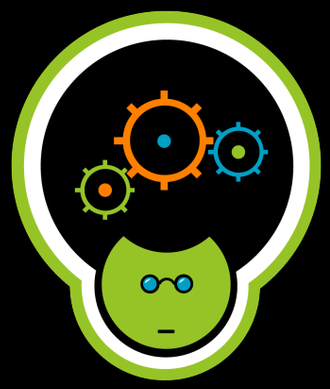

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