Generating Event Notifications

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Contoso Airlines IoT Scenario

We're a small airline

Continental U.S.

12 flights

6 airports

Requirements

Real-time flight info

No-fly zone alerts

Up-to-date arrivals

Permanent archival

Solution

Ingest flight telemetry

Implement microservices

Email alerts

Materialized views

Archive to Blob Storage

Ingesting Flight Telemetry

location container

Receives flight telemetry

Speed, altitude, duration, location (lat/long)

Every 10ms, per flight

Partitioned on /id

Exactly one document per logical partition

Optimized for bulk loading of device telemetry in real-time

Demo

Flight Telemetry Generator

No-fly Zone Alerts

Track all flights

Constantly monitor each flight location

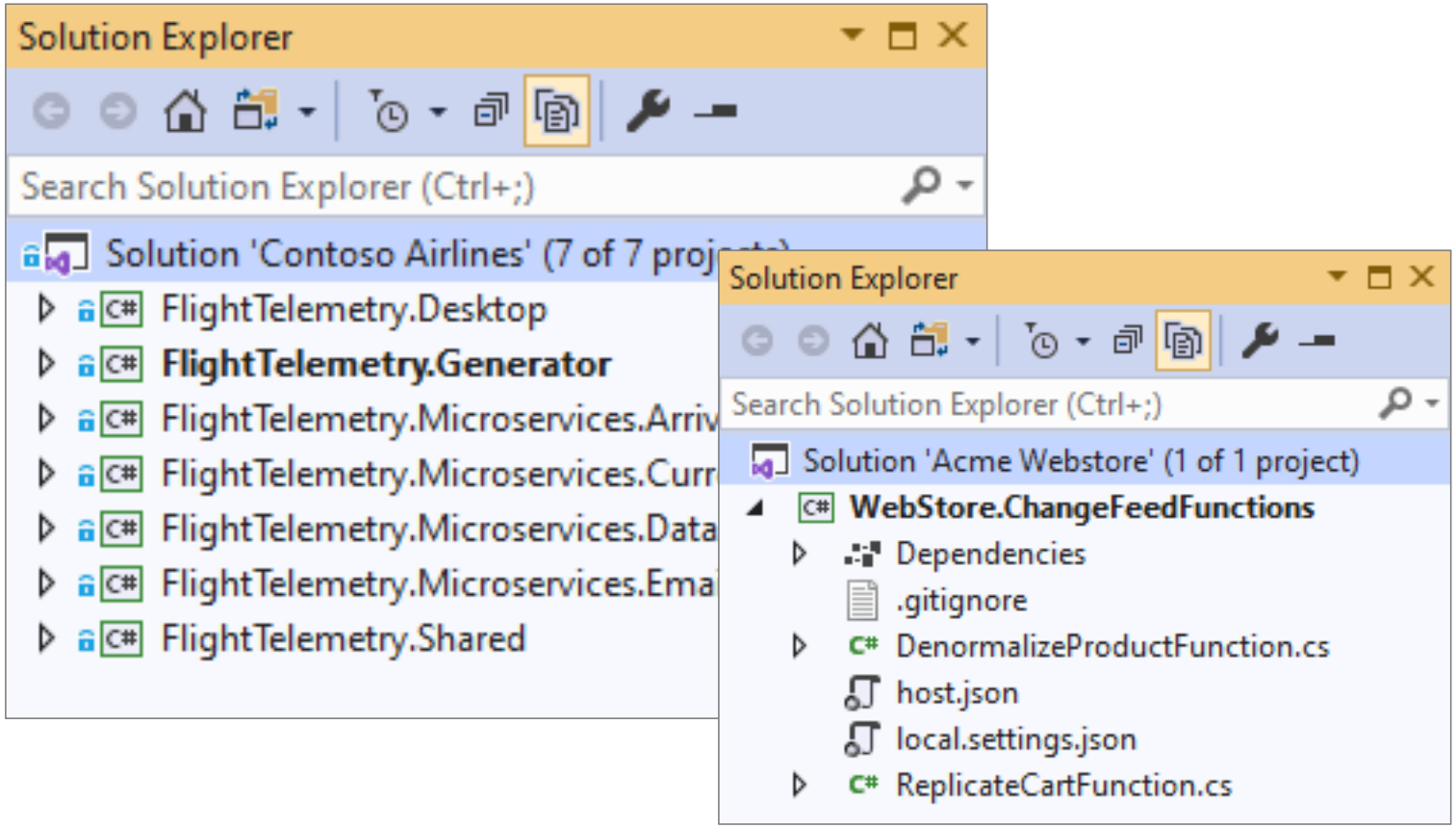
Issue alerts when a flight enters a no-fly zone

Monitor the change feed

Examine each telemetry document

Run a spatial query against designated no-fly zones

Microservices Solution Structure



Demo

Creating the Email Alert Microservice

Demo

Testing the Email Alert Microservice

Summary

IoT scenario

- Contoso Airlines
- Ingesting flight telemetry

Email Alert microservice

- Watch each flight in real-time
- Spatial queries to detect no-fly zones
- Delivery for email alerts

Building Materialized Views

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Querying Real-time Flight Data

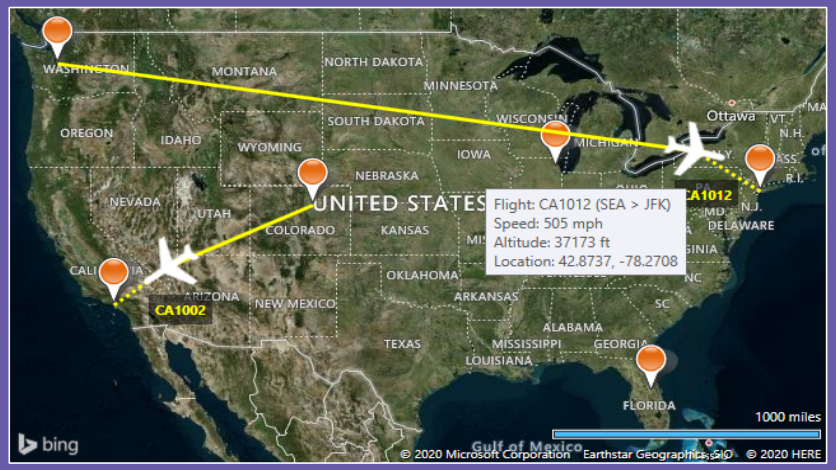
Get current telemetry

Query the location container for each flight in the air

```
SELECT TOP 1 *
FROM c
WHERE
 c.flightNumber = 'CA1012'
ORDER BY
 c._ts DESC
```

Present a live map

Bing Maps mashup



Demo

Flight Location Map

Introducing Materialized Views

Get current location

Continuous querying for each flight's current telemetry

Expensive operation over voluminous raw data using cross-partition query

Build a materialized view

Materialize a tiny view – one document per flight

Partition on /type

Set /id to flight number

Extremely cheap to query the materialized view

Demo

Current Location Microservice

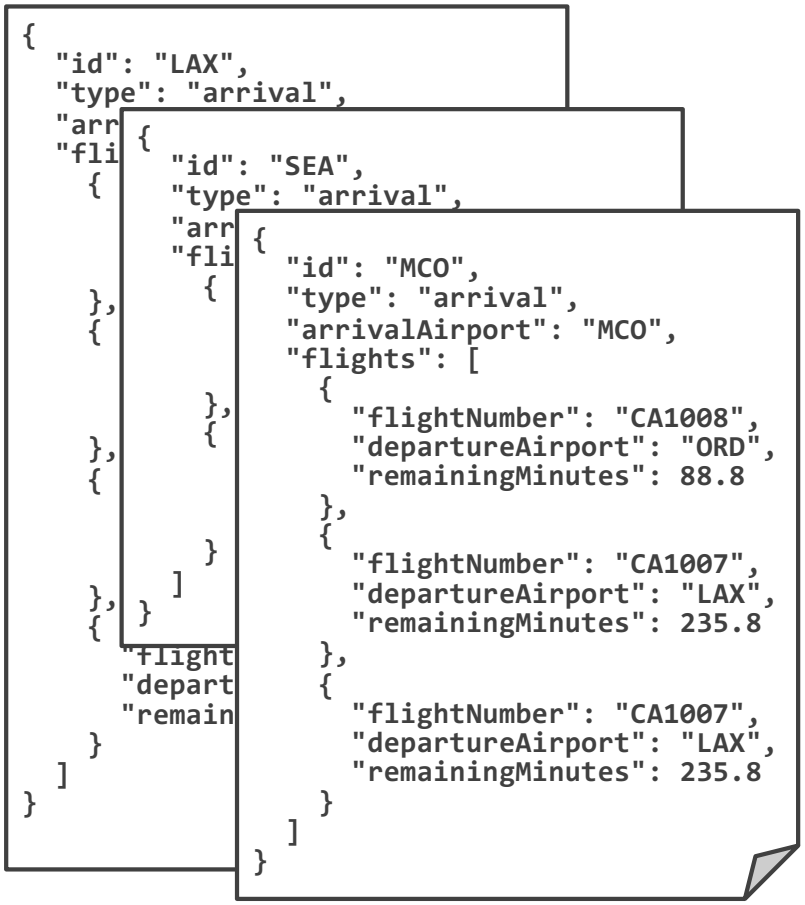
Querying Arrival Data

Get current telemetry

Query the remaining time for each flight in the air

Group the flights by airport

Create a materialized view



Querying Arrival Data

Get current telemetry

Query the remaining time for each flight in the air

Group the flights by airport

Create a materialized view

Present an arrivals board

Query the materialized view

Demo

Arrivals Board Microservice

Summary

Querying IoT data

- Build materialized views

Current Location microservice

- Real-time flight location maps

Arrivals Board microservice

- Real-time flight arrivals, by airport