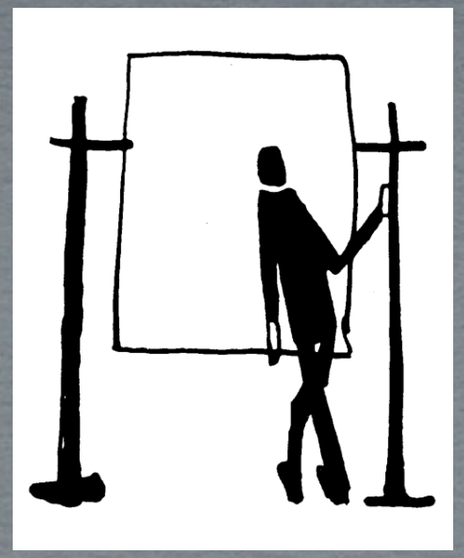
Kafka

A pub-sub messaging system for web-scale stream processing

Neha Narkhede - Distributed Systems at LinkedIn



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A pub-sub messaging system for web-scale stream processing

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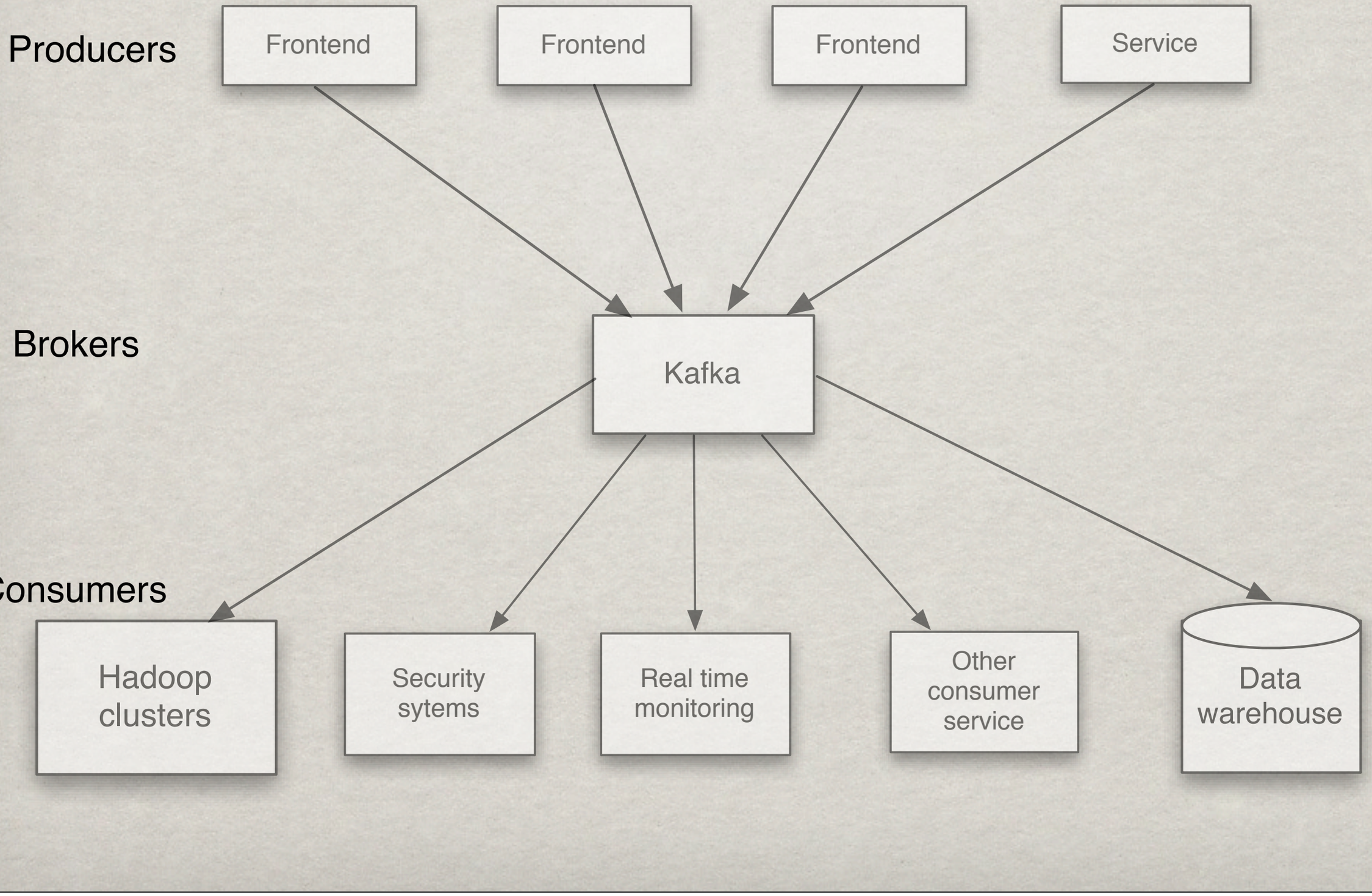
One sentence:

Kafka is a distributed, high throughput, persistent pub-sub messaging system

REQUIREMENTS

- Support consumers operating at different rates (real time & offline)
- Allow very parallel consumption (e.g. Hadoop)
- Pick throughput and performance over fancy features

KAFKA AT LINKEDIN



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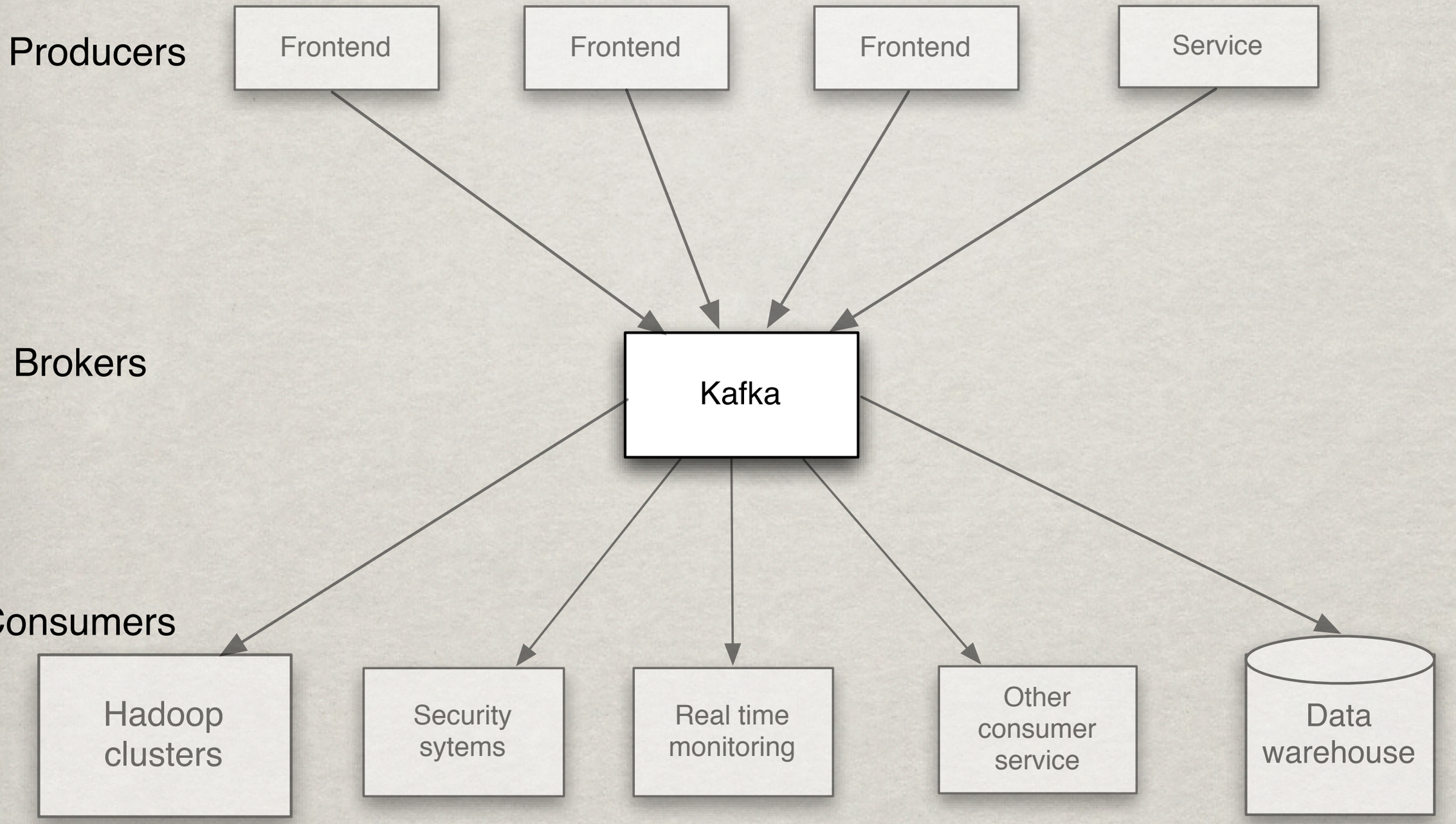

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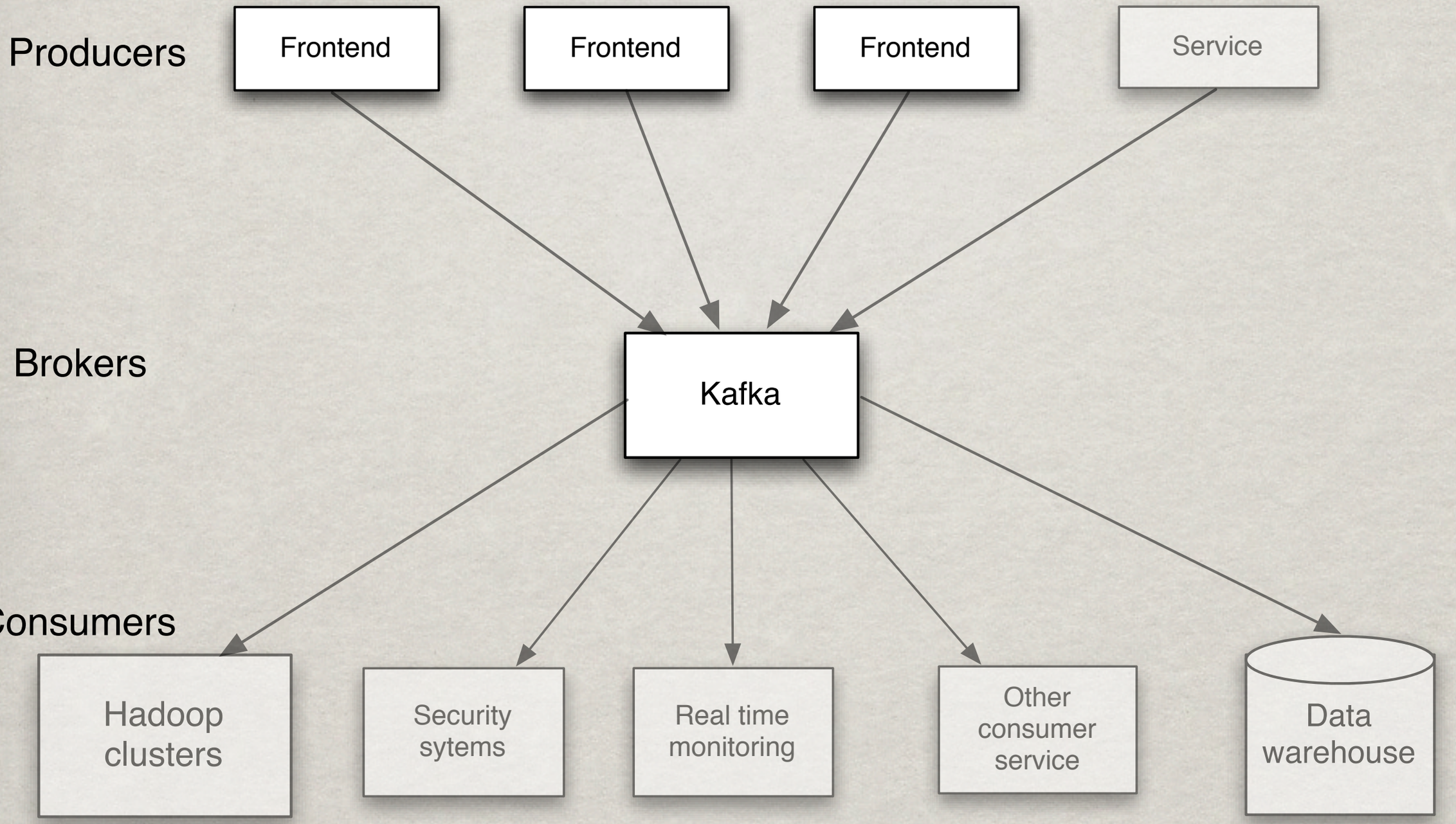

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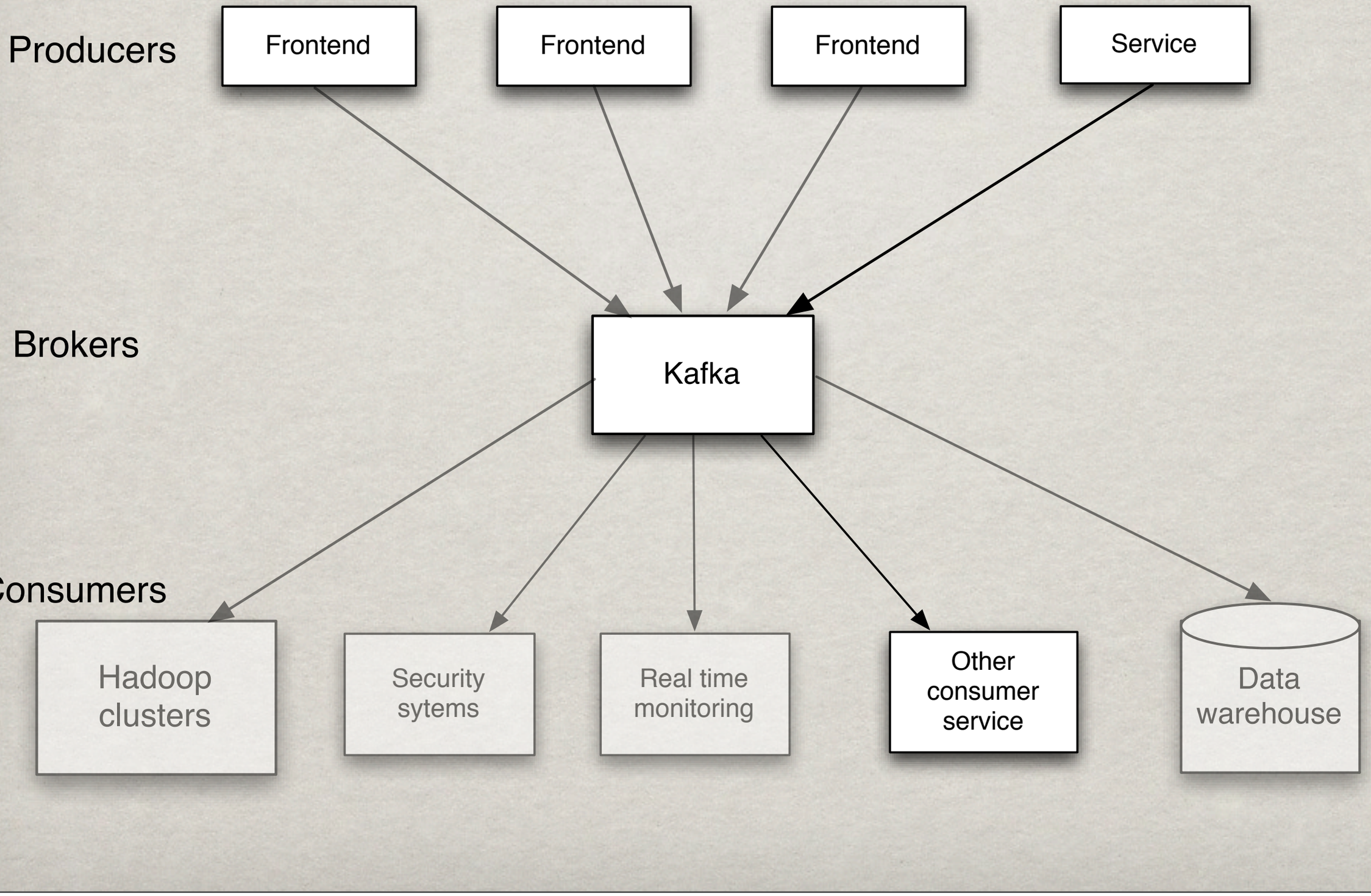

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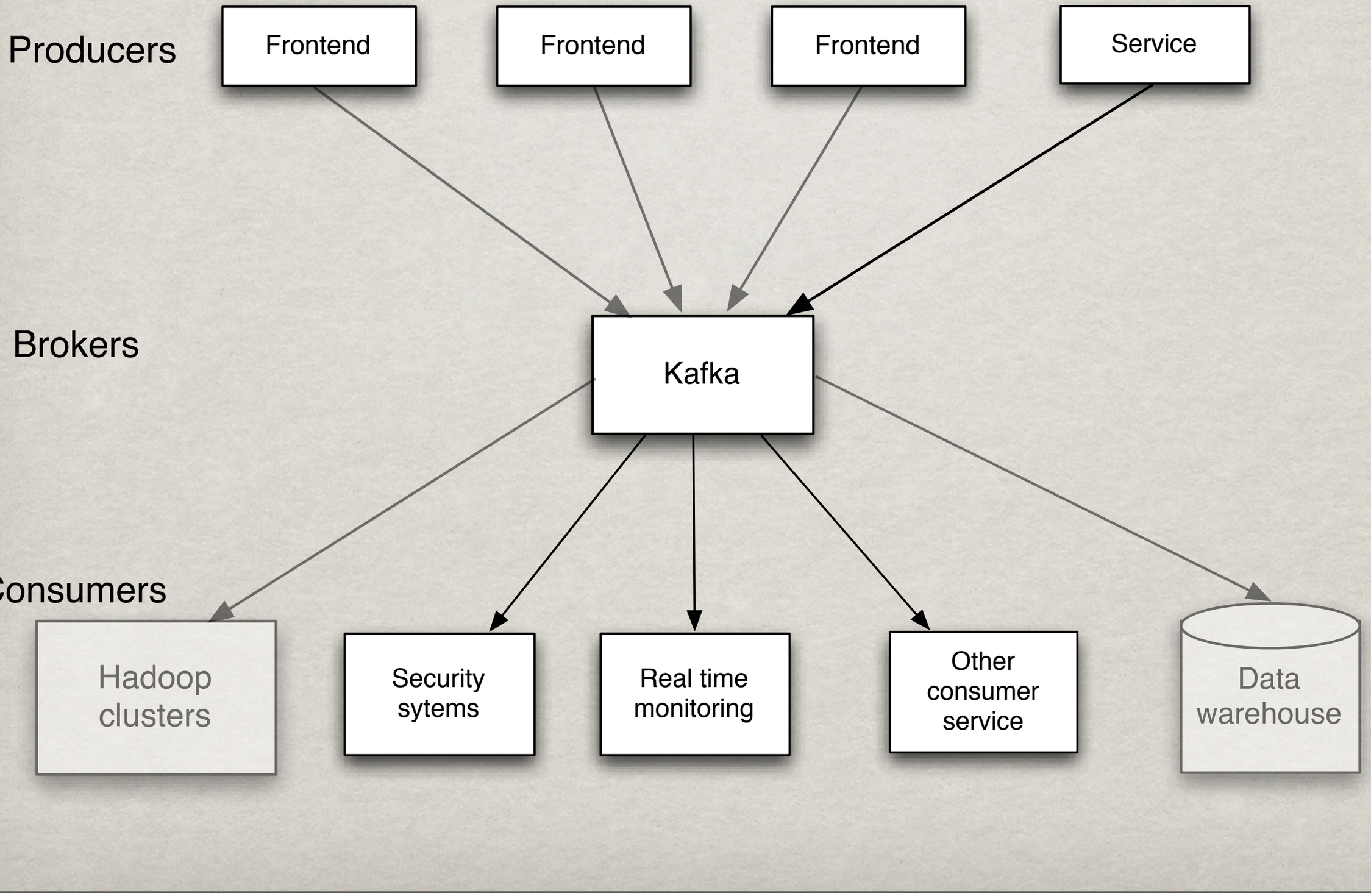
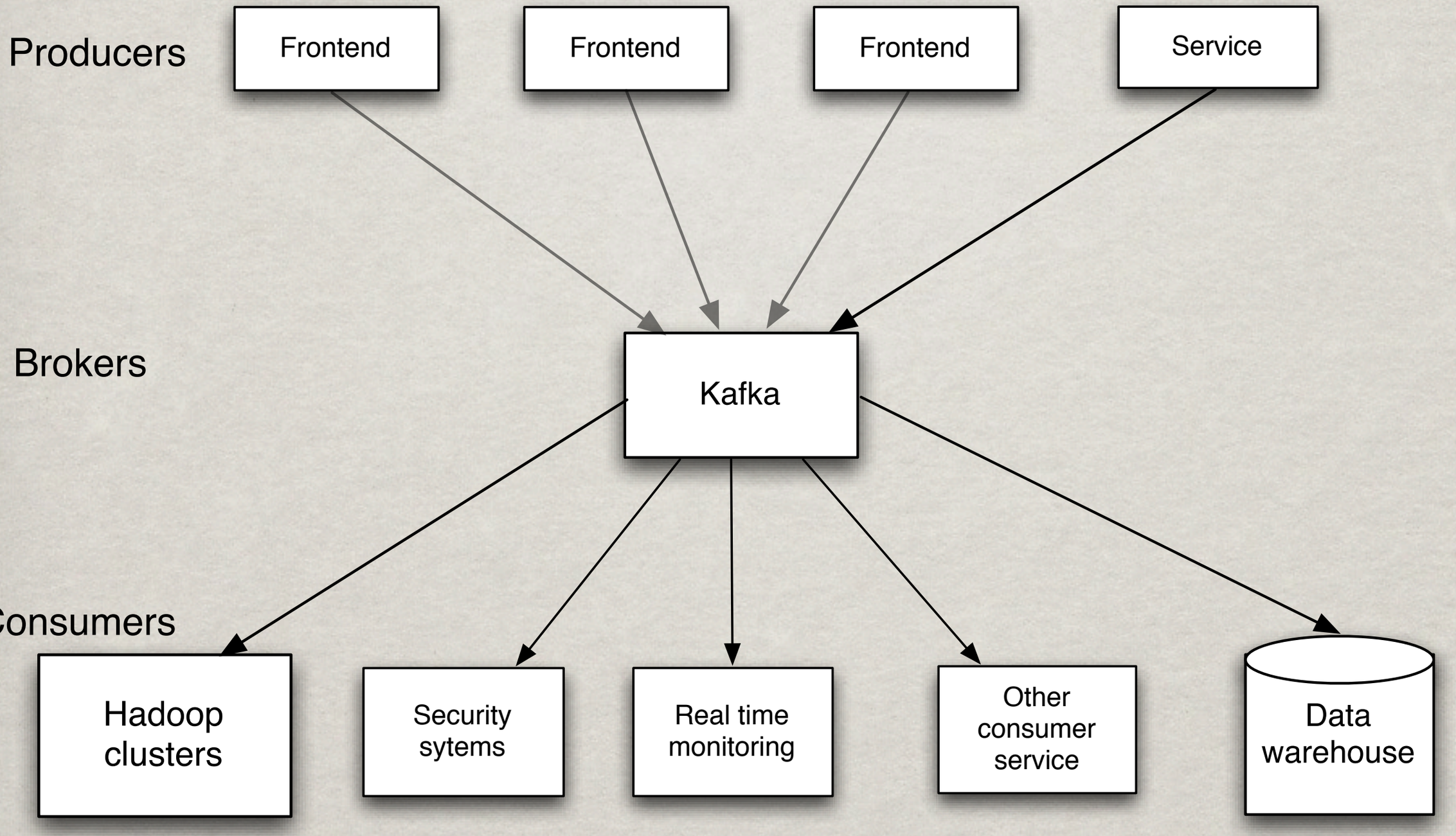
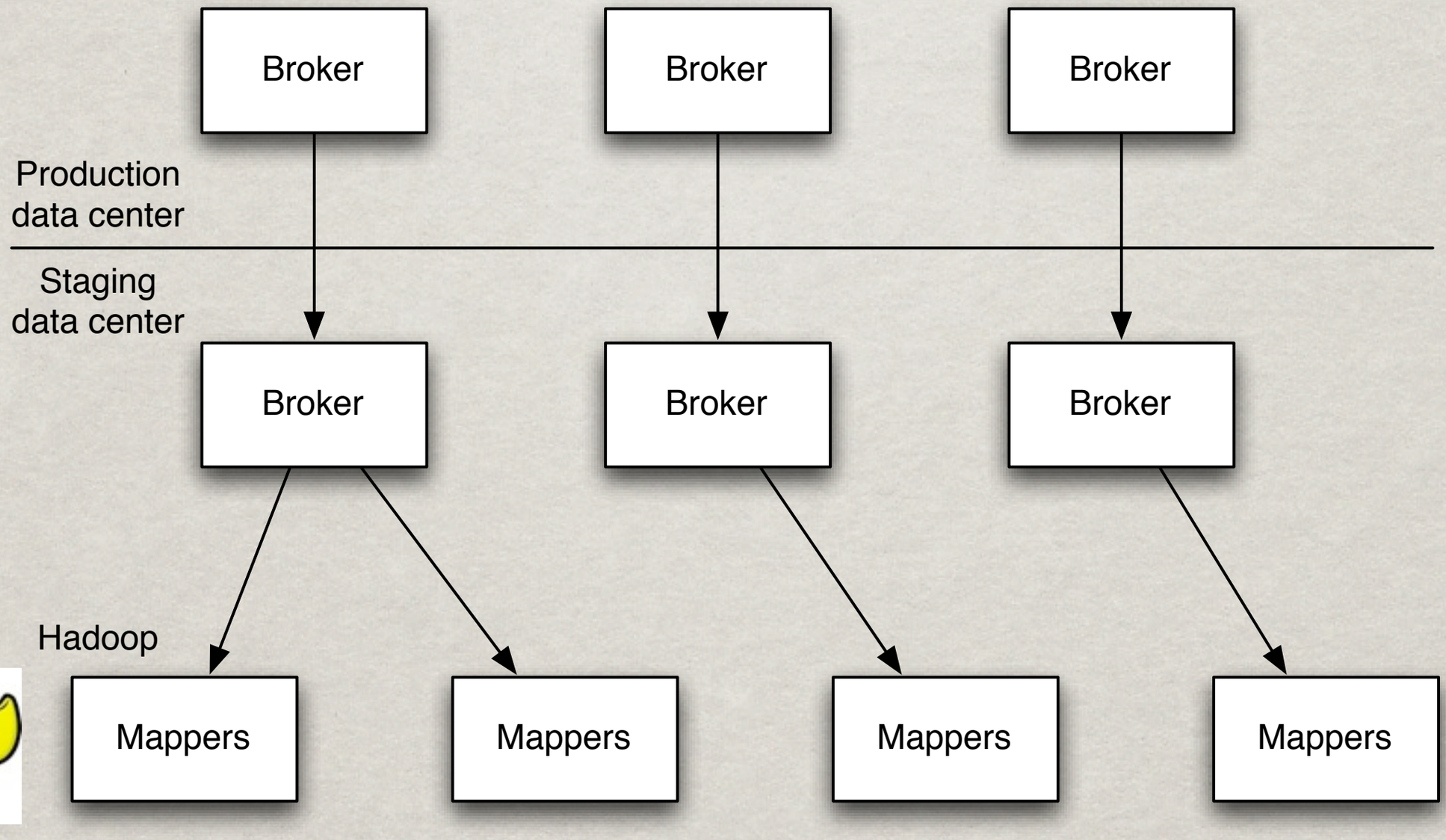
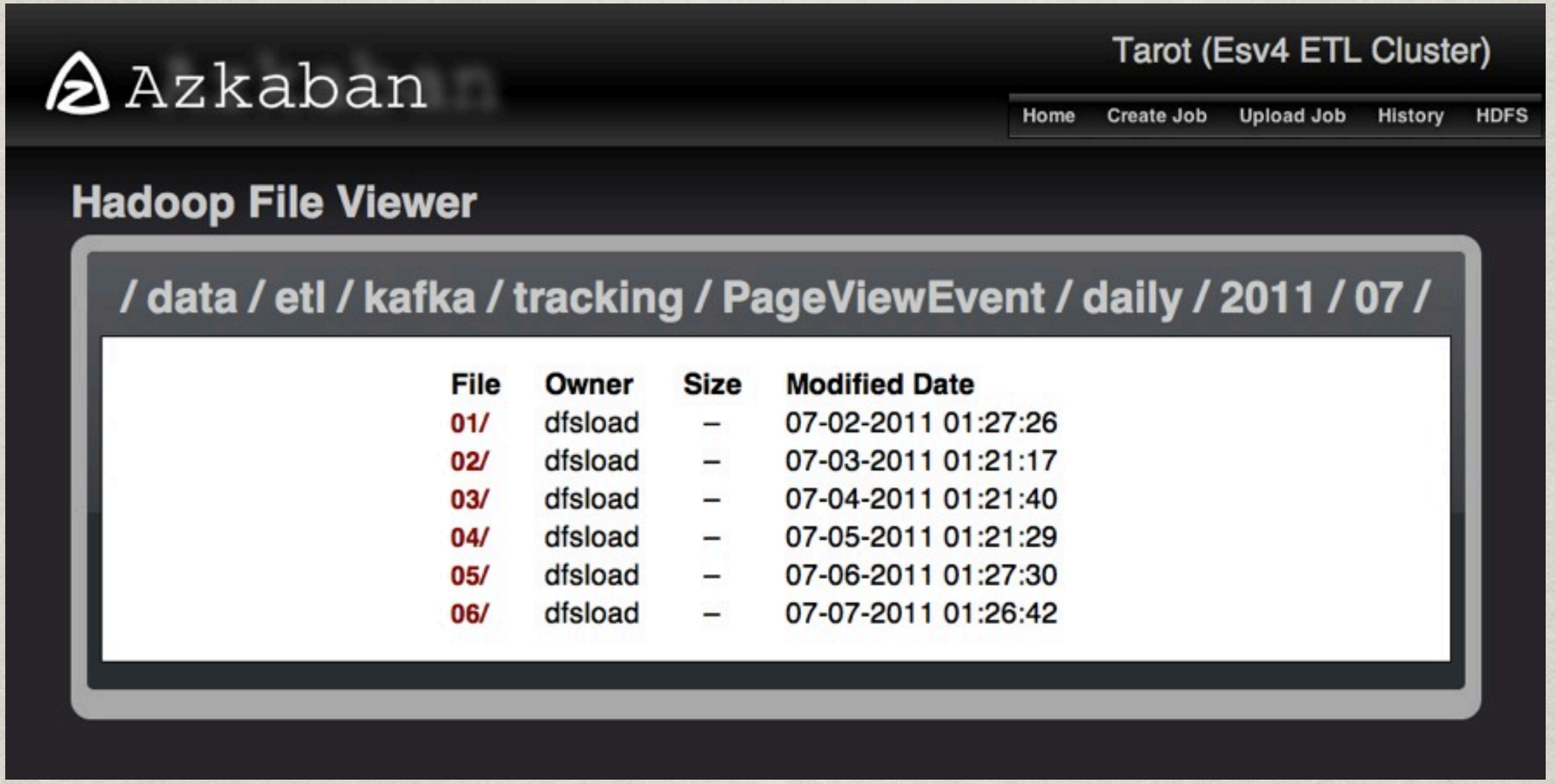


KAFKA AT LINKEDIN



HADOOP INTEGRATION




Azkaban
Tarot (Esv4 ETL Cluster)
Home
Create Job
Upload Job
History
HDFS
Hadoop File Viewer
/ data / etl / kafka / tracking / PageViewEvent / daily / 2011 / 07 /
File
Owner
Size
Modified Date
01/ dfsload – 07-02-2011 01:27:26
02/ dfsload – 07-03-2011 01:21:17
03/ dfsload – 07-04-2011 01:21:40
04/ dfsload – 07-05-2011 01:21:29
05/ dfsload – 07-06-2011 01:27:30
06/ dfsload – 07-07-2011 01:26:42

Production Kafka

Broker

Broker

Broker

Production data center

Staging data center

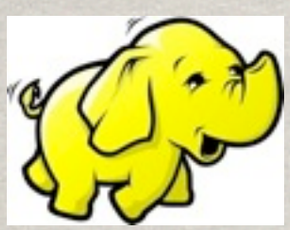
Staging Kafka

Broker

Broker

Broker

Hadoop



Hadoop

Hadoop

Hadoop

VOLUME

- billions of events / day
- couple of terabytes / day

GUARANTEES

- No corruption of data
  - over the network
  - on the disk
- At least once delivery

Claim: These are the strongest possible guarantees given the performance constraints

PRODUCER API

```
package scalathon.kafka.producer

import java.util.Properties
import kafka.message.Message
import kafka.producer.{ProducerConfig, ProducerData, Prod
ucer}

object ProducerExample {
  def main(args: Array[String]) {
    // set the right config options
    val props = new Properties
    props.put("zk.connect", "127.0.0.1:2181");
    val config = new ProducerConfig(props);
    val producer = new Producer[Message, Message](config);
    // Kafka is not in the serialization business
    val topic = "Kafka-Novels"
    val data = "The Metamorphosis".getBytes
    val producerData =
      new ProducerData[Message, Message](topic,
                                         new Message(data))
    // send data to Kafka
    producer.send(producerData)
    producer.close
    println("Sent message -> test-message")
  }
}
```

Consumer Api

```scala
package scalathon.kafka.consumer

import java.util.Properties
import kafka.consumer.{Consumer, ConsumerConnector, ConsumerConfig}
import java.util.concurrent.Executors
import org.I0Itec.zkclient._
import kafka.utils.StringSerializer

object ConsumerExampleSingleThread {
  def main(args: Array[String]) {
    // set the right config options
    val props = new Properties
    props.put("zk.connect", "127.0.0.1:2181")
    props.put("groupid", "kafka-fans")

    val topic = "Kafka-Novels"
    // pull all the Novels in ONE stream
    val partitions = 1

    val consumerConfig = new ConsumerConfig(props)
    val consumerConnector: ConsumerConnector =
      Consumer.create(consumerConfig)
    // create the message streams for topic Novels
    val topicMessageStreams =
      consumerConnector.createMessageStreams(Predef.Map(topic -> partitions))

    val novelsTopicStreams = topicMessageStreams.get(topic).get
    // we just have one novel topic stream
    val novelsTopicStream = novelsTopicStreams.head
    for(novel <- novelsTopicStream)
      println("Woohoo ! Time to read " + kafka.utils.Utils.toString(novel.payload,
  }
}
```

Project ideas

- http://sna-projects.com/kafka/projects.php
- Producer ACK
- Consumer pluggable decoder
- RESTful Kafka server

ROADMAP

- Apache incubator inclusion
- Successfully deployed in production at LinkedIn
- https://github.com/kafka-dev/kafka
- New Kafka features
  - End-to-end block compression
  - Replication
  - stream processing (online M/R)

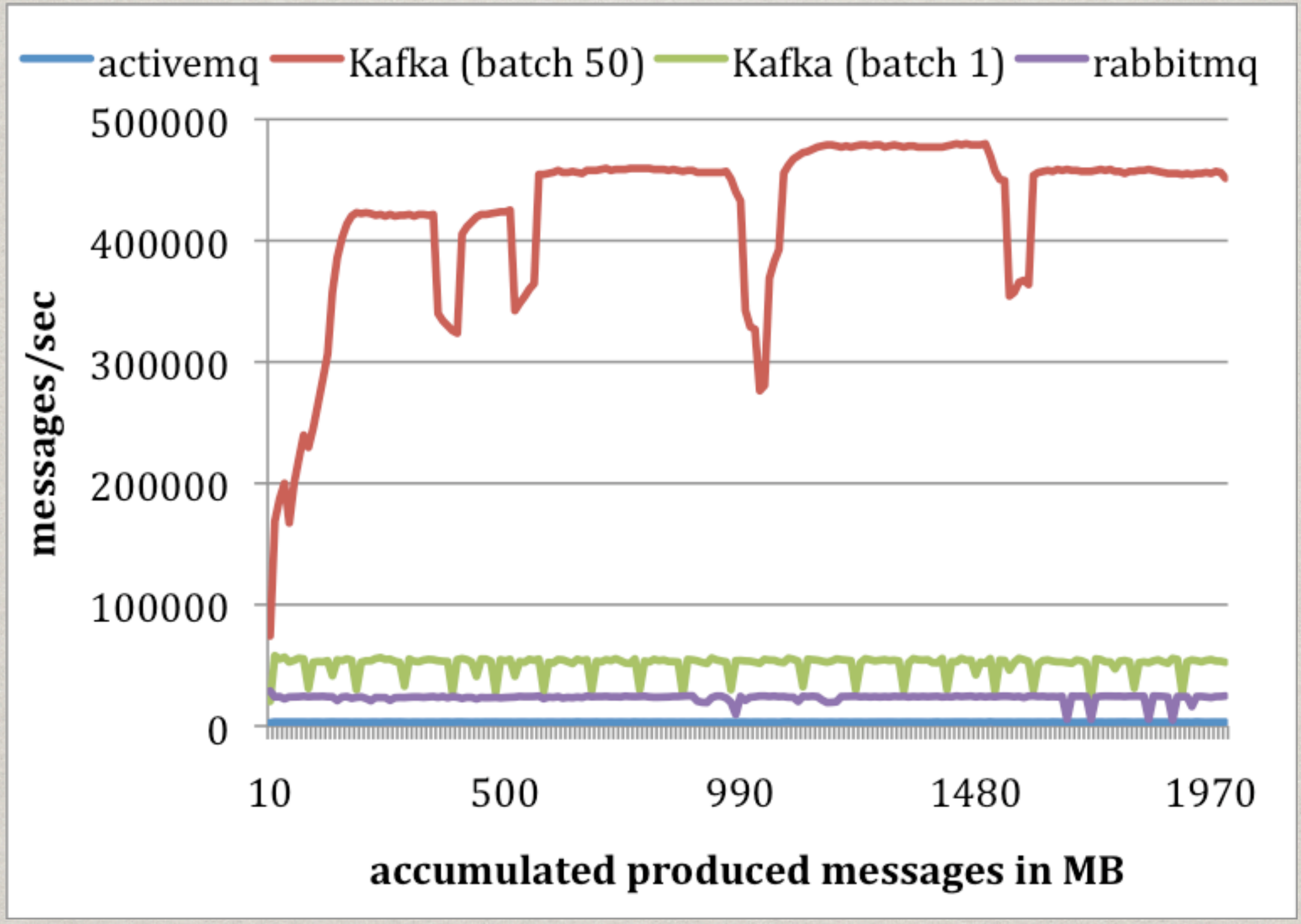
QUESTIONS ?

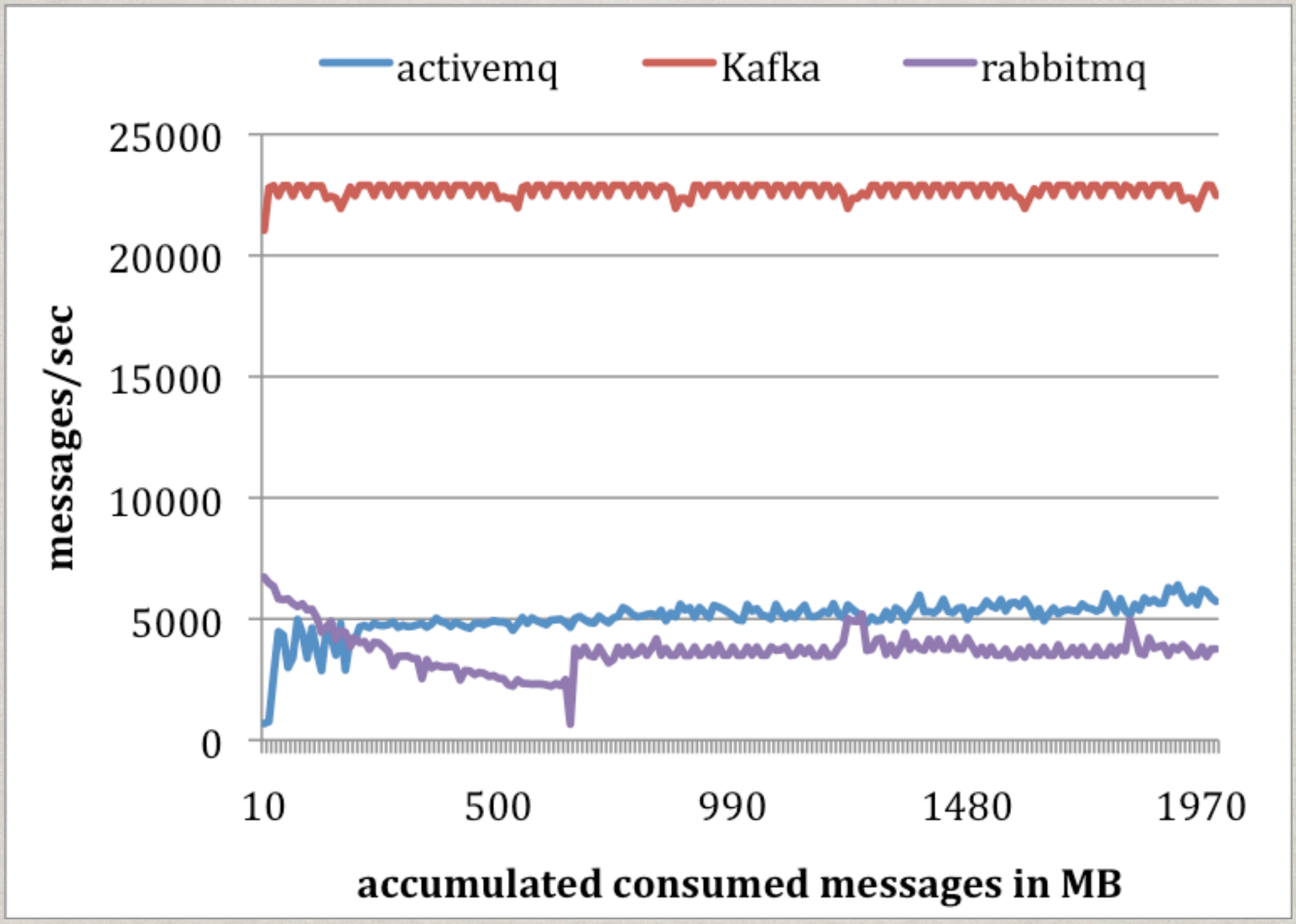
http://sna-projects.com/kafka
https://github.com/kafka-dev/kafka
kafka-dev@incubator.apache.org
neha.narkhede@gmail.com

PERFORMANCE

- 2 Linux boxes
  - 8 2.0 GHz cores
  - 6 7200 rpm SATA drive RAID 10
  - 16GB memory
  - 1Gb network link
- 200 byte messages
- 10 million messages
- 1 consumer thread

- Kafka
  - flush 10K messages
  - batch size = 1 and 50
- Active MQ
  - syncOnWrite=false
  - KahaDB
- RabbitMQ
  - mandatory=true, immediate=false
  - persistent=true


activemq
Kafka (batch 50)
Kafka (batch 1)
rabbitmq
500000
400000
300000
200000
100000
0
messages/sec
10
500
990
1480
1970
accumulated produced messages in MB


activemq
Kafka
rabbitmq
25000
20000
15000
10000
5000
0
messages/sec
10
500
990
1480
1970
accumulated consumed messages in MB