

CLOUDERA

CLOUDERA STREAM PROCESSING (CSP)

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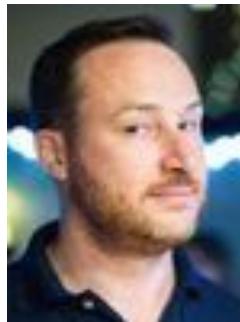
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Daniel Chaffelson

Welcome to our Edge Management Lab

Who are we?

Cloudera Data in Motion Field Team



@PaasDev



Kafka



Slides:

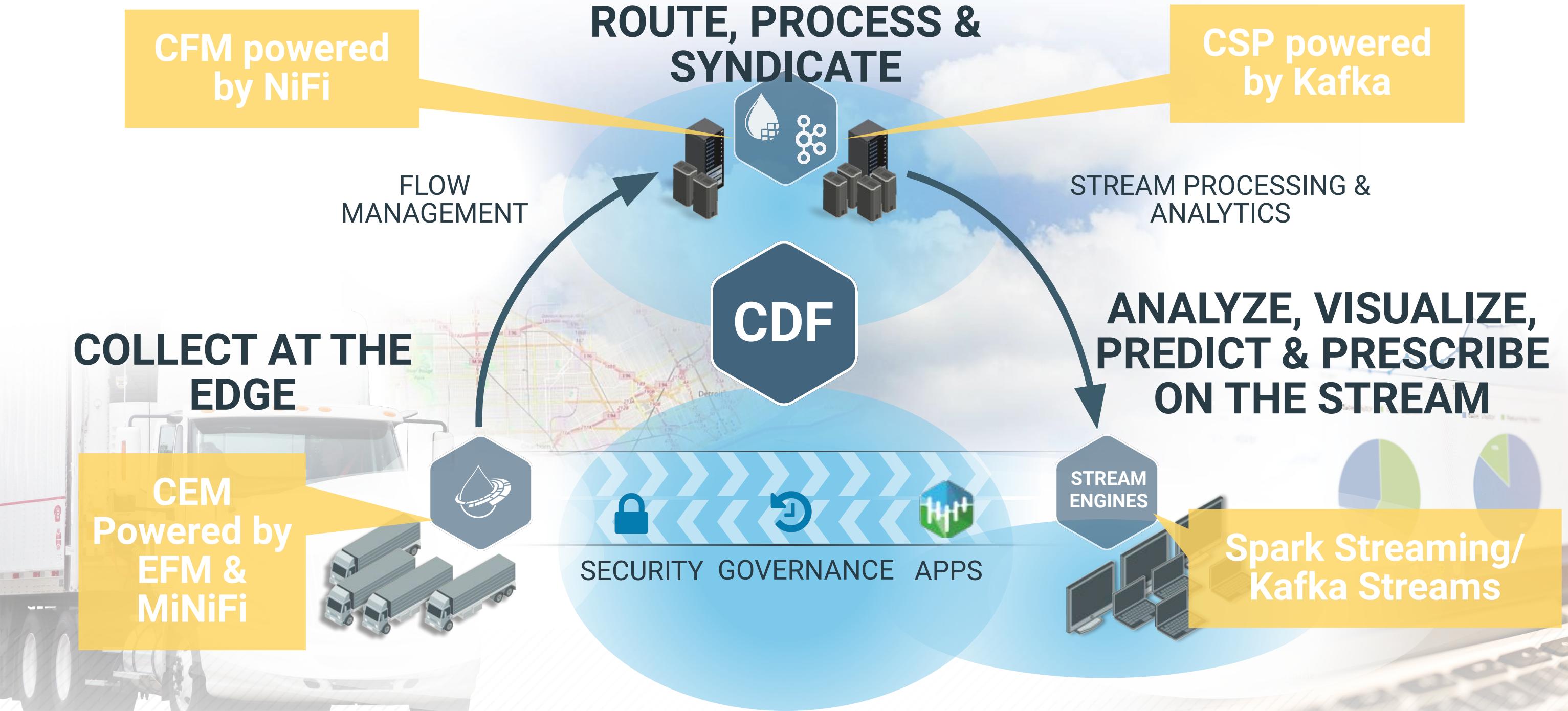
[http://tiny.cloudera.com/kafka-strata-n
y](http://tiny.cloudera.com/kafka-strata-new-york-slides.pdf)

https://github.com/purn1mak/SMM-NewYork/blob/master/SMM_Kafka_CrashCourse.pdf

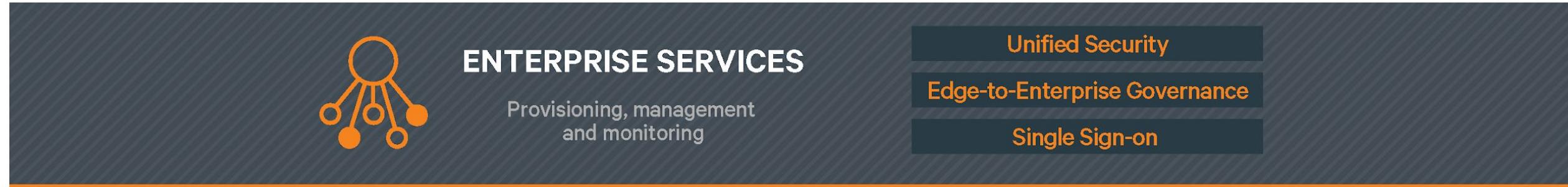
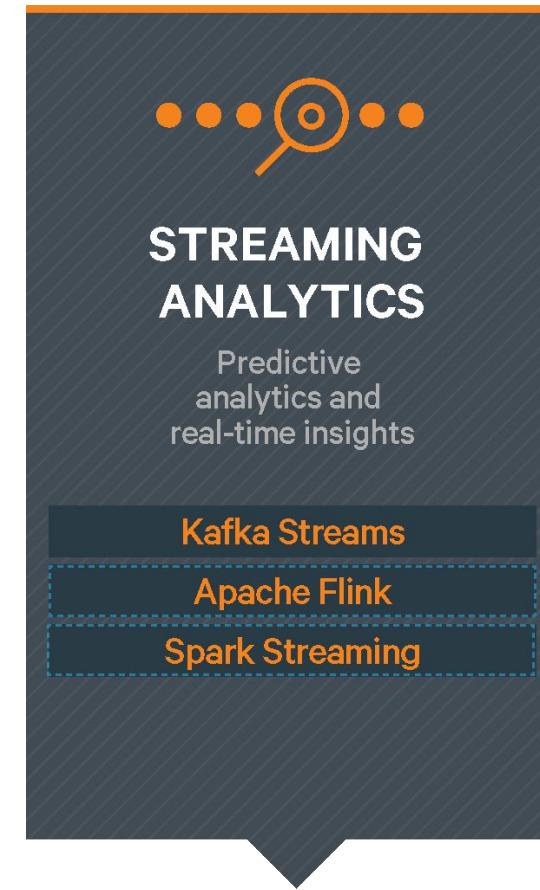
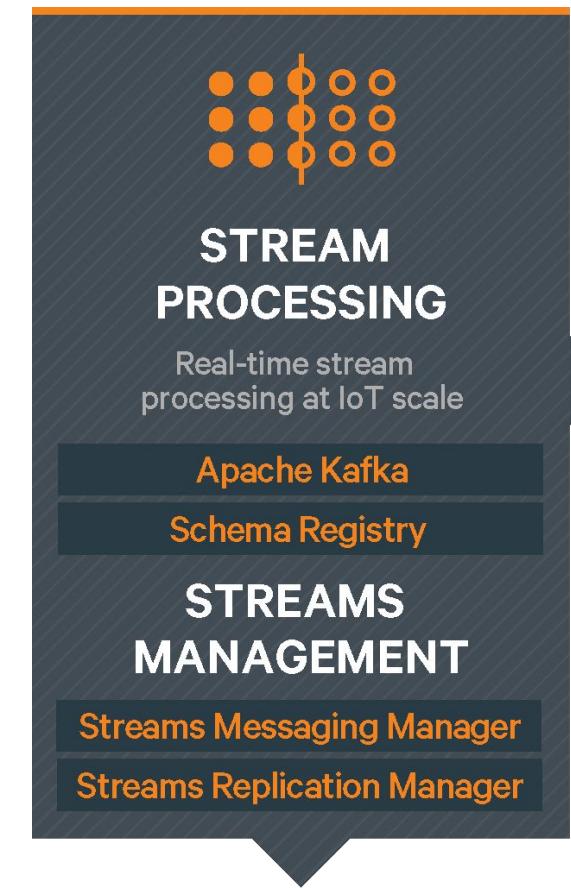
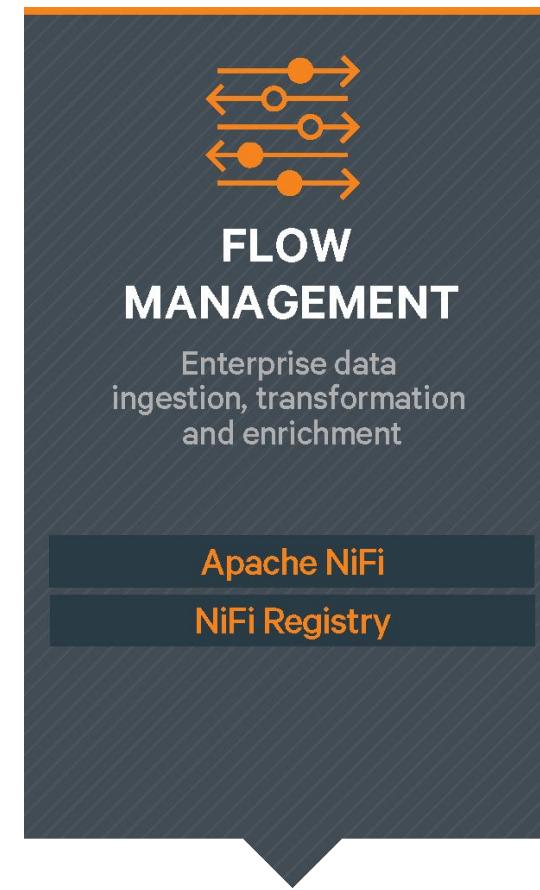
Workshop: <http://54.236.34.164/>

<http://tiny.cloudera.com/smm-workshop>

Cloudera DataFlow (CDF)



CLOUDERA DATAFLOW DATA-IN-MOTION PLATFORM

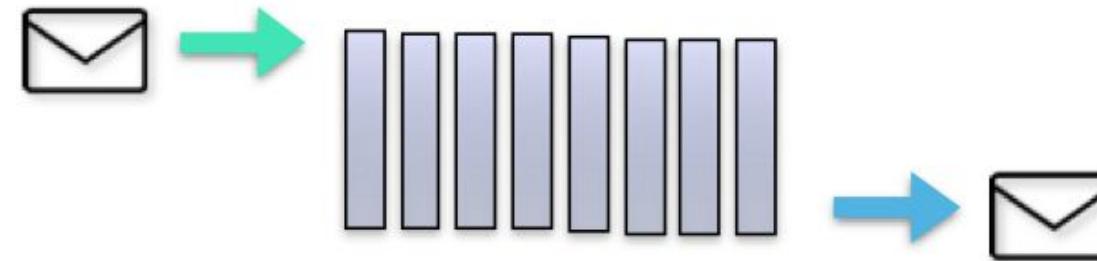


What is Kafka

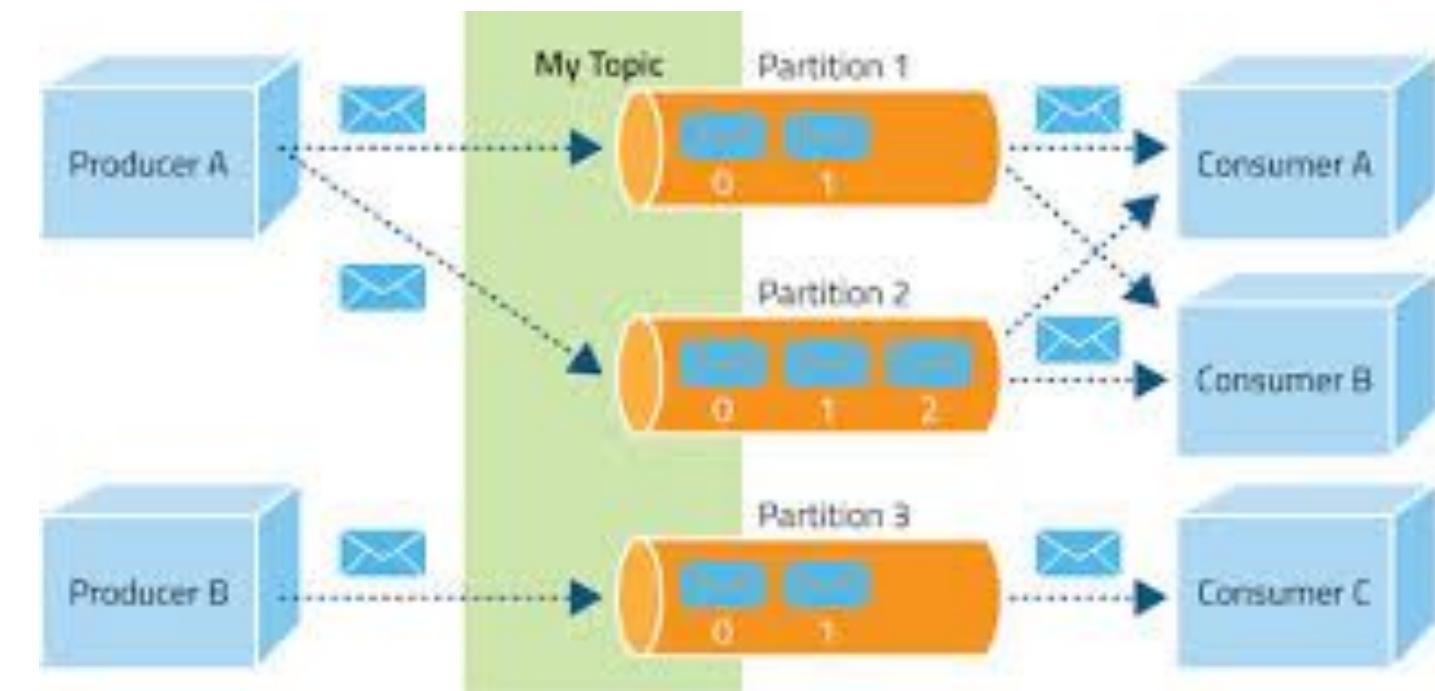


- ➊ Who is Kafka?
- ➋ What is it
 - A messaging system
 - It can handle lots of messages
 - Messages cannot get lost
 - Message order is preserved
 - Message will get delivered
 - A *producer* sends the message and one or more *consumers* can read the message
- ➌ Kafka was built at LinkedIn in 2011
- ➍ Open sourced as an Apache project

Inside Kafka



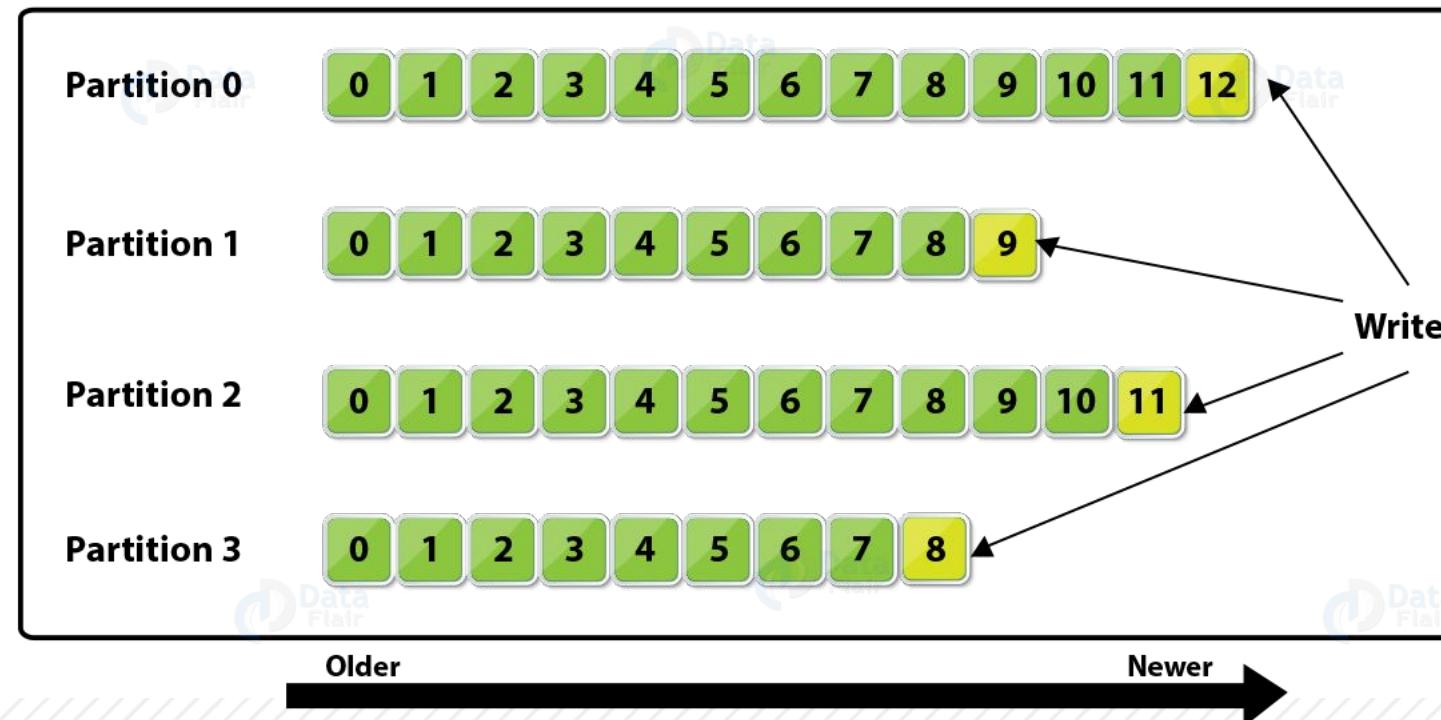
- Kafka topic and topic partition
- Kafka Broker
- Producers
- Consumers



How does Kafka preserve message order

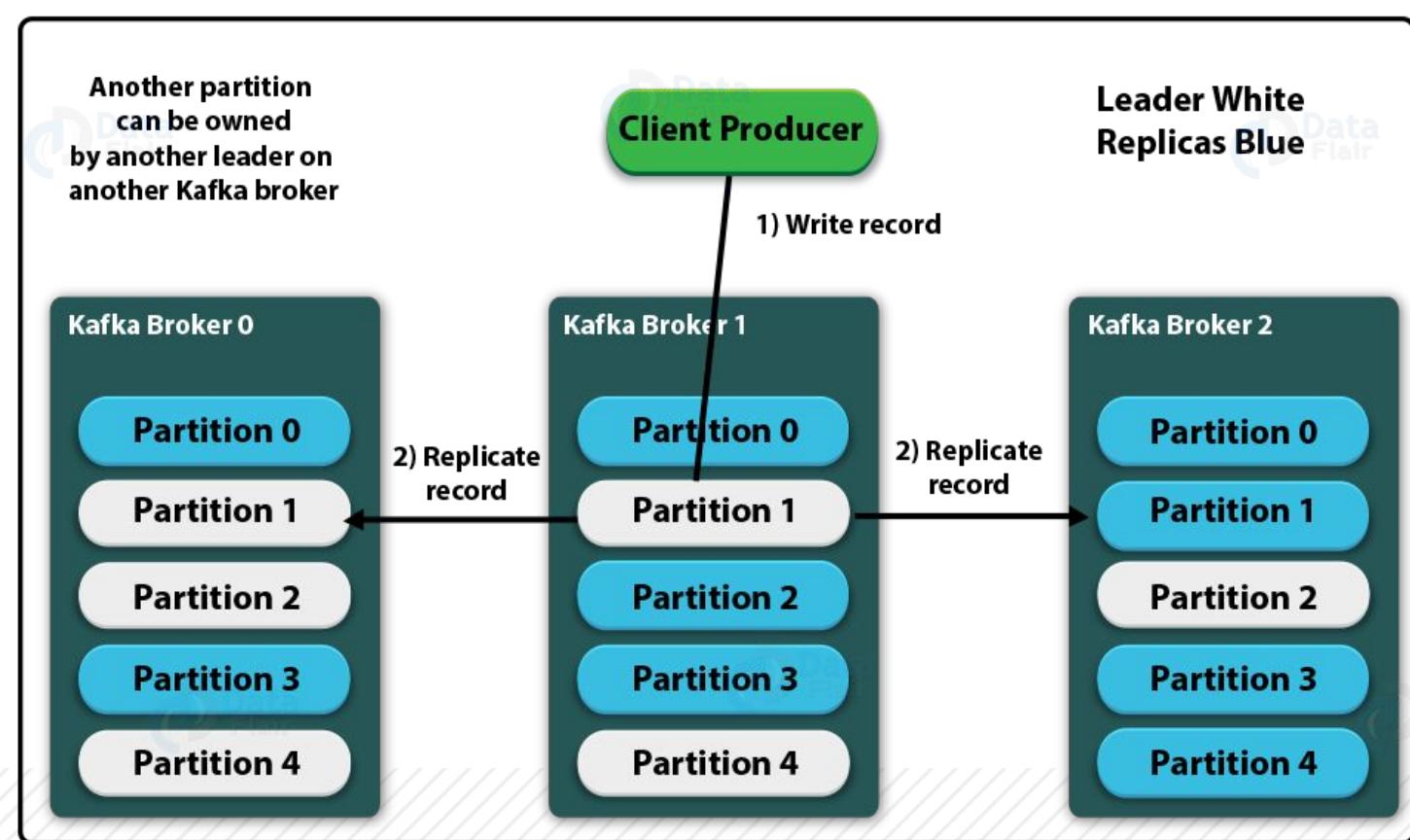
- Partition algorithm is fixed (hash on key)
- Stored as a log sequential write to a file
- Consume in order based on offset

Kafka Topic Partitions Layout

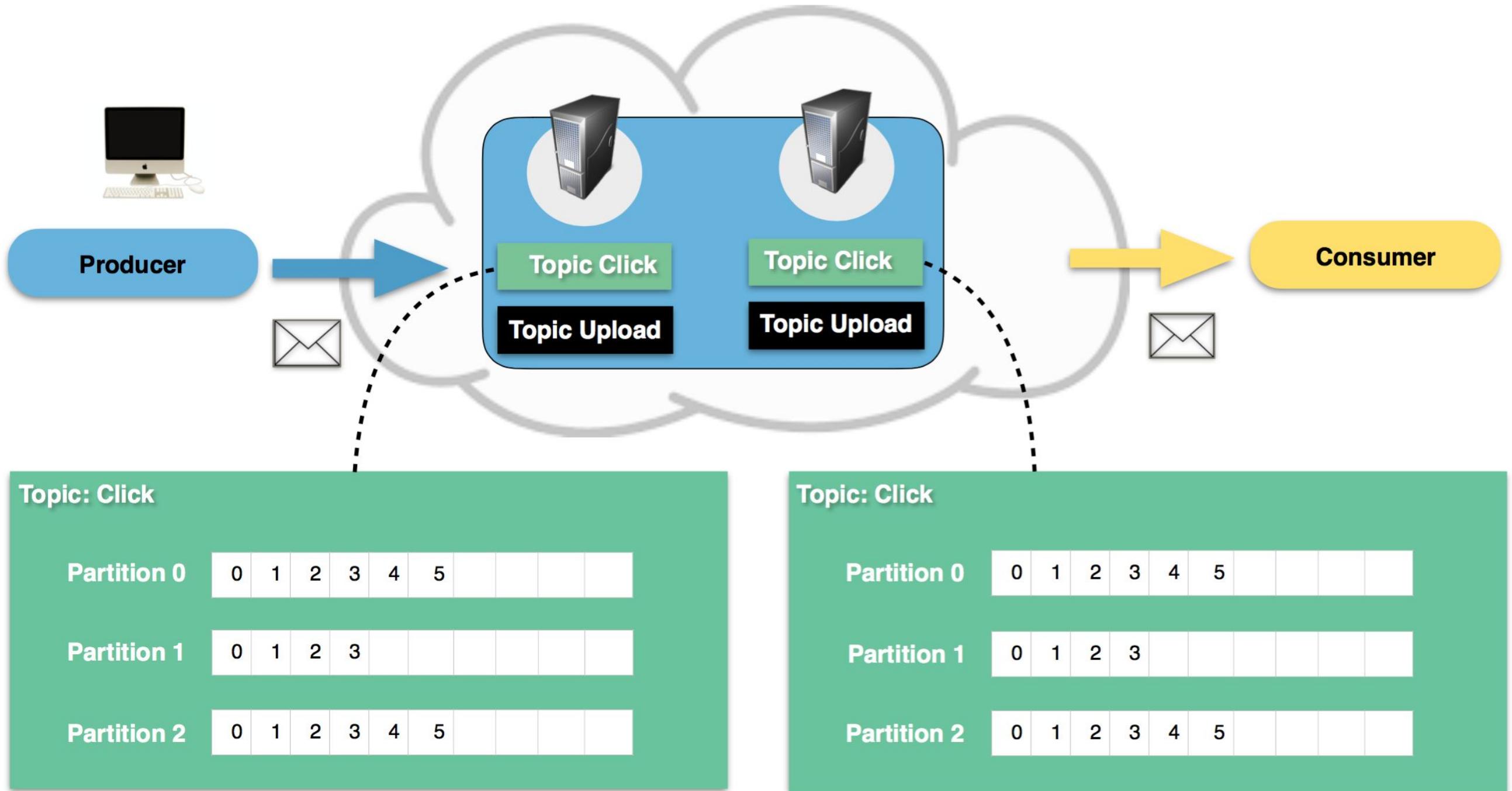


How does Kafka prevent data loss

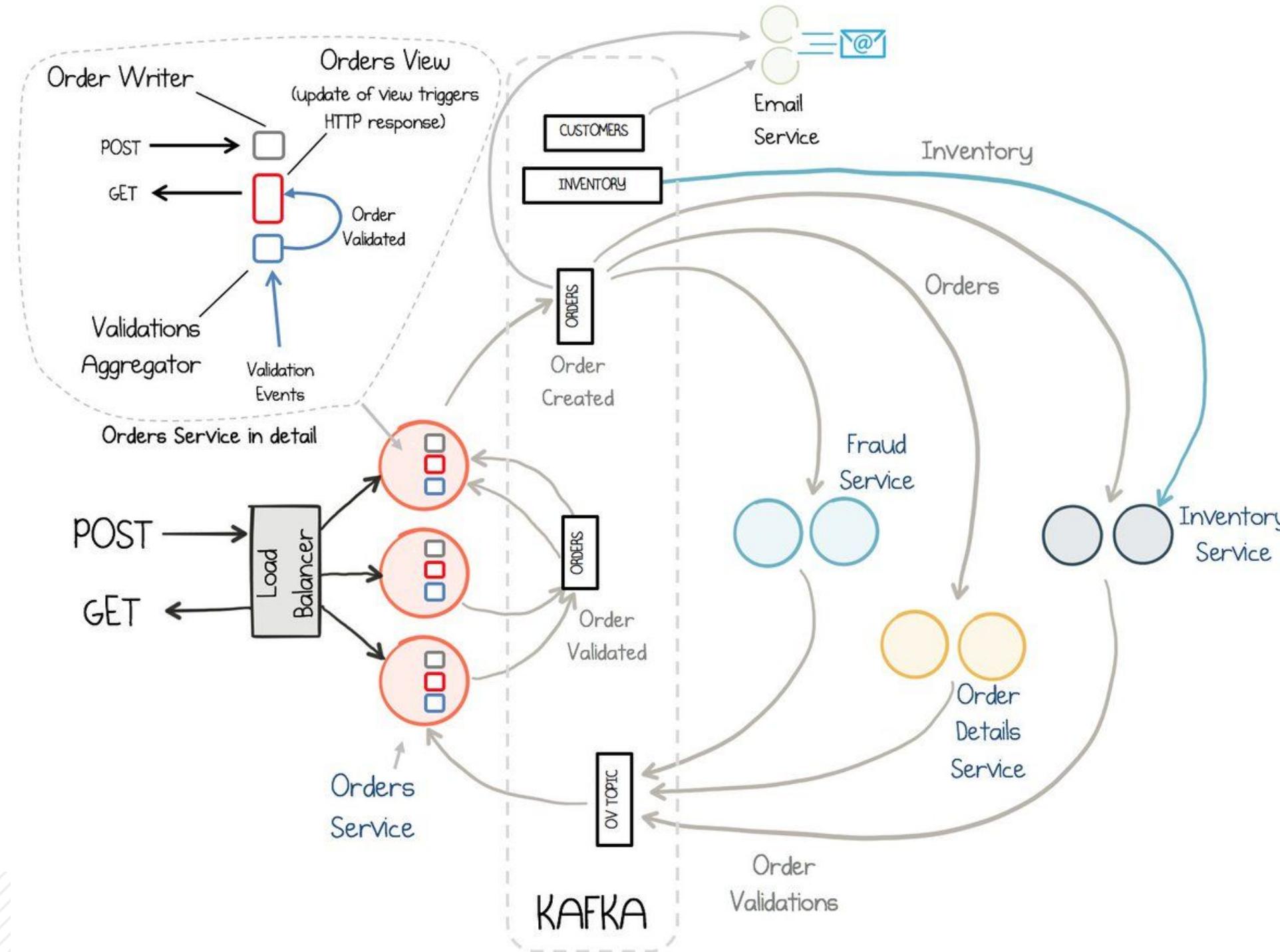
- Replicate, replicate, replicate
- Acknowledge you got the message
- Keep it even after it is consumed



Kafka Use Case: Clickstream Data



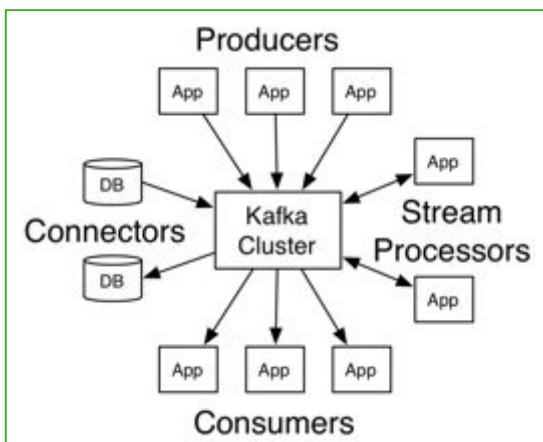
Kafka Use Case: Online ordering system



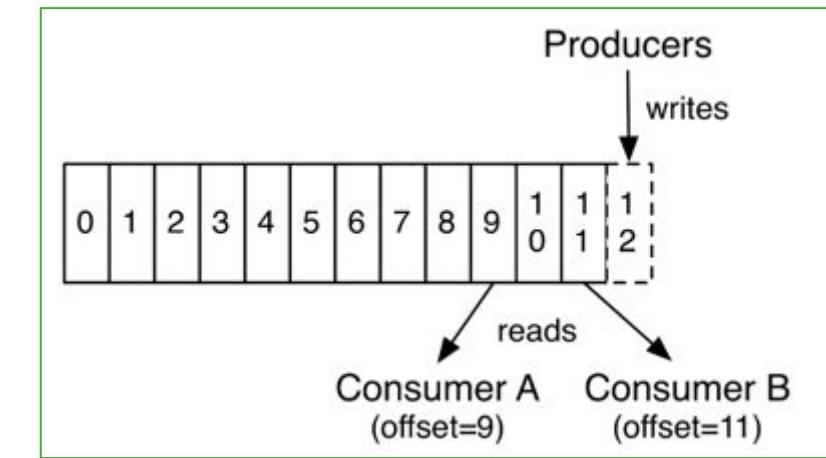
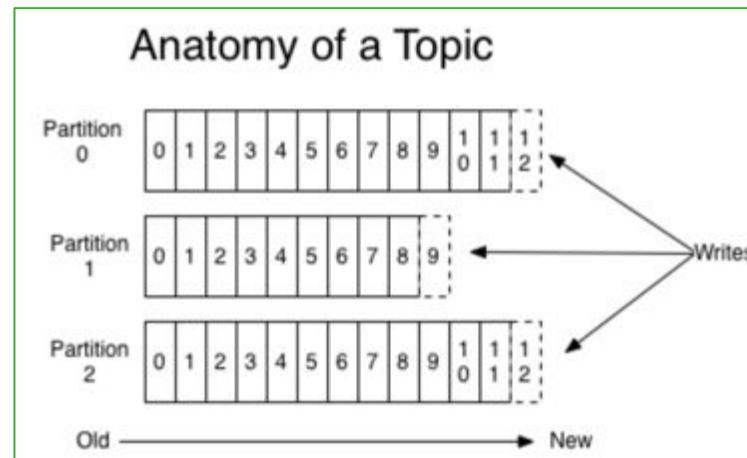
Kafka Basics - Summary

Kafka has 4 core APIs

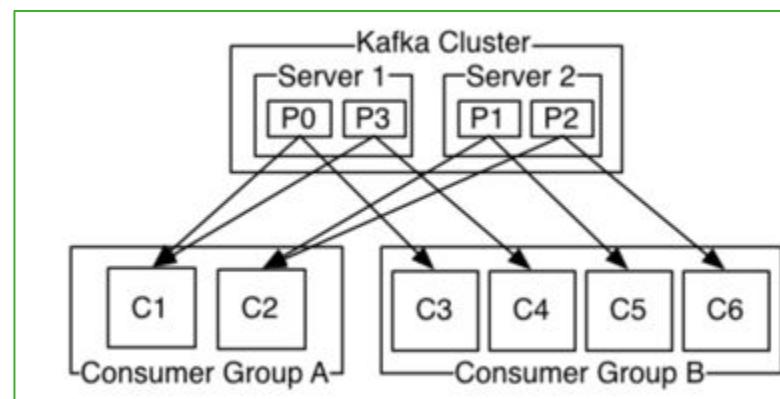
1. [Producer API](#)
2. [Consumer API](#)
3. [Streams API](#)
4. [Connector API](#)



Anatomy of a Kafka Topic



Kafka Consumers



Kafka's Omnipresence Has Led to the Onset of “Kafka Blindness”

- ◆ What is “Kafka Blindness”?
 - Customers who use Kafka today struggle with monitoring / “seeing”/troubleshooting what is happening in their clusters
- ◆ Who is Affected?
 - Platform Operation Teams
 - Developers / DevOps Teams
 - Security / Governance Teams
- ◆ What are the Symptoms?
 - Difficulty seeing who is producing and consuming data
 - Difficulty understanding the flow of data from producers -> topics consumers
 - Difficulty troubleshooting/monitoring.

Streams Messaging Manager (SMM)

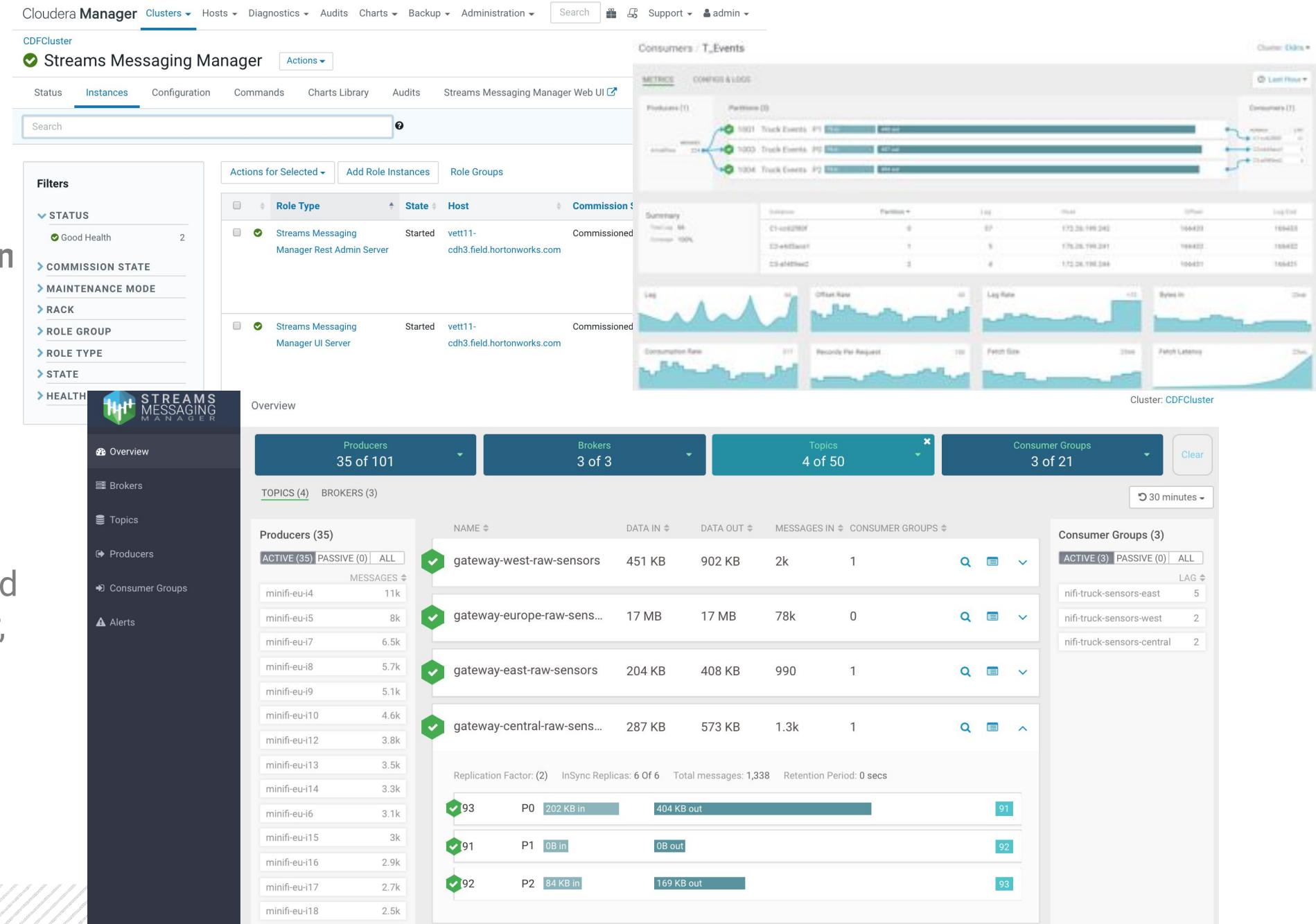
Curing the Kafka Blindness

Problem Statement / Requirements

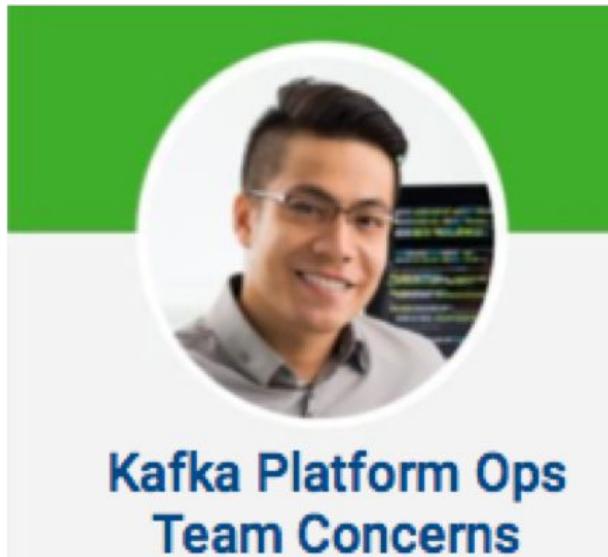
- Customers struggle with monitoring / “seeing”/ troubleshooting what is happening in their Kafka clusters
- They need an enterprise Kafka monitoring solution full integrated with platform services including CM and Sentry

Solution

- SMM provides single monitoring Dashboard for Kafka Clusters across 4 entities: Broker, Producer, Topic, Consumer
- SMM integrated with CM Log Search
- Kerberized based authentication and rich access Control via Sentry
- DataPlane Platform NOT required

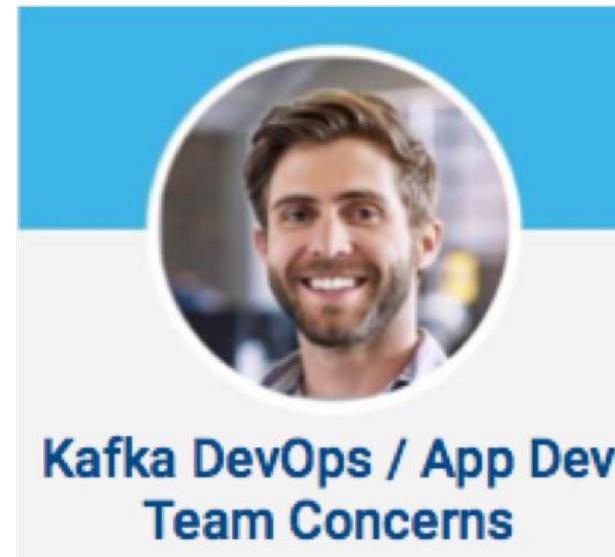


SMM Addresses the Distinct Needs of 3 Personas/Teams



**Kafka Platform Ops
Team Concerns**

**Concerned with monitoring
the overall health of the
cluster and the infrastructure
it runs on**



**Kafka DevOps / App Dev
Team Concerns**

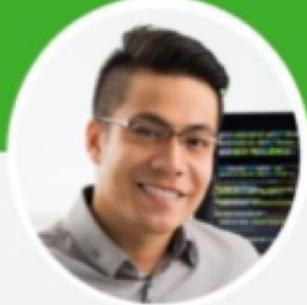
**Concerned with monitoring
the Kafka entities associated
with their apps**



**Governance / Security
Team Concerns**

**Concerned with audit,
compliance, access control &
chain of custody requirements**

SMM for the Platform Ops Team



Kafka Platform Ops
Team Concerns

Do I have any offline topic partitions?

Which consumer group is falling behind the most?

Are any of my brokers down?

Which producers are generating the most data right now?

What is the throughput in/out for a given partition on that broker?

What hosts are my brokers located on?

Are all my replicas in my topic in-synch?

How many total active producers/consumers is there currently?

Which producers are generating the most data right now?

Are there any skewed partitions for a broker?

How many total active producers and consumers exist now?

Are any of my brokers running hot? Which broker has the highest throughput in and out rates?

How many total topics does my Kafka cluster have?

Which producers are generating the most data right now?

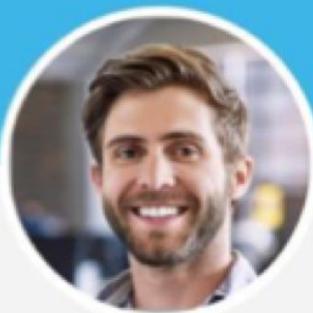
Are any of my brokers running out of disk space?

How of the cluster is being used, how much capacity do I have available per broker / cluster?

Which partitions are located on each broker?

Which of my topics has produced/consumers the most messages over the last N minutes/hours?

SMM for the DevOps/AppDev Teams



Kafka DevOps / App Dev
Team Concerns

Find all entities (producer, consumers, topics) associated with my app.

What brokers holds the partitions for my app topics?

What is the total number of messages into my topic over the last N minutes/hours?

Are there consumers in a consumer-group for a given topic slow/falling behind?

What topic(s) are the consumer group consuming messages from?

What is the retention rate for my app topics?

Who are all the producers and consumers connected to my app topics?

Did a consumer rebalance occur for a given topic?

How many active consumers instances are in a given consumer group?

Are any of my consumers/consumer-groups that are under-consuming?

What is the replication factor for my app topics?

What type of events are in my application topics? What does the event look like?

Are any of my consumers/consumer-groups that are over-consuming?

SMM for the Security and Governance Team



Governance / Security
Team Concerns

When was a topic created?

How has the schema evolved for a given topic?

Which consumers have consumed from a topic?

Which users/groups/service accounts have read from a given topic?

When was the topic configuration last modified?

What is the schema for a given topic?

How does data flow across multiple kafka hops?

What are the ACL policies for a given topic?

Which users/groups/service accounts have sent data to a topic?

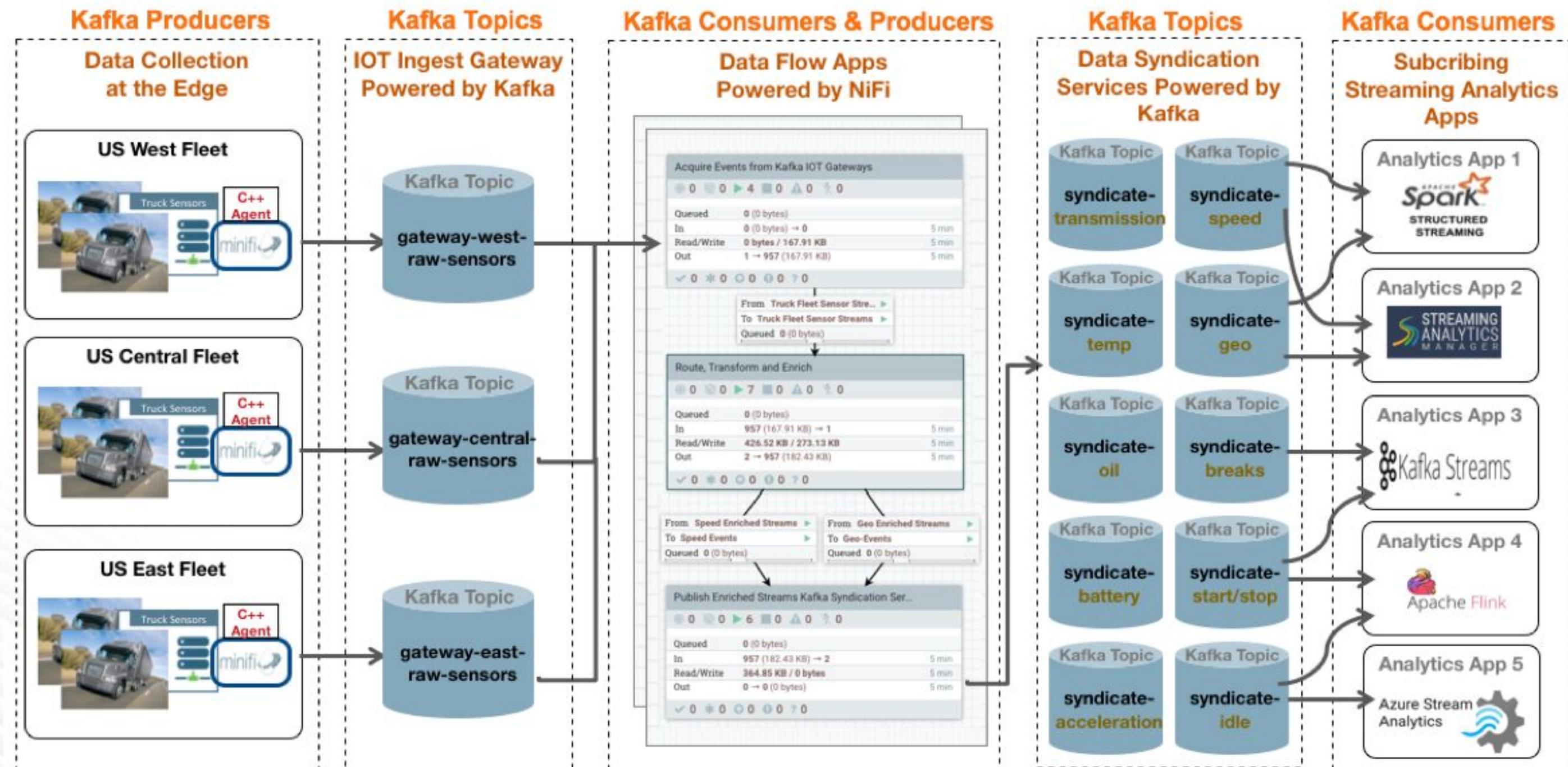
Which producers have sent data to the topic?

What is the lineage of a kafka topic?

Who has edited the ACL policies of a given topic?

When were additional brokers added to the topic?

Demo Setup: Dev Ops / App Dev Persona – Monitoring the Streaming Truck App



Kafka Challenges

Shared Schema Registry

How do I associate schemas for messages in Kafka topics

Agility and Self-Service

How do I develop, deploy & manage Kafka producers and consumers without code in self service manner

Kafka Blindness

How do I manage/monitor the different kafka clusters, topics, consumers, and producers

Data Collection

Kafka as a Service

I want to provide my users self service capabilities for Kafka: creation of clusters, monitoring, management



Kafka Topics

IOT Ingest Gateway Powered by Kafka

Kafka Topic gateway-west-raw-sensors

US Central Fleet



Balanced Kafka at Scale

As my clusters grow larger, I need the system to detect and automate balancing policies

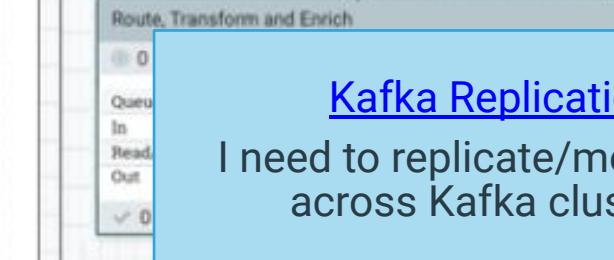
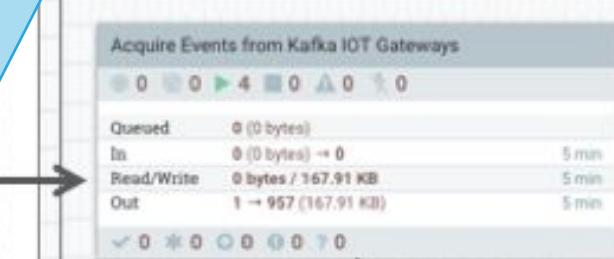


Kafka Topic gateway-central-raw-sensors

Kafka Topic gateway-east-raw-sensors

Consumers & Producers

Data Flow App Powered by NiF



SQL/Access Patterns on Kafka

I want to treat Kafka as a table and execute SQL on it for ETL and analytics

Kafka Topics

Data Syndication Services Powered by Kafka

Kafka Topic syndicate-transmission

Kafka Topic syndicate-speed

Kafka Topic syndicate-temp

Kafka Topic syndicate-geo

Kafka Topic syndicate-oil

Kafka Topic syndicate-breaks

Kafka Topic syndicate-battery

Kafka Topic syndicate-start/stop

Kafka Topic syndicate-acceleration

Kafka Topic syndicate-idle

Kafka Consumers

Subscribing Streaming Analytics Apps

Analytics App 1



Analytics App 2



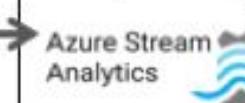
Analytics App 3



Analytics App 4



Analytics App 5



Tutorial - Log In Instructions

EDGE2AI Workshop Home

Go to this website: **http://**

Logout



P
K

Cloudera Manager <http://54.190.22.232:7180/>

Edge Flow <http://54.190.22.232:10080/efm/ui/>

NiFi <http://54.190.22.232:8080/nifi/>

NiFi Registry <http://54.190.22.232:18080/nifi-registry/>

Schema Registry <http://54.190.22.232:7788/>

SMM <http://54.190.22.232:9991/>

Hue <http://54.190.22.232:8888/>

Cloudera Data Science Workbench <http://cdsw.54.190.22.232.nip.io/>

SSH Connection

Download key:

[Download SSH Key](#)

And then run:

```
chmod 400 workshop.pem  
ssh -i workshop.pem centos@54.190.22.232
```

Main Dashboard View

STREAMS MESSAGING MANAGER

Overview

Cluster: OneNodeCluster

Producers 29 Brokers 1 Topics 40 Consumer Groups 16 Clear

TOPICS (40) BROKERS (1)

The Kafka cluster called OneNodeCluster is selected

30 minutes

Consumer Groups (16)

NAME	DATA IN	DATA OUT	MESSAGES	CONSUMER GROUPS
syndicate-tra...	783 KB	0B	3.5k	0
syndicate-sp...	0B	0B	0	0
syndicate-sp...	0B	0B	0	0
syndicate-oil	940 KB	0B	4.3k	0
syndicate-ge...	0B	0B	0	0
syndicate-ge...	0B	0B	0	3
syndicate-bat...	854 KB	0B	3.9k	0
load-optimiz...	1.3m			
fuel-micro-se...	0.6m			
supply-chain...	0.4m			
predictive-mi...	0.3m			
energy-micro...	0.3m			
audit-micro-...	0.2m			
compliance-...	0.2m			
adjudication-...	0.2m			
approval-mic...	0.1m			
nifi-truck-sen...	2			
nifi-truck-sen...	2			
flink-analytic...	0			
kafka-strea...	0			
spark-strea...	0			

Producers (29)

ACTIVE ...	PASSIV...	ALL
MESSAGES		
geo-critical-e...	89k	
geo-critical-e...	45k	
minifi-eu-i1	45k	
load-optimiz...	42k	
geo-critical-e...	30k	
minifi-eu-i2	23k	
geo-critical-e...	23k	
fuel-apps	21k	
geo-critical-e...	18k	
minifi-eu-i3	15k	
supply-chain...	14k	
predictive-ap...	11k	
energy-apps	8.5k	
audit-apps	7.1k	
compliance-...	6.1k	

Find the Most Active Producer in my Cluster

The screenshot shows the Streams Messaging Manager interface with the following details:

- Overview:** The main dashboard displays cluster statistics: 1 Broker, 40 Topics, and 16 Consumer Groups.
- Producer Activity:** A callout box highlights the "MESSAGES" sorting option in the Producers section, stating: "Click on Messages to sort on messages sent by all producers in the last 30 mins".
- Most Active Producer:** A callout box highlights the "geo-critical-event-collector-i" producer, noting: "A Kafka producer called geo-critical-event-collector-i is the most active producer sending 89K messages in the last 30 mins".
- Producer Data:** The Producers table lists 29 entries, with the top entry being "syndicate-tra...".
- Consumer Groups:** The Consumer Groups section lists 16 groups, with the top entry being "load-optimiz...".

NAME	DATA IN	DATA OUT	MESSAGES	CONSUMER GROUPS
syndicate-tra...	783 KB	0B	3.5k	0
syndicate-sp...	0B	0B	0	0
syndicate-sp...	0B	0B	0	0
syndicate-oil	940 KB	0B	4.3k	0
syndicate-ge...	0B	0B	0	0
syndicate-ge...	0B	0B	0	3
syndicate-bat...	854 KB	0B	3.9k	0

Find the Consumer Who Has Fallen Behind the Most

The screenshot shows the Streams Messaging Manager interface with the following details:

- Overview** section with counts: Producers (29), Brokers (1), Topics (40).
- Topics** tab selected.
- Producers** table:
 - syndicate-tra... (783 KB, 0B, 3.5k, 0)
 - syndicate-sp... (0B, 0B, 0, 0)
 - syndicate-sp... (0B, 0B, 0, 0)
 - syndicate-oil (940 KB, 0B, 4.3k, 0)
 - syndicate-ge... (0B, 0B, 0, 0)
 - syndicate-ge... (0B, 0B, 0, 3)
 - syndicate-bat... (854 KB, 0B, 3.9k, 0)
- Consumer Groups** table:
 - load-optimiz... (1.3m lag)
 - fuel-micro-se... (0.6m lag)
 - supply-chain... (0.4m lag)
 - predictive-mi... (0.3m lag)
 - energy-micro... (0.3m lag)
 - audit-micro... (0.2m lag)
 - compliance-... (0.2m lag)
 - adjudication-... (0.2m lag)
 - approval-mic... (0.1m lag)
 - nifi-truck-sen... (2 lags)
 - nifi-truck-sen... (2 lags)
 - flink-analytic... (0 lags)
 - kafka-strea... (0 lags)
 - spark-strea... (0 lags)
- A callout box points to the **Consumer Groups** table with the text: "Click on LAG to sort on consumer lag across all consumers in the last 30 mins".
- A callout box points to the **load-optimiz...** entry in the **Consumer Groups** table with the text: "Consumer group named load-optimizer-micro-service has significantly more lag (1.3m) than any other consumer in the cluster."

Broker Centric View – View Details of the Brokers in My Cluster

The screenshot shows the Streams Messaging Manager Overview dashboard. At the top, there are four main metrics: Producers (29), Brokers (1), Topics (40), and Consumer Groups (16). A green callout box highlights the 'Brokers' tab, which is currently selected. Below the metrics, there are sections for Producers, Topics, and Consumer Groups.

Producers (29)

ACTIVE	PASSIV...	ALL
MESSAGES		
geo-critical-e...	89k	
geo-critical-e...	45k	
minifi-eu-i1	45k	
load-optimiz...	42k	
geo-critical-e...	30k	
minifi-eu-i2	23k	
geo-critical-e...	23k	
fuel-apps	21k	
geo-critical-e...	18k	
minifi-eu-i3	15k	
supply-chain...	14k	
predictive-ap...	11k	
energy-apps	8.5k	
audit-apps	7.1k	
compliance-...	6.1k	

Topics (40)

INPUTS	MESSAGES	PARTITIONS	REPLICAS
8	93 MB	0.4m	194
ip-10-0-1-248.us-west...			L C M V

Consumer Groups (16)

ACTIVE	PASSIV...	ALL
LAG		
load-optimiz...	1.3m	
fuel-micro-se...	0.6m	
supply-chain...	0.4m	
predictive-mi...	0.3m	
energy-micro...	0.3m	
audit-micro...	0.2m	
compliance-...	0.2m	
adjudication-...	0.2m	
approval-mic...	0.1m	
nifi-truck-sen...	2	
nifi-truck-sen...	2	
flink-analytic...	0	
kafka-strea...	0	
spark-strea...	0	

Cluster: OneNodeCluster **Time:** 30 minutes **Clear**

Click on the Brokers tab to see a broker centric view of the Dashboard

Broker Centric View: Find my Hottest Broker – Broker with Highest Throughput In

Step 1
Click on the Brokers tab to see a broker centric view of the Dashboard

Step 2
Click on Throughput to sort on data in across all brokers

NAME	THROUGHPUT	MESSAGES IN	PARTITIONS	REPLICAS
1001 c-dps-connected-dp13.field.hortonwor...	17MB	80k	21	36
1002 c-dps-connected-dp12.field.hortonwor...	16MB	75k	16	34
1005 c-dps-connected-dp11.field.hortonwor...	14MB	63k	15	31
1003 c-dps-connected-dp14.field.hortonwor...	10MB	42k	16	30
1004 c-dps-connected-dp15.field.hortonwor...	7MB	33k	14	30
geo-critical-event-collec...	7.7k			
geo-critical-event-collec...	7.1k			
geo-critical-event-collec...	6.5k			
minifi-eu-i6	6.5k			
audit-apps	6k			
geo-critical-event-collec...	6k			
geo-critical-event-collec...	5.6k			
minifi-eu-i7	5.5k			
compliance-apps	5.2k			
minifi-eu-i8	4.8k			
geo-critical-event-collec...	4.8k			
geo-critical-event-collec...	4.6k			
adjudication-apps	4.5k			
minifi-eu-i9	4.3k			
approval-apps	4k			
minifi-eu-i10	3.9k			

Consumer Groups (26)

ACTIVE (18) PASSIVE (8) ALL

route-micro-service	0
load-optimizer-micro-se...	5
fuel-micro-service	2
supply-chain-micro-serv...	1
predictive-micro-service	1.3k
energy-micro-service	984
audit-micro-service	812
compliance-micro-servi...	698
adjudication-micro-servi...	599
approval-micro-service	542
flink-analytics-geo-event	224
kafka-streams-analytics...	224
spark-streaming-analyti...	224
nifi-truck-sensors-east	4
nifi-truck-sensors-west	2
nifi-truck-sensors-central	1
ranger_entities_consum...	1
atlas	0

This is a multi-node cluster. What you are working with is a single node cluster.

Find Partitions on a given Broker and Understand flow of data flow from Producer to selected Broker Partition to Consumer

The screenshot shows the Streams Messaging Manager interface with the following details:

- Overview:** Producers 1 of 83, Brokers 3 of 5, Topics 1 of 27.
- Producers:** 1 active producer named "nifi-syndicate-speed-avro" with 1.6k messages.
- Brokers:** 3 brokers listed, with broker 1001 highlighted.
- Topics:** 1 topic named "syndicate-speed-event-avro" with 21 partitions and 36 replicas.
- Consumer Groups:** 3 consumer groups: "sam-speed-stream-consum...", "sam-speed-stream-consum...", and "sam-speed-stream-consum...".

Three callouts provide instructions:

- Step 1:** Click on Panel expand to get more details on the broker like all partitions that are stored on the broker.
- Step 2 - Analysis:** Note that partition 0 of topic syndicate-speed has high throughput-out on that partition.
- Step 3:** Click on the partition and see who are all the producers and consumers sending/consuming from that partition. There is 1 producer and 3 consumer groups explaining why the high throughput out vs in.

Detailed description of the highlighted broker panel:

- Topic:** syndicate-speed-event-avro - P0
- Data In:** 93385
- Data Out:** 14260475
- Profile Filter:** EXPLORE

Partition	Throughput	Messages In	Messages Out
P0	14MB out	91KB in	14MB out
P1	28KB in	28KB in	0B out
P2	72KB in	153KB in	0B out
P3	0B in	0B in	0B out
P4	0B in	0B in	0B out
P5	0B in	0B in	0B out
P6	0B in	0B in	0B out
P7	0B in	0B in	0B out
P8	0B in	0B in	0B out
P9	0B in	0B in	0B out
P10	0B in	0B in	0B out
P11	0B in	0B in	0B out
P12	0B in	0B in	0B out
P13	0B in	0B in	0B out
P14	0B in	0B in	0B out
P15	0B in	0B in	0B out
P16	0B in	0B in	0B out
P17	0B in	0B in	0B out
P18	0B in	0B in	0B out
P19	0B in	0B in	0B out
P20	0B in	0B in	0B out
P21	0B in	0B in	0B out

Analyze Detailed Broker Host Metrics – Cloudera Manager Integration

Overview

Cluster: OneNodeCluster

TOPICS (5) BROKERS (1)

Producers (12)

ACTIVE (1) PASSIVE (0) ALL

MESSAGES

	minifi-eu-i1	minifi-eu-i2	minifi-eu-i3	minifi-truck-w1	minifi-truck-w2	minifi-truck-w3	minifi-truck-c1	minifi-truck-c2
45k	23k	15k	798	660	568	496	442	

Brokers (1 of 1)

Topics 5 of 40

Consumer Groups 3 of 16

30 minutes

NAME THROUGHPUT MESSAGES IN PARTITIONS REPLICAS

8 ip-10-0-1-248.us-west-2.compute... 93 MB 0.4m 194 194

Consumer Groups ACTIVE (2) PASSIVE (0) ALL LAG

nifi-truck-sensors... 2

nifi-truck-sensors... 2

FREE MEMORY FREE DISK CPU IDLE 14.98 LOAD AVERAGE 2.07

DISK I/O 1059780.20

syndicate-tr... P0 202 KB in 0B out

syndicate-tr... P1 68 KB in 0B out

syndicate-tr... P2 271 KB in 0B out

Cloudera Manager Clusters Hosts Diagnostics Audits Charts Backup Administration

OneNodeCluster / Kafka / ip-10-0-1-248

! Kafka Broker (id: 8) (Active Controller)

Status Configuration Processes Commands Charts Library Audits Log Files Stacks Logs Quick Links

Health Tests Create Trigger

Host Health Suppress...
The health of this role's host is bad. The following health tests are bad:
agent parcel directory.

Show 7 Good

Log Directory Free Space Suppress...
This role has no Log Directory configured.

Charts

30m 1h 2

Messages Received

messages / second

KAFKA_BROKER (ip-10-0-1-248.us-west-2.compute...) 247

Bytes Received

bytes / second

KAFKA_BROKER (ip-10-0-1-248.us-west-2.compute...) 54.1K/s

Bytes Fetched

bytes / second

KAFKA_BROKER (ip-10-0-1-248.us-west-2.compute...) 427b/s

Partitions

partitions

KAFKA_BROKER (ip-10-0-1-248.us-west-2.compute...) 194

Health History

> ! Host Health Bad 10:41 PM

> ● Host Health Concerning 9:40 PM

> ○ 3 Became Good Sep 20 11:14 PM

> ○ 3 Became Good Sep 20 11:11 PM

Leader Replicas

Offline Partitions

Click on the CM icon on the broker panel and the CM host detail view for that broker is displayed providing host level metrics and a view of other services running on that host

The screenshot shows the Cloudera Manager interface for a Kafka broker. At the top, there are navigation tabs for Producers, Brokers, Topics, and Consumer Groups. The 'Brokers' tab is selected, showing one broker named '8' (ip-10-0-1-248.us-west-2.compute...). Below the broker list are resource usage metrics: Free Memory, Free Disk, CPU Idle, and Load Average. A green callout box points to the broker row, stating: 'Click on the CM icon on the broker panel and the CM host detail view for that broker is displayed providing host level metrics and a view of other services running on that host'. The main content area shows the 'Kafka Broker (id: 8) (Active Controller)' page. It includes sections for Health Tests (with one critical error about host health), Charts (for messages received, bytes received, bytes fetched, partitions, and leader replicas), and a Health History log. The bottom left corner contains the Cloudera copyright notice.

Keyword Search via Log Search

Overview

The screenshot shows the Cloudera Manager interface for a cluster named "OneNodeCluster". The top navigation bar includes tabs for Producers (12 of 29), Brokers (1 of 1), Topics (5 of 40), Consumer Groups (3 of 16), and a Clear button. Below this, there are sections for TOPICS (5) and BROKERS (1). The BROKERS section displays a table for "Producers (12)" with columns for NAME, THROUGHPUT, MESSAGES IN, PARTITIONS, and REPLICAS. One row is selected for "ip-10-0-1-248.us-west-2.compute.internal". The right side of the screen shows "Consumer Groups (3)" with a table for "nifi-truck-sensors-...".

A green callout box with a blue border and rounded corners points from the text "Click on the Log Search icon on the broker panel and the Log Search detail view is displayed. This enables you to search for specific keywords and to filter for specific log levels, components, and time ranges." to the "Logs" section of the interface.

The "Logs" section has the following configuration:

- Keywords:** Enter Search Keywords or Regular Expression
- Sources:** Services (checked), Cloudera Manager Agent (checked), Cloudera Manager Server (checked)
- Services:** Kafka (selected)
- Hosts:** ip-10-0-1-248.us-west-2.compute.internal (selected)
- Role Types:** Kafka Broker (selected)
- Minimum Log Level:** WARN
- Timeout (sec):** 60
- Search:** A blue button

Below the search controls, a message states "1 Machine(s) Searched (311ms), 0 Error(s), More Statistics". The results table lists three log entries:

Hosts	Log Level	Time	Source	Message
ip-10-0-1-248.us-west-2.compute.internal	ERROR	September 22, 2019 12:14 AM	KafkaApis	[KafkaApi-8] Number of alive brokers '1' does not meet the required replication factor '3' for the transactions state topic (configured via 'transaction.state.log.replication.factor'). This error can be ignored if the cluster is starting up and not all brokers are up yet. View Log File
ip-10-0-1-248.us-west-2.compute.internal	ERROR	September 22, 2019 12:14 AM	KafkaApis	[KafkaApi-8] Number of alive brokers '1' does not meet the required replication factor '3' for the transactions state topic (configured via 'transaction.state.log.replication.factor'). This error can be ignored if the cluster is starting up and not all brokers are up yet. View Log File
ip-10-0-1-248.us-west-2.compute.internal	ERROR	September 22, 2019 12:14 AM	KafkaApis	[KafkaApi-8] Number of alive brokers '1' does not meet the required replication factor '3' for the transactions state topic (configured via 'transaction.state.log.replication.factor'). This error can be ignored if the cluster is starting up and not all brokers are up yet. View Log File

At the bottom left, there are copyright notices: "© Cloudera Inc. 2011 – 2016. All Rights Reserved" and "3 0".

SMM DevOps/App Dev Use Cases

Topic Centric Dashboard View: Filter on Topics associated with my Topic

STREAMS MESSAGING MANAGER

Overview Cluster: orlandostreamcluster

Producers: 83 | Brokers: 5 | Topics: 27 | Consumer Groups: 0 minutes

TOPICS (27) BROKERS (5)

Producers (83) ACTIVE (83) PASSIVE (0) ALL

	NAME	DATA IN	DATA OUT	MESSAGES IN	CONSUMER GROUPS
<input checked="" type="checkbox"/>	syndicate-all-geo-critical-eve...	26MB	0B		
<input checked="" type="checkbox"/>	route-planning	26MB	28		
<input checked="" type="checkbox"/>	gateway-europe-raw-sensors	18MB	0B	88k	0
<input checked="" type="checkbox"/>	load-optimization	5MB	28KB	23k	1
<input checked="" type="checkbox"/>	fuel-logistics	1MB	28KB	6.5k	1
<input checked="" type="checkbox"/>	supply-chain	863KB	28KB	4.3k	1
<input checked="" type="checkbox"/>	audit-events	804KB	27KB	3.9k	1
<input checked="" type="checkbox"/>	compliance	697KB	29KB	3.4k	1
<input checked="" type="checkbox"/>	predictive-alerts	648KB	28KB	3.3k	1

Consumer Groups ACTIVE (18) PASSIVE (8) ALL

	NAME	LAG
<input checked="" type="checkbox"/>	route-micro-service	0.2m
<input checked="" type="checkbox"/>	load-optimizer-micro-service	12k
<input checked="" type="checkbox"/>	fuel-micro-service	6k
<input checked="" type="checkbox"/>	supply-chain-micro-service	4k
<input checked="" type="checkbox"/>	predictive-micro-service	3k
<input checked="" type="checkbox"/>	energy-micro-service	2.3k
<input checked="" type="checkbox"/>	audit-micro-service	1.9k
<input checked="" type="checkbox"/>	compliance-micro-service	1.7k
<input checked="" type="checkbox"/>	adjudication-micro-service	1.4k
<input checked="" type="checkbox"/>	approval-micro-service	1.3k
<input checked="" type="checkbox"/>	flink-analytics-geo-event	525
<input checked="" type="checkbox"/>	kafka-streams-analytics-geo...	525
<input checked="" type="checkbox"/>	spark-streaming-analytics-g...	525
<input checked="" type="checkbox"/>	nifi-truck-sensors-west	2
<input checked="" type="checkbox"/>	nifi-truck-sensors-east	2
<input checked="" type="checkbox"/>	nifi-truck-sensors-central	1
<input checked="" type="checkbox"/>	ranger_entities_consumer	1
<input checked="" type="checkbox"/>	atlas	0

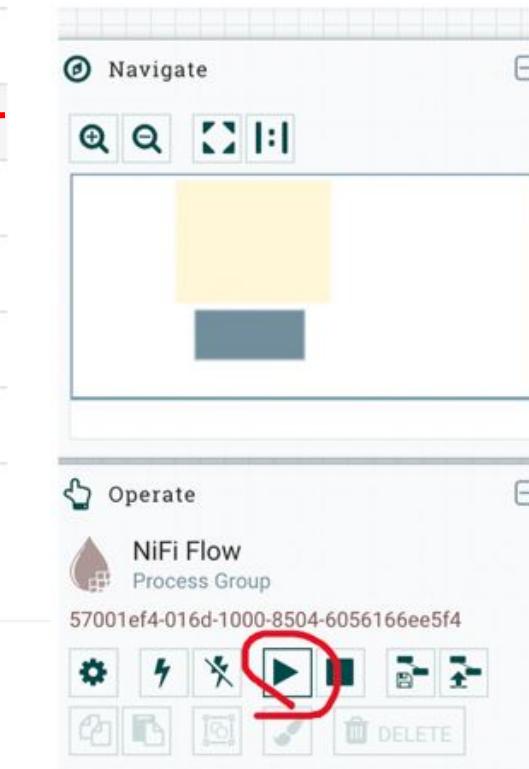
Use the Filter to filter on topics and select all the IOT gateway topics



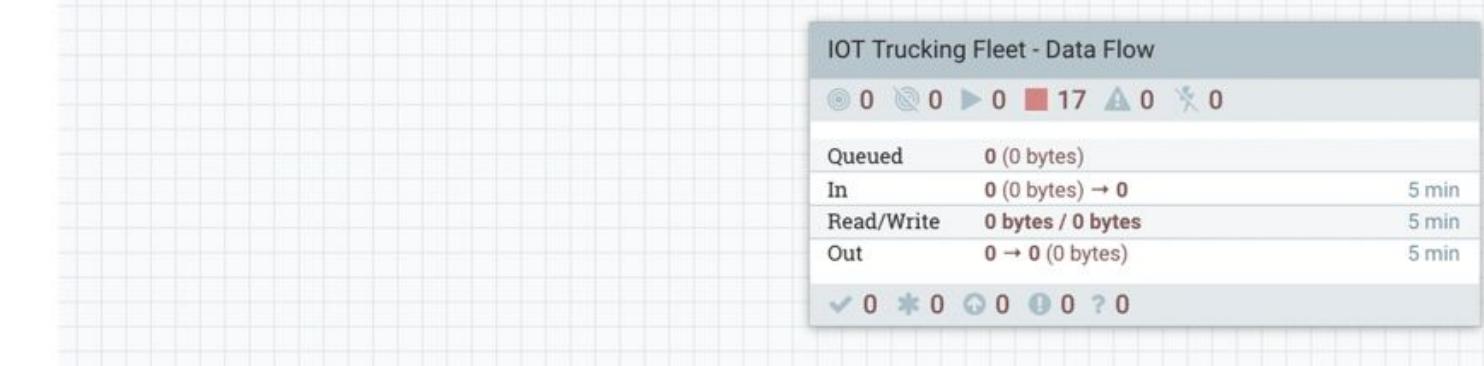
pk-strata

Cloudera Manager	http://54.185.190.193:7180/
Edge Flow	http://54.185.190.193:10080/efm/ui/
NiFi	http://54.185.190.193:8080/nifi/
NiFi Registry	http://54.185.190.193:18080/nifi-registry/
Schema Registry	http://54.185.190.193:7788/
SMM	http://54.185.190.193:9991/
Hue	http://54.185.190.193:8888/
Cloudera Data Science Workbench	http://cdsw.54.185.190.193.nip.io/

Start NiFi Flow



1. Nifi ingest Trucking CSV Events with kafka headers that contains schema name which is a pointer to schema in HWX Schema Registry..
2. Nifi extracts the schema name from kafka header and fetches schema from the HWX Schema Registry to perform record based processing including filtering, routing and enrichment
3. These CSV records are then enriched and converted into Avro Records and send to a Kafka Topic. When publishing to Kafka Topic, Nifi will look up the schema associated with the kafka topic in HWX SR and encode the Avro binary with HWX schema encoding so that SAM can work with the data.



Intelligent Filtering – Selected Topics causes Producers / Consumer to be Intelligently Filtered

Overview

Cluster: OneNodeCluster

The screenshot shows the Apache NiFi interface with several panels and annotations:

- Producers:** 12 of 29 (Topics: 5). A green callout box labeled "Intelligent Filtering" states: "SMM automatically filters the producers associated with the selected topics. 12 of the 29 producers have been identified as sending data to the 5 topics selected".
- Brokers:** 1 of 1.
- Topics:** 5 of 10. A green callout box labeled "User Action" states: "5 IOT Gateway topics have been selected". A modal window lists the selected topics:
 - gateway-west-raw-sensors
 - gateway-europe-raw-sensor
 - gateway-east-raw-sensors
 - gateway-east-raw-sensor
 - gateway-central-raw-sensors
- Consumer Groups:** 3 of 17. A green callout box labeled "Intelligent Filtering" states: "SMM automatically filters the consumers associated with the selected topics. 3 of the 17 consumers have been identified as consuming data from the 5 topics selected".
- Consumer Groups (3):** ACTIVE (3) PASSIVE (0) ALL. The consumer groups listed are:
 - nifi-truck-sensors-west (LAG: 2)
 - nifi-truck-sensors-east (LAG: 0)
 - nifi-truck-sensors-central (LAG: 0)

Below the main panels is a table of producers:

	NAME	DATA IN	0B	0B	0	0	0	0
minifi-eu-i2	23k	411 KB	0B	0B	0	0	0	0
minifi-eu-i3	15k	16 MB	0B	0B	0	0	0	0
minifi-truck-w1	788	198 KB	0B	0B	0	0	0	0
minifi-truck-w2	662	0B	0B	0B	0	0	0	0
minifi-truck-w3	562	0B	0B	0B	0	0	0	0
minifi-truck-c1	496	0B	0B	0B	0	0	0	0
minifi-truck-c2	442	0B	0B	0B	0	0	0	0
minifi-truck-c3	398	264 KB	0B	1.3k	1	0	0	0
minifi-truck-e1	364	0B	0B	0B	0	0	0	0
minifi-truck-e2	332	0B	0B	0B	0	0	0	0
minifi-truck-e3	304	0B	0B	0B	0	0	0	0

Find the Hottest Topic – Topic With Highest Throughput-In

Overview

Cluster: OneNodeCluster

Step 1
Click on DATA IN to sort on data-in across all topics in the last 30 mins

NAME	DATA IN	DATA OUT	LAG	PARTITIONS	OFFSET
gateway-west-raw-sensors	411 KB	0B			
minifi-eu-i2	23k				
minifi-eu-i3	15k				
minifi-truck-w1	788				
minifi-truck-w2	662				
minifi-truck-w3	562				
minifi-truck-c1	496				
minifi-truck-c2	442				
minifi-truck-c3	398				
minifi-truck-e1	364				
minifi-truck-e2	332				
minifi-truck-e3	304				
gateway-europe-raw-sensors	16 MB	0B			
gateway-east-raw-sensors	198 KB	0B			
gateway-east-raw-sensor	0B	0B	0	0	0
gateway-central-raw-sensors	264 KB	0B	1.3k	1	1

TOPICS (5) BROKERS (1)

Analysis

Kafka topic called gateway-europe-raw-sensors has more data being sent to it than any other topic: 88K messages totaling 16 MB in the last 30 mins

Topics 5 of 40

Consumer Groups 3 of 17

Clear

30 minutes

Consumer Groups (3)

ACTIVE (3) PASSIVE (0) ALL LAG

nifi-truck-sensors-west	2
nifi-truck-sensors-east	0
nifi-truck-sensors-central	0

How are the Partitions Laid out for the Topic? Who are the Producers and Consumers? Are there any Partition Skews?

Overview

Producers 12 of 30

TOPICS (5) BROKERS (1)

Step 2
Click on the Topic to see who are all the producers sending data to the topic

Brokers 1 of 1

Topics 5 of 40

Consumers 3 of 30

30 minutes

Consumer Groups (3)

ACTIVE (3) PASSIVE (0) ALL

LAG

nifi-truck-sensors-west 2

nifi-truck-sensors-east 0

nifi-truck-sensors-ce... 0

NAME DATA IN DATA OUT MESSAGES IN CONSUMER GROUPS

gateways-europe-raw-sensors 96 KB 0B 486 1

Topic: gateway-europe-raw-sensors - P1
DATA IN 351606
DATA OUT 0
PROFILE FILTER EXPLORE

Replication Factor: (1) InSync Replicator

minifi-eu-i1 11k

minifi-eu-i2 5.5k

minifi-eu-i3 3.7k

minifi-truck-w1 188

minifi-truck-w2 162

minifi-truck-w3 136

minifi-truck-c1 120

minifi-truck-c2 104

minifi-truck-c3 96

minifi-truck-e1 88

minifi-truck-e2 80

minifi-truck-e3 74

P0 1 MB in

P1 343 KB in 0B out

P2 1 MB in 0B out

P3 1 MB in 0B out

P4 195 KB in 0B out

ALL PARTITIONS

Analysis
Note that for each partition there is no data going out (0B) and we see no data going to any consumer groups. This means that while the topic has lots of producers, there is no consumers which could indicate a problem

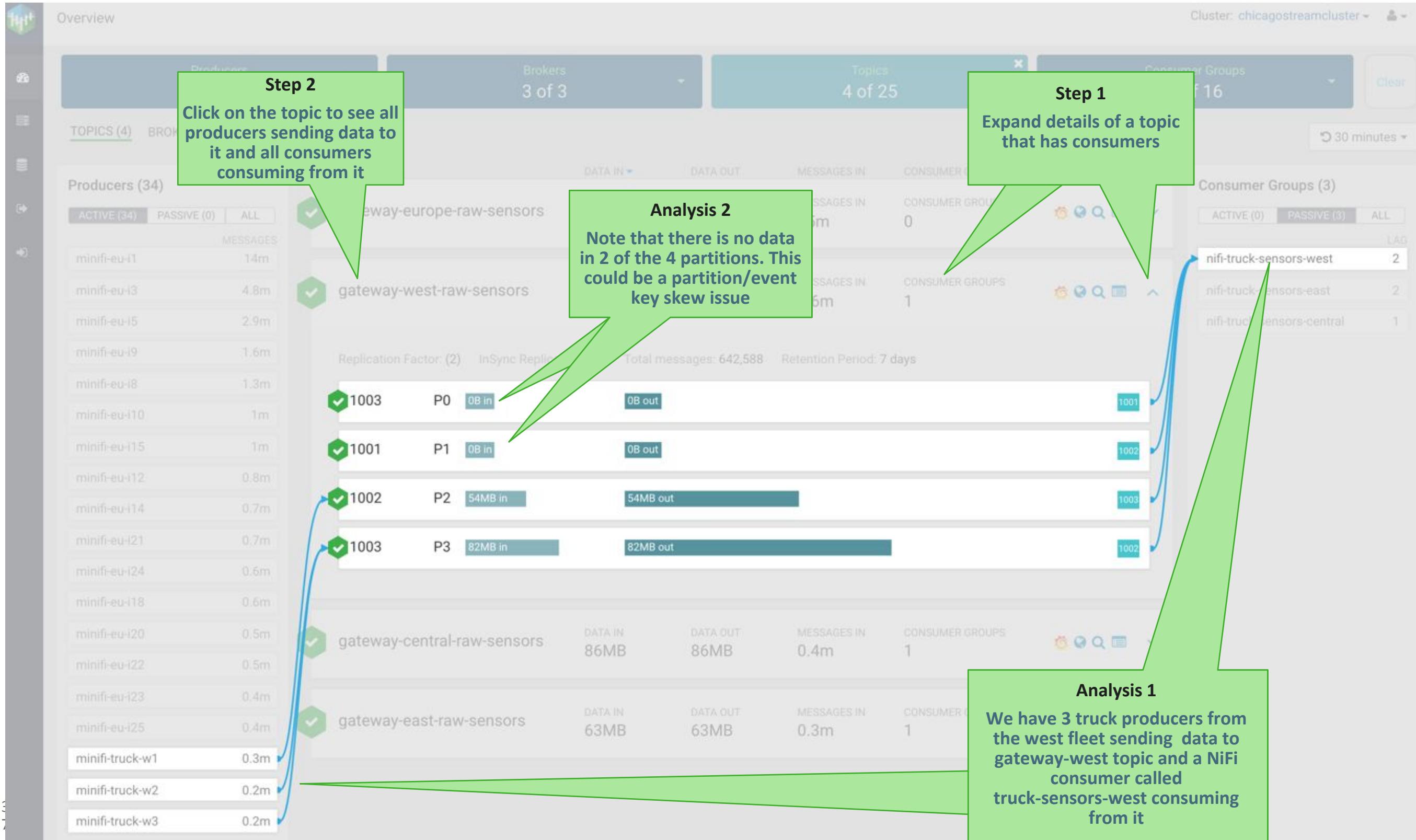
Cluster: OneNodeCluster

Step 1
Expand topic panel to see more details of the topic that has high data-in rates

3

6

How does Data Flow between Producers to Topics to Consumers?



How does Data Flow between Producers to Topics to Consumers?

Overview

Cluster: OneNodeCluster



Explore/Search Messages in the Kafka Topic

Overview

Producers
12 of 30

Brokers
1 of 1

Topics
5 of 40

TOPICS (5) BROKERS (1)

Producers (12)

ACTIVE (12) PASSIVE (0) ALL

MESSAGES

minifi-eu-i1 11k

minifi-eu-i2 5.5k

minifi-eu-i3 3.7k

minifi-truck-w1 188

minifi-truck-w2 162

minifi-truck-w3 136

minifi-truck-c1 120

minifi-truck-c2 104

minifi-truck-c3 96

minifi-truck-e1 88



gateway-west-raw-sens...

96 KB

OR

186

1

Topic: gateway-west-raw-sensors - P1

Replication Factor: (1) InSync Replic

DATA IN 37824

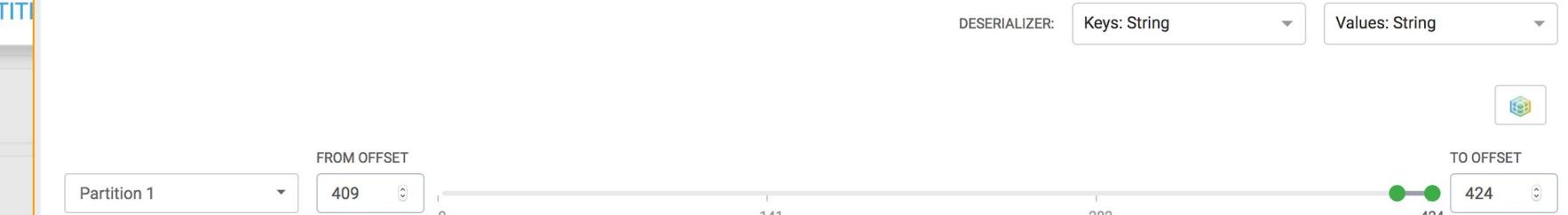
DATA OUT 0

PROFILE FILTER EXPLORE

	NAME	DATA IN	DATA OUT	MESSAGES IN	CONSUMER GROUPS
✓	gateway-west-raw-sensors - P1	96 KB	0B out	186	1
✓	P0 26 KB in	0B out	0B out	0	0
✓	P1 37 KB in	0B out	0B out	186	1
✓	P2 33 KB in	0B out	0B out	0	0
✓	P3 0B in	0B out	0B out	0	0
✓	P4 0B in	0B out	0B out	0	0

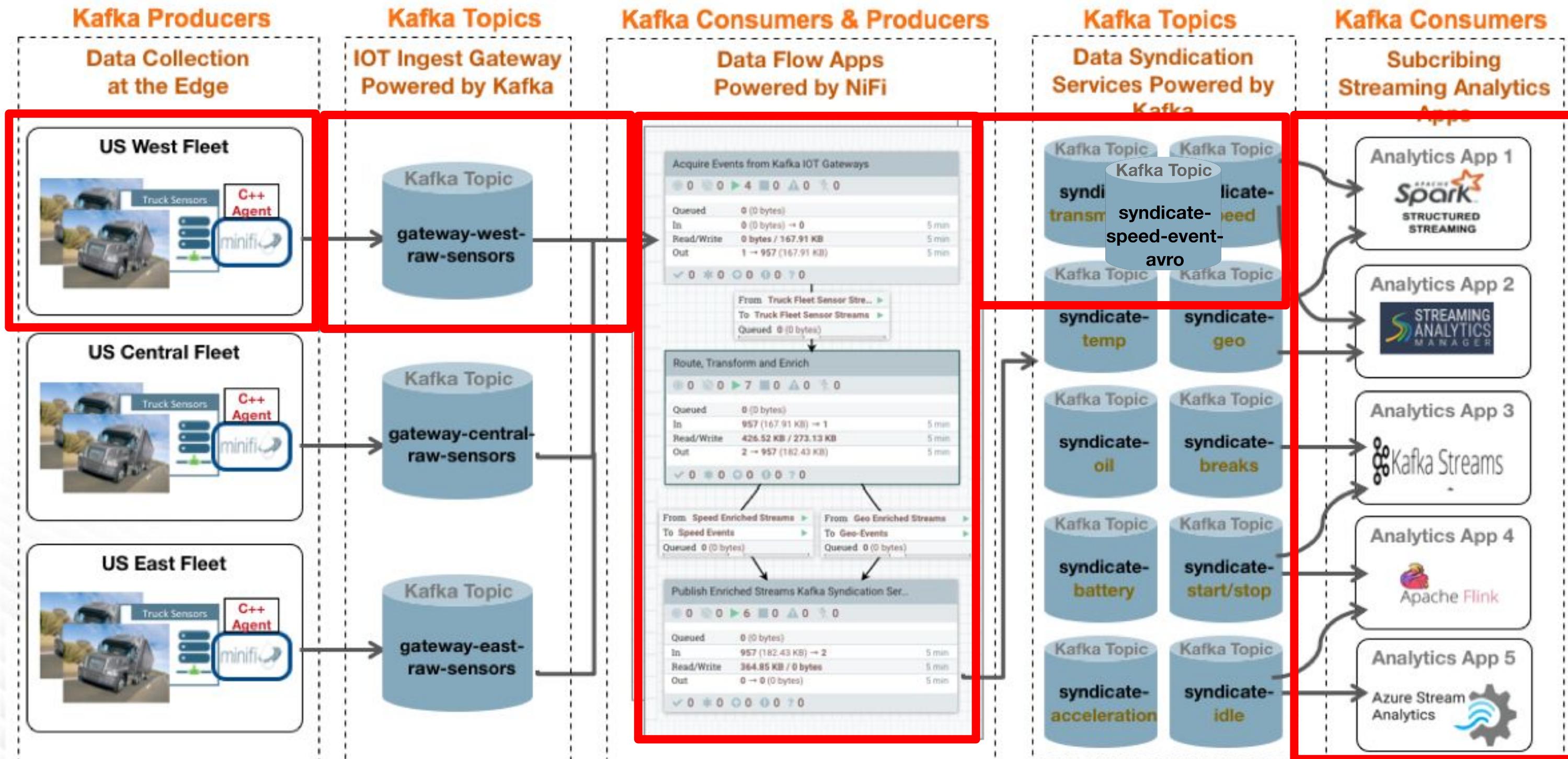
Topics / gateway-west-raw-sensors

METRICS DATA EXPLORER CONFIGS LATENCY



Click on the explorer icon to search for events in the Kafka Topic

Recap: What Did We Just see? Tracking the flow of data across multiple Kafka Hops with SMM & Atlas Integration-Powerful



SMM 1.2 New Features

New Features

Topic Lifecycle Management

- Create
- Update
- Delete

Alerting

- Alert Notifier
- Alert Policy

Schema Registry Integration

- Data Governance
 - Provide reusable schema (centralized registry)
 - Define relationship between schemas (version management)
 - Enable generic format conversion, and generic routing (schema validation)
- Operational Efficiency
 - To avoid attaching schema to every piece of data (centralized registry)
 - Consumers and producers can evolve at different rates (version management)
 - Data quality (schema validation)

LESS OF THIS

```
[cloudbreak@ip-10-0-1-199 ~]$ kafka-topics.sh --list --zookeeper ip-10-0-1-115.eu-west-1.compute.internal:2181
ATLAS_ENTITIES
ATLAS_HOOK
.consumer_offsets
.smm_alert_notifications
.transaction_state
adjudication
alerts-speeding-drivers
approval
audit-events
compliance
energy-mgmt
fleet-supply-chain
fuel-logistics
gateway-central-raw-sensors
gateway-east-raw-sensor
gateway-east-raw-sensors
gateway-europe-raw-sensors
gateway-west-raw-sensors
gdeleon-test
load-optimization
myFirstTopic
nifi-kafka-demo
predictive-alerts
route-planning
supply-chain
syndicate-all-geo-critical-events
syndicate-battery
syndicate-geo-event-avro
syndicate-geo-event-json
syndicate-oil
syndicate-speed-event-avro
syndicate-speed-event-json
syndicate-transmission
[cloudbreak@ip-10-0-1-199 ~]$ pwd
"/tmp/cloudbreak"
```

```
Last login: Tue Mar 19 00:42:54 2019 from 195.53.52.170
cat /etc/motd
=====
* : 

[cloudbreak@ip-10-0-1-199 ~]$ export PATH=$PATH:/usr/hdp/current/kafka-broker/bin/
[cloudbreak@ip-10-0-1-199 ~]$ kafka-configs.sh --zookeeper ip-10-0-1-136.eu-west-1.compute.internal:2181
escribe --entity-name testKnoxSetUp
Configs for topic 'testKnoxSetUp' are cleanup.policy=compact,delete
```

```
[cloudbreak@ip-10-0-1-199 ~]$ kafka-topics.sh --zookeeper ip-10-0-1-136.eu-west-1.compute.internal:2181
tion-factor 1 --topic topic-command-line
Created topic "topic-command-line".
[cloudbreak@ip-10-0-1-199 ~]$
```

Topic Lifecycle Management

The screenshot shows the Streams Messaging Manager interface. On the left, there's a sidebar with navigation links: Overview, Brokers, Topics (which is selected and highlighted in grey), Producers, Consumer Groups, Alerts, and Replication. The main area has a title bar 'Topics' and a sub-header 'Cluster: orlandostreamcluster'. Below this is a table with columns for Topic Name, Size, and Partition Count. One row is selected, showing 'syndicate-geo-event-avro' with 116KB size and 5 partitions. A modal window titled 'Add Topic' is open over the table. It contains fields for 'TOPIC NAME' (set to 'syndicate-geo-event-json-2') and 'PARTITIONS' (set to '3'). Under 'Availability', there are five radio button options: 'MAXIMUM' (selected), 'HIGH', 'MODERATE', 'LOW', and 'CUSTOM'. Below these are four rows of replication factor and min insync replica settings. The first row is 'REPLICATION FACTOR 3 MIN INSYNC REPLICA 2'. The second is 'REPLICATION FACTOR 3 MIN INSYNC REPLICA 1'. The third is 'REPLICATION FACTOR 2 MIN INSYNC REPLICA 1'. The fourth is 'REPLICATION FACTOR 1 MIN INSYNC REPLICA 1'. Under 'Limits', there's a dropdown for 'CLEANUP.POLICY' set to 'compact'. At the bottom of the modal are 'Advanced', 'Cancel', and 'Save' buttons.

Add Topic
User friendly UI to create new topics. Simple and Advance features are available

Topic Update

The screenshot shows the Cloudera Manager interface for managing topics. On the left, there's a summary of cluster metrics: Total Bytes In (64MB), Total Bytes Out (2MB), Produced Per Sec (243), and Fetched Per Sec (705). Below this is a list of 35 topics, with two selected: 'gdeleon-test' and 'testKnoxSetUp'. A green callout box labeled 'Search Topic' points to the search bar at the top of the page, which contains the text 'test'. Another green callout box labeled 'Update Topic' points to the 'CONFIGS' tab of the detailed configuration dialog for 'testKnoxSetUp'. This dialog lists various configuration parameters like compression.type, retention.bytes, and flush.ms.

Topics

Total Bytes In: 64MB Total Bytes Out: 2MB Produced Per Sec: 243 Fetched Per Sec: 705

Topics (35)

NAME	DATA IN	DATA OUT	MESSAGES IN	CONSUMER GROUPS
gdeleon-test	0B	0B	0	0
testKnoxSetUp	0B	0B	-1	0

Search Topic
Search the Topic you would like to update. Then click on profile

Cluster: pkuc-wv-smm-m

Under Replicated: 0 Offline Partitions: 0

test 30 minutes

Topics / testKnoxSetUp

Metrics Data Explorer Configs

TOPIC NAME: testKnoxSetUp PARTITIONS: 1

REPLICATION FACTOR: 1

CLEANUP POLICY: compact,delete

MAX MESSAGE BYTES: 1000000

RETENTION BYTES: -1

RETENTION HOURS: 168

COMPRESSION TYPE: producer

DELETE RETENTION HOURS: 24

FILE DELETE DELAY MS: 60000

FLUSH BYTES: 922337203685477507

FLUSH MS: 9223372036854775807

INDEX INTERVAL BYTES: 10485760

Name Value

Name	Value
compression.type	producer
min.insync.replicas	1
segment.jitter.ms	0
cleanup.policy	delete
flush.ms	9223372036854775
segment.bytes	1073741824
retention.hours	168
flush.messages	9223372036854775
message.format.version	2.0-IV1
file.delete.delay.ms	60000
max.message.bytes	1000000
min.compaction.lag.ms	0
message.timestamp.type	CreateTime
preallocate	false
min.cleanable.dirty.ratio	0.5
index.interval.bytes	4096
unclean.leader.election.enable	false
retention.bytes	-1
delete.retention.hours	24
segment.ms	604800000
message.timestamp.difference.max.ms	9223372036854775
segment.index.bytes	10485760

simple Save

Update Topic
Click on Config and you can change Cleanup Policy or click Advanced to modify the configuration parameters.

Alerting – Create Notifier

Notifier

NAME
email_notifier

DESCRIPTION
Notifies via Email

PROVIDER
Email

FROM ADDRESS
smm.barcelona1@gmail.com

TO ADDRESS
smm.barcelona1@gmail.com

USERNAME
smm.barcelona1@gmail.com

PASSWORD

1st Key Construct of Alerts

Alert Notifier

1. Email
2. http end point
3. Kafka topic

PASSWORD
.....

SMTP HOSTNAME
smtp.gmail.com

SMTP PORT
587

ENABLE AUTH
 ENABLE SSL ENABLE STARTTLS

PROTOCOL
smtp

ENABLE DEBUG

NOTIFIER RATE LIMIT

COUNT	DURATION
2	HOUR

Alerting – Create Alert

Alert Policy

NAME
High Lag - Kafka Streams Truck Join Micro Service

DESCRIPTION
High Lag - Kafka Streams Truck joining the speed and geo streams

EXECUTION INTERVAL IN SECONDS
60

EXECUTION DELAY IN SECONDS
300

ENABLE

Policy

COMPONENT TYPE
IF... Consumer

TARGET NAME
nifi-truck-sensors-west

+

ATTRIBUTE	CONDITION	VALUE
CONSUMER GROUP LAG	<	50

+

Action

NOTIFICATION
x email_notifier

Preview

IF CONSUMER: nifi-truck-sensors-west has CONSUMER GROUP LAG > 50 THEN notify by email_notifier

Cancel Save

2nd Key Construct of Alerts

Alert Policy

1. Defined for 6 key entities (cluster, broker, topic, producer, consumer, latency, cluster replication)
2. Metrics defined on entities
3. Complex alerts
4. Includes notifier when triggered

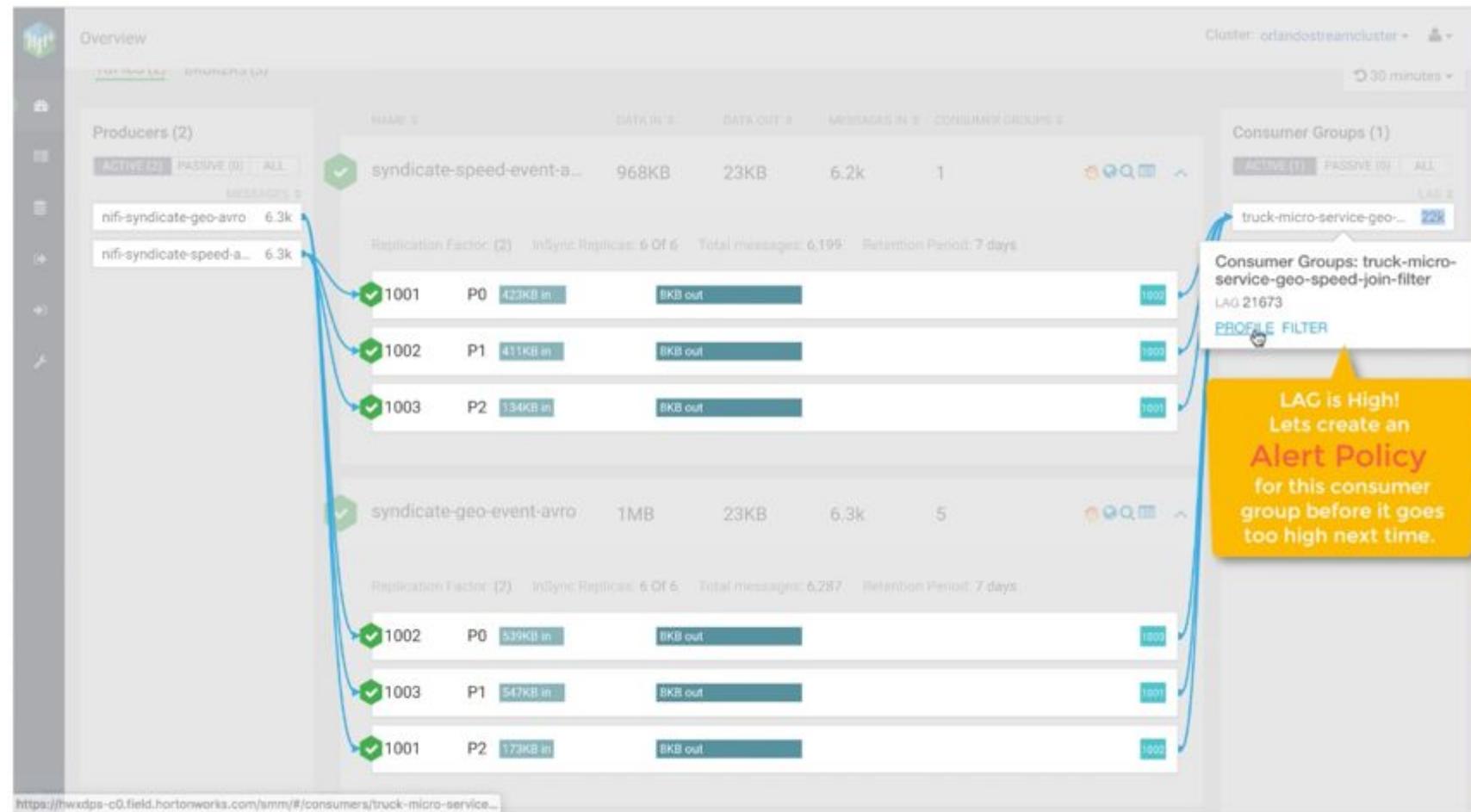
Alert History

HISTORY	ALERT POLICIES	NOTIFIERS			
Title	Timestamp	Component name	Type	State	Payload
Alert: Lag_Alert	2m 32s ago	load-optimizer-micro-service	CONSUMER	RAISED	Alert policy : 'Lag_Alert' For CONSUMER=load
Alert: Lag_Alert	7m 32s ago	load-optimizer-micro-service	CONSUMER	RAISED	Alert policy : 'Lag_Alert' For CONSUMER=load

Disable Alert

HISTORY	ALERT POLICIES	NOTIFIERS	ADD NEW
NAME	CONDITION	DESCRIPTION	ENABLE
gdeleon-alert	IF Topic: gdeleon-test has BYTES IN PER SEC >= 10	my alert	<input checked="" type="checkbox"/>
Lag_Alert	IF Consumer: load-optimizer-micro-service has CONSUMER GROUP LAG >= 10		<input type="checkbox"/>

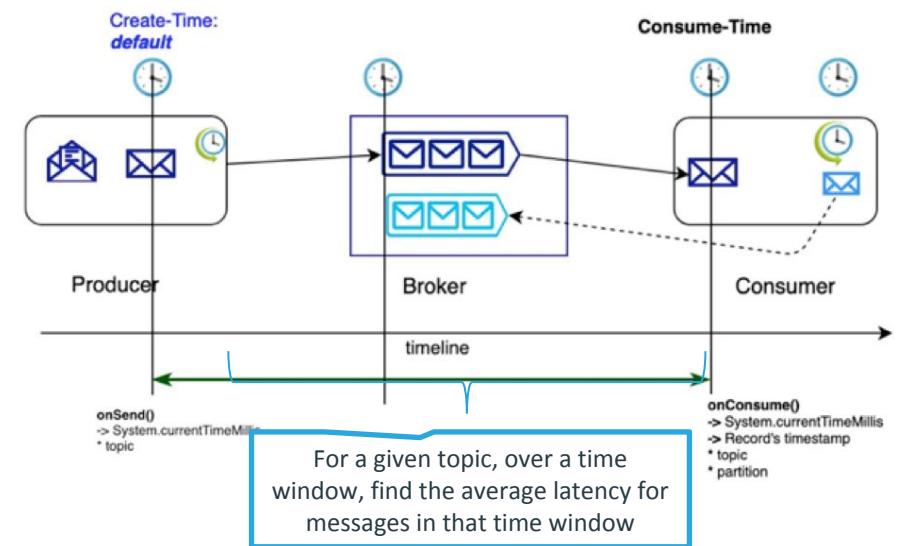
Example: Alerting on Micro-Service Consumer Group with High Lag



New DevOps Monitoring Capability with End to End Latency View

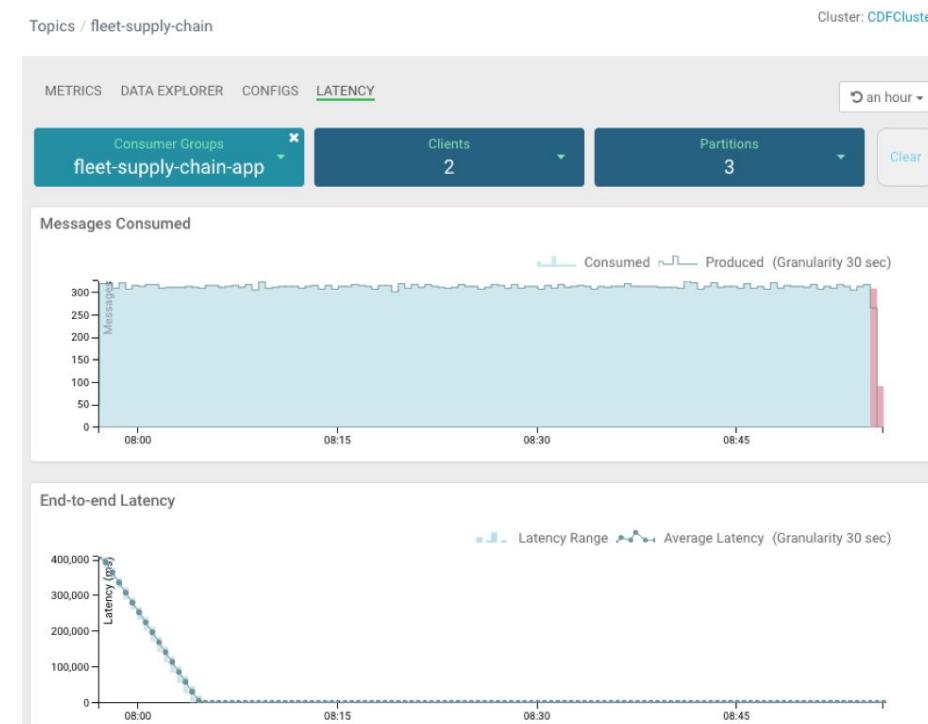
Problem Statement / Requirements

- Kafka DevOps teams need the ability to see an end to end latency view of messages produced and consumed across producers to topics/brokers to consumers
- Common DevOps questions include:
 - For the last five minutes, what is the average latency of messages consumed after being produced.
 - For the last hour, which topics have under consumption?



Solution / Benefit

- SMM 2.0 provides new monitoring view for end to end Latency
- End to End Latency view is powered by new embedded Kafka streams application that calculates end to end latencies and new interceptors that can be used to instrument producer and consumer clients.



Select a Topic of Interest

Overview Cluster: hdf_mpack

Producers: 100 | Brokers: 3 | Topics: 13 | Consumer Groups: 2 | Clear | 30 minutes

TOPICS (13) BROKERS (3)

Producers (100) Consumer Groups (2)

NAME	DATA IN	DATA OUT	MESSAGES IN	CONSUMER GROUPS
TruckEvents2	616B	2KB	1.6k	0
TruckEvents	1KB	928B	997	0

ACTIVE (100) PASSIVE (0) ALL | ACTIVE (0) PASSIVE (2) ALL

MESSAGES

8-5-producer-23	24k
8-5-producer-99	24k
8-5-producer-37	24k
8-5-producer-0	24k
8-5-producer-45	24k
8-5-producer-63	24k
8-5-producer-96	24k
8-5-producer-39	23k
8-5-producer-20	23k
8-5-producer-14	23k
8-5-producer-81	23k
8-5-producer-85	23k

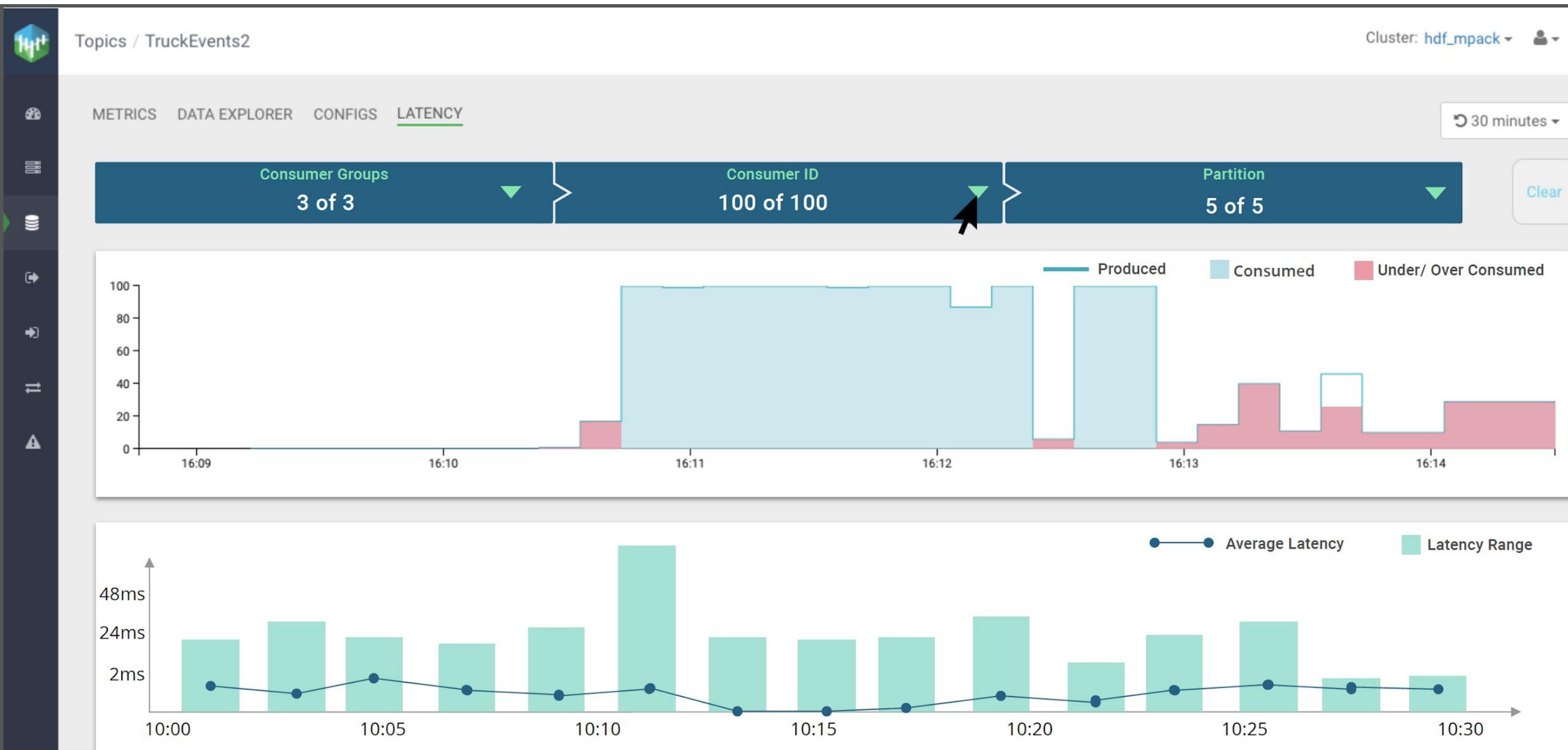
Replication Factor: (2) InSync Replicas: 8 Of 8 Total messages: 1,620 Retention Period: 0 secs

✓ 2 P0 2KB in 2KB out 0
✓ 0 P1 2KB in 1KB out 1
✓ 1 P2 2KB in 2KB out 2
✓ 2 P3 2KB in 1KB out 1

LAG

ExampleTestGroup2 0
ExampleTestGroup 0

Select the End to End Latency Tab



SMM Atlas Integration

Explore Metadata about the Topic in Atlas

Topics / gateway-west-raw-sensors

METRICS DATA EXPLORER CONFIGS

Producers (3)

Replication Factor: (2) InSync Replicas: 8 Of 8 Total messages: 805 Retention Period: 7 days

		MESSAGES	
	1001	P0	0B in 0B out
	1002	P1	0B in 0B out
	1003	P2	62KB in 62KB out
	1004	P3	98KB in 98KB out

Summary

Number of Replicas	2
Number of Partitions	4
Total number of Brokers for Topic	5
Preferred Replication %	100
Under Replicated %	0

Atlas Integration is not available on the workshop cluster.

Cluster: orlandostreamcluster

Click on Atlas Link to see the metadata of the topic gateway-west-raw-sensors in Atlas

The screenshot shows the Apache Atlas search interface. The search bar at the top has 'kafka_topic' selected as the type. Below it, a search query 'name=gateway-west-raw-sensors' is entered. The search results table lists one item: 'gateway-west-raw-sensors (kafka_topic)'. The table has columns for Key and Value, showing details like avgMessageSizeInBytes: 0, name: gateway-west-raw-sensors, and owner: gateway-west-raw-sensors@orlandostreamcluster.

Key	Value
avgMessageSizeInBytes	0
avroSchema	
contactInfo	
description	
desiredRetentionInHrs	0
keyClassName	
maxThroughputPerSec	0
name	gateway-west-raw-sensors
numberOfEventsPerDay	0
owner	
partitionCount	0
partitionCountLocal	0
partitionCountNational	0
qualifiedName	gateway-west-raw-sensors@orlandostreamcluster

If Atlas does not come up then use this link and then pick Type as Kafka_Topic for search
<https://99.80.132.89:8443/pkuc-wv-smm-m/dp-proxy/atlas/>

Traverse the flow of data across multiple Kafka Topics using SMM and Atlas Integration

Topics / gateway-west-raw-sensors

METRICS DATA EXPLORER CONFIGS

Producers (3)

		Replication Factor: (2)	InSync Replicas: 8 Of 8	Total messages: 805	Retention Period
1001	P0	0B in	0B out		
1002	P1	0B in	0B out		
1003	P2	62KB in	62KB out		
1004	P3	98KB in	98KB out		

MESSAGES

Summary

	Bytes In Count	Bytes Out Count	Messages In Count
Number of Replicas	2		
Number of Partitions	4		
Total number of Brokers for Topic	5		
Preferred Replication %	100		
Under Replicated %	0		

Atlas Integration is not available on the workshop cluster.

Question

The topic has one active consumer which is a NiFi consumer. Which Kafka topic if any is this NiFi Flow consumer publishing events to?

Cluster: orlandostreamcluster



30 minutes

Consumer Groups (1)

nifi-truck-sensors-west LAG 2

Step 1

Click on Atlas Icon to see lineage of the the topic gateway-west-raw-sensors

Apache Atlas

SEARCH CLASSIFICATION GLOSSARY

Basic Advanced

Search By Type: kafka_topic

Search By Query: name=gateway-west-raw-sensors

Clear Search

Favorite Searches Save Save As

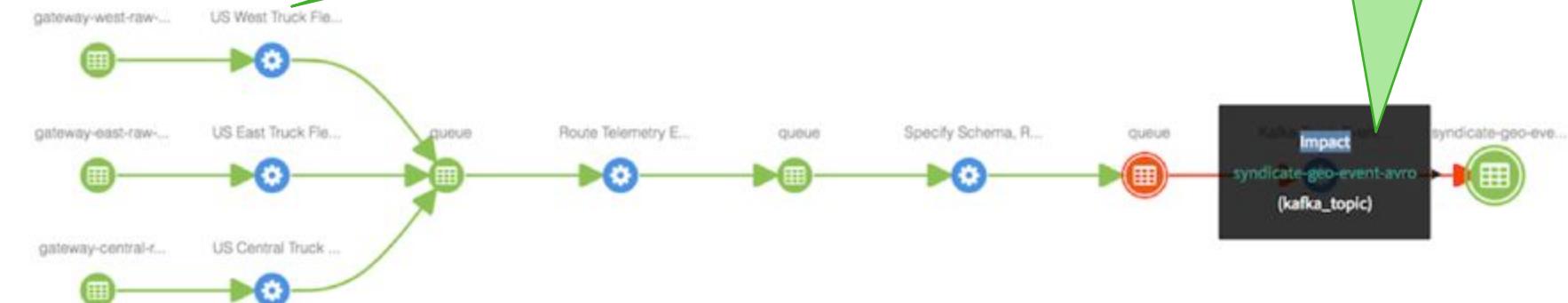
You don't have any favorite search.

gateway-west-raw-sensors (kafka_topic)

Classifications: +

Term: +

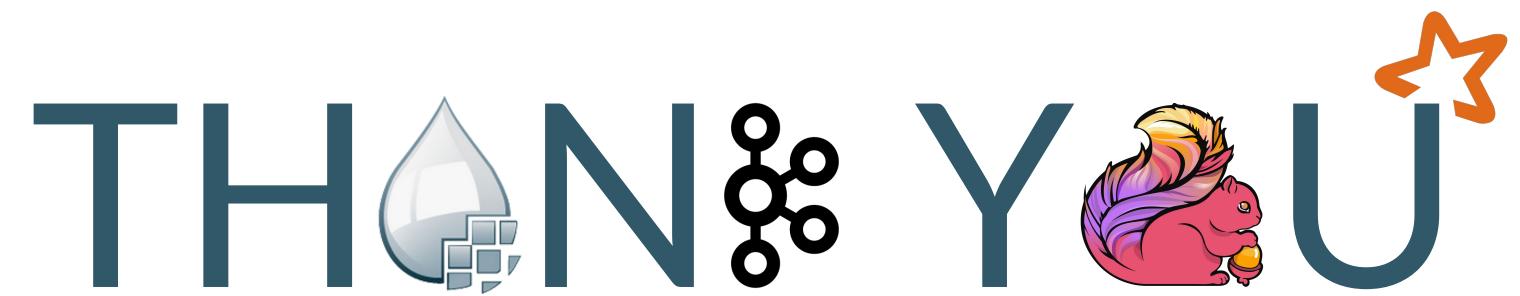
Properties Lineage Relationships Classifications Audits



Analysis

NiFi App consumes from the gateway-west-raw-sensors topic and publishes events to downstream Kafka topic called syndicate-geo-event-avro

TH^ON^G Y^OU[★]

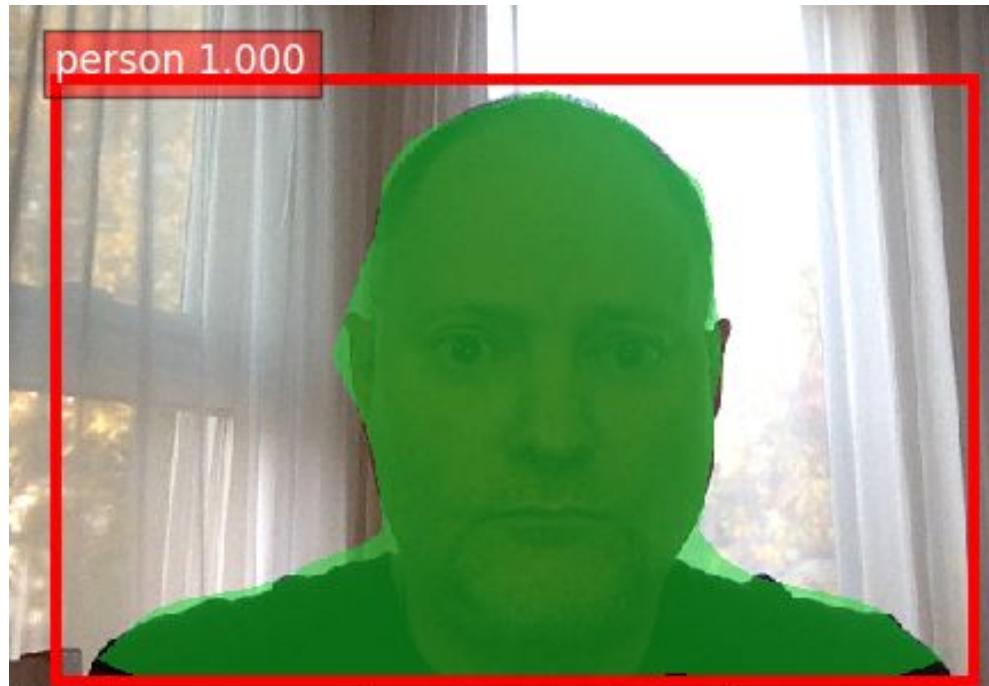


CLOUDERA

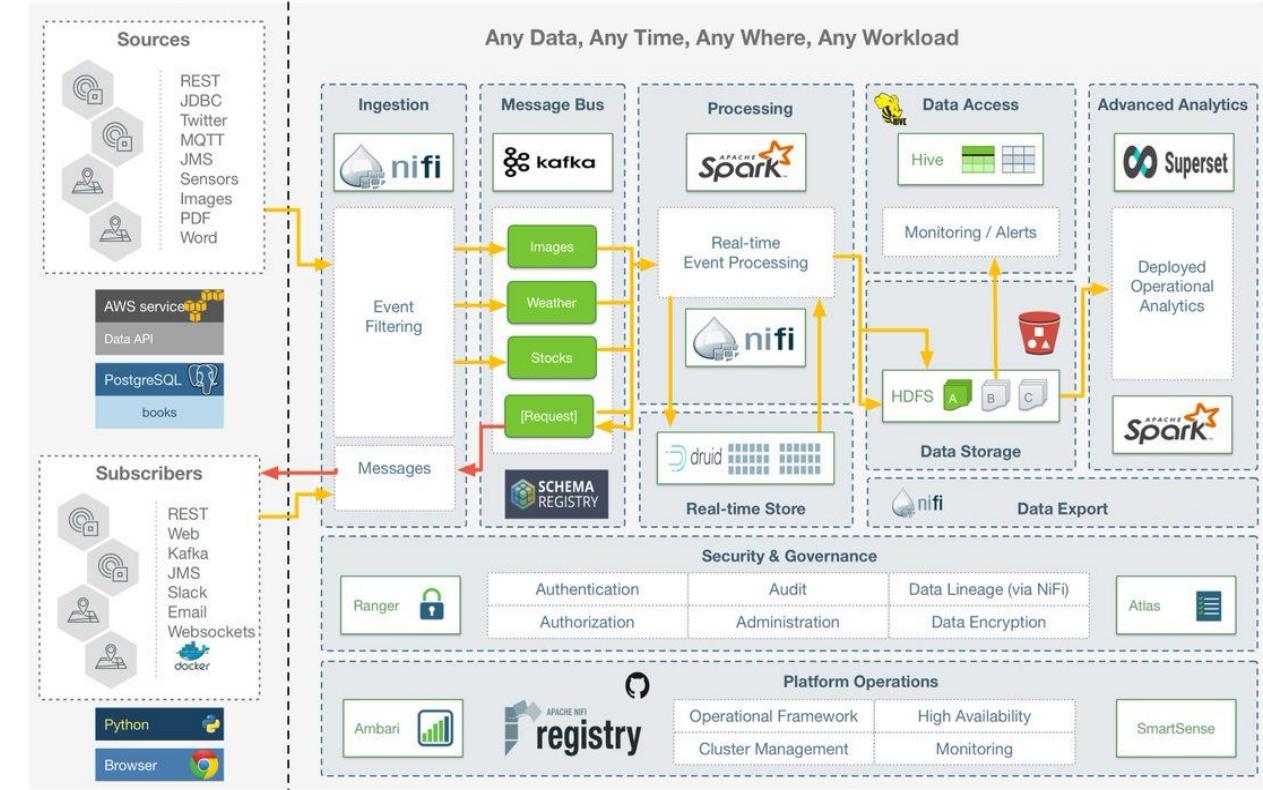
SMM Workshop - Kafka Streams

Timothy Spann

DZone Zone Leader and Big Data MVB;
Princeton Future of Data Meetup;
ex-Pivotal Field Engineer;
Author of Apache Kafka RefCard
<https://github.com/tspannhw>



Streaming with Apache Kafka and Apache NiFi



<https://community.hortonworks.com/articles/227560/real-time-stock-processing-with-apache-nifi-and-ap.html>

<https://community.hortonworks.com/users/9304/tspann.html>

<https://dzone.com/users/297029/bunkertor.html>

<https://www.datainmotion.dev/>

Contents

Kafka CRUD

Kafka Streams Overview

Kafka Streams Walk Through

Kafka Topics and Testing Your Microservice

Kafka Streams Architecture

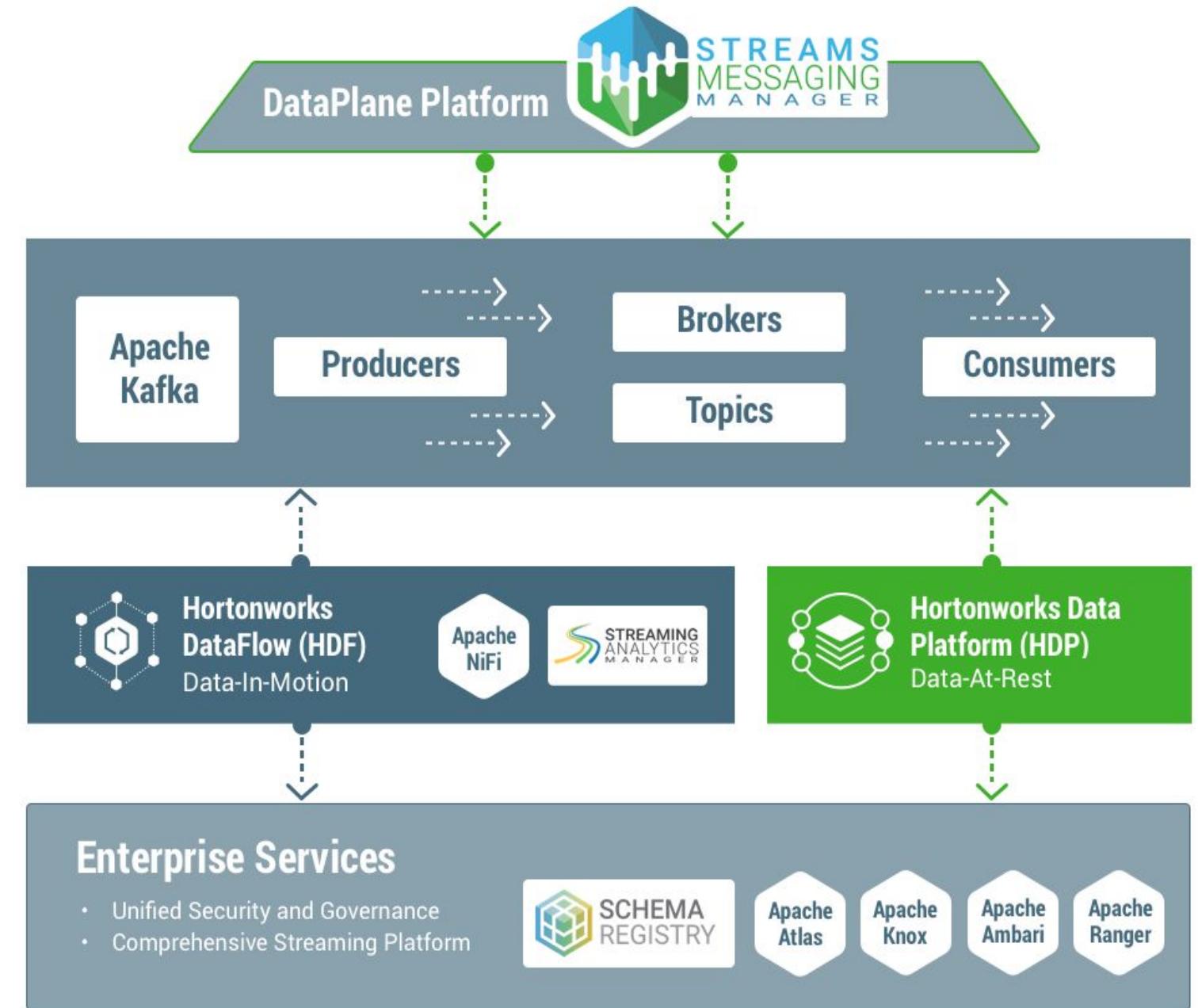
Kafka Streams Example

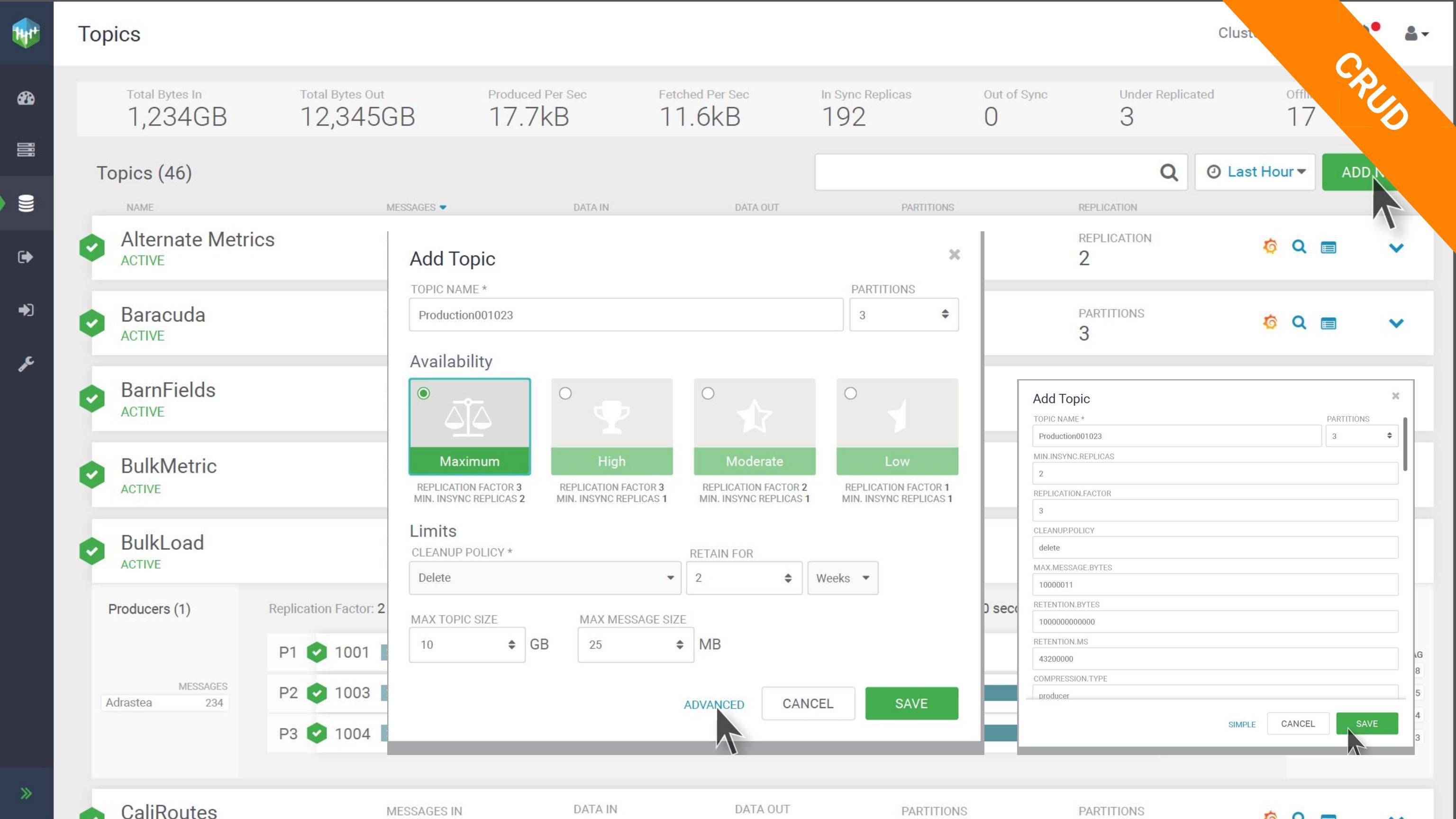
<https://github.com/purn1mak/SMM-NewYork>

KAFKA CRUD

Streams Messaging Manager (SMM)

- Open Source tool to Cure the “Kafka Blindness”
- Single Monitoring Dashboard for all your Kafka Clusters across 4 entities
- Notification on available metrics
- Designed for the Enterprise
 - Support for Secure Kafka cluster
 - Rich Access Control Policies (ACLS)
 - Supports multiple Kafka Clusters
- REST as a First Class Citizen





Create a Kafka Topic

The screenshot shows the Cloudera Streams Messaging interface. On the left, there's a sidebar with icons for topics, brokers, and logs. The main area displays a list of topics with their sizes: Total bytes in 129 KB and Total bytes out 153 KB. Below this is a table with columns: Name, Last modified, Last offset, and Last partition. A modal window titled "Add Topic" is open in the center. It has fields for "TOPIC NAME" (cleandata) and "PARTITIONS" (1). Under "Availability", there are five options: MAXIMUM (selected), HIGH, MODERATE, LOW, and CUSTOM. For each, there are fields for "REPLICATION FACTOR 2", "MIN IN SYNC REPLICAS 2", and "REPLICATION FACTOR 1", "MIN IN SYNC REPLICAS 1". Below this is a "Limits" section with a dropdown for "CLEANUP POLICY" set to "compact", and a "delete" option highlighted. At the bottom of the modal are "Advanced", "Cancel", and "Save" buttons.

Create a Kafka Topic

Add Topic

TOPIC NAME cleandata PARTITIONS 1

Availability

MAXIMUM HIGH MODERATE LOW CUSTOM

REPLICATION FACTOR 3 MIN INSYNC REPLICA 2
REPLICATION FACTOR 3 MIN INSYNC REPLICA 1
REPLICATION FACTOR 2 MIN INSYNC REPLICA 1
REPLICATION FACTOR 1 MIN INSYNC REPLICA 1

Limits

CLEANUP.POLICY

Select...
compact
delete
compact,delete

Advanced Cancel Save

0

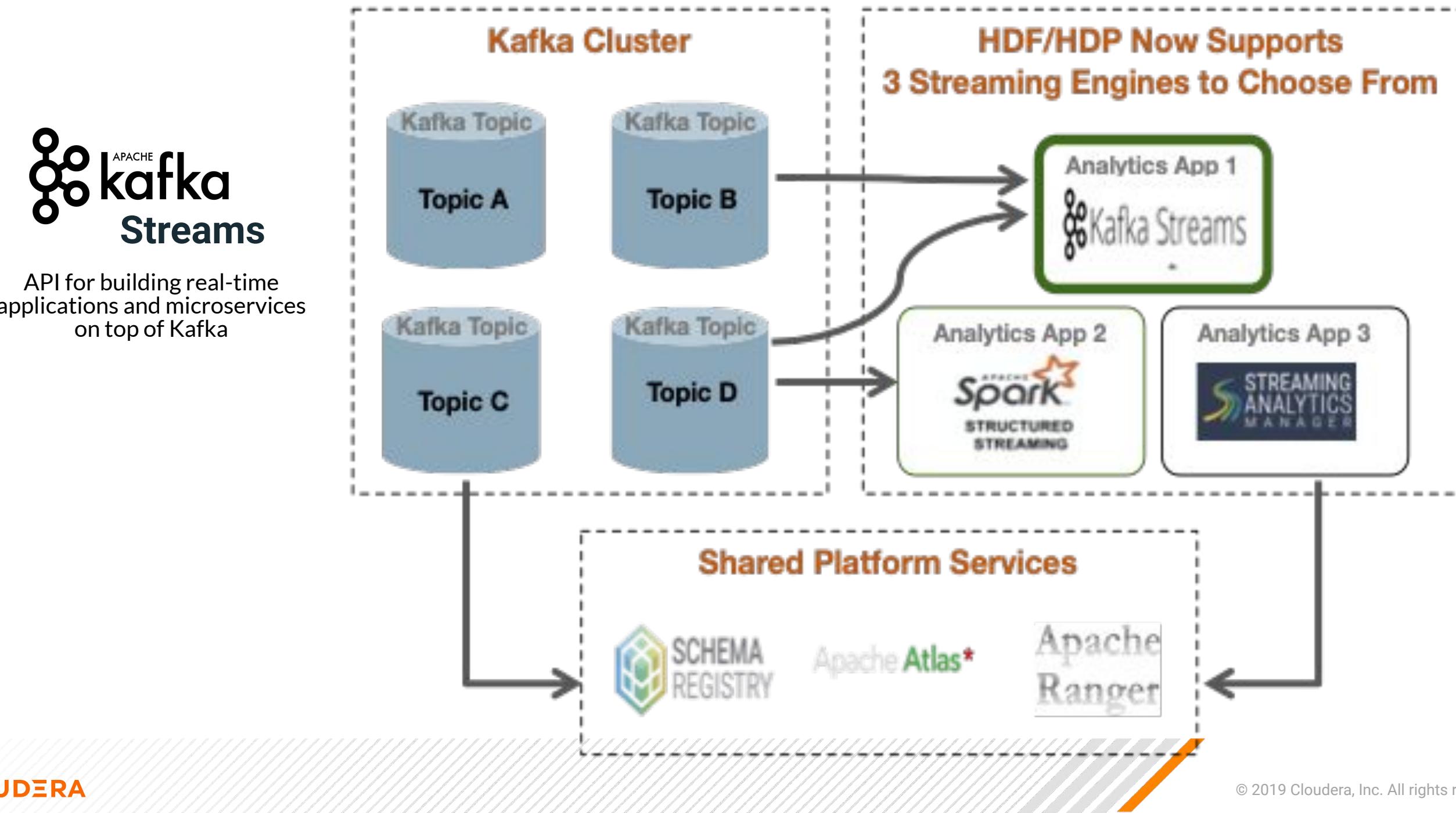
- Topic Name
- Partitions (1 or more)
- Pick a Template with replicas and replication factor
- Carefully select a Cleanup Policy **DELETE**
 - (your messages need a key)

Create Kafka Topics For Kafka Streams Application

- Topic Name: **streams-plaintext-input**
 - Partitions: 1
 - Replicas: 1
 - Delete
- Topic Name: **streams-wordcount-output**
 - Partitions: 1
 - Replicas: 1
 - Delete

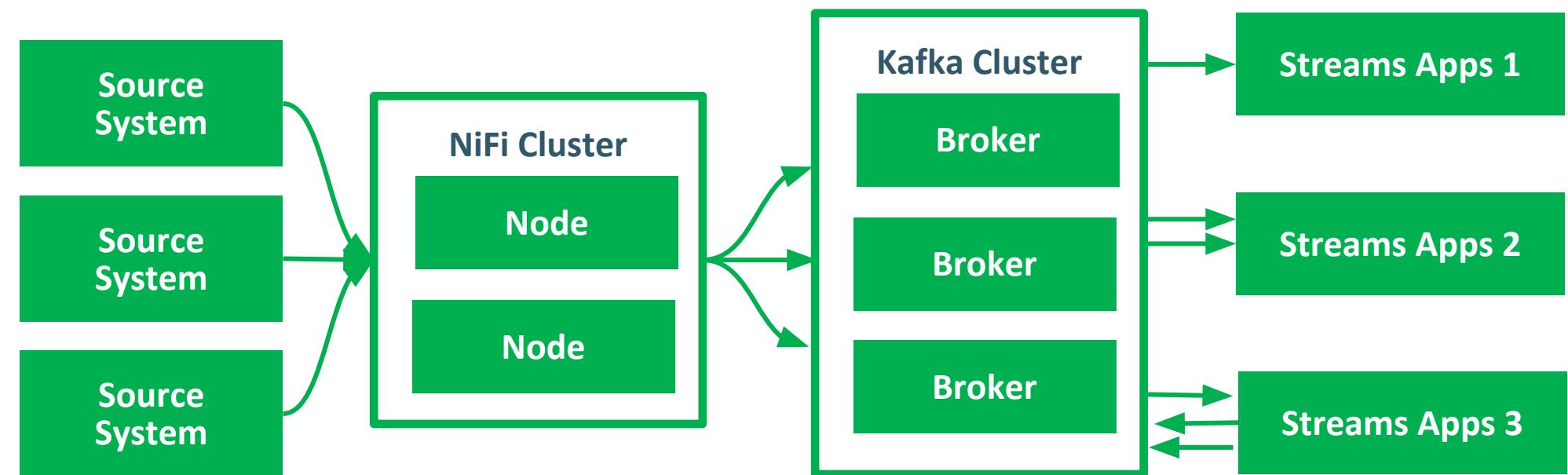
KAFKA STREAMS

Secure and Governed Microservices with Kafka Streams Support



Kafka Streams

- A client library for applications and microservices on top of Kafka
- Written in Java or Scala
- Elastic, highly scalable, fault-tolerant
- Supports At-Least-Once and Exactly-once semantics inside Kafka
- Deploy to containers, VMs, bare metal, cloud, K8, devices.



Kafka Streams Library

Stream Processing Style	Event a time
Delivery Guarantee	Exactly Once (within Kafka)
State Management	Implicit support with RocksDB
Fault Tolerance	Implicit support with internal Kafka topics / ZK
Advanced feature: Joins/ Aggregations/ Windowing	Stream/Stream joins, Stream/Table joins, joins with only message key, no OOO aggregation processors
Advanced Feature: Watermarking (late arriving data)	Not fully supported
Latency	Low
Throughput	Medium
APIs	Simple APIs (Compositional)

Kafka Streams Library

SQL DSL	Nothing in Apache Kafka.
Lambda Architecture	No Supported
GUI Tooling / Code-Less Approach	Not Supported
Maturity	Relatively New
Use Cases	Lightweight eventing based microservices, ETL
Cluster Requirement	No

KAFKA STREAMS WALK THROUGH

Tutorial - Log In Instructions



Cloudera Manager	http://54.190.22.232:7180/
Edge Flow	http://54.190.22.232:10080/efm/ui/
NiFi	http://54.190.22.232:8080/nifi/
NiFi Registry	http://54.190.22.232:18080/nifi-registry/
Schema Registry	http://54.190.22.232:7788/
SMM	http://54.190.22.232:9991/
Hue	http://54.190.22.232:8888/
Cloudera Data Science Workbench	http://cdsw.54.190.22.232.nip.io/

SSH Connection

Download key:

[Download SSH Key](#)



And then run:

```
chmod 400 workshop.pem  
ssh -i workshop.pem centos@54.190.22.232
```

Topic - Create

Add Topic

TOPIC NAME

PARTITIONS

Availability



MAXIMUM



HIGH



MODERATE



LOW



CUSTOM

REPLICATION

FACTOR 3

MIN INSYNC

REPLICA 2

REPLICATION

FACTOR 3

MIN INSYNC

REPLICA 1

REPLICATION

FACTOR 2

MIN INSYNC

REPLICA 1

REPLICATION

FACTOR 1

MIN INSYNC

REPLICA 1

Limits

CLEANUP.POLICY

Advanced

Cancel

Save

Topics							
Total Bytes In	Total Bytes Out	Produced Per Sec	Fetched Per Sec	In Sync Replicas	Out Of Sync	Under Replicated	Offline Partitions
88 MB	2 MB	212	169	196	0	0	0
Topics (42)							
NAME	DATA IN	DATA OUT	MESSAGES IN	CONSUMER GROUPS			
streams-plaintext-input	0B	0B	0	0			
streams-wordcount-output	0B	0B	0	0			

Cluster: OneNodeCluster
Topic added successfully

Setup Your Development Environment

```
sudo su
```

```
yum install maven curl wget unzip zip git -y
```

```
mkdir /opt/demo
```

```
chmod -R 777 /opt/demo
```

```
cd /opt/demo
```

Generate a Kafka Streams Project

```
mvn archetype:generate \  
  -DarchetypeGroupId=org.apache.kafka \  
  -DarchetypeArtifactId=streams-quickstart-java \  
  -DarchetypeVersion=2.2.0 \  
  -DgroupId=streams.examples \  
  -DartifactId=streams.examples \  
  -Dversion=0.1 \  
  -Dpackage=myapps
```

Update Word Count Kafka Connection

Edit the file

/opt/demostreams.examples/src/main/java/myapps/**WordCount.java**

```
Properties props = new Properties();
props.put(StreamsConfig.APPLICATION_ID_CONFIG,
"streams-pipe");
props.put(StreamsConfig.BOOTSTRAP_SERVERS_CONFIG,
"<YOURAWSINTERNALIPNAME>:9092");
```

Build a Kafka Streams Project

```
rm /opt/demostreams.examples/src/main/java/myapps/Pipe.java  
rm /opt/demostreams.examples/src/main/java/myapps/LineSplit.java  
mvn clean package
```

KAFKA TOPIC INTERACTION

Produce Kafka Messages

```
/opt/cloudera/parcels/CDH/lib/kafka/bin/kafka-console-producer.sh --broker-list  
<YOURAWSINTERNALIPNAME>:9092 --topic streams-plaintext-input
```

Instructions: Then type messages with a return.

Run Kafka Streams Java Application

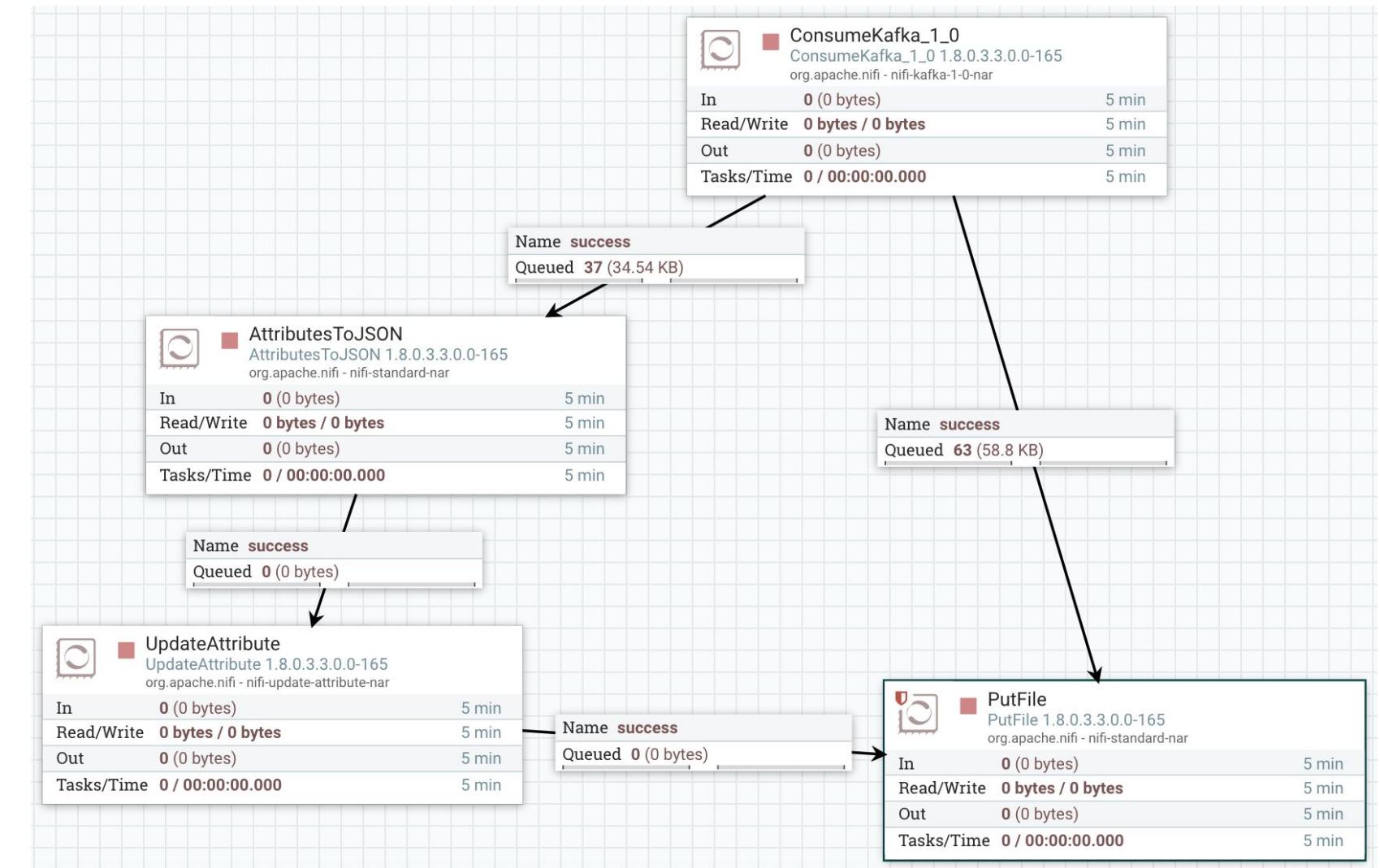
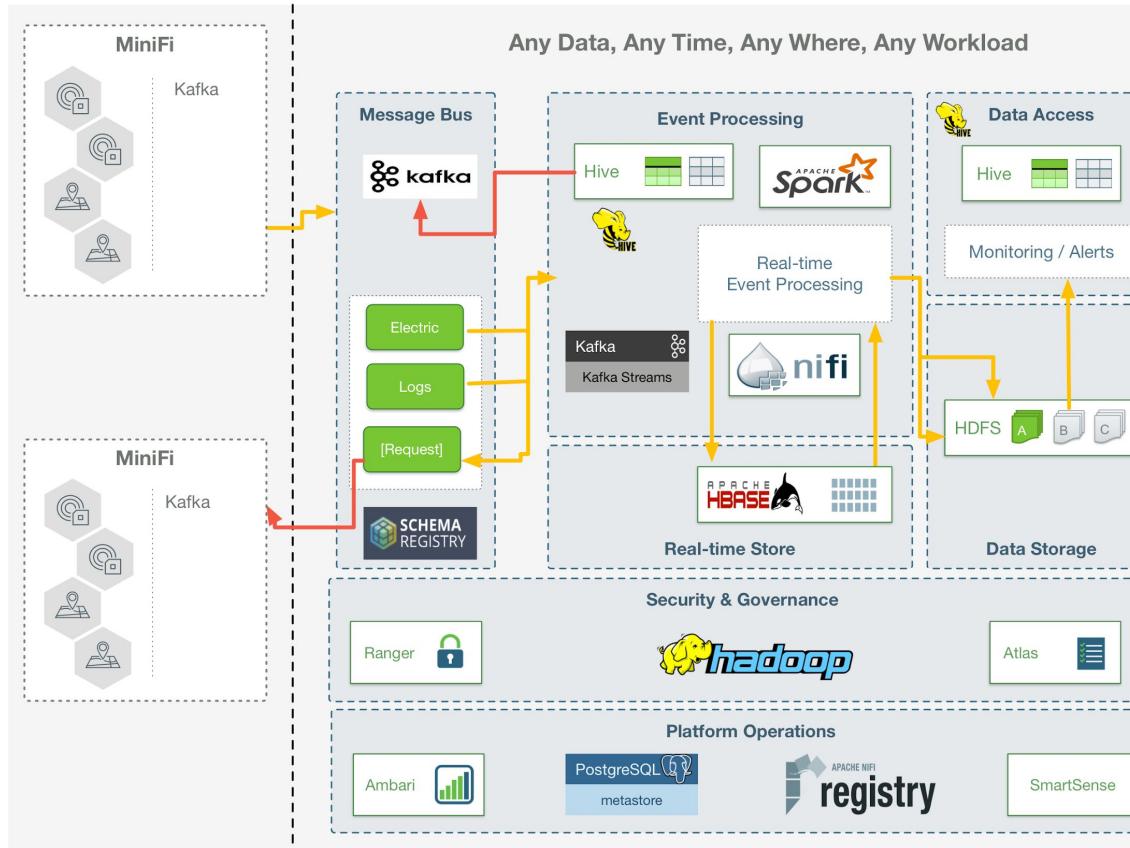
```
mvn exec:java -Dexec.mainClass=myapps.WordCount
```

Consume Kafka Messages

```
/opt/cloudera/parcels/CDH-6.3.0-1.cdh6.3.0.p0.1279813/lib/kafka/bin/kafka-console-consumer.sh --bootstrap-server <YOURAWSINTERNALIPNAME>:9092 \
--topic streams-wordcount-output \
--from-beginning \
--formatter kafka.tools.DefaultMessageFormatter \
--property print.key=true \
--property print.value=true \
--property key.deserializer=org.apache.kafka.common.serialization.StringDeserializer \
--property value.deserializer=org.apache.kafka.common.serialization.LongDeserializer
```

CONSUME AND PRODUCE KAFKA MESSAGES

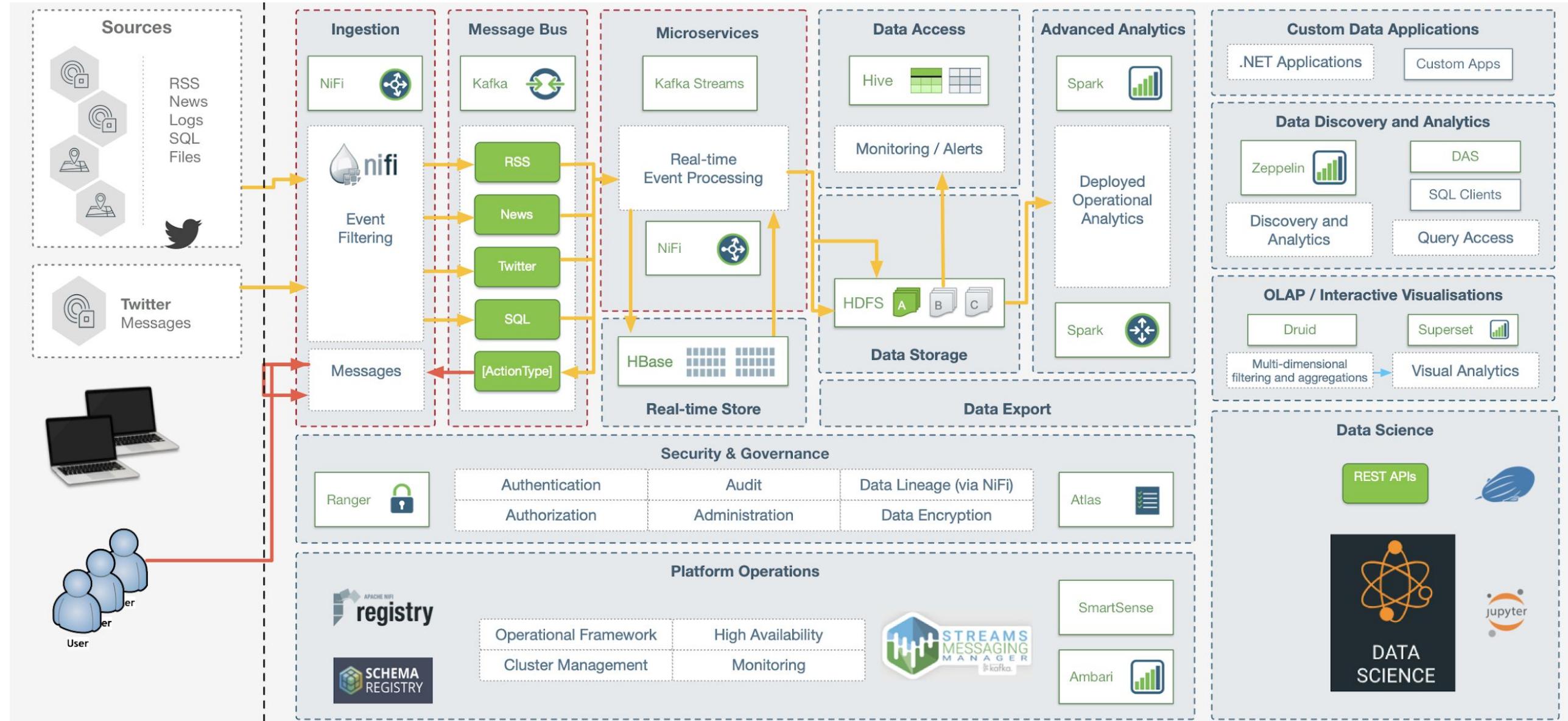
IoT Edge Use Cases with Apache Kafka and Apache NiFi - MiniFi



<https://community.cloudera.com/t5/Community-Articles/IoT-Edge-Use-Cases-with-Apache-Kafka-and-Apache-NiFi-MiniFi/ta-p/249232>

KAFKA STREAMS ADDITIONAL EXAMPLE

Kafka Streams Example Architecture



Kafka Streams

```
Timer timer = new Timer();  
timer.schedule(new DisplayStatus(), 0, 120000);  
  
final StreamsBuilder builder = new StreamsBuilder();  
KStream<String, String> source = builder.stream("bme680");  
  
source.foreach((key, value) -> processValues(key, value));  
source.to("bme680out");  
  
final Topology topology = builder.build();  
final KafkaStreams streams = new KafkaStreams(topology, props);  
final CountDownLatch latch = new CountDownLatch(1);
```

Kafka Streams

```
Runtime.getRuntime().addShutdownHook(new Thread(STREAMS_SHUTDOWN_HOOK) {
    @Override
    public void run() {
        log.error(SHUTDOWN);
        streams.close();
        latch.countDown();
    }
}) ;

try {
    streams.start();
    latch.await();
} catch (Throwable e) {
    System.exit(1);
}
```

Kafka Streams Example 2

The screenshot shows an IDE interface with the following details:

- Project Structure:** The project is named "kstreams" located at "/Volumes/TSPANN/projects/kstreams". It contains a ".idea" folder, a "src" directory with "main" and "java" sub-directories, and a "com.dataflowdeveloper.kstream" package containing a "BME680" class.
- Code Editor:** The "BME680.java" file is open. The code initializes MQTT connections, setting up a publisher and connecting it with specific options like automatic reconnect and clean session.
- Run Tab:** The "Run" tab shows the configuration for running the "BME680" application, pointing to the Java executable path: "/Library/Java/JavaVirtualMachines/jdk1.8.0_121.jdk/Contents/Home/bin/java".
- Output Tab:** The "Run" tab also displays the command-line output, which includes error messages from SLF4J indicating that the "StaticLoggerBinder" class was found in multiple locations and that a no-operation (NOP) logger implementation is being used.

Cloudera Managed Kafka

Cloudera Manager Clusters ▾ Hosts ▾ Diagnostics ▾ Audits Charts ▾ Backup ▾ Administration ▾ Search Support ▾ admin ▾

nyc KAFKA-2 Actions ▾

◀ 24 hours preceding Sep 12, 7:54 PM UTC ▶ ⏪ ⏩

Status Instances Configuration Commands Charts Library Audits Quick Links ▾ Hide Descriptions 30m 1h 2h 6h 12h 1d 7d 30d

Status Page Charts

Topics ▾

Filter

__smm_consumer_metrics
__smm_producer_metrics
global-retail-pos
global-retail-store
global-retail-web
heartbeats
local-retail
mm2-configs.paris.internal
mm2-offset-syncs.paris.internal
mm2-offsets.paris.internal
Events

Total Bytes Received Across Kafka Broker Topics
The sum of the **Bytes Received** metric computed across all this entity's descendant Kafka Broker Topic entities.

bytes / second

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_b... 0

Total Bytes Fetched Across Kafka Broker Topics
The sum of the **Bytes Fetched** metric computed across all this entity's descendant Kafka Broker Topic entities.

bytes / second

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_b... 0

Total Bytes Rejected Across Kafka Broker Topics
The sum of the **Bytes Rejected** metric computed across all this entity's descendant Kafka Broker Topic entities.

bytes / second

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_b... 0

Total Messages Received Across Kafka Broker Topics
The sum of the **Messages Received** metric computed across all this entity's descendant Kafka Broker Topic entities.

messages / sec...

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_b... 0

Total Rejected Message Batches Across Kafka Broker Topics
The sum of the **Rejected Message Batches** metric computed across all this entity's descendant Kafka Broker Topic entities.

message_batches...

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_r... 0

Total Fetch Request Failures Across Kafka Broker Topics
The sum of the **Fetch Request Failures** metric computed across all this entity's descendant Kafka Broker Topic entities.

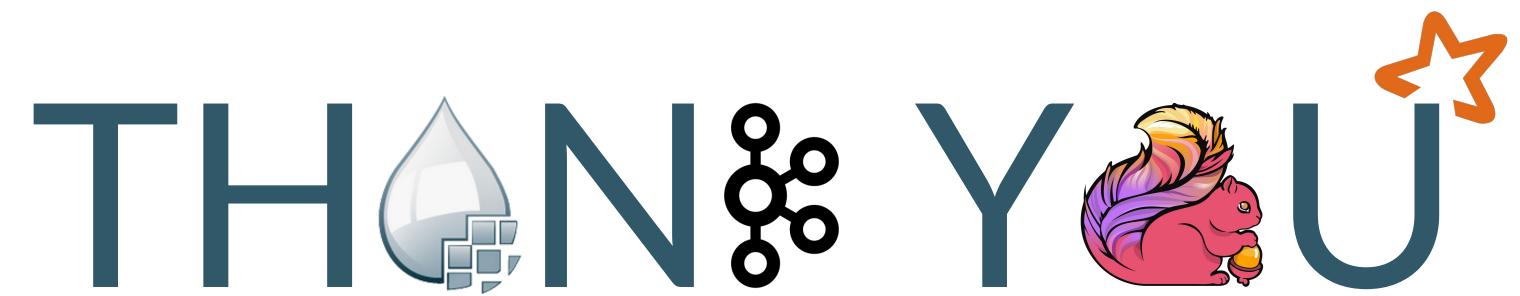
fetch_requests ...

Thu 12 06 AM 12 PM 06 PM

CD-KAFKA-plvdjsn:global-retail-store, total_kafka_f... 0

Feedback

TH^ON^G Y^OU[★]



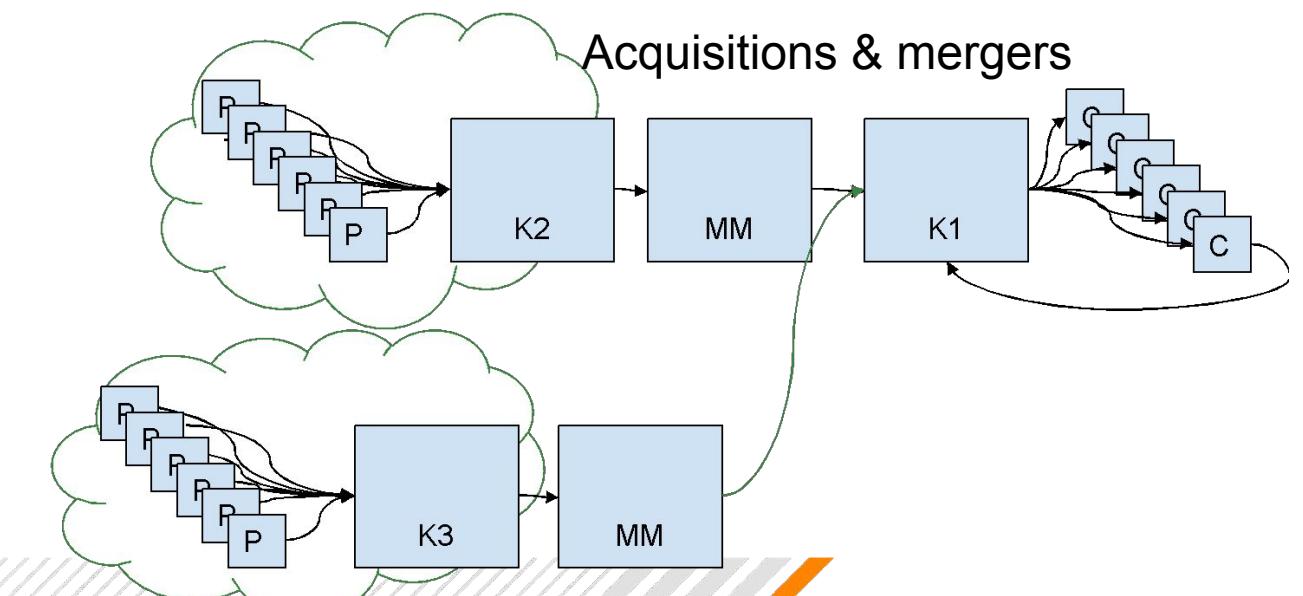
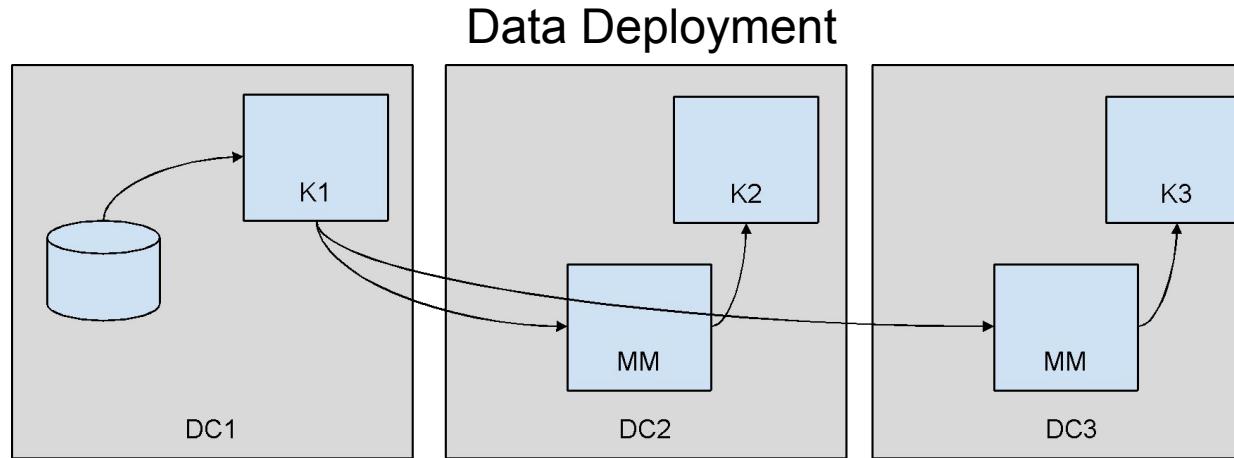
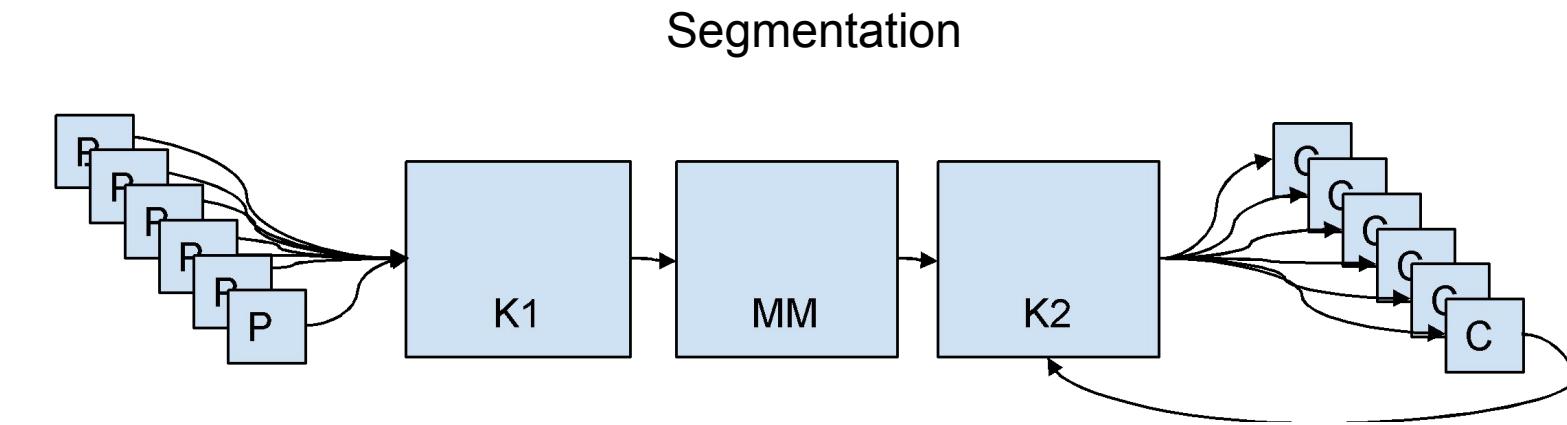
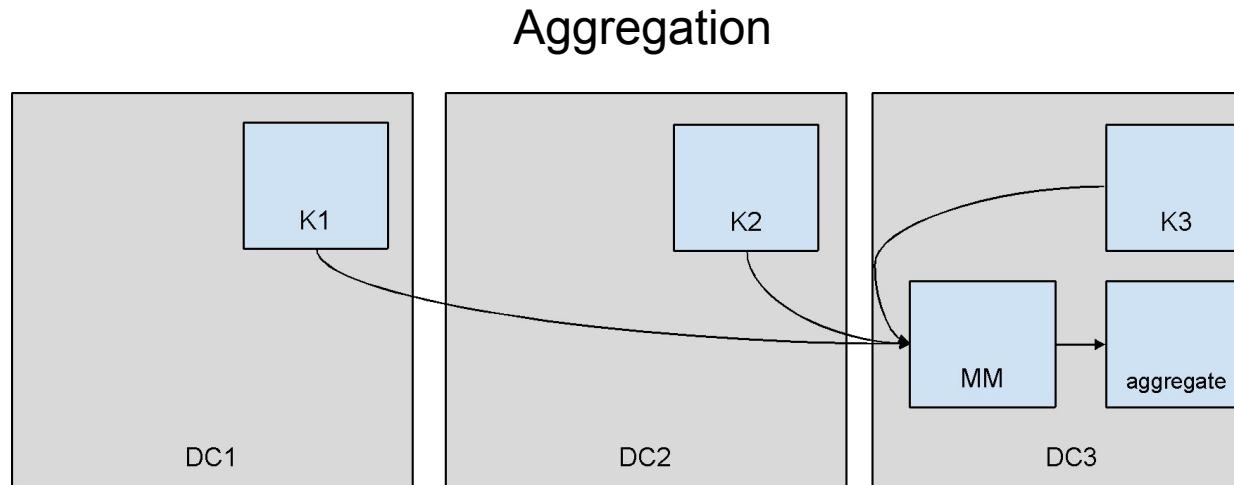
CLOUDERA

Kafka Replication

Kafka Replication Use Cases

Disaster Recovery In an event of a partial or complete datacenter disaster, providing failover/fallback to a secondary cluster in a different region / DC	Geo-Locality Active-active geo-localized deployments allows users to access a near-by data center to optimize their architecture for low latency and high performance.	Data Movement / Deployment Use Kafka to synchronize data between on-prem applications and cloud deployments
Centralized Analytics Aggregate data from multiple Kafka clusters into one location for organization-wide analytics	Workload Isolation Creation of different envs for SDLC: Dev, Test, Prod. Clusters for specific use case cases (ETL, ingestion, analytics, etc)	Legal / Compliance Since different regions have different data storage and security requirements, clusters need to be created in region but data still needs to be shared.

Various Replication Deployments Based on Use Cases



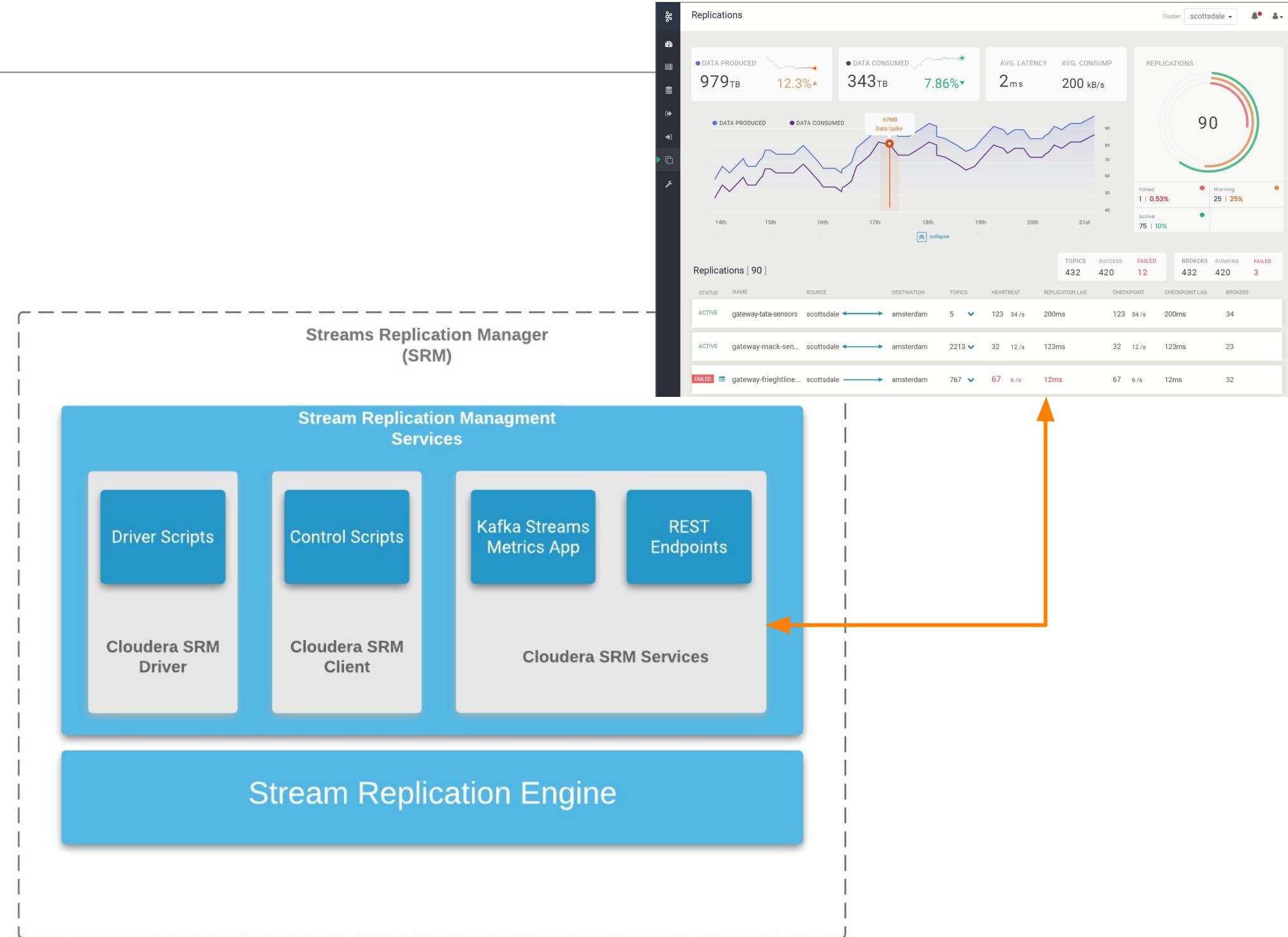
Legacy MirrorMaker

Limitations with Legacy MirrorMaker(MM) for Replication Use Cases

Challenge / Limitation	Description
Static Whitelists and Blacklists	Changes to replication jobs require restart of MirrorMaker cluster.
No Configuration/Metadata Synch	Topic configuration changes in the origin cluster are not detected and propagated to the destination cluster. New Topics are not detected
Scalability and Throughput Limitations due to Rebalances	Cannot scale replication processes as Kafka traffic increases
Lack of Monitoring and Operational Support	No tooling to install and manage replication cluster. Difficult to monitor replication lag, consumer and producer metrics for replication workflows
No Disaster Recovery, Migration, Failover	MM doesn't support active/active without capabilities such as topic renaming, etc. No support for client failover/failover out of the box.

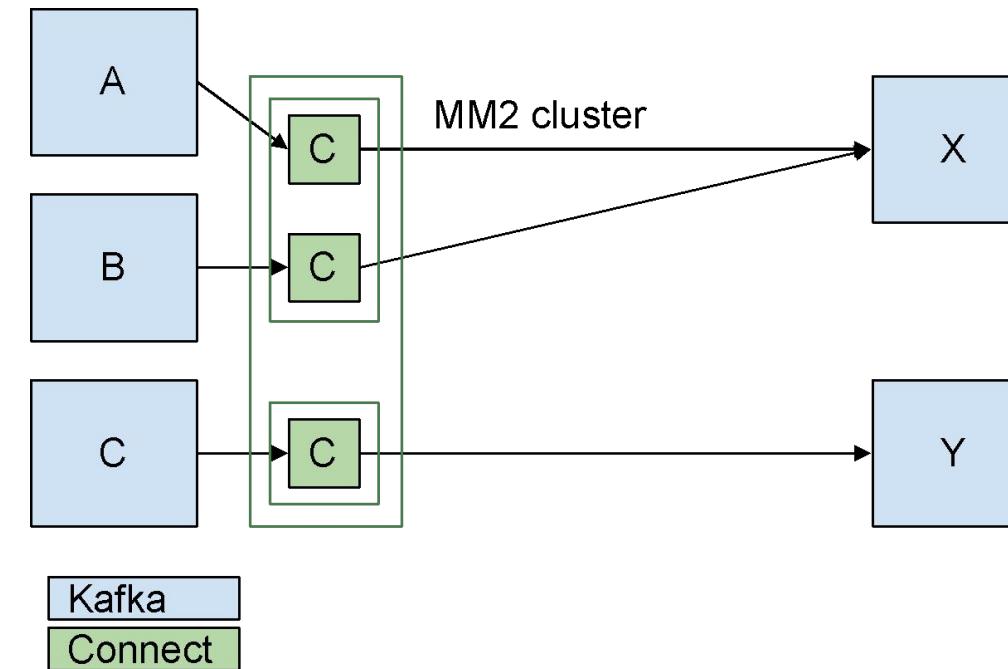
Streams Replication Manager (SRM)

- Easy installation & automation
- Lifecycle management
- Management and monitoring of replication flows across clusters with Streams Messaging Manager
- Smart client for failover and fallback

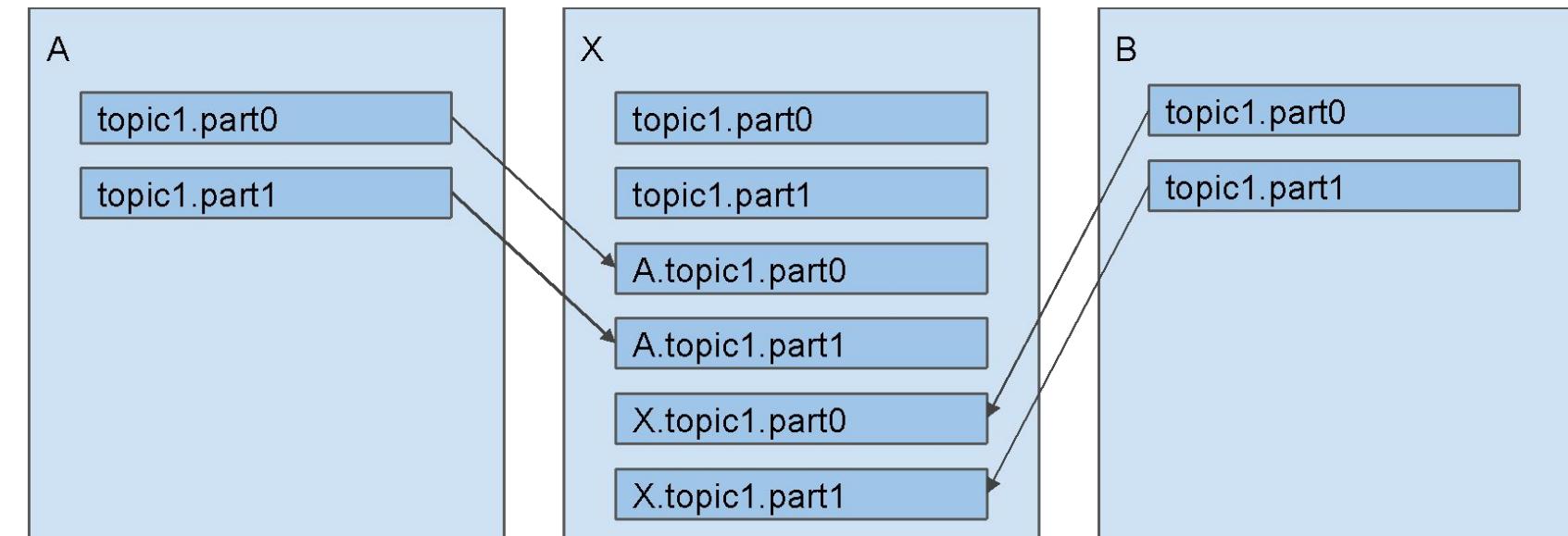


SRM Engine

- Supports active-active, multi-cluster, cross DC replication & other complex scenarios
- Leverage Kafka Connect for scalability and HA
- Replicate data and configurations (ACL, partitioning, new topics, etc)
- Offset translation

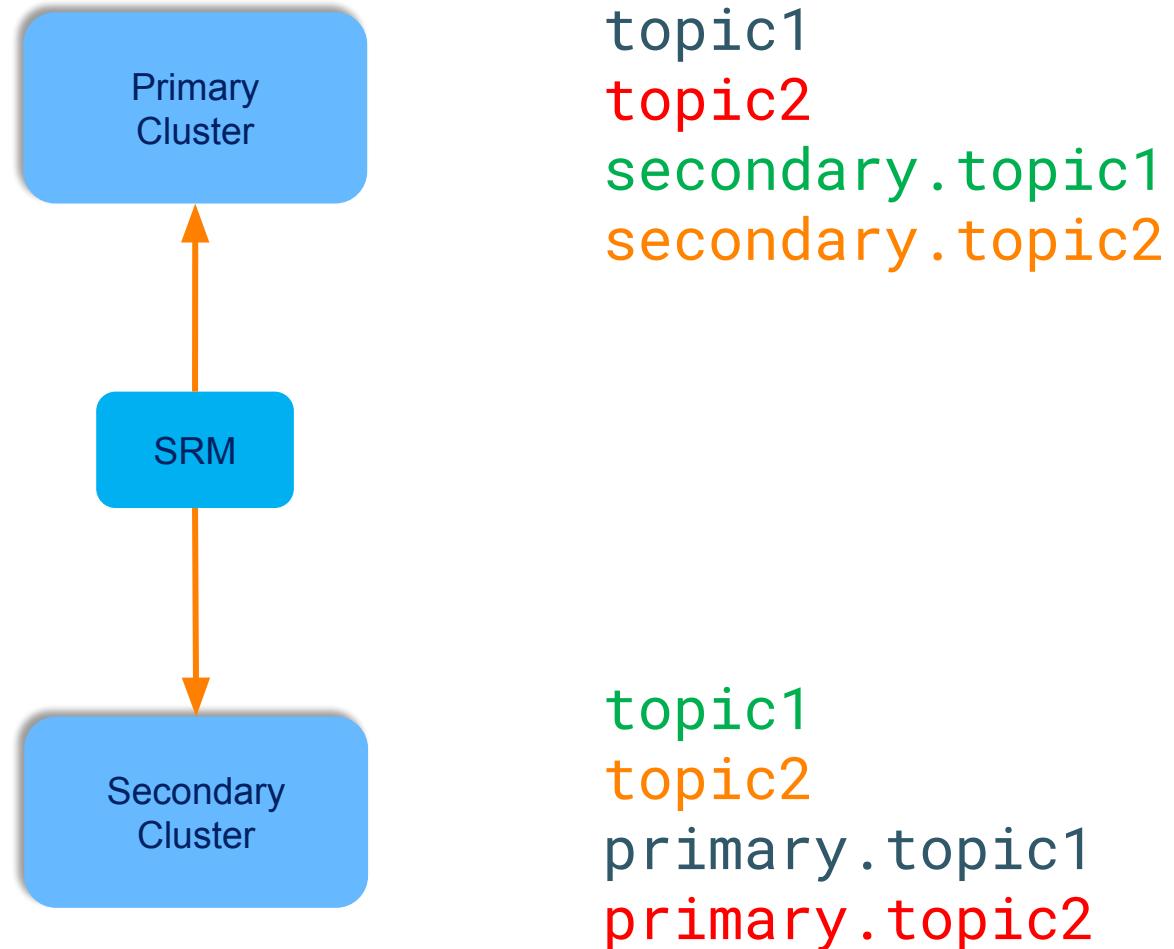


Kafka
Connect



Remote topics

- Replicated topics are renamed according to `ReplicationPolicy`.
- Default policy : `<source>.<topic>`
- Can implement custom policies



4 Key Concepts in MM2

Remote Topics

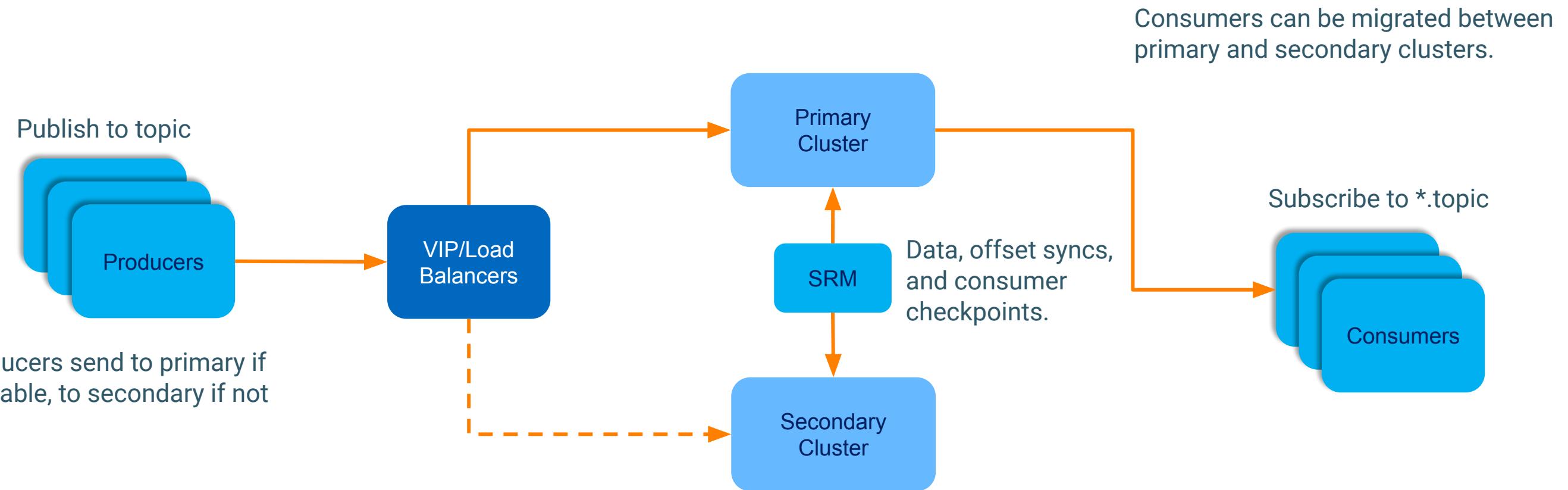
HeartBeats

Offset Syncs

Checkpoints

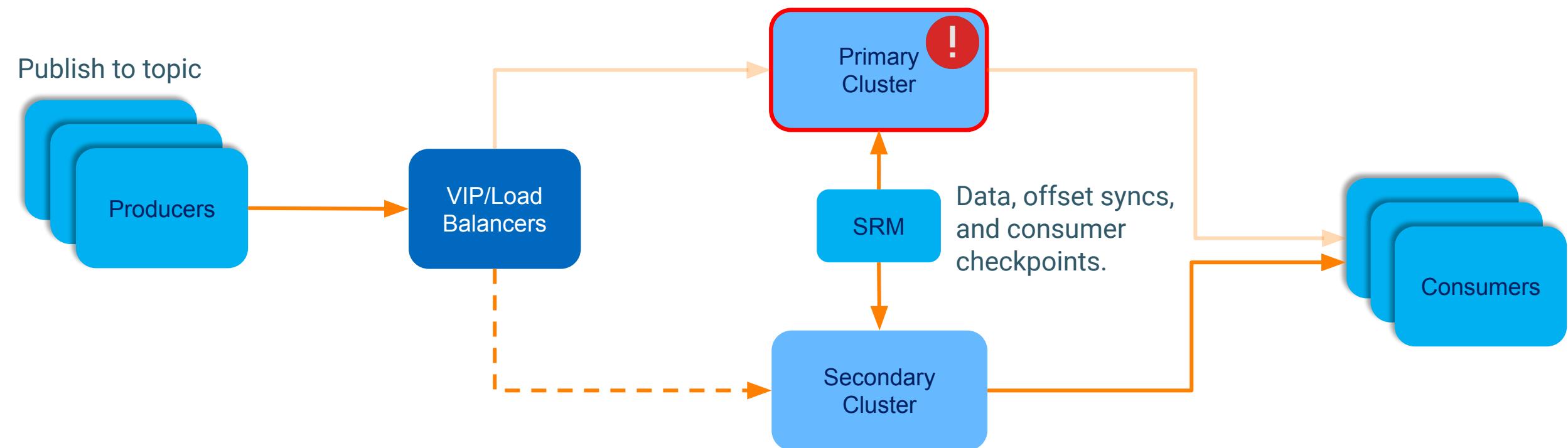
Active Passive

Active Passive



Active Passive

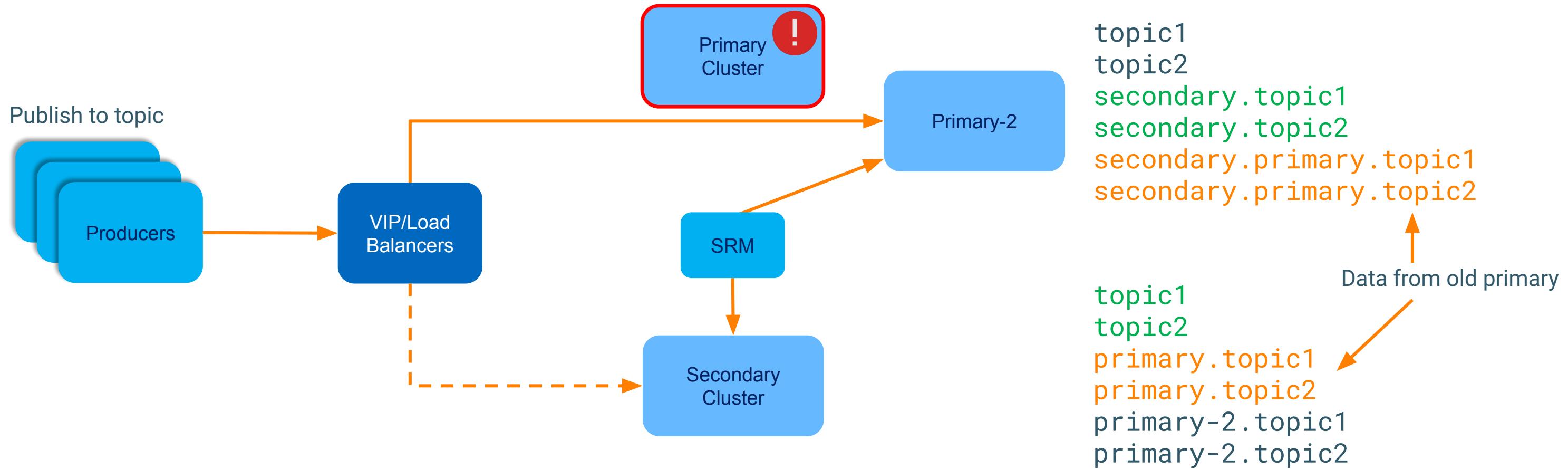
Primary down: failover and migrate consumers



```
$ srm-control offsets --bootstrap-server :9092 --source primary --group foo --export > out.csv  
$ kafka-consumer-groups --bootstrap-server B_host:9092 --reset-offsets --group foo --execute --from-file  
out.csv
```

Active Passive

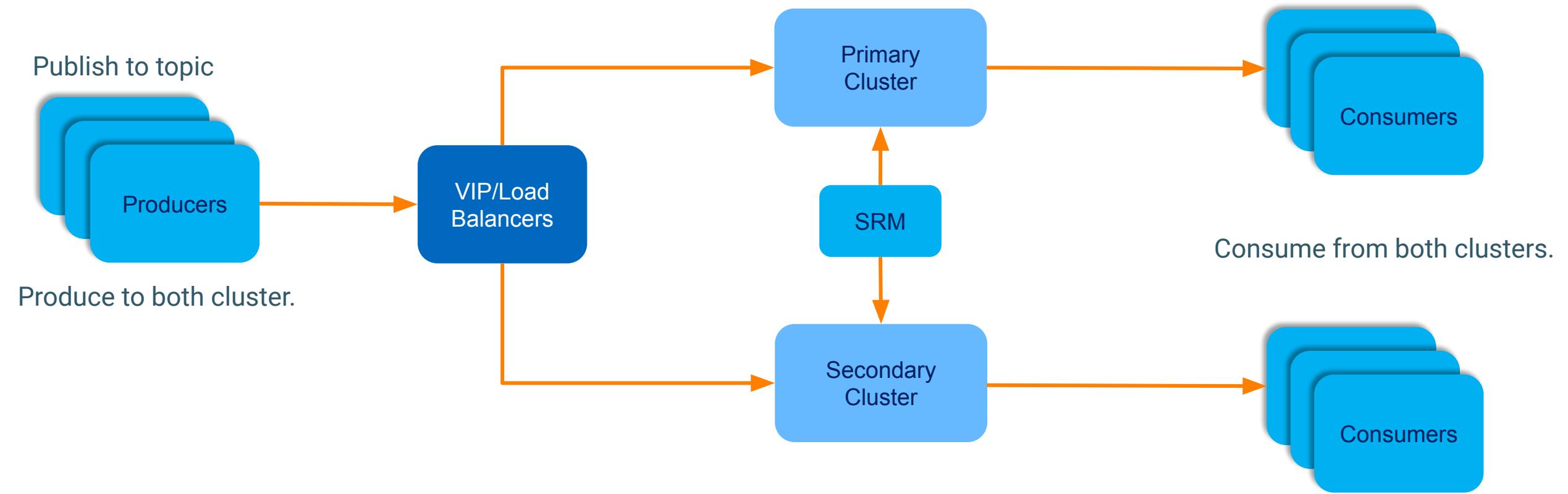
Primary permanently lost? Recover from secondary.



Active Active

Active Active: Cross DC Consumer Groups or Cross DC Replication

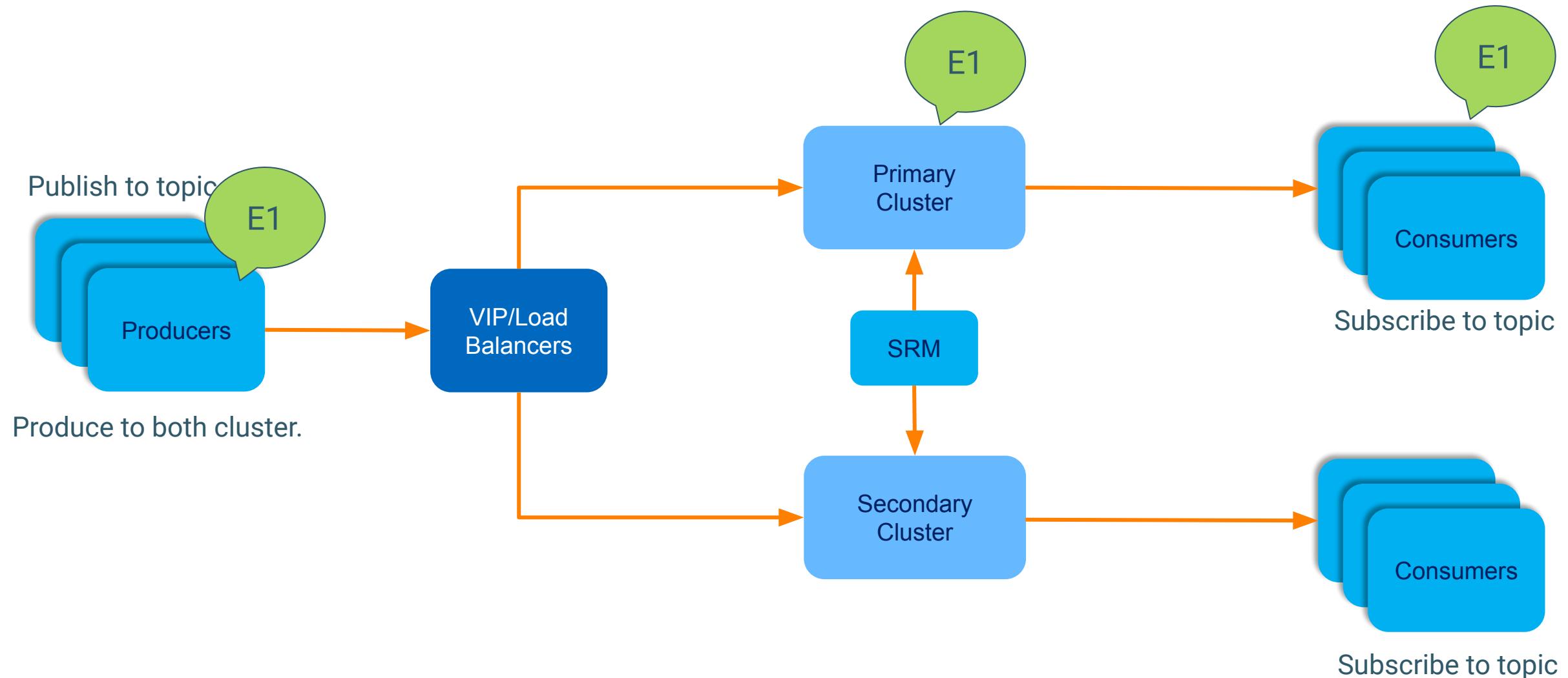
Consumer subscription defines the patterns



A/ Cross DC Consumer Groups

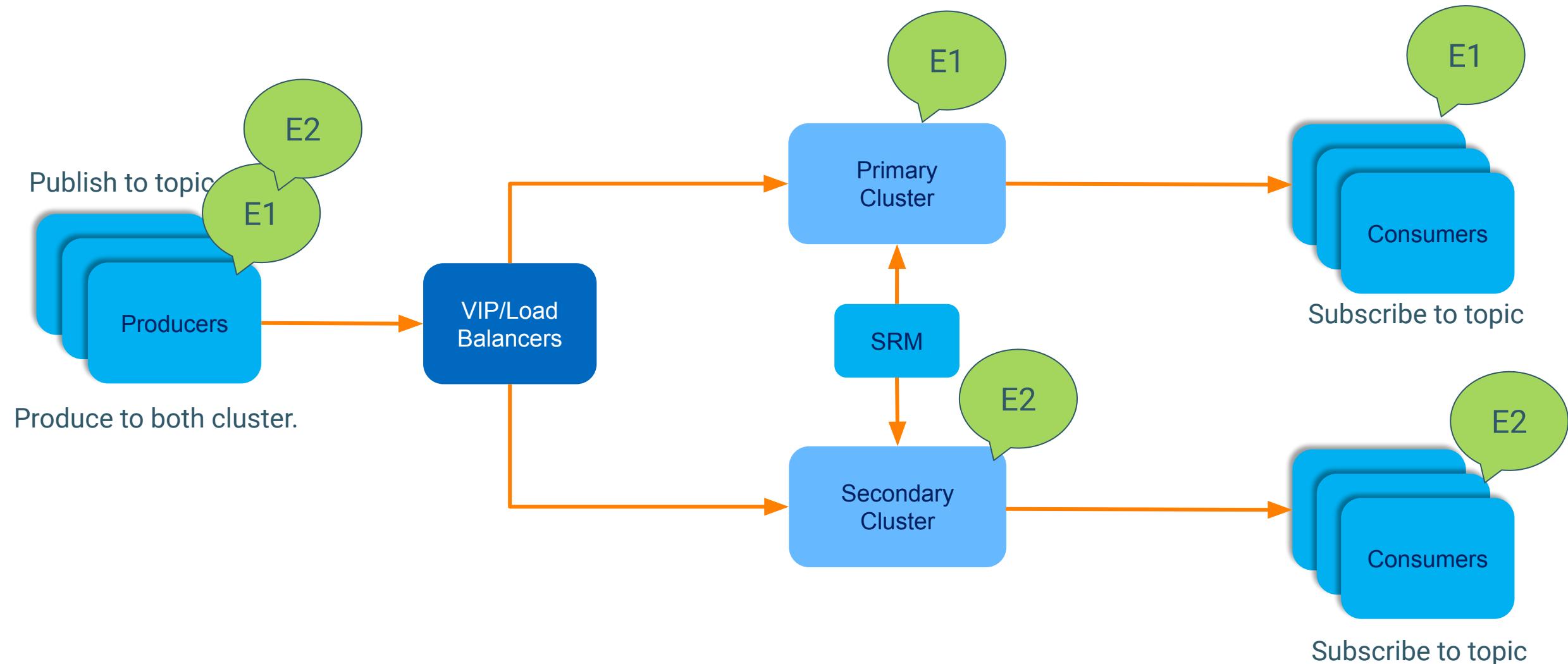
Cross DC consumer groups

Only one consumer processes each record



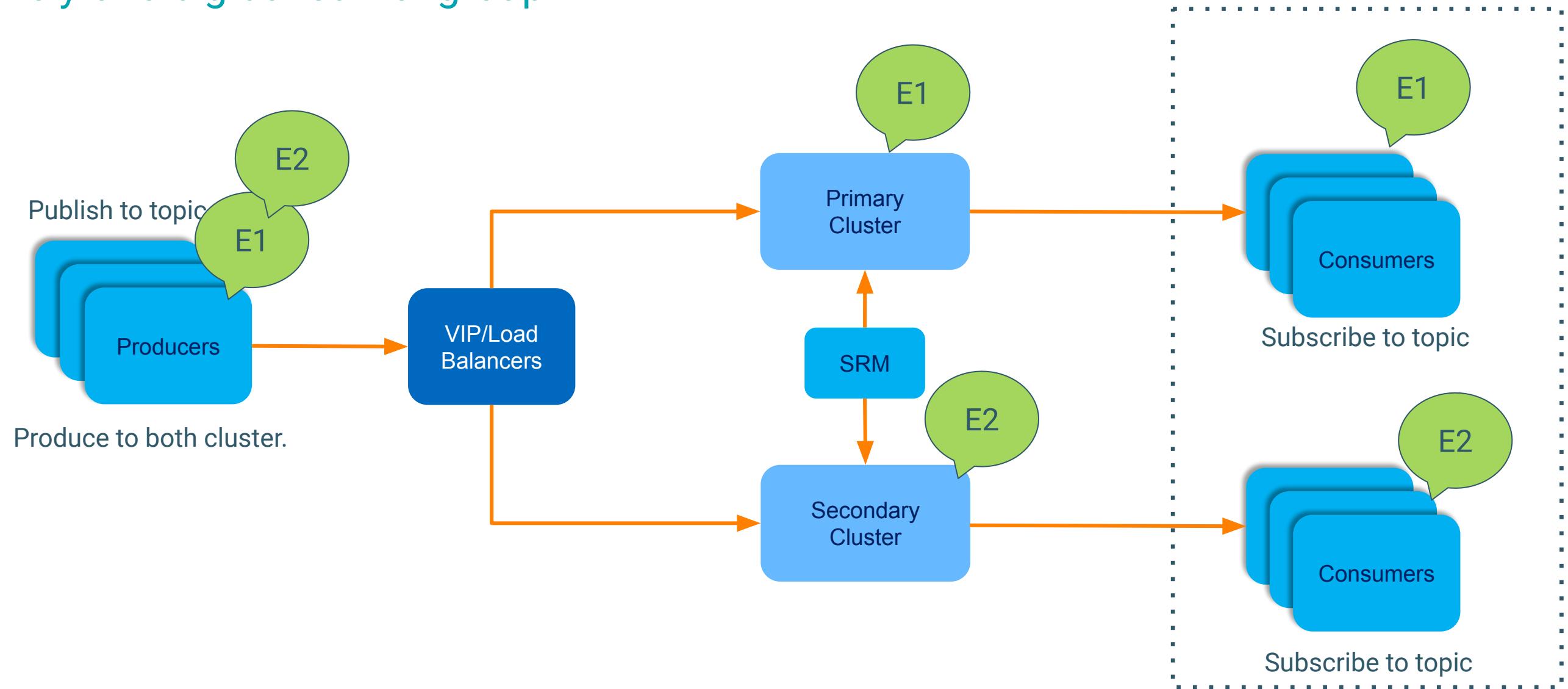
Cross DC consumer groups

Only one consumer processes each record



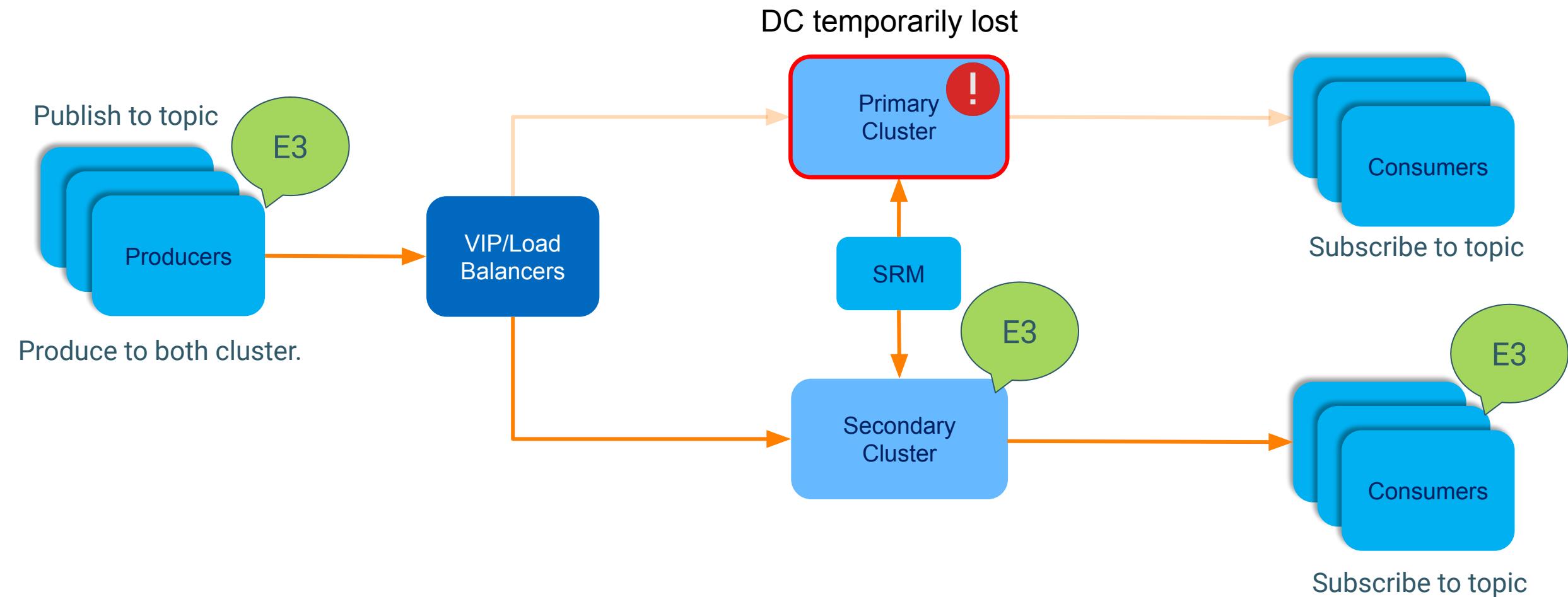
Cross DC consumer groups

Effectively one big consumer group



Cross DC consumer groups

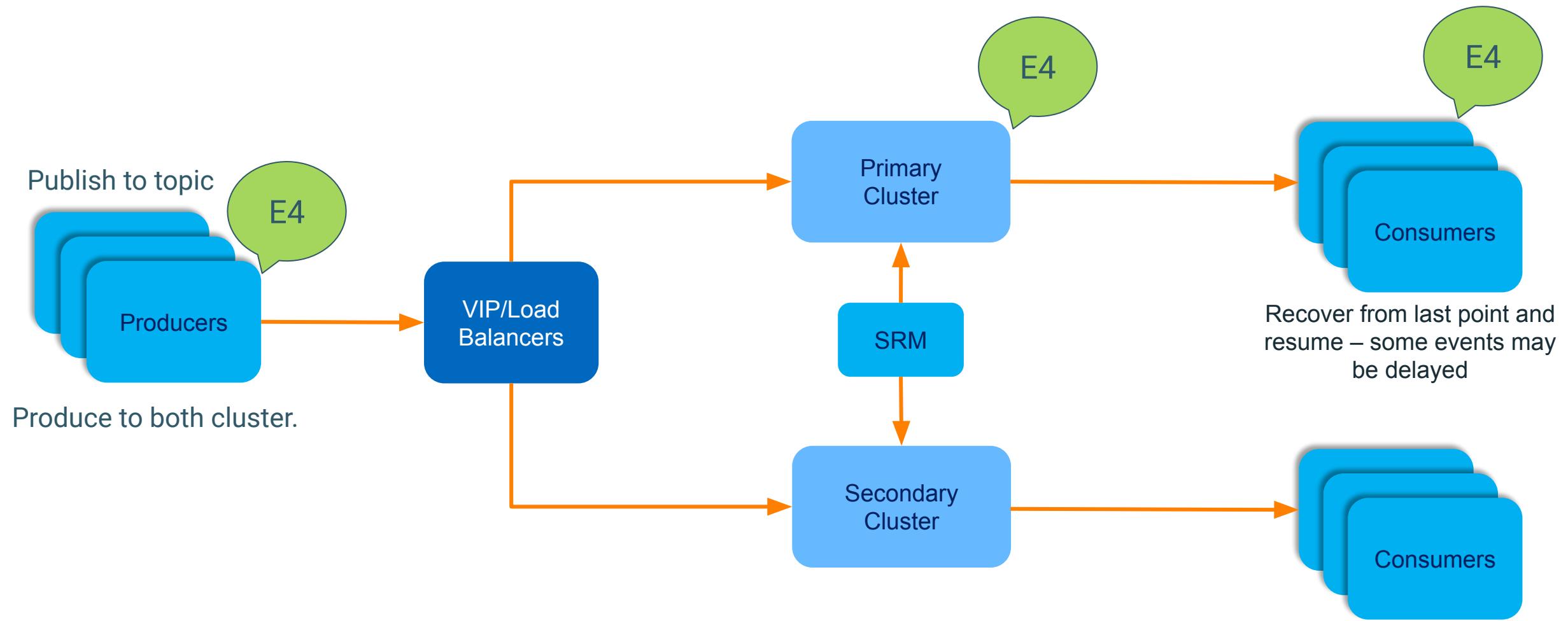
What it takes to fail-over? Nothing



Cross DC consumer groups

What it takes to fail-back? Nothing also

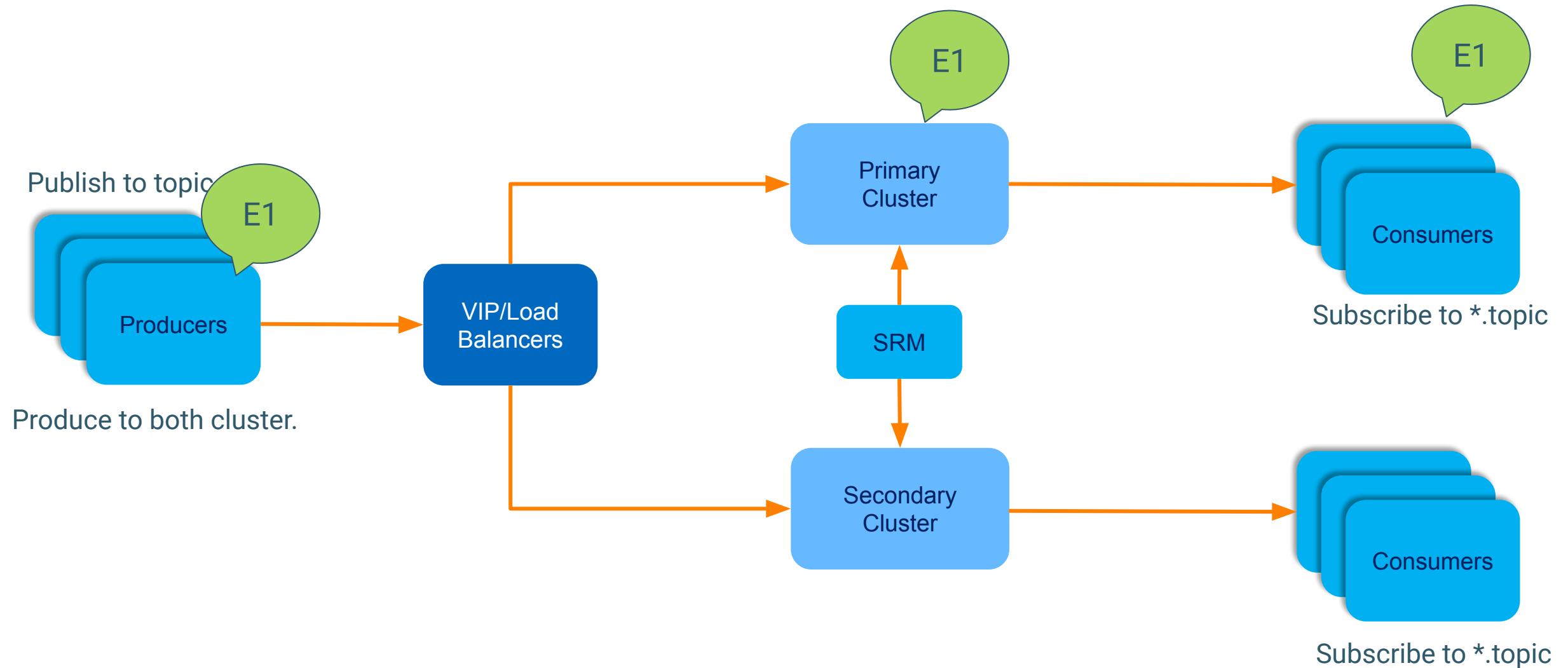
DC issue resolved !



B/ Cross DC Replication

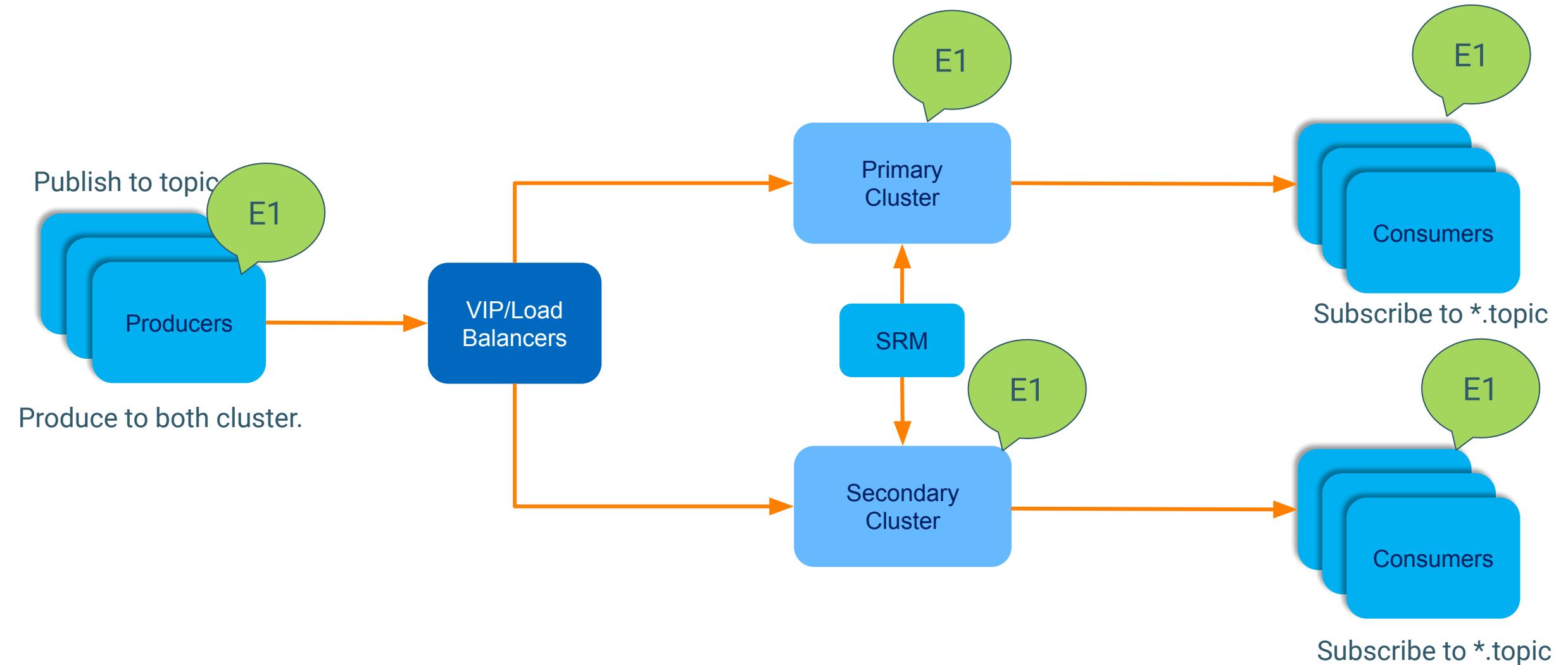
Cross Data Center Replication XDCR

All consumers process all records



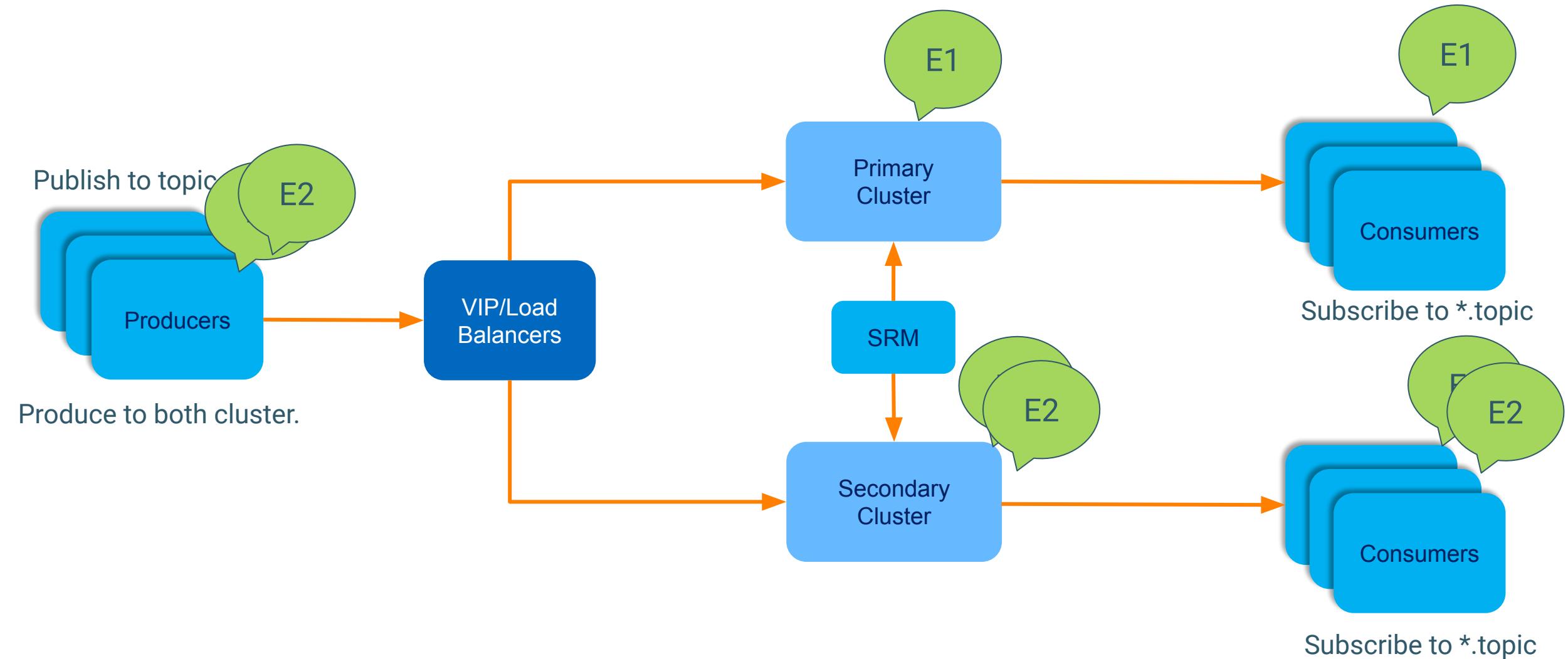
Cross Data Center Replication XDCR

All consumers process all records



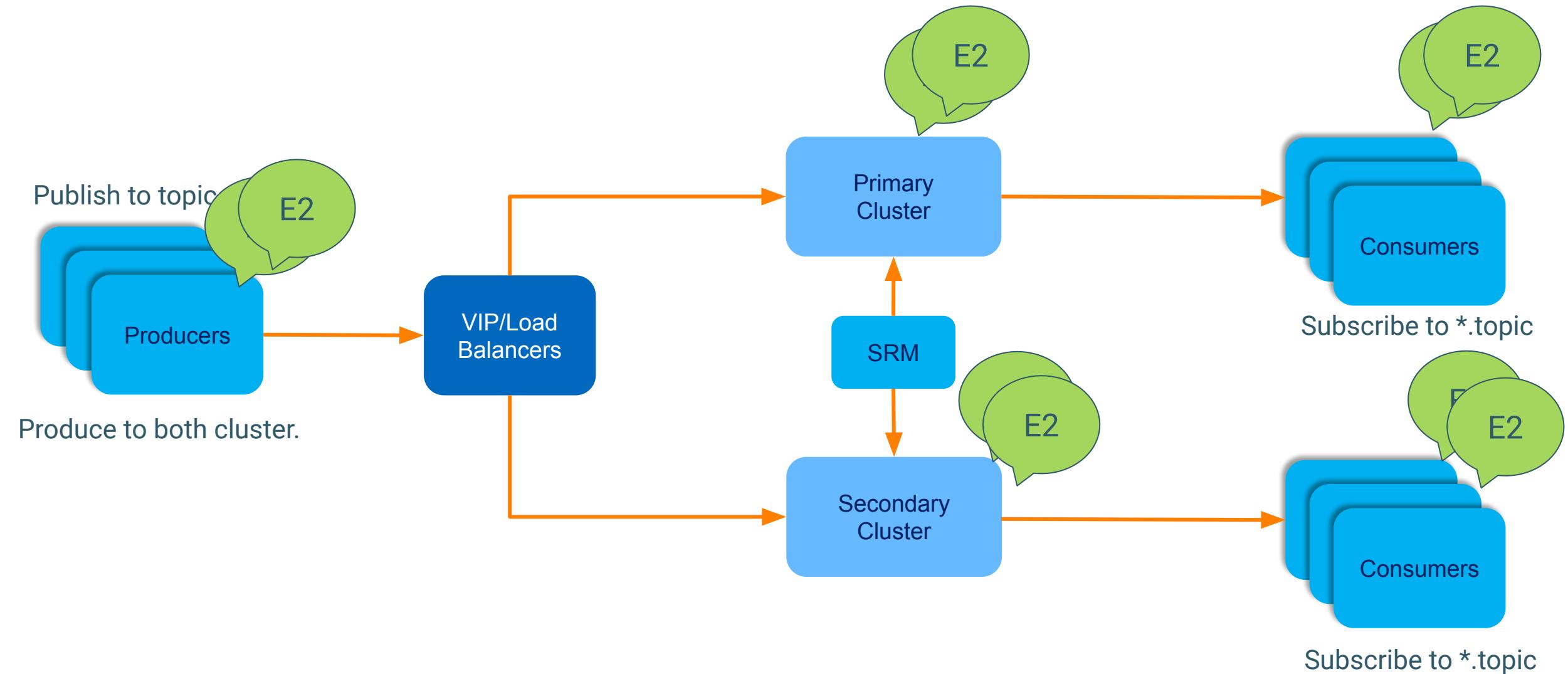
Cross Data Center Replication XDCR

All consumers process all records



Cross Data Center Replication XDCR

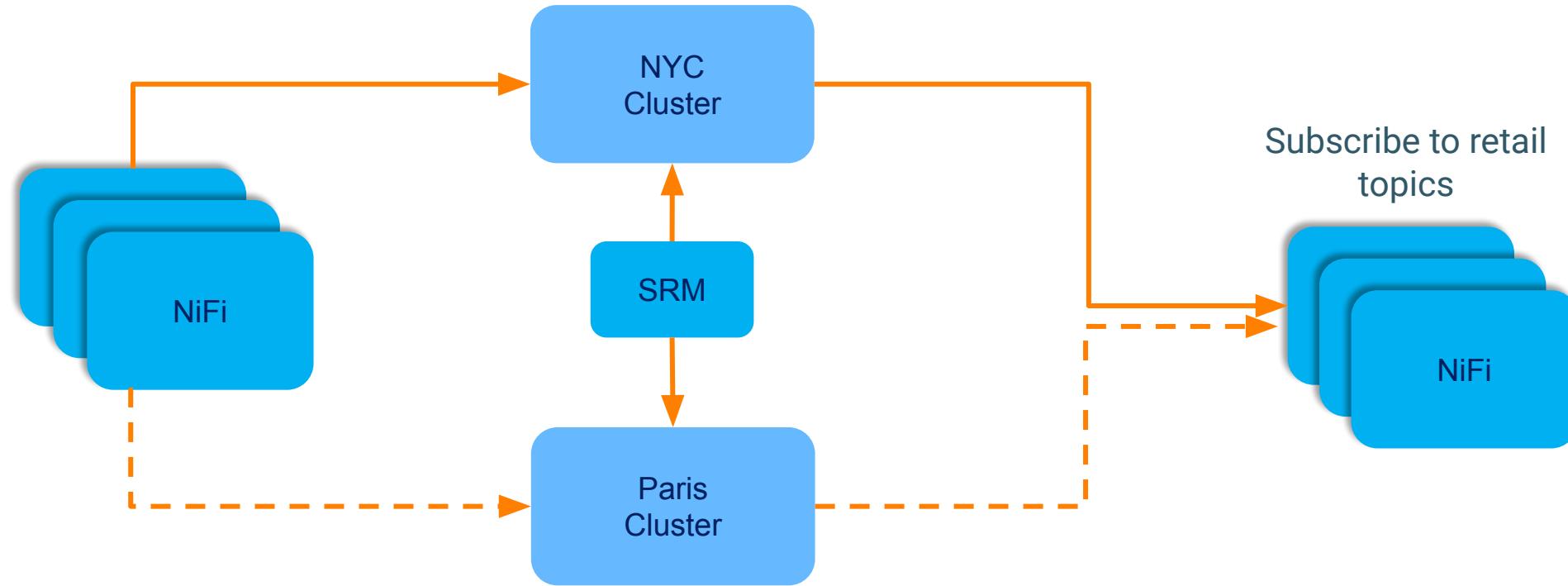
All consumers process all records



Demo DR with SRM

Use cases and scenarios

- WW retailer with critical use cases on Kafka
- Two clusters : NYC & Paris
- NiFi publish/consume events to/from Kafka
- global-retail-* topics are critical and should be replicated
- Local-retail-* are not replicated



TH^ON^G Y^OU[★]

