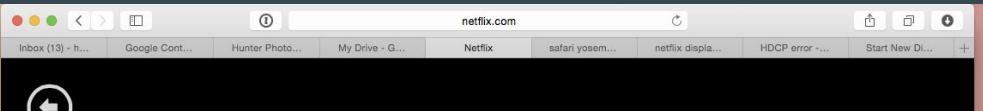


Crisis to Calm: A Story of Data Validation @ Netflix

...

Lavanya Kanchanapalli





Barack Obama ✅ @BarackObama · Feb 4 2015



Yesterday Netflix went down for about 45 minutes, I had planned to watch House of Cards



22K



192K



851K



There appears to be a display problem. Please ensure your monitor is HDCP compliant and is not mirrored using Airplay.

Albert Einstein ✅ @AlbertEinstein · May 11



As per theory of relativity, netflix being down for few hours feels like an eternity
netflix.com...



3



16



49



- Rollback data
- Increase capacity
- Netflix starts to work



Root Cause

- Duplicate objects
- Apps failed
- Cascading failures
- Netflix goes down!





Who's watching?

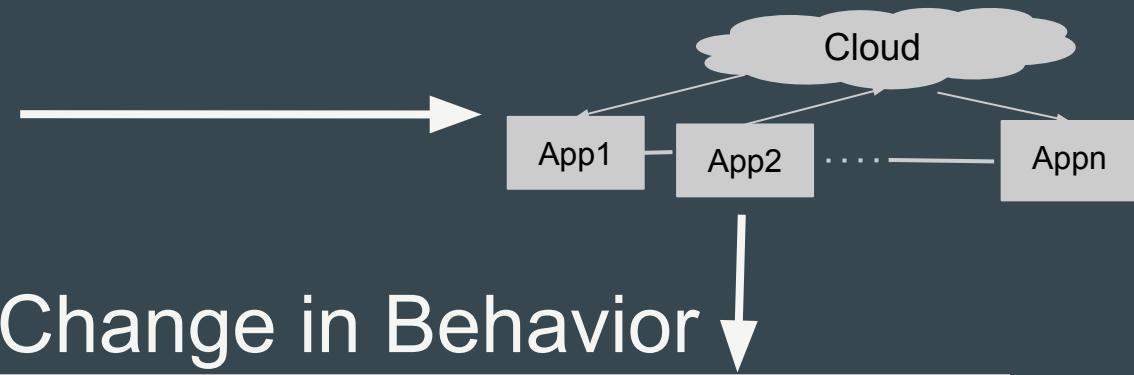




Data Change



Netflix Microservices



Change in Behavior





#netflixeverywhere

Audio

- German
- English [Original]
- Spanish
- French
- Italian
- English - Audio Description

Subtitles

- Off
- Spanish
- French
- Traditional Chinese
- Simplified Chinese

|| 🔊 The Crown S1:E1 Wolferton Splash ? ▶ 📄 💬 ⏵

NETFLIX ORIGINAL
MARVEL
DEFENDERS

57% Match 2017 TV-MA Limited Series

Daredevil, Jessica Jones, Luke Cage and Iron Fist join forces to take on common enemies as a sinister conspiracy threatens New York City.

PLAY

+ MY LIST



Starring: Charlie Cox, Krysten Ritter, Mike Colter

Genres: TV Shows, Crime TV Shows, TV Action & Adventure

This show is: Violent, Exciting, Suspenseful

OVERVIEW

EPISODES

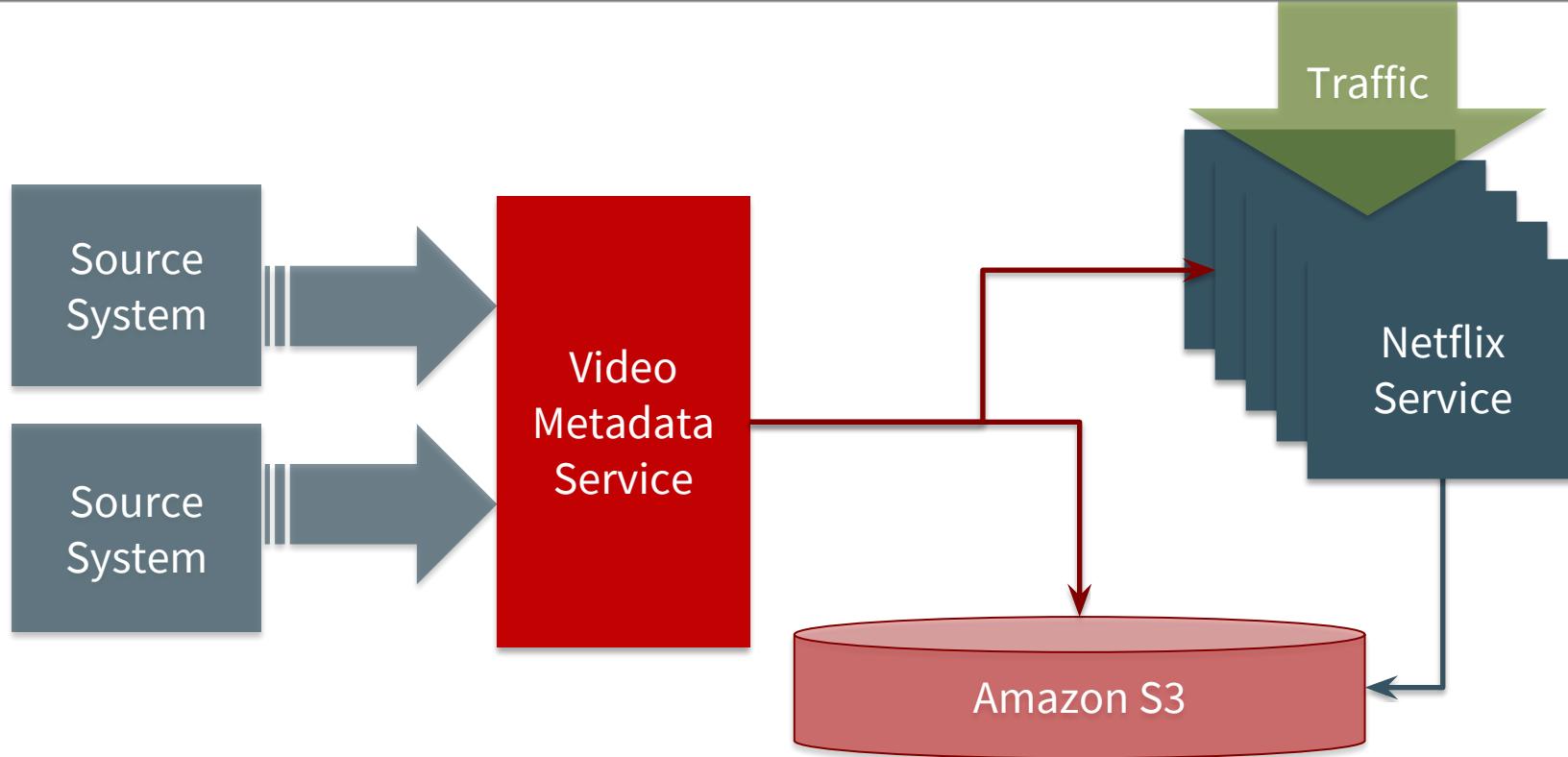
TRAILERS & MORE

MORE LIKE THIS

DETAILS



Metadata Architecture



- Single publisher
- Multiple consumers
- Hollow ([hollow.how](#))
- Versioned data
- Fast propagation



Bad data happens!



Leaked Content



Disables Features



Deletes data

Blockbuster Movies



Blockbuster Movies





Barack Obama  @BarackObama · Feb 4 2015

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3



16



49



Data change = Code Push



Detection **Staggering** **Rollback**

1

—

2

—

3

Detection

Staggering

Rollback



Detection Staggering Rollback

Many Unknowns



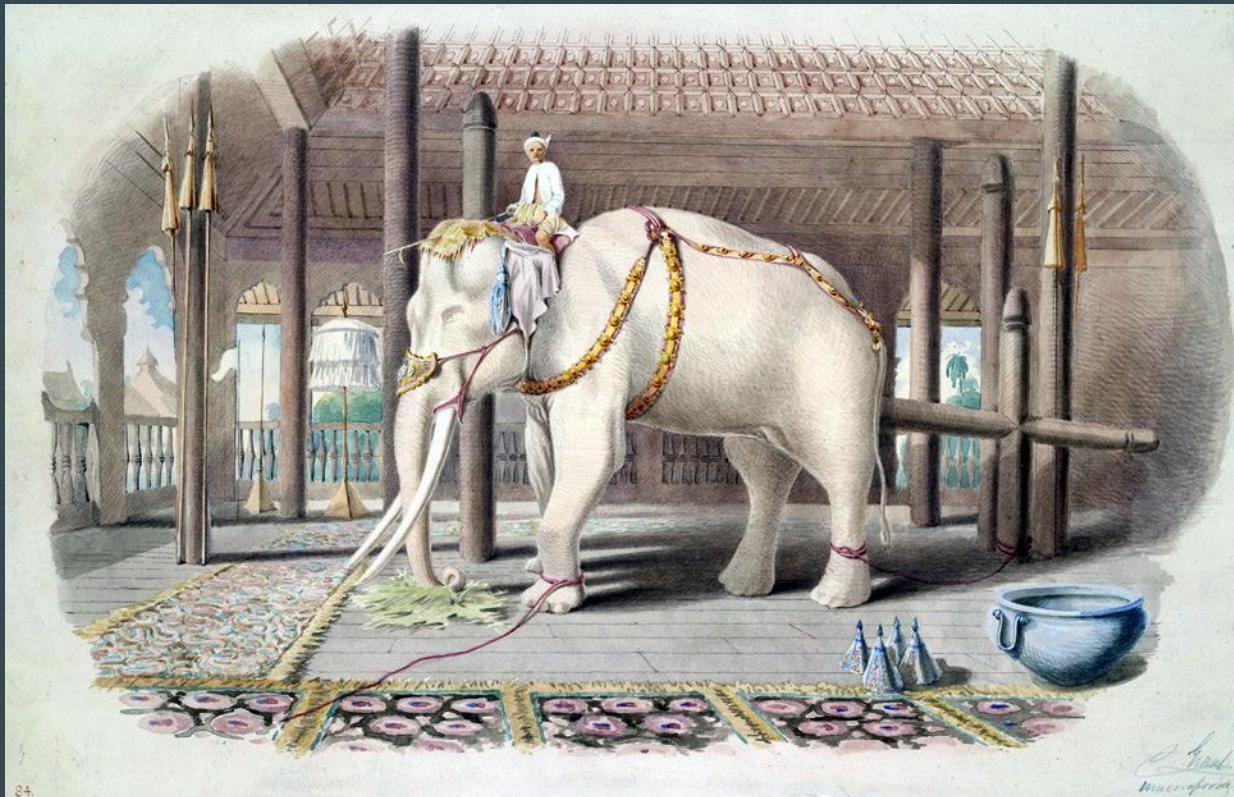
Would it be too slow?



Would there be too many failures?



Would it cost too much?



1

—

2

—

3

Detection

Staggering

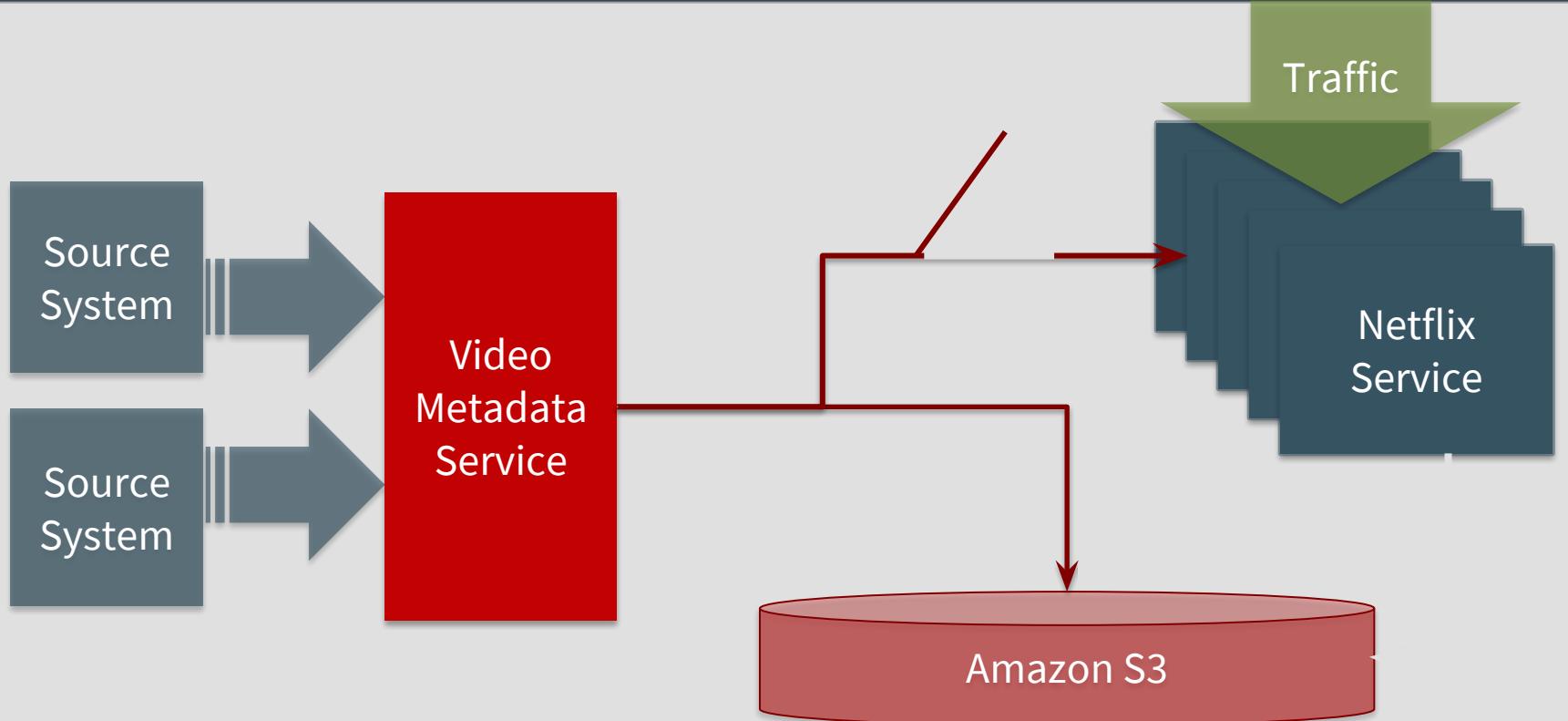
Rollback



Detection **Staggering** **Rollback**

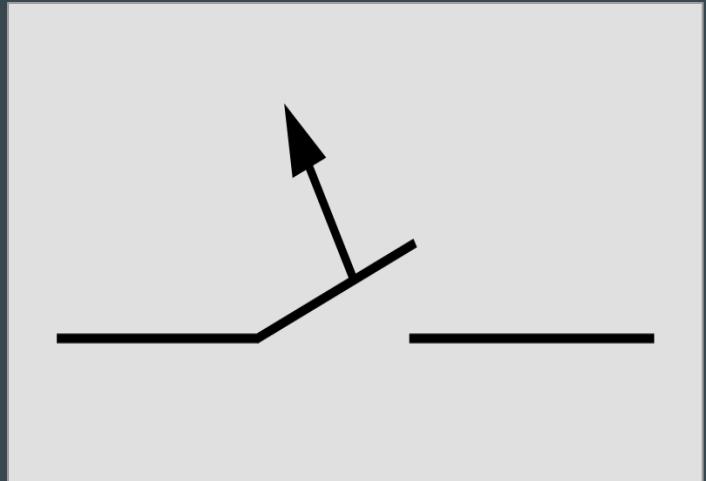
Chapter 1: Circuit Breakers

Metadata Architecture

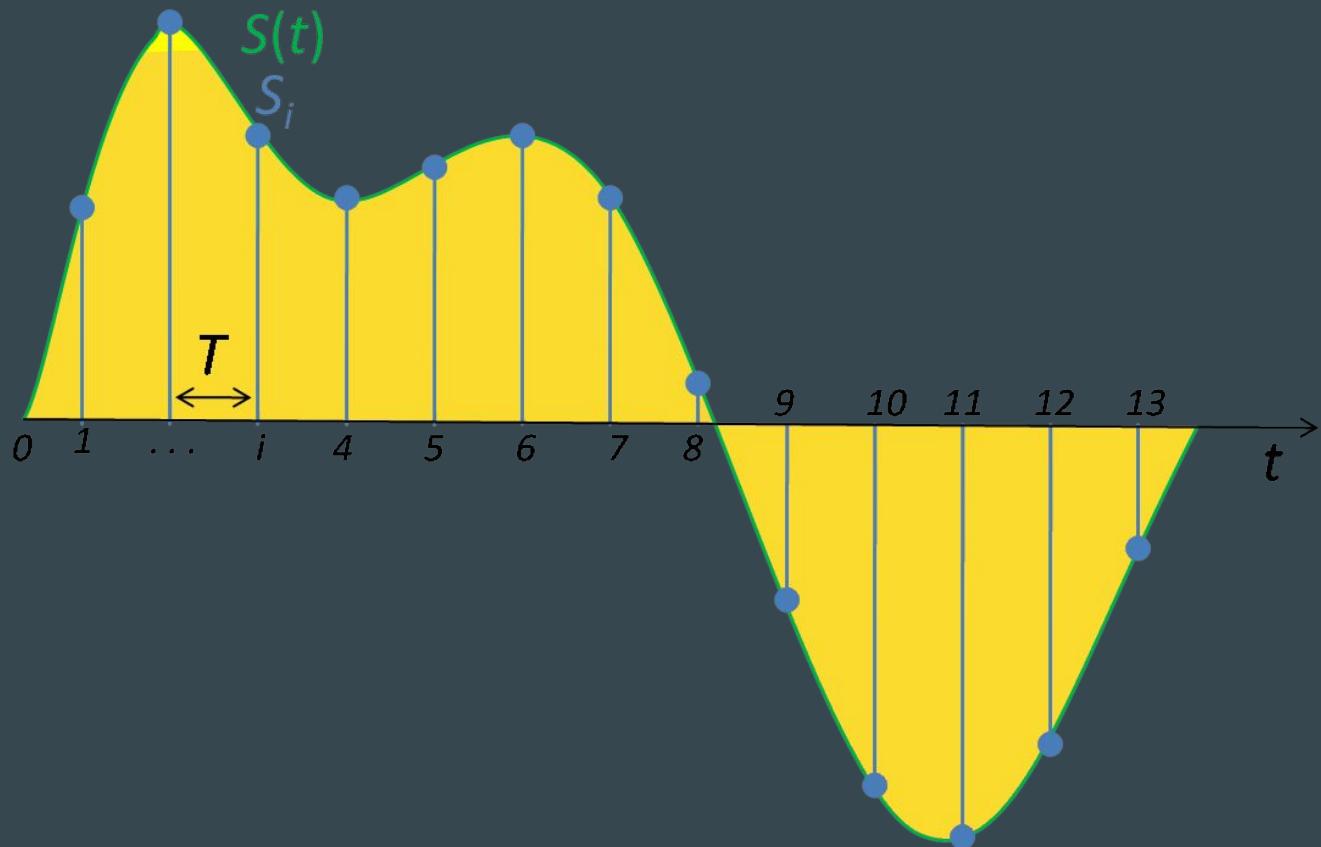


Circuit Breakers

- Integrity checks
- Duplicate detection
- Object counts
- Semantic checks

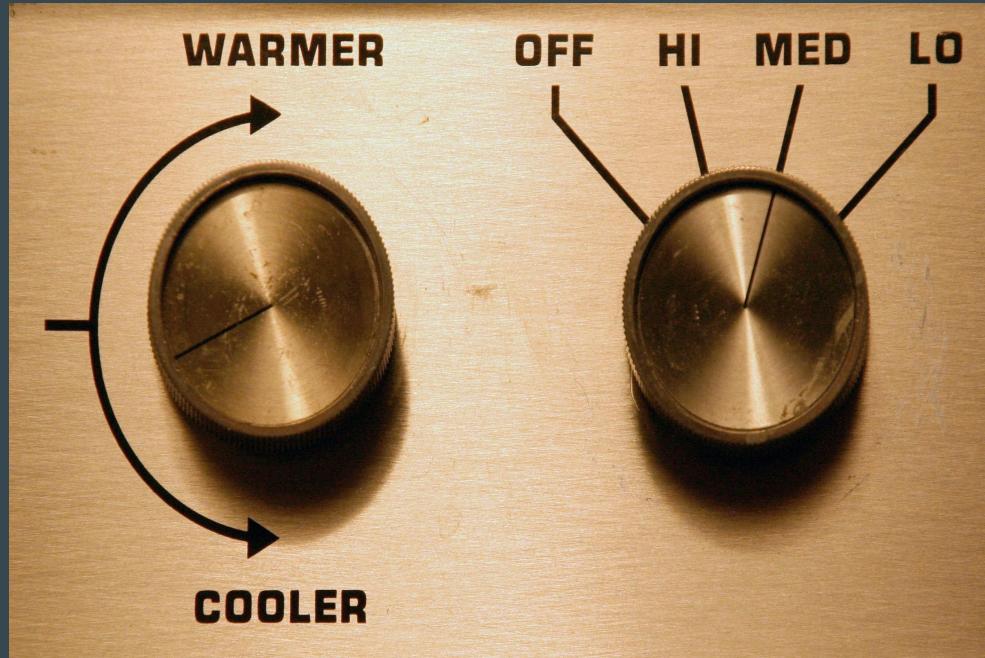


Know your data change



Knobs are key to sanity

- On/ off
- Threshold
- Exclusions



Test Patterns

2014 G 4 Seasons

This is a collection of video test patterns organized by source resolution and native frame rate. The resolution indicated in the pattern's title identifies the title's source resolution, and...

▶ PLAY

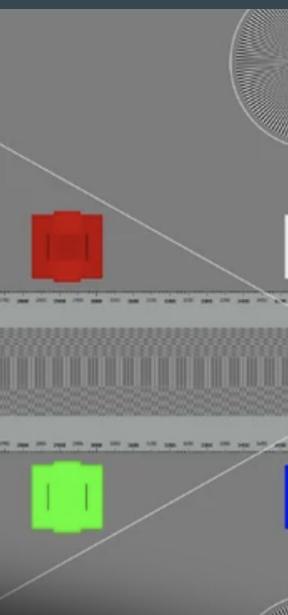
+ MY LIST



Genres: TV Shows, US TV Shows, TV Dramas

OVERVIEW EPISODES MORE LIKE THIS DETAILS

Test patterns
developed for Netflix
by www.archimediatech.com



NETFLIX ORIGINAL

THE CROWN

96% Match 2017 TV-MA 2 Seasons

S1:E1 "Wolferton Splash"

12 of 56m

A young Princess Elizabeth marries Prince Philip. As King George VI's health worsens, Winston Churchill is elected prime minister for the second time.

▶ RESUME

+ MY LIST



Creators: Peter Morgan

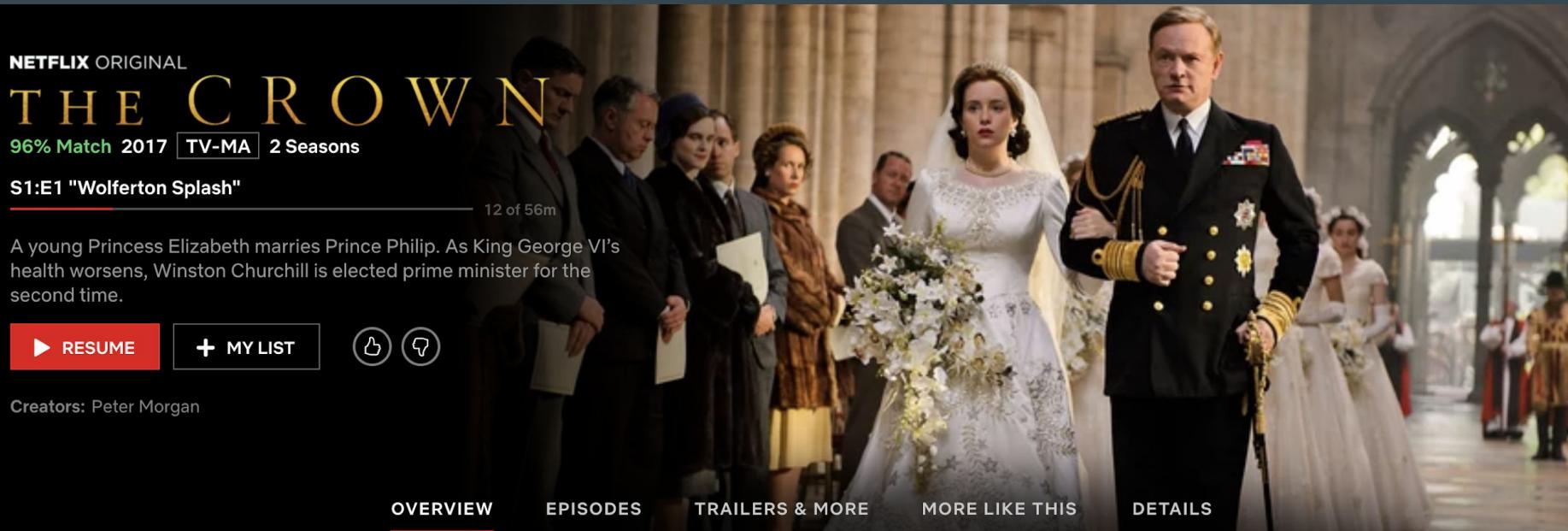
OVERVIEW

EPISODES

TRAILERS & MORE

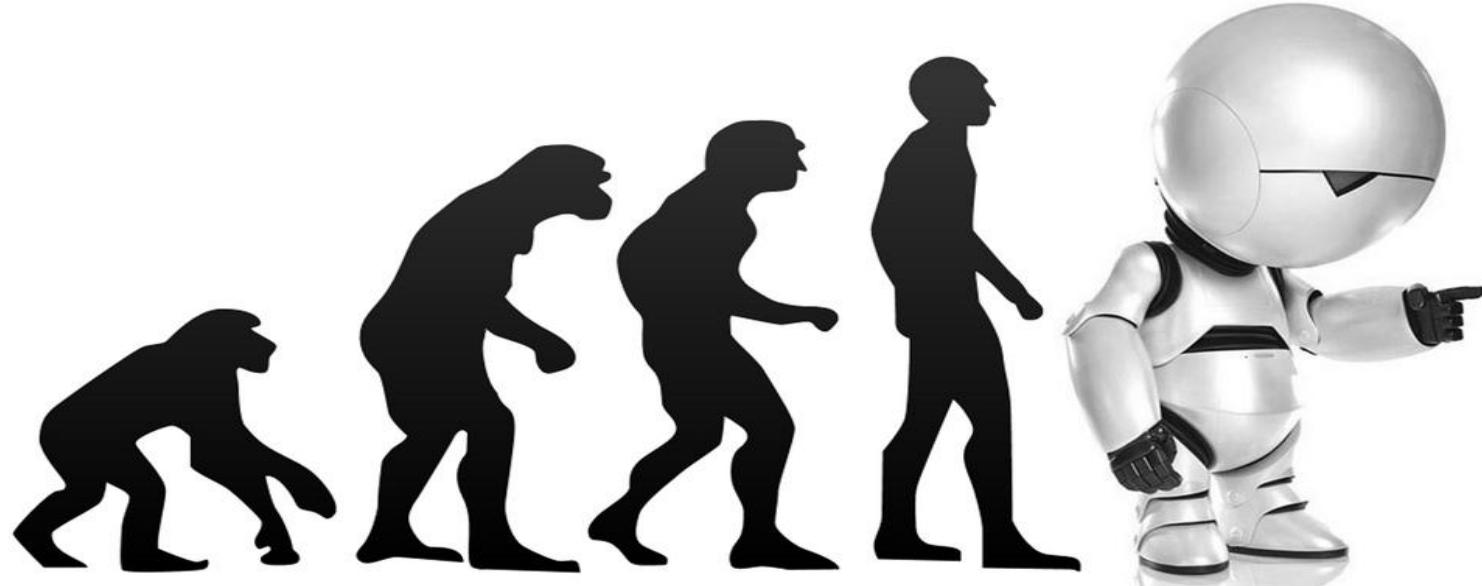
MORE LIKE THIS

DETAILS



Business value is the key





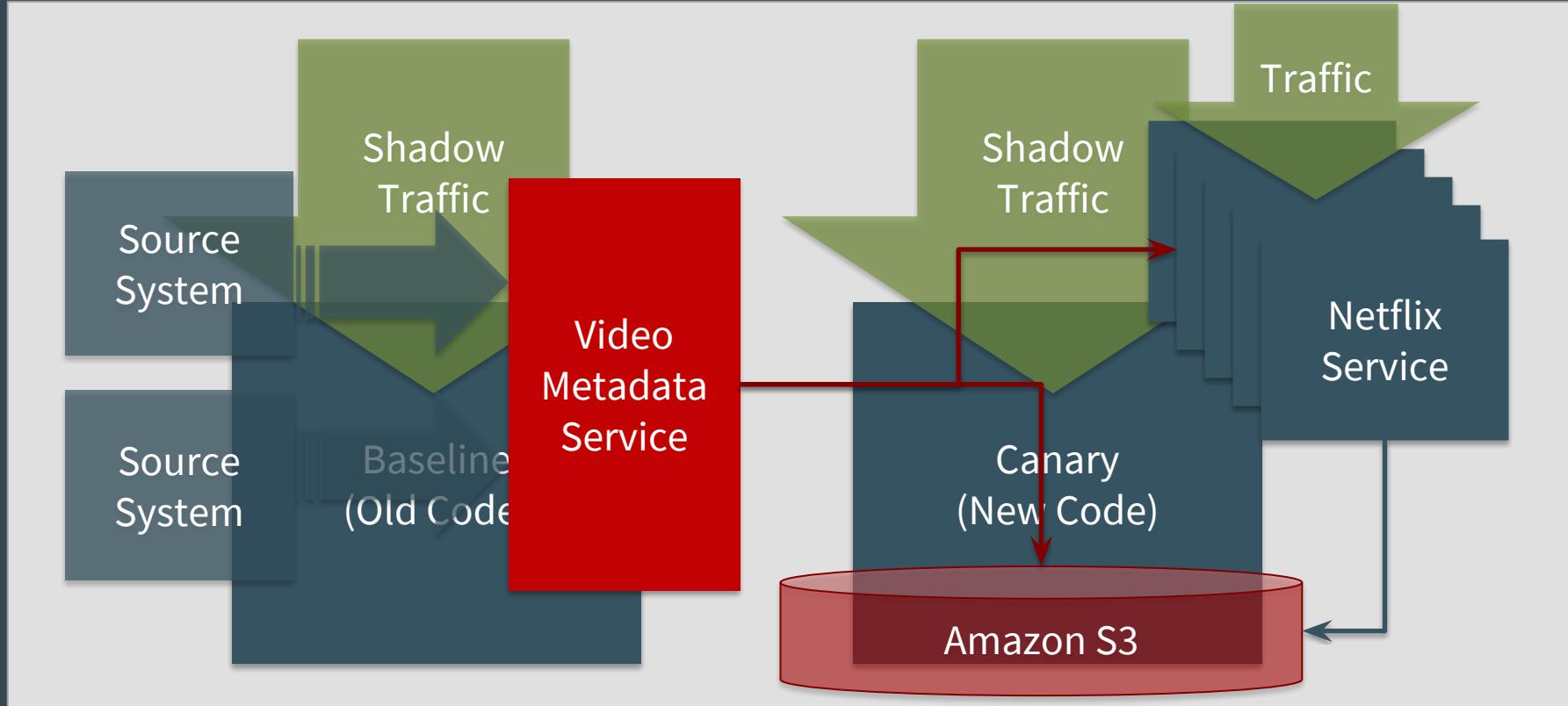
Efficiency

- Change Isolation
- Sampling

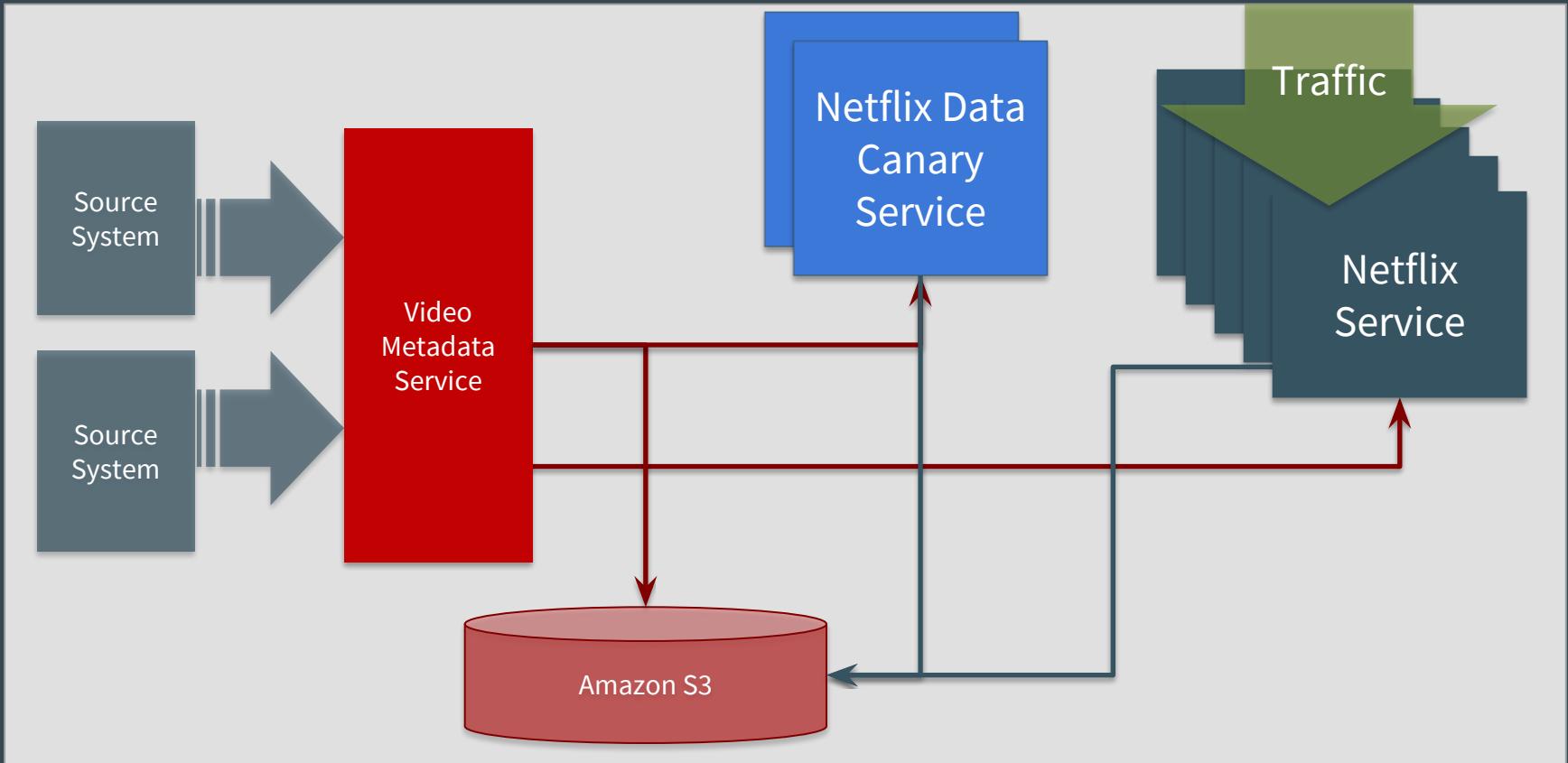


Chapter 2: Canaries

Traditional Canaries



Data Canaries



Netflix Data Canary Service

- Pick key use case(s)
- Pick data to test
- Test with latest data



Netflix Data
Canary
Service

1

—

2

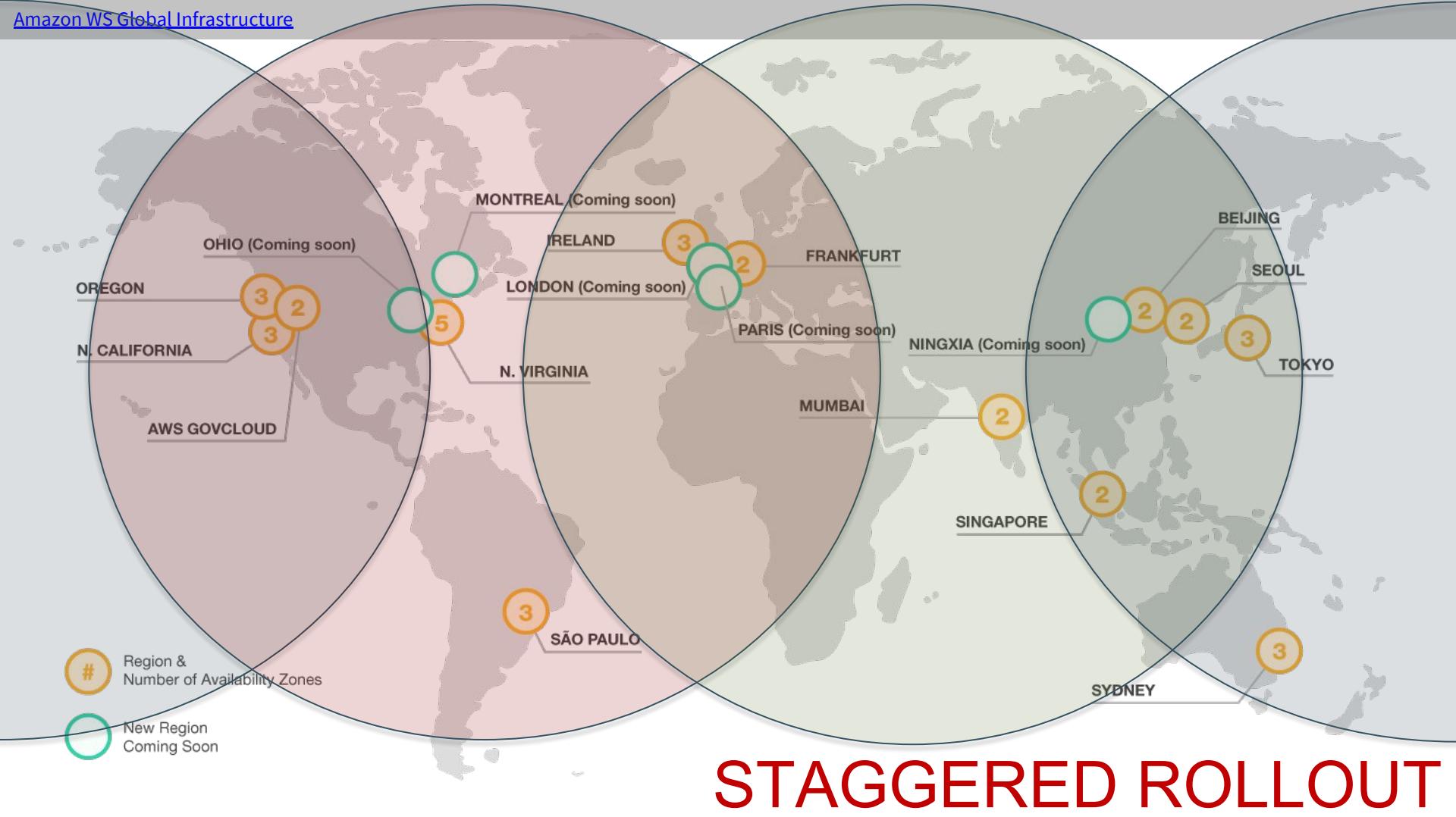
—

3

Detection

Staggering

Rollback

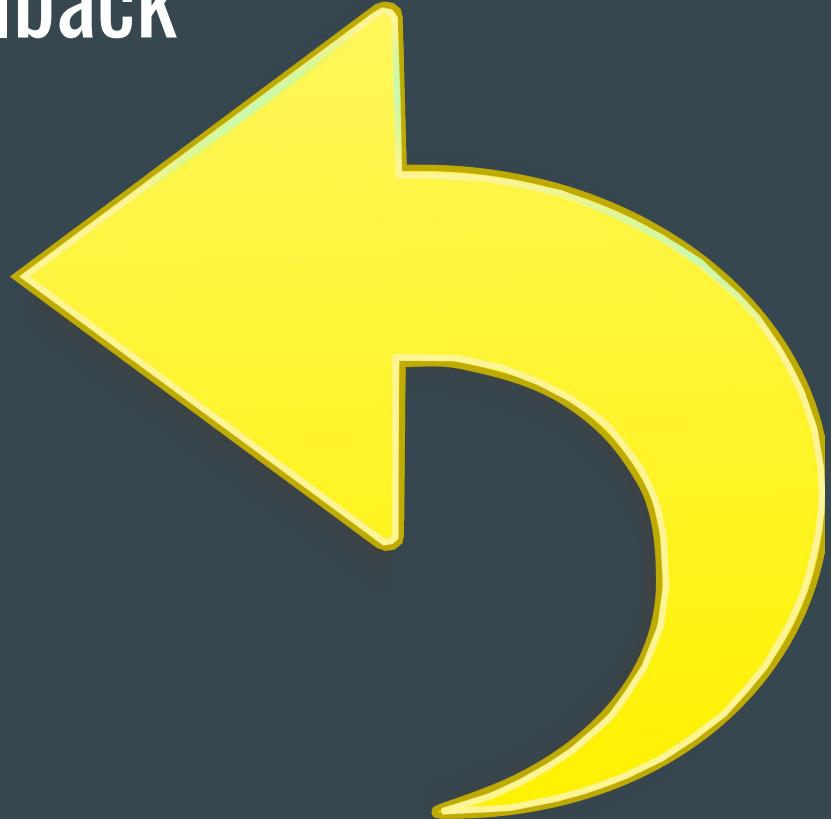




Detection Staggering Rollback

Keep calm & rollback

- Pin back
- Root cause
- Unpin



Rollback

- Visibility
- Traversing

State: 20170524184939019

Movie	138 (Δ : 136, +: 0, -: 2)
Actor	1 (Δ : 1, +: 0, -: 0)

[< prev version](#)

[> next version](#)

Data Diff UI

05/24 11:50 <	From	To
	<pre>. ->(Movie) ... ->id: 1004125 ... ->title: (String) ... ->actors: (SetOfActor) + 1 ->element: (Actor) 0 . ->actorId: 1000172 - 1 . ->actorName: (String) 0 . ->value: vmwzcs1 - 9 . ->element: (Actor) 0 . ->actorId: 1000285 - 1 . ->actorName: (String) 0 . ->value: uriwrlvhztkf1 - 0 - 1 - 0</pre>	<pre>. ->(Movie) ... ->id: 1004125 ... ->title: (String) ... ->actors: (SetOfActor) + 1 ->element: (Actor) 0 . ->actorId: 1000273 - 1 . ->actorName: (String) 0 . ->value: labxcnbolwkurzk1</pre>

Circuit Breaker UI

Name	Enabled / Disabled
DuplicateDetection	On <input type="checkbox"/>
CatalogSize	On <input type="checkbox"/>

Pinning UI

All Blobs		
31 Oct 2018 — 20:39:09	<button>Pin all</button> ▾	20181101032316021
31 Oct 2018 — 20:17:00	<button>Pin all</button> ▾	20181101030138020
31 Oct 2018 — 19:55:21	<button>Pin all</button> ▾	20181101024039019

```
        'replace_interests' => false,  
        'send_welcome'      => false,  
    );  
  
if($array['error'], $result)) {  
    $result = array ('response'=>'error', 'message'  
    =>  
    $result = array ('response'=>'success');  
  
    $array['error']=>$errResult);
```



Data validation is key to high availability

- Data change = Code push
- Circuit breakers & canaries
- Staggering and rollback

Thank You