



**NETFLIX**

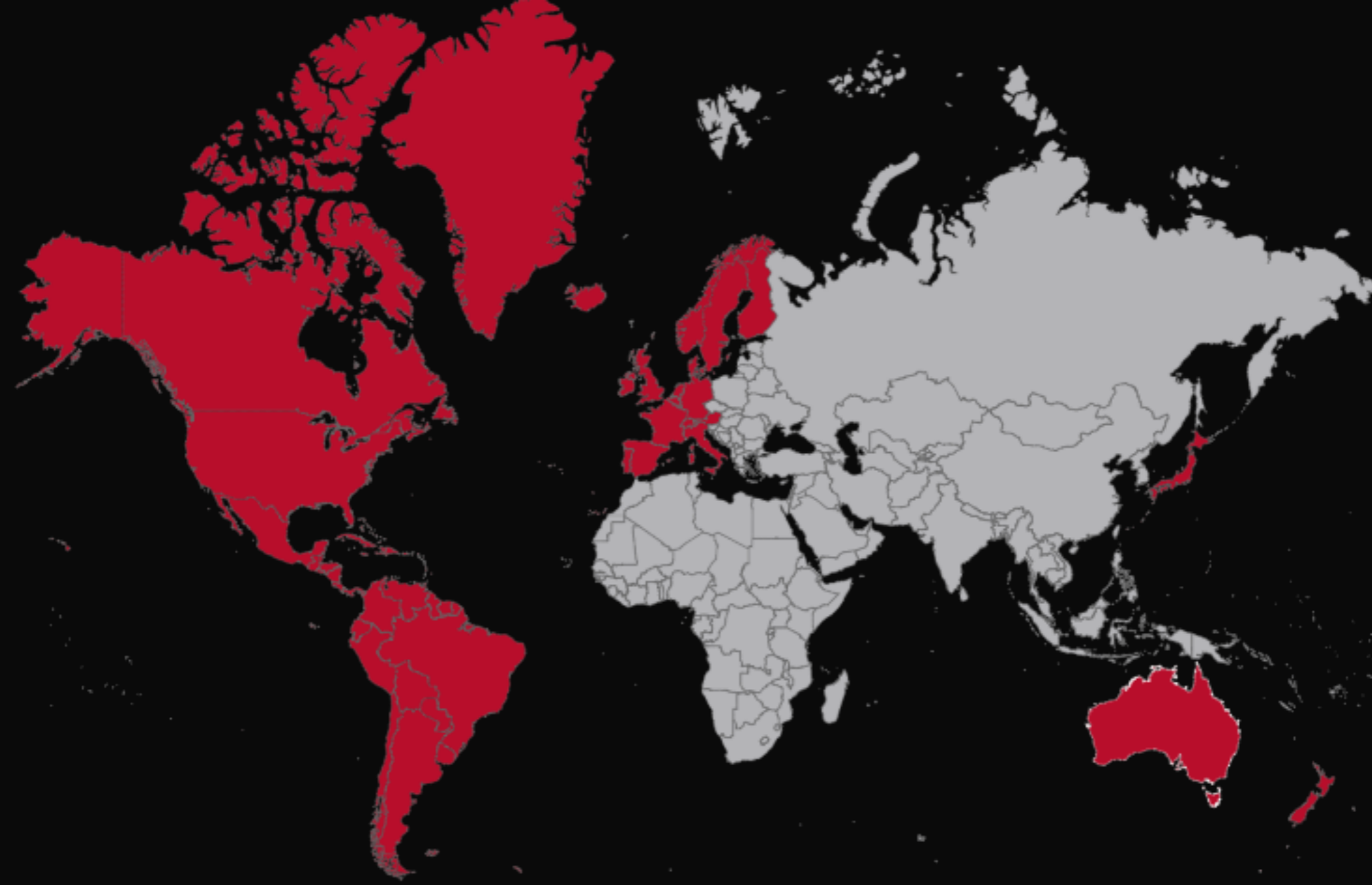
# **Containers at Netflix - An Evolving Story**

Sangeeta Narayanan  
Engineering Manager @Netflix  
*@sangeetan*

**NETFLIX**

**UNBREAKABLE**  
**KIMMY SCHMIDT**





# Going Global

Recent Launches: Italy, Spain, Portugal  
Early 2016: Korea, Hong Kong, Taiwan, Singapore



**Growing BIGGER**



**Winning Moments of Truth**



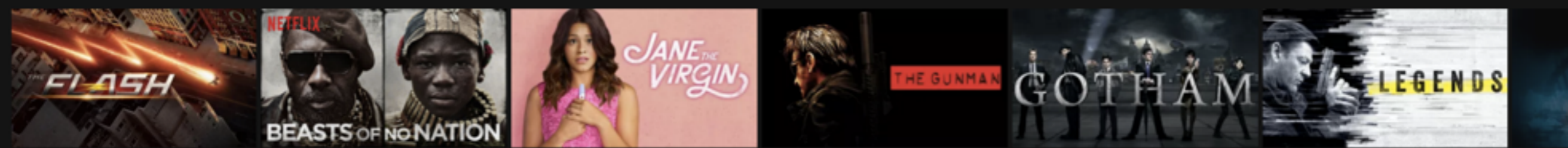
# LEGENDS

2014 TV-14 1 Season

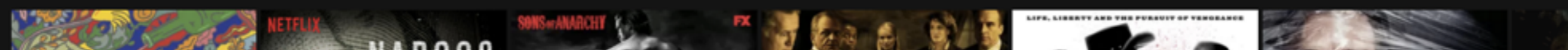
An amnesiac spy makes for a lethal agent. It's all good ... till he starts digging into the mystery of his past.

+ MY LIST EPISODES

## Popular on Netflix



## Trending Now



Popular on Netflix



A NETFLIX ORIGINAL FILM  
**BEASTS OF NO NATION**

★★★★★ 2015 NR 2h 17m

When civil war tears his family apart, a young West African boy is forced to join a unit of mercenary fighters and transform into a child soldier.

Starring: Idris Elba, Abraham Attah, Kurt Egyiawan  
Genres: Dramas, Dramas based on Books, Independent Dramas  
This movie is: Violent

MY LIST

OVERVIEW TRAILERS MORE LIKE THIS DETAILS

Trending Now



Getting **BETTER**

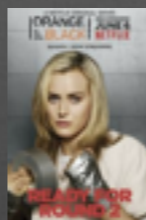
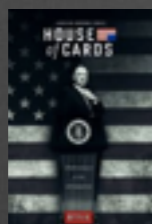
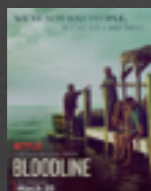
# 2015





# 2015

Jan Apr Jul Oct



# 2015

A/B Tests

New features



# 2015

Device Launches

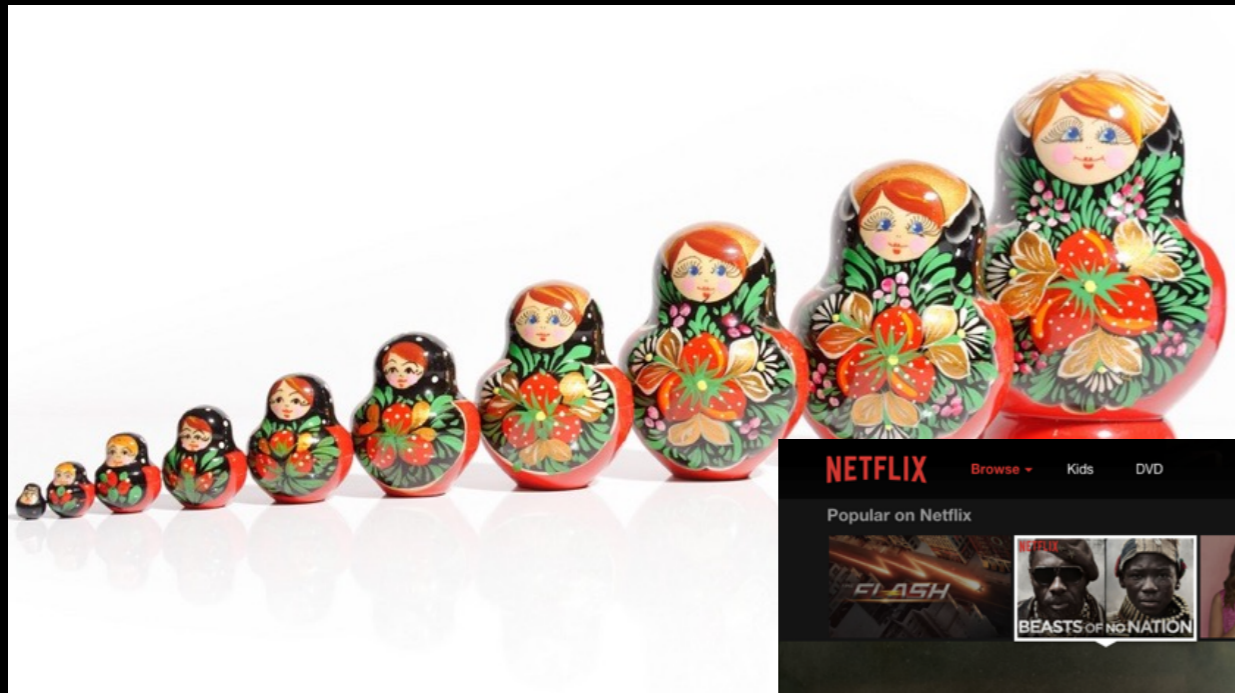
A/B Tests

New features





Going **FASTER**



**NETFLIX** Browse Kids DVD

Search Sangeeta

Popular on Netflix

*FLASH* *BEASTS OF NO NATION* *JANE VIRGIN* *THE GUNMAN* *GOTHAM* *LEGENDS*

A NETFLIX ORIGINAL FILM  
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Trending Now

*GRAND MEN* *Narcos* *THE MARCH* *FX*







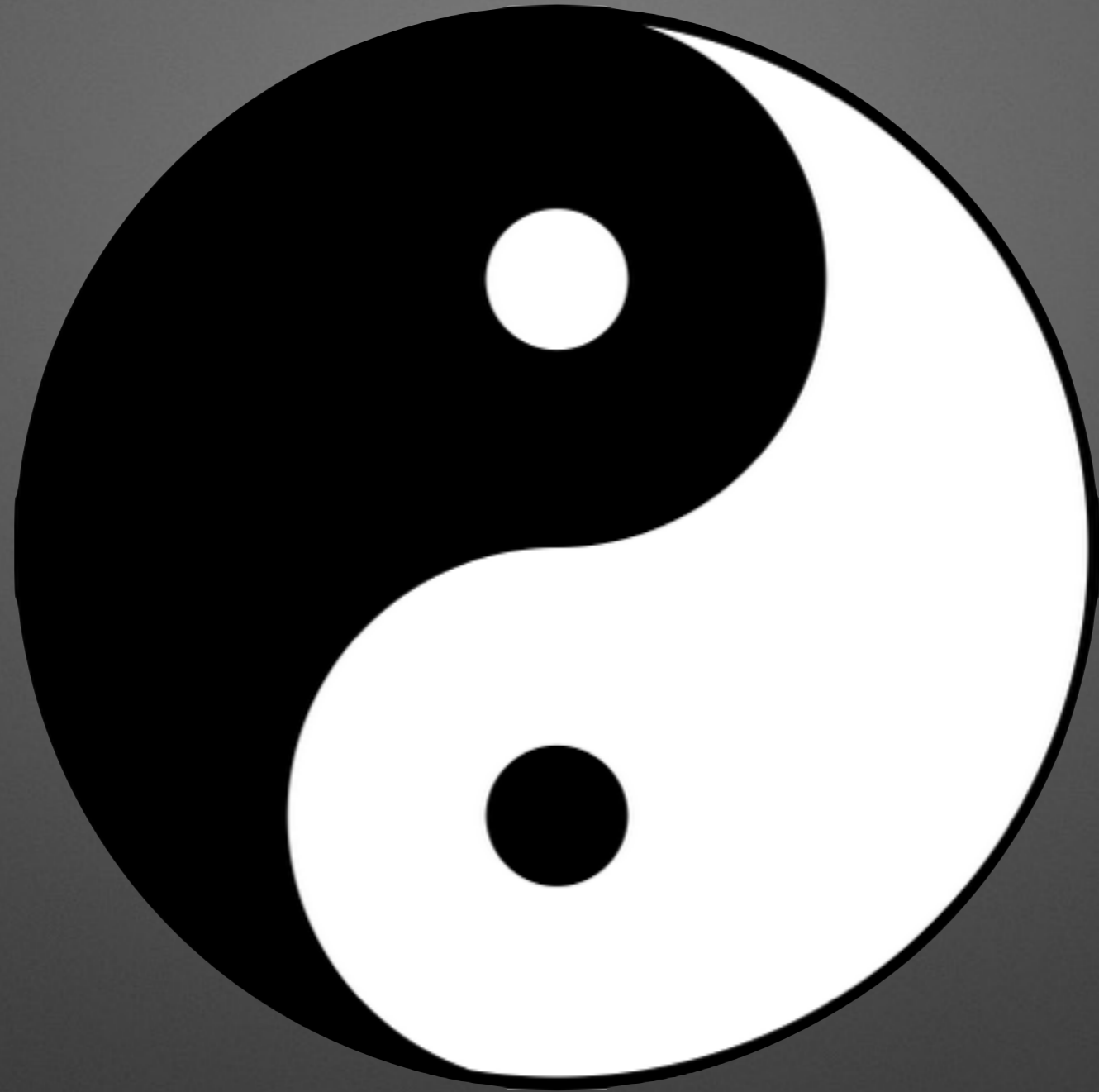
# Cloud Native Architecture







# **Automation & Tooling**



**Culture**

# New Considerations

Diversity - Users, Tech stacks, Workloads

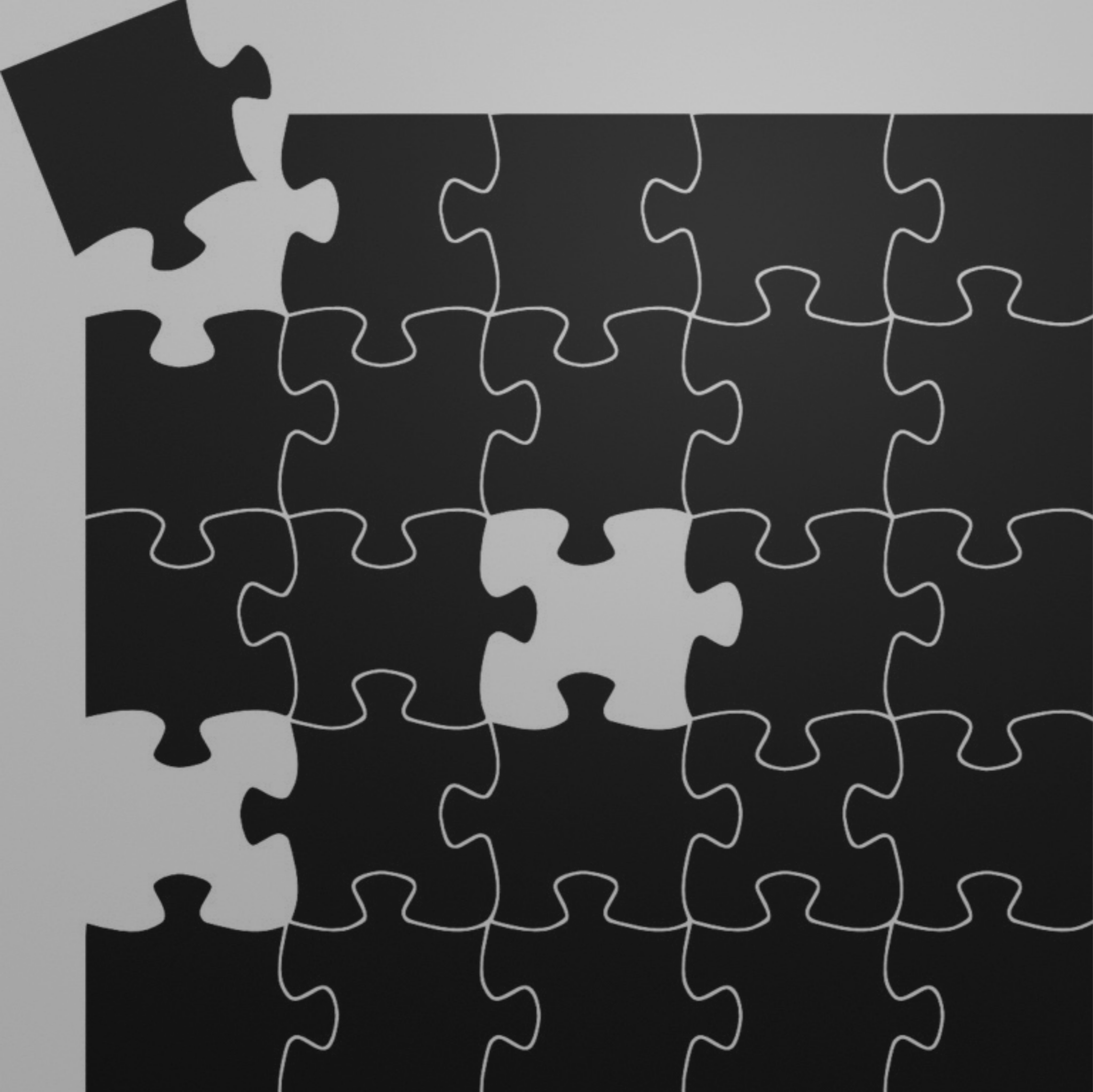
Dev Ex - Dev iterations, Debugging, Packaging

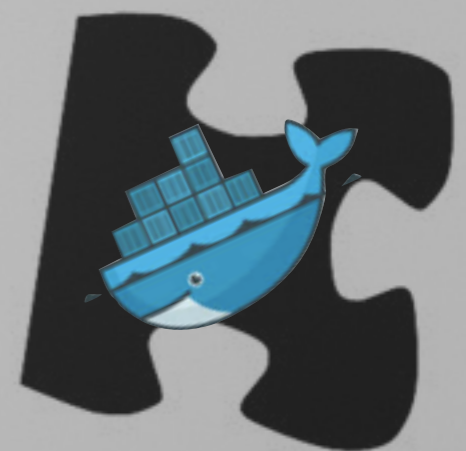
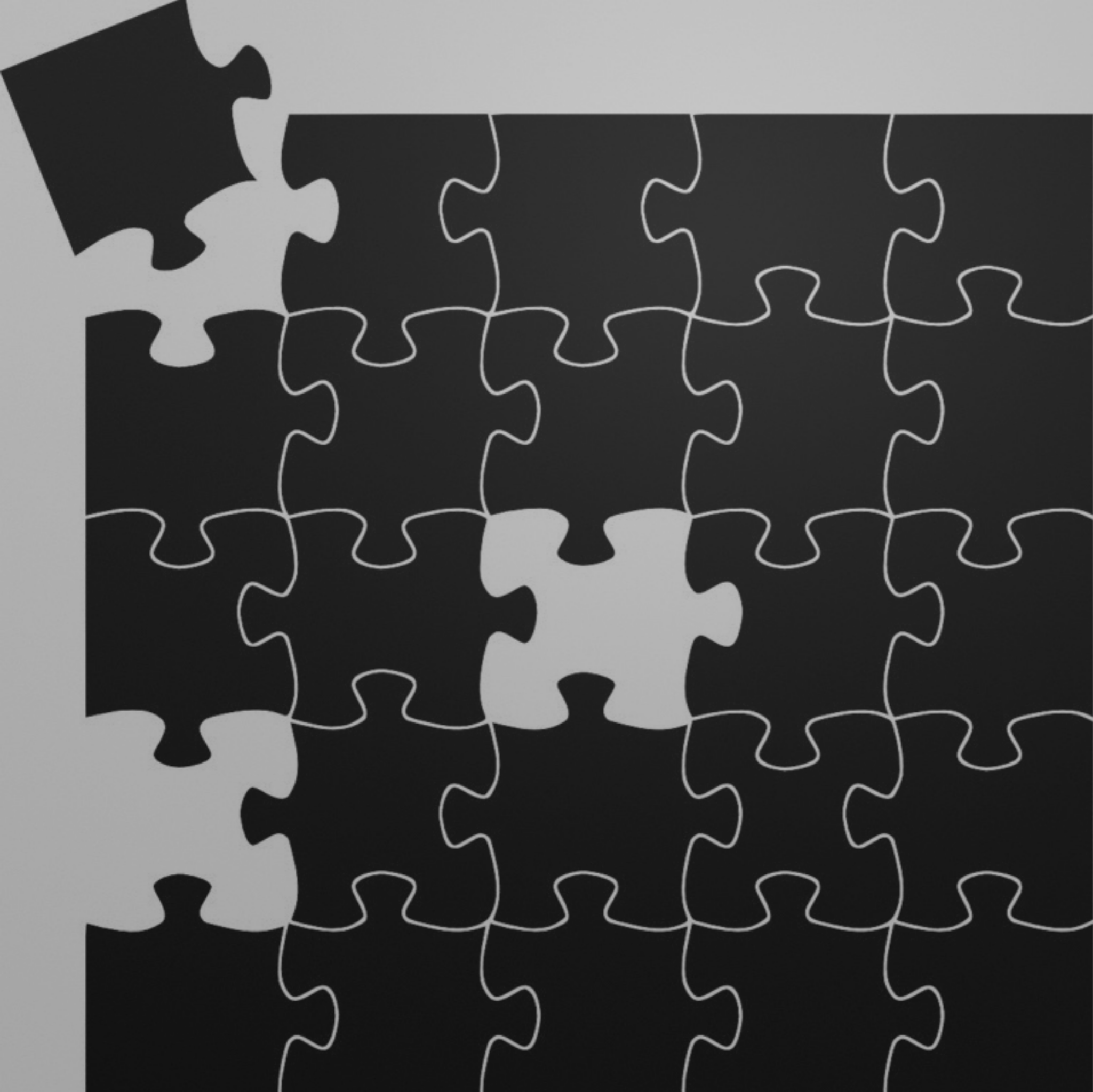
Rapid Delivery

Resource Sharing









# Why Docker?

Dev-centric packaging & reproducibility

Infrastructure abstraction

Faster dev iterations

Resource sharing







# **Docker @Netflix - Use Cases**

**Algorithms Engineering**

**Data Pipeline**

**Edge Engineering**

# **Docker @Netflix - Use Cases**

**Algorithms Engineering**

**Data Pipeline**

**Edge Engineering**

# Algorithms Engineering

R&D of algorithmic components for product

NETFLIX

Browse ▾

Kids

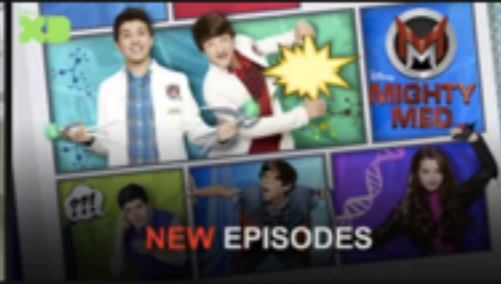
DVD

Search



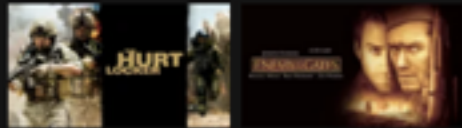
Sangeeta ▾

Top Picks for Sangeeta



Suspenseful Movies

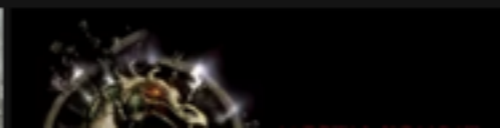
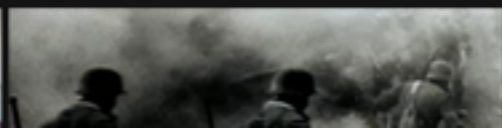
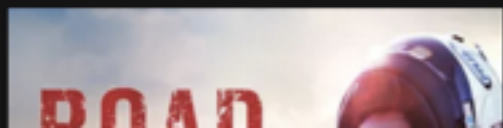
Based on your interest in:

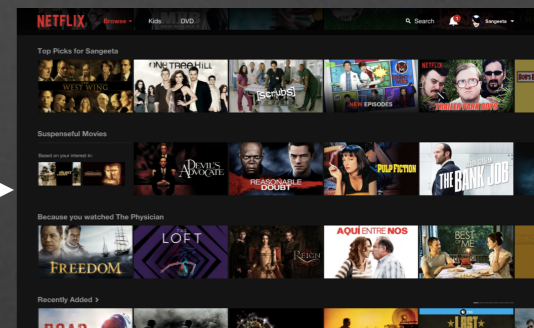
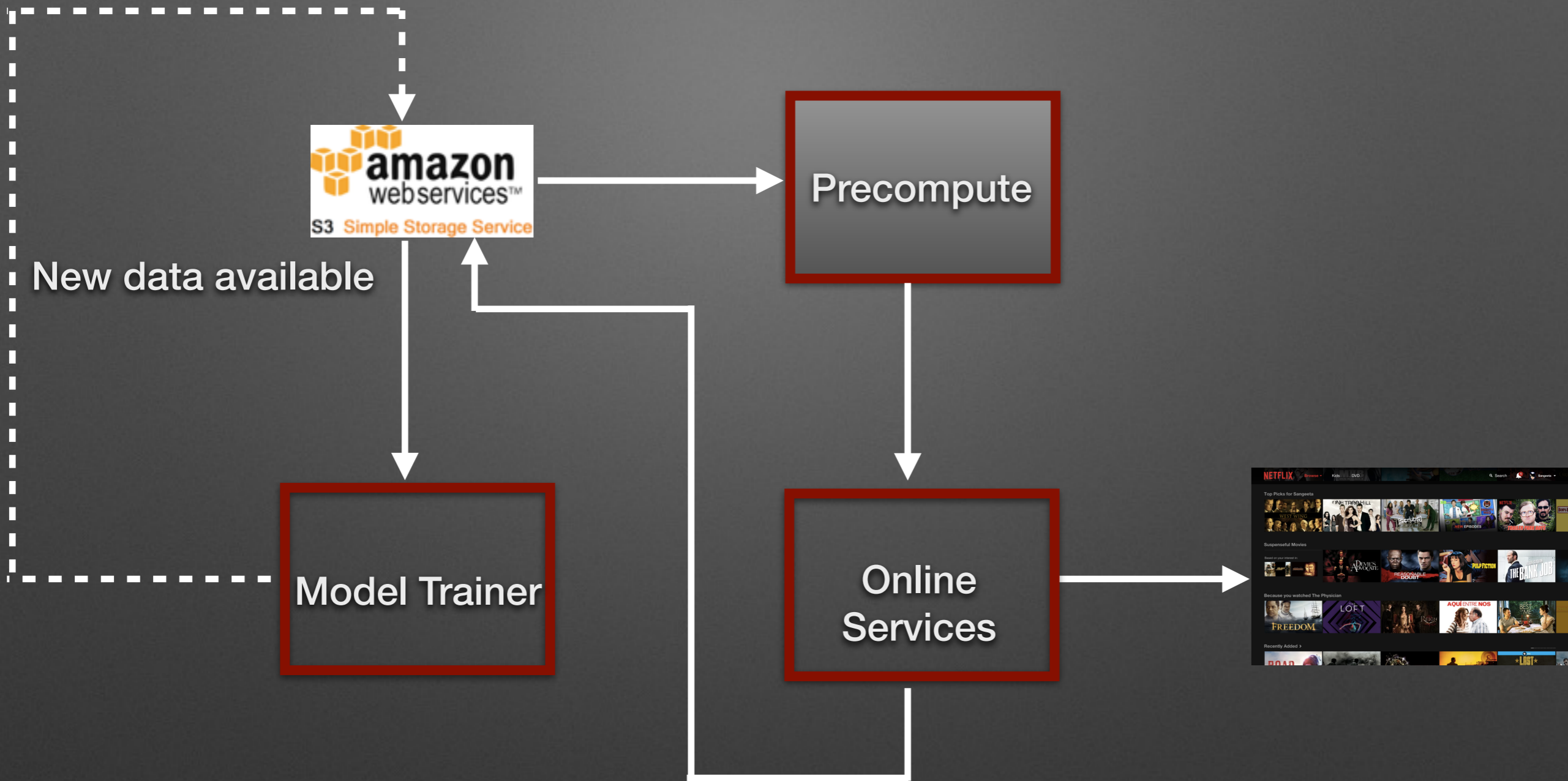


Because you watched The Physician



Recently Added >





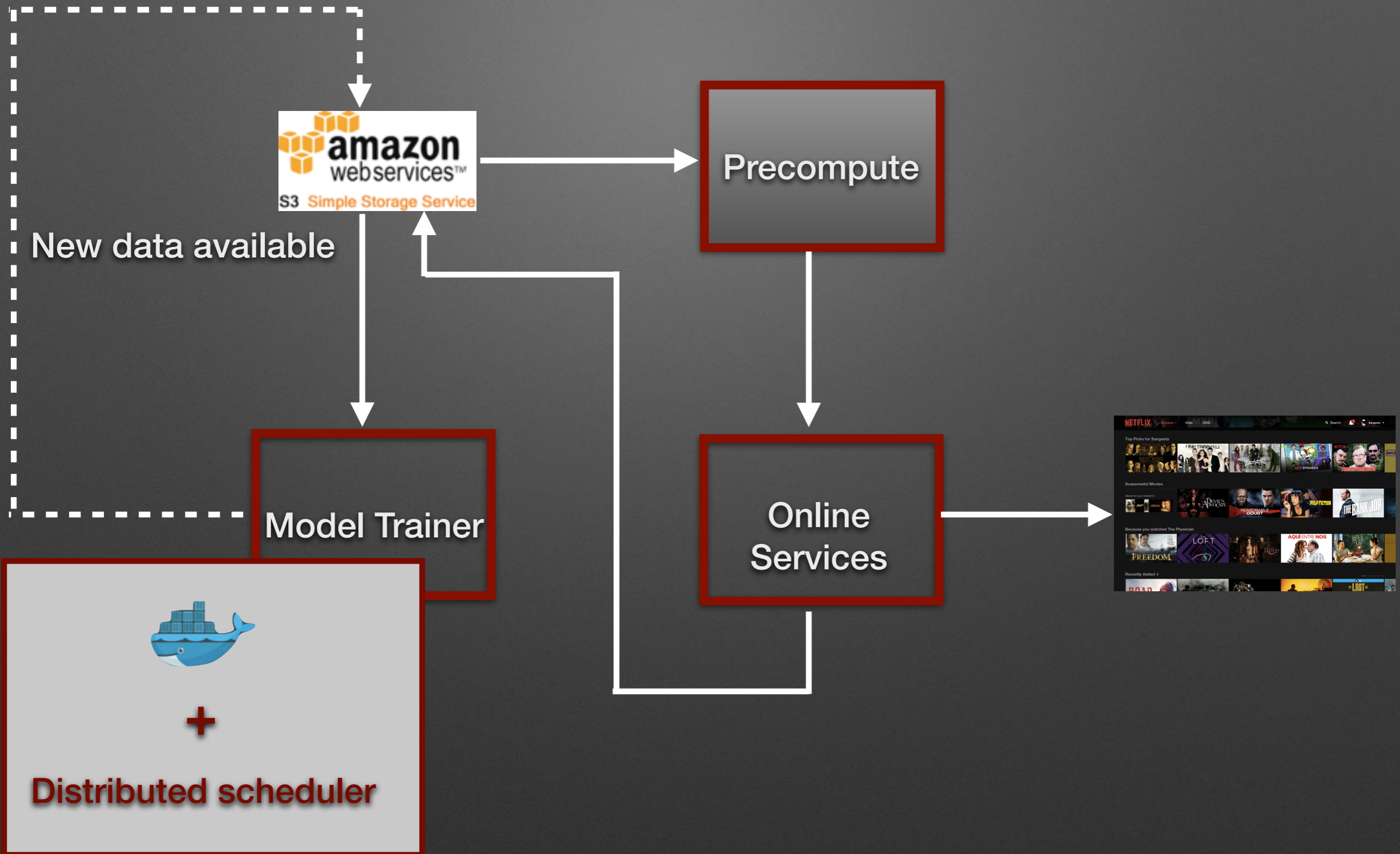
# Requirements

Infrastructure abstraction



Polyglot support & Local Dev Ex

Dynamic resource allocation &  
distributed job scheduling





Model Trainer

Spinnaker

*Other Apps*

Distributed Scheduling & Task Management

Fenzo



MESOS



Amazon Virtual  
Private Cloud (VPC)



Infrastructure abstraction

Polyglot + Local Dev

Distributed Scheduling

# Docker @Netflix - Use Cases

Algorithms Engineering

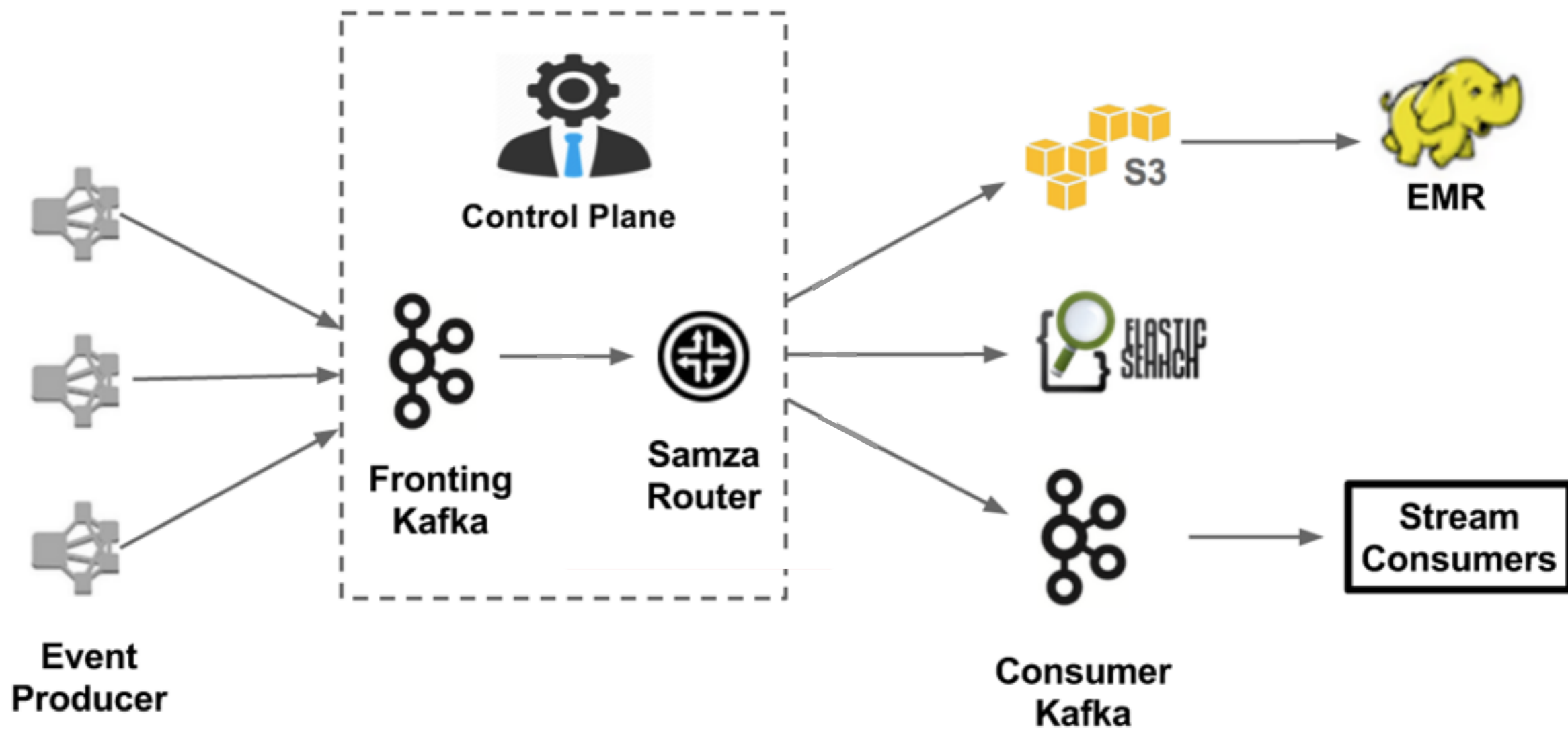
Data Pipeline

Edge Engineering

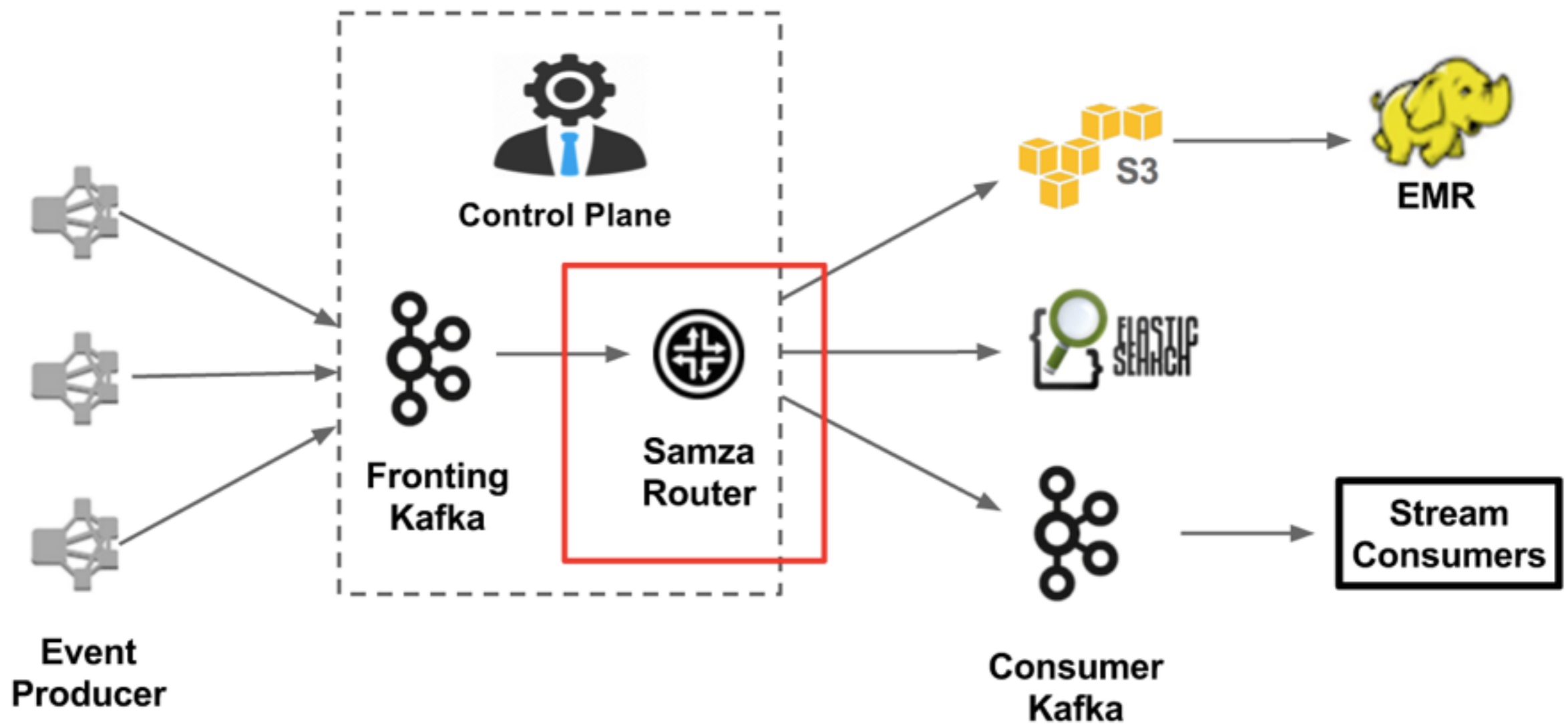
# **Data Pipeline**

**Publish, Collect, Process, Move Data**

# Keystone



# Keystone



# Requirements

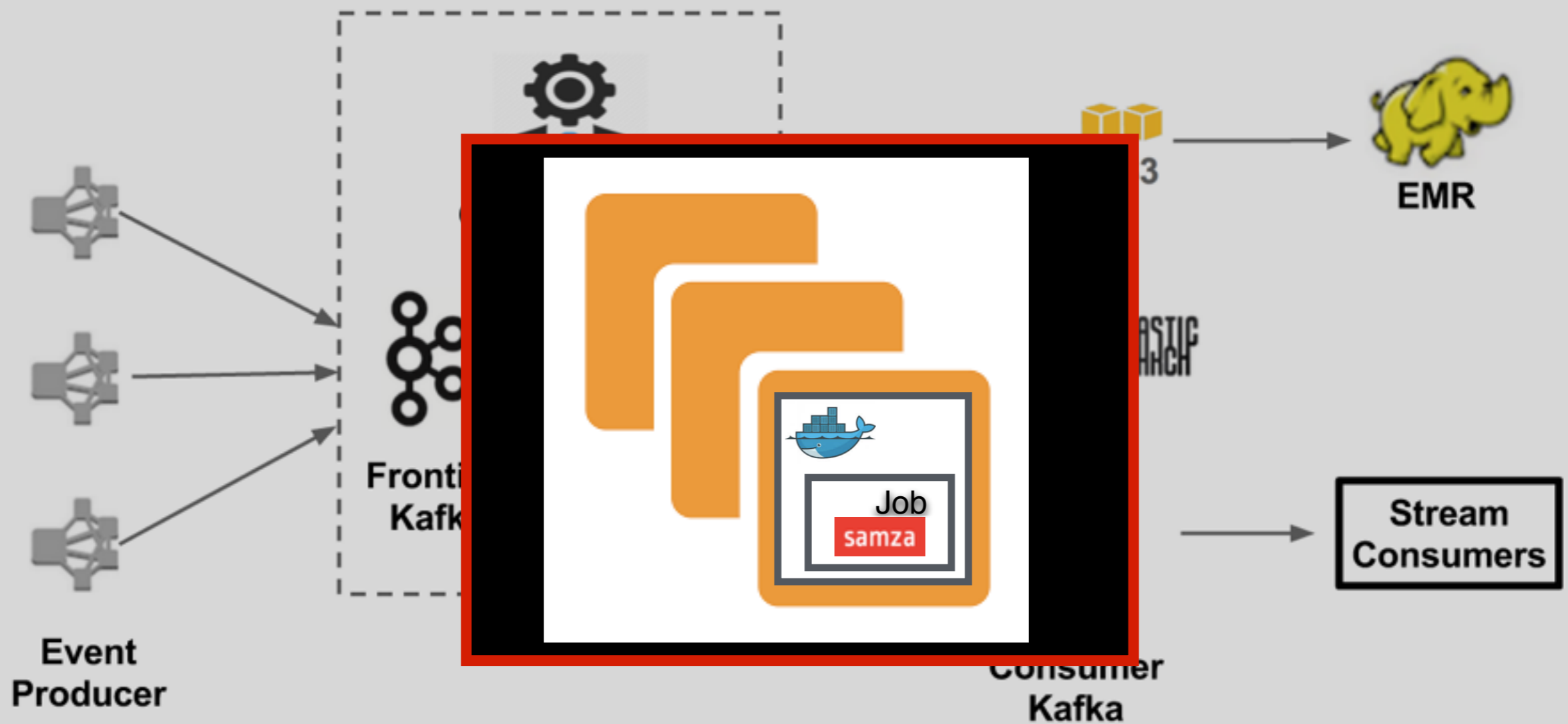
Local Dev Ex



Infrastructure abstraction

Fine-grained resource management

# Keystone







Infrastructure abstraction

Local Dev Ex

Fine grained resource Management

# Docker @Netflix - Use Cases

Algorithms Engineering

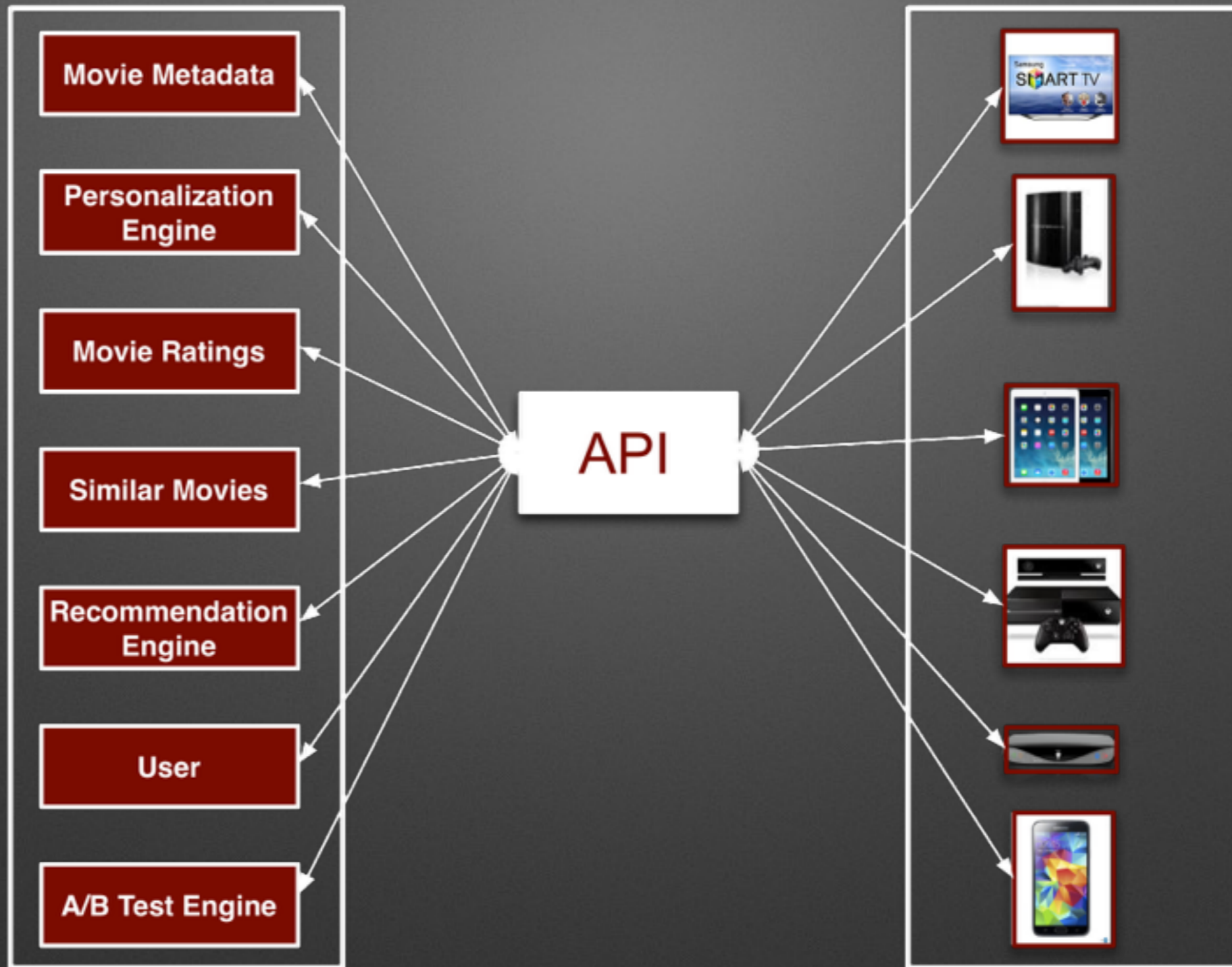
Data Pipeline

Edge Engineering

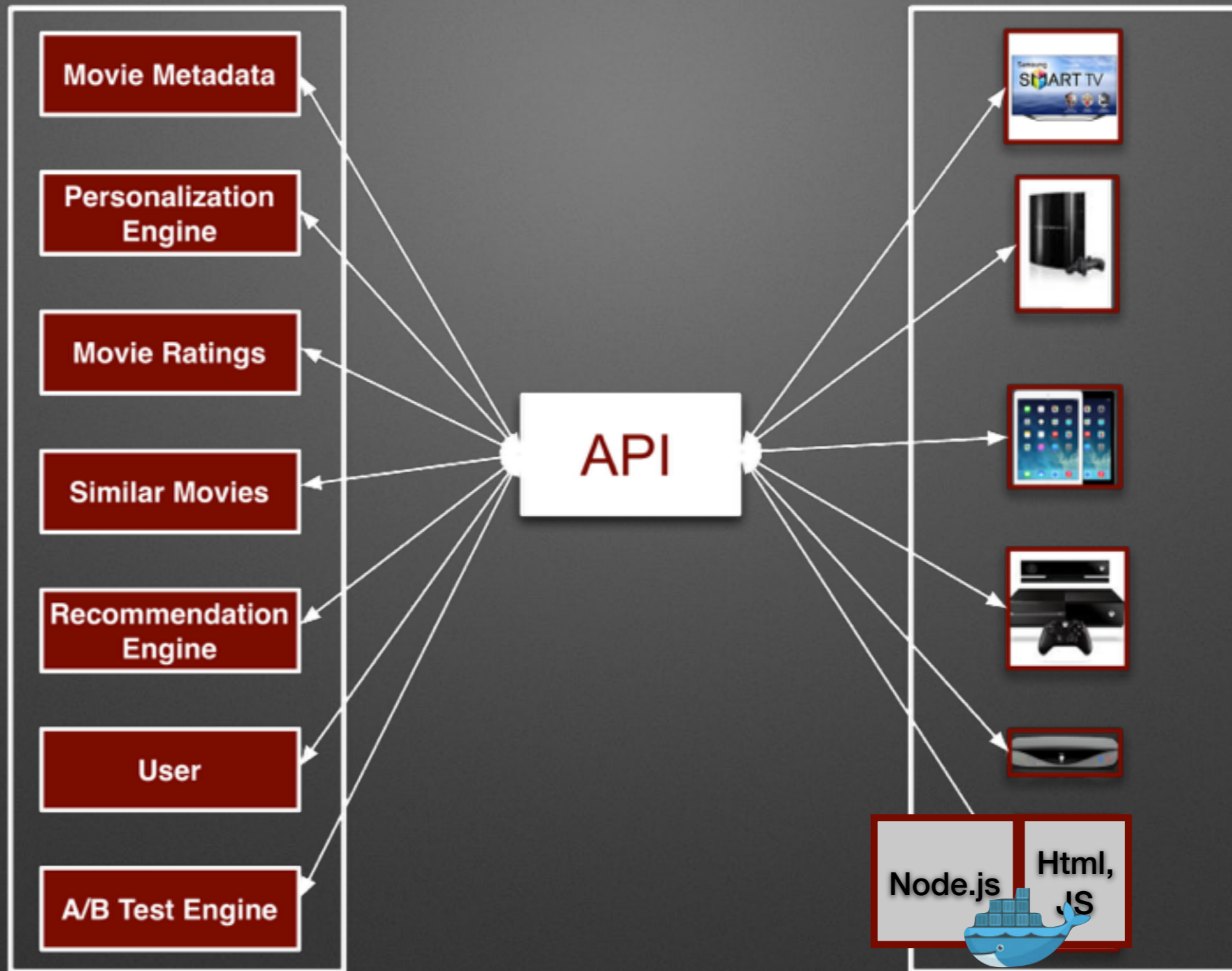
# Edge Engineering

Entry point to Netflix for all device traffic

# Automation & Tools



# Automation & Tools



# Requirements

Infrastructure abstraction



Local dev, Polyglot - Java, Groovy,  
Node.js

Fine-grained resource  
management

# Requirements++

Ops Tooling

Networking, IPC

Security

Insights

Failure Testing

Performance

And more...



*Long running Services  
vs.  
Batch Jobs*

# Requirements++

Ops Tooling

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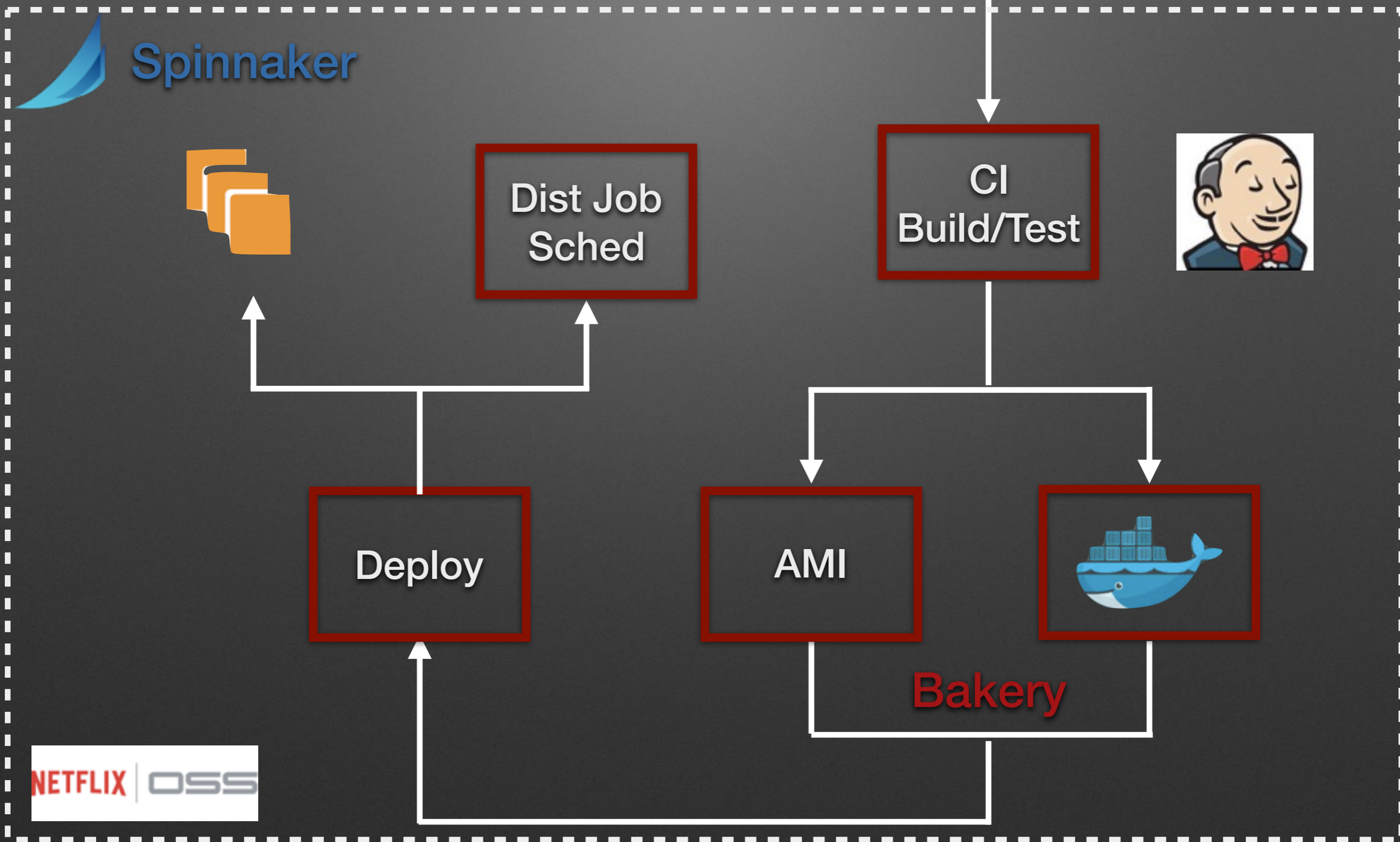


Modules / all

Filter...



Name	Version	Stack	Region	Meta
<a href="#">/shakti/primer-ludo-no-remote/setVideoRating</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/wigenre</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/ratinghistory</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/geo</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/ecapi/account/subscription/plancancel</a>	1	*	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/densityKids/recentlyWatchedCharacter</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/util/error</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/pin/info</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/atf/primer/FT/modify</a>	1	*	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/primer/shared_module/endpoint</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/uberContext</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/densityKids/character</a>	1	test	*	API, java-1.7.0+groovy-2.3.6, com.netflix.api.endpoint.BaseEnd
<a href="#">/shakti/primer-ludo-no-remote/servicecode</a>	1	test	*	API, java-1.7.0+groovy-2.3.6,



Group by Pipeline Show 10 per group

Configure Start Manual Execution

Bake & Titan Deploy

Trigger: Enabled Configure Start Manual Execution

BAKE DETAILS

BAKE IN US-WEST-1

Step	Started	Duration	Status
Bake in us-west-1	2015-11-03 12:13:48 PST	00:00	COMPLETED

Bake Config Task Status

**Provider** Amazon  
**Image** edge.primer-ui-server:master-201511022319-trusty-8f98f58  
**Region** us-west-1  
**Package** ssh://git@stash.corp.netflix.com:7999/edge/primer-ui-server.git?8f98f5875223b8dc563b3b2c9d16e43c27a85a3d  
**Base OS** trusty  
**VM Type** PV  
**Store Type** DOCKER  
**Label** release

View Bakery Details

Source | Permalink

BUILD #21 MANUAL START dzapata@netflix.com 2015-11-03 12:07:38 PST

Status: CANCELED

Duration: 05:10

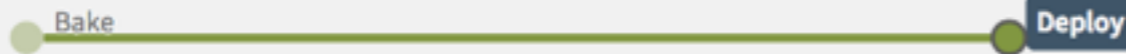
BUILD #21 MANUAL START

+ - Group by Pipeline Show 10 per group

Configure Start Manual Execution

Bake & Titan Deploy Trigger: Enabled Configure Start Manual Execution

BUILD #21 MANUAL START dzapata@netflix.com 2015-11-03 12:13:47 PST Status: COMPLETED Duration: 01:15



DEPLOY DETAILS

DEPLOY IN US-EAST-1

Table with 4 columns: Step, Started, Duration, Status. Rows include 'Deploy in us-east-1' and 'Shrink Cluster'.

Deployment Config Task Status

Account: TITANDEVVPC, Region: primerui-titan, Cluster: , VPC: [none], Strategy: highlander, Capacity: 1

Deployed: primerui-titan-v000

Source | Permalink

BUILD #21 MANUAL START dzapata@netflix.com 2015-11-03 12:07:38 PST Status: CANCELED Duration: 05:10

BUILD #21



Clusters Show  Instances  with details

Create Server Group

Filtered by: STACK: prod STACK: test STACK: titan Clear All

TEST	primerui-prod	1 ▲ : 100%
US-WEST-2		
V003: Build: #24		
Permalink		
TEST	primerui-test	1 ▲ : 100%
US-WEST-2		
V003: Build: #24		
Permalink		
TITANDEWPC	primerui-titan	1 ▲ / 1 ▼ : 50%
US-EAST-1		
TT	V001 (No build info)	1 ▲ : 100%
TT	V000 (No build info)	1 ▼ : 0%
Permalink		

**TT primerui-titan-v001**

Titan Job Actions

**TITAN JOB INFORMATION**

Id: 14761b70-83fc-11e5-a909-123020c47da1  
Created: 2015-11-05 12:30:40 PST

**PLACEMENT CONSTRAINTS**

Account: titandevvpc  
Region: us-east-1  
Zones:

**SIZE**

Desired: 1  
Current: 1

**HEALTH**

Tasks: 1 ▲ : 100%

**DOCKER IMAGE**

Image Name: edge-primerui.com  
Image Version: master-201511022319-trusty-8f98f58

**PARAMETERS**

jobName: primerui-titan-v001  
application: primerui  
source: spinnaker  
region: us-east-1  
account: titandevvpc

# Building out the pieces

Gradle docker plugin to generate Dockerfile

Spinnaker CloudProvider provides abstraction

Bakery support for image generation

Docker registry for internal images

*libnetwork* plugin for addressable IP

# Dev Ex Wins

Faster dev iterations

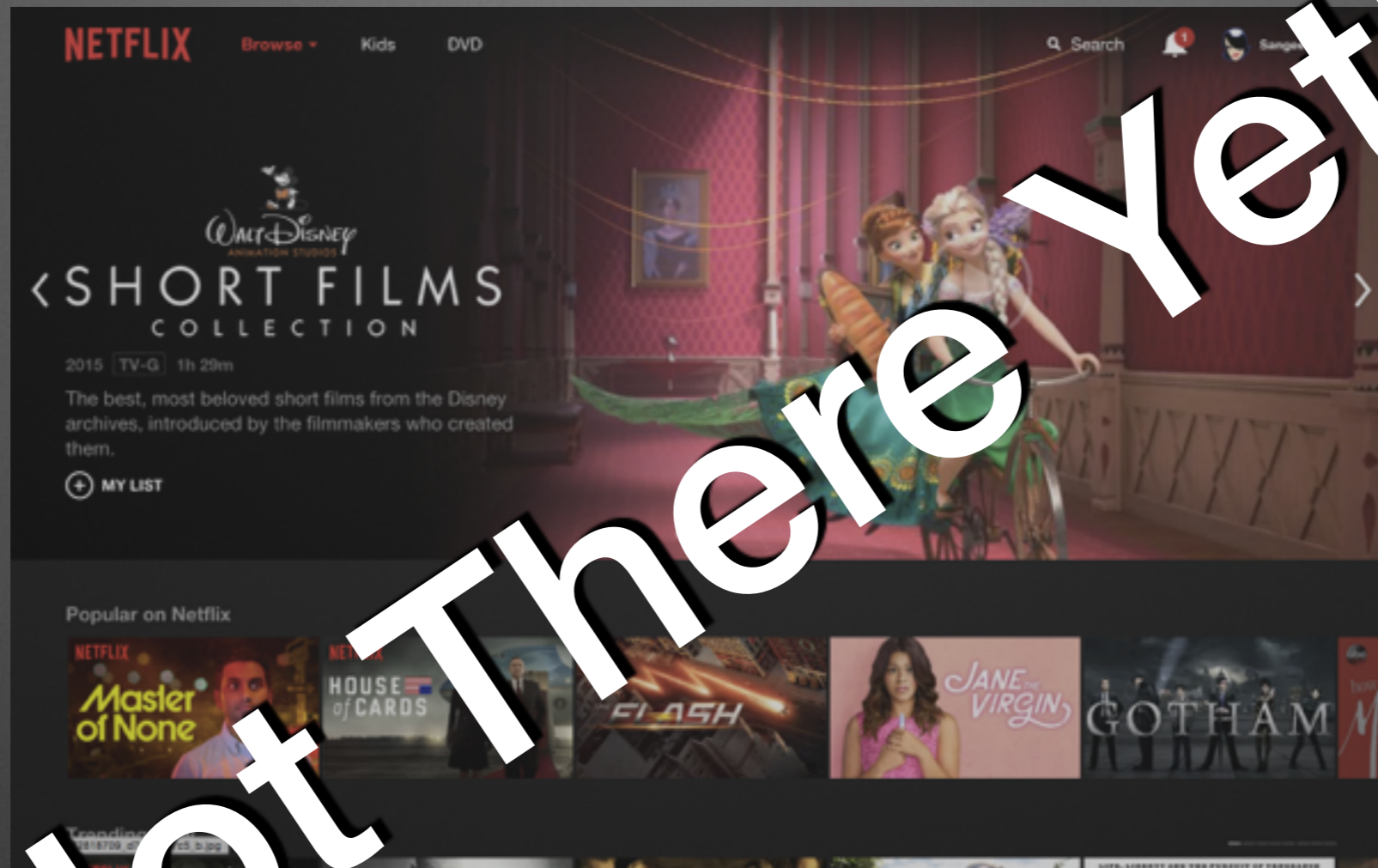
Run prod image locally; attach debugger

Multiple branch/config variations

Hot reloading of files

‘Roman Riding’ with AMIs

Not There Yet!



ON



docker





**‘PaaS-like’ Dev Experience**

**Production scale/Operational readiness**

**Optimized resource utilization**

**Dev Ex**



**Polyglot env, Packaging**



**Infrastructure Abstraction**



**Production ready Online Services**





BRAKE

TRIP A 0.0  
100000

SELECT  
RESET





**Thank You**

*@sangeetan*

**NETFLIX**

# *Acknowledgements*

The Netflix Algorithms Engineering & Data Pipeline teams

## *Photo Credits*

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<https://goo.gl/fRcpPN>

<https://goo.gl/tF199H>

<https://goo.gl/K1OH9T> wildflowers

<https://goo.gl/KSaL5s> roadmap

<https://goo.gl/8JCDQy> odometer

<https://goo.gl/c4RuSR> takeaway box