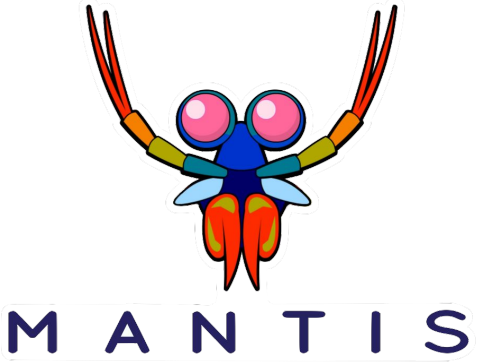
Mantis: Stream Processing for operational data

Mar 27, 2024

Sundaram Ananthanarayanan
Harshit Mittal



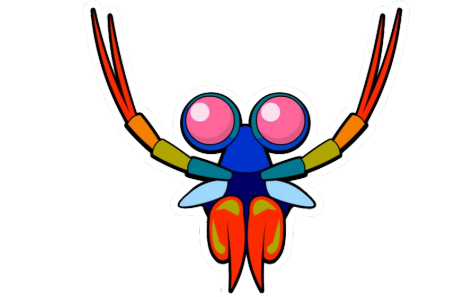
Sundaram Ananthanarayanan

Harshit Mittal

Operational insights using Mantis

- Complexity of the systems have grown rapidly in recent years.
- Still, failures are not that uncommon.
- Understanding failures is getting harder.
- Existing tooling does not make it easy!

- Timely, efficient, cost-effective insights using



Agenda

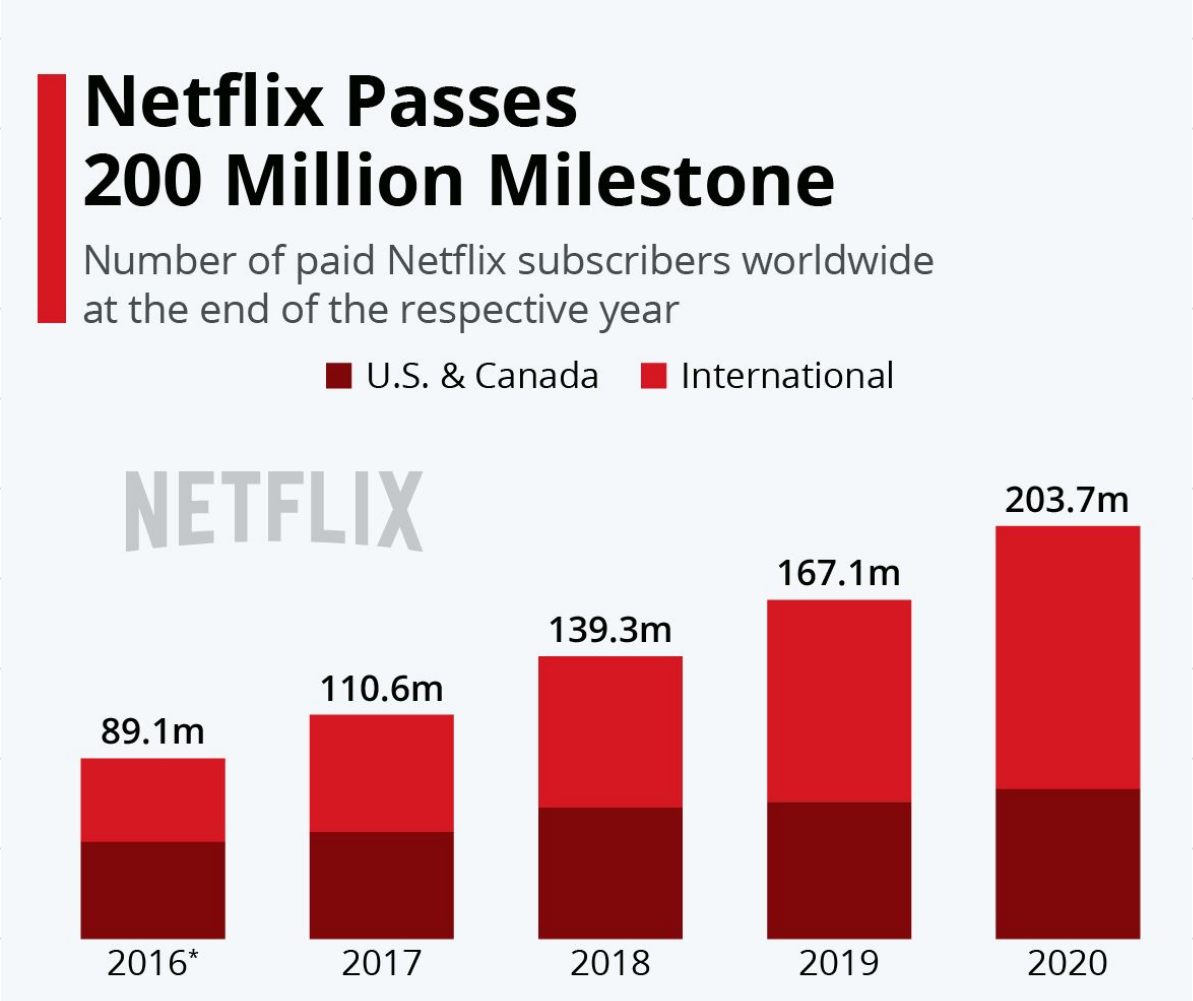
- **Motivation for Mantis**
- **Mantis**: Goals, Components
- **Raven**: Purpose, Demo
- **Mantis OSS**: Demo

Netflix!

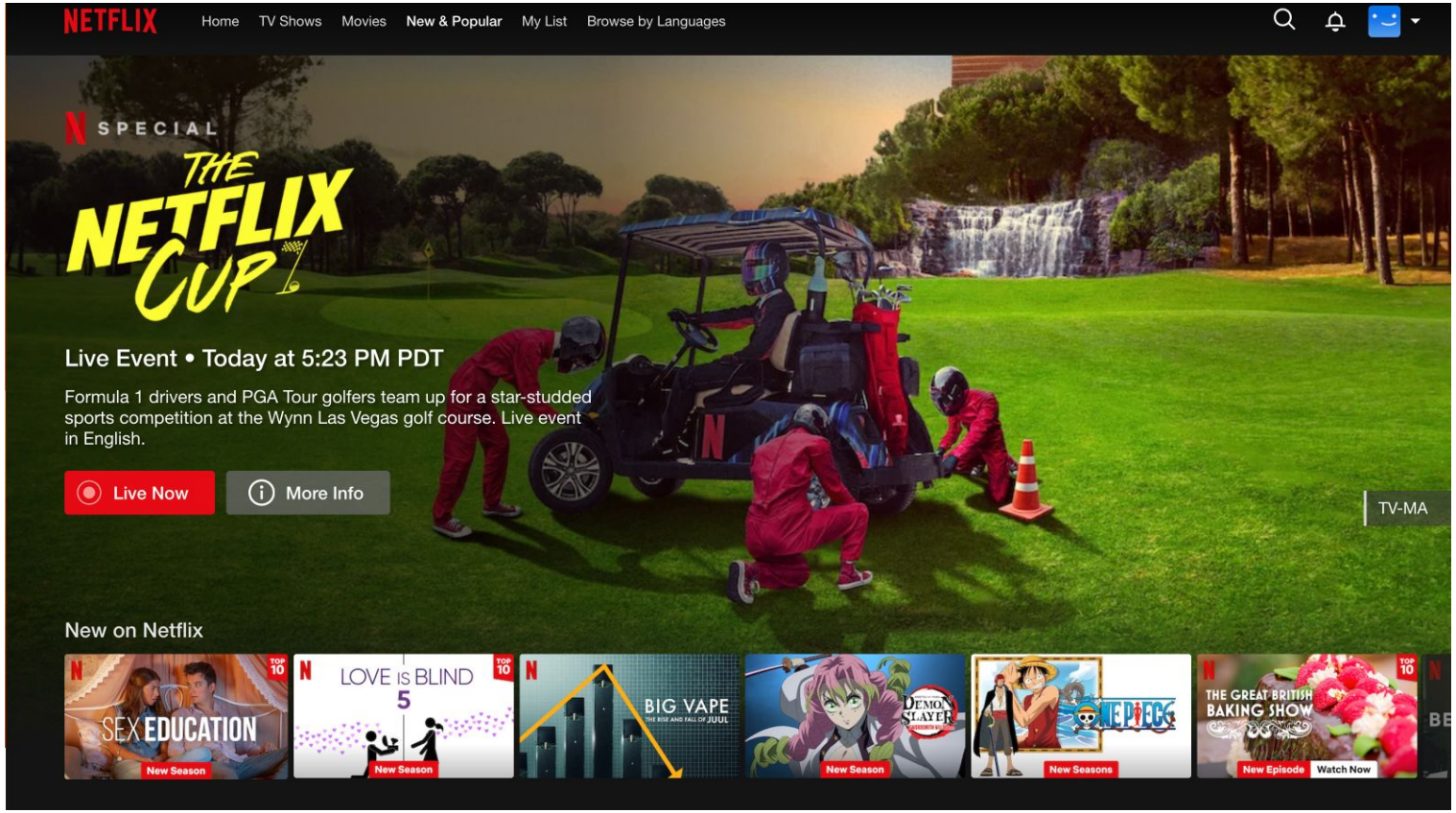
Netflix has grown rapidly in the last decade.

- 200M+ members

- 100s of countries
- 100s of ISPs
- 1000s of devices
- 18k+ titles



Netflix Live



Netflix Games

Events do not always unfold as anticipated.

Love is Blind Retweeted

Netflix
@netflix

To everyone who stayed up late, woke up early, gave up their Sunday afternoon... we are incredibly sorry that the Love is Blind Live Reunion did not turn out as we had planned. We're filming it now and we'll have it on Netflix as soon as humanly possible. Again, thank you and sorry.

6:29 PM · Apr 16, 2023 · **17.5M** Views

Dr. Dana-Marie Thomas @Dr_DanaMarie · Apr 17

Not Nice #Netflix We played in your #LIB Season 4 sandbox allll this time only to be let down. 😞 I accept your apology. Now pls credit my account for the inconvenience @netflix

1 562

yeknoMgoD @yeknomgod · Apr 16

Wait, so there's an episode of Love is Blind but no one can see it?

Tile
@TheTileApp · **Follow**

Did ya'll lose the remote or what?

6:46 PM · Apr 16, 2023

Challenges of an oncall engineer

- 😕 Metrics, yes, but not the **right metrics**
- 😕 Lack of highly-granular logs
  - storing everything is **expensive**
  - storing everything is **inefficient**
- 😕 Too much **noise**!

Existing Tooling: Limitations

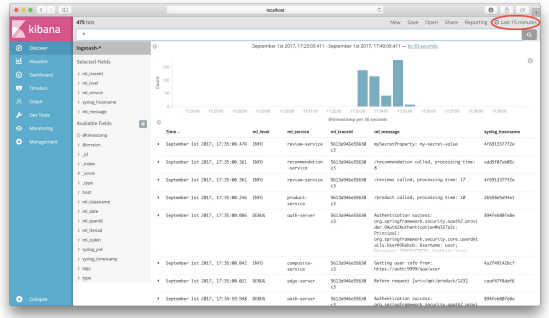
❌ Monitoring systems

Only store aggregates.
Not dynamic.
Hard to root-cause.

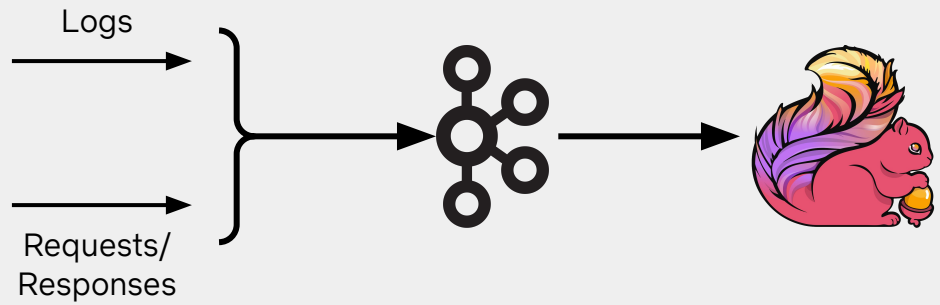
Existing Tooling: Limitations

❌ **Monitoring systems**
Only store aggregates.
Not dynamic.
Hard to root-cause.

splunk>



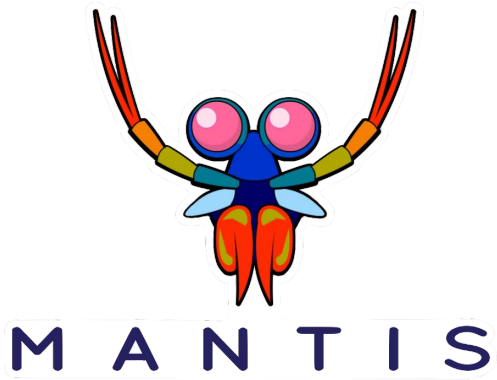
❌ **Logging systems**
Expensive.
Inefficient.
Needle in a haystack.



Introducing
Mantis!

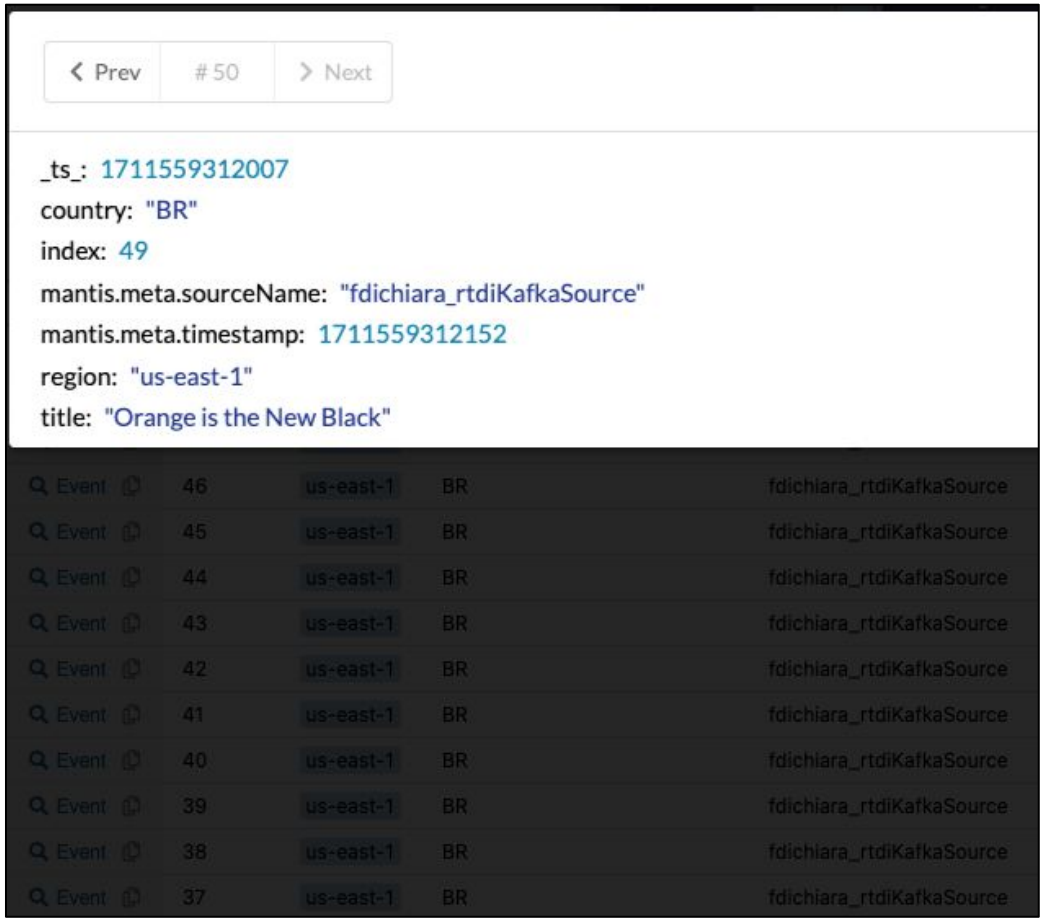
Mantis: Introduction

- Real-time stream processing system
- Like Mantis shrimp
  Great eyes for complex world



Mantis: Goals

- Access to fine-grained data



Mantis: Goals

- Access to fine-grained data
  - Also, **efficient**

Mantis: Goals

- Access to fine-grained data
  - Also, **efficient**
  - Also, **cost-effective**

Mantis: Goals

- Access to fine-grained data
  - Also, **efficient**
  - Also, **cost-effective**
  - Also, **low-latency**

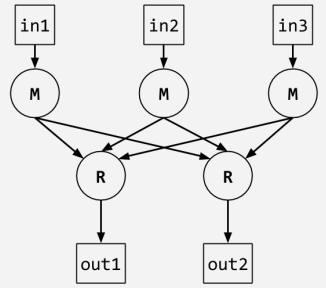
Mantis: Overview

Mantis Realtime Events (MRE)

- Transport layer like Kafka
- Provides capability to filter/project events on the edge - ***efficient***
- Storageless transport - ***cost-effective***

Mantis Compute

- dataflow engine for operational data
  - ***availability*** over consistency
- low-latency



Mantis: Example

Love is Blind Retweeted

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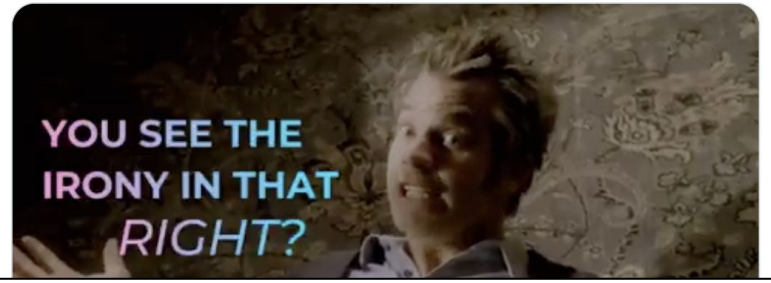

Tile
@TheTileApp · **Follow**

Did ya'll lose the remote or what?

6:46 PM · Apr 16, 2023

Pardon the interruption
This title is not available to watch instantly. Please try another title. - 1044
Netflix Home
Error Code D7121-1331

Mantis: Example

Love is Blind Retweeted

Netflix
@netflix

To everyone who stayed up late, woke up early, gave up their Sunday afternoon... we are incredibly sorry that the Love is Blind Live Reunion did not turn out as we had planned. We're filming it now and we'll have it on Netflix as soon as humanly possible. Again, thank you and sorry.

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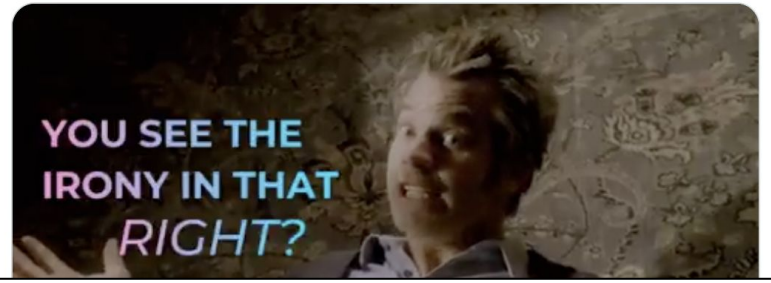

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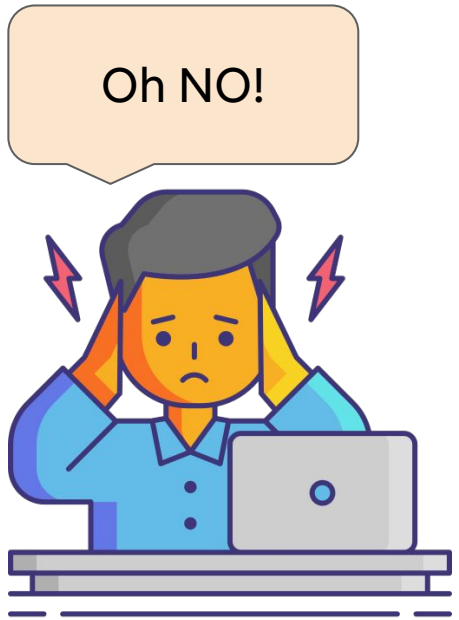
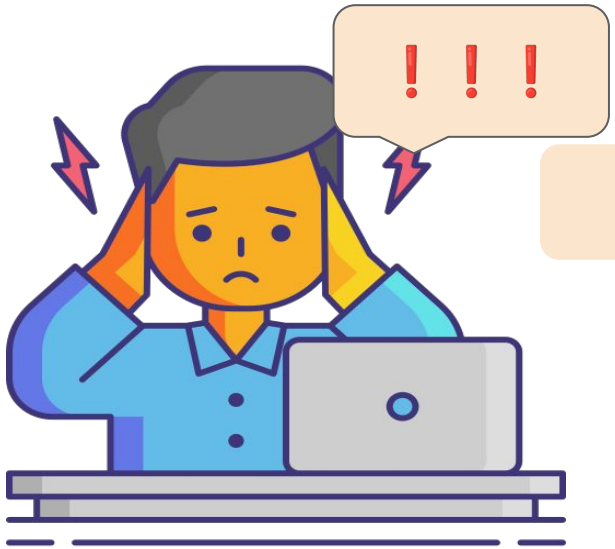


On-call

Mantis: Example



On-call

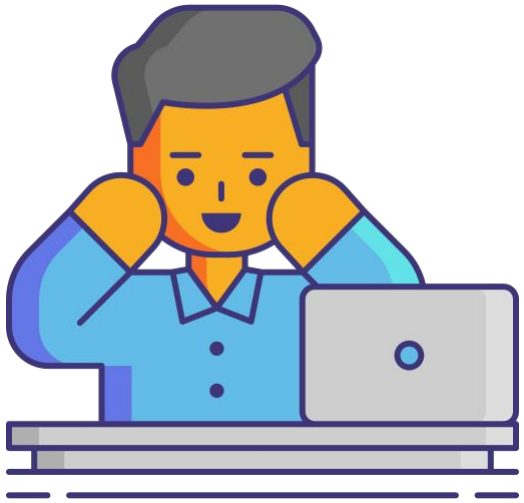
What if there was a table with all requests/responses?

SELECT *

FROM table

WHERE title = “Love Is Blind”

Mantis: Example



but realtime => stream

What if there was a ~~table~~ with all requests/responses?

SELECT *

FROM ~~table~~ stream

WHERE title = “Love Is Blind”

Mantis: Example

but realtime => stream

What if there was a ~~table~~ with all requests/responses?

JSON event	# ↓	Region	stack	status	cluster	response.header.X-Fram...	method
Event	36	us-east-1	lorem	200	svc0-lorem	DENY	GET
Event	35	us-east-1	ab	400	svc0-ab	DENY	GET
Event	34	us-east-1		200	svc0	DENY	GET
Event	33	us-east-1	svc1	200	svc0-svc1	DENY	GET
Event	32	us-east-1	ipsum	200	svc0-ipsum	DENY	GET
Event	31	us-east-1	lorem	400	svc0-lorem	DENY	GET
Event	30	us-east-1	ab	400	svc0-ab		
Event	29	us-east-1		400	svc0		
Event	28	us-east-1	svc1	200	svc0-svc1	DENY	GET
Event	27	us-east-1		200	svc0	DENY	GET
Event	26	us-east-1	ab	400	svc0-ab		
Event	25	us-east-1	manifest	200	svc0-manifest	DENY	GET
Event	24	us-east-1	license	200	svc0-license	DENY	GET
Event	23	us-east-1	ipsum	200	svc0-ipsum	DENY	GET
Event	22	us-east-1	license	200	svc0-license	DENY	GET
Event	21	us-east-1	ab	400	svc0-ab	DENY	GET

Mantis: Example

🤿 into exceptions

SELECT * **FROM** stream

WHERE title = “Love Is Blind”

AND cluster ==~ /^ab.*/ `-- starts with`

AND http.response.status != **200**

Mantis: Example

into exceptions

JSON event	# ↓	Region	stack	status	cluster	deviceType	method
Event	25	us-east-1	bazsvc	200	ab-bazsvc	tv	GET
Event	24	us-east-1	corgesvc	200	ab-corgesvc	tv	GET
Event	23	us-east-1	barsvc	200	ab-barsvc	tv	GET
Event	22	us-east-1	corgesvc	200	ab-corgesvc	tv	GET
Event	21	us-east-1	ab	404	ab-qux	iOS	GET
Event	20	us-east-1	bazsvc	200	ab-bazsvc	tv	GET
Event	19	us-east-1	ab	200	ab-qux		
Event	18	us-east-1		200	ab		
Event	17	us-east-1	ab	200	ab-qux		
Event	16	us-east-1	adloadtest	200	ab-adloadtest	tv	GET
Event	15	us-east-1	adloadtest	404	ab-adloadtest	iOS	GET
Event	14	us-east-1	ab	200	ab-qux		
Event	13	us-east-1	foosvc	200	ab-foosvc	tv	GET
Event	12	us-east-1	ab	200	ab-qux	tv	GET
Event	11	us-east-1		400	ab	Android	GET
Event	10	us-east-1	barsvc	400	ab-barsvc	Android	GET

Mantis: Example #2

Seeing new analytics events added to mobile apps (during testing)

Mantis: Example #2

Seeing new analytics events added to mobile apps (during testing)

SELECT * **FROM** stream

WHERE platform = “iOS”

AND app.name = “netflix-development”

AND analytics_event_name = “my_analytics_event”

Mantis: Example #2

Can we generalize?

Seeing new analytics events added to mobile apps (during testing)

SELECT * **FROM** stream

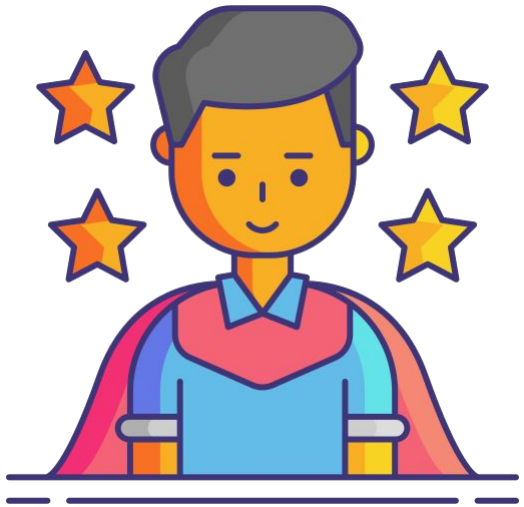
WHERE platform = “iOS”

AND app.stack = “development”

AND analytics_event_name = “my_analytics_event”

Platform: Raven (on Mantis)

A realtime interactive application built on top of Mantis



Selected source: **fdichiara_rtdiKafkaSource**

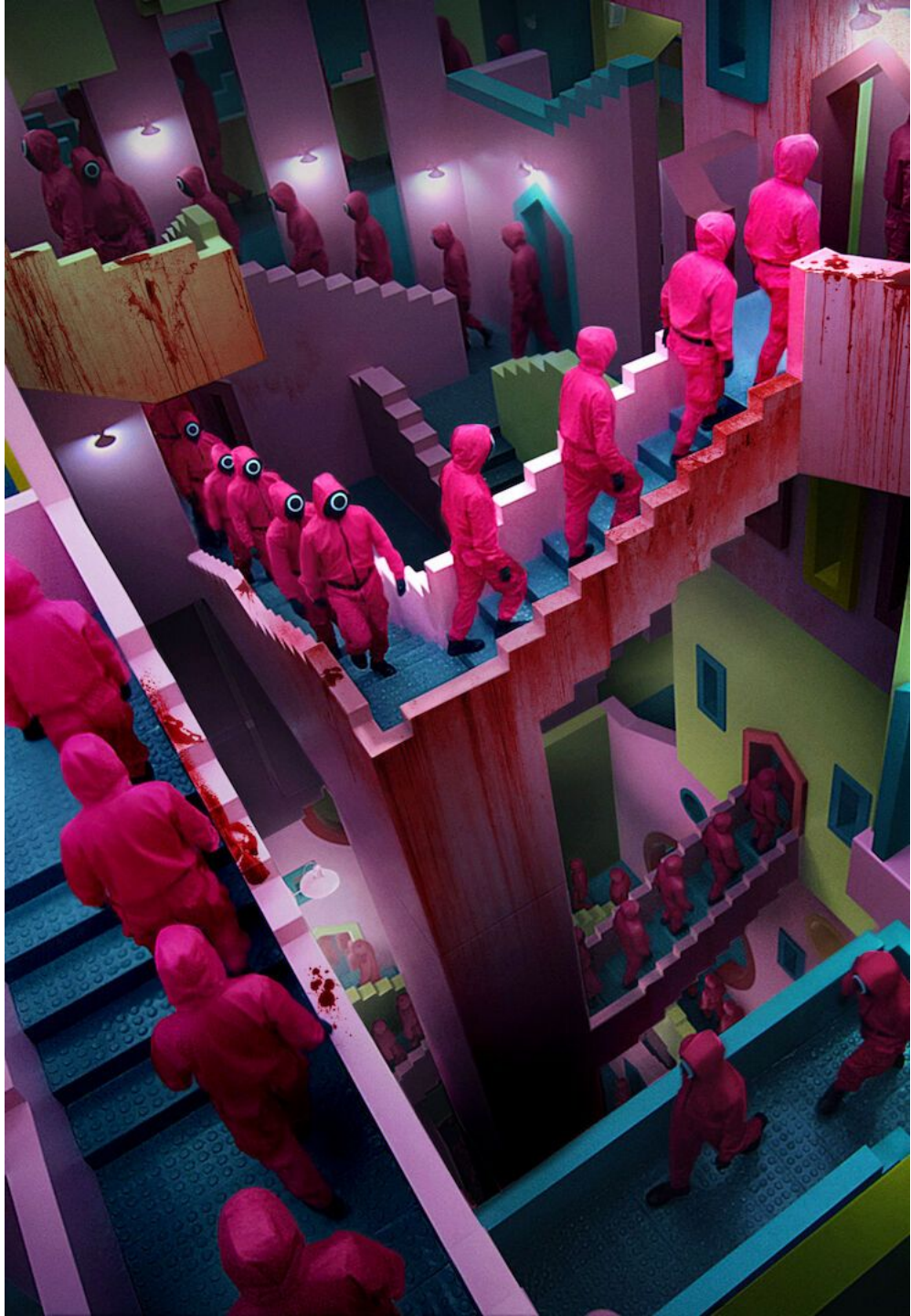
Search name or description... | + Add new source | Refresh sources

Source Name	Type	Description
fdichiara_rtdiKafkaSource	Kafka	Test
firewood-defaultStream	MRE v2	Event stream emitted by app firewood stream defaultStrea
FirewoodSource	MRE v1	Reads events from the firewood app
flixbook-defaultStream	MRE v2	Contains events from flixbook application
fooservice-defaultStream	MRE v2	Event stream emitted by app fooservice stream defaultStre
ftlservice-defaultStream	MRE v2	Event stream emitted by app ftlservice stream defaultStrea
gameprogressdgs-defaultStream	MRE v2	Event stream emitted by app gameprogressdgs stream def
gamestats-defaultStream	MRE v2	Game Stats and Leaderboard
gamesystemsdgs-defaultStream	MRE v2	gamesystemsdgs

Demos

Demo #1 — Raven

- Raven job on sample data
- Querying capabilities

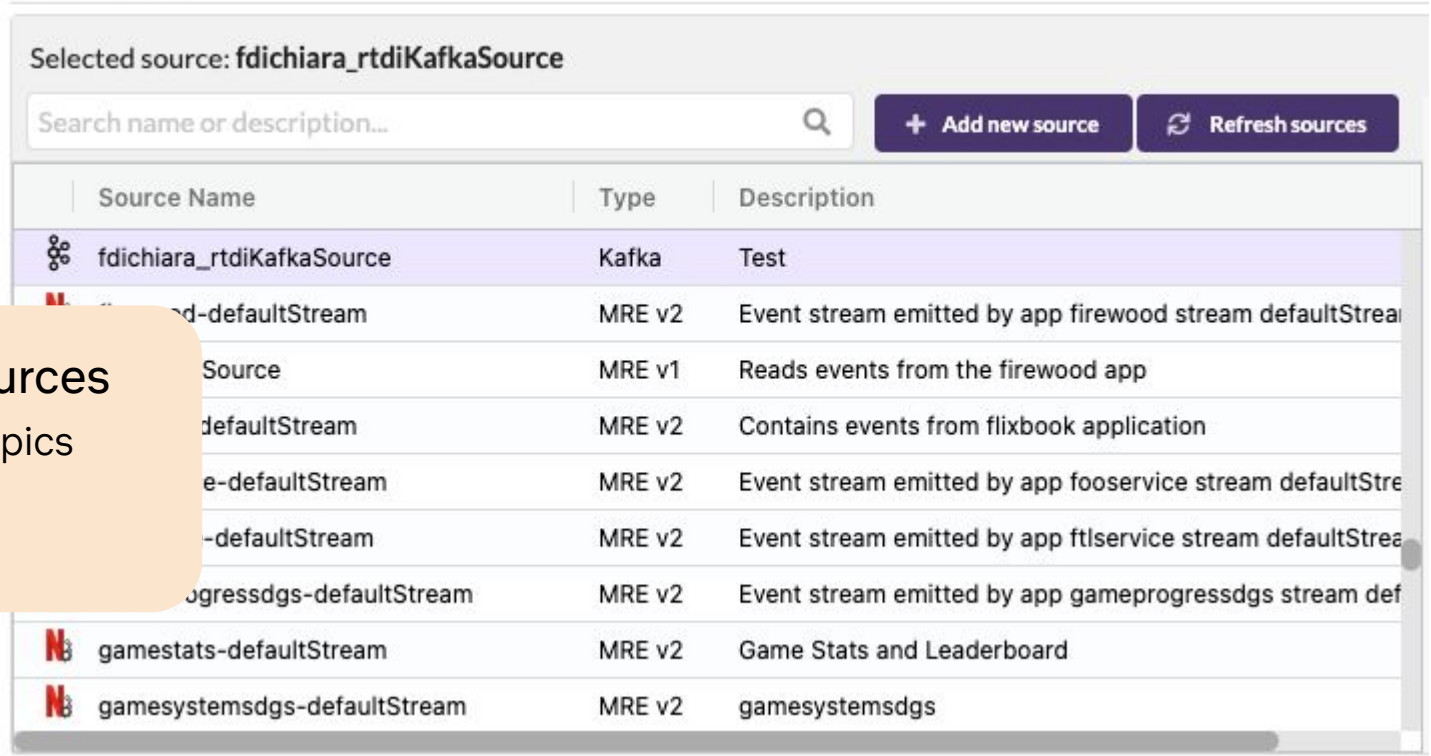


Platform: Raven (on Mantis)

A realtime interactive application built on top of Mantis

Access to 2000+ Mantis Data Sources

- All major microservices and kafka topics
- Over 2000 queries submitted daily



Platform: Raven (on Mantis)

Type Mantis Query Language (MQL)

rmation

d From	7a5f3863-6c77-4828-829f-2198f3c13091
Status	Query is Active
Environment	test
Submitted at	2024-03-27 10:07:42 PDT **(5s ago)**
Time to live	Temporary job
Submitted by	hmittal Impersonate this user (admin only) Open in WhitePages
SLA	Standard SLA
	Source: **fdichiara_rtdiKafkaSource** This MQL query was created by hand with "Edit Raw MQL"

Query	`SELECT * FROM stream`
	`WHERE e["country"] == "BR" AND`
	`e["title"] == "Orange is the New Black"`

Horizontal Scaling	3 min, 10 max
Vertical Scaling	2 CPUs, 14336 MB

Platform: Raven (on Mantis)

Stream results

SELECT * **FROM** stream

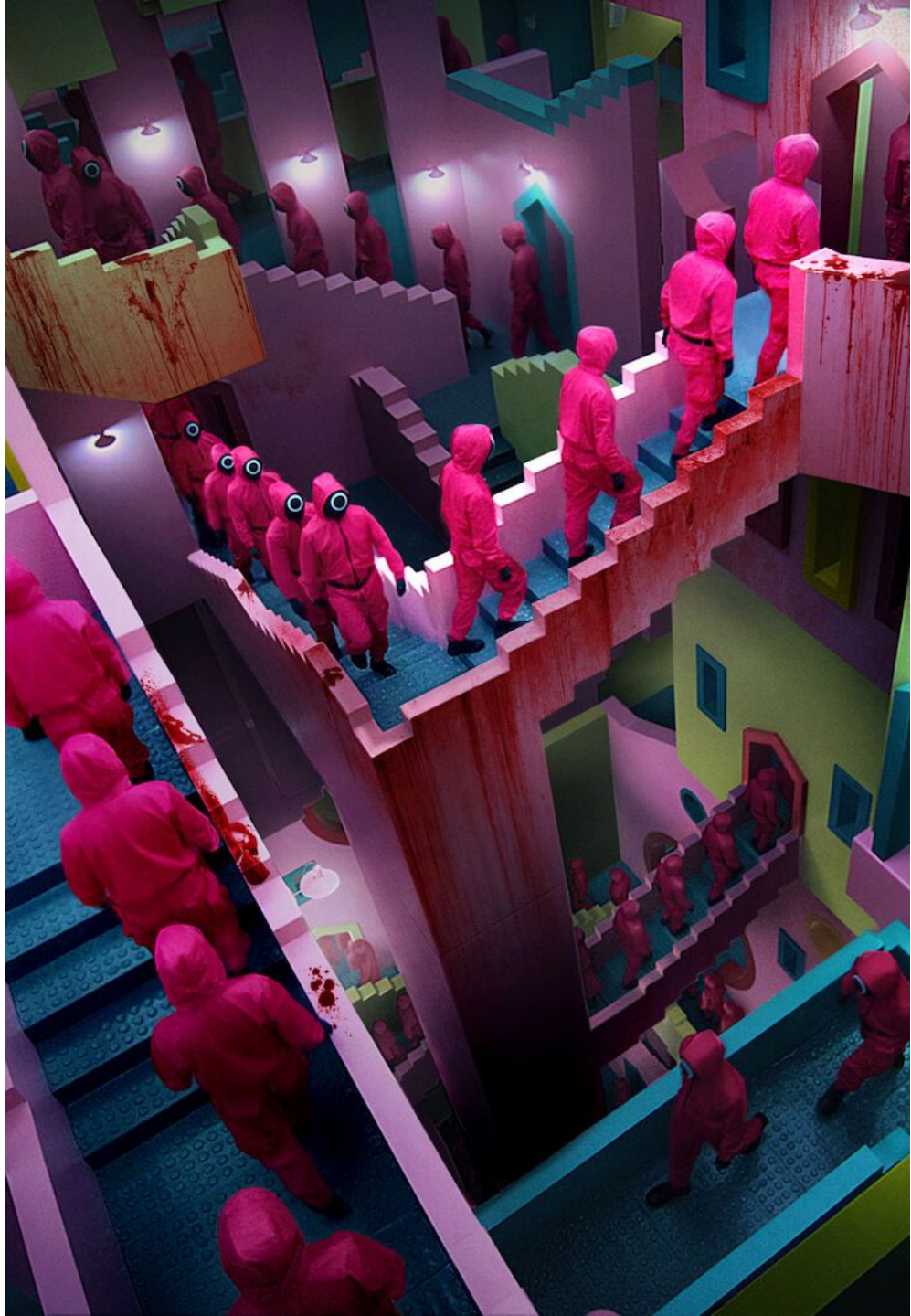
WHERE country = “BR”

AND title = “Orange Is the New Black”

JSON event	# ↓	Region	country	title	_ts_
Event	50	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:3
Event	49	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:3
Event	48	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:3
Event	47	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	46	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	45	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	44	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	43	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	42	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	41	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	40	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	39	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	38	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	37	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	36	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2
Event	35	us-east-1	BR	Orange is the New Black	Wed, 27 Mar 2024 17:08:2

Demo #2 — OSS

- Deploy mantis-helm in minikube
- Walk through a source job



Mantis: Stream processing for operational data

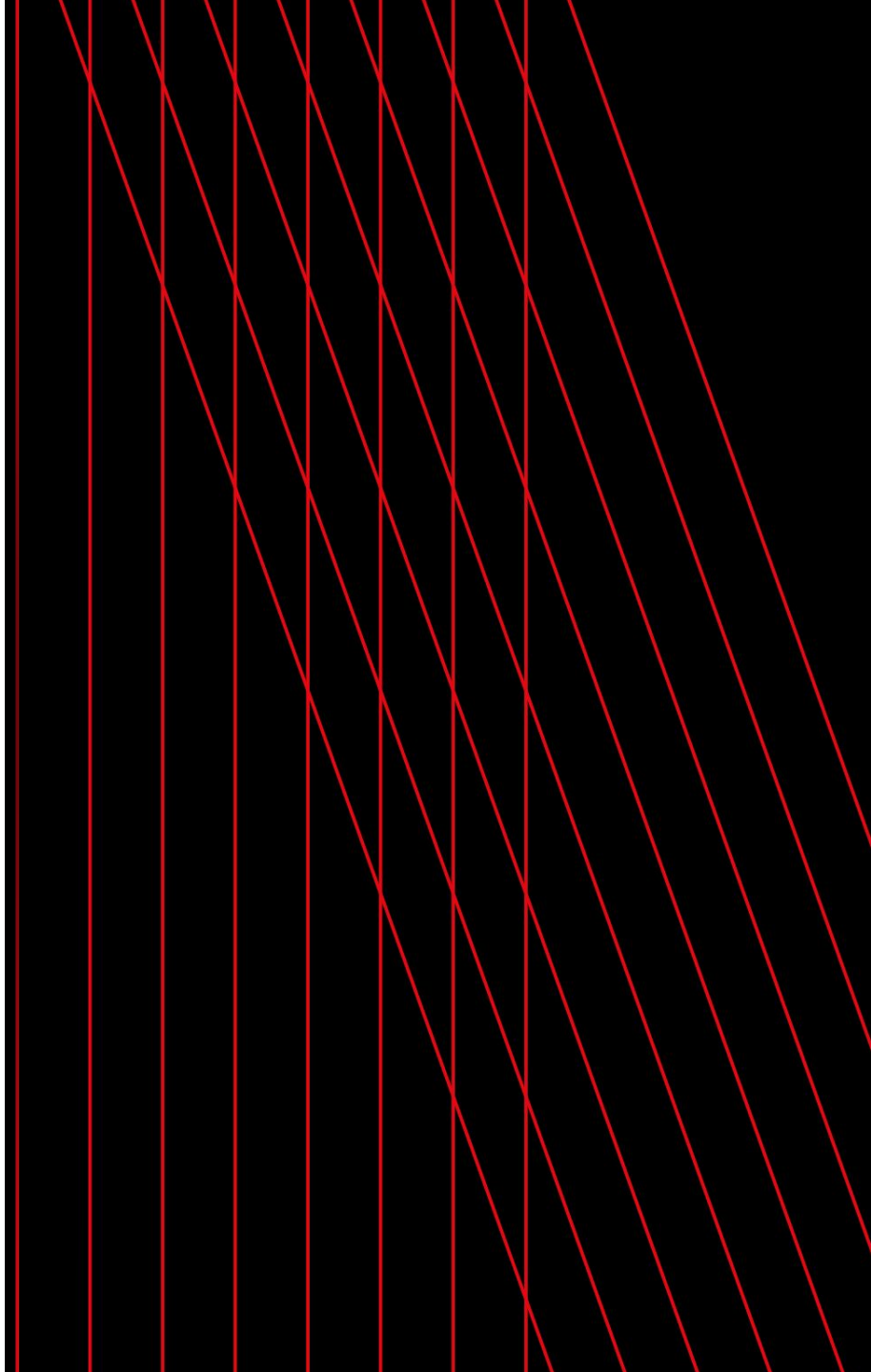
- It can be challenging to gain fine-grained insights into complex systems with existing tooling.

- Mantis solves this problem by providing a
  - on-demand, storageless transport layer (MRE)
  - dataflow engine tuned for operational data

- Battle tested @Netflix since 2014

Thank You

- Docs: https://netflix.github.io/mantis
- Email: mantis-oss-users@googlegroups.com
- Github:
  - Netflix/mantis
  - Netflix/mantis-api
  - Netflix/mantis-helm
  - Netflix/mantis-ui



Mantis @Netflix

Anomaly Detection & Alerting

- SPS Alerts
- RDX - Device/Title Based Alerting
- Chaos experiments
- Cassandra/ES health monitoring

Interactive Debugging

- Raven
- Kafka stream sampler

Miscellaneous

- Flink autoscaler
- PII Detector
- Schema Inferer
- ETL

Mantis Scale@Netflix

Jobs launched (daily)	Containers	Data processed (daily)
60k	30,000+	100 PB