ARCANE
LEAGUE OF LEGENDS
NETFLIX | NOW STREAMING

Measuring Real Life Latency of the Internet

Thiara Ortiz
Senior CDN Reliability Engineer
SRECon Americas 2023

SQUID GAME

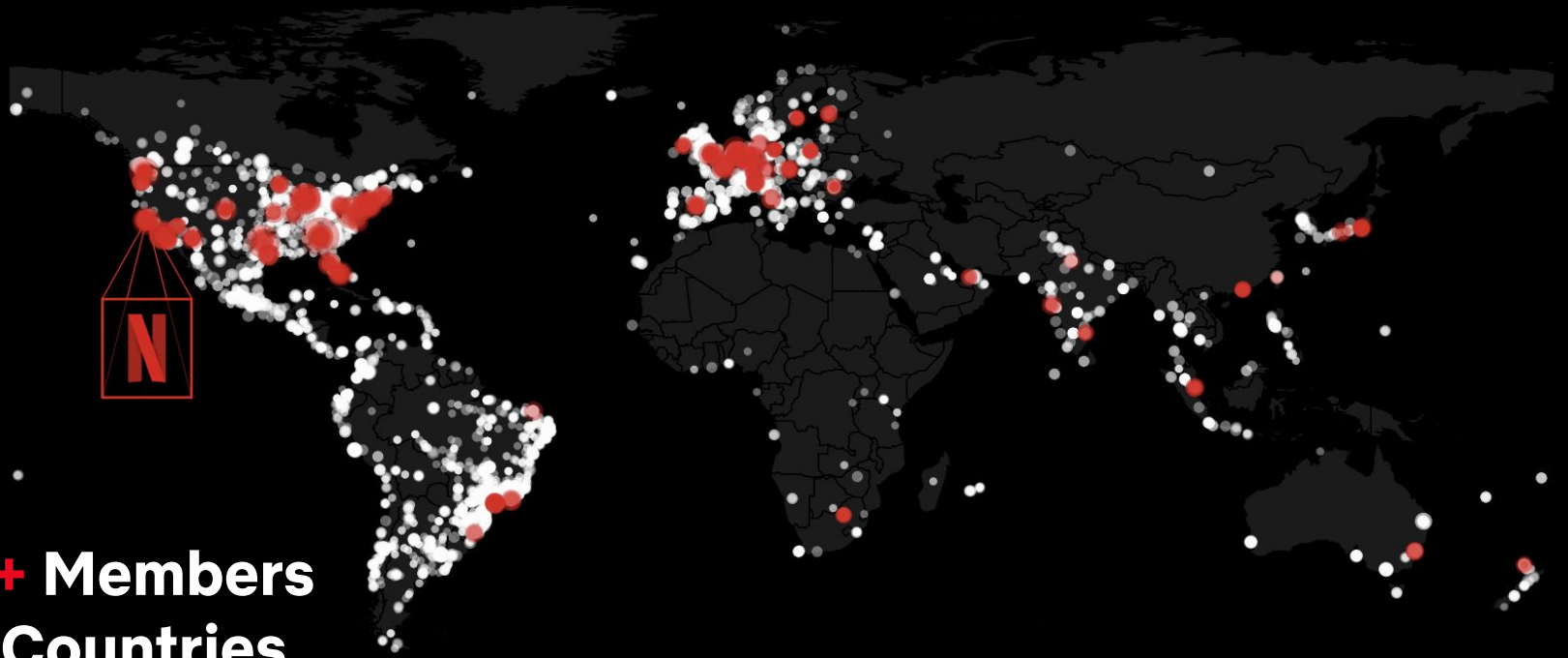
WEDNESDAY

STRANGER THINGS

MONEY HEIST

A NETFLIX SERIES
THE WITCHER

Open Connect



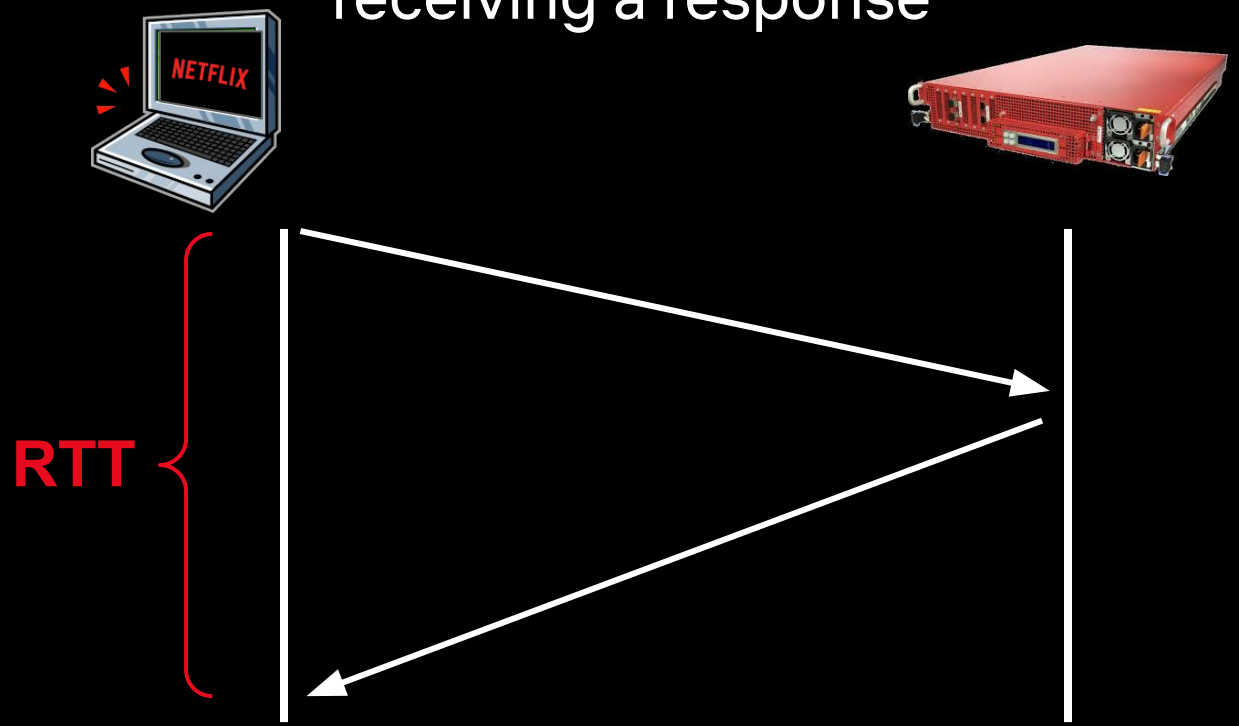
230M + Members
175+ Countries
18K+ OCAs
14 CDN SREs

Measuring Quality of Experience

- Bitrate Analysis
  - Higher bitrate typically means better video quality
  - What was the time-weighted video bitrate for a session compared to the maximum possible bitrate?
- Rebuffers
  - How many rebuffers did this session have? How many rebuffers did we observe for every view hour?
- Play Delay
  - How long did it take to play the first byte of video?
- **Latency**
  - What is the round trip time between the client and server?

Round Trip Time (RTT)

Duration of time between a client sending a request and receiving a response

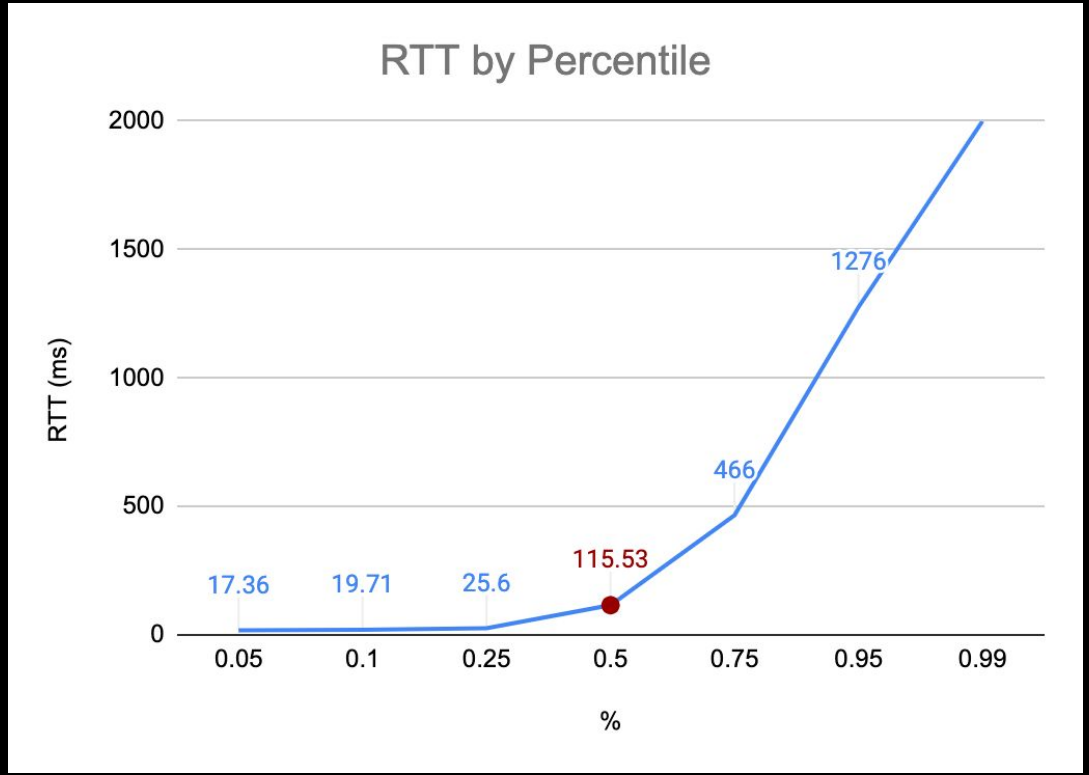


Analyzing RTT for a Single Session

Min RTT: 10 ms

Max RTT: 3883 ms

Average RTT: 360.94 ms



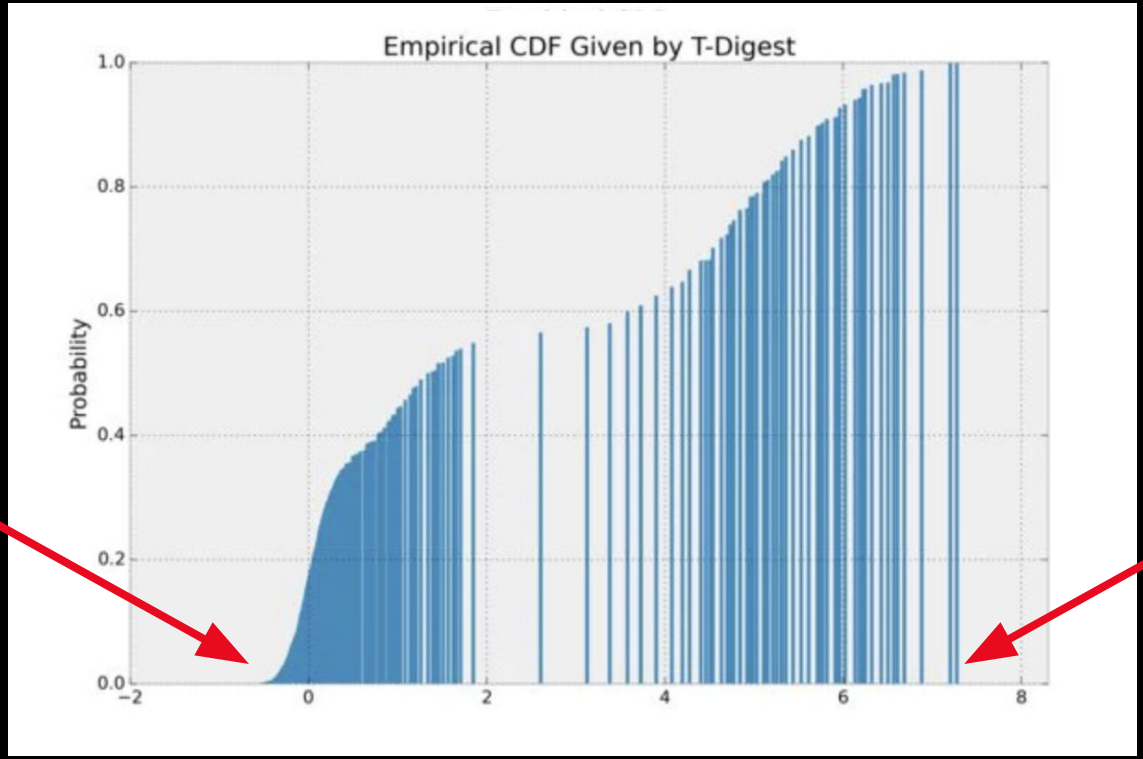
T-Digest

Data structure for collecting, aggregating data, and extracting online ranked based statistics without sacrificing too much accuracy or utilizing too much memory

github.com/tdunning/t-digest

T-Digest In Action

Taken from Cam Davidson Pilon: “Percentile and Quantile Estimation of Big Data: The t-Digest“



T-Digest in Action Cont.

```
'centroids' : {
   '-1 : 12,
   '0' : 328,
      ...
   '64.0' : 16,
   '122.0' : 9672
},
'centroidCount' : 234,
'compression' : -1,
'minValue' : 23,
'maxValue' : 970
```

What's the p5?
What's the p50?
What's the p75?
What's the p50 when I aggregate the t-digest with another t-digest?

Leveraging T-Digest for Data Collection

1

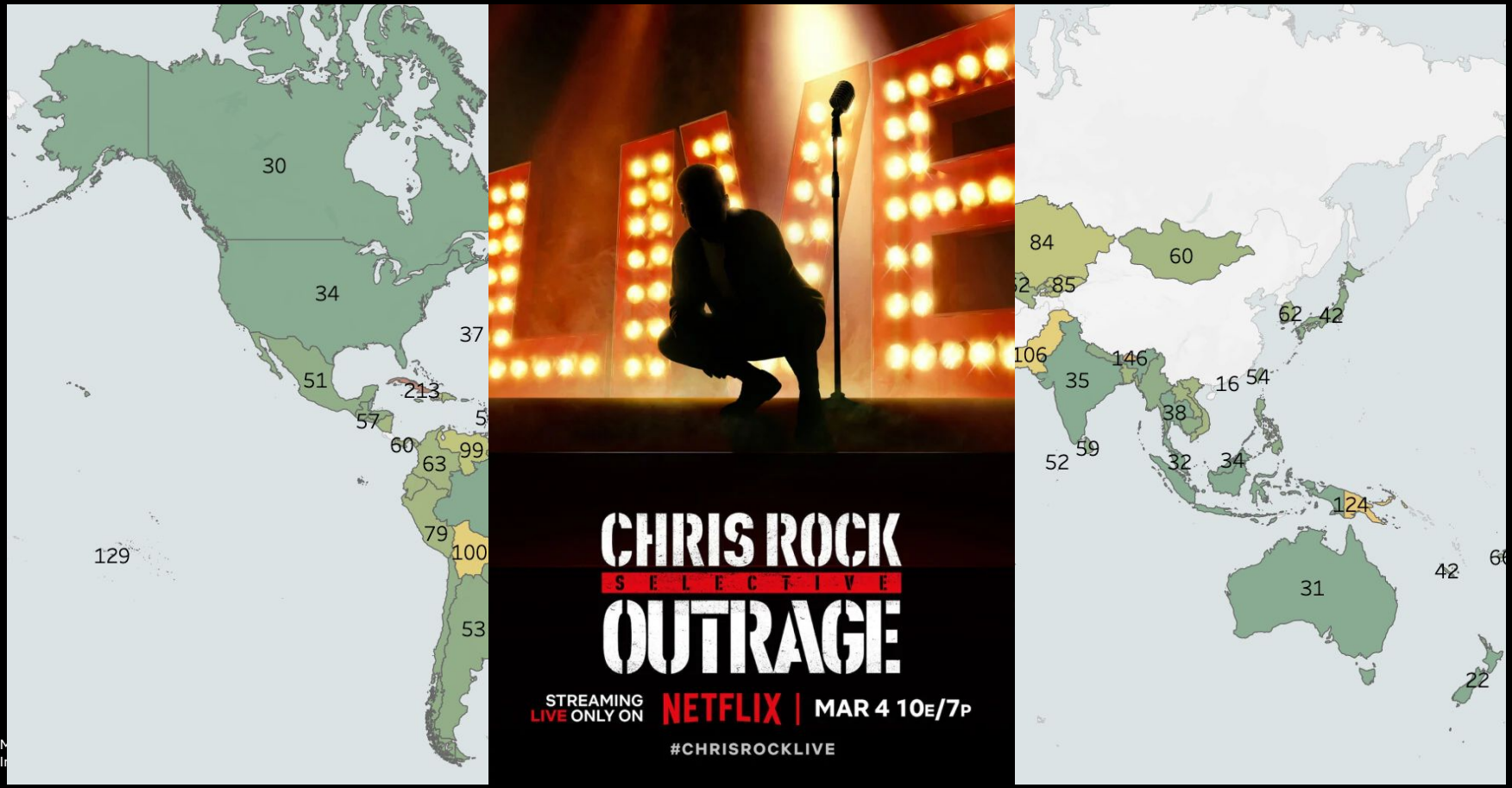
Sampled sessions that capture rtt t-digest

[5, 4, 6, 3, 5 , 3, 6, 2, …, n]

{tdigest}

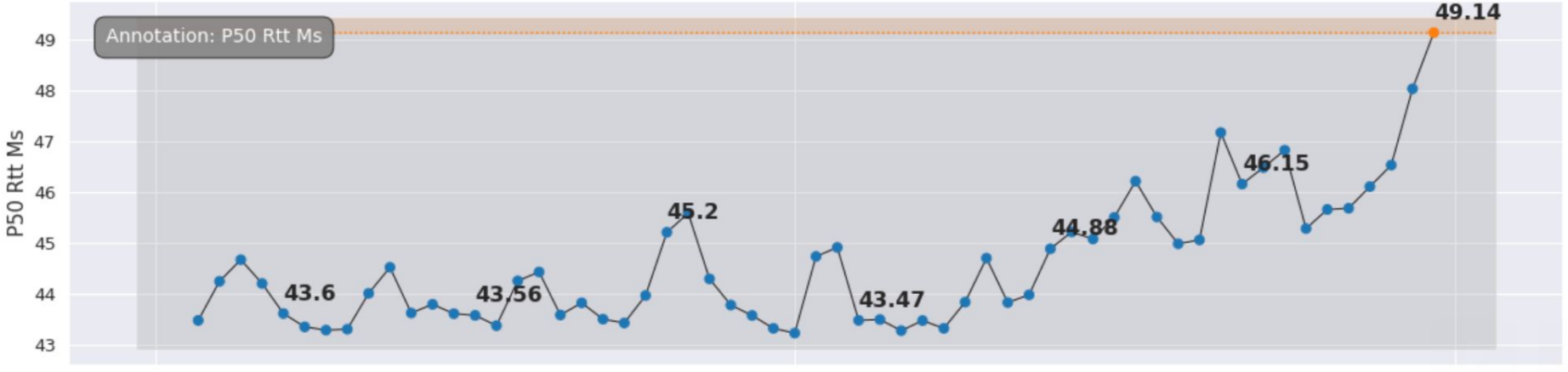
Analyzing Latency Sensitive Applications

2



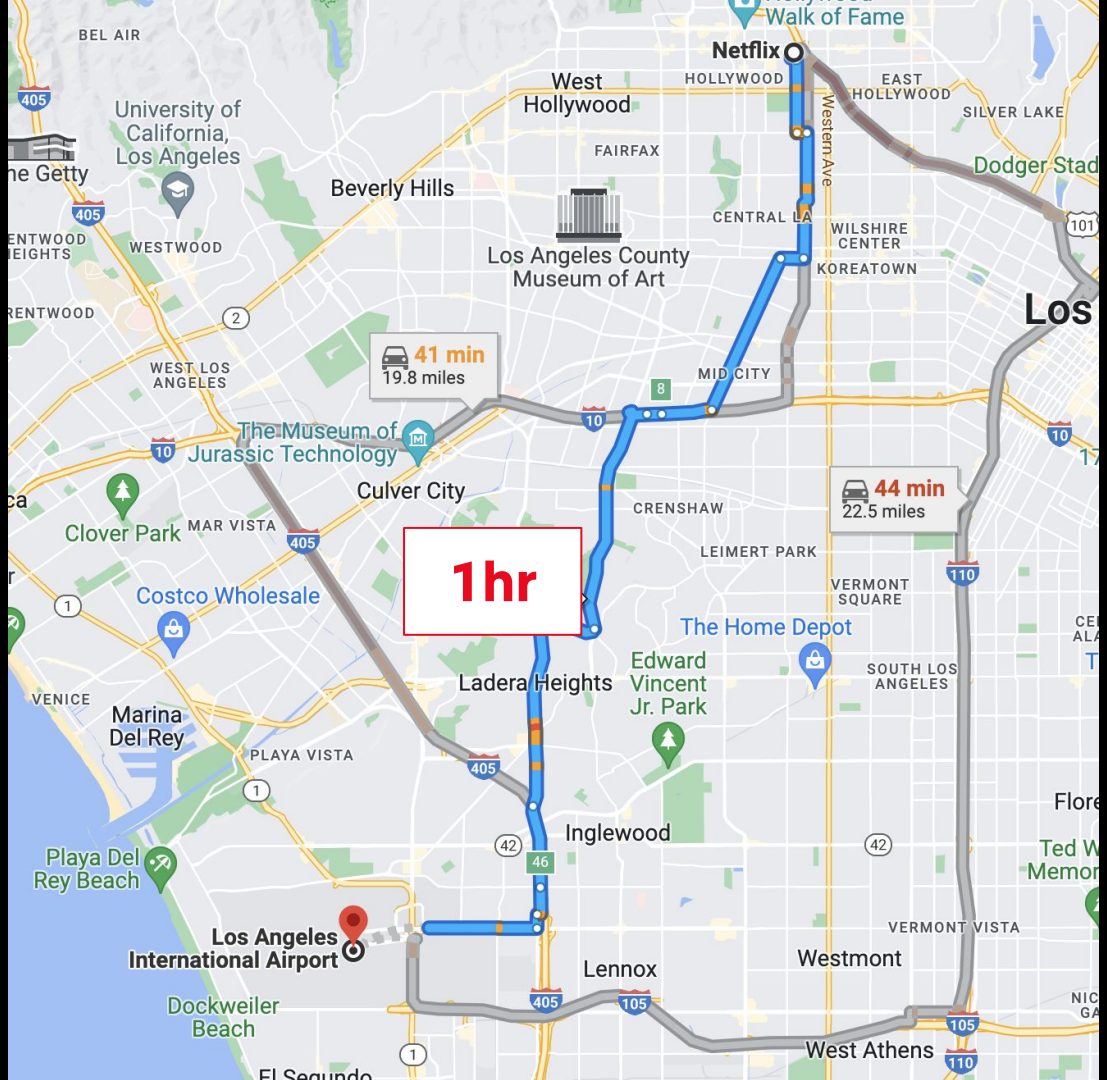
Anomaly Detection in RTT on a Country Level

3



Summary

1. T-digest allows for us to gain insights we did not have previously and to quickly apply them to three different applications
2. Operating a lean team requires us to be systematic in our alerting and monitoring


Walk of Fame
Netflix
BEL AIR
West Hollywood
HOLLYWOOD
EAST HOLLYWOOD
SILVER LAKE
University of California, Los Angeles
FAIRFAX
Beverly Hills
Western Ave
Dodger Stad
CENTRAL LA
WILSHIRE CENTER
KOREATOWN
Los Angeles County Museum of Art
WESTWOOD
Los
41 min
19.8 miles
WEST LOS ANGELES
MID CITY
The Museum of Jurassic Technology
Culver City
Clover Park
MAR VISTA
CRENSHAW
44 min
22.5 miles
1hr
LEIMERT PARK
VERMONT SQUARE
Costco Wholesale
The Home Depot
Edward Vincent Jr. Park
SOUTH LOS ANGELES
Ladera Heights
VENICE
Marina Del Rey
PLAYA VISTA
Inglewood
Playa Del Rey Beach
Los Angeles International Airport
VERMONT VISTA
Westmont
Lennox
Dockweiler Beach
West Athens

Thank you