

CS 237 Project Presentation

Flight Traffic Monitoring System

Sharon Ladron de Guevara Contreras

Xuchang Zhan

Hanjie Yao

Motivation & Goal

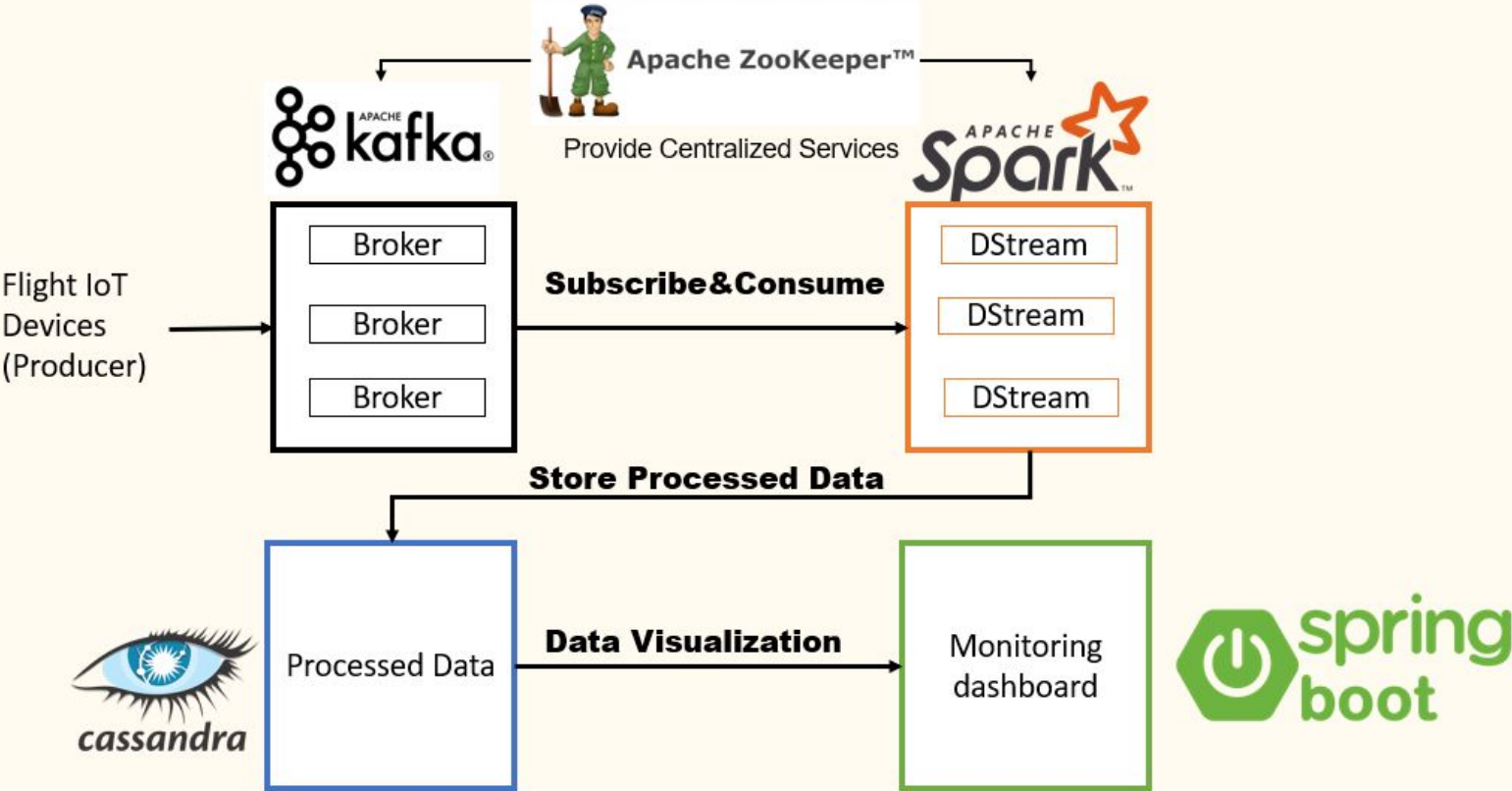
- Motivation. Mitigate flight delay - unreasonable route planning and inaccurate positioning of flights lead to the heavy traffic volume and the delay of aircraft arriving. (GPS is sometimes inaccurate and cannot provide some local information)
- Goal. Develop an IoT flight monitoring system to get the real-time flight information, such as position, route state, fuel, local weather, and so on.

Related Work

- Kafka. Use Kafka producers to simulate IoT devices that generate information data of flights.
- Spark. Develop a high throughput and real-time IoT data stream processor using Spark. Store the processed data in Cassandra database.
- Front-End. Access the processed data from Cassandra and build a monitoring dashboard.

System Design - Flight Monitoring IoT application

FLIGHT MONITORING IOT APPLICATION



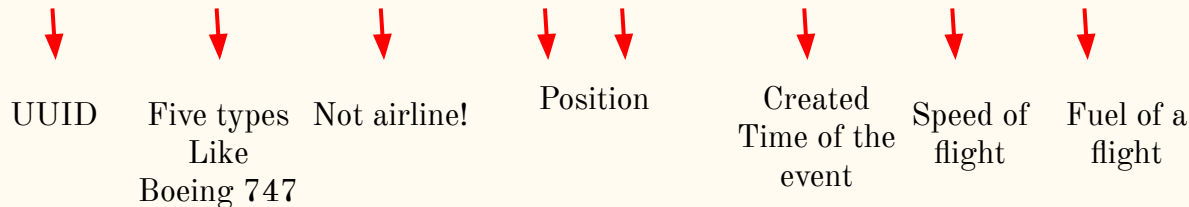
Q&A

1. Why do we use Kafka?

- Log processing. Fast, scalable, and fault tolerant.
- Topic. Facilitate data management.

2. What is the event of our system?

```
FlightData event = new FlightData(flightID, flightType, routeID, latitude, longitude, timestamp, speed, fuelLevel);
```



Route ID is updated to Region ID

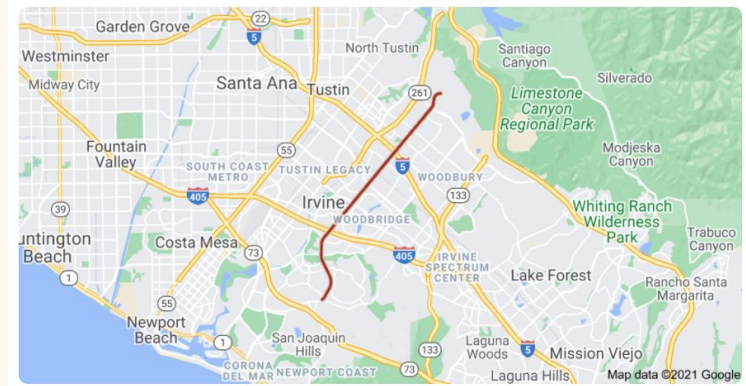
Region ID

Why use route ID at first?

Refer to vehicle traffic at first.

Eg. Culver route. Many vehicles on a route.

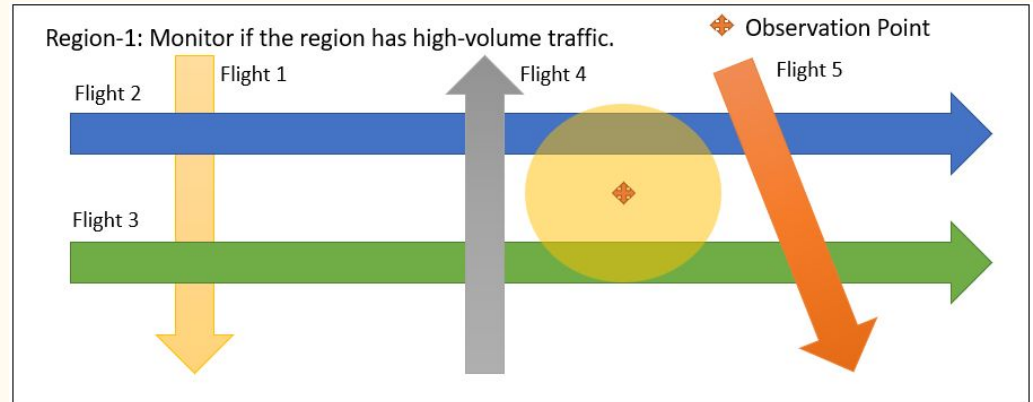
However, for flights, a route is an airline that cannot occur more than one flights at the same time to avoid collision.



Culver Dr
Irvine, CA

Arrows are airlines.

There might be more than one flight in a specific region. However, if the flight traffic volume is high, some flights will delay. Our system is to monitor the traffic volume of a particular region.



Evaluation

Kafka: Message size	203 Bytes
Kafka: Input rate (messages per minute)	{10, 20, 60, 80, 100, 200, 300, 400, 500, 1000, 5000, 10000, 50000}
Spark batch size	10 seconds
Spark threads	2
Spark transformations used	Filter, Map, Reduce

Table 1: Kafka and Spark settings

