Optimizing Data Access

For Frontend Use Cases
With A Modular Api Gateway

NETFLIX

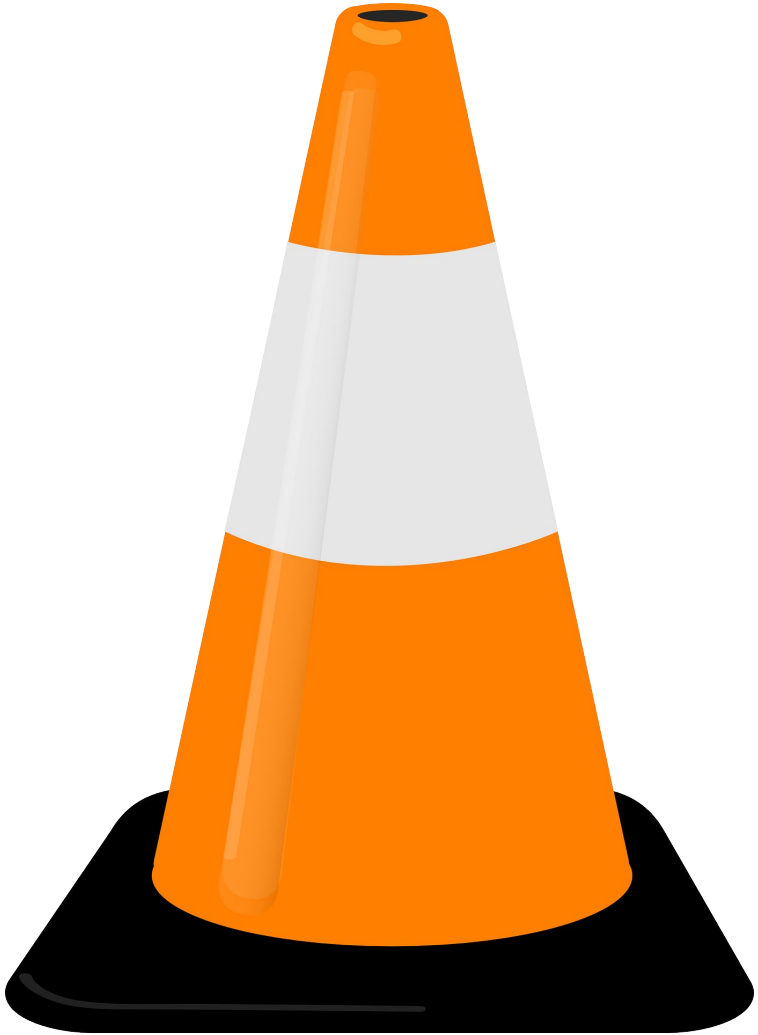

Naming things is hard!

What I meant was...

Discuss how we can :

Enable frontend developers to access the data they need to *drive their user's experiences*.

The Pattern I'll describe is best known as "Backend for Frontend".

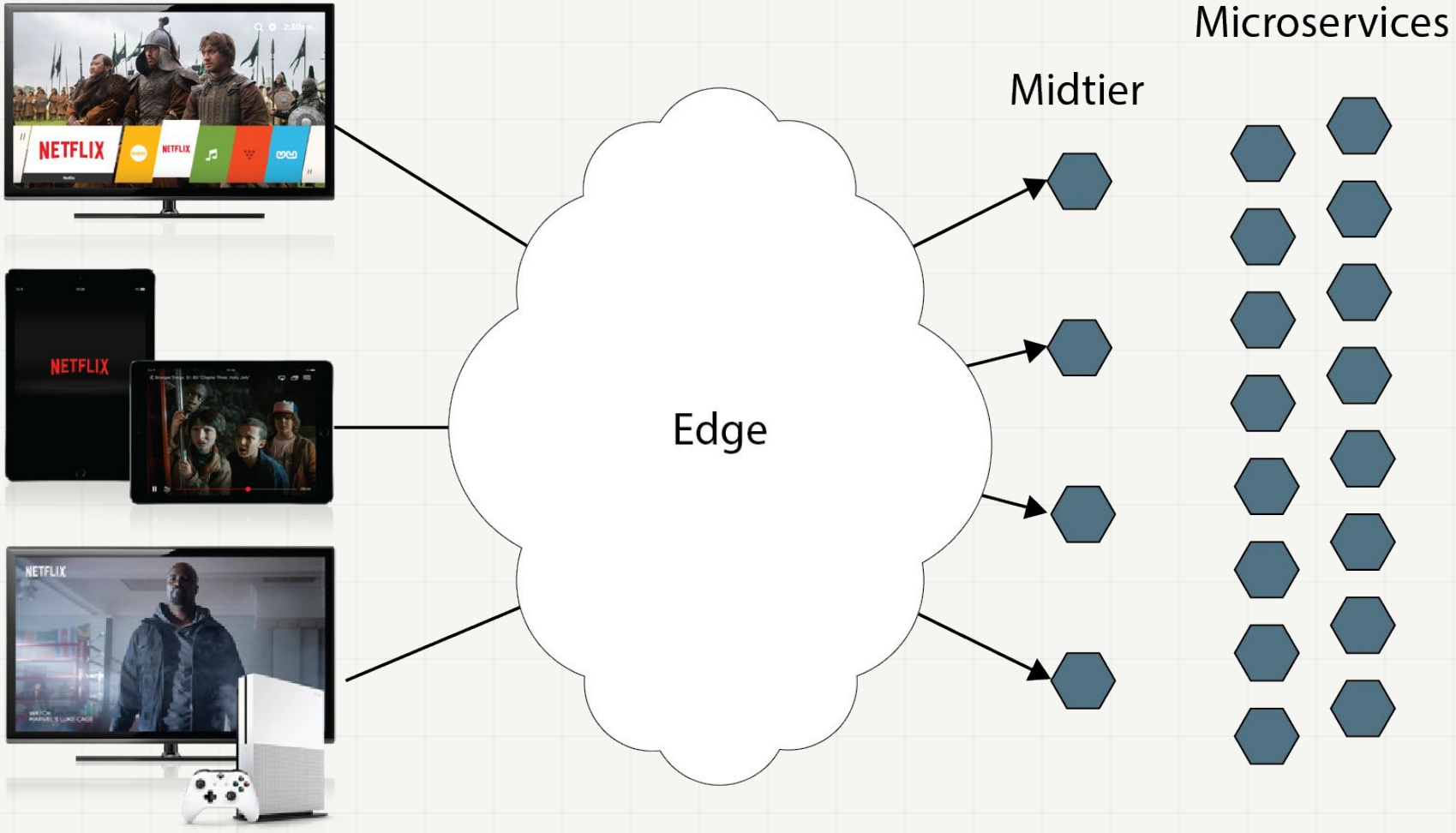


Who am I?

Brian Leathem

Senior Software Engineer @ Netflix
- Edge Developer Productivity

@brianleathem


Microservices
Midtier
Edge
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The Ideal Developer Experience

GreenField:
A developer's bliss

No legacy codebase
No technical debt
No features to support
    Other than those ahead of you!

Rapid turnaround!

- Run the whole stack on your laptop
- Easy debugging

The good old days

And yet our front end developer yearns for more simple times...

When she could:

- Work independently
- Achieve a high velocity
- Debug a simple stack
- Run everything locally

@ Scale

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Traffic


A 54 Northwich, Chester
Middlewich, Holmes Chapel
NORTH WALES, Preston,
Manchester, Leeds M6
18
M6
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276.0


NETFLIX
NETFLIX
MARVEL
LUKE CAGE
NETFLIX
NARCOS
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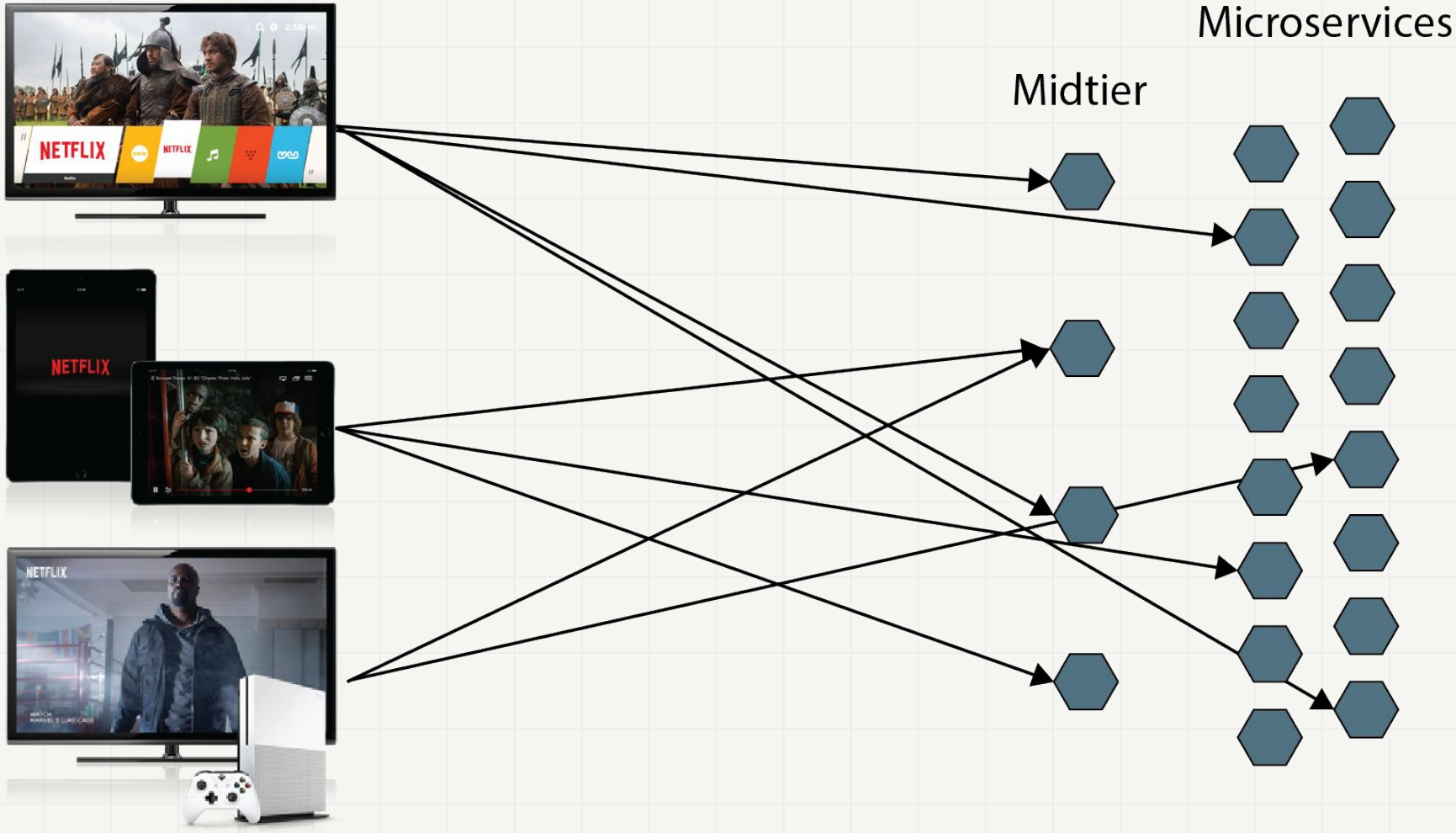
STRANGER THINGS

Microservices


Teams

Backend For Frontend (BFF)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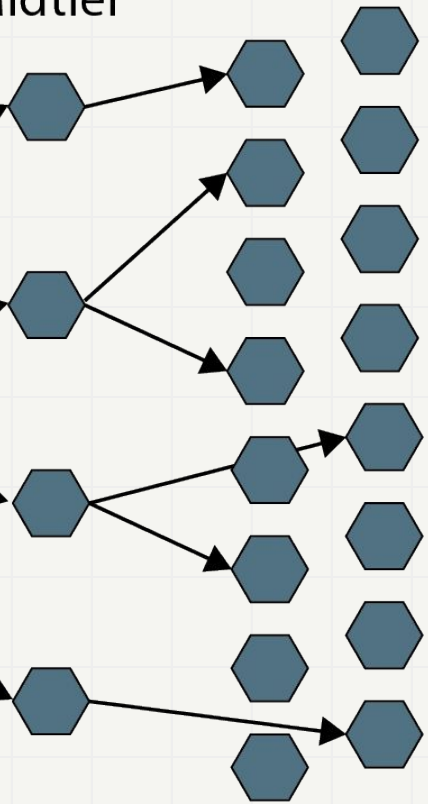
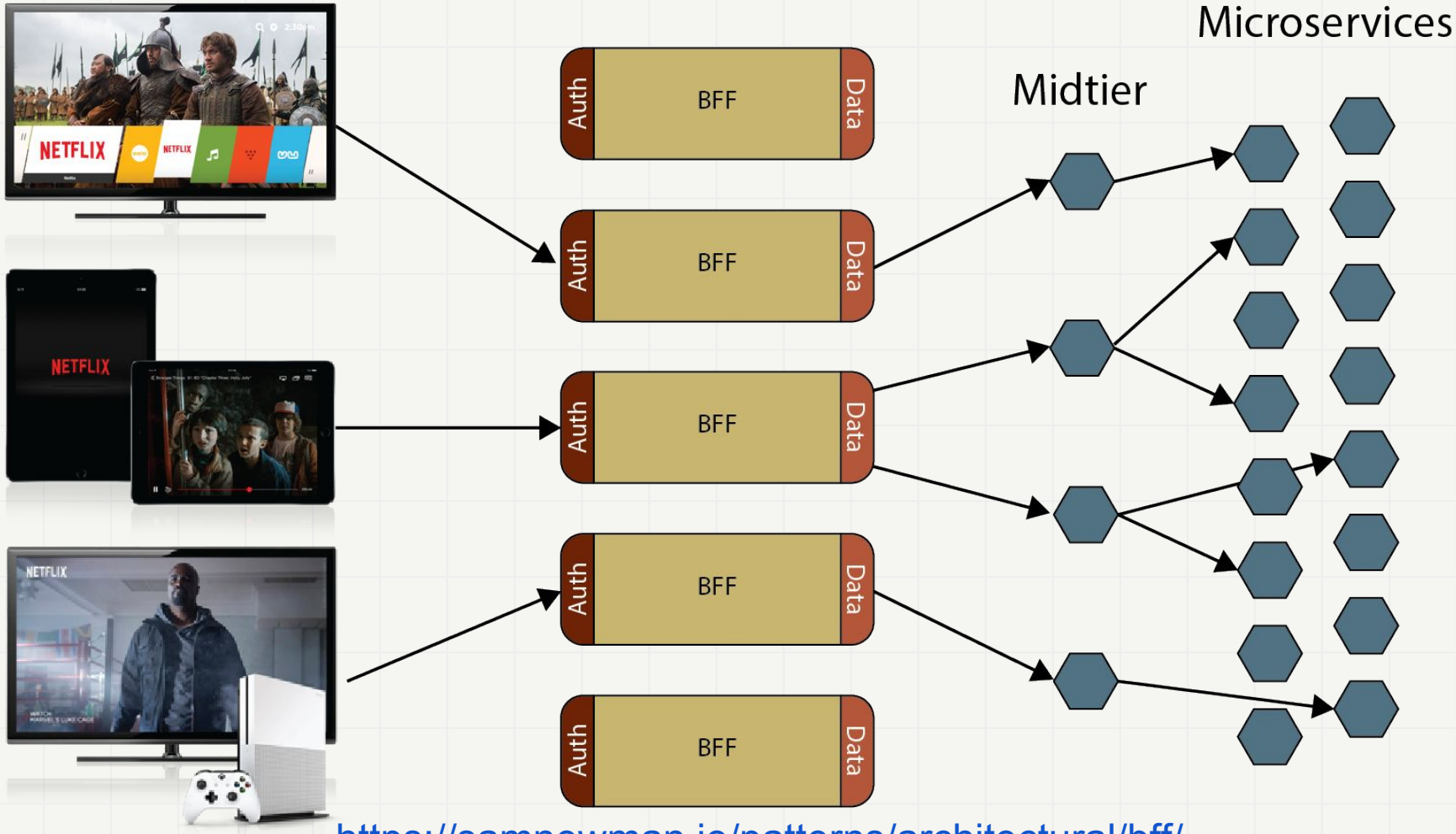
General Purpose API Gateway

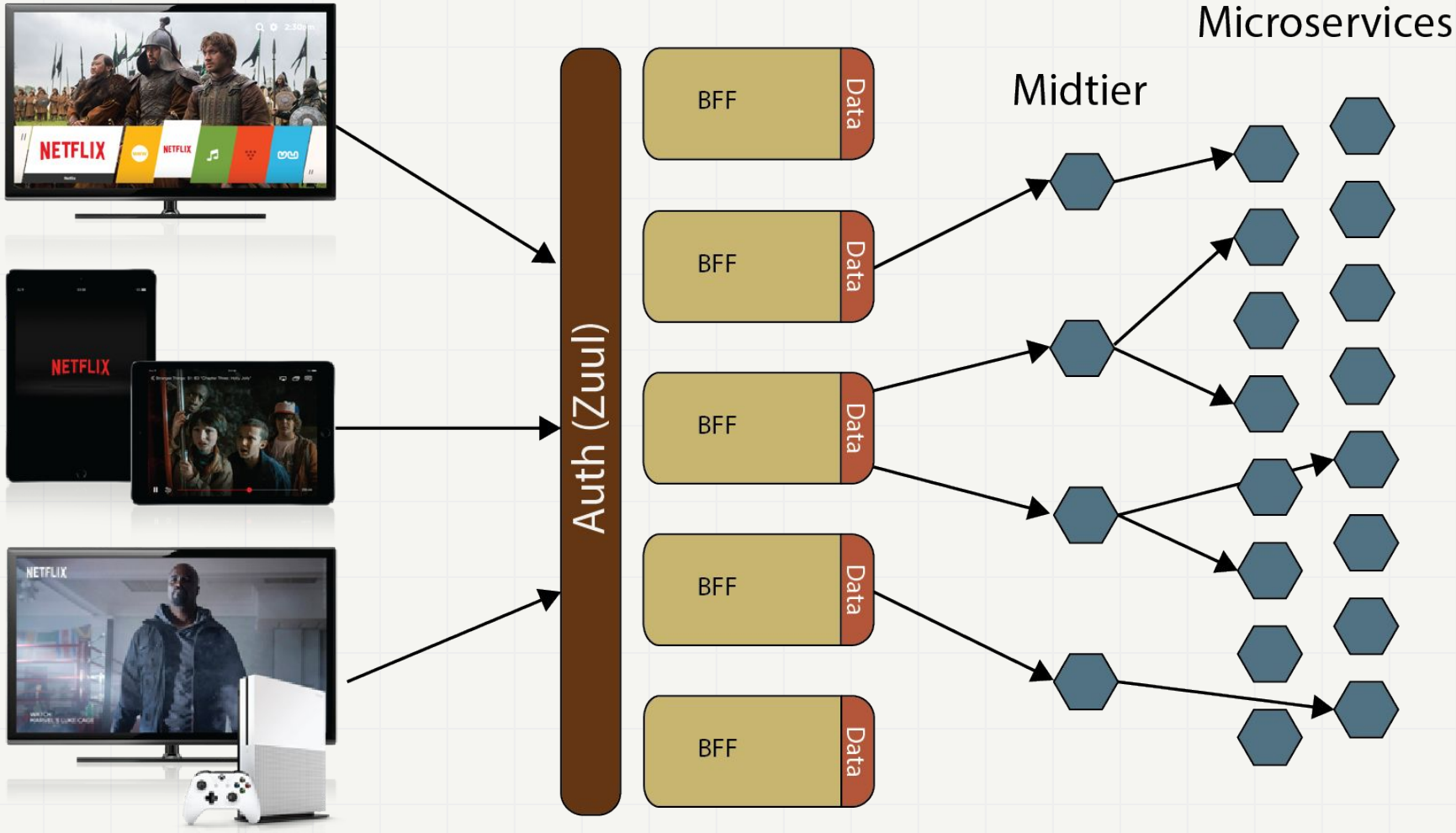
Microservices

Midtier





https://samnewman.io/patterns/architectural/bff/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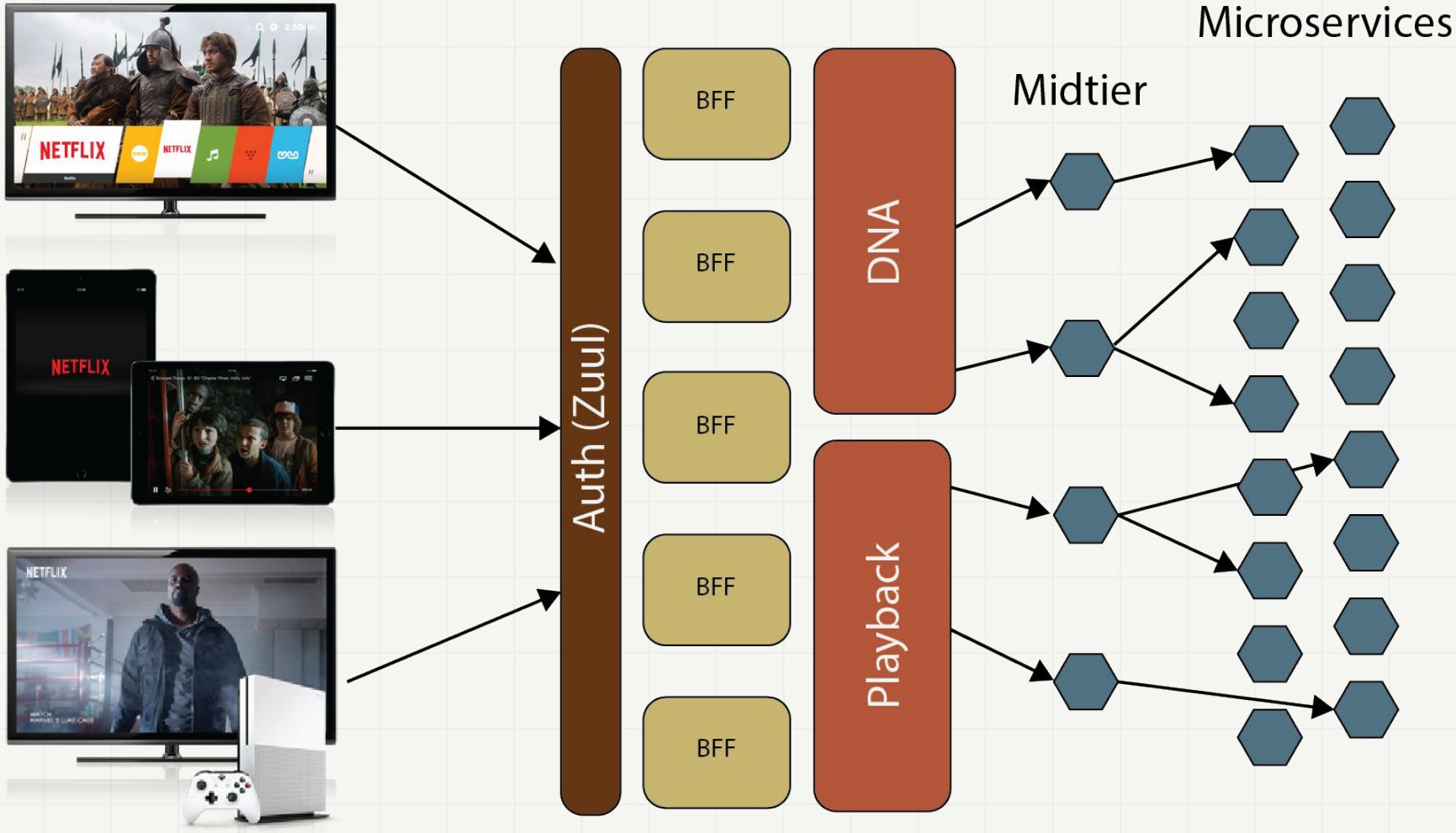
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DNA
Playback

How we Built our BFF

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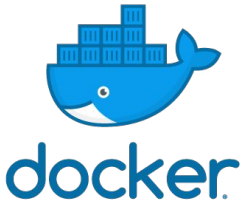
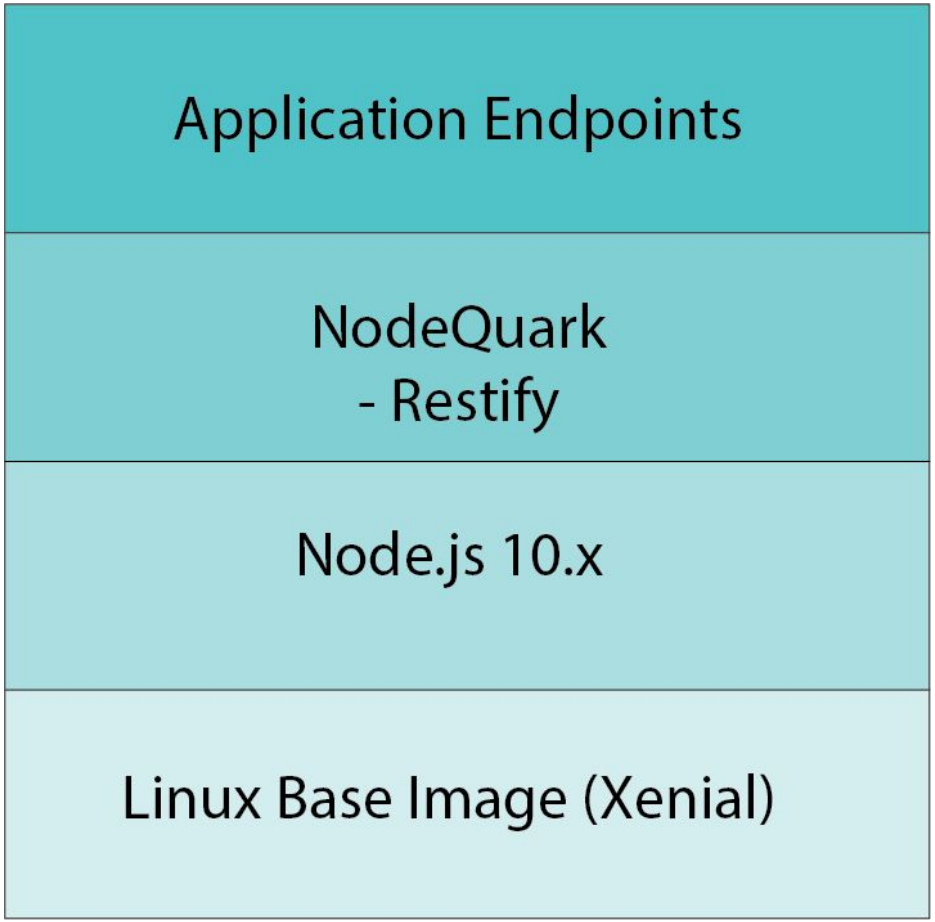
docker

Inside the container

- Node.js
- Restify for HTTP
- Eureka for service registration and discovery
- Archaius for configuration management
- Atlas for metrics





The Client Data Request

Requirements:

- Fine grained data access
- Aggregate multiple paths into a single network call
- Fault tolerant responses

REST isn't a good fit.

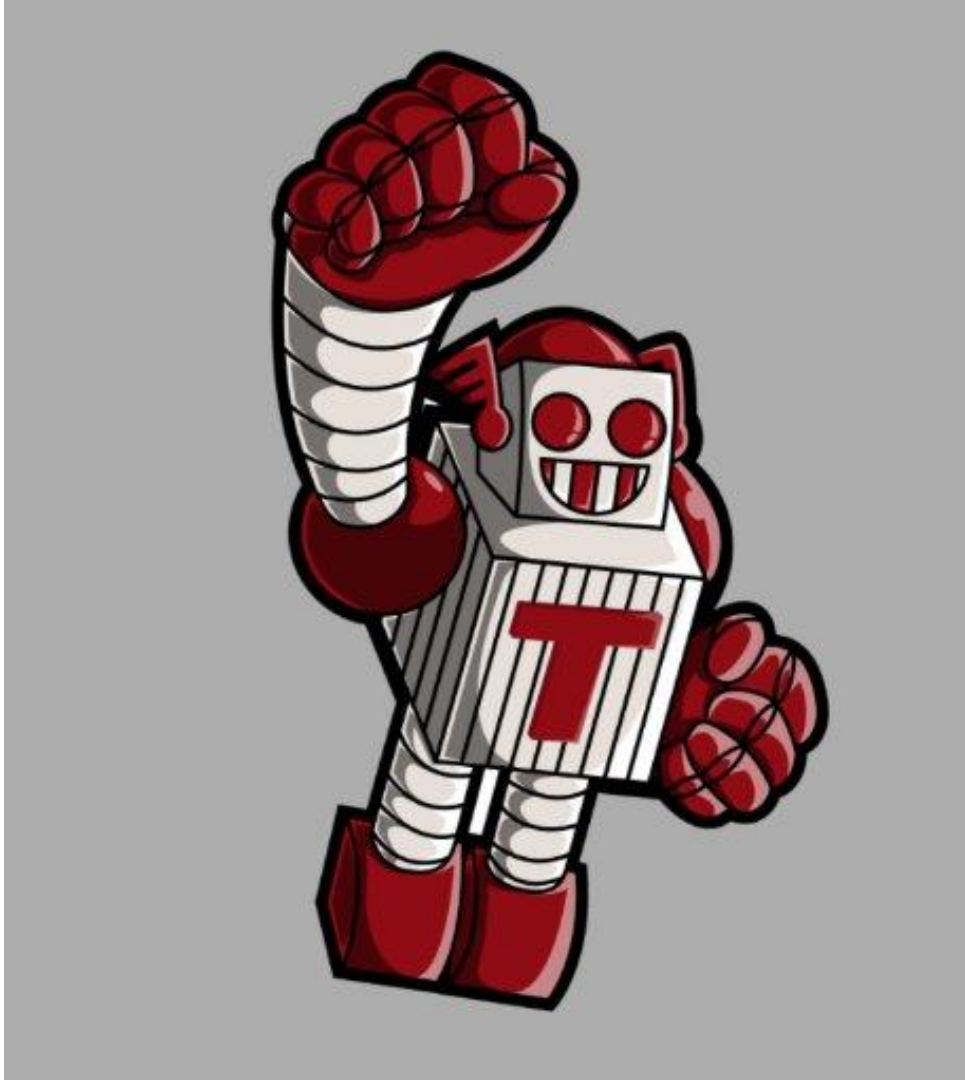
Falcor: distributed JSON graph

https://netflix.github.io/falcor/

Scaling traffic with Titus

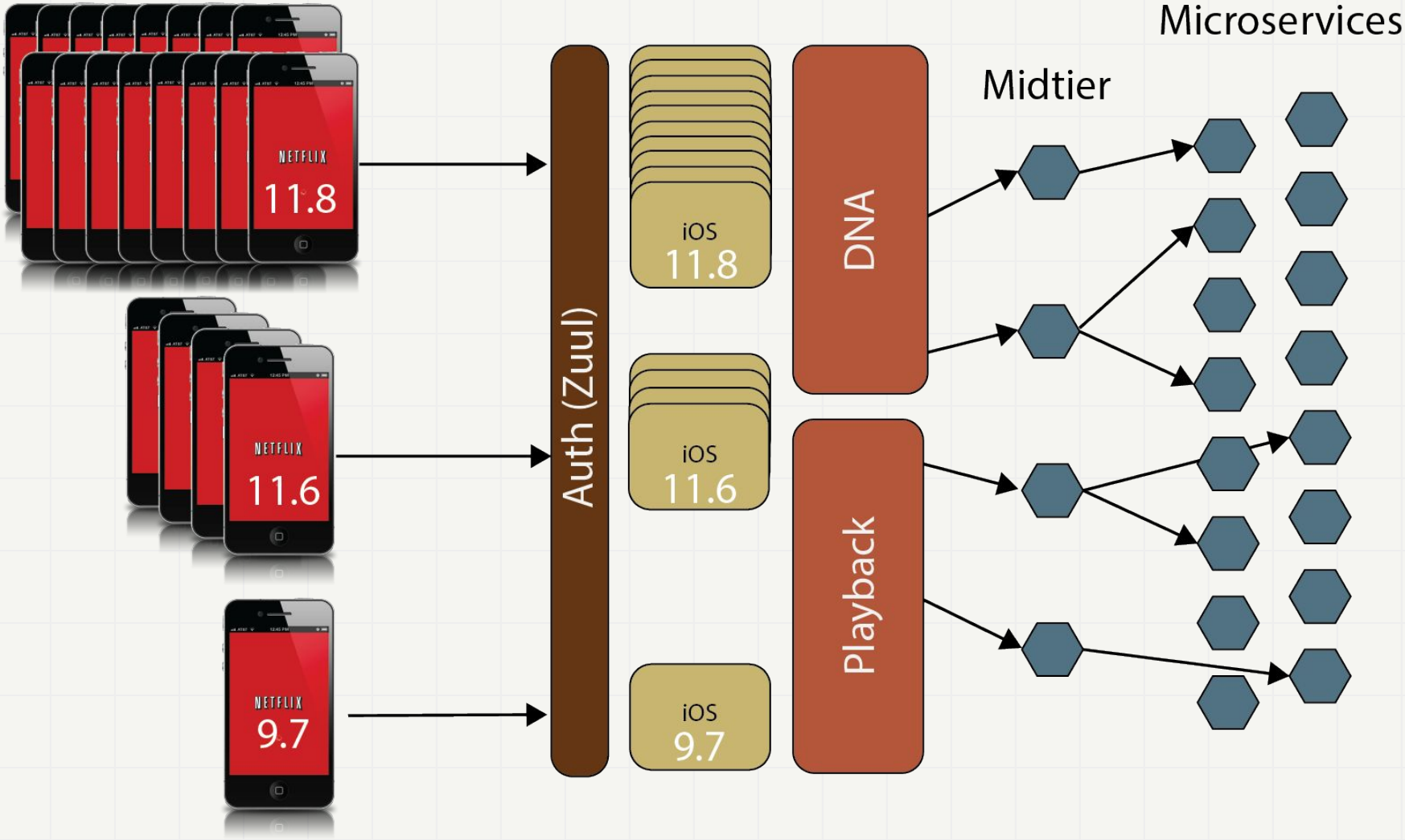
- A production ready container platform
- Integration with AWS
- Netflix OSS integration

https://netflix.github.io/titus/



Dynamic Routing

Dynamic Routing with Zuul
https://github.com/Netflix/zuul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NETFLIX
9.7
Auth (Zuul)
iOS
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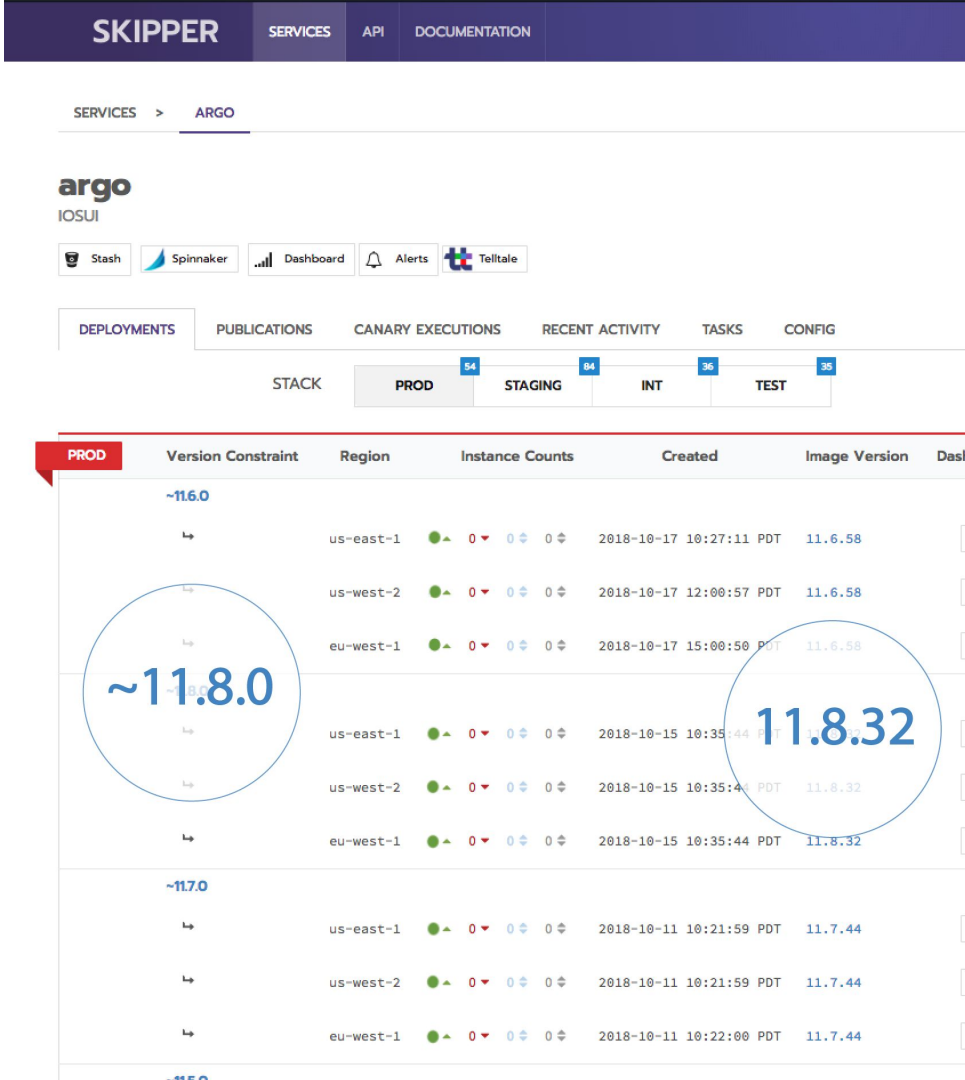
DNA
Playback

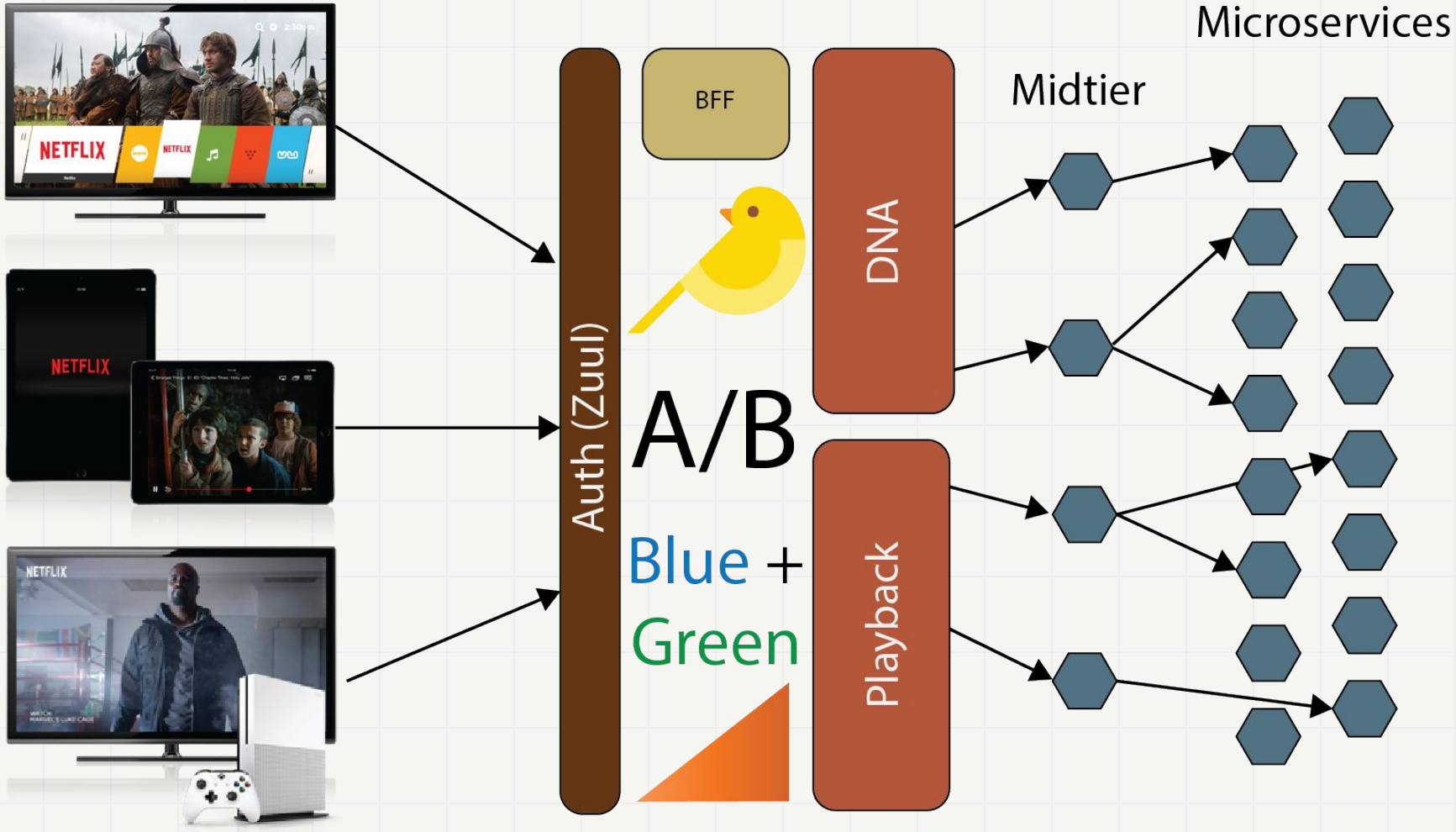
Scaling Versions

Multiple deployed versions of a BFF endpoint to support

Client has a hardcoded endpoint

Deploy patch releases to a given endpoint

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A/B
Blue +
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The Developer Experience

The Developers Goal

Map client requests into backend requests

From the client:

- Path requests from a Falcor client

From the backend:

- Use the DNA API to retrieve the required data

Sample Client Code

```
function getShowInfo(context) {
 const paths = [
   ['videos', showId, 'title'],
   ['currentProfile', 'preferredExperience'],
   ['videos', showId, 'seasons', 'length'],
   ['videos', showId, 'seasons', {to:9}, ['number', 'numberLabel', 'title', 'id']],
   ['videos', showId, 'seasons', {to:9}, 'episodes', 'length'],
   ['videos', showId, 'seasons', {to:9}, 'episodes', {to:30},
        ['summary', 'volatile', 'downloadAssetDetails']
    ]
 ];
  return model.get(paths);
}
```

Server-side Route Implementation

```
{
  pattern: ['videos', integerKey('videoId'), 'title'],
  get({ path, params }, cb) {
    const query = api
      .videos(params.videoId)
      .pluckTitle();

    this.client.get(query, function clientDone(err, response) {
      if (err) {
        return cb(PathTerminationError({ cause: err }));
      }
      const { data } = response.get(query);
      return cb(null, { path: value: _.get(data, 'title') });
    });
  }
},
```

Data Discovery: Comprehensive API docs

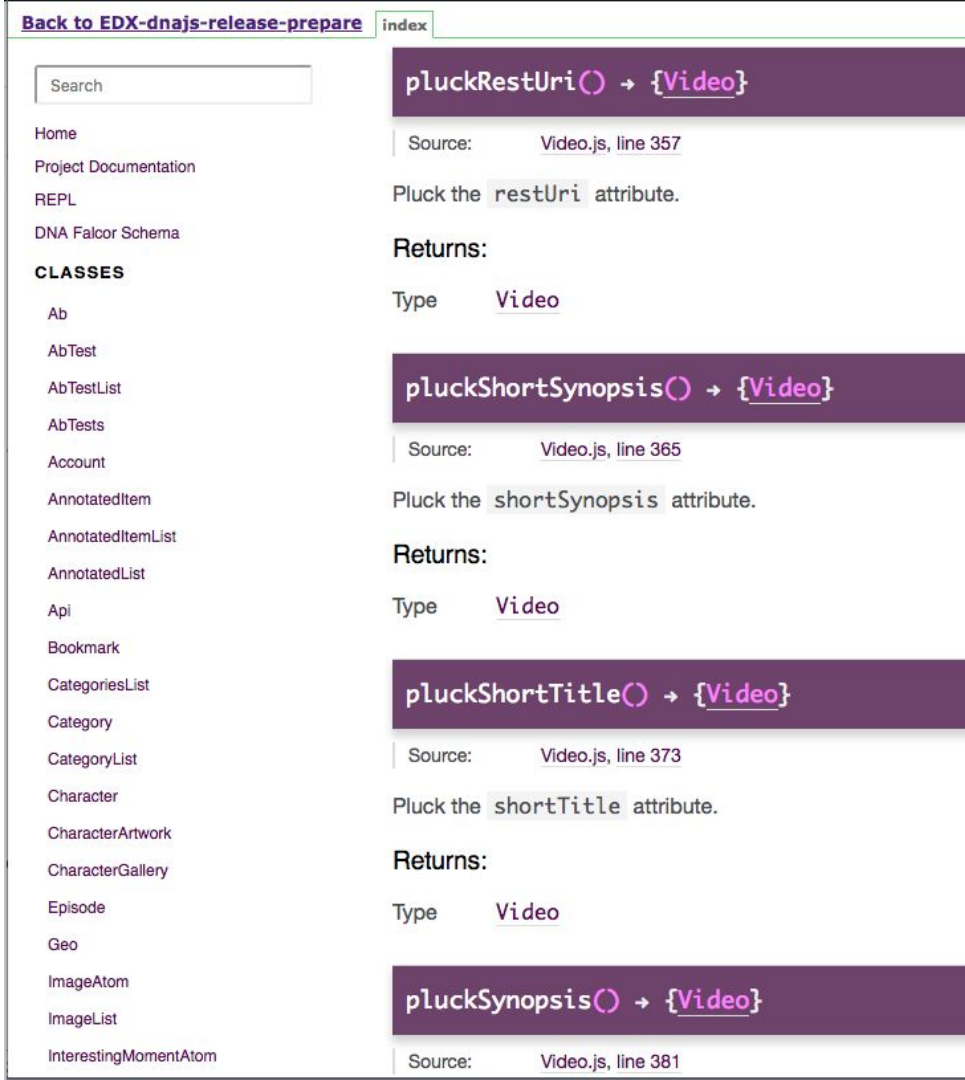
Map client requests into backend requests

From the client:

- Path requests from a Falcor client

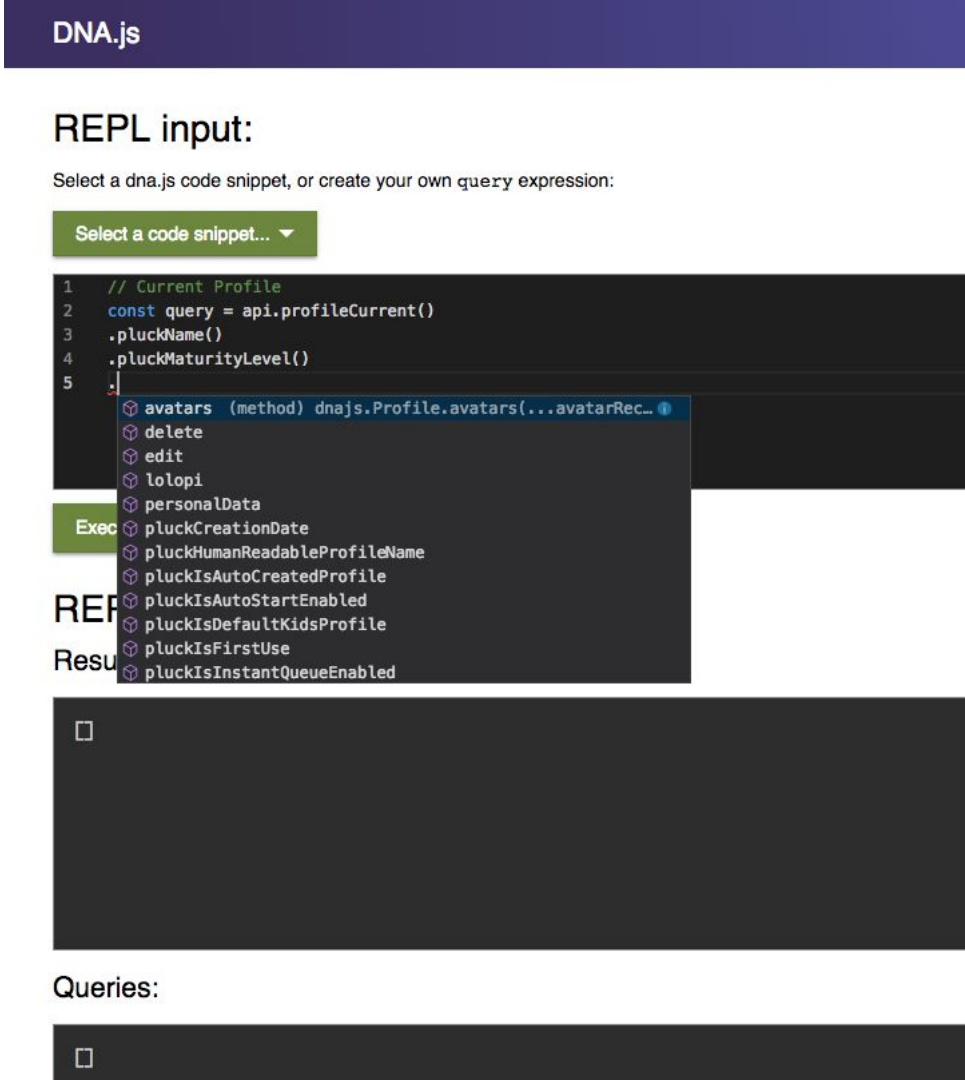
From the backend:

- Use the DNA.js API to retrieve the required API



Data Discovery: Online REPL

- Typesafe autocomplete
- Execution against live data
  - Instant feedback
  - Error reporting



Develop in container

Develop in a prod-like environment

Mount the application folder into the local image

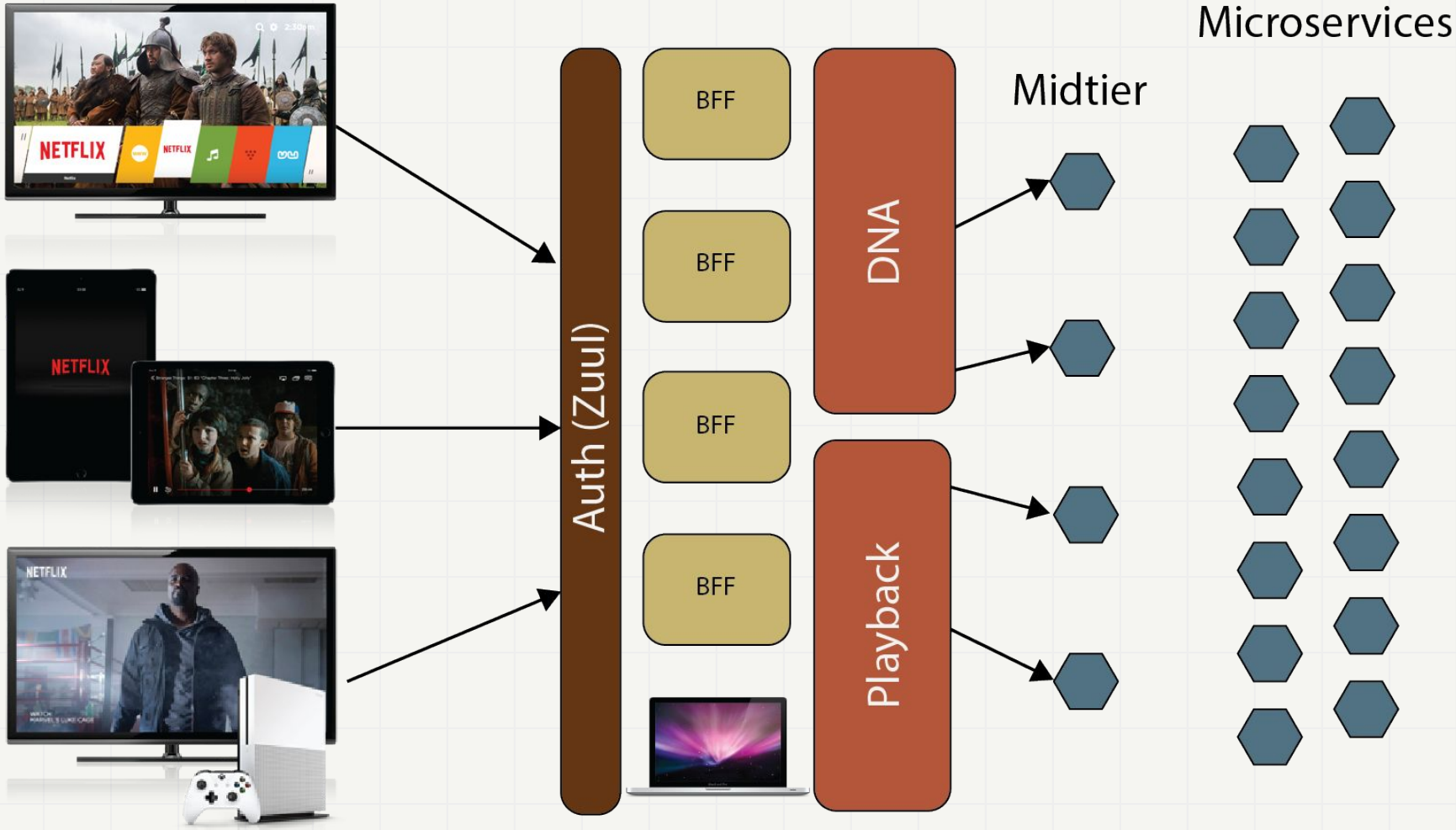
* Exclude node_modules !

Run nodemon within the container to watch for changes

Debug in container

Debug in a prod-like environment

Expose the node.js debug port from the container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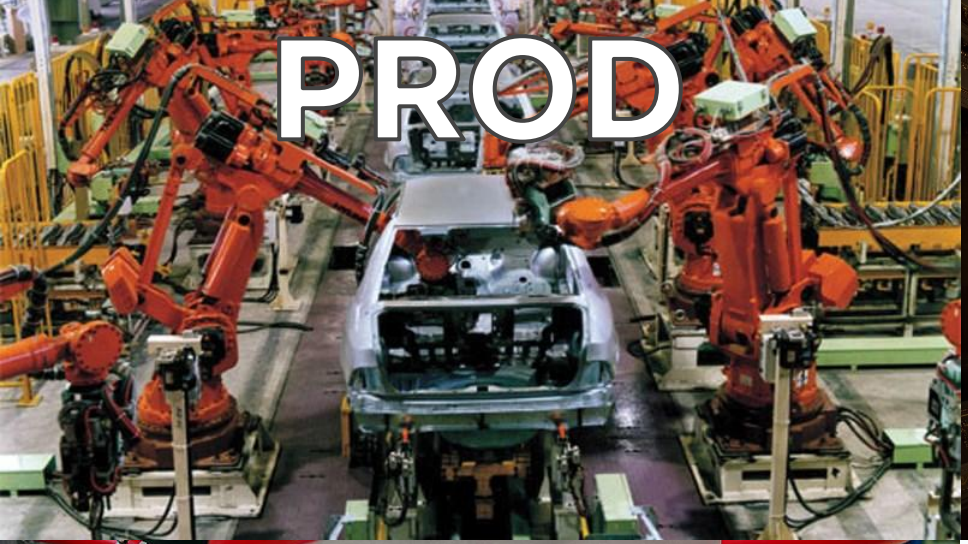
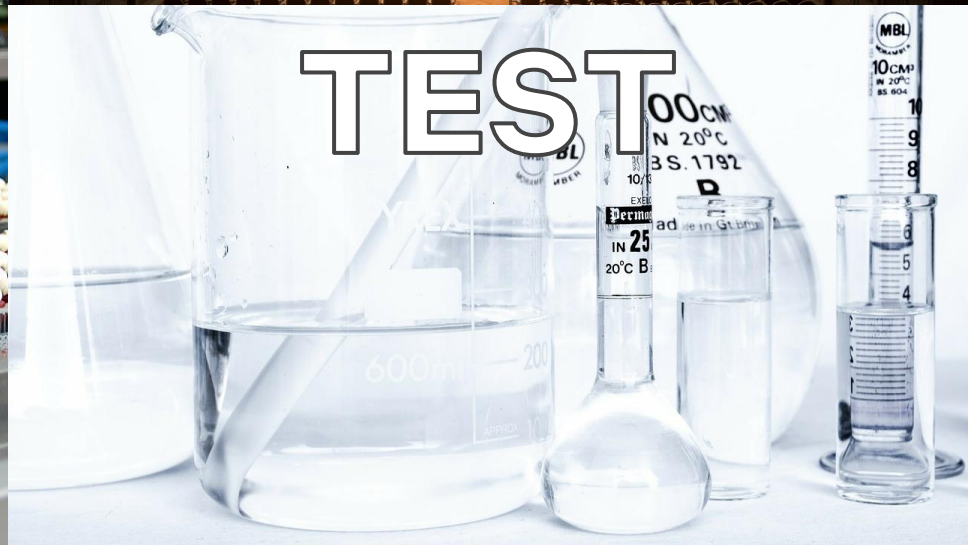

PROD


STAGING


INT


TEST

Test in container

Unit tests:

- Rest route handler functions directly

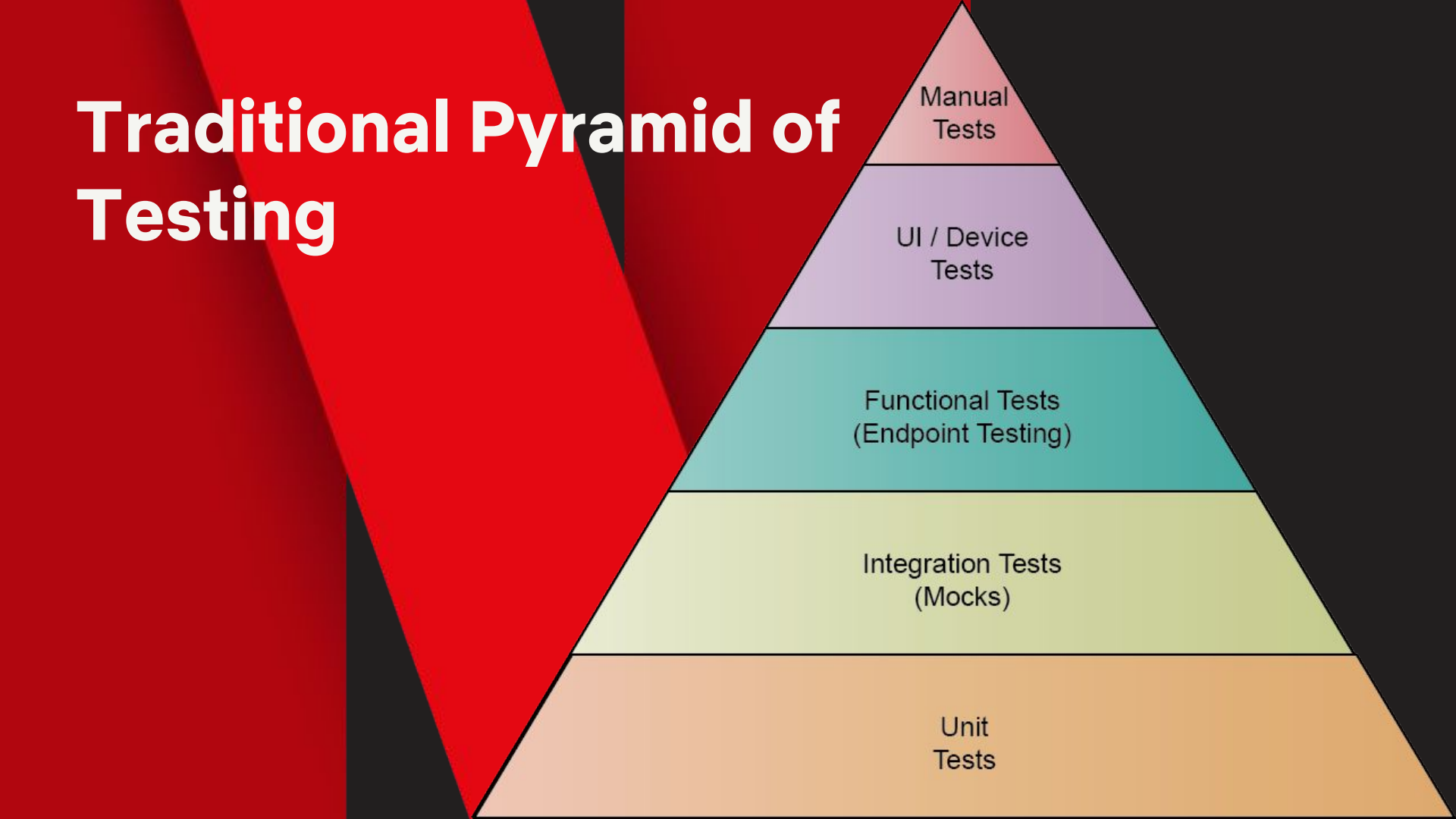
Integration tests:

- Test in-process with mocked platform components

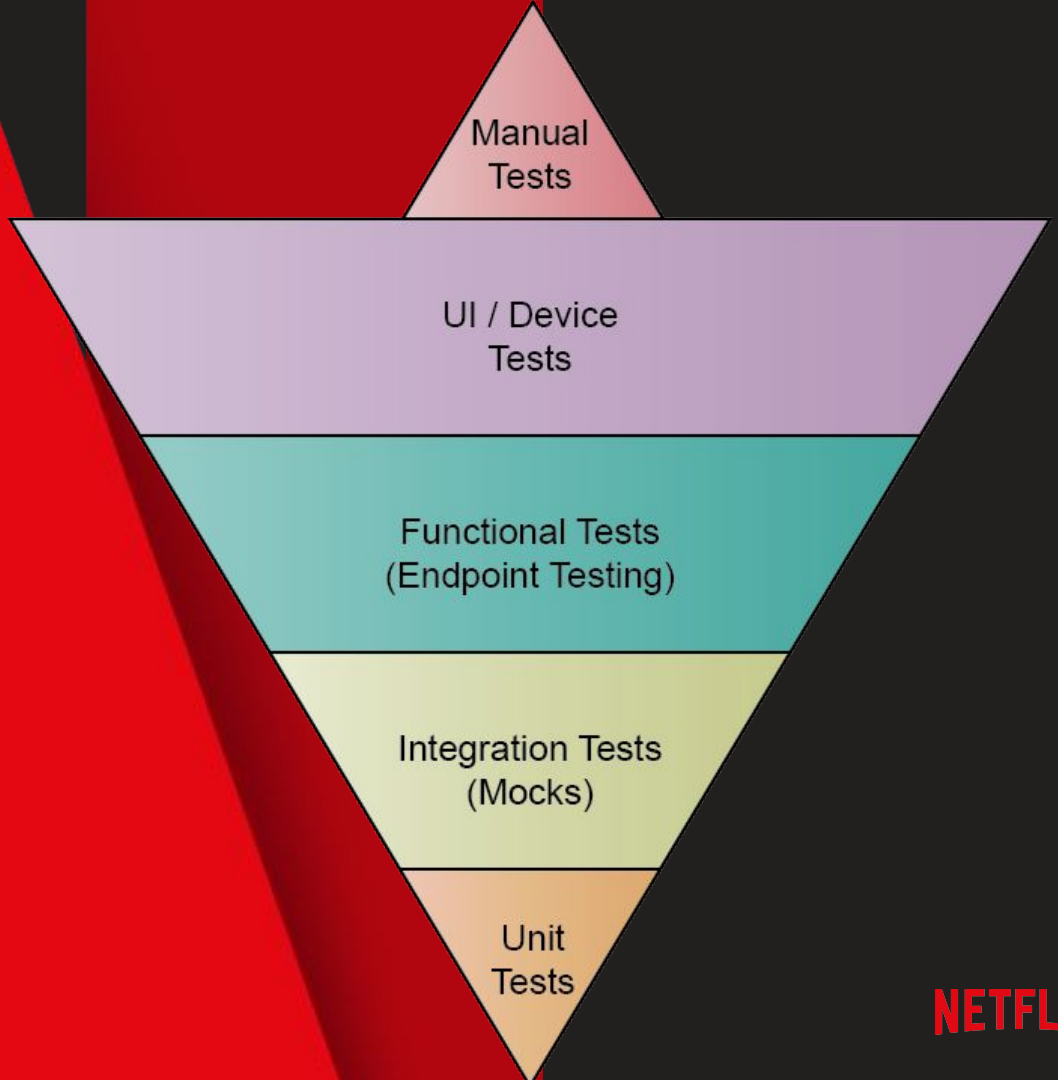
Functional tests:

- Black-box testing of the exposed endpoints

Traditional Pyramid of Testing



Inverted Pyramid of Testing



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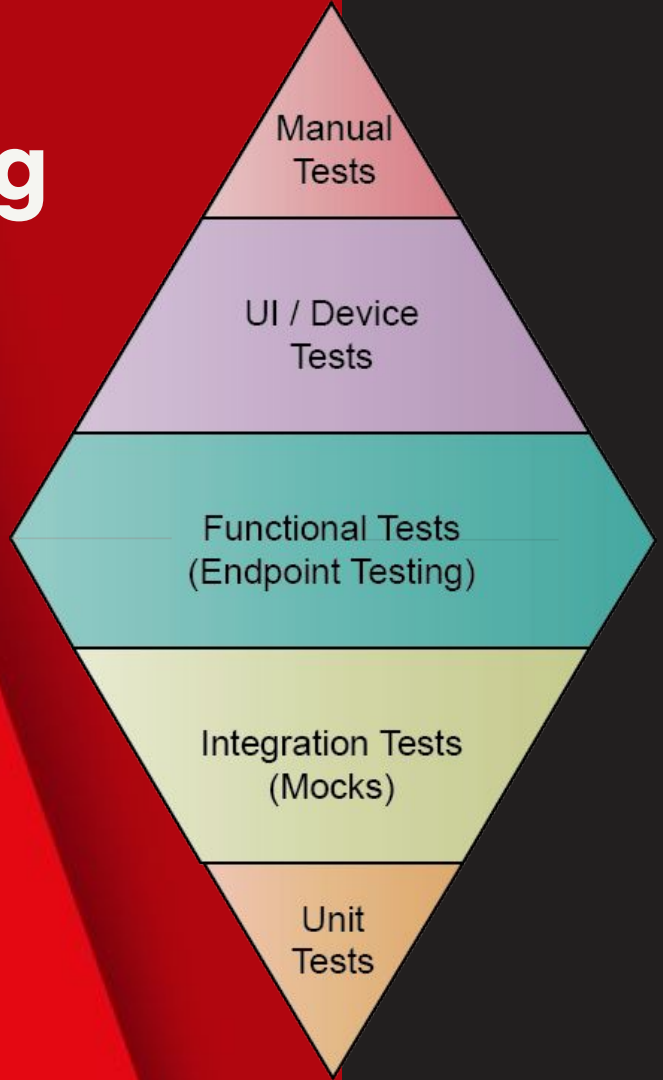
Diamond of Testing



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Conclusion

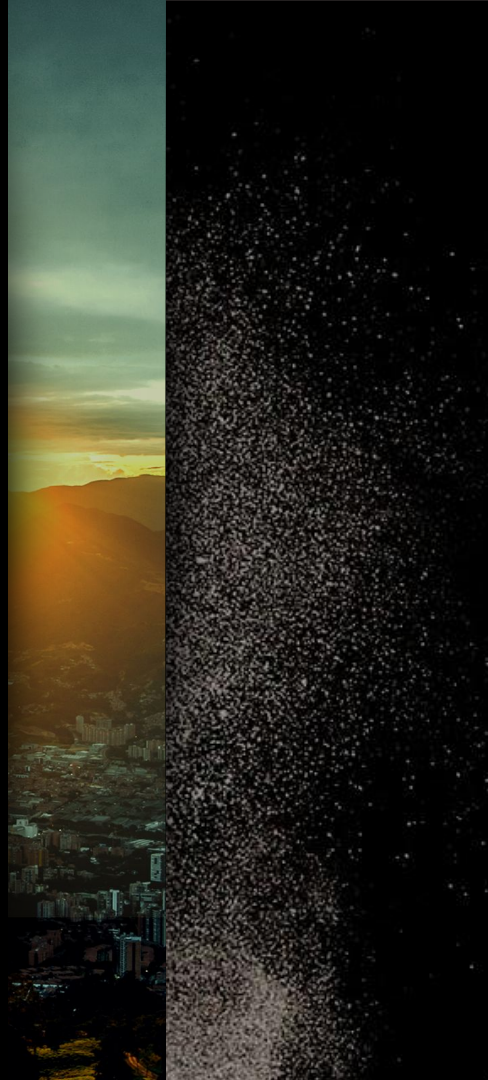
BFFs aligned with frontend teams enable:

- Evolve the front and backends together, quickly
- Fluidity in deciding where functionality lives

However...

- Increased complexity
- Require staffing to develop, rollout, and maintain

Identify which pieces work best for your use case



Thank you

@brianleathem

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