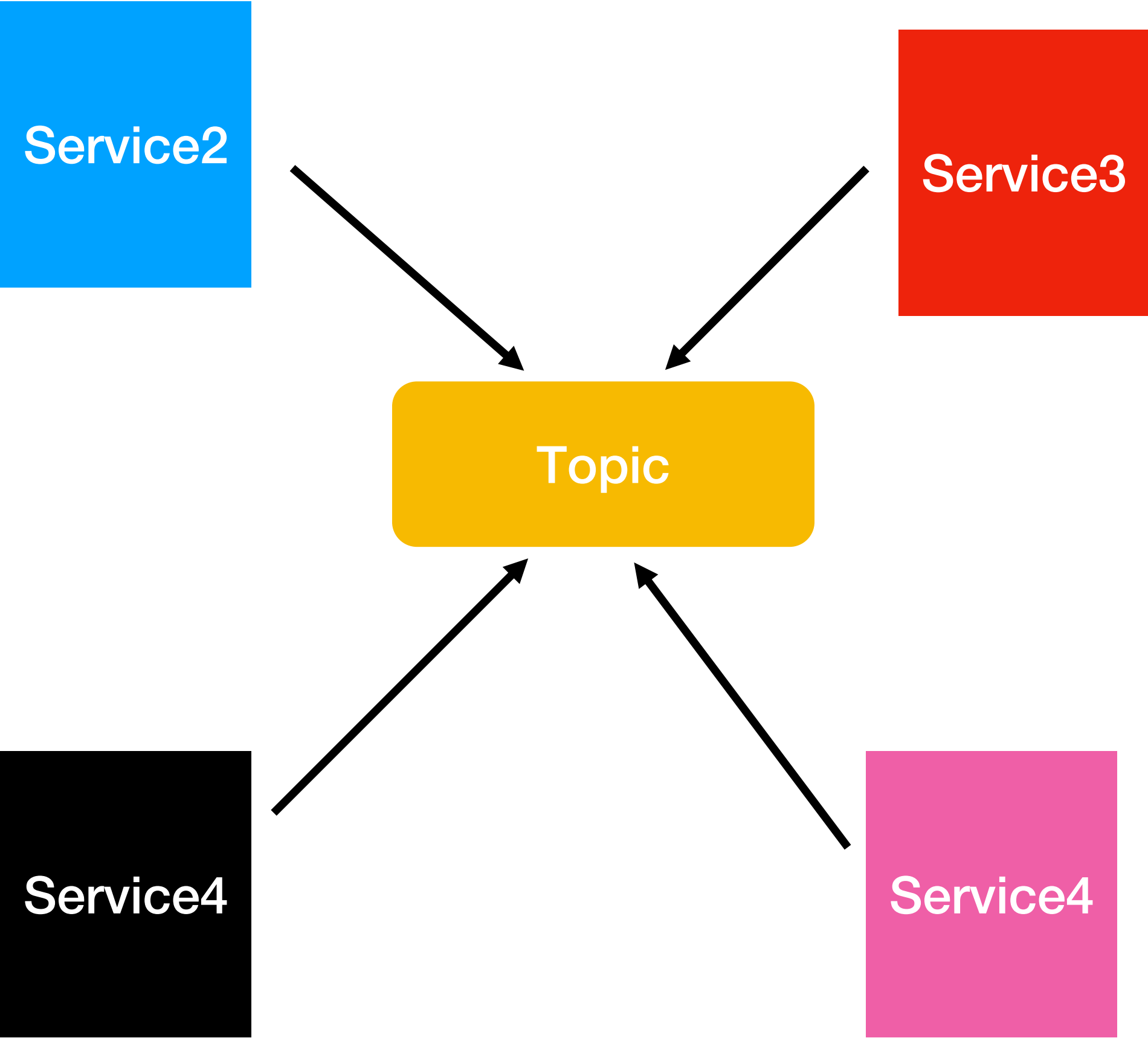
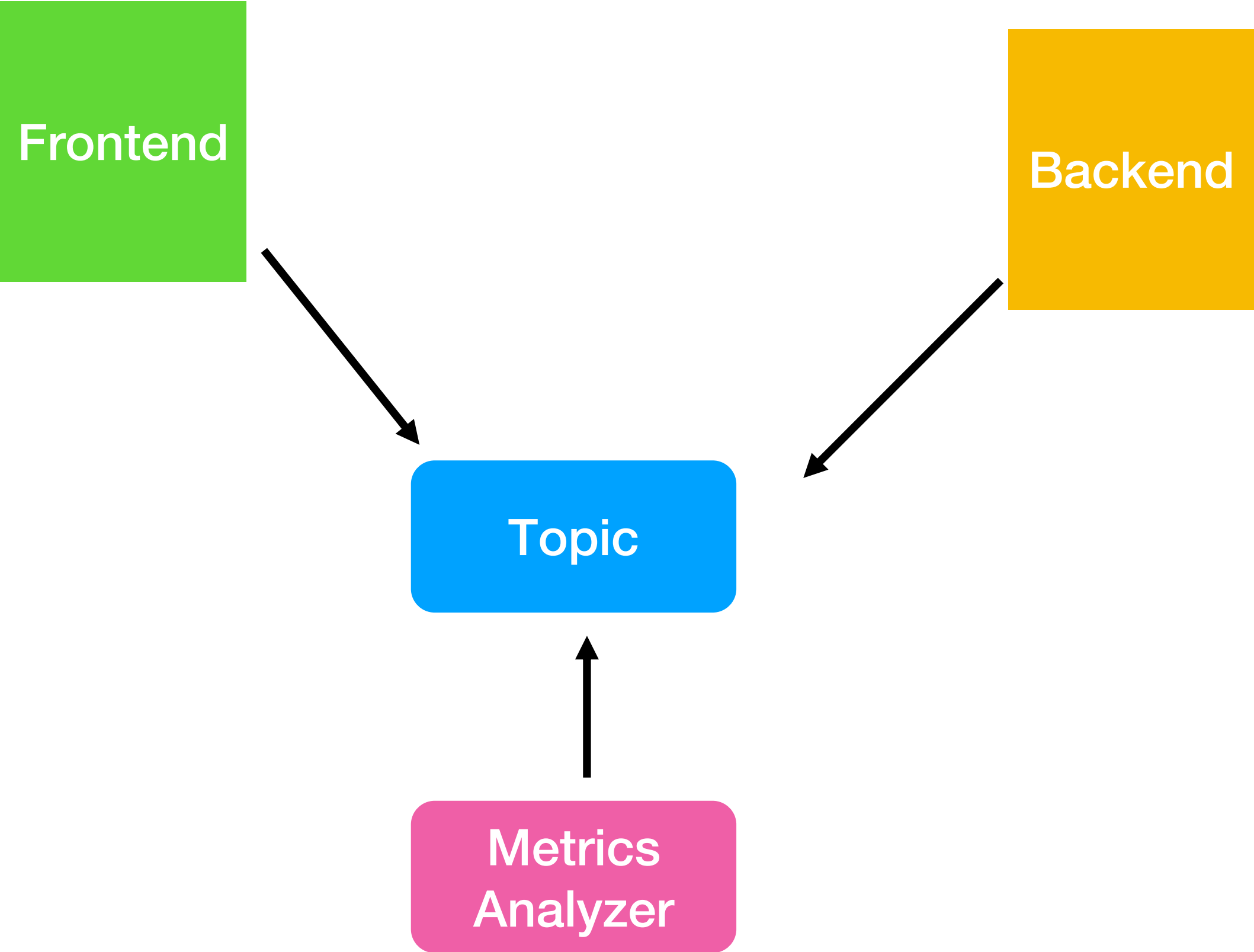
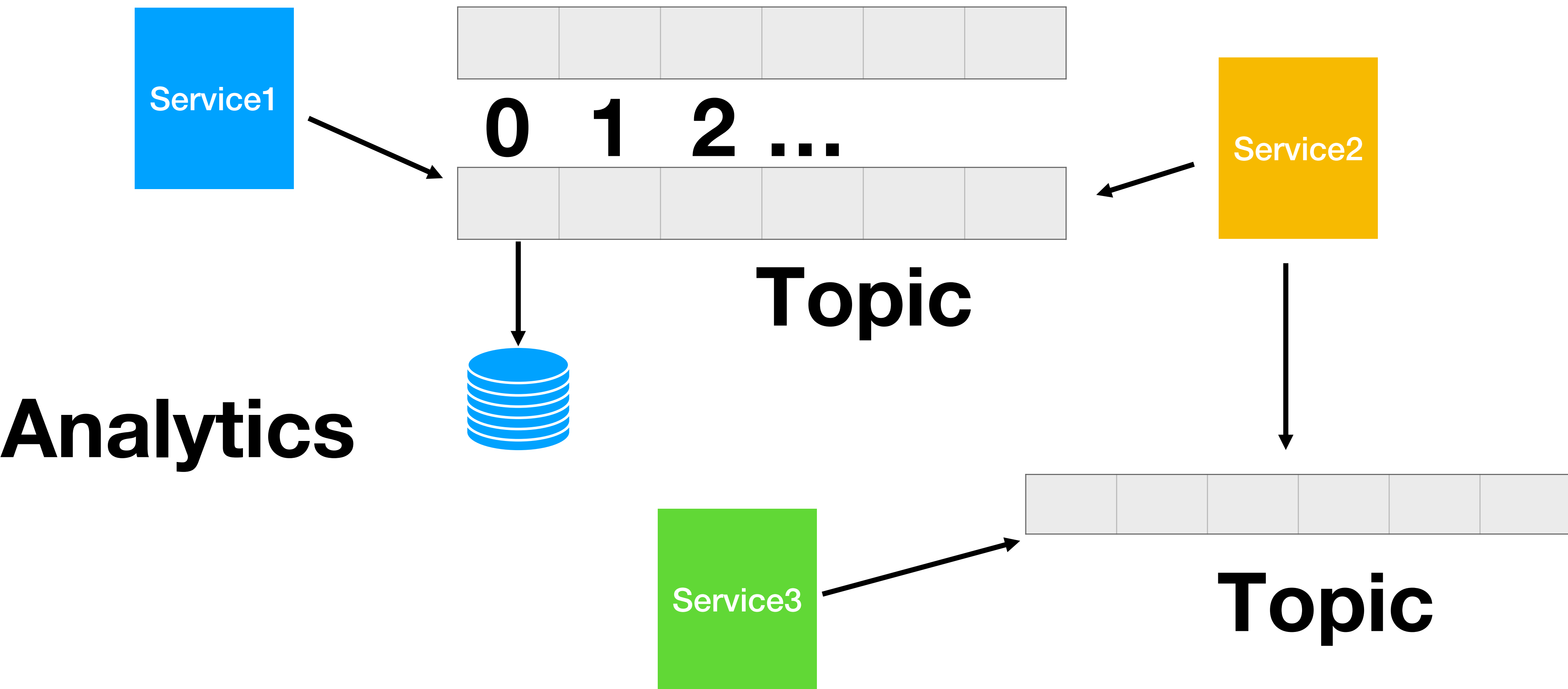


Pub - Sub



What is Kafka



Kafka Streams API

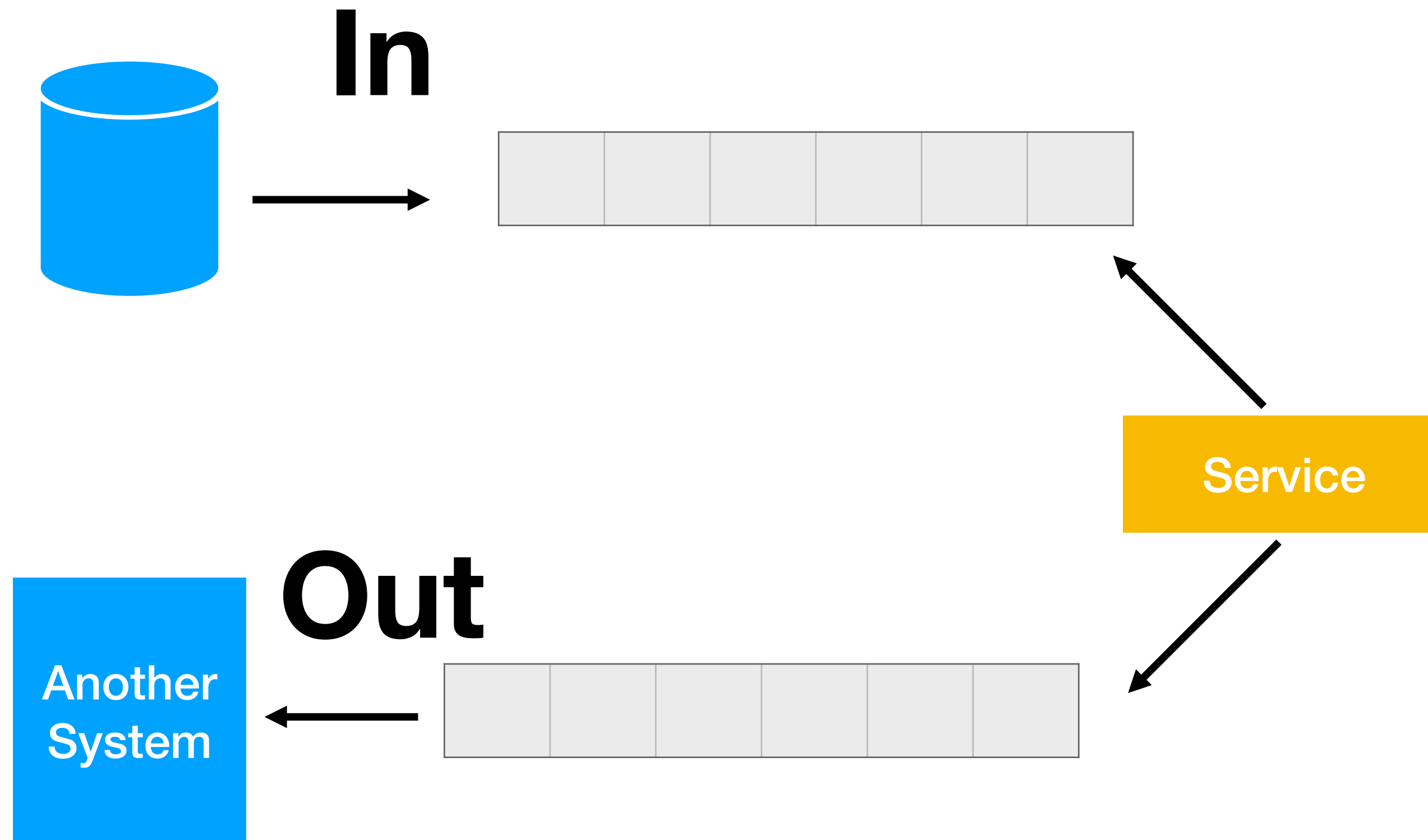
Out Of Box

Grouping
Aggregating
Filtering
Joining



Service

Kafka Connect



Declarative

Open Source
Commercial

Who

Twitter

Perf and Analytics

Netflix

Messaging Backbone

Uber

uReplicator

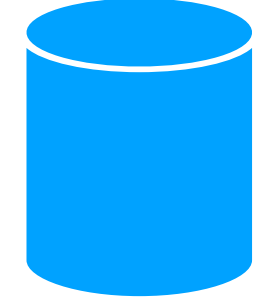
Yahoo

Real Time Analytics

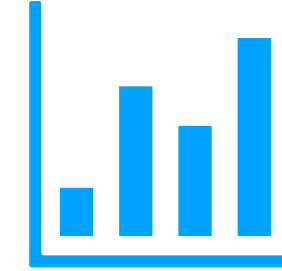
Pinterest

Real Time Ads

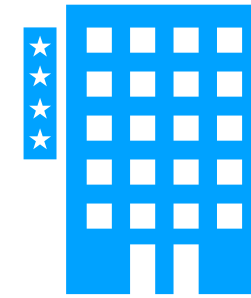
Where



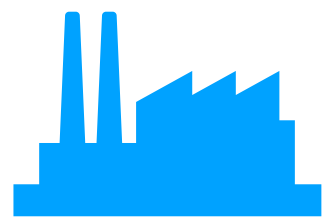
Data platforms, Micro Services



Monitoring Trucks, Cars



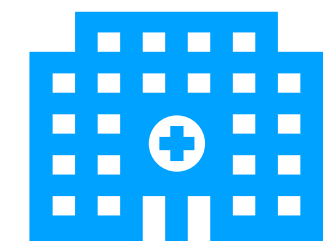
Retail, Hotel and Travel



Factories



Hospitals

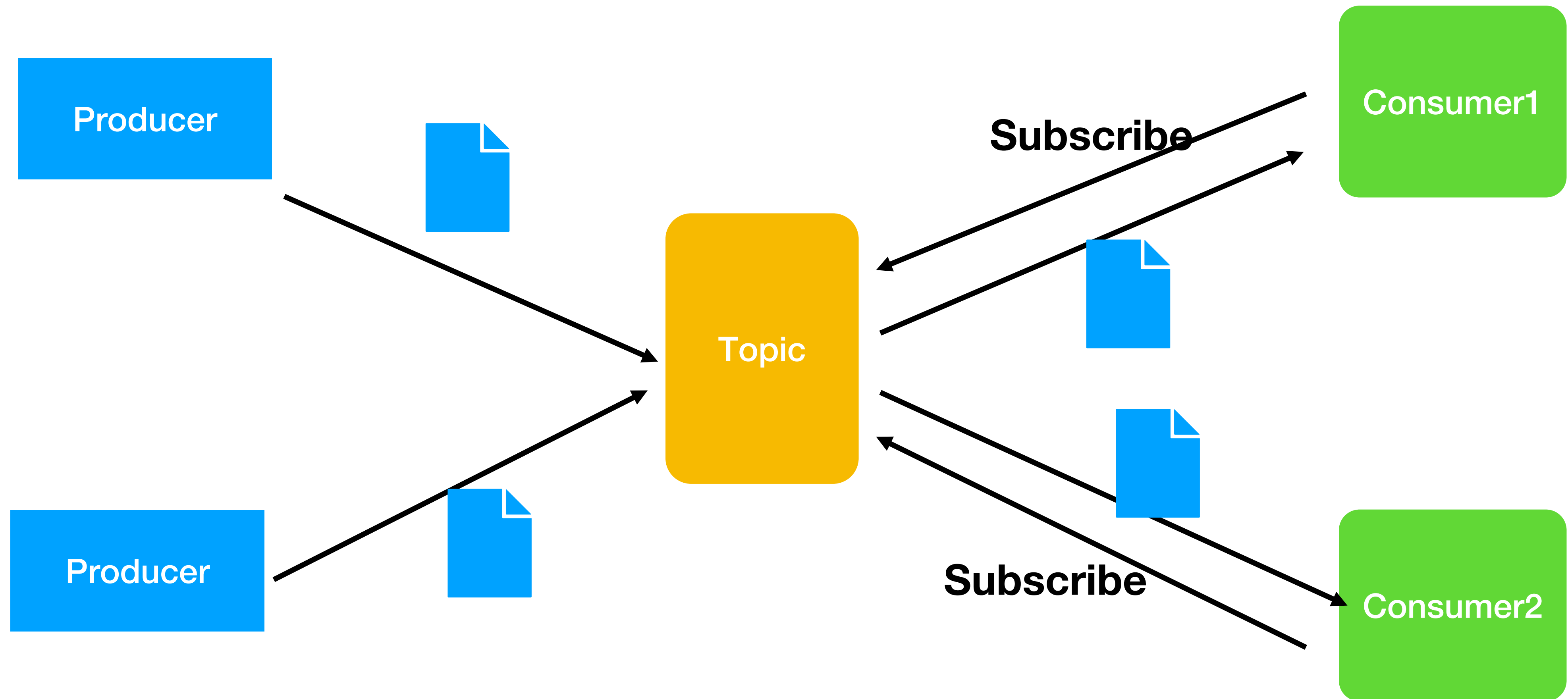


Financial Transactions



Why?

Multiple Producers and Consumers



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

ownership

Consumer 0

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Consumer 1

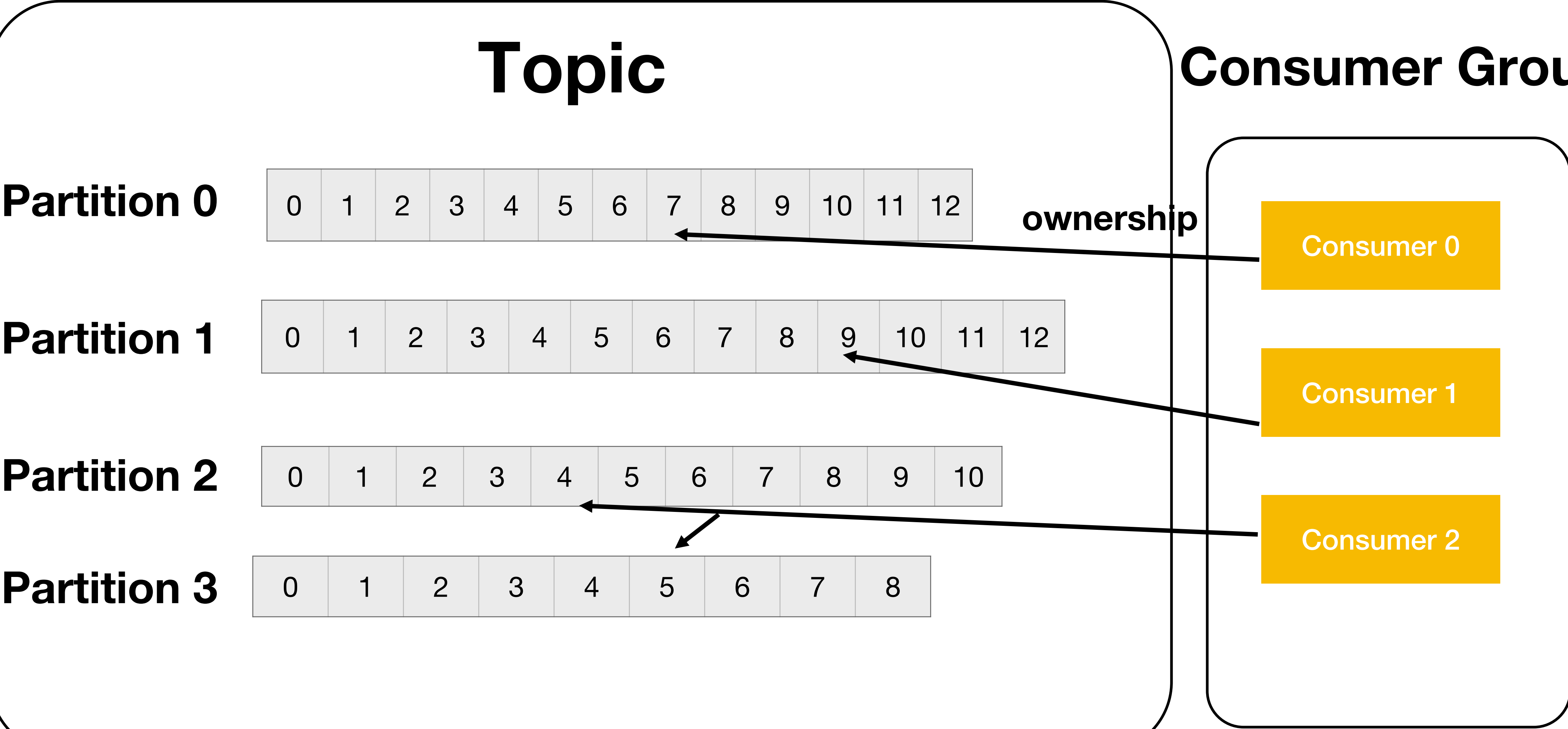
Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

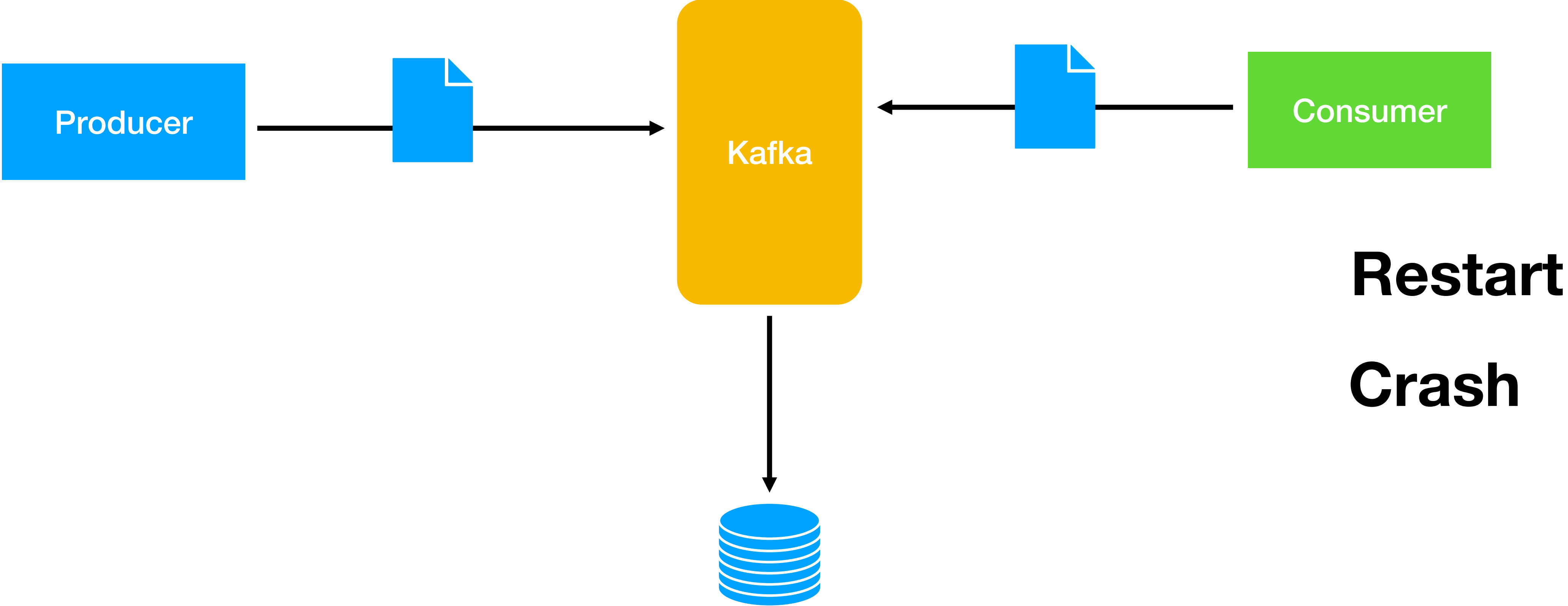
Consumer 2

Partition 3

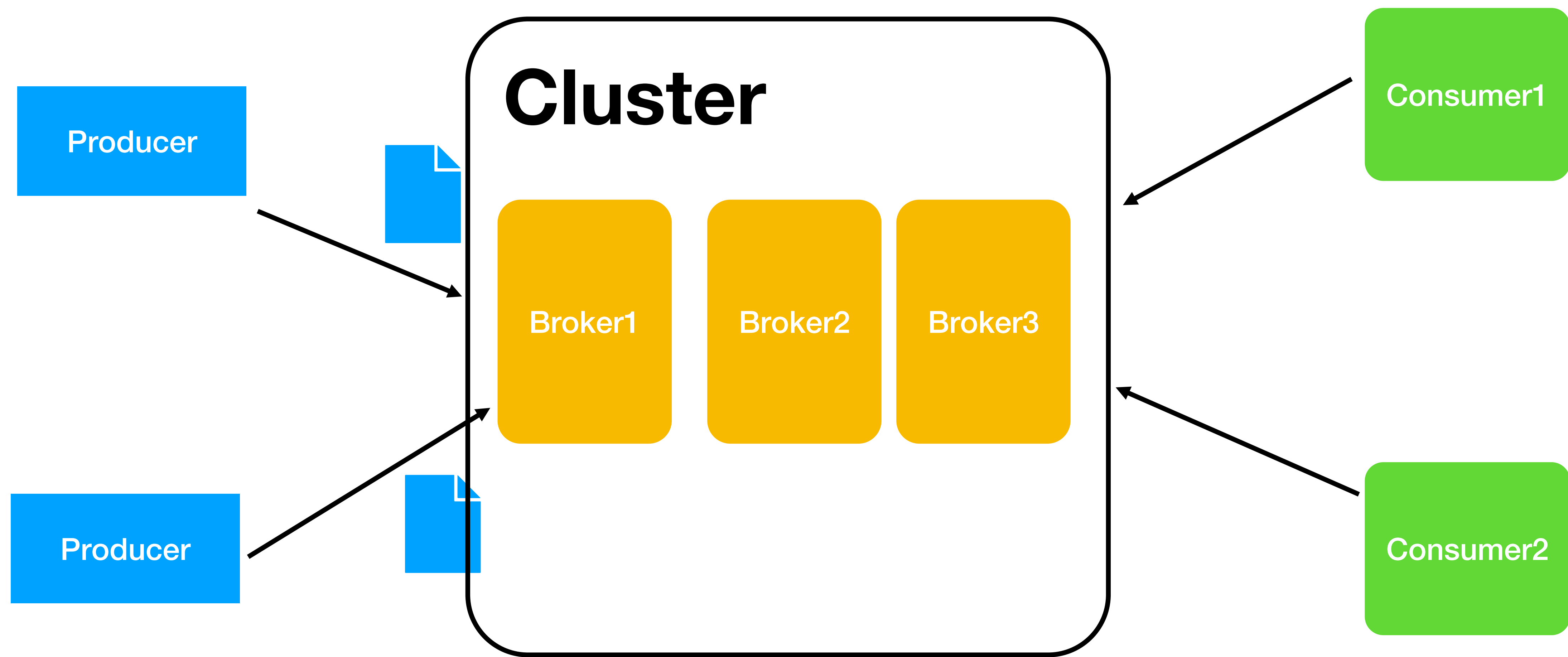
0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---



Disk Based Persistence



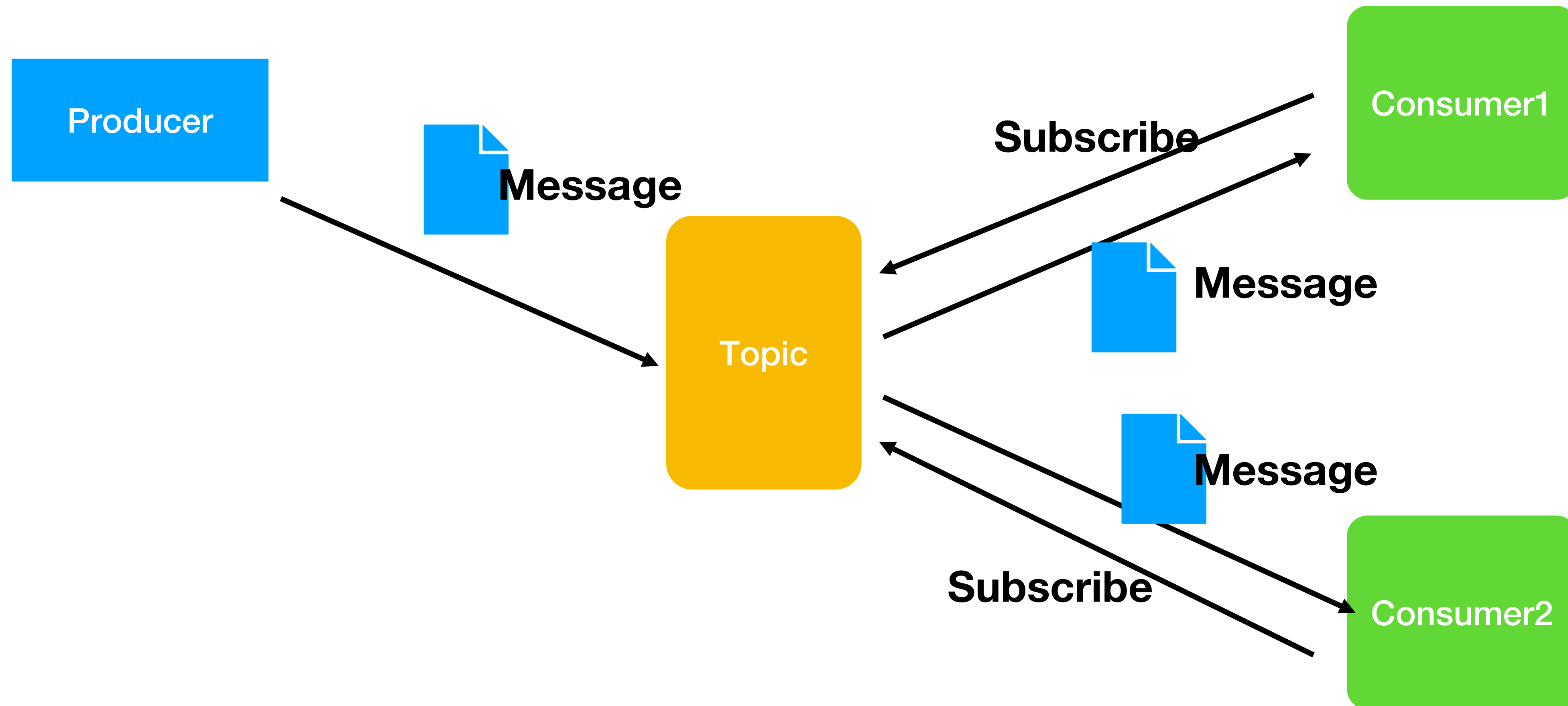
Scalability



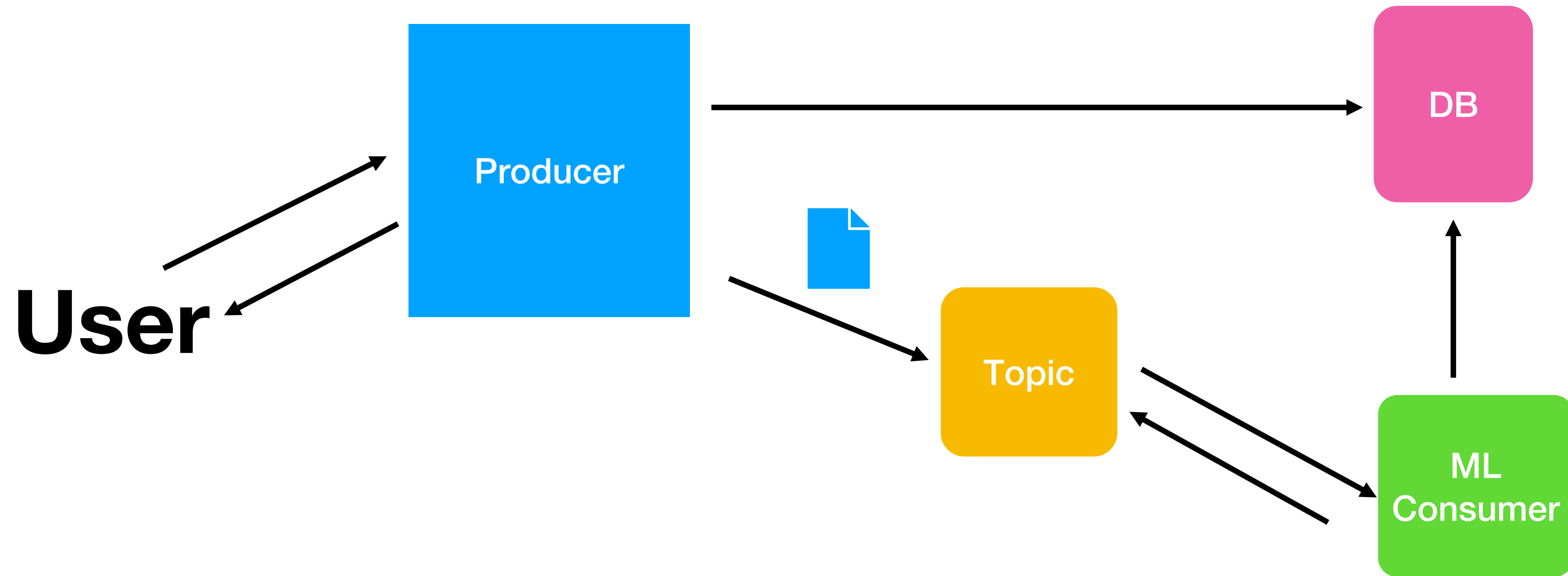
Performance

Usecases

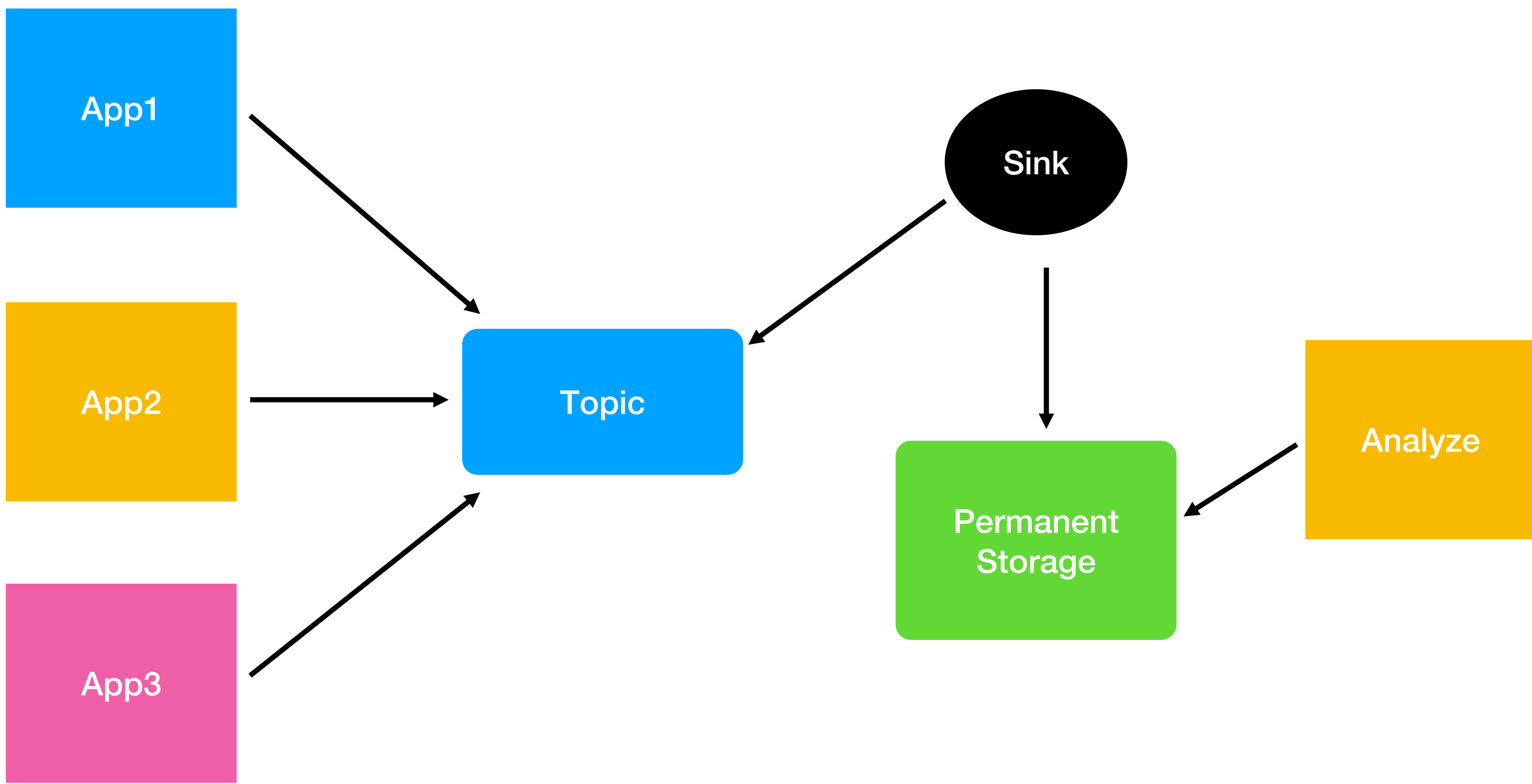
Pub-Sub



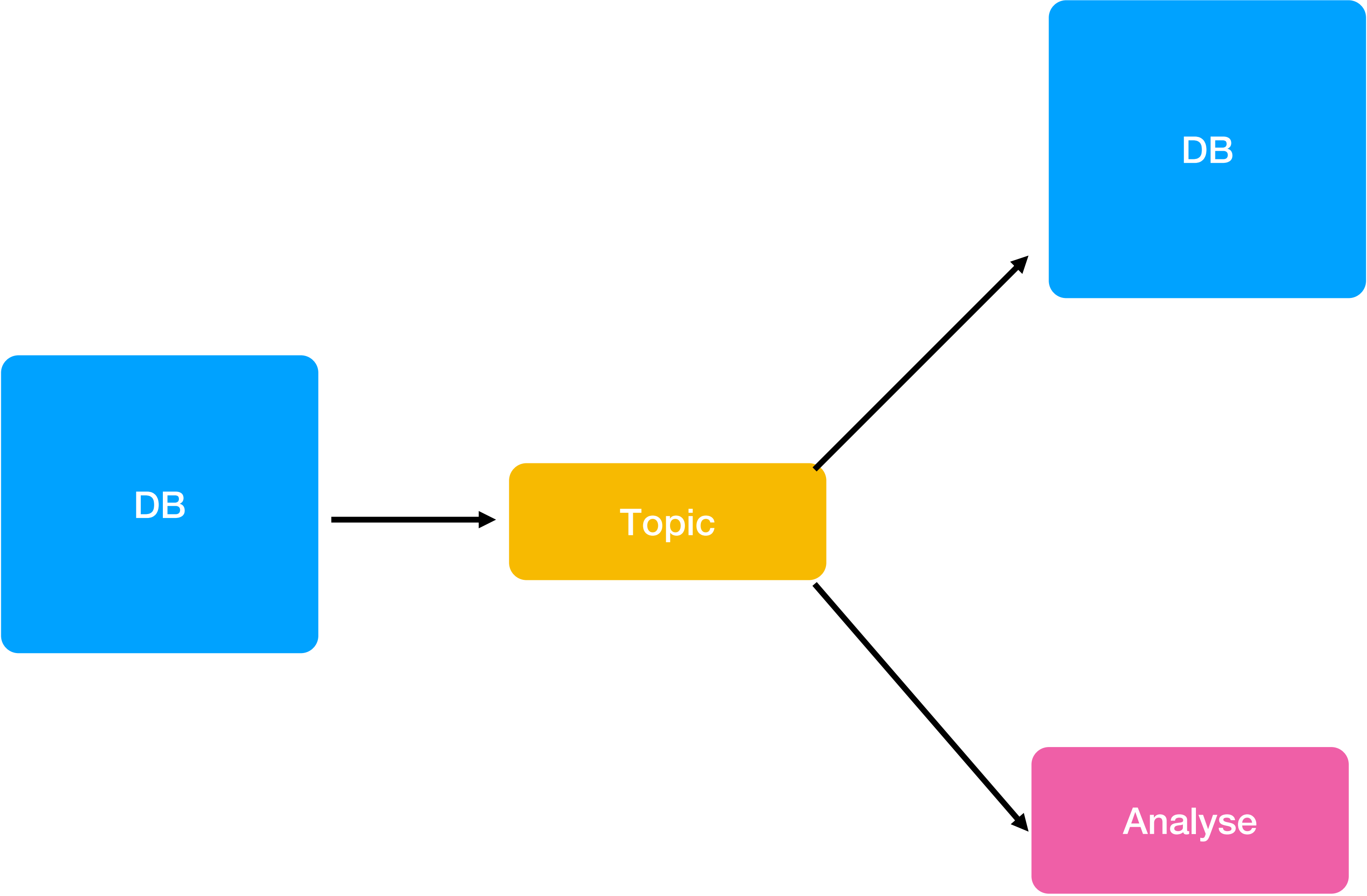
Activity Tracking



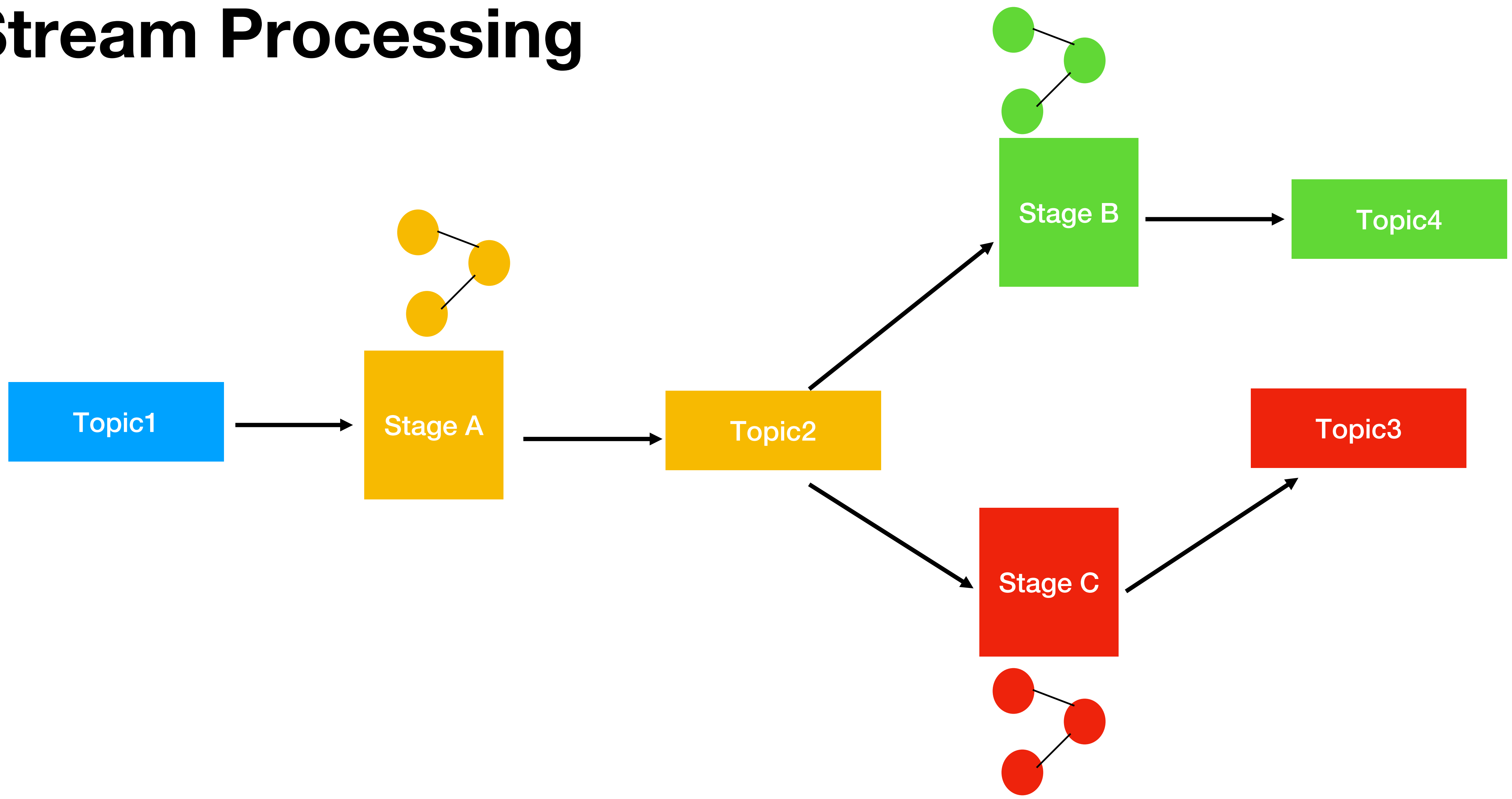
Metrics and Log Aggregation



Commit Log



Stream Processing

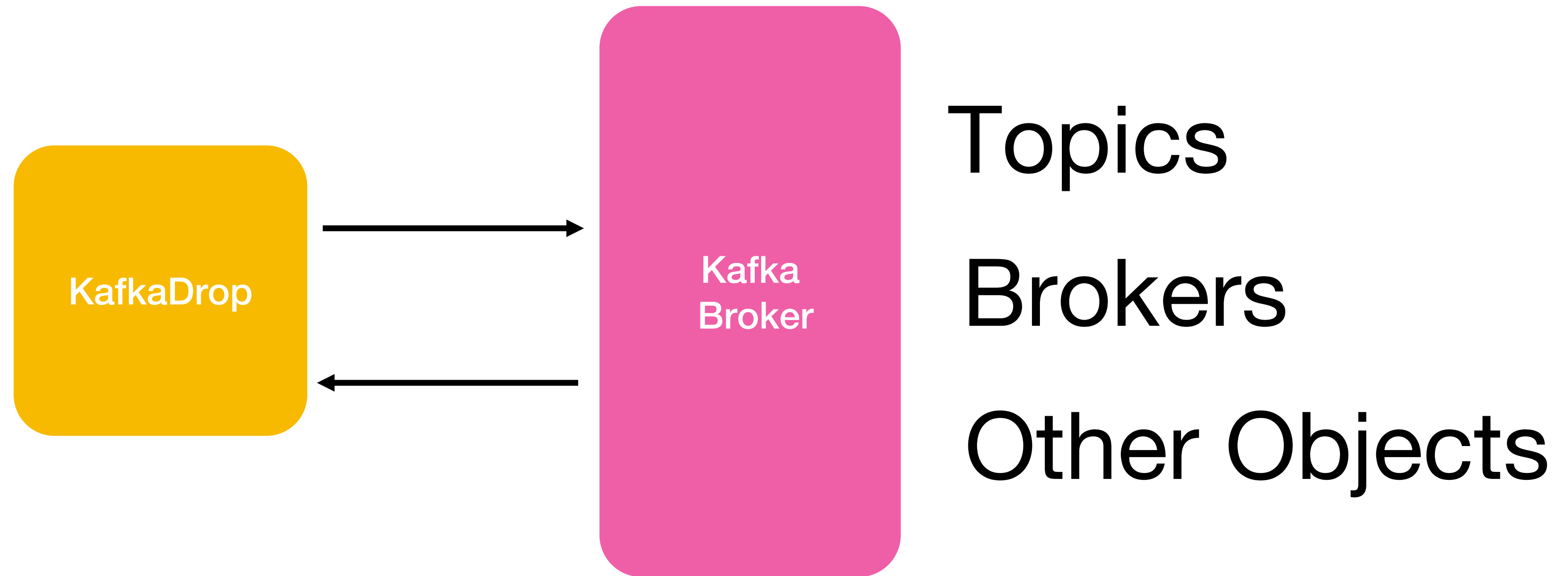


Java

APIs

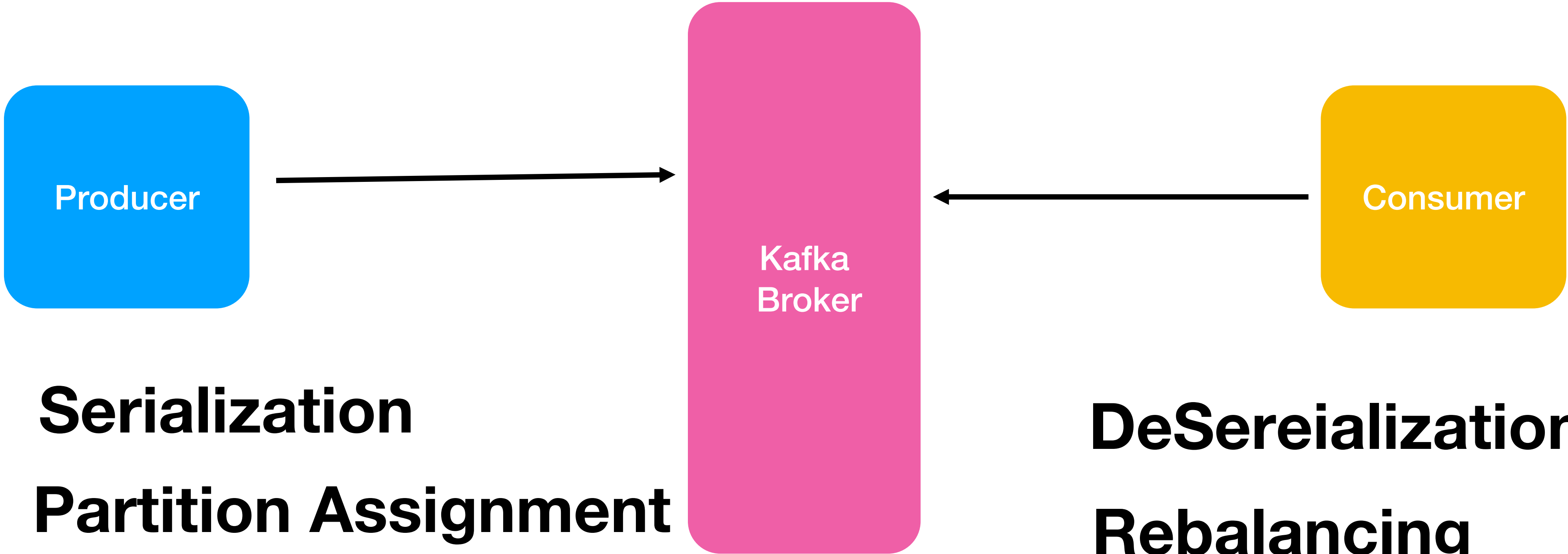
Scala

Admin API

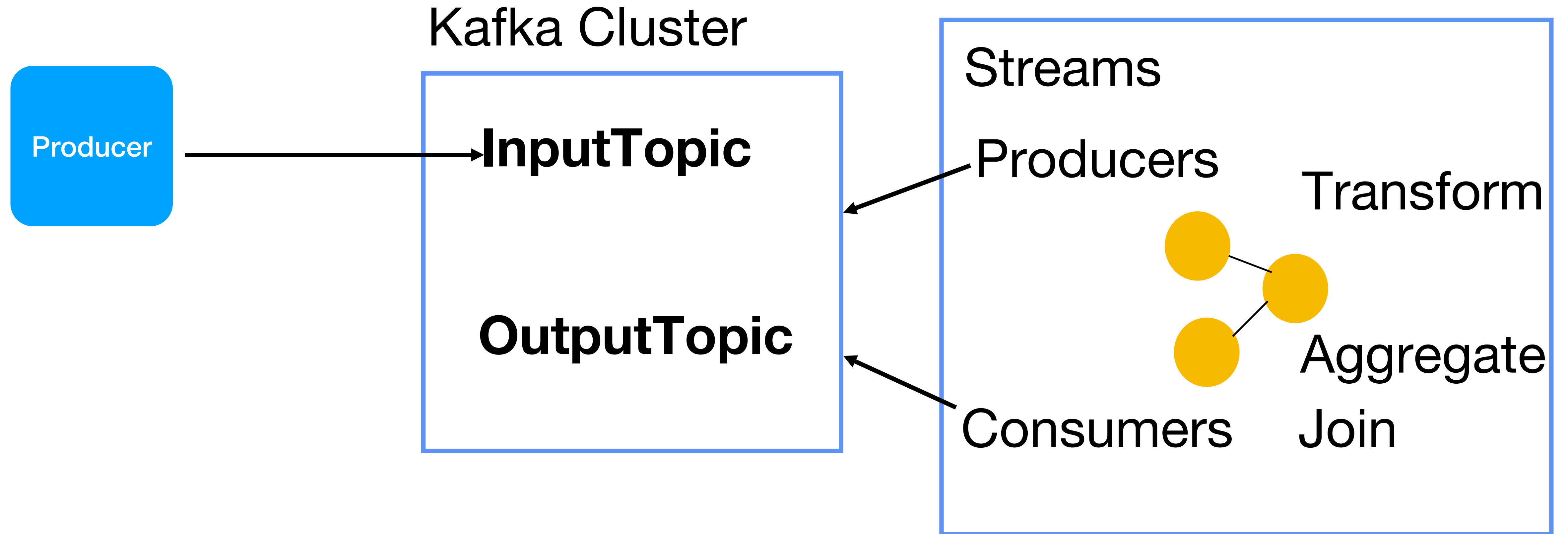


Producer API

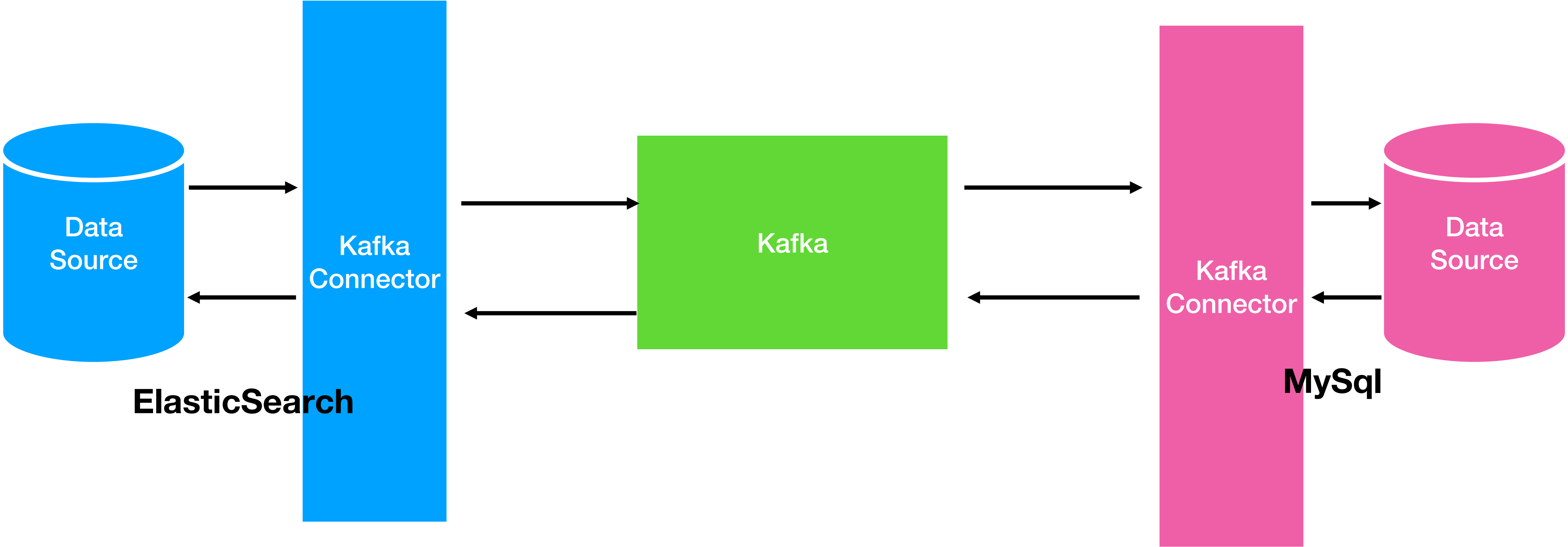
Consumer API



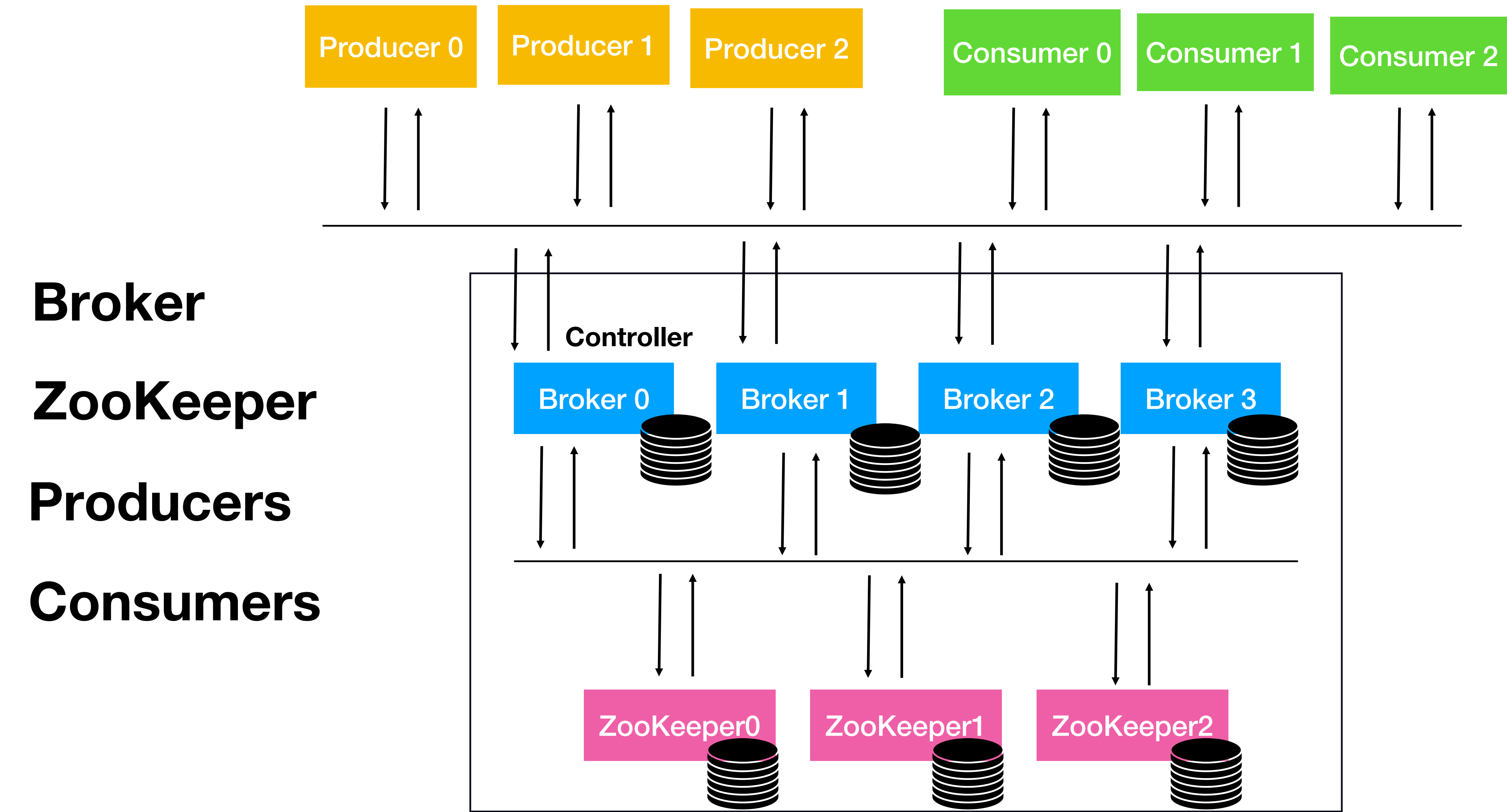
Streams API



Connect API



Kafka Architecture



Java Version

Kafka

Confluent Platform

Schema Registry

Java 11

Topics Partitions and Offsets

Topic

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12	13
---	---	---	---	---	---	---	---	---	---	----	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10	11	12	13
---	---	---	---	---	---	---	---	---	---	----	----	----	----

Partition 3

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

Replication Factor

1

2

3

Broker 0

Broker 1

Broker 2

Partition 0 (L)

Partition 1 (L)

Partition 3 (F)

Partition 2 (L)

Partition 0 (F)

Partition 1 (F)

Partition 3 (L)

Partition 2 (F)

Leader

Follower

Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

ownership

Consumer 0

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Consumer 1

Partition 2

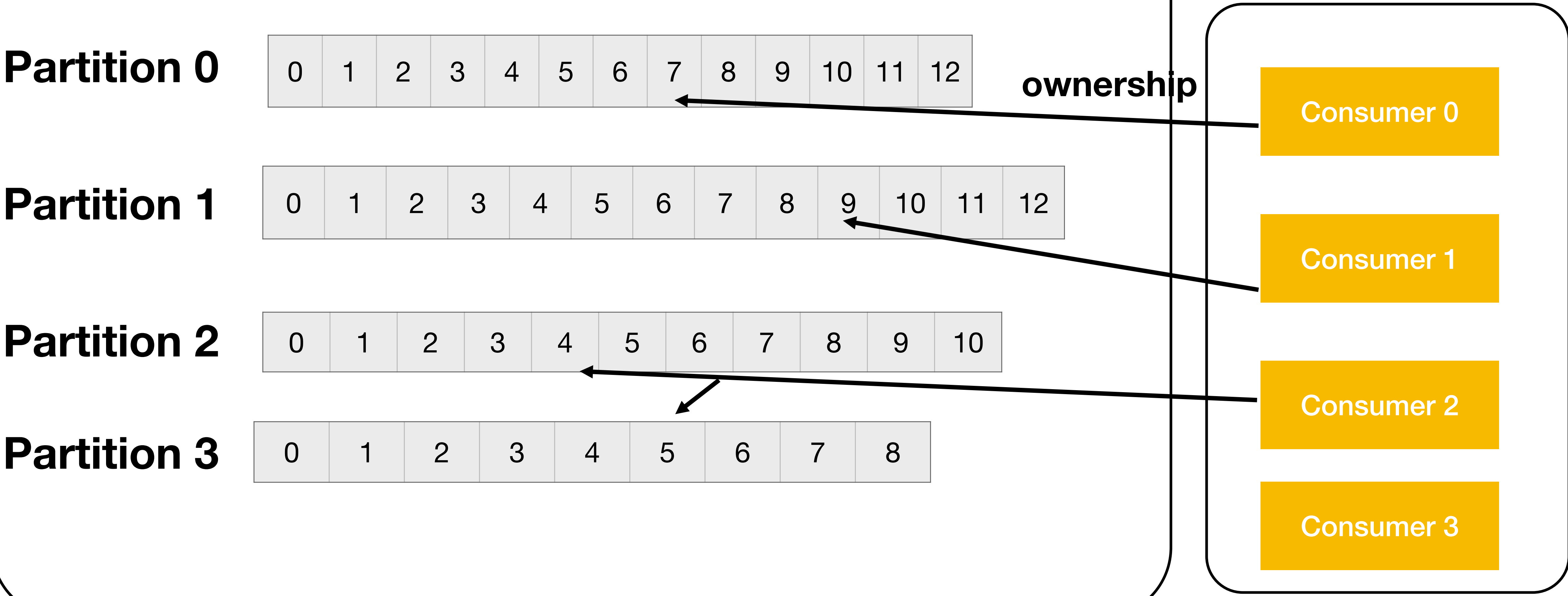
0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Consumer 2

Partition 3

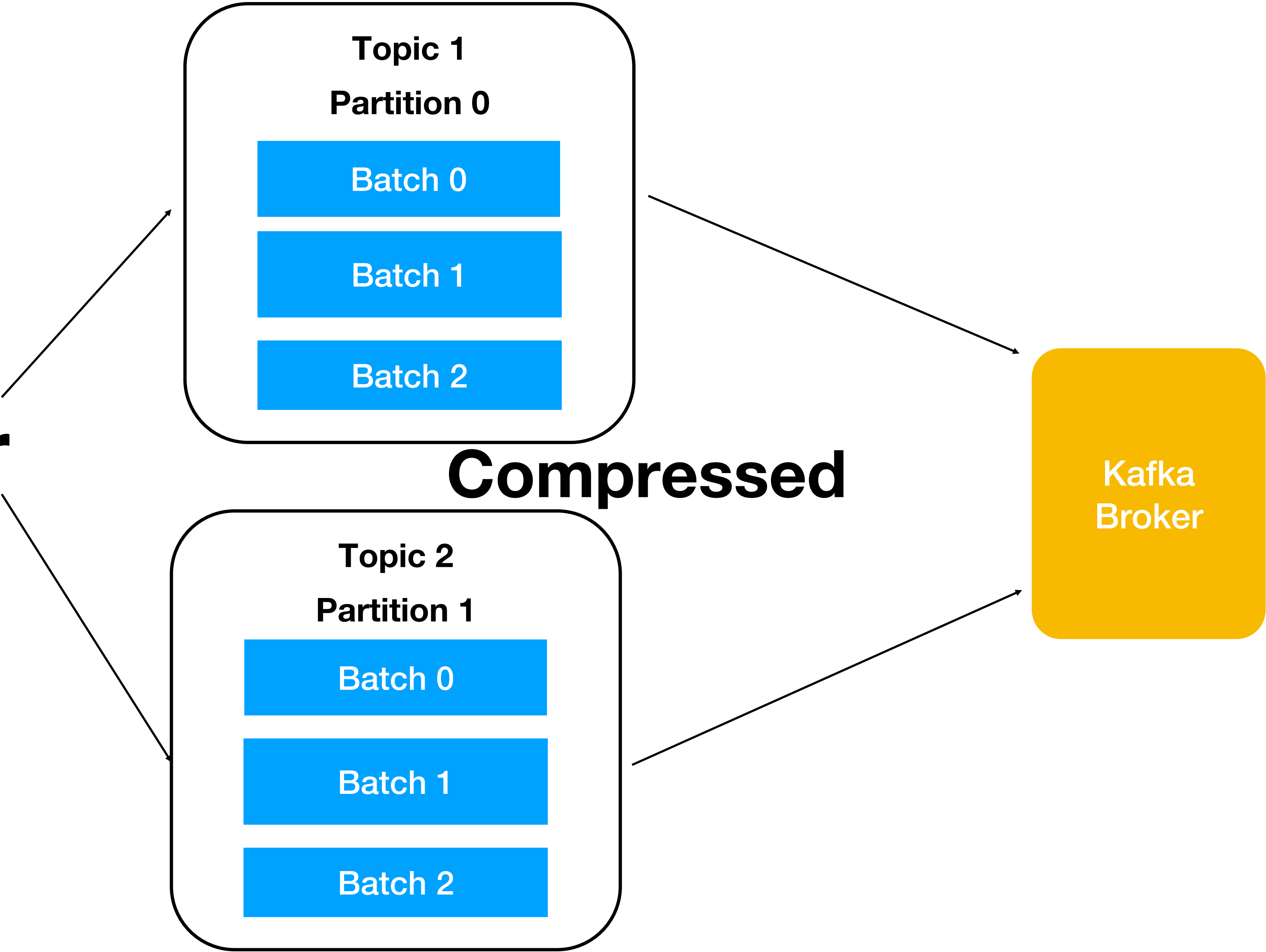
0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

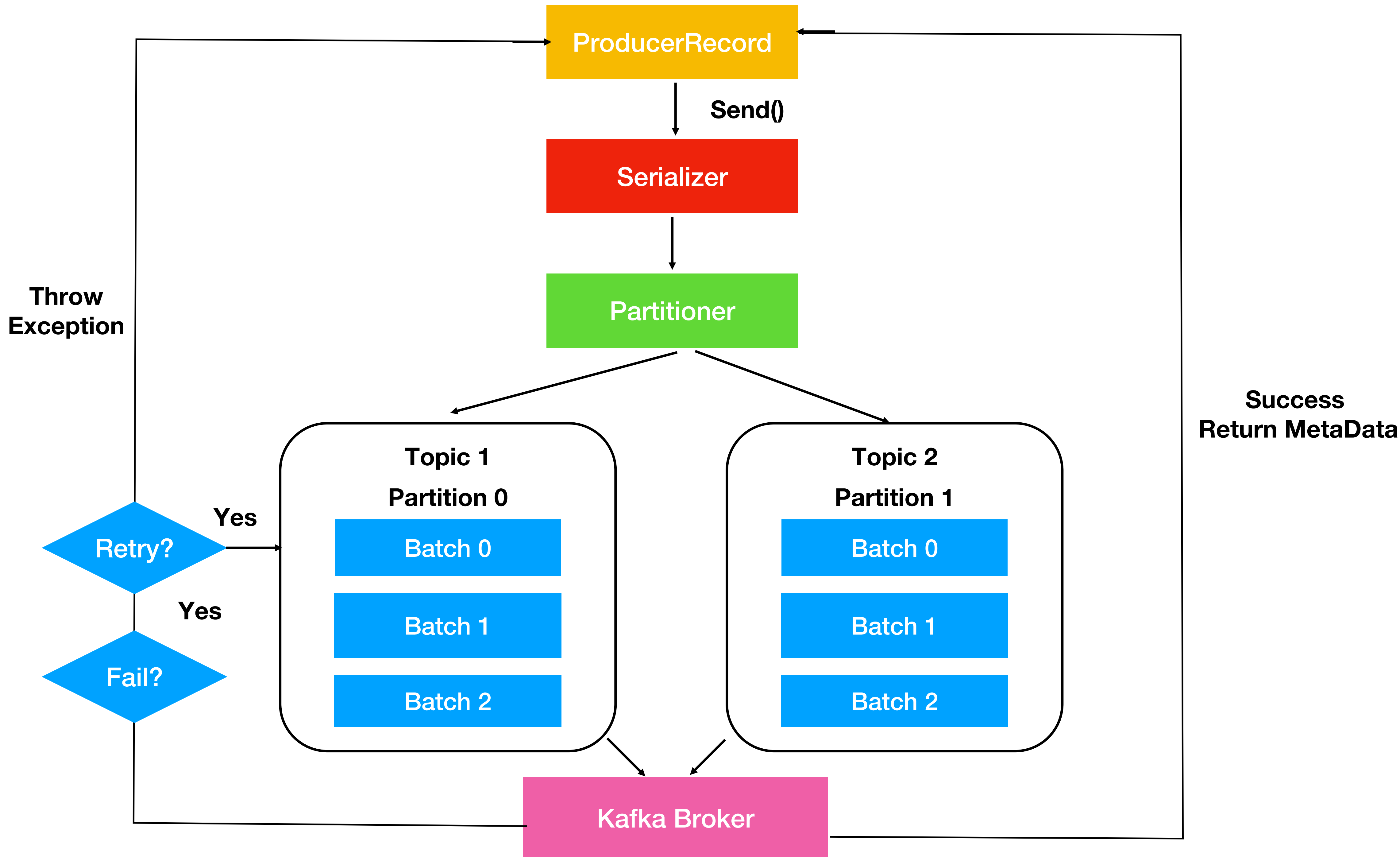
Consumer 3



Batches

KafkaProducer





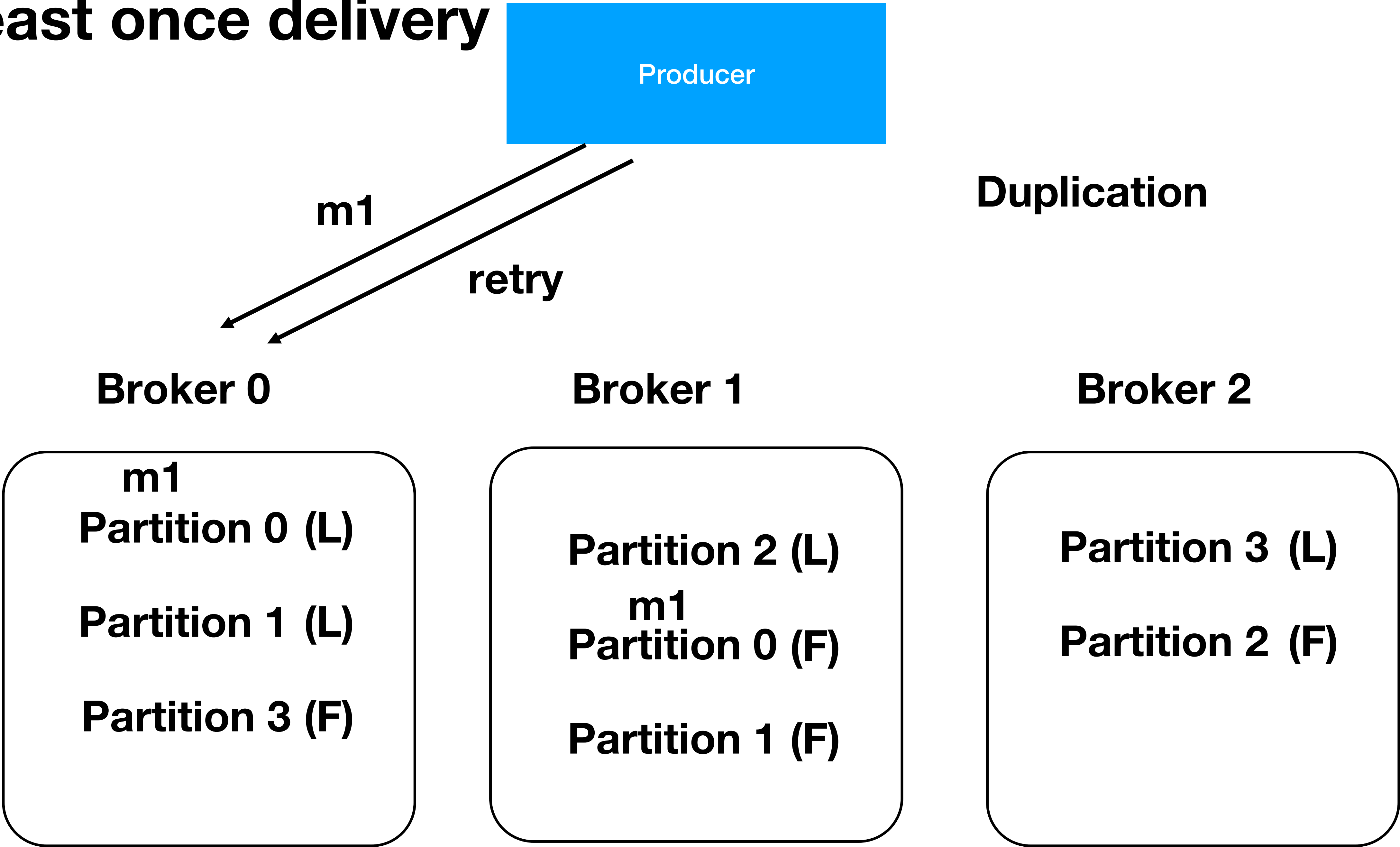
Three Semantics

At Least Once

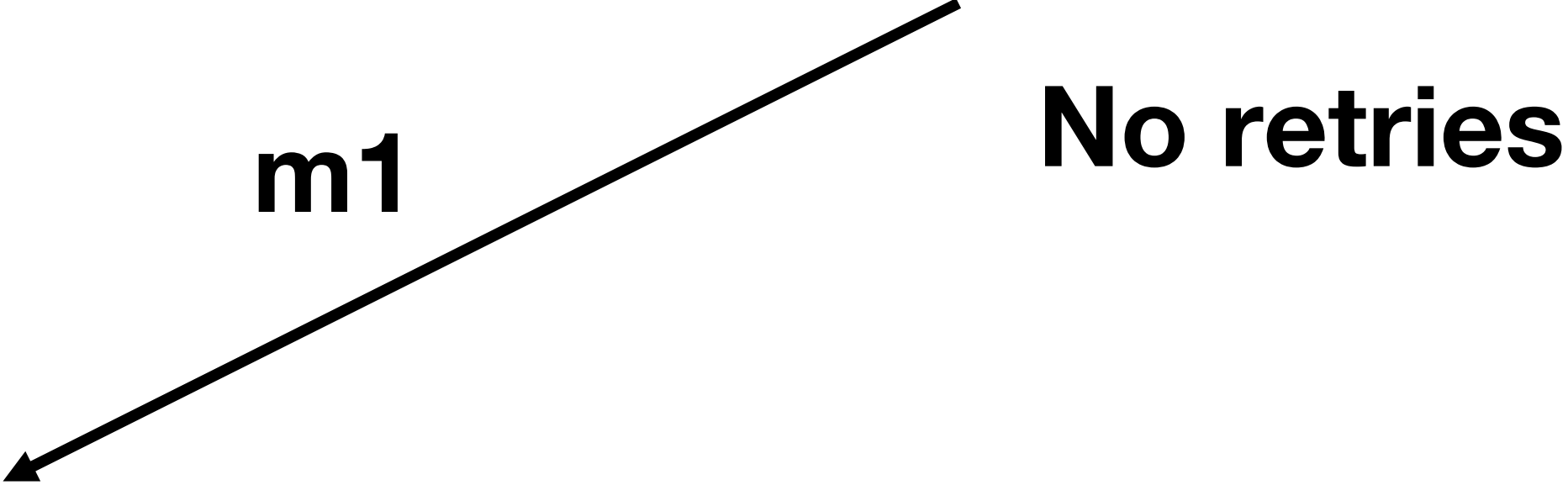
At Most Once

Only Once/Idempotency

At least once delivery



Atmost once delivery

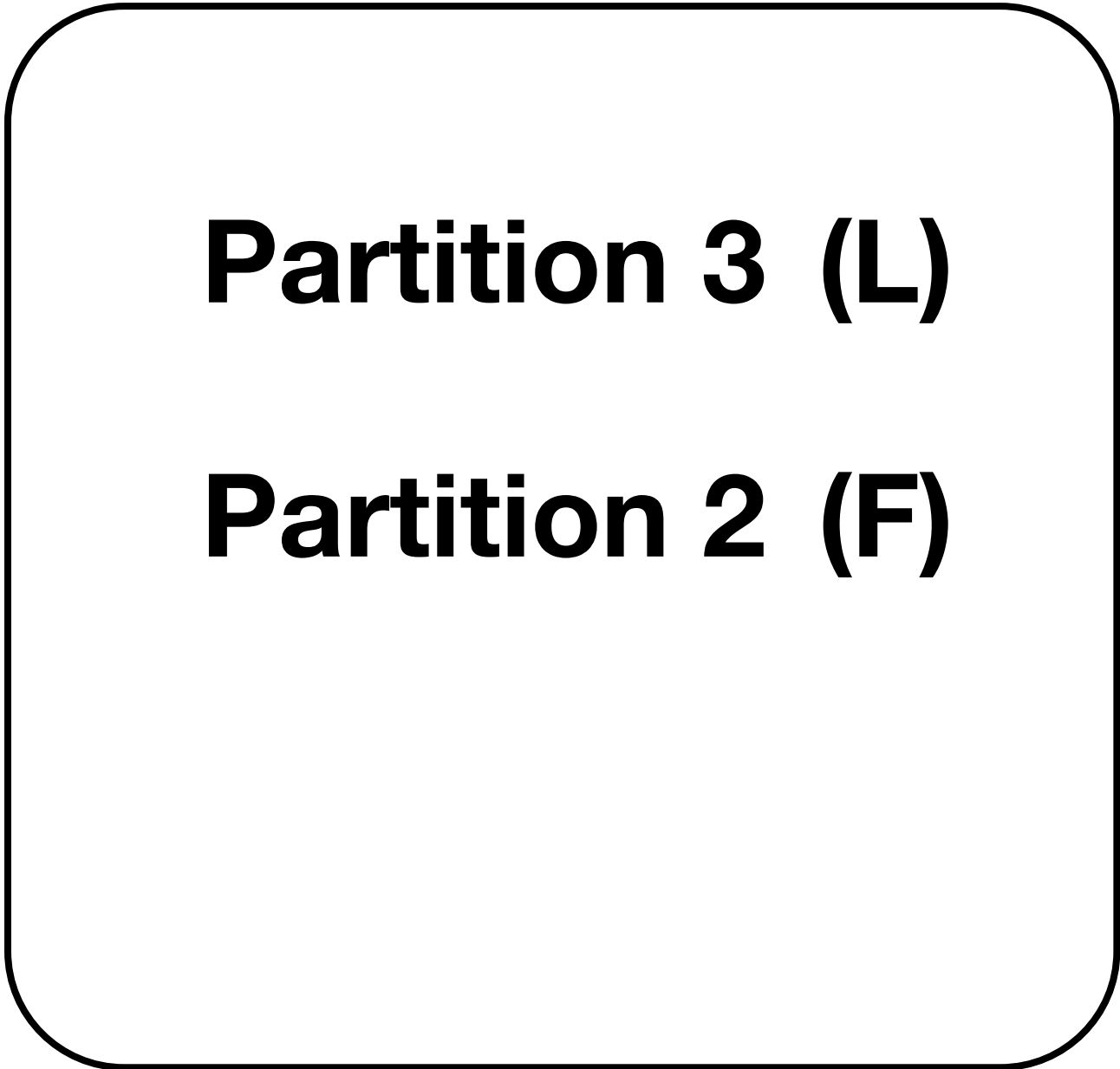
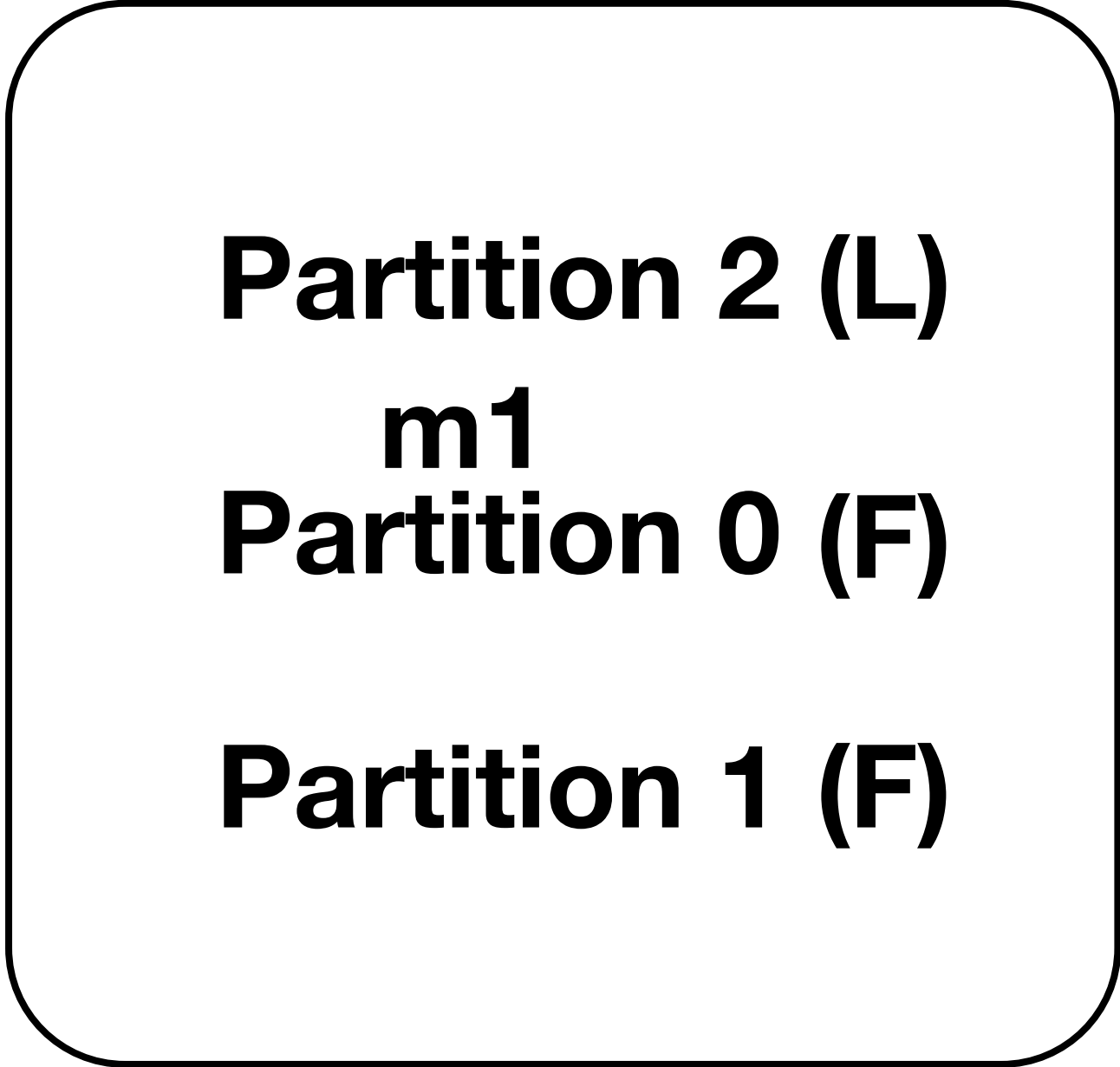
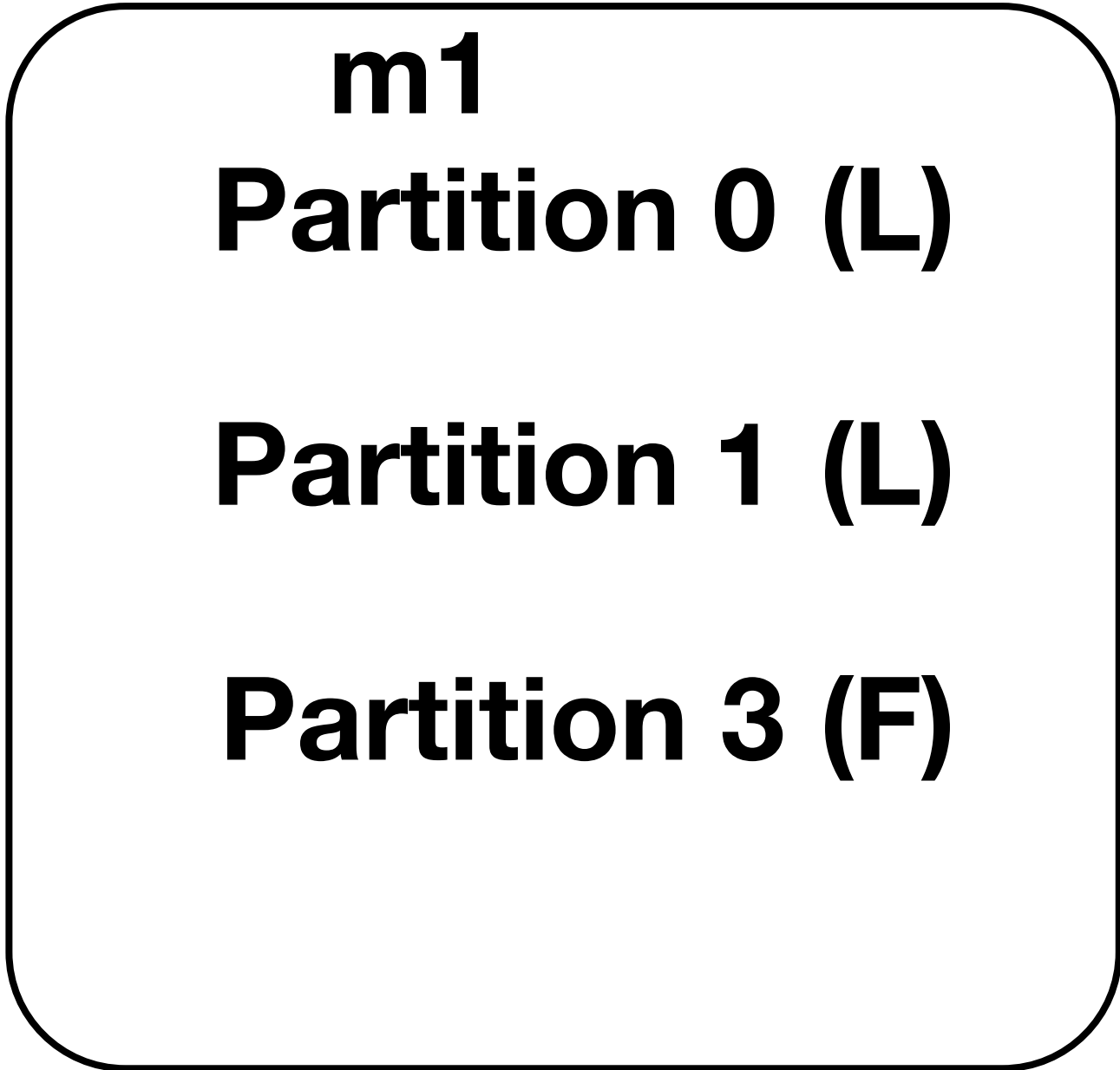


Messages Lost

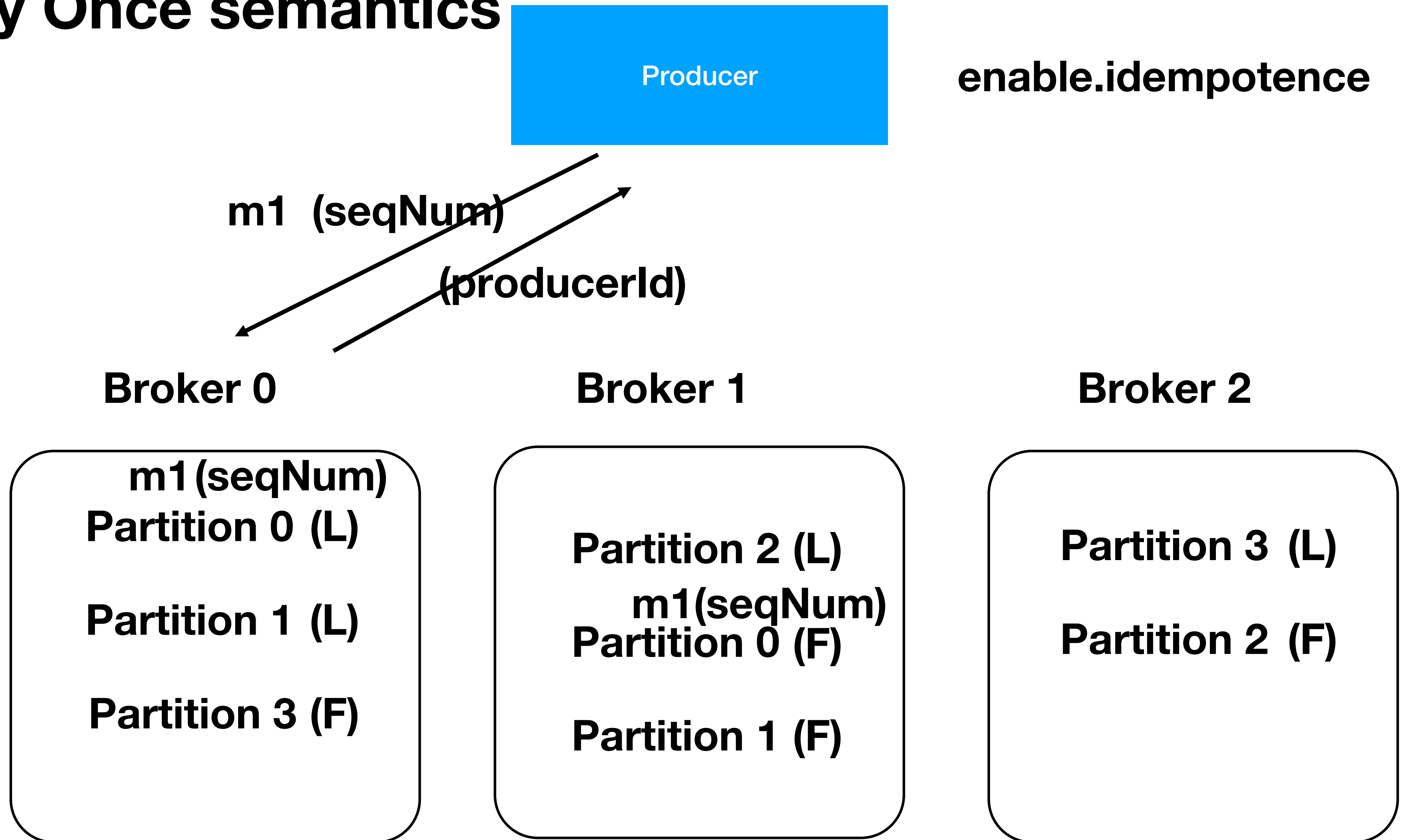
Broker 0

Broker 1

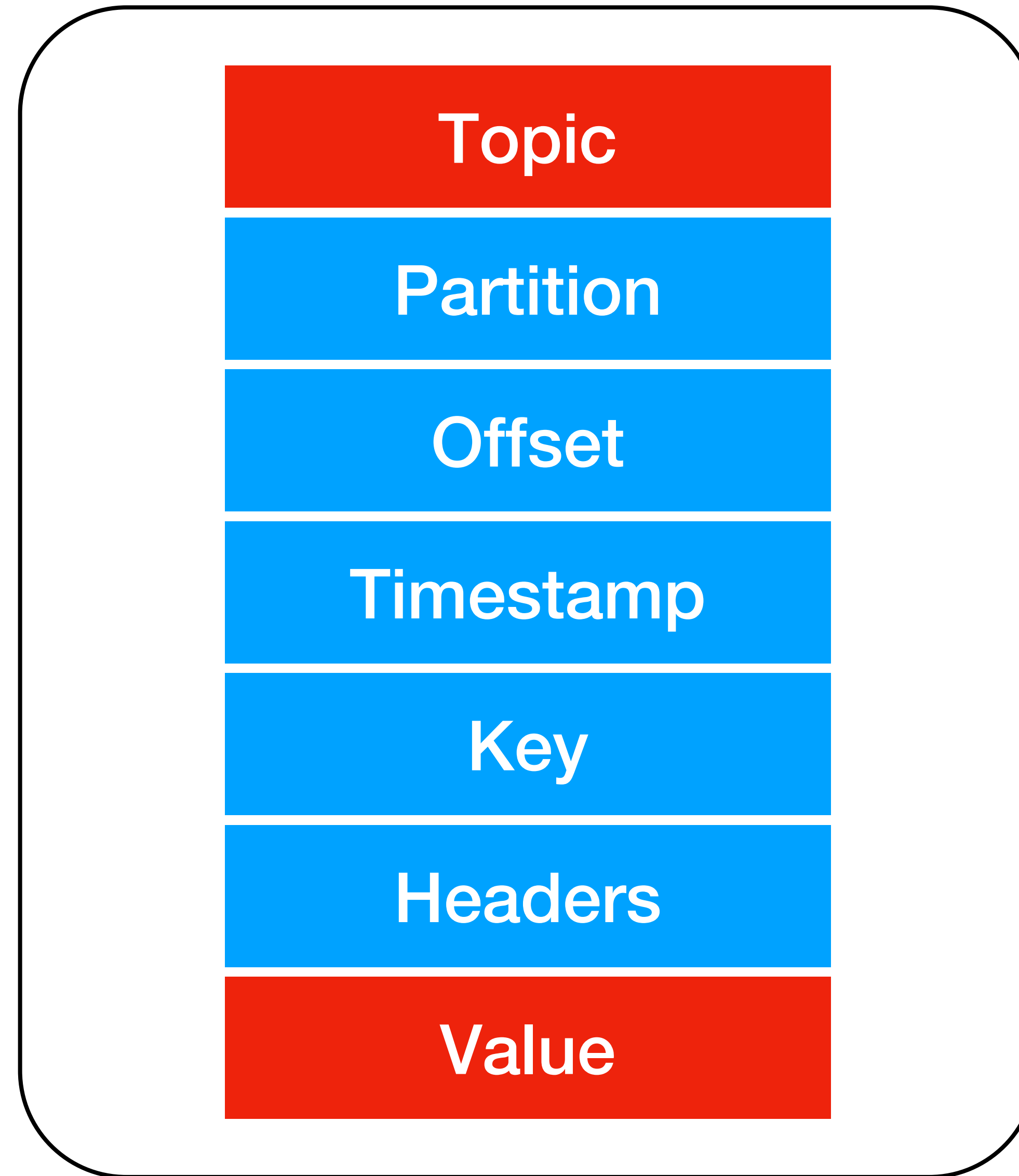
Broker 2



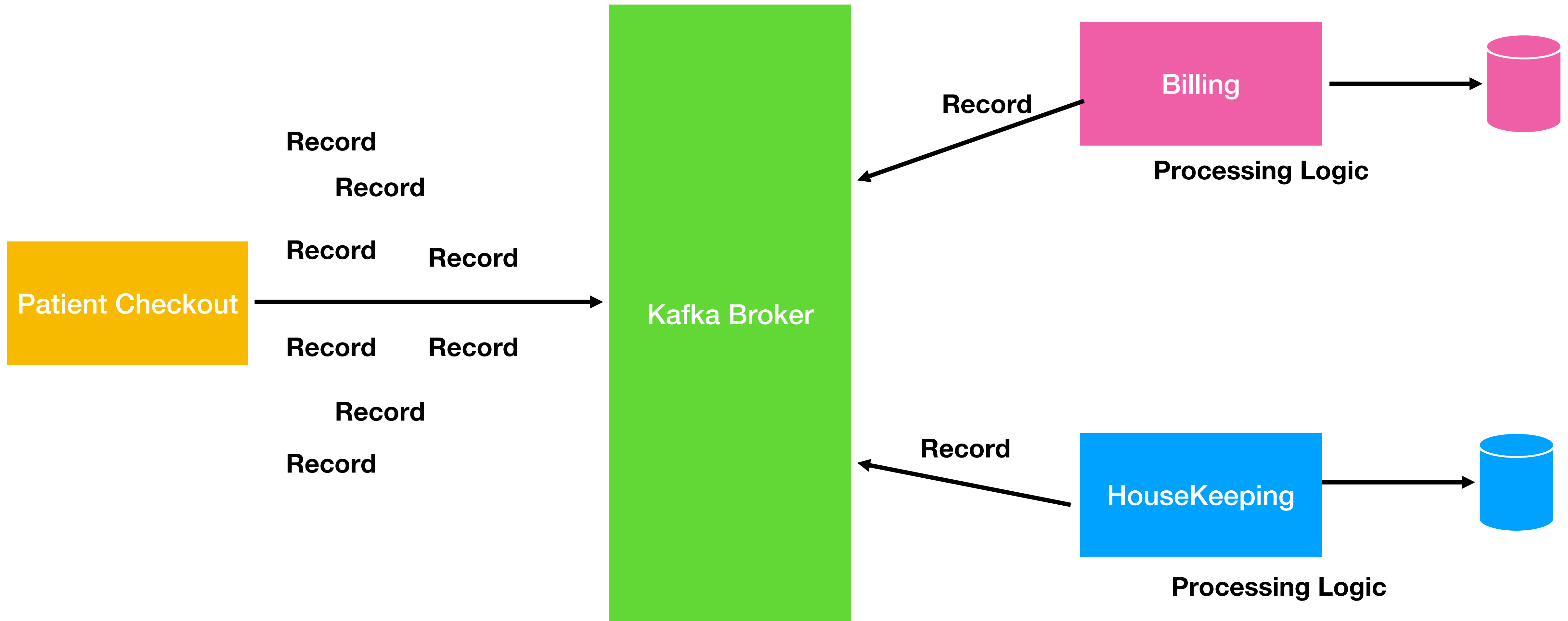
Exactly Once semantics



Record



Consumer Groups



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

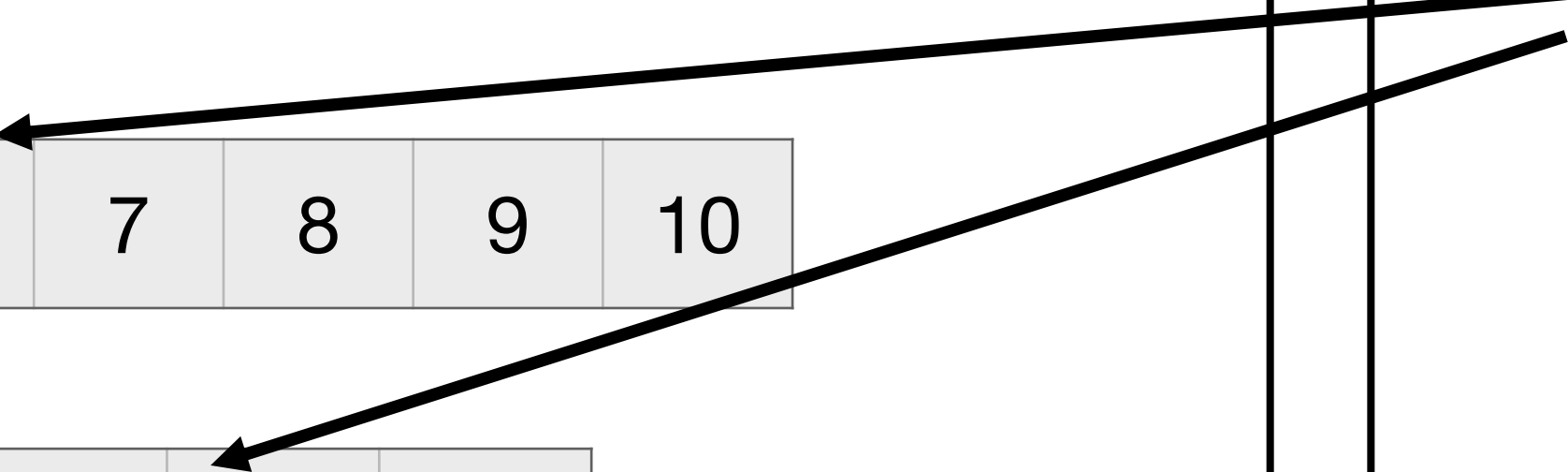
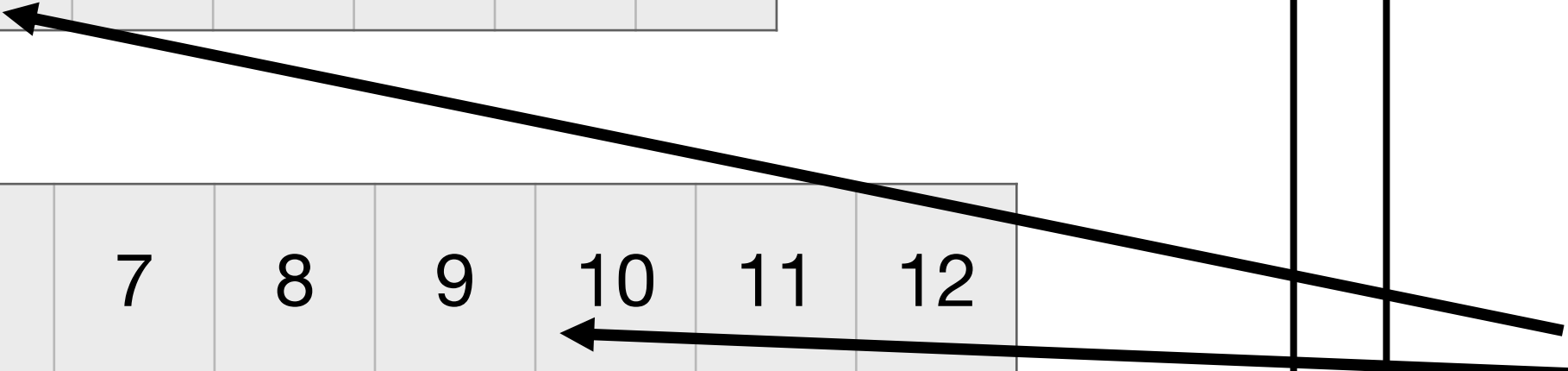
Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0



Topic

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

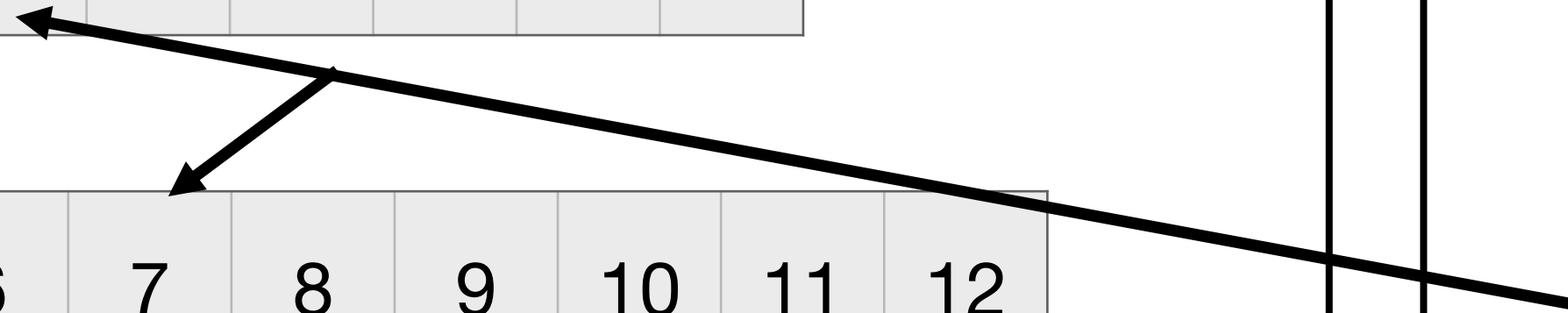
Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer Group

Consumer 0

Consumer 1



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

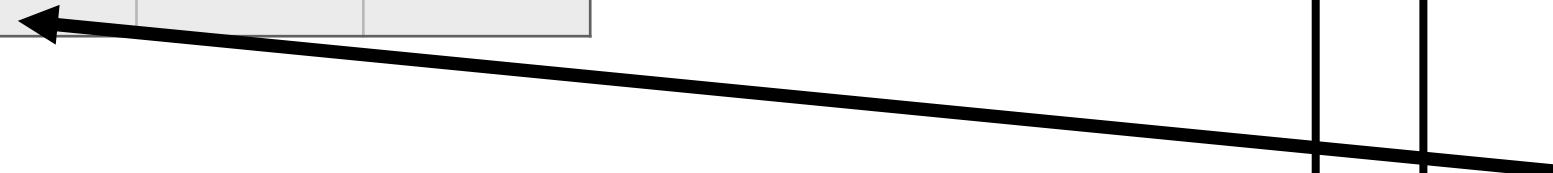
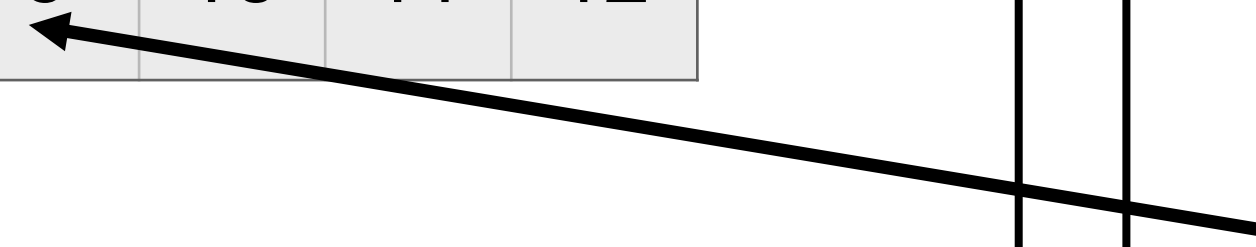
0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2

Consumer 3



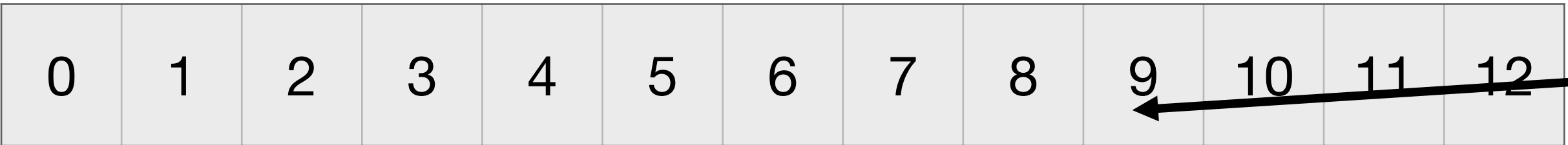
Topic

Consumer Group

Partition 0



Partition 1



Partition 2



Partition 3



Consumer 0

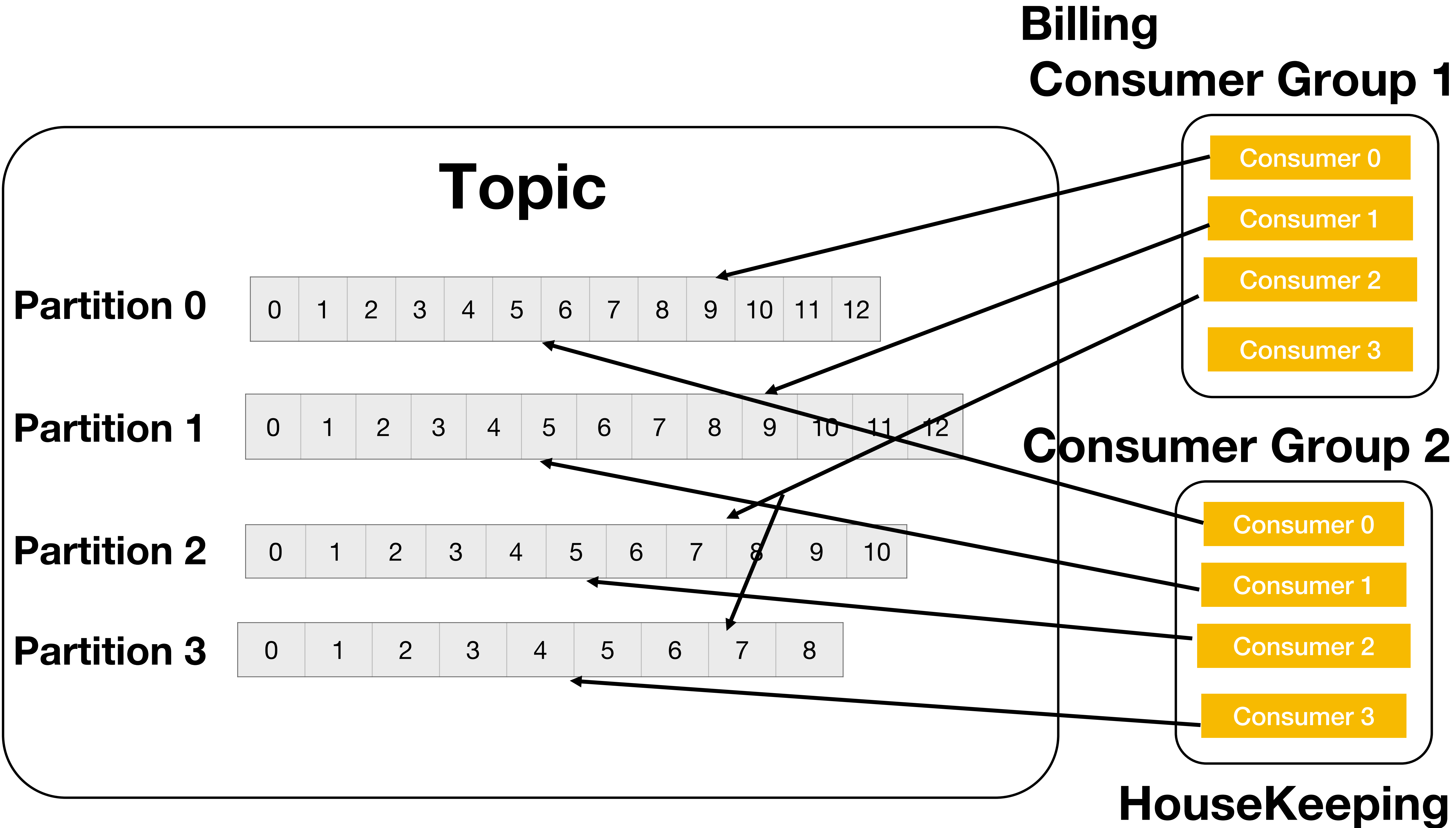
Consumer 1

Consumer 2

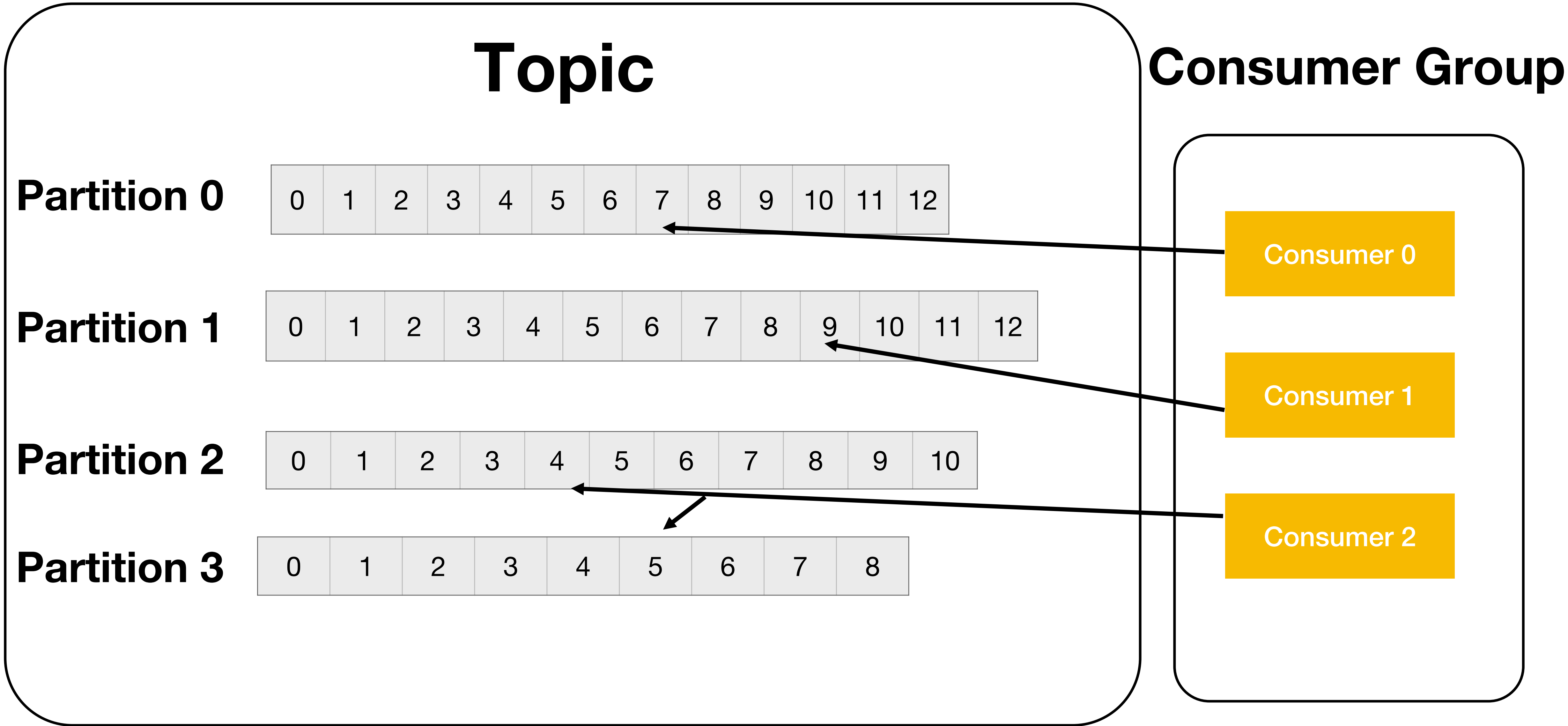
Consumer 3

Consumer 4

Consumer 5



Rebalancing



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2

Consumer 3



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2

Consumer 3



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

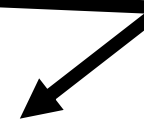
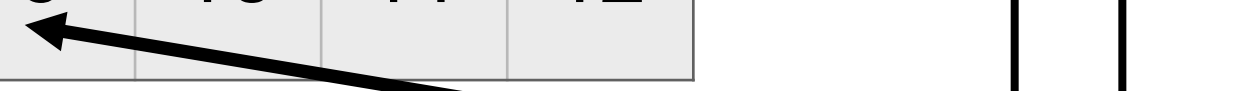
Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2



Rebalancing

Topic

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

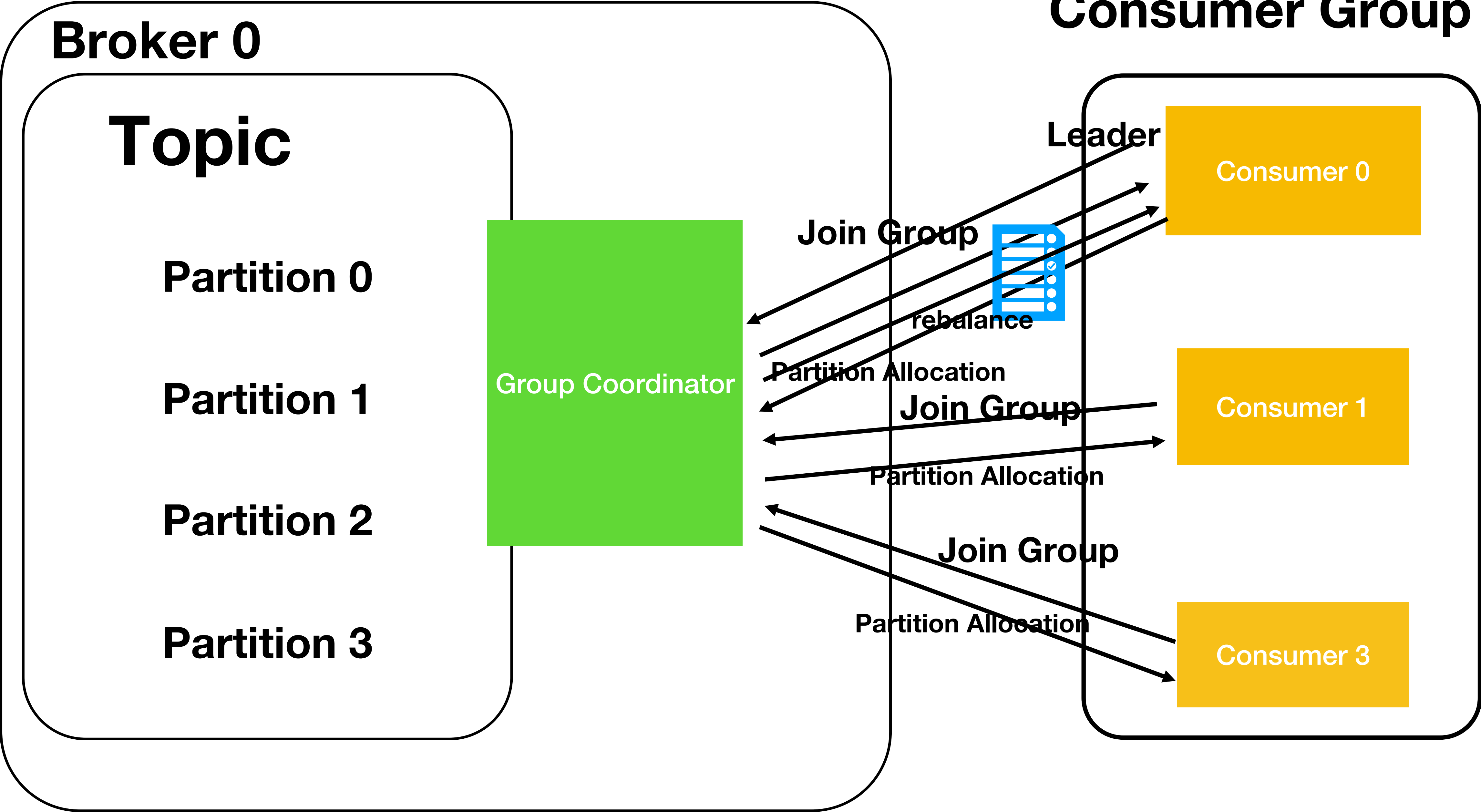
Consumer Group

Consumer 0

Consumer 1

Consumer 2

Consumer 3



Broker 0

Topic

Partition 0

Partition 1

Partition 2

Partition 3

Group Coordinator

Consumer Group

Leader

Consumer 0

Consumer 1

Consumer 3

Join Group

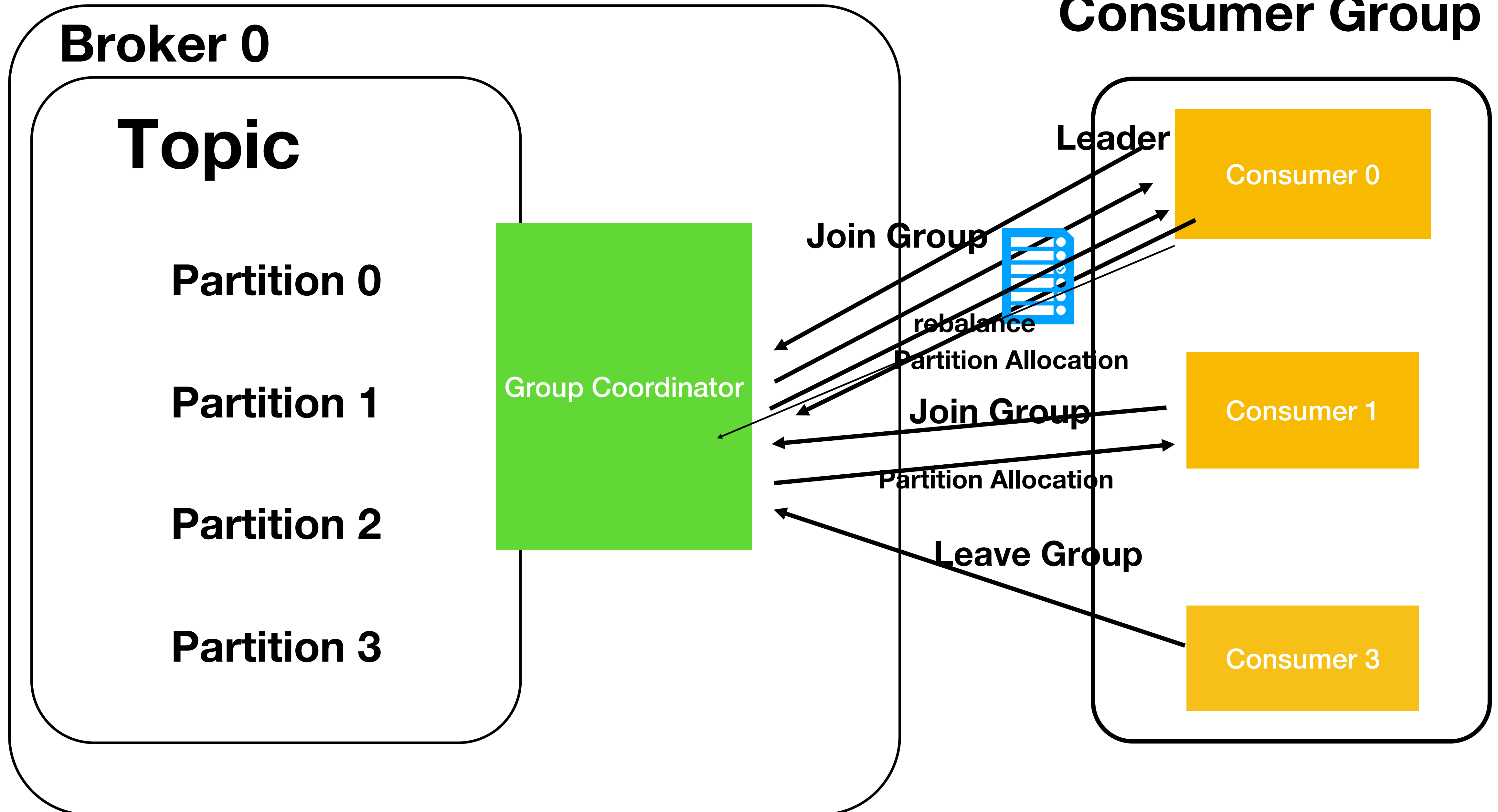
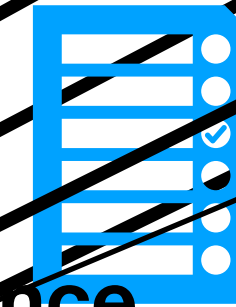
rebalance

Partition Allocation

Join Group

Partition Allocation

Leave Group



Offset Commits

Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

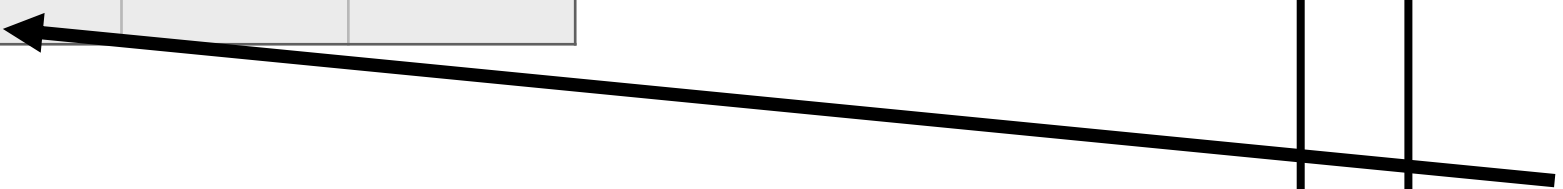
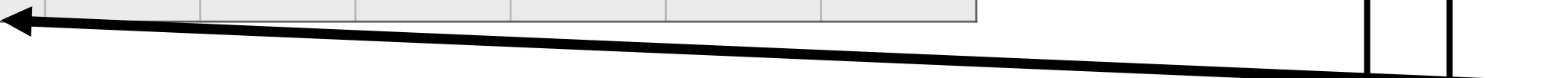
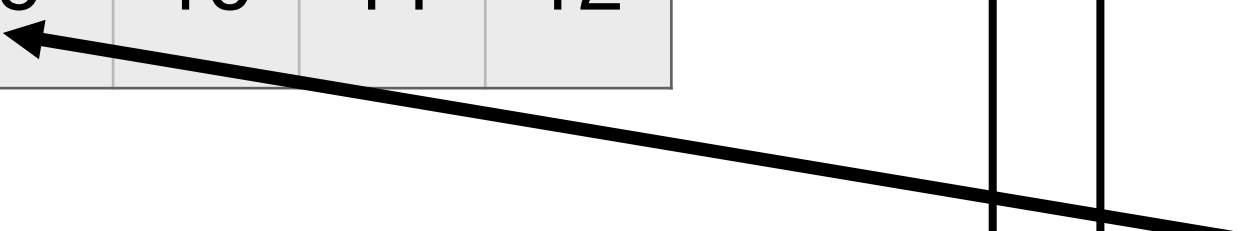
0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2

Consumer 3



Rebalancing

Topic

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer Group

Consumer 0

Consumer 1

Consumer 2

Consumer 3

Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

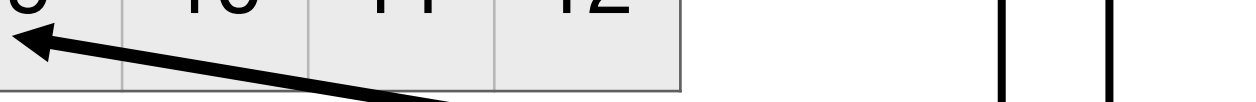
0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

Consumer 0

Consumer 1

Consumer 2

Consumer 3



Topic

Consumer Group

Partition 0

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 1

0	1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	---	----	----	----

Partition 2

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Partition 3

0	1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	---

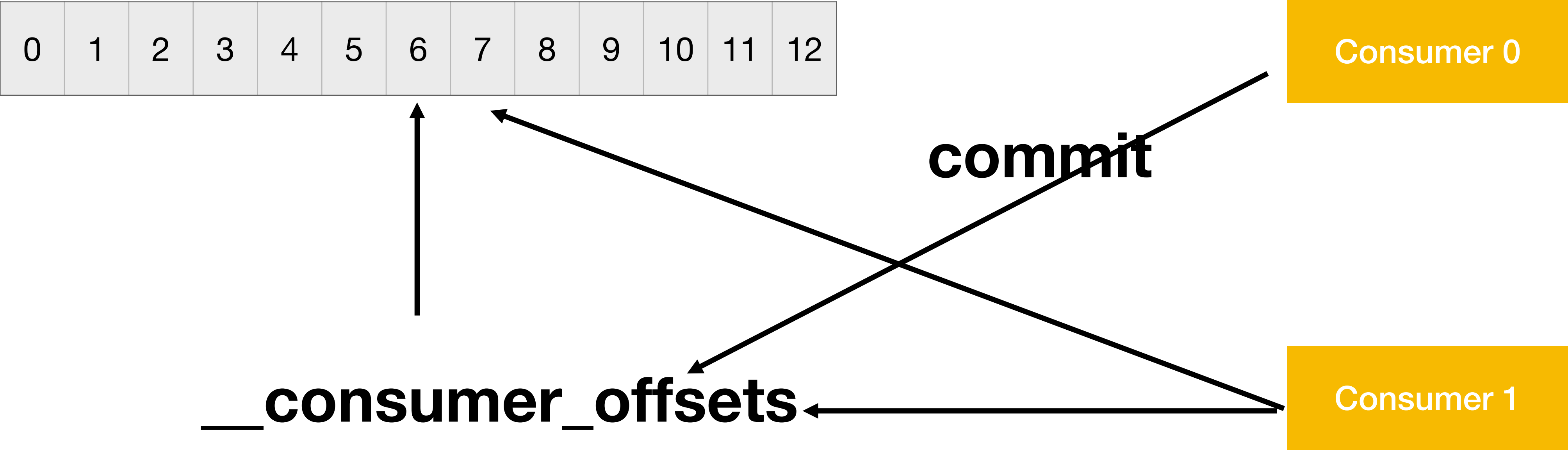
Consumer 0

Consumer 1

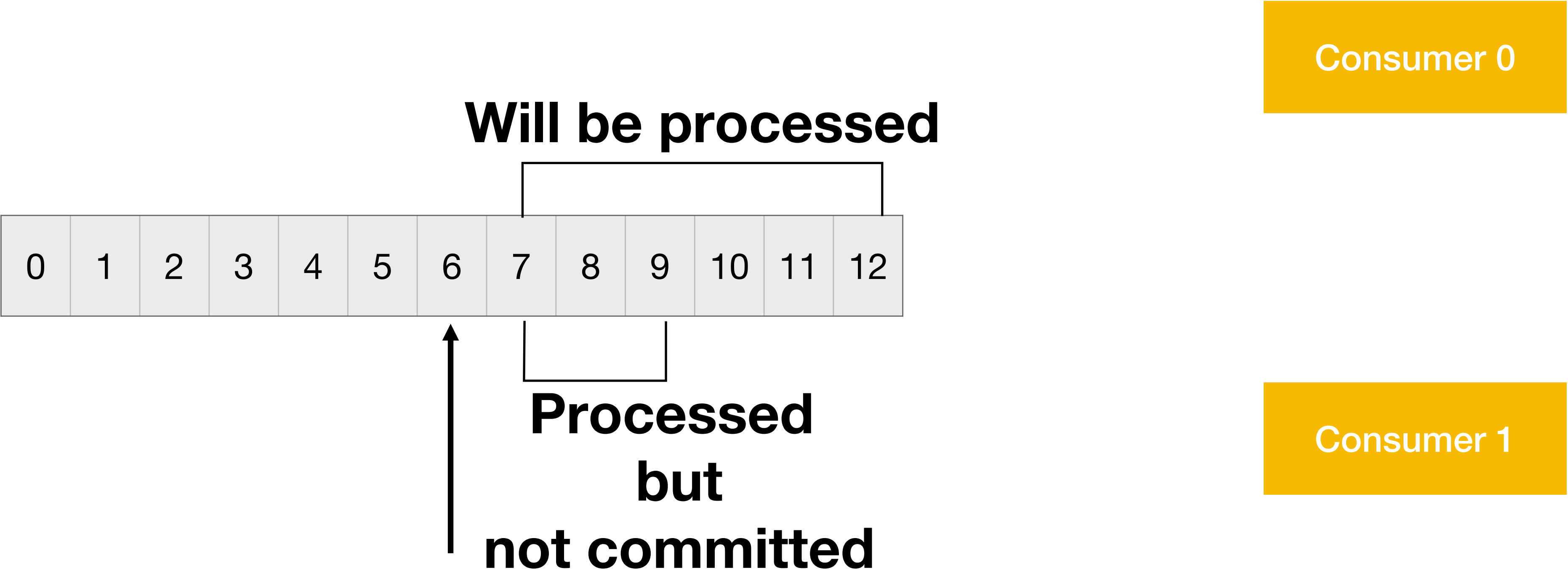
Consumer 2

?

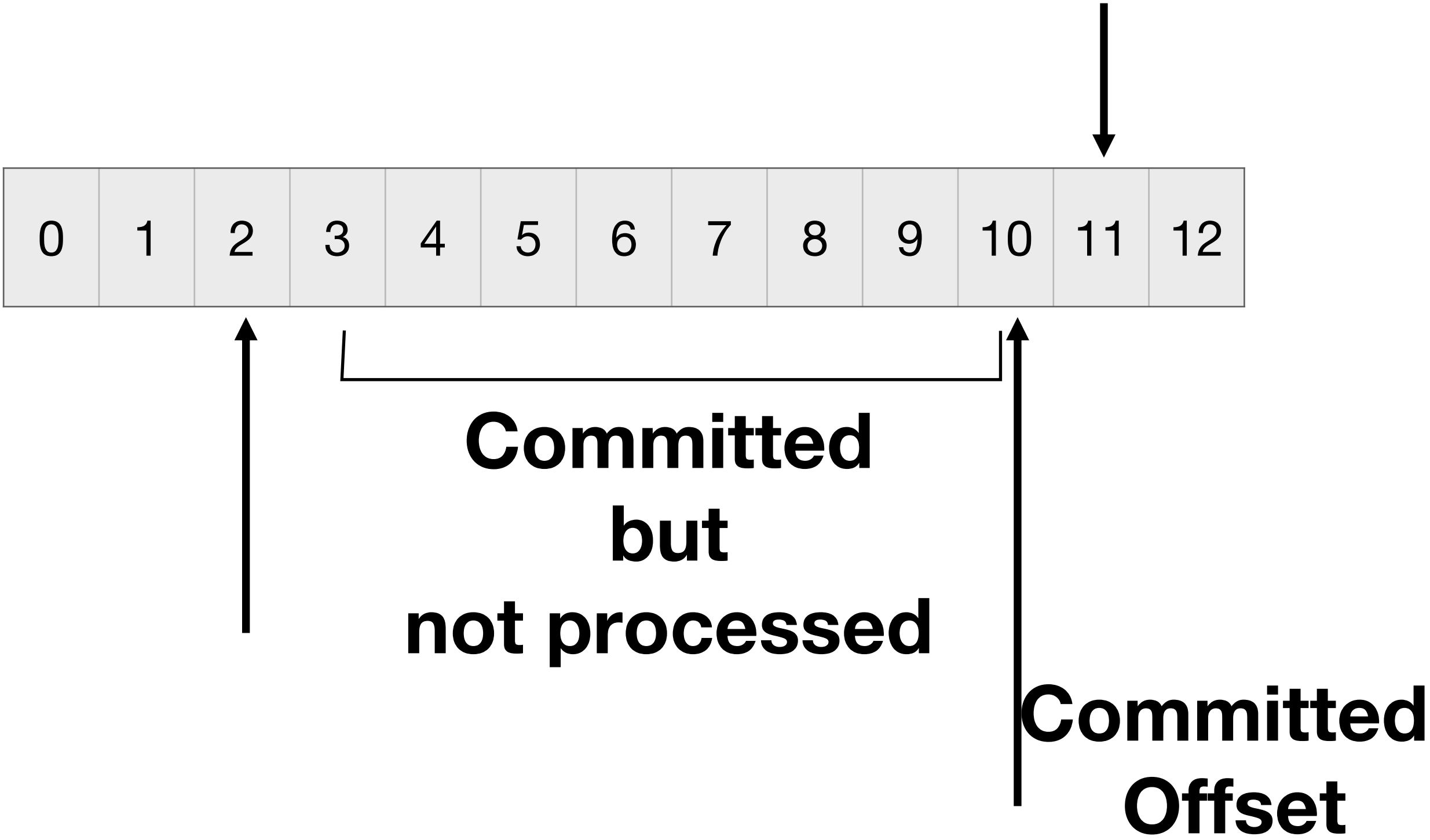
Offset Commits



Duplicate Processing



Missed Processing



Consumer 0

Consumer 1

Auto Commit

Manual

Sync

Async

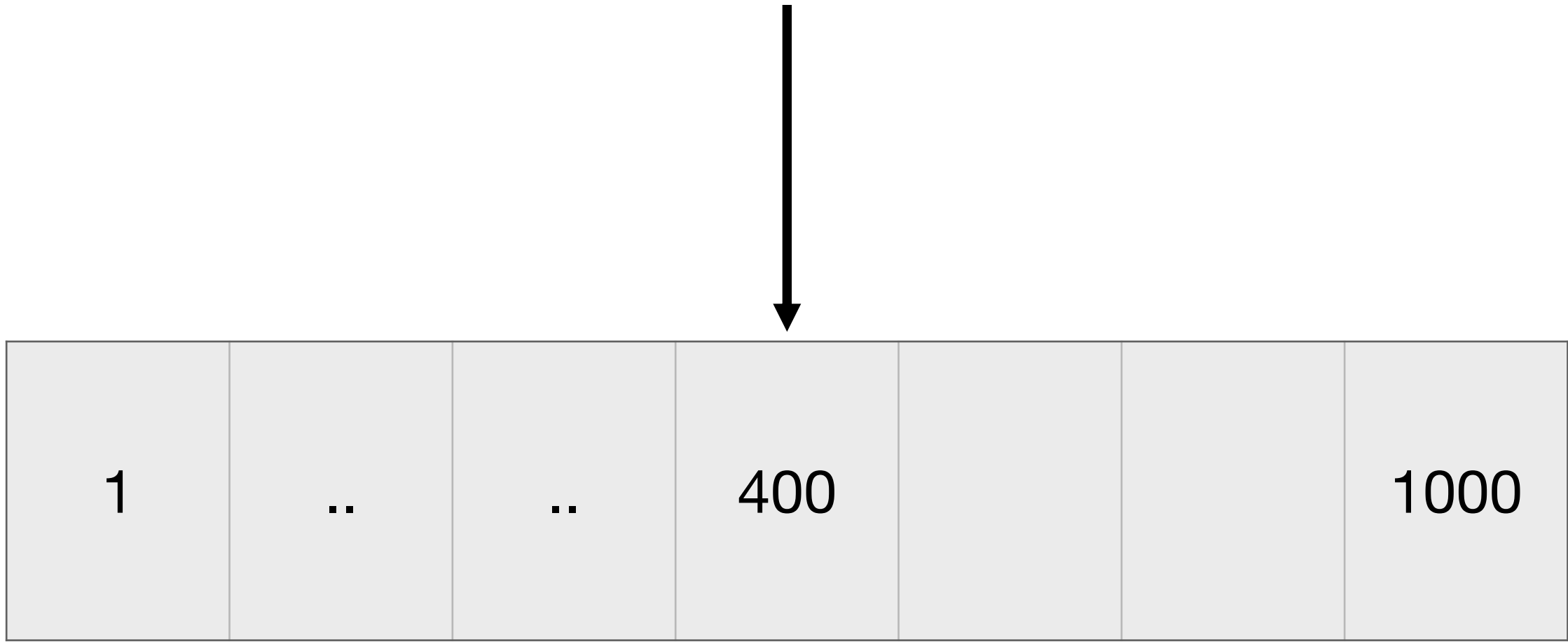
Specific Offset

Auto Commit

5 seconds

2 seconds

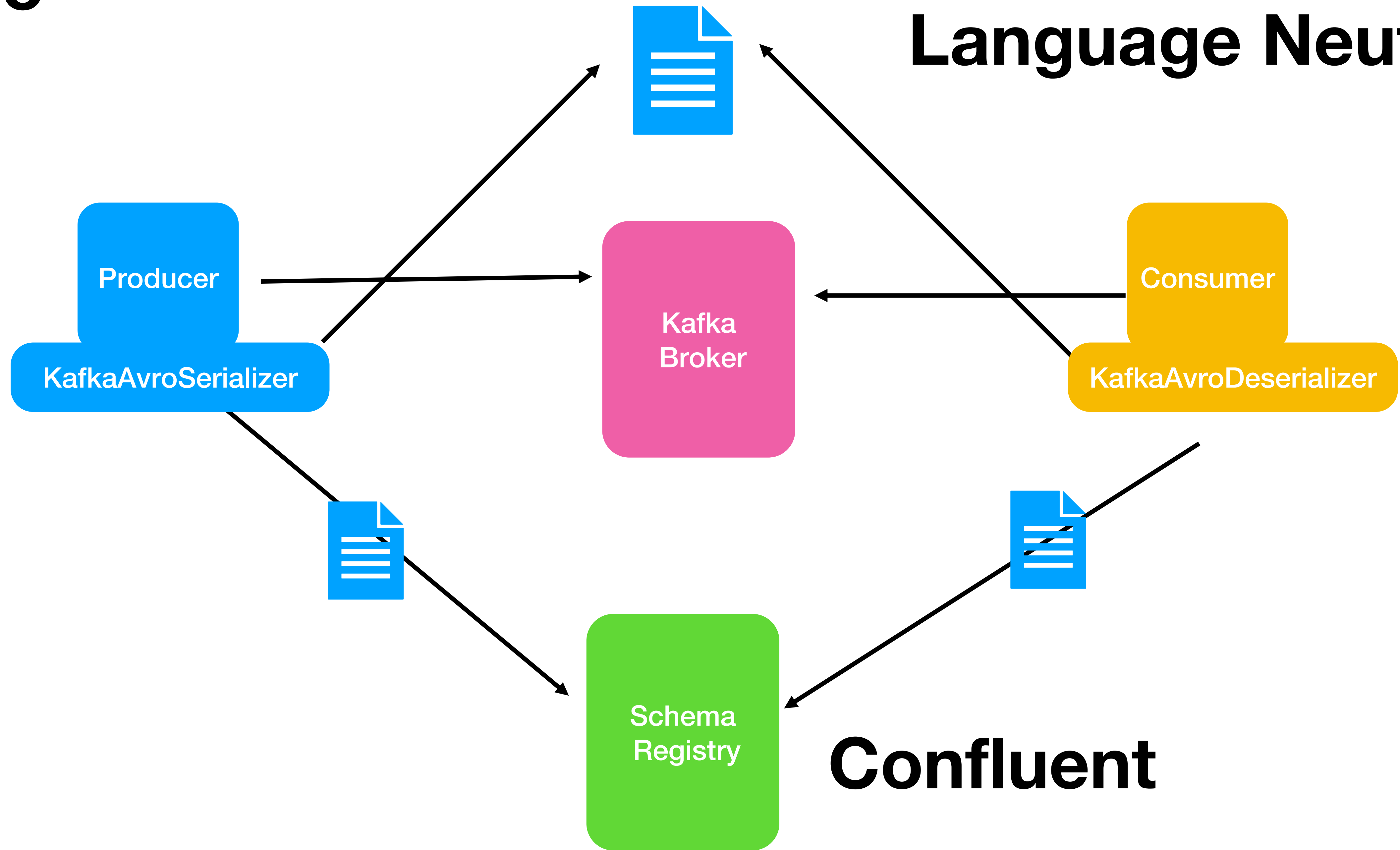
Rebalance



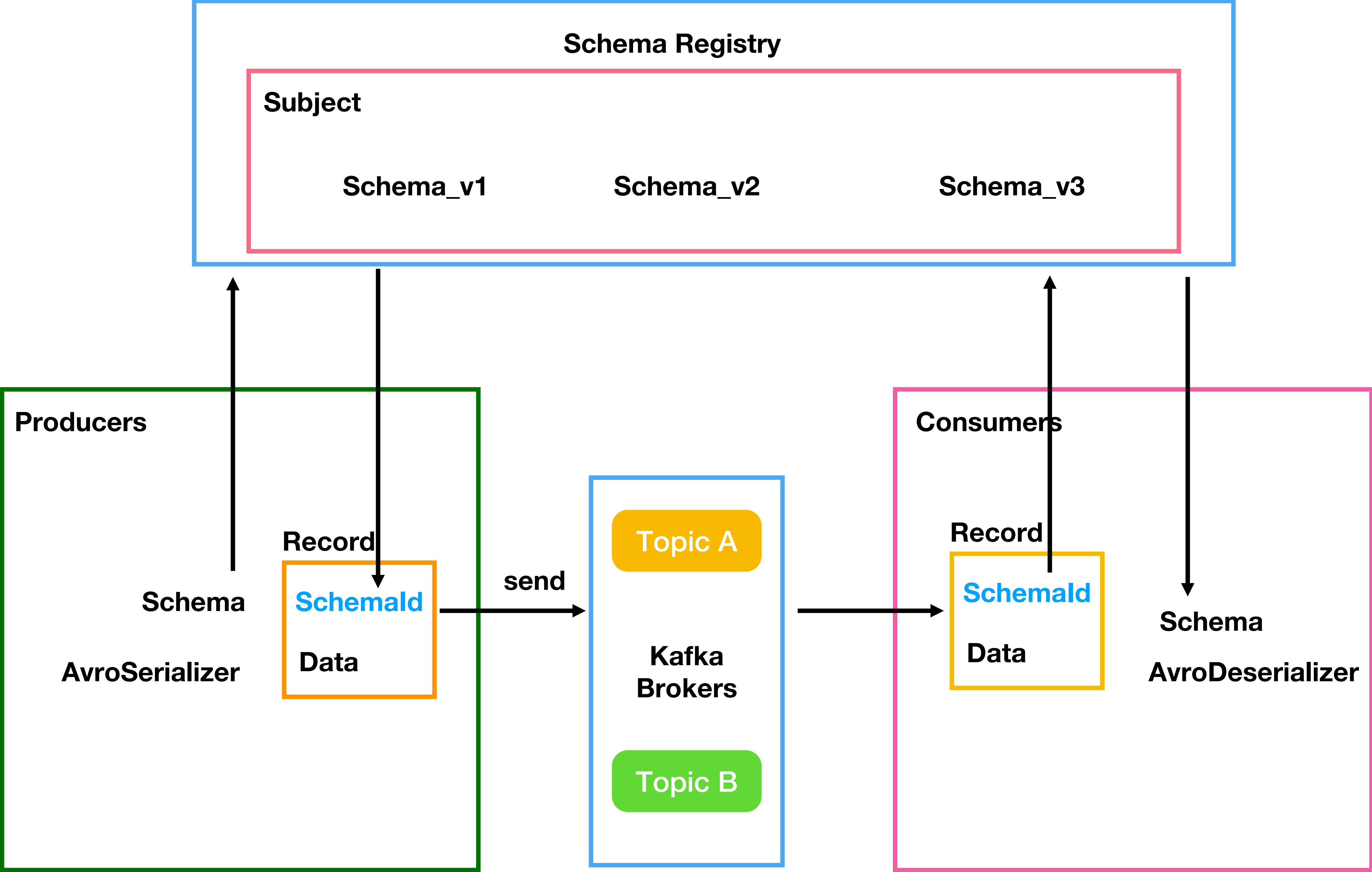
1-400

Avro

Language Neutral



Confluent



Backward Compatible

Delete Fields

Add Optional Fields

Add Mandatory Fields
With Defaults

Mandatory to optional

Forward Compatible

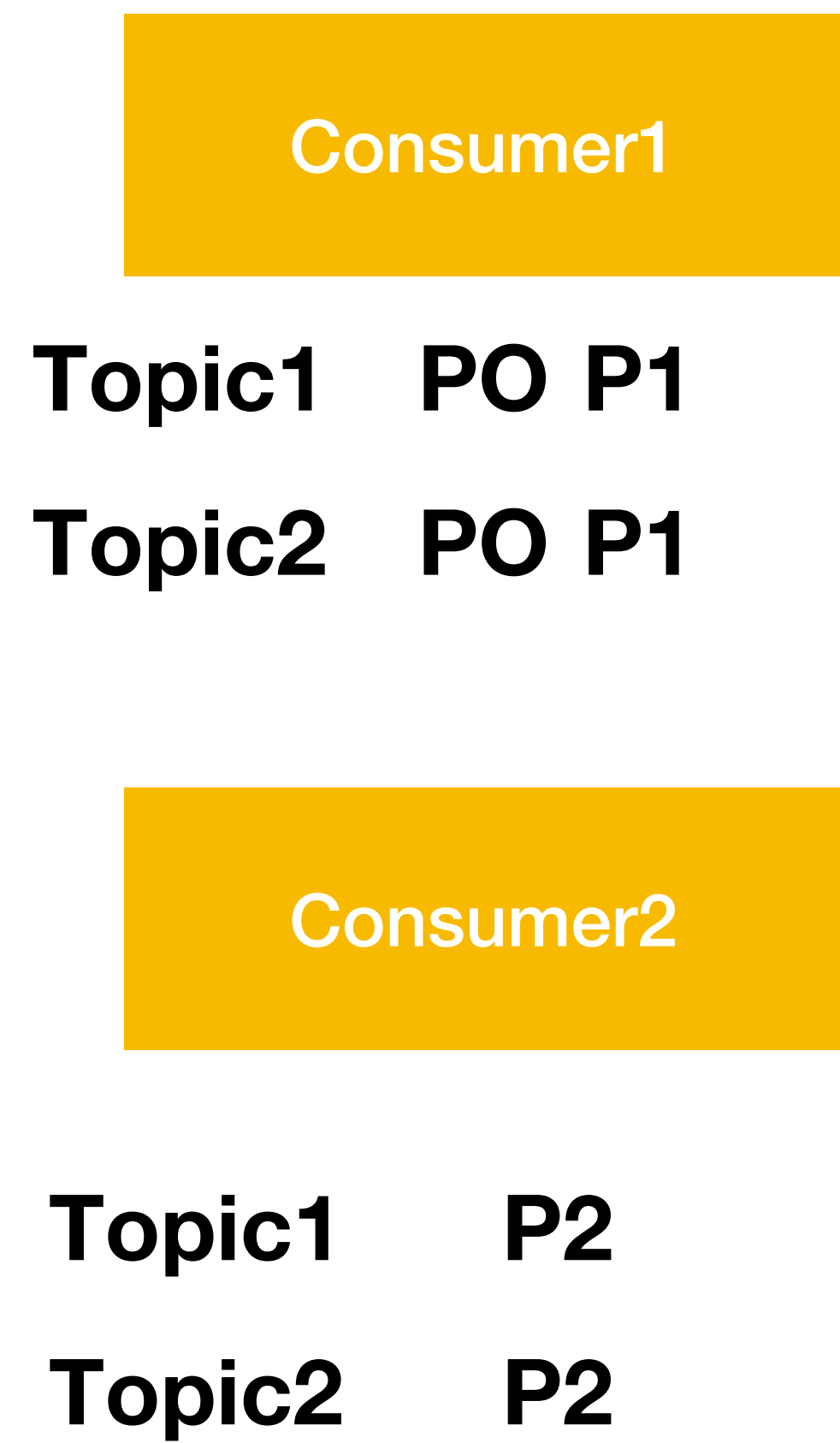
Add Mandatory or optional
Fields

Remove Optional Fields

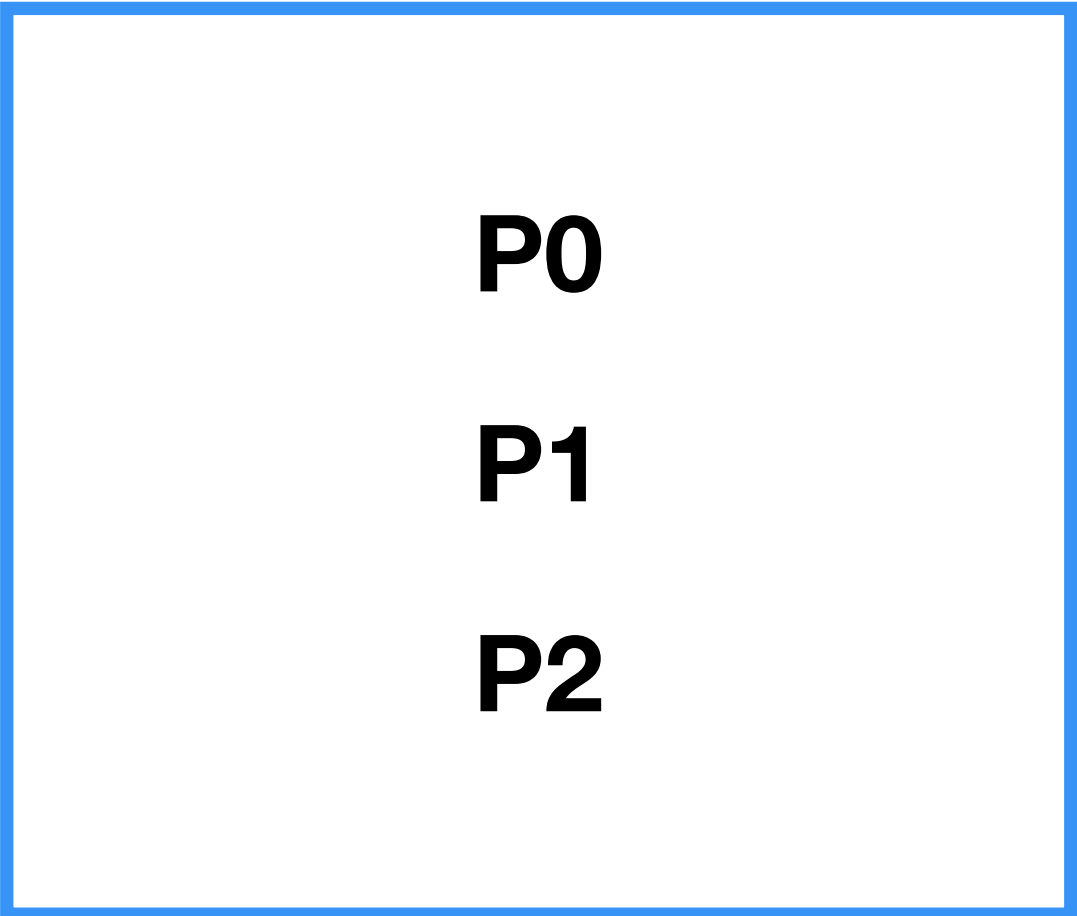
Remove Mandatory Fields
With or With Out

Optional to Mandatory

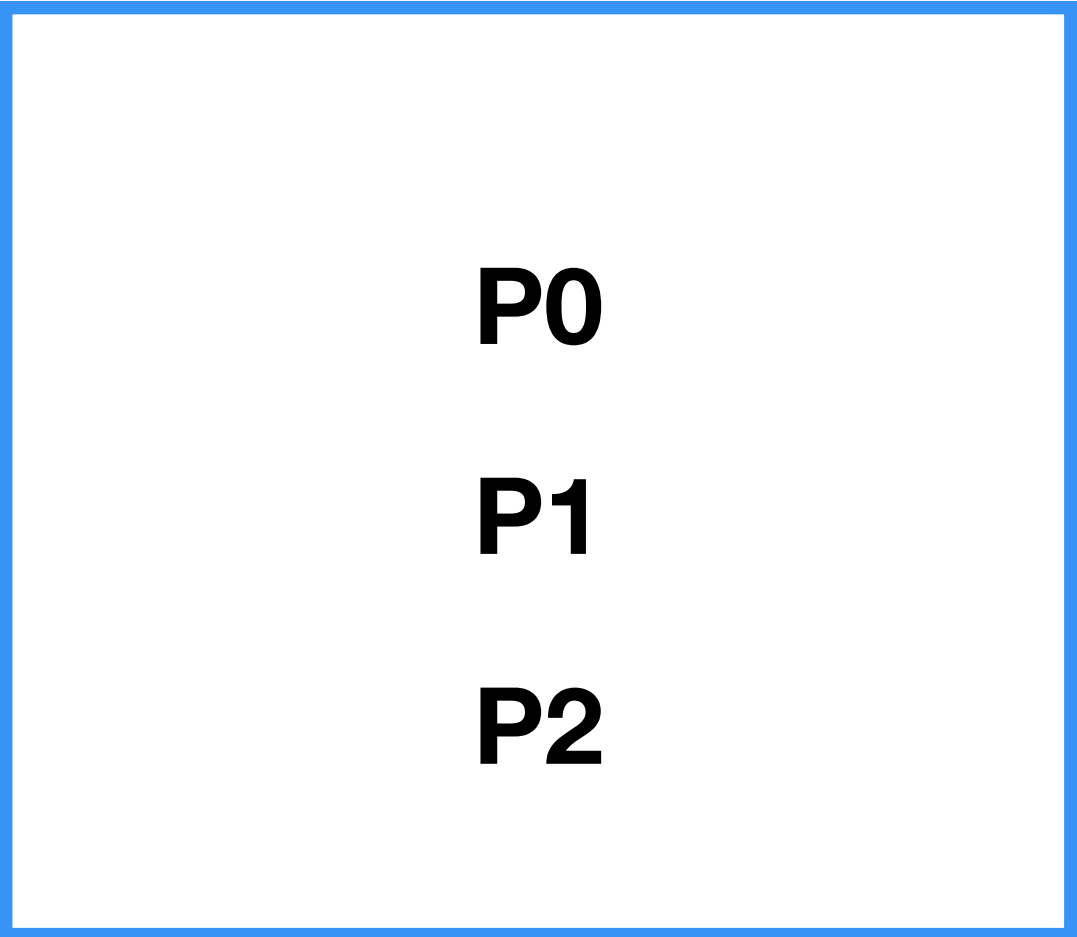
RangeAssignor



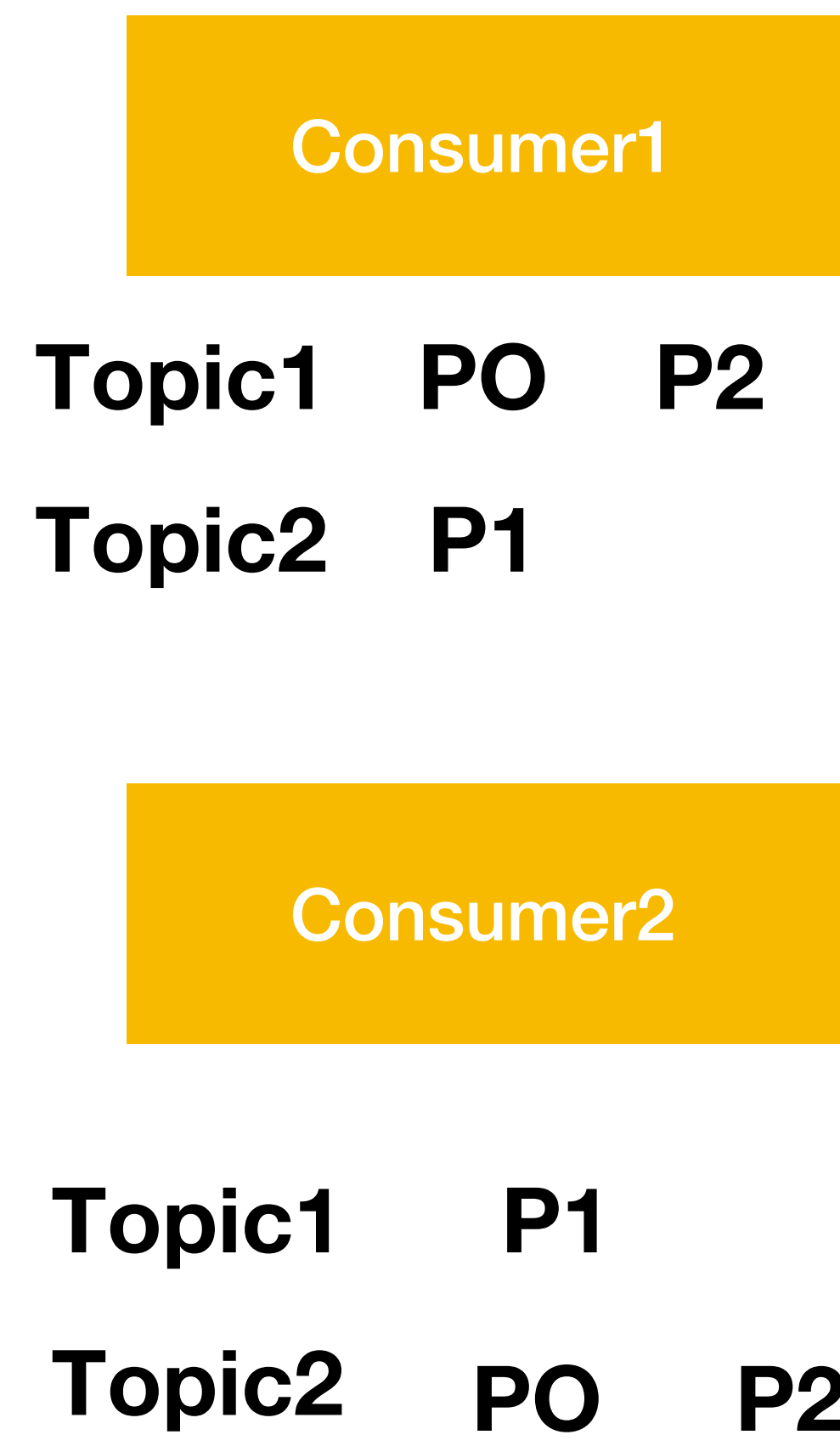
Topic1



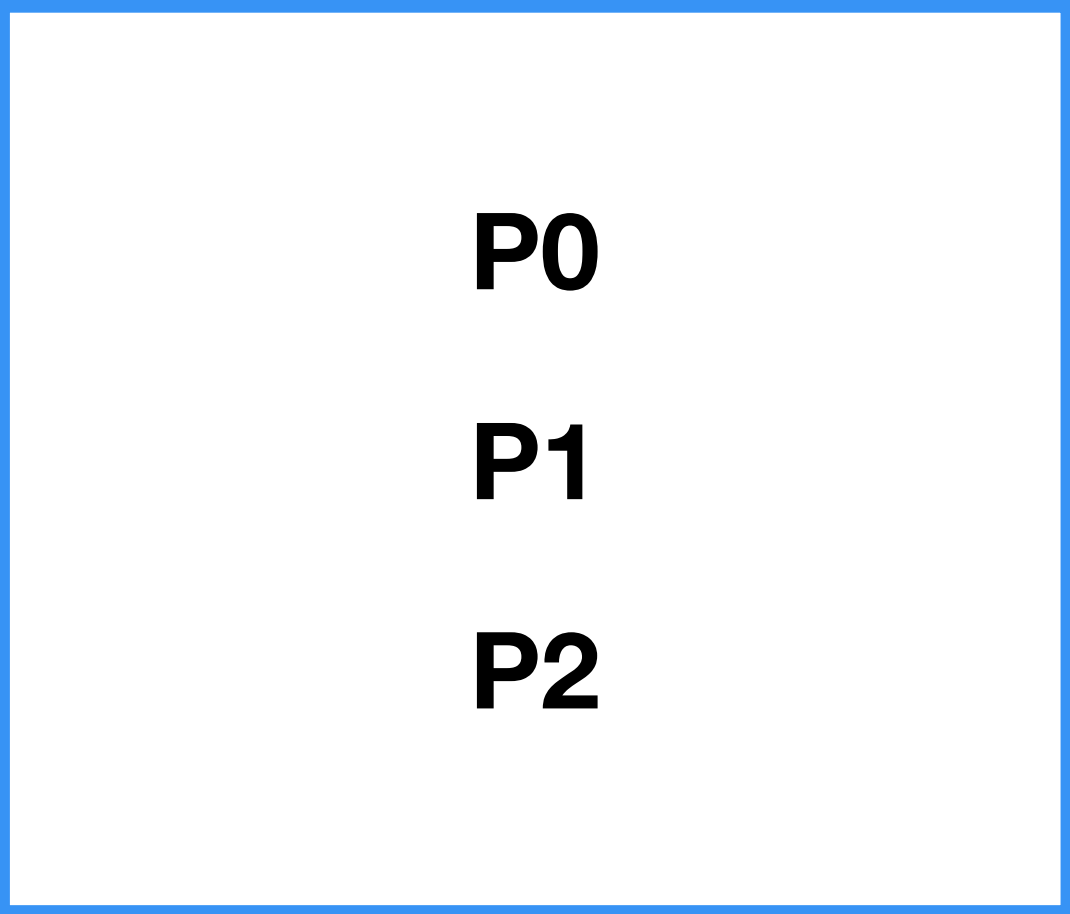
Topic2



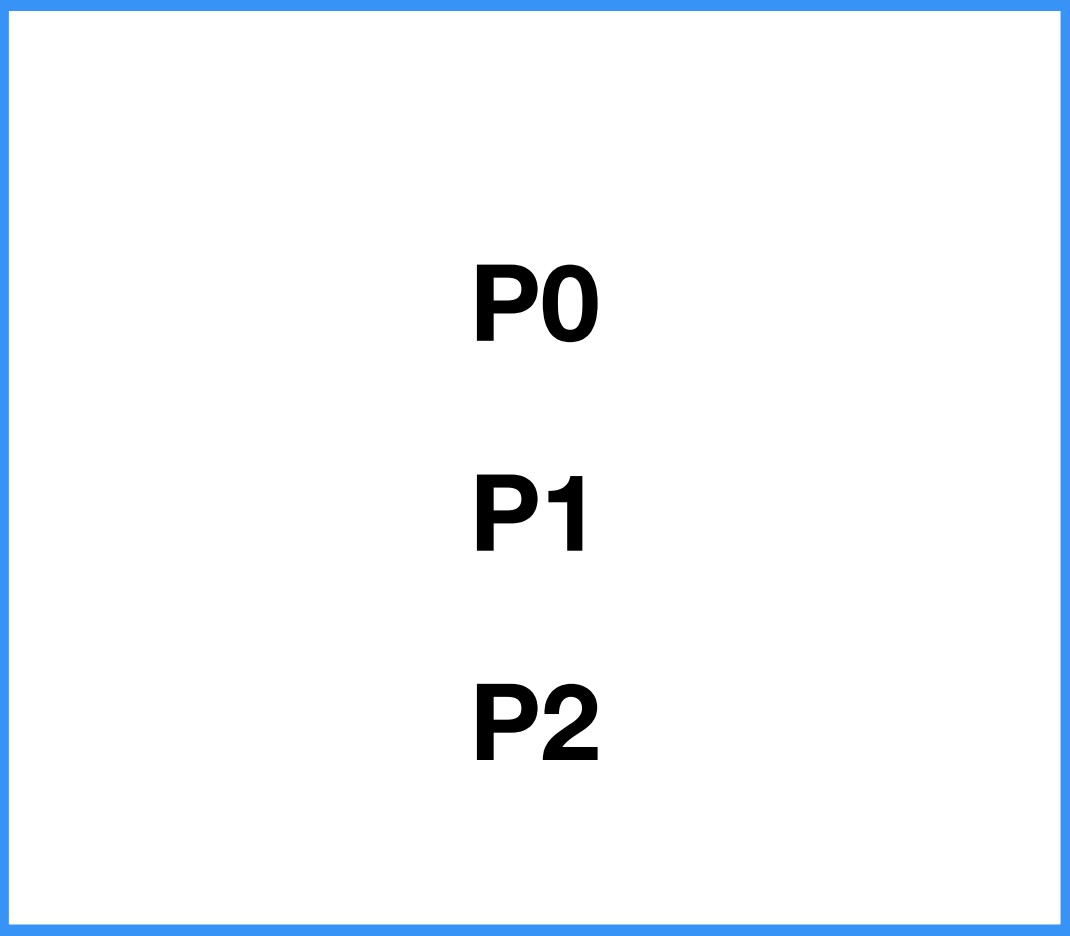
RoundRobinAssignor



Topic1



Topic2



Schema

JSON

String

Object

Array

null

int

long

float

double

bytes

string

spring-kafka kafka-clients

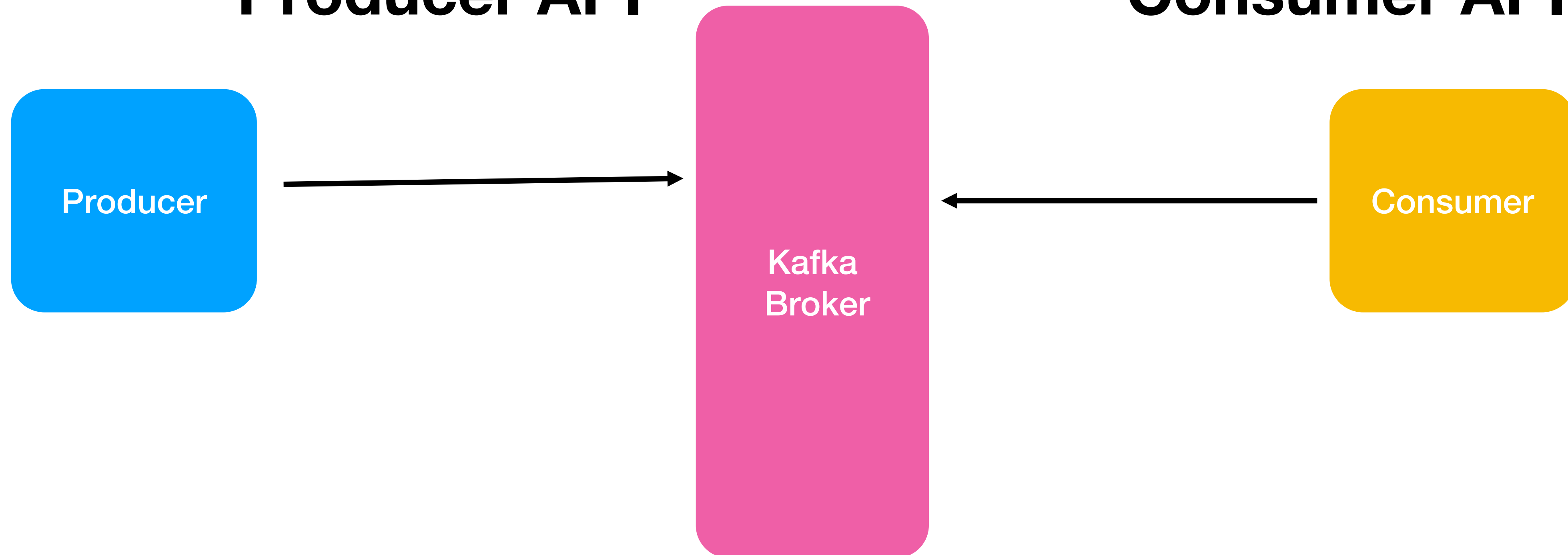
KafkaTemplate

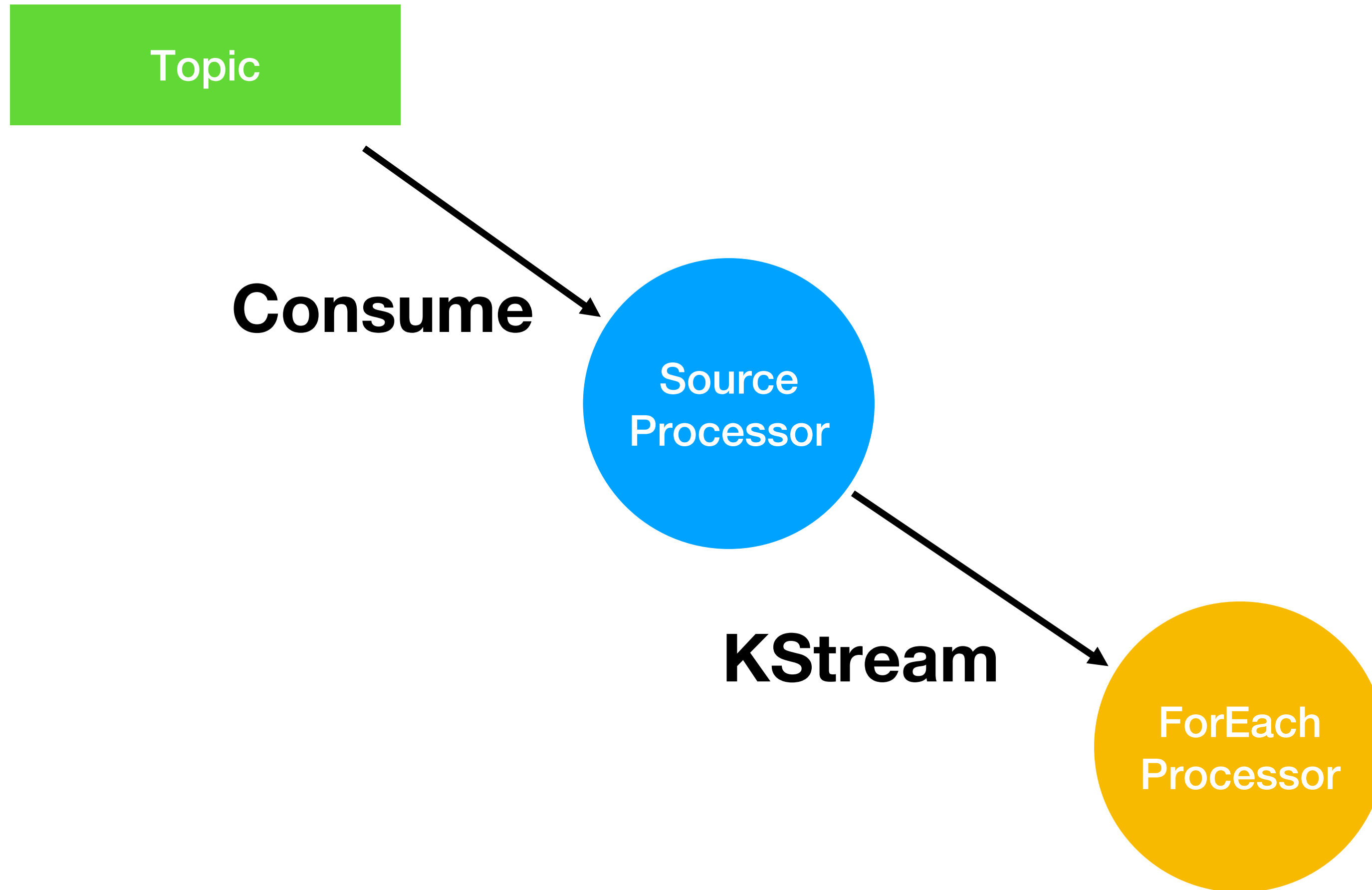
@KafkaListener

Listener Container

Producer API

Consumer API





KTable

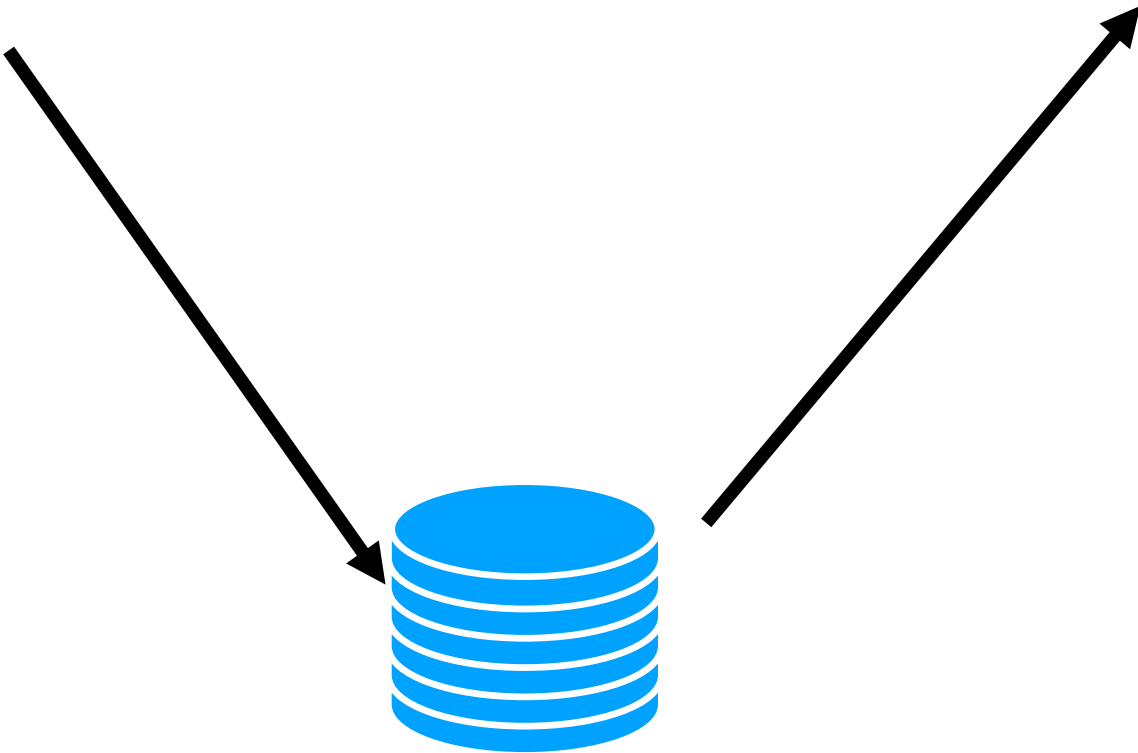
change-log

upsert

Key	Value
apple	10
banana	20
orange	5
pineapple	3

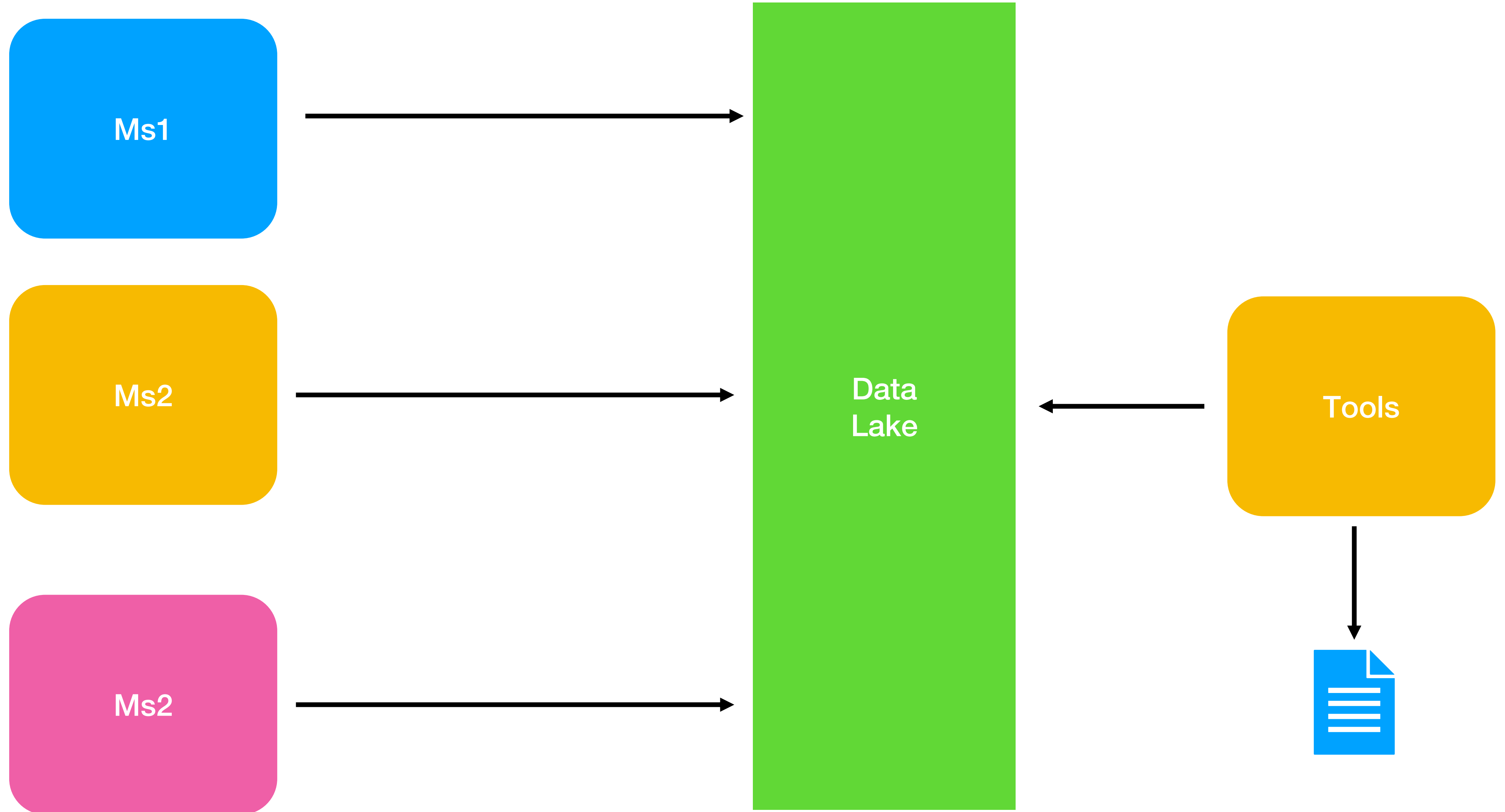


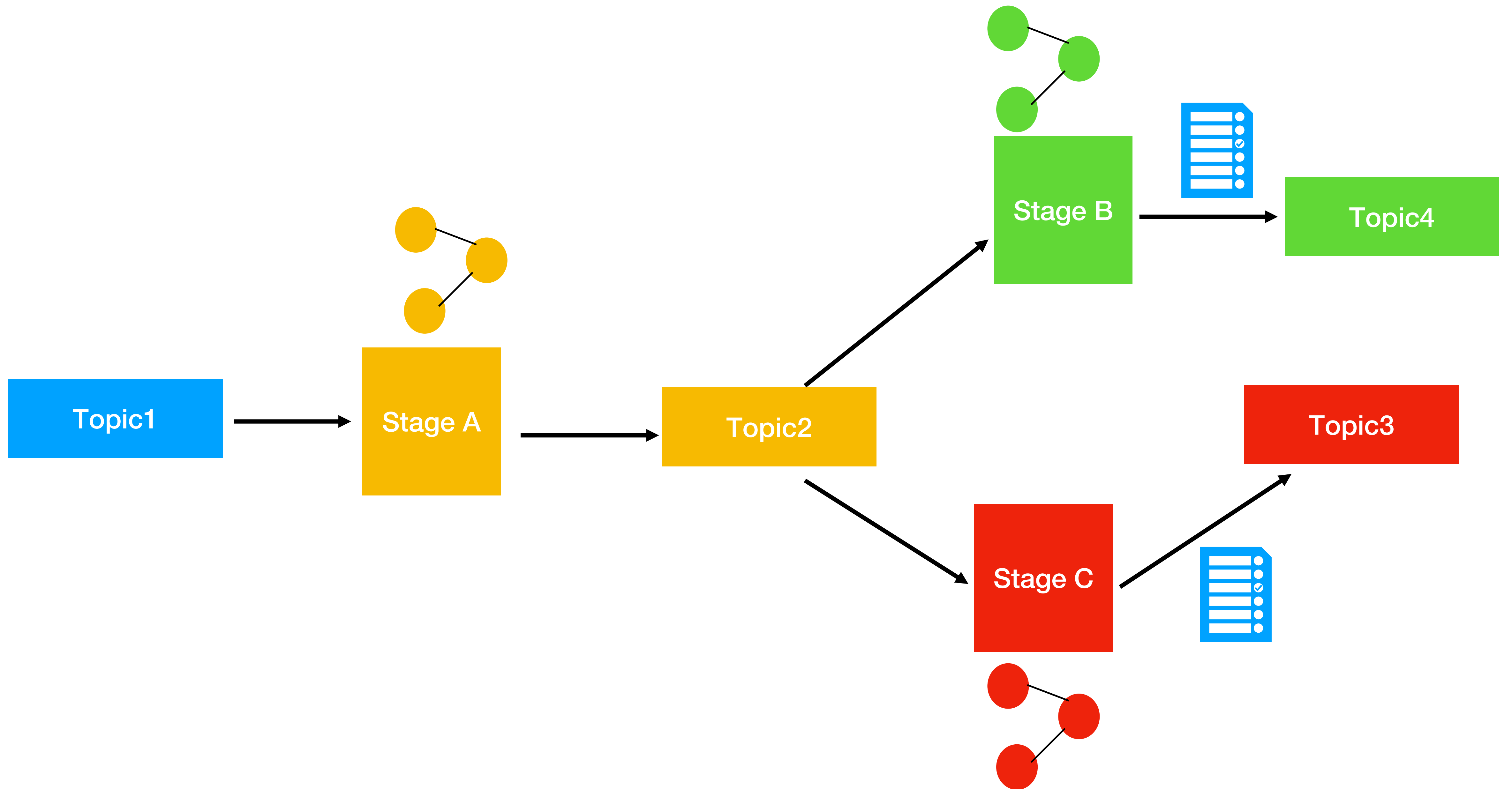
Key	Value
apple	15
banana	25
orange	5
pineapple	6



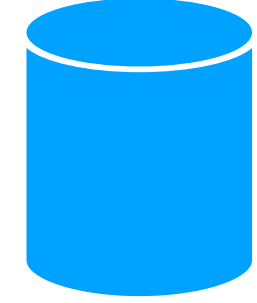
Real Time Stream Processing

Big Data

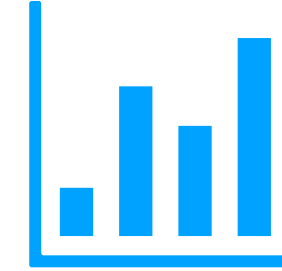




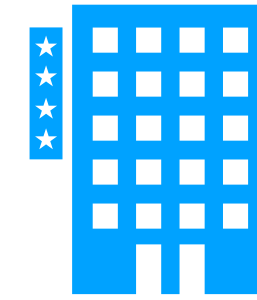
Where



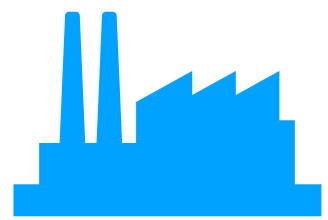
Data platforms, Micro Services



Monitoring Trucks, Cars



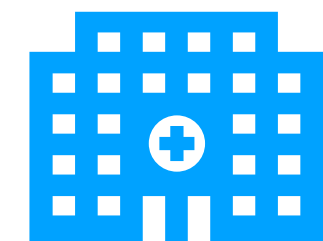
Retail, Hotel and Travel



Factories



Hospitals



Financial Transactions



Kafka Streams Library

Streams DSL

Processor API