

ARC209

# A Day in the Life of A Netflix Engineer

Dave Hahn, Sr SRE  
Netflix

November 28, 2017



# By The Numbers

100,000,000,000s

10,000,000,000s

1,000,000,000s

100,000,000s

10,000,000s

1,000,000s

100,000s

10,000s

1,000s

100s

10s

1

**Our goal is**

**ADAM  
SANDLER**

**WINONA  
RYDER**

# **MR. DEEDS**



NETFLIX

# SANDY WEXLER



NETFLIX

THE  
*RIDICULOUS*  
6



NETFLIX



# THE DO-OVER

**Our goal is**

# Winning Moments of Truth

**What** they want  
**When** they want  
**Device** they want

# NETFLIX



NETFLIX ORIGINAL

# STRANGER THINGS

95% Match 2017 2 Seasons 4K Ultra HD 5.1

When a young boy vanishes, a small town uncovers a mystery involving secret experiments, terrifying supernatural forces and one strange little girl.

*Winona Ryder, David Harbour, Matthew Modine*  
TV Shows, TV Sci-Fi & Fantasy, Teen TV Shows



## Popular on Netflix



## Recently Watched



NETFLIX ORIGINAL

# STRANGER THINGS

95 % Übereinstimmung 2017 2 Staffeln 4K Ultra HD 5.1

Nach dem Verschwinden eines Jungen treten in einer Kleinstadt geheime Regierungsexperimente, übernatürliche Kräfte und ein merkwürdiges kleines Mädchen zutage.

Winona Ryder, David Harbour, Matthew Modine  
Serien, Sci-Fi- und Fantasy-Serien, Thrillerserien, US-Serien



## Beliebt auf Netflix



## Kürzlich angesehen



NETFLIX ORIGINAL

# STRANGER THINGS

95% compatibile 2017 2 stagioni 4K Ultra HD 5.1

La scomparsa di un ragazzino in una cittadina porta alla luce un mistero in cui si mescolano esperimenti segreti, spaventose forze soprannaturali e una strana bambina.

Winona Ryder, David Harbour, Matthew Modine  
Serie TV, Serie TV di fantascienza e fantasy



## I più visti su Netflix



## Visti di recente



NETFLIX ORIGINAL

# STRANGER THINGS

95% concordanță 2017 2 sezoane 4K Ultra HD 5.1

După dispariția unui băiat, un orașel descoperă un mister care implică experimente secrete, forțe supranaturale cutremurătoare și o fetiță foarte ciudată.

*Winona Ryder, David Harbour, Matthew Modine*  
Seriale TV, Seriale TV cu adolescenti, Thrillere TV



## Populare pe Netflix



## Vizionate recent



NETFLIX ORIGINAL

# STRANGER THINGS

Trafność: 95% 2017 2 sezony 4K Ultra HD 5.1

W małym miasteczku znika chłopiec. To początek intragi, w której pojawiają się przerażające nadprzyrodzone siły, sekretne eksperymenty i pewna dziwna dziewczynka.

Winona Ryder, David Harbour, Matthew Modine  
Seriale i programy, Seriale science fiction i fantasy



## Popularne w serwisie Netflix



## Ostatnio oglądane



NETFLIX オリジナル作品  
ストレンジャー・シングス  
未知の世界

マッチ度: 95% 2017 2シーズン 4K Ultra HD 5.1

姿を消した少年、人目を忍び行われる数々の実験、  
破壊的な超常現象、突然現れた少女。すべての不可  
解な謎をつなぐのは、小さな町に隠された恐ろしい  
秘密。

ウィノナ・ライダー、デヴィッド・ハーバー  
海外TV番組・ドラマ、アメリカTV番組・ドラマ



### Netflixで人気の作品



### 最近観た作品



NETFLIX ORIGINAL

# สแตนเจอร์ ริงส์

STRANGER THINGS

ตรงกัน 95% 2017 2 ชีชั่น 4K Ultra HD 5.1

หลังจากเด็กหนุ่มหายตัวไป เมืองเล็กๆ ทั้งเมืองก็ต้องเจอกับ  
ปริศนาการทดลองลับ พลังเหนือธรรมชาติอันน่าสะพรึงกลัว  
และเด็กหญิงสุดประหลาด

วิโนนา ไรเดอร์, เดวิด ไซร์เบอร์, แมททิว โมดีน  
รายการทีวี, รายการทีวีสำหรับวัยรุ่น, รายการทีวีแนววาระทึ่กขวัญ



## ฮิตทาง Netflix



## รับชมล่าสุด



NETFLIX 오리지널  
**기묘한 이야기**  
STRANGER THINGS

95% 일치 2017 시즌 2개 **4K Ultra HD** **5.1**

한 소년이 연기처럼 사라져 버리자 이 작은 마을의 사람들은 정부의 비밀 실험과 무시무시한 초자연 현상, 그리고 한 낯선 미스터리의 소녀에 대한 비밀을 밝히려 한다.

위노나 라이더, 데이비드 하버, 매슈 모딘  
TV 시리즈, SF & 판타지, 10대 TV 시리즈



### Netflix 인기 동영상



### 최근 본 동영상



NETFLIX 原創

# 怪奇物語

STRANGER THINGS

95% 適合您 2017 共 2 季 **4K Ultra HD** **5.1**

一名小男孩失蹤後，小鎮就此發現了涉及秘密實驗、  
駭人的超自然力量，以及一個奇怪小女孩的謎團。

薇諾娜·瑞德，大衛·哈伯，馬修·莫迪恩  
電視節目，科幻節目，青少年節目



## 熱門選擇



## 最近觀賞



NETFLIX ORIGINAL  
**STRANGER THINGS**

تطابق بنسبة 95% 2017 موسم 2 4K Ultra HD 5.1

عندما يختفي صبيّ صغير، تكتشف بلدة صغيرة لغزاً ينطوي على تجارب سرية، وقوى مُرعبة خارقة للطبيعة، وفتاة صغيرة غريبة الأطوار.

وينونا رايدر، ديفيد هاربر، مايلز مودين عروض تلفزيونية تلفزيون الخيال العلمي عروض تلفزيونية للمراهقين

الأكثر مشاهدة على Netflix



ما تمت مشاهدته مؤخرًا



# Architecture

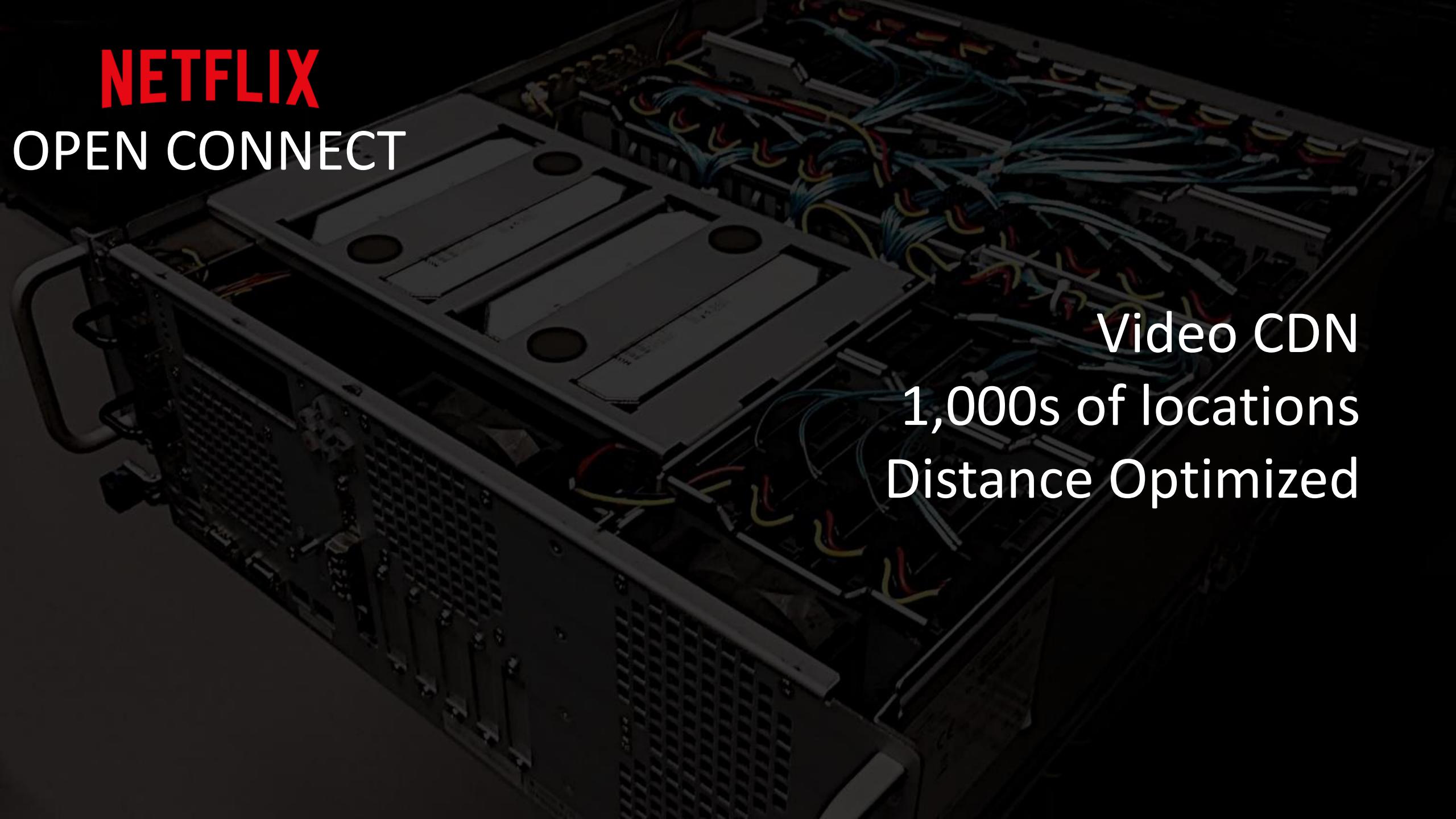
| Building Moments of Truth



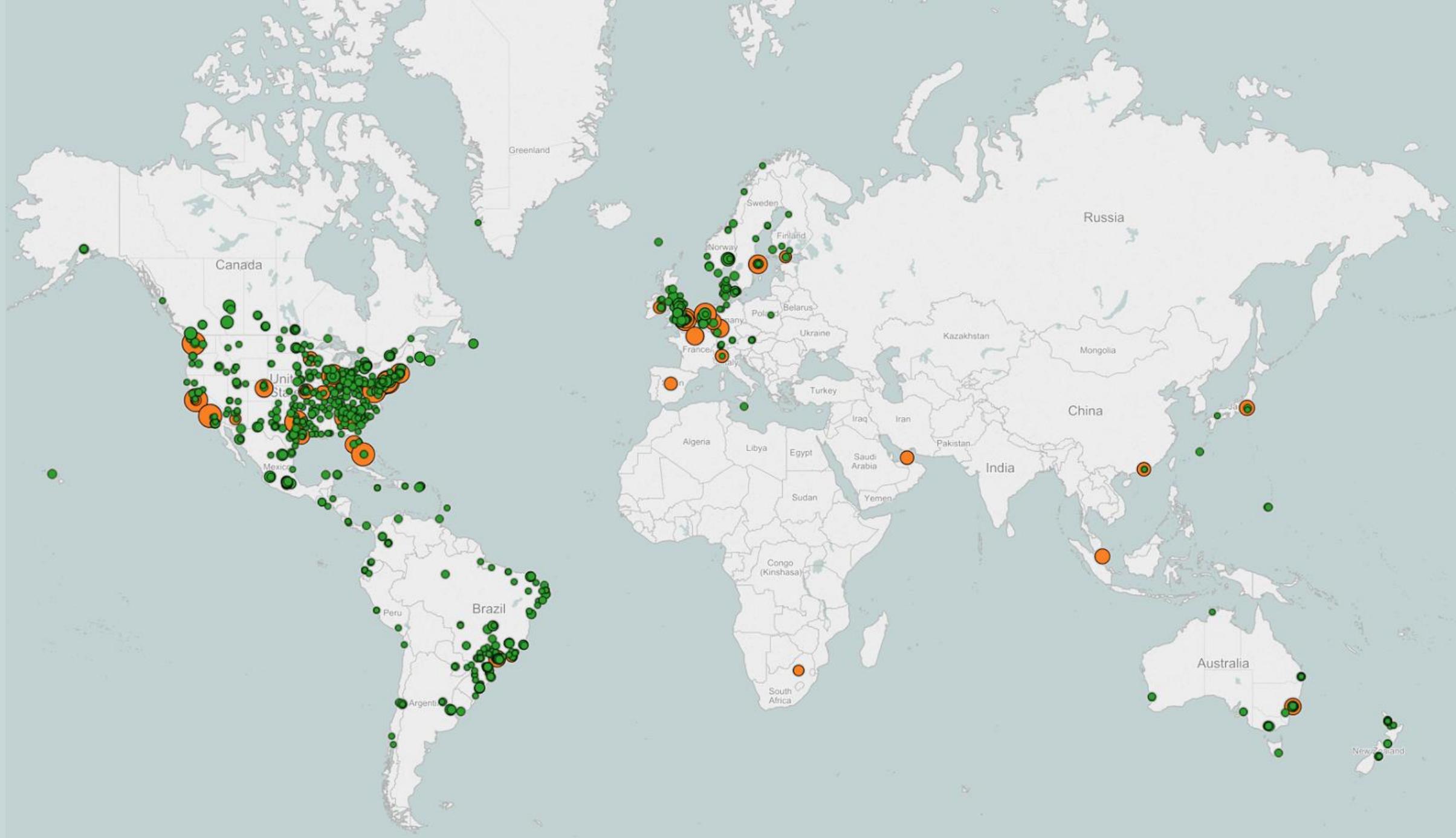
**NETFLIX**  
**OPEN CONNECT**

# NETFLIX

## OPEN CONNECT

A dark, high-angle photograph of a server rack. The front panel of the rack is visible, showing ventilation grilles and several network interface cards (NICs) installed in the slots. Numerous colored cables, primarily blue, yellow, and red, are bundled together and run across the top of the rack, connecting the various components.

Video CDN  
1,000s of locations  
Distance Optimized



# NETFLIX

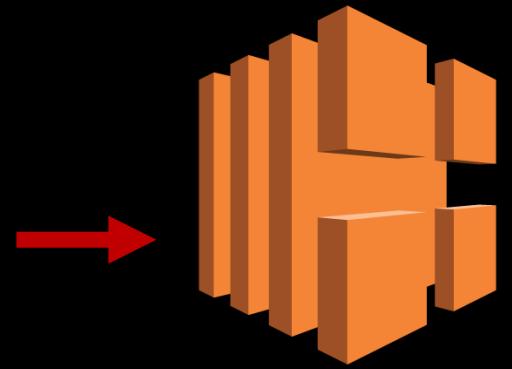
## OPEN CONNECT



Highly Optimized  
Commodity Hardware



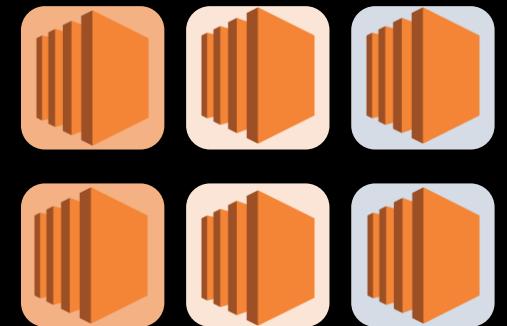




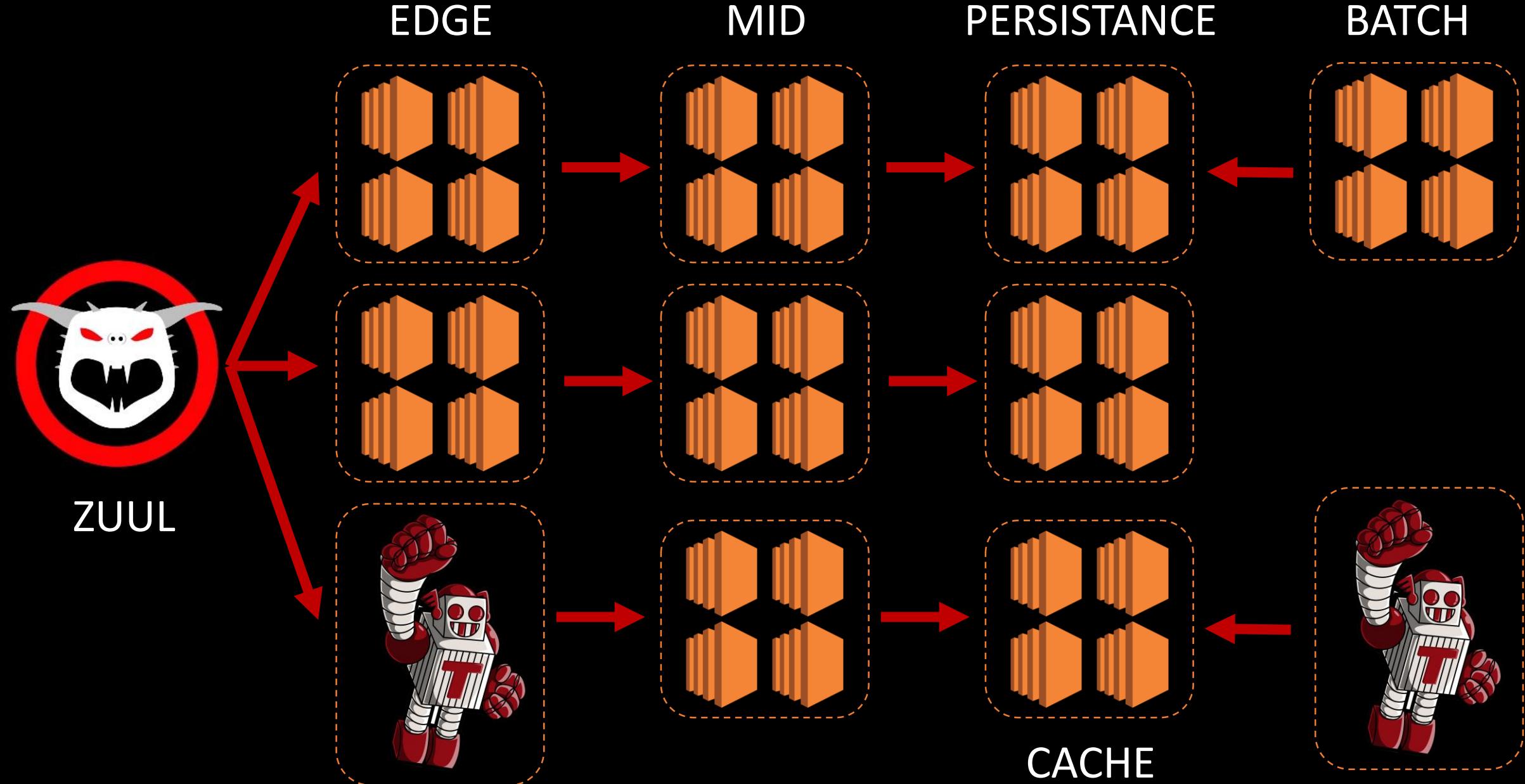
AWS  
Classic  
Load Balancer

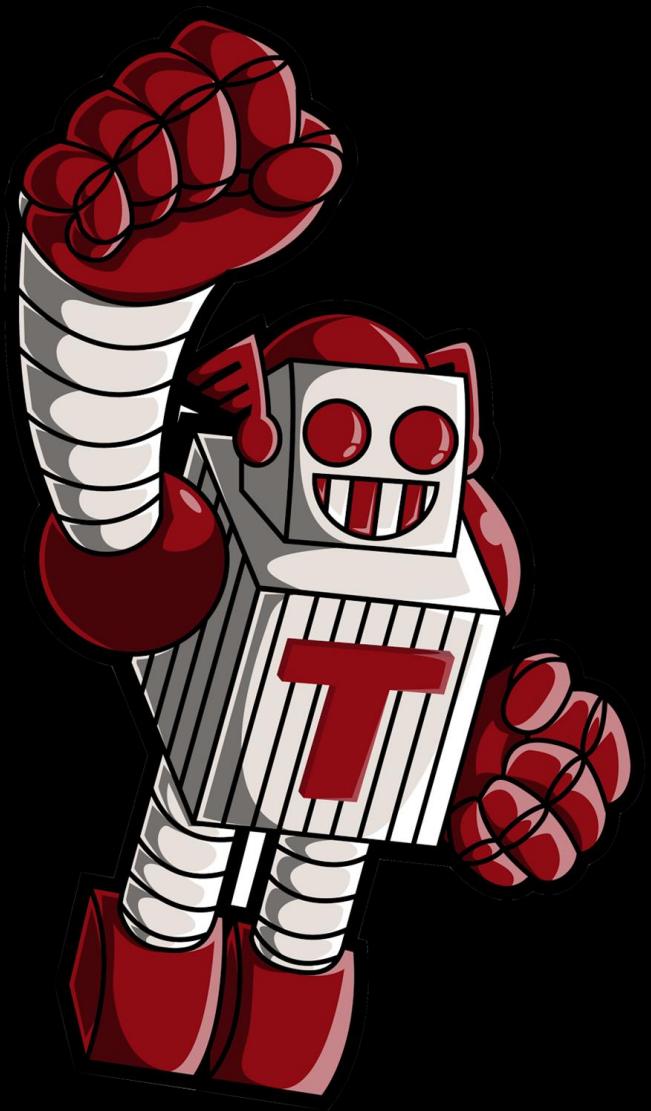


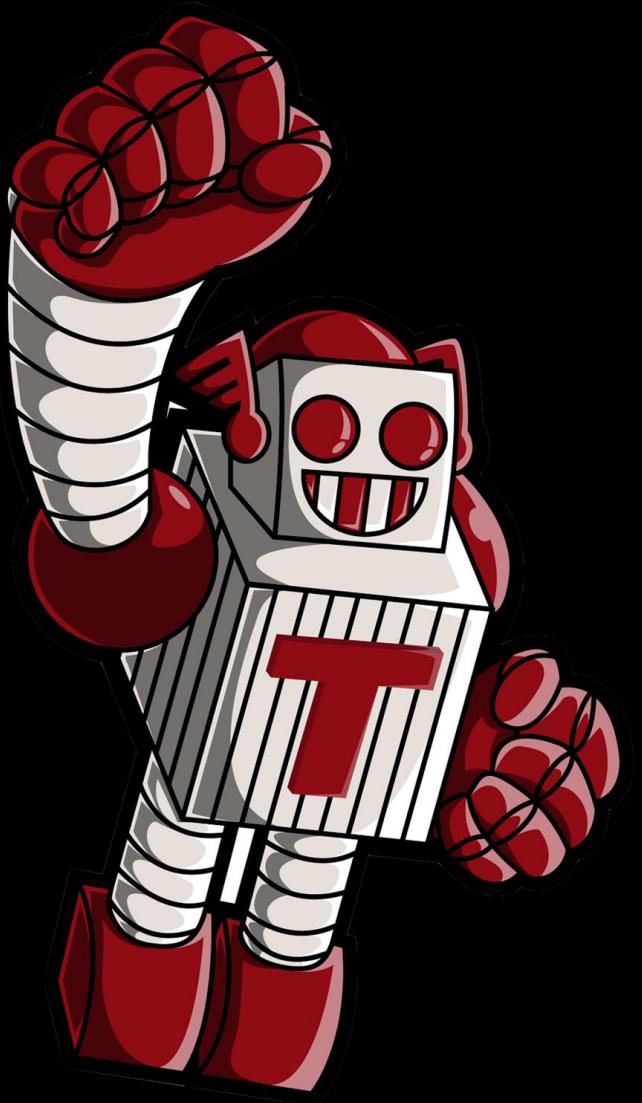
ZUUL



SERVICES





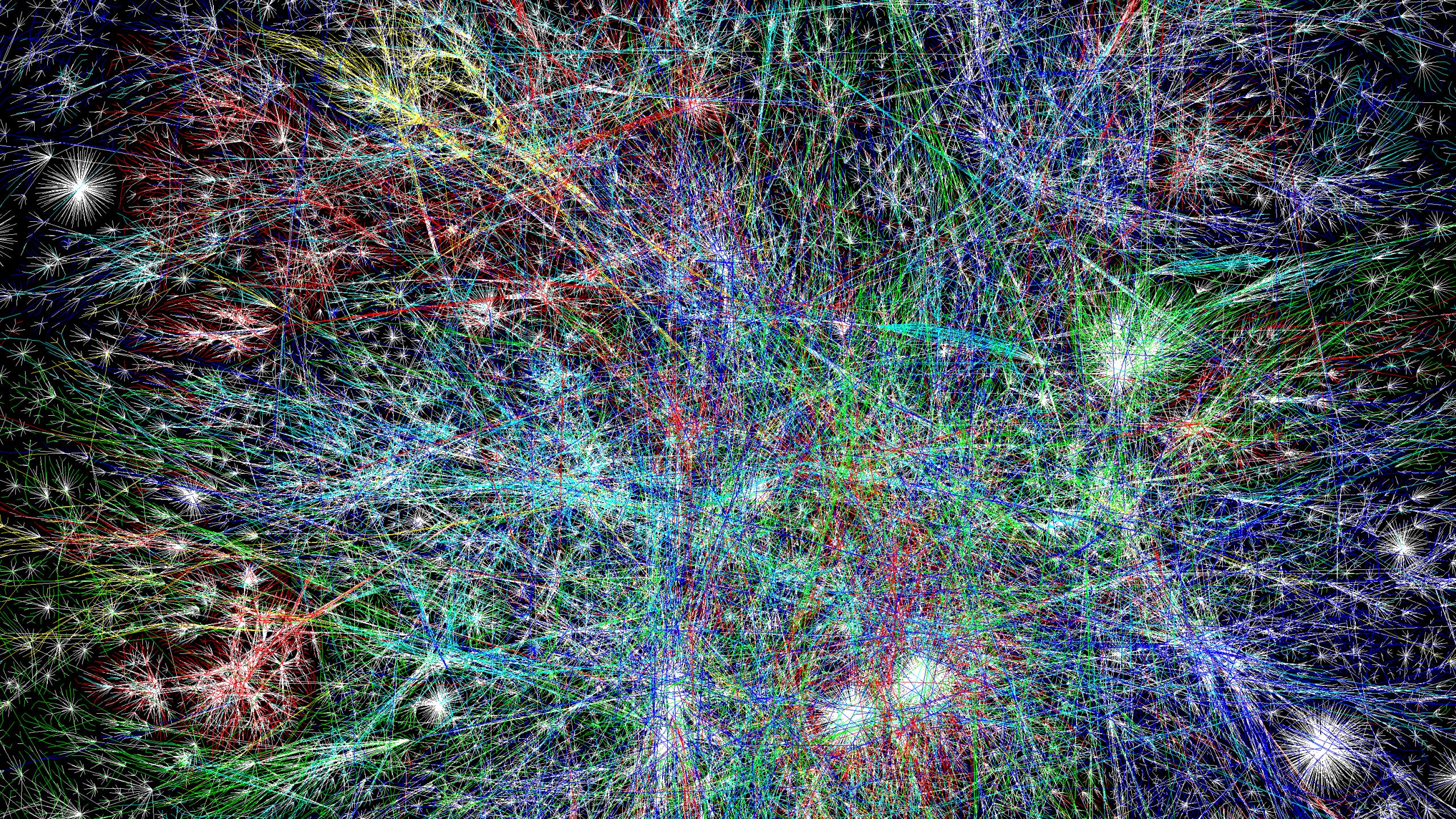


N

Fenzo



# **Networking Outside the Cloud**



# NETFLIX



dnsTime (ms)	DRUID	Heatmap of dnsTime events (%) by local hour																							
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
10	0.33%	1.16%	0.00%	0.00%	0.00%	0.00%	1.05%	2.35%	0.00%	0.47%	0.22%	0.00%	0.00%	0.41%	0.00%	0.00%	0.48%	0.44%	0.20%	0.00%	0.91%	0.85%	1.13%	1.51%	
12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.00%	0.00%	0.00%	0.24%	0.22%	0.20%	0.00%	0.20%	0.00%	0.48%	0.38%	
14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.25%	0.00%	0.00%	0.66%	0.00%	0.00%	0.44%	0.10%	0.00%	0.16%	0.19%		
17	0.33%	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.53%	0.00%	0.22%	0.33%	0.24%	0.00%	1.18%	0.00%	0.40%	0.17%	0.48%	0.19%	
20	1.96%	5.81%	0.00%	0.64%	1.31%	1.89%	0.00%	0.00%	0.71%	0.44%	0.00%	0.53%	0.62%	0.44%	0.00%	0.48%	0.88%	0.79%	0.44%	1.21%	0.85%	1.13%	2.08%		
24	0.00%	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.53%	0.41%	0.22%	0.66%	0.48%	0.44%	1.18%	1.32%	0.81%	0.17%	0.48%	0.38%	
29	0.33%	0.58%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.87%	0.25%	1.05%	0.00%	0.22%	0.66%	0.48%	0.44%	0.98%	2.20%	0.60%	0.00%	0.80%	0.38%	
35	1.63%	2.91%	2.99%	1.28%	1.31%	1.89%	1.05%	0.00%	4.04%	2.61%	2.40%	0.99%	1.32%	0.21%	1.32%	1.64%	0.72%	3.30%	3.14%	1.76%	2.12%	1.19%	1.77%	2.27%	
42	2.29%	1.16%	2.40%	1.28%	0.65%	0.00%	5.26%	2.35%	2.02%	2.84%	3.28%	2.73%	2.11%	1.23%	1.98%	3.61%	3.61%	2.42%	4.13%	3.52%	3.53%	1.36%	1.45%	1.32%	
50	1.31%	0.58%	2.40%	1.92%	0.00%	0.00%	3.16%	0.00%	7.07%	4.27%	3.71%	3.72%	2.89%	1.64%	3.74%	4.92%	5.54%	5.51%	5.89%	4.85%	3.93%	2.21%	2.57%	1.51%	
60	0.65%	2.33%	5.99%	0.64%	0.65%	0.00%	6.32%	0.00%	16.16%	5.45%	7.86%	8.68%	5.00%	5.75%	7.93%	6.89%	10.36%	7.27%	7.47%	9.25%	4.64%	4.08%	4.34%	2.65%	
72	8.82%	8.14%	4.19%	5.77%	5.88%	0.00%	15.79%	8.24%	13.13%	8.29%	12.01%	12.16%	6.32%	8.42%	10.13%	6.23%	9.16%	9.25%	9.63%	9.25%	10.08%	10.37%	6.27%	8.70%	
86	0.98%	3.49%	1.80%	4.49%	0.65%	5.66%	18.95%	2.35%	12.12%	10.19%	9.61%	18.36%	7.63%	12.11%	9.25%	6.23%	7.47%	8.15%	7.47%	9.25%	6.05%	9.69%	3.86%	3.21%	
103	3.59%	6.98%	2.40%	3.85%	7.84%	15.09%	14.74%	20.00%	6.06%	11.37%	10.26%	11.91%	7.63%	10.47%	8.37%	5.57%	6.51%	10.79%	9.04%	7.05%	6.75%	11.39%	5.47%	4.35%	
124	2.94%	3.49%	7.78%	0.64%	0.65%	5.66%	11.58%	21.18%	2.02%	8.77%	7.21%	7.69%	17.37%	8.83%	5.29%	5.57%	4.82%	11.89%	7.66%	0.88%	6.05%	5.95%	4.18%	4.35%	
149	21.90%	13.95%	10.78%	16.03%	12.42%	11.32%	10.53%	21.18%	3.03%	13.03%	5.24%	3.97%	13.68%	8.83%	8.59%	7.21%	6.75%	6.39%	8.84%	9.69%	8.27%	8.84%	4.82%	6.05%	
179	0.33%	0.00%	6.59%	1.92%	0.65%	1.89%	1.05%	1.18%	10.10%	1.66%	4.80%	5.71%	5.79%	3.08%	4.63%	12.79%	8.43%	1.32%	6.09%	8.81%	1.81%	3.06%	3.05%	1.32%	
215	0.65%	1.74%	5.39%	3.21%	3.27%	7.55%	2.11%	7.06%	4.04%	2.84%	5.02%	2.73%	2.63%	2.05%	5.95%	7.21%	3.37%	5.95%	2.95%	3.52%	4.13%	11.73%	1.93%	0.95%	
258	2.29%	0.58%	1.80%	3.85%	1.31%	1.89%	1.05%	1.18%	1.01%	3.08%	6.33%	1.74%	2.11%	2.67%	4.63%	8.85%	1.69%	1.76%	2.95%	2.20%	2.72%	2.38%	2.57%	3.02%	
310	9.48%	12.79%	9.58%	8.97%	7.19%	9.43%	3.16%	2.35%	13.13%	1.42%	2.40%	1.99%	3.42%	6.37%	6.17%	8.52%	5.06%	2.20%	4.32%	4.41%	3.73%	3.23%	5.31%	5.86%	
372	3.59%	0.58%	0.60%	3.21%	0.00%	0.00%	2.11%	2.35%	1.01%	2.61%	1.31%	0.25%	2.37%	0.82%	2.42%	3.28%	0.24%	2.20%	2.95%	0.88%	2.52%	0.34%	1.77%	2.08%	
447	1.63%	2.33%	4.19%	3.85%	4.58%	1.89%	1.05%	2.35%	1.01%	0.47%	0.66%	0.99%	0.53%	3.49%	3.08%	2.62%	4.10%	1.32%	2.95%	2.20%	2.22%	3.06%	3.05%	2.65%	
537	1.63%	1.74%	4.19%	1.92%	0.65%	1.89%	0.00%	0.00%	2.02%	1.42%	2.62%	3.23%	1.84%	0.41%	1.32%	0.33%	0.72%	1.10%	1.57%	10.57%	0.91%	1.87%	0.96%	1.70%	
645	0.33%	0.58%	0.00%	1.92%	1.31%	1.89%	0.00%	0.00%	0.00%	0.47%	1.31%	0.50%	6.05%	0.00%	4.85%	0.33%	2.89%	0.44%	0.20%	0.88%	1.01%	1.53%	0.32%	1.89%	
774	1.63%	10.47%	2.40%	2.56%	2.61%	3.77%	0.00%	2.35%	1.01%	3.08%	4.59%	1.49%	0.79%	0.82%	2.64%	1.31%	0.48%	1.10%	0.59%	0.44%	1.31%	0.51%	1.13%	2.65%	
929	4.90%	3.49%	5.39%	10.90%	3.27%	1.89%	0.00%	1.18%	0.00%	3.32%	1.75%	3.23%	1.05%	0.62%	0.88%	0.66%	0.72%	1.98%	0.98%	0.88%	2.02%	1.36%	1.45%	2.84%	
1115	1.96%	3.49%	2.40%	4.49%	4.58%	0.00%	1.05%	0.00%	1.01%	1.66%	1.53%	0.50%	0.26%	1.64%	1.54%	0.98%	2.89%	5.29%	2.36%	0.88%	3.33%	2.72%	3.05%	1.32%	
1339	5.56%	1.74%	5.39%	9.62%	3.92%	5.66%	0.00%	0.00%	2.61%	0.44%	2.23%	0.53%	0.41%	0.22%	0.33%	1.45%	1.32%	1.77%	0.00%	3.02%	2.72%	2.41%	4.54%		
1608	7.19%	1.74%	4.19%	4.49%	0.00%	1.89%	0.00%	0.00%	0.00%	1.90%	0.22%	0.25%	0.79%	0.62%	0.22%	0.00%	0.48%	2.42%	1.38%	0.88%	3.73%	2.04%	0.48%	8.32%	
1930	4.90%	1.74%	0.60%	0.64%	5.23%	0.00%	0.00%	0.00%	0.95%	0.00%	1.24%	0.79%	0.41%	0.88%	0.66%	2.17%	0.22%	0.39%	0.44%	2.62%	1.53%	0.32%	3.78%		
2317	0.33%	0.58%	2.40%	1.28%	6.54%	9.43%	0.00%	0.00%	0.71%	0.87%	0.50%	0.26%	4.72%	0.00%	0.98%	3.13%	3.30%	0.20%	0.44%	2.32%	0.51%	0.96%	3.40%		
2782	1.31%	1.74%	0.00%	0.00%	5.88%	1.89%	0.00%	1.18%	0.00%	0.47%	1.09%	0.00%	3.42%	2.46%	0.44%	0.00%	0.00%	0.22%	0.20%	0.00%	3.23%	0.17%	0.64%	6.05%	
3340	3.59%	0.00%	0.60%	0.64%	16.99%	0.00%	0.00%	0.00%	0.24%	0.00%	2.48%	0.79%	8.83%	0.00%	0.33%	0.72%	0.00%	0.00%	1.32%	2.42%	1.53%	4.18%	5.86%		
4010	0.33%	0.58%	0.00%	0.00%	0.65%	0.00%	0.00%	0.00%	2.37%	0.00%	0.00%	0.00%	0.41%	0.00%	0.00%	1.45%	0.22%	0.00%	0.00%	1.11%	0.00%	0.16%	1.13%		
4814	0.00%	0.00%	0.00%	0.00%	0.00%	3.77%	0.00%	0.00%	0.00%	1.31%	0.25%	0.00%	0.00%	2.20%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.57%		
5779	0.00%	0.00%	0.00%	0.00%	0.00%	1.89%	0.00%	1.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%	0.10%	0.17%	0.00%	0.38%	
6938	0.33%	0.00%	1.80%	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.22%	0.00%	0.96%	0.22%	0.20%	0.00%	0.00%	0.32%	0.00%		
8329	0.98%	3.49%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.23%	0.00%	0.00%	1.45%	0.00%	0.20%	1.32%	0.10%	2.38%	26.53%	0.19%	

DRUID	Heatmap of dnsTime events (%) by local hour																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.92%	3.33%	0.86%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	0.43%	1.01%	2.12%	
12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.30%	
14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.00%	0.61%	
17	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.69%	0.61%	
20	0.84%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.56%	1.44%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	2.80%	2.48%	0.78%	0.85%	2.03%	3.94%
29	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.43%	0.68%	0.30%
35	2.52%	2.90%	1.41%	2.50%	0.00%	0.00%	0.00%	1.37%	0.00%	0.00%	5.56%	0.48%	1.33%	1.72%	0.00%	0.40%	0.56%	0.00%	5.61%	1.24%	1.95%	1.28%	1.69%	4.24%
42	1.68%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.33%	0.86%	0.00%	0.80%	0.00%	1.61%	4.67%	1.86%	0.78%	0.43%	1.01%	2.42%
50	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.34%	0.61%
60	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.67%	0.86%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.39%	0.00%	0.68%	1.21%
72	7.56%	21.74%	7.98%	7.50%	5.56%	0.00%	0.00%	1.37%	9.09%	18.75%	5.56%	1.44%	11.33%	2.16%	5.69%	2.00%	2.26%	1.61%	6.54%	5.59%	5.84%	2.98%	9.12%	9.39%
86	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.55%	0.00%	0.00%	1.44%	2.00%	0.00%	2.44%	0.00%	0.00%	0.93%	0.00%	0.39%	0.43%	1.69%	1.21%	
103	1.68%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.92%	1.33%	1.29%	1.63%	0.00%	1.13%	0.00%	0.00%	0.00%	0.00%	0.78%	1.70%	1.69%	2.73%
124	0.00%	1.45%	0.00%	0.00%	0.00%	0.00%	0.00%	1.37%	0.00%	0.00%	1.92%	0.00%	0.43%	0.81%	0.40%	0.00%	0.00%	0.93%	0.62%	0.00%	0.00%	1.01%	3.33%	
149	19.33%	30.43%	11.27%	22.50%	33.33%	15.79%	11.11%	2.74%	13.64%	25.00%	27.78%	13.46%	19.33%	12.07%	13.01%	3.60%	7.34%	14.52%	17.76%	14.29%	14.01%	11.91%	13.51%	16.36%
179	1.68%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	6.25%	5.56%	5.77%	5.33%	0.43%	2.44%	0.40%	0.00%	0.00%	0.93%	0.00%	0.39%	1.70%	2.36%	0.00%	
215	1.68%	2.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.67%	0.00%	0.81%	0.00%	1.69%	0.00%	0.00%	1.86%	0.39%	0.85%	3.04%	0.30%	
258	0.84%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.55%	0.00%	5.56%	0.00%	2.67%	0.00%	0.81%	0.00%	0.56%	0.00%	0.00%	1.17%	0.43%	0.68%	0.00%	
310	15.97%	23.19%	11.74%	30.00%	50.00%	57.89%	88.89%	4.11%	13.64%	18.75%	22.22%	13.94%	16.00%	9.48%	17.07%	10.00%	10.17%	20.97%	19.63%	15.53%	15.18%	18.30%	15.88%	6.67%
372	0.00%	1.45%	0.47%	2.50%	0.00%	5.26%	0.00%	0.00%	4.55%	0.00%	5.56%	0.00%	6.00%	0.43%	1.63%	0.00%	0.00%	1.61%	0.00%	0.00%	0.39%	0.85%	0.68%	0.30%
447	2.52%	8.70%	0.94%	2.50%	11.11%	10.53%	0.00%	4.11%	18.18%	12.50%	11.11%	0.96%	6.00%	5.17%	13.82%	0.80%	2.26%	4.84%	3.74%	4.35%	3.11%	3.83%	1.69%	3.03%
537	0.84%	4.35%	2.82%	5.00%	0.00%	5.26%	0.00%	0.00%	13.64%	0.00%	0.00%	0.48%	2.00%	3.02%	4.07%	1.20%	1.13%	1.61%	4.67%	1.86%	0.78%	0.43%	3.38%	1.52%
645	0.00%	1.45%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.55%	0.00%	0.00%	0.00%	1.33%	4.74%	0.00%	0.40%	0.00%	0.00%	0.00%	0.00%	0.43%	0.34%	1.21%	
774	0.84%	1.45%	1.41%	5.00%	0.00%	0.00%	0.00%	4.55%	0.00%	5.56%	0.00%	0.67%	2.59%	0.81%	2.80%	0.00%	1.61%	0.00%	1.24%	0.78%	2.98%	1.01%	1.21%	
929	0.84%	0.00%	1.88%	0.00%	0.00%	5.26%	0.00%	0.00%	0.00%	0.00%	3.37%	0.67%	2.59%	0.81%	0.80%	1.13%	3.23%	1.87%	1.24%	1.95%	2.13%	1.35%	1.21%	
1115	1.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.37%	0.00%	6.25%	0.00%	1.92%	0.67%	2.16%	0.81%	0.80%	0.00%	1.61%	1.87%	0.62%	0.78%	1.70%	2.03%	1.52%
1339	0.00%	0.00%	0.47%	5.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.81%	2.00%	0.00%	1.63%	0.40%	0.56%	1.61%	3.74%	2.48%	1.95%	1.70%	1.35%	1.82%	
1608	0.00%	0.00%	0.00%	2.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.21%	0.67%	1.72%	2.44%	0.40%	0.56%	1.61%	0.93%	2.48%	1.17%	0.43%	0.68%	2.42%	
1930	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.25%	0.00%	8.65%	0.67%	0.00%	5.69%	0.00%	1.69%	0.00%	3.74%	4.35%	2.33%	0.85%	0.68%	2.12%	
2317	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	0.86%	3.25%	0.80%	0.56%	6.45%	3.74%	3.11%	3.50%	1.70%	0.68%	3.33%	
2782	0.84%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	9.09%	6.25%	0.00%	0.00%	0.00%	2.44%	0.80%	1.13%	1.61%	1.87%	1.86%	3.11%	2.55%	2.70%	2.12%		
3340	3.36%	0.00%	9.39%	0.00%	0.00%	0.00%	9.59%	0.00%	0.00%	5.77%	0.67%	5.17%	0.00%	8.80%	5.65%	4.84%	4.67%	8.70%	7.78%	5.96%	4.39%	3.03%		
4010	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	1.37%	0.00%	0.00%	0.00%	0.67%	0.00%	0.40%	0.00%	0.00%	0.93%	3.73%	2.72%	2.13%	1.01%	0.91%		
4814	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	1.37%	0.00%	0.00%	0.00%	0.43%	0.00%	1.20%	0.00%	0.00%	1.24%	0.00%	1.70%	0.00%	0.61%			
5779	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.39%	5.11%	0.00%	0.61%	
6938	1.68%	0.00%	2.35%	0.00%	0.00%	0.00%	26.03%	0.00%	0.00%	0.00%	1.92%	0.67%	3.45%	0.81%	10.80%	12.99%	3.23%	1.87%	4.35%	7.00%	13.19%	3.72%	2.12%	
8329	33.61%	0.00%	44.60%	7.50%	0.00%	0.00%	46.58%	0.00%	0.00%	0.00%	18.27%	10.67%	37.50%	17.07%	52.00%	48.59%	27.42%	5.61%	14.91%	20.23%	10.21%	16.22%	14.55%	



Magic  
Modem

AWS

```
guy — bash — 63x31
magicmodem:~ guy$ ping 52.41.159.16
```

MagicModem

192.168.20.1:5000

# Magic Modem

Favorite ISPs

- US - ISP 1
- KZ - ISP 2
- ZA - ISP 3
- CM - ISP 4

+ CM ASN36912 ISP 4

## isp 4

Current Settings

ISP:US/ISP 1  
47/2 56/2 5/2

Calibration Recalibrate...  
Last: 10/24/2017 5:03:24 PM  
{"akam":12,"aws":22,"oc":1}

The first was ringed in red metal  
The second, in green stone  
The third is clearest crystal  
And cannot be unlocked alone.

# Networking Inside the Cloud

# DREDGE



Amazon  
CloudWatch



VPC  
Flow Logs

## Query Parameters

Region

us-east-1    us-west-2    eu-west-1

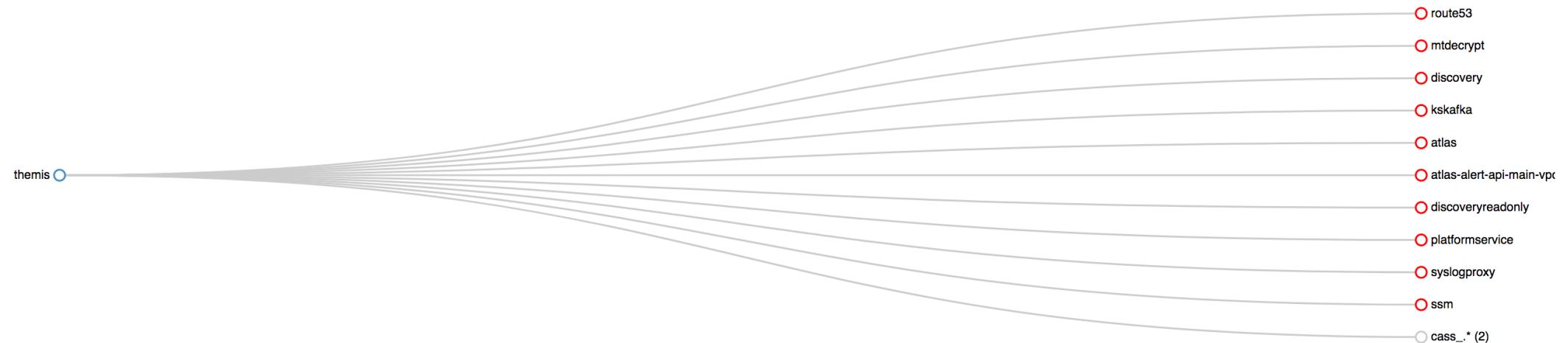
App

Search bar:  ⚙️

- abcloud
- beaconserver
- themis**
- playbackcontentserver
- api
- geo
- coda
- ichnaea

themis x

The diagram shows a network graph where the 'themis' application is at the center, connected by multiple grey lines to various other services listed on the right. These services include route53, mtdecrypt, discovery, kskafka, atlas, atlas-alert-api-main-vpc, discoveryreadonly, platformservice, syslogproxy, ssm, and cass\_\* (2).



## ☰ Dredge VPC Flow Logs

## DIMENSIONS

- Time
- Action
- Direction
- Foreign Account
- Foreign App
- Foreign Cluster
- Foreign Elasticache Name
- Foreign ELB Name
- Foreign IPAddr
- Foreign Kind
- Foreign RDS Name
- Foreign Region
- Foreign Subnet ID
- Foreign Vpc ID
- Foreign Zone
- Local Account
- Local App
- Local Cluster
- Local Elasticache Name
- Local ELB Name

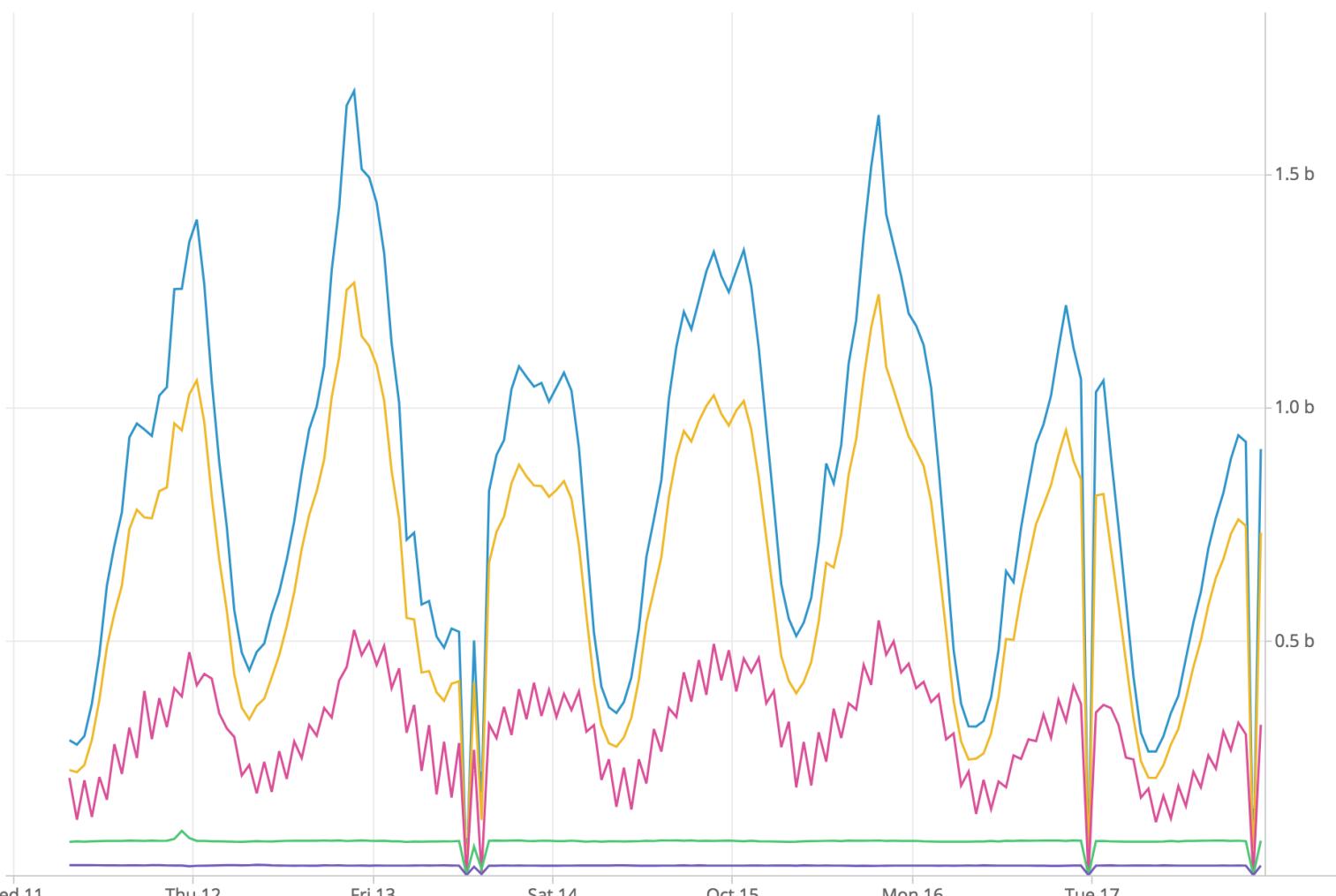
## MEASURES

- Bytes
- Flows
- Packets

FILTER Oct 10 - Oct 17, 11pm Local App: themis Direction: out +2 Line Chart

SPLIT Foreign App Time (Hour)

Bytes: 306.0 b



## LEGEND Bytes

FOREIGN APP	Bytes	m
cass_themis	134,146.3	m
kskafka	104,973.2	m
s3	48,853.3	m
atlas	11,403.3	m
amazon	3,189.1	m
discoveryreadonly	1,238.4	m
platformservice	766.3	m
discovery	579.2	m
syslogproxy	384.3	m
ssm	279.2	m
null	157.0	m
mtdecrypt	35.6	m
cass_cassandra	22.1	m

Show selection

## PINBOARD Bytes

Click or drag dimensions to pin them

## ☰ Dredge VPC Flow Logs

## DIMENSIONS

Time

Action

Direction

Foreign Account

Foreign App

Foreign Cluster

Foreign Elasticache Name

Foreign ELB Name

Foreign IPAddr

Foreign Kind

Foreign RDS Name

Foreign Region

Foreign Subnet ID

Foreign Vpc ID

Foreign Zone

Local Account

Local App

Local Cluster

Local Elasticache Name

Local ELB Name

## MEASURES

Bytes

Flows

Packets

FILTER

Oct 10 - Oct 17, 11pm

Local App: themis

Direction: out

+2



Table

SPLIT

Foreign App

PINBOARD

Bytes



Click or drag dimensions to pin them

Foreign App

Total 306,039.3 m

cass\_themis 134,146.3 m

kskafka 104,973.2 m

s3 48,853.3 m

atlas 11,403.3 m

amazon 3,189.1 m

discoveryreadonly 1,238.4 m

platformservice 766.3 m

discovery 579.2 m

syslogproxy 384.3 m

ssm 279.2 m

null 157.0 m

mtdecrypt 35.6 m

cass\_sandbox 33.1 m

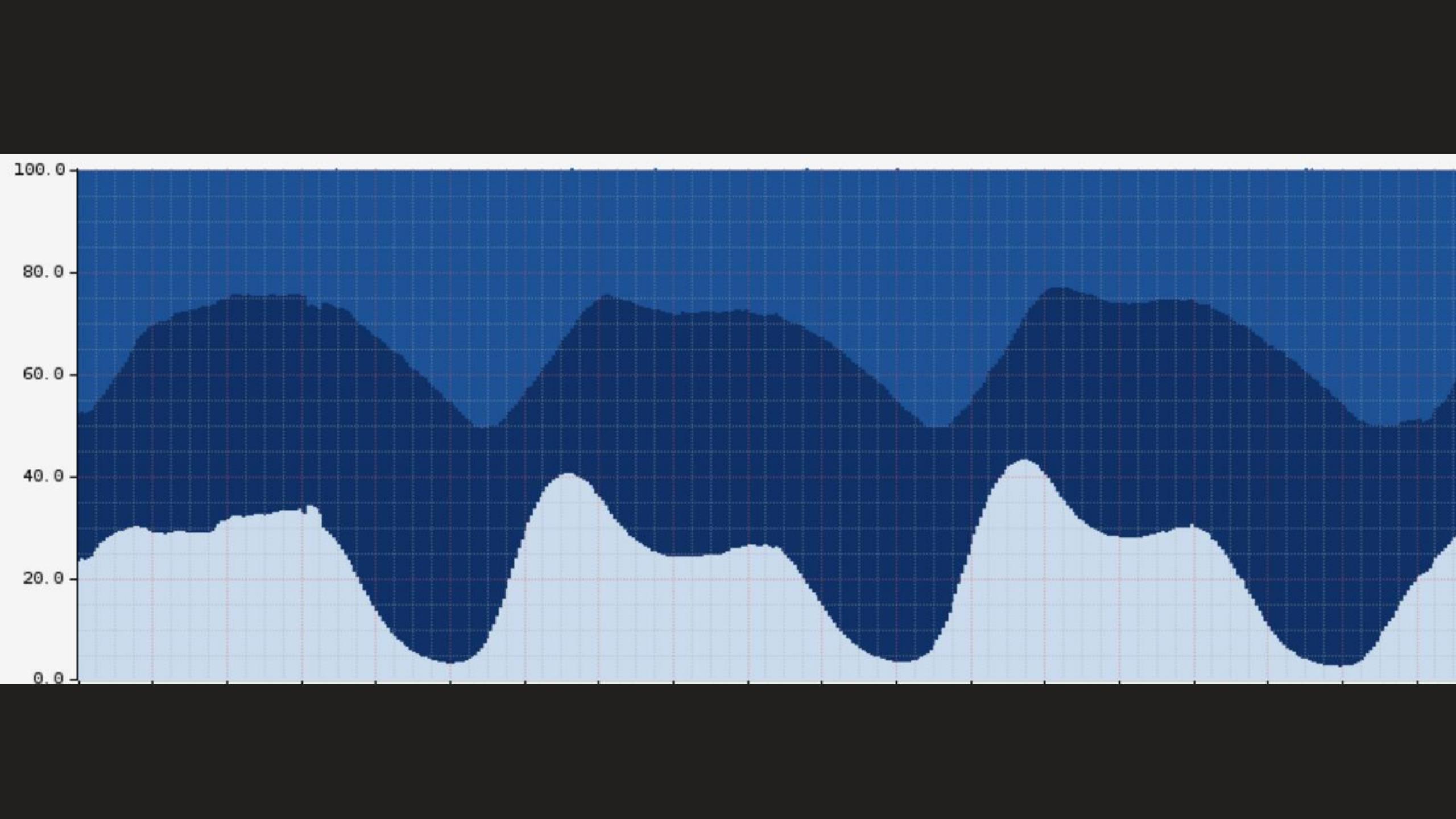
atlas-alert-api-main-vpc0 0.6 m

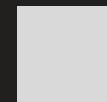
route53 0.5 m

ec2 0.0 m

titusmesosmaster 0.0 m

# Traffic



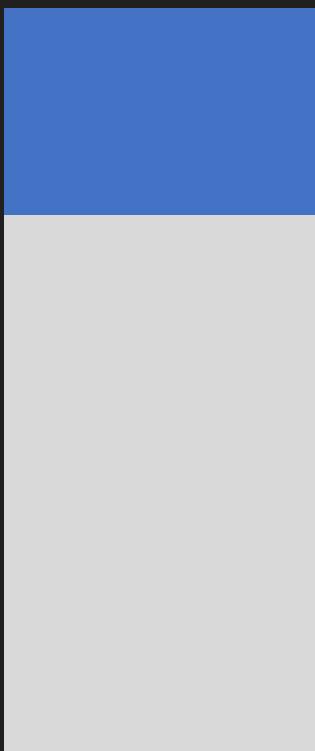


Capacity for daily scaling patterns

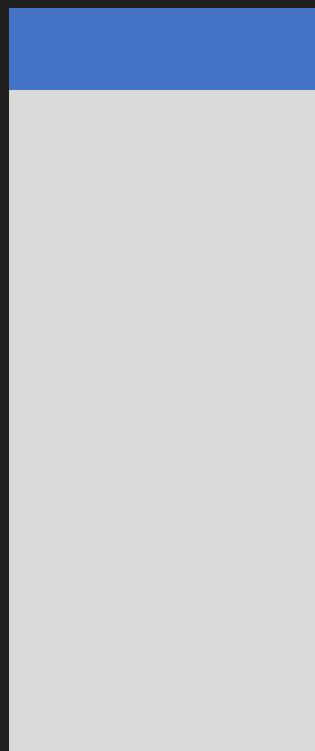


Capacity for redirected traffic

US-WEST-2

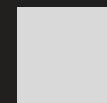


US-EAST-1

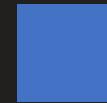


EU-WEST-1



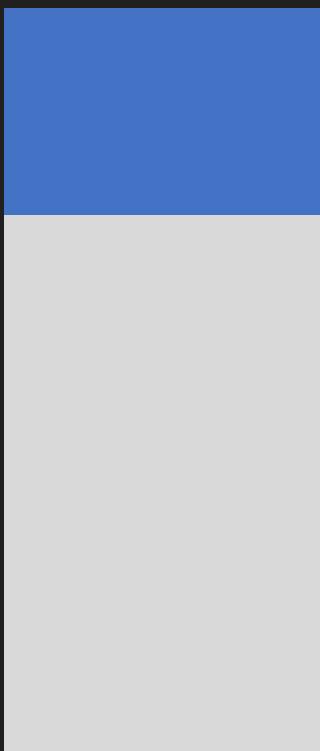


Capacity for daily scaling patterns

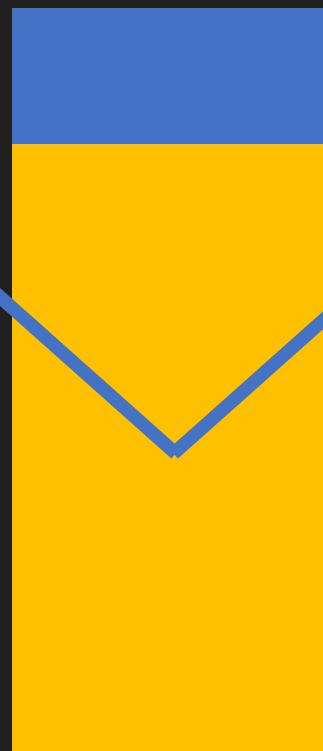


Capacity for redirected traffic

US-WEST-2



US-EAST-1



EU-WEST-1



# PROJECT



# NIMBLE

# Chaos





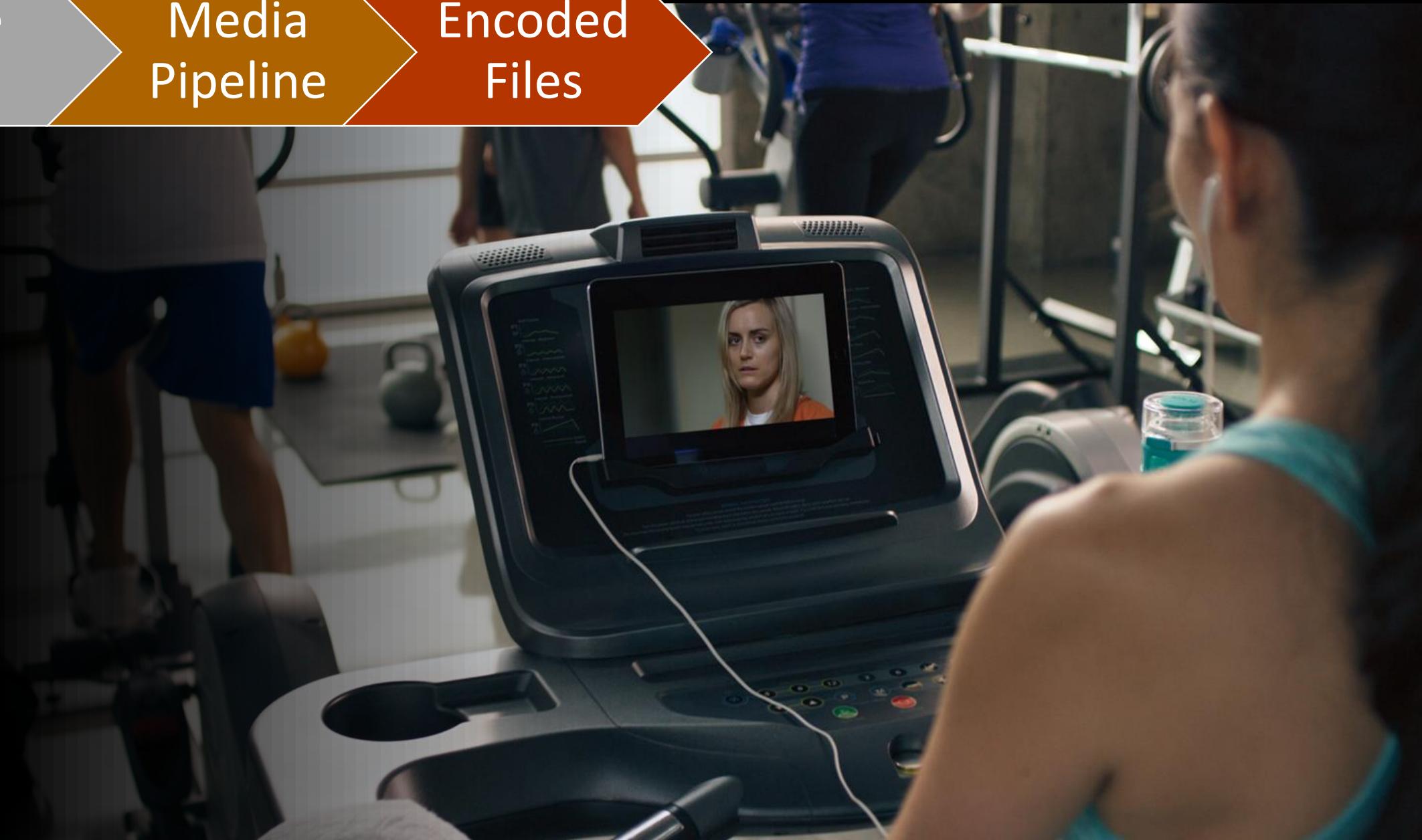
# Media Encoding



Source  
Media

Media  
Pipeline

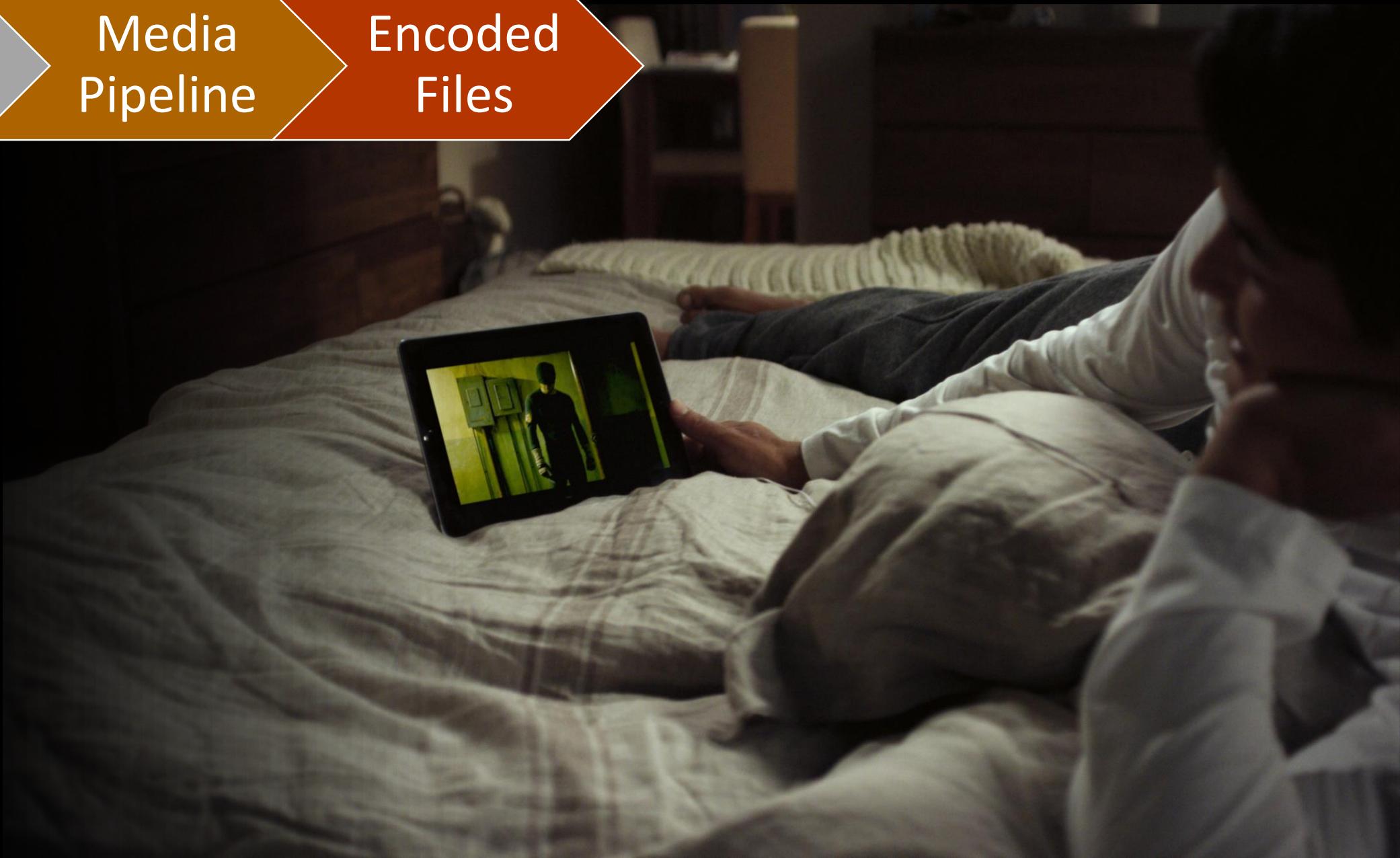
Encoded  
Files



Source  
Media

Media  
Pipeline

Encoded  
Files



1

Source  
Media

Media  
Pipeline

Encoded  
Files

Source  
Media

2

Media  
Pipeline

Encoded  
Files

Video Source

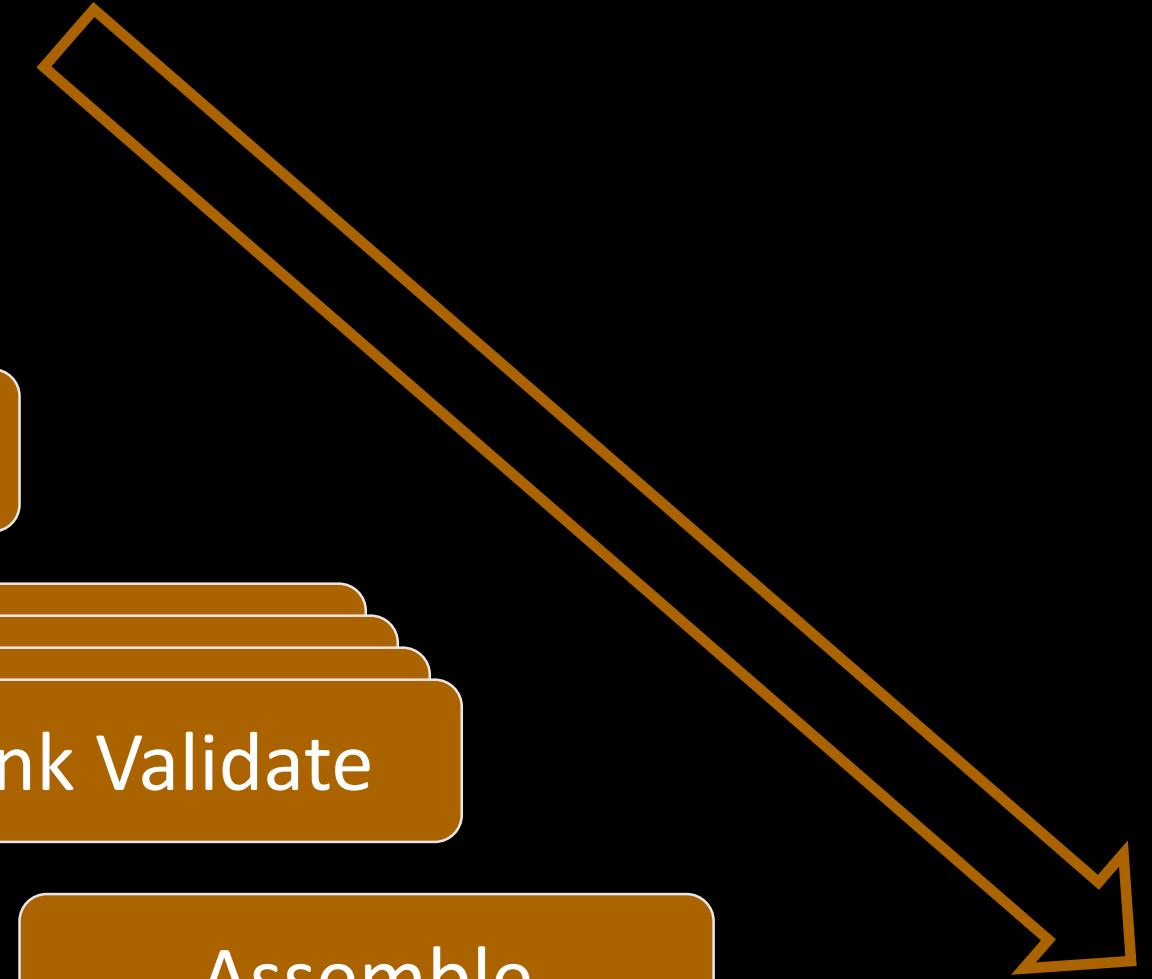
Chunk Encode

Chunk Validate

Assemble

Validate

2





**mcefingerprint**  
**assetinspector**  
**videoassembler**  
**mceconvertimagesmv**  
**mcedynamicoptimizer**  
**mcevideoqualityrun**  
**mceconvertimage**  
**mcepackagerxl**  
**s3cleanup**  
**mcenlevideochunker**  
**mceav1highres**  
**mceiplcleanup**  
**mceav1mediumres**  
**mceintvideoencoder**  
**mcenleaudioencoder**  
**merchstillextractor**  
**extractstills**  
**mcescenetochunkmapr**  
**mcesourceanalyzeraggr**  
**mcesourceanalyzer**  
**mcedolbyvisionencoder**  
**mcecomposeimage**  
**mceav1lowres**  
**mcederivedvidencoder**  
**mcescivolutionencoder**  
**mcedolbyvisionencoder**  
**dubcard**  
**mcecopier**  
**mcegifcreator**  
**mcepackager**  
**mcenlevideoencoder**  
**mcevideomeasure**  
**chunkinspector**  
**ccconvert**  
**deployer**  
**montage**  
**mcevidindexassembler**  
**mcevideoqualityassem**  
**mcevbrpeakcalculator**  
**mcecmplxanalyzerstats**



Source  
Media

Media  
Pipeline

Encoded  
Files

3

NETFLIX ORIGINAL

# STRANGER THINGS



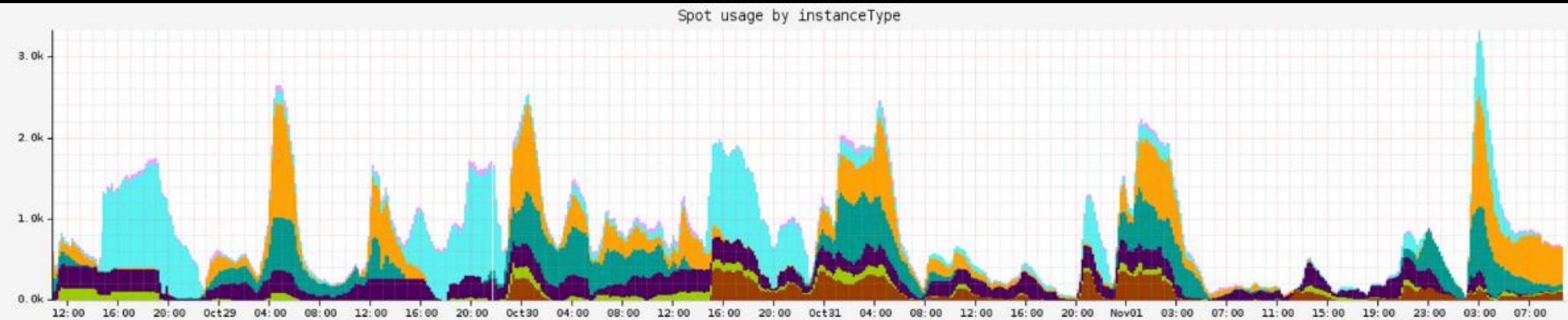
NETFLIX ORIGINAL

# STRANGER THINGS



Episodes	9
Source Files	Terabytes and Terabytes
CPU Hours	190,000
Instance Equivalents	2,965 m4.16XL
Resulting Files	9,570

# Instance Equivalents & Internal Spot Market



# Security in the Cloud



AWS IAM



# Netflix Talks @ re:Invent

## Wednesday

11:30am **MCL317**: Orchestrating ML Training for Netflix Recommendations (Venetian)

12:15pm **NET303**: A day in the life of a Cloud Network Engineer at Netflix (Venetian)

1:00pm **ARC312**: Why Regional Reservations are a Game Changer for Netflix (Venetian)

1:00pm **SID304**: SecOps 2021 Today: Using AWS Services to Deliver SecOps (MGM)

1:45pm **DEV334**: Performing Chaos at Netflix Scale (Venetian)

4:45pm **SID316**: Using Access Advisor to Strike the Balance Between Security and Usability (MGM)

## Thursday

11:30am **NET402**: Elastic Load Balancing Deep Dive and Best Practices

12:15pm **CMP311**: Auto Scaling Prime Time: Target Tracking Hit the Bullseye (Venetian)

12:15pm **DAT308**: A story of Netflix and AB Testing in the User Interface using DynamoDB (Venetian)

12:55pm **CMP309**: How Netflix Encodes at Scale (Venetian)

4:00pm **ARC321**: Models of Availability (Venetian)

4:00pm **ABD401**: How Netflix Monitors Applications Real Time with Kinesis (Aria)

## Friday

8:30am **ABD319**: Tooling Up For Efficiency: DIY Solutions @ Netflix (Aria)

10:00am **ABD320**: Netflix Keystone SPaaS - Real-time Stream Processing as a Service (Aria)

Dave Hahn  
Sr SRE, Netflix

[dhahn@netflix.com](mailto:dhahn@netflix.com)  
[@relix42](https://twitter.com/relix42)



Available @  
Our Booth

NETFLIX