

Delivering Real-Time Data with Azure

DevUp
October 16, 2019

Chad Green

Platinum Sponsors



Celebration Sponsor



Notebook Sponsor



Lanyards Sponsor



Registration Sponsor



Gold Sponsors



Silver Sponsors





Chad Green

*Director of Software Development
ScholarRx*

✉ chadgreen@chadgreen.com

in chadwickegreen

🐦 ChadGreen

🌐 ChadGreen.com



Agenda

Delivering Real-Time Data with Azure

- Real-Time Data and Azure
- Consuming Data Through Event Hubs
- Analyzing Data with Stream Analytics
- Ingesting Streaming Data into Power BI
- Building Real-Time Visualizations with Power BI

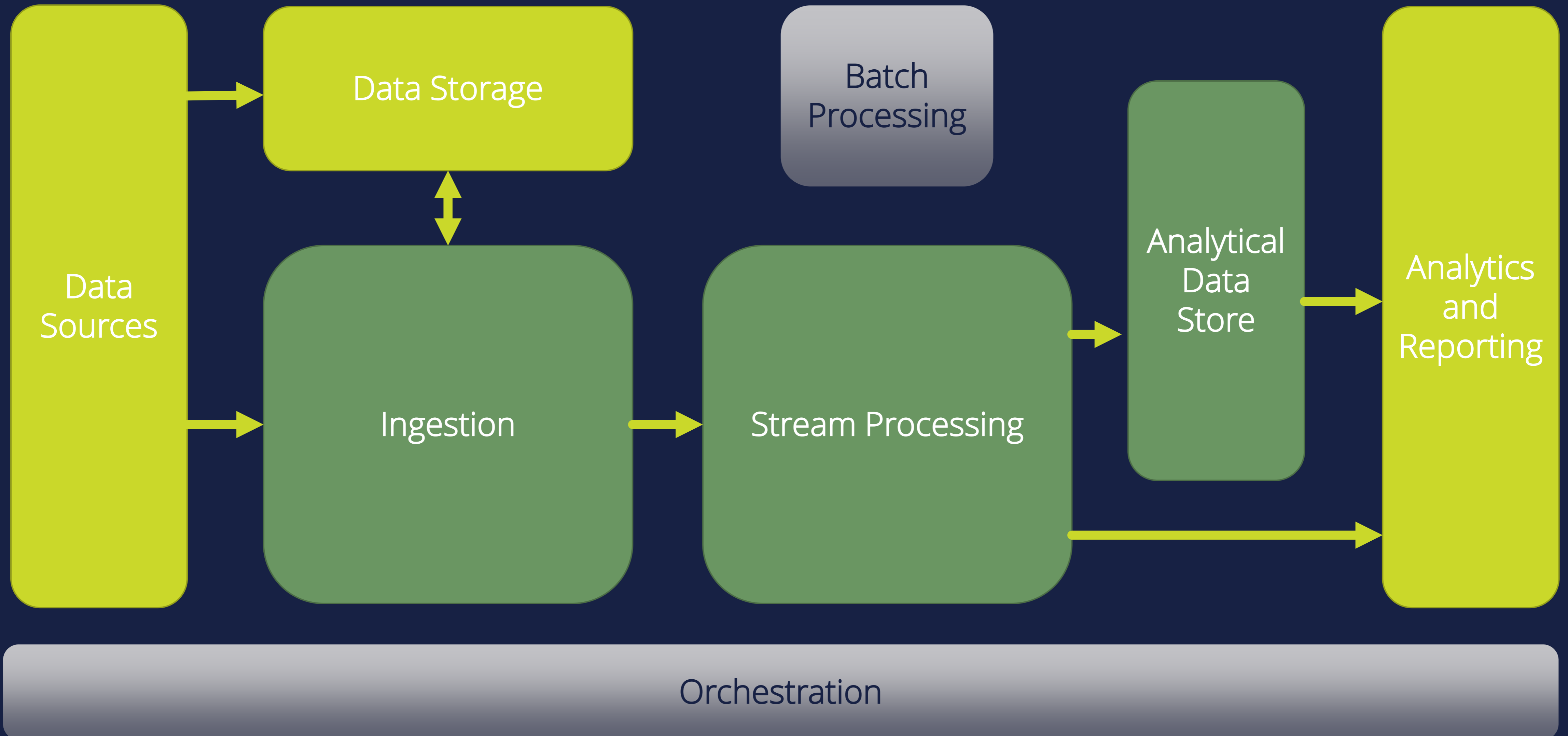


Real-Time Data and Azure

Delivering Real-Time Data with Azure

Real-Time Processing

Real-Time Data and Azure



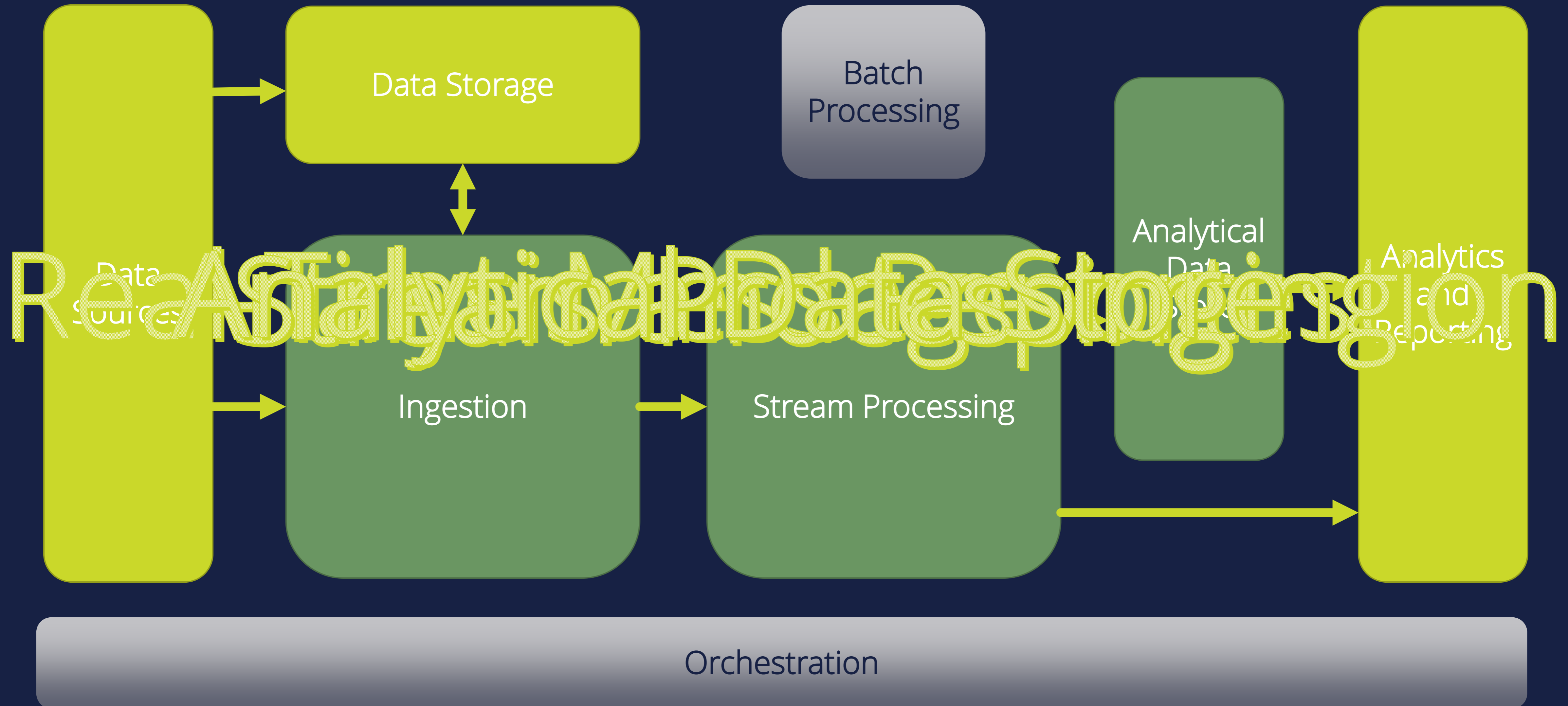
Challenges

Real-Time Data and Azure

- Ingest, process, and store messages in real-time
 - Cannot block the ingestion pipeline
- Act on data quickly

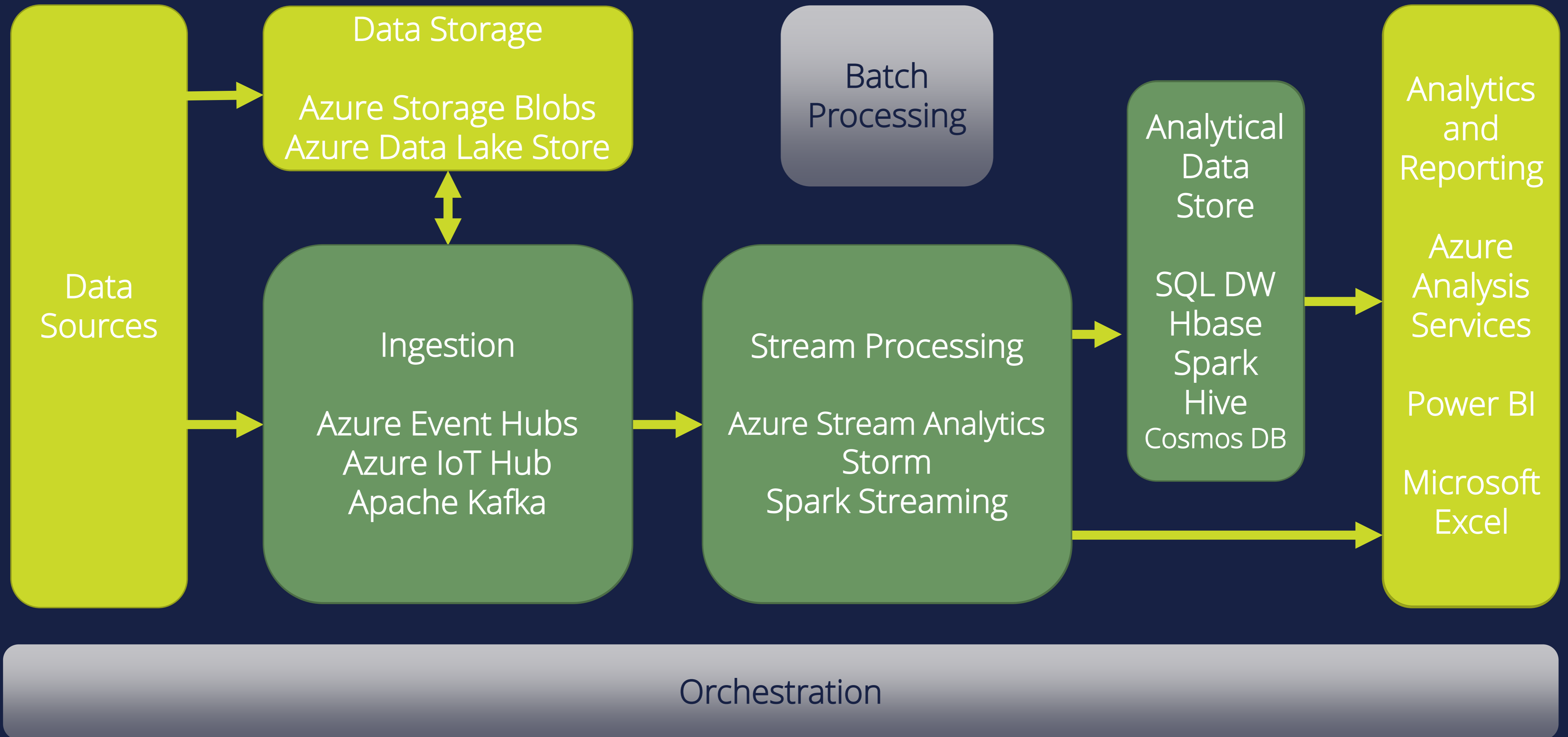
Architecture

Real-Time Data and Azure



Technology Choices

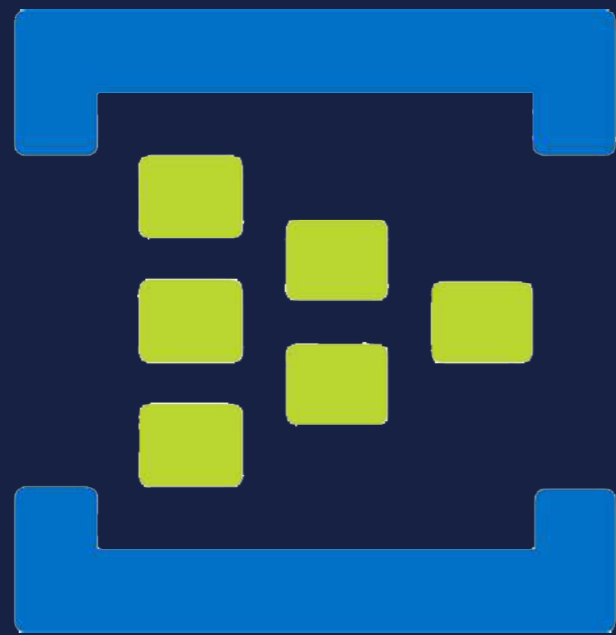
Real-Time Data and Azure



Technology Choices

Real-Time Data and Azure

Real-Time Message Ingestion



Event Hubs

Stream Processing



Stream Analytics

Analytics and Reporting



Power BI

Data Storage



Storage Blob Container

Analytical Data Store



Cosmos DB

Demo Scenario

Real-Time Data and Azure

- User answers practice test question
- System records interaction
- Dashboard showing real-time usage of test functionality

Demo Scenario

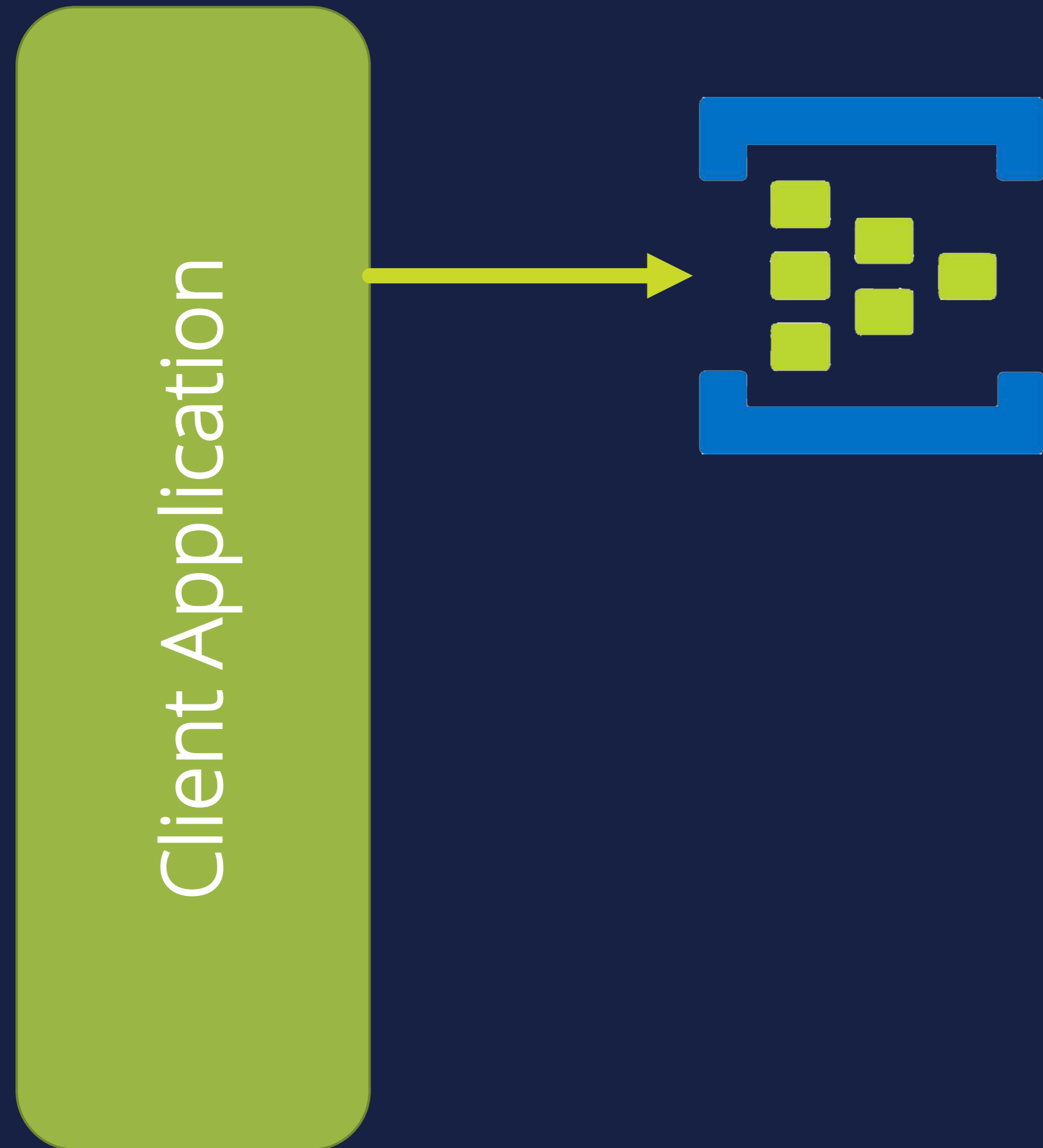
Real-Time Data and Azure

Client Application

.NET Core

Demo Scenario

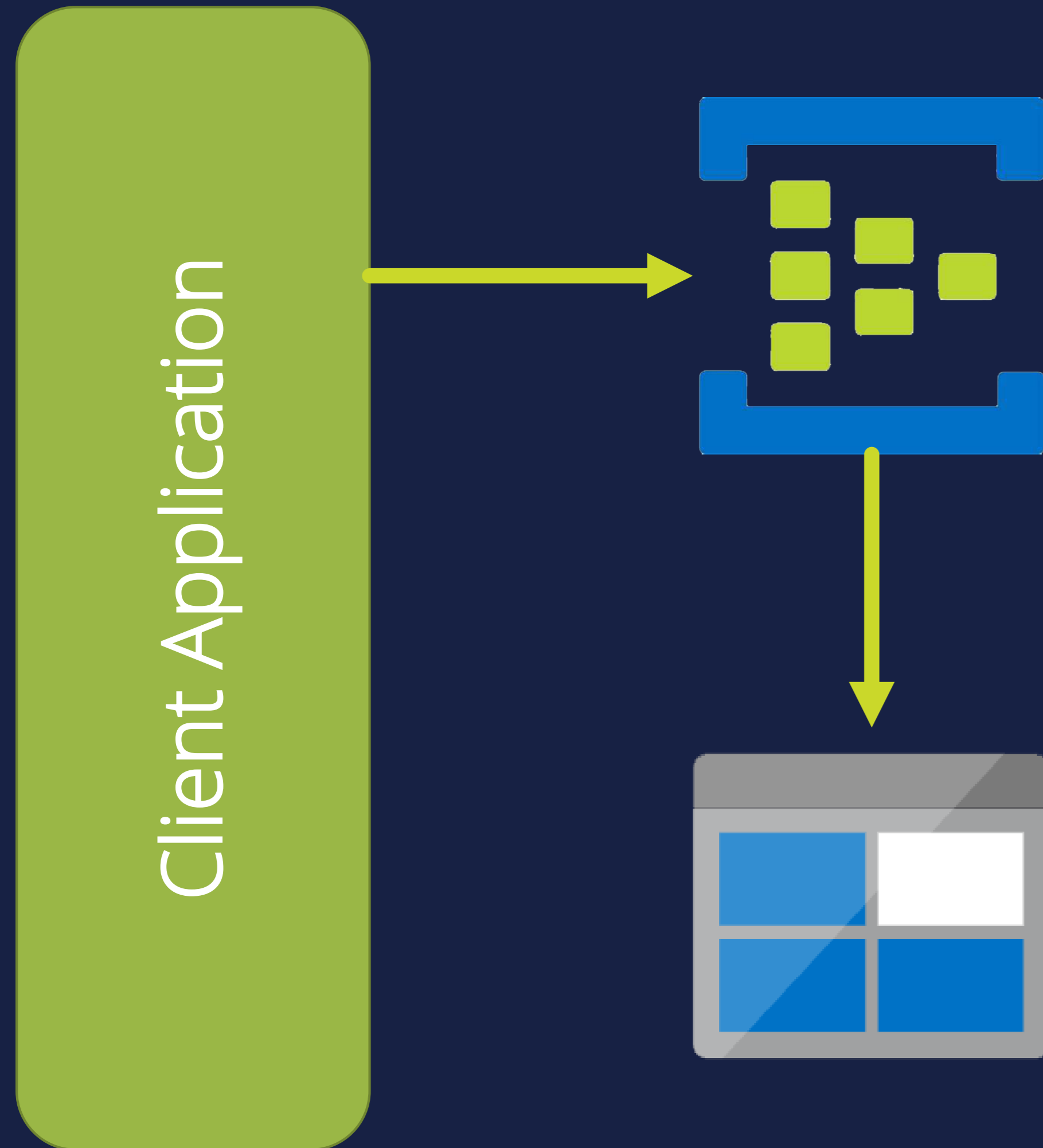
Real-Time Data and Azure



Event Hubs

Demo Scenario

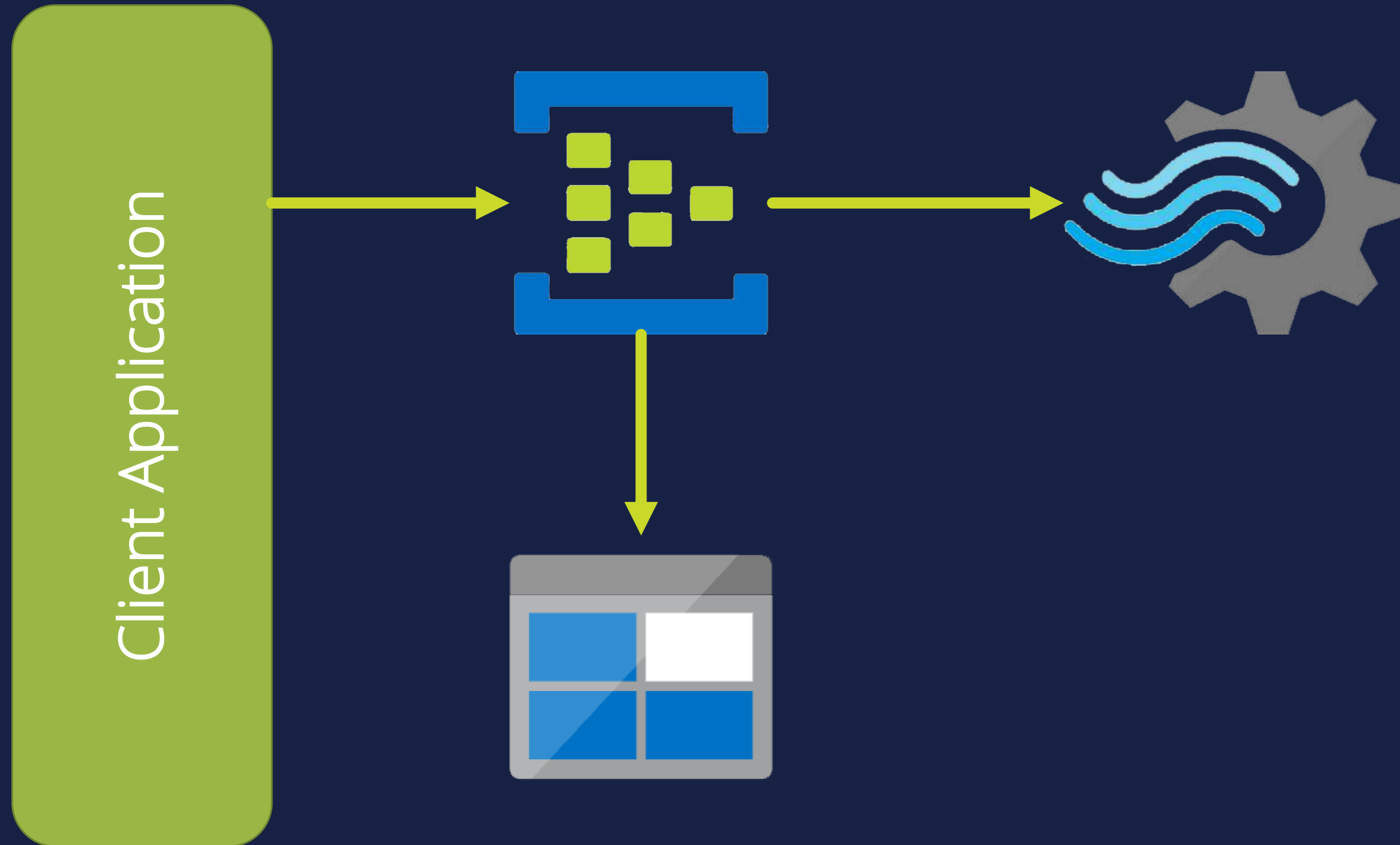
Real-Time Data and Azure



Storage Blob

Demo Scenario

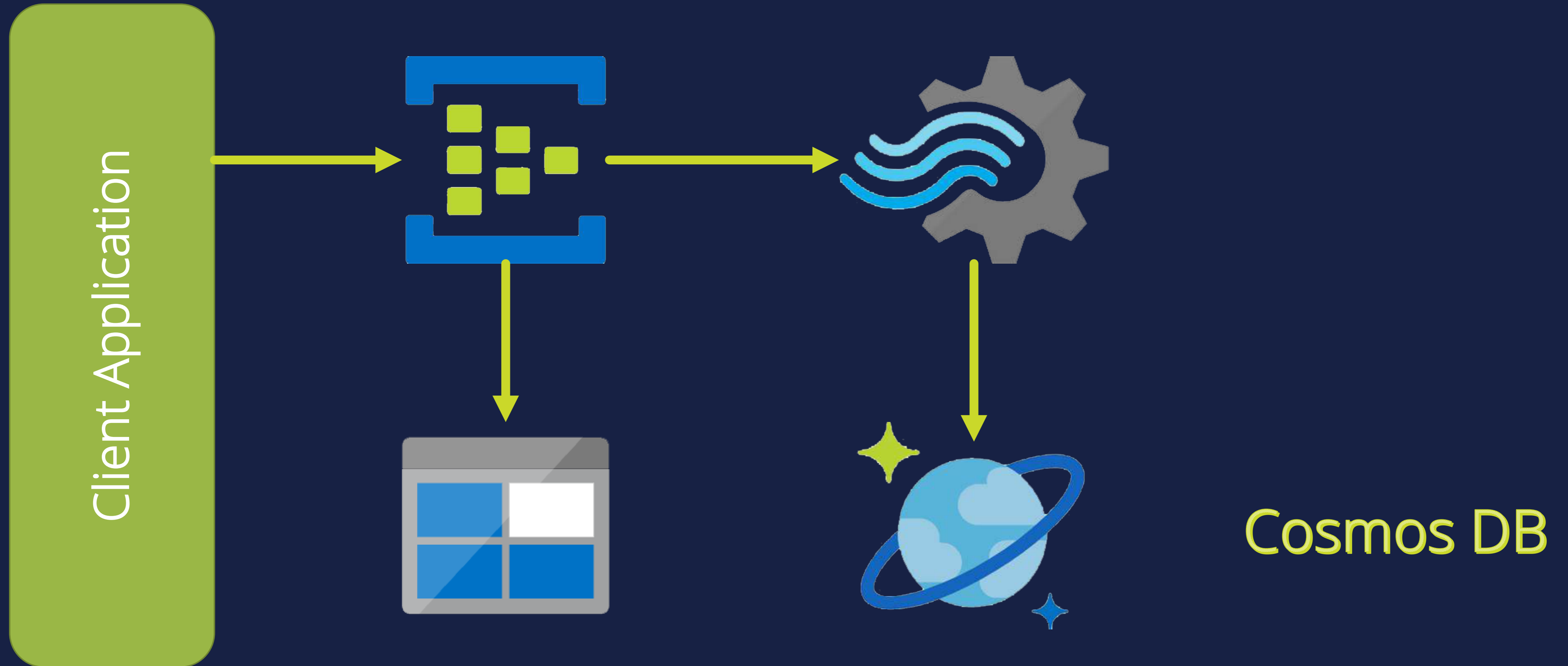
Real-Time Data and Azure



Streaming Analytics

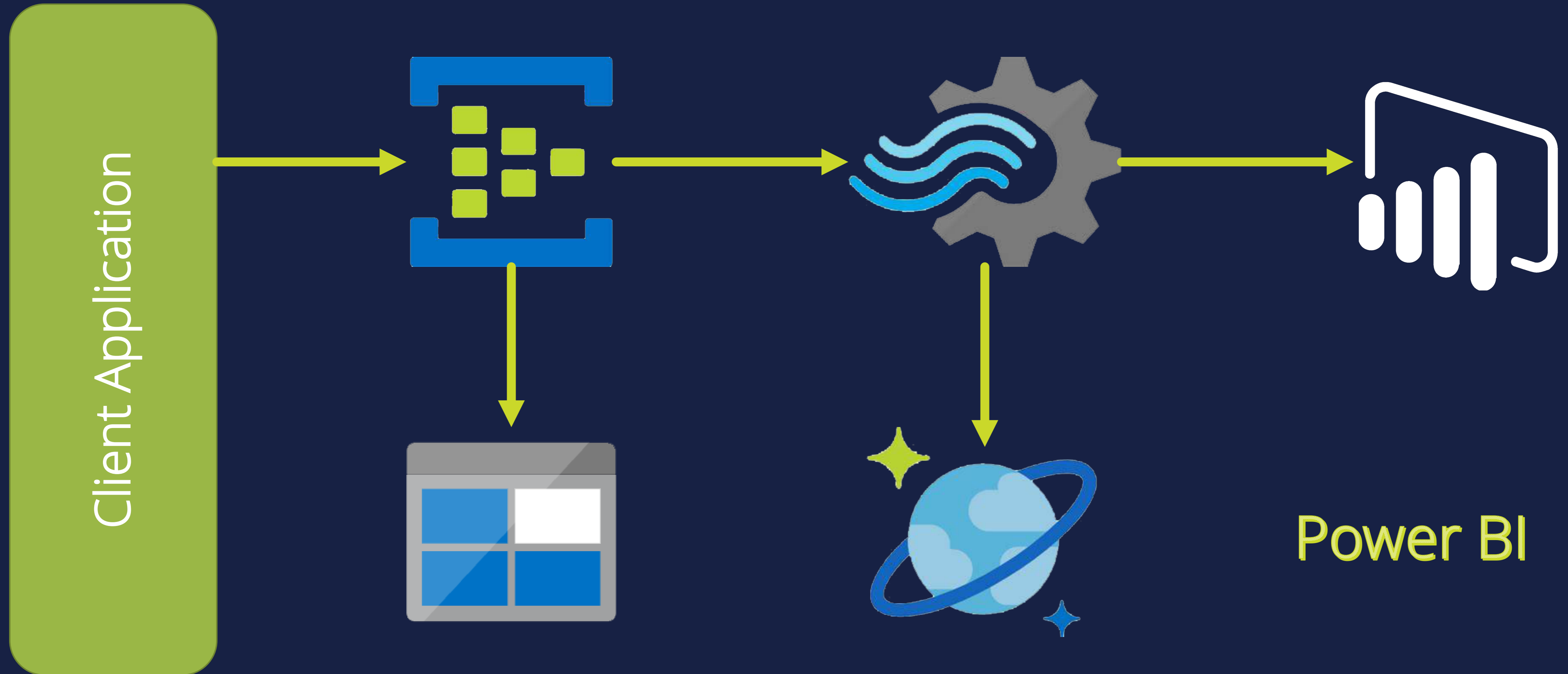
Demo Scenario

Real-Time Data and Azure



Demo Scenario

Real-Time Data and Azure



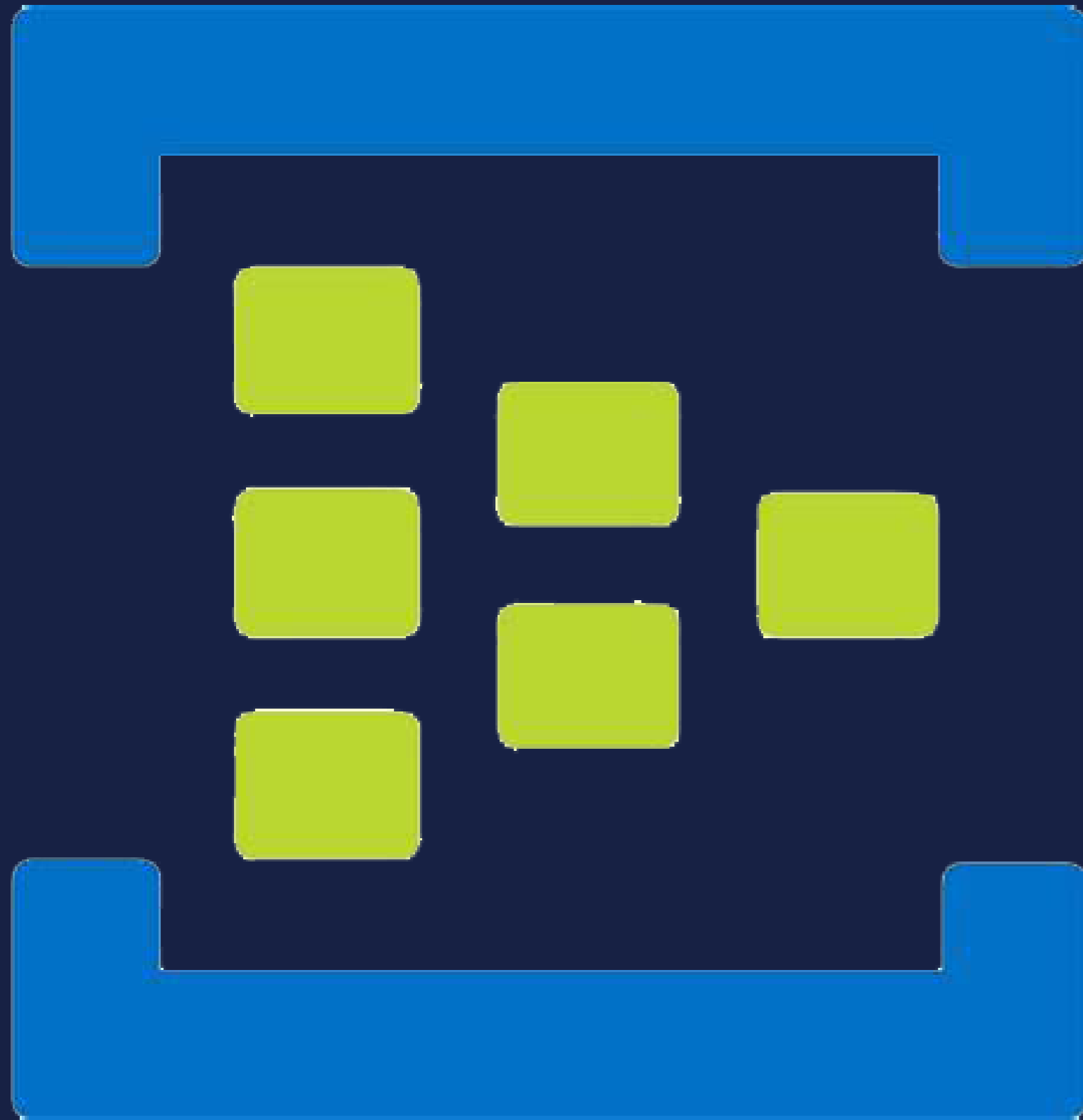


Consuming Data Through Event Hubs

Delivering Real-Time Data with Azure

Azure Event Hubs

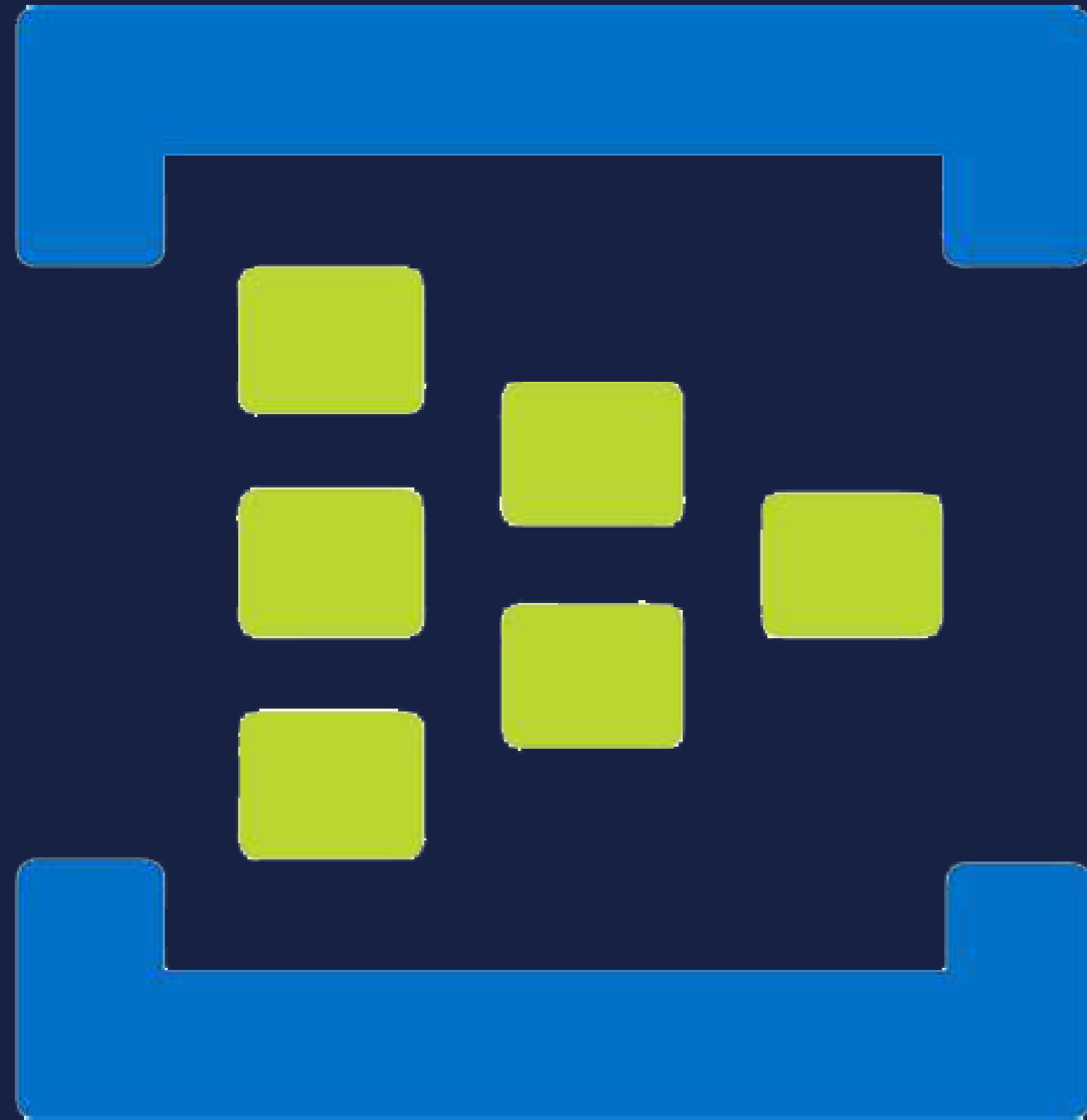
Simple, secure, and scalable real-time data ingestion



Fully managed, real-time data ingestion service that is simple, trusted, and scalable.

Azure Event Hubs

Simple, secure, and scalable real-time data ingestion



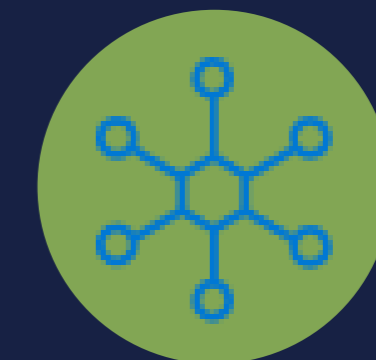
Simple



Secure



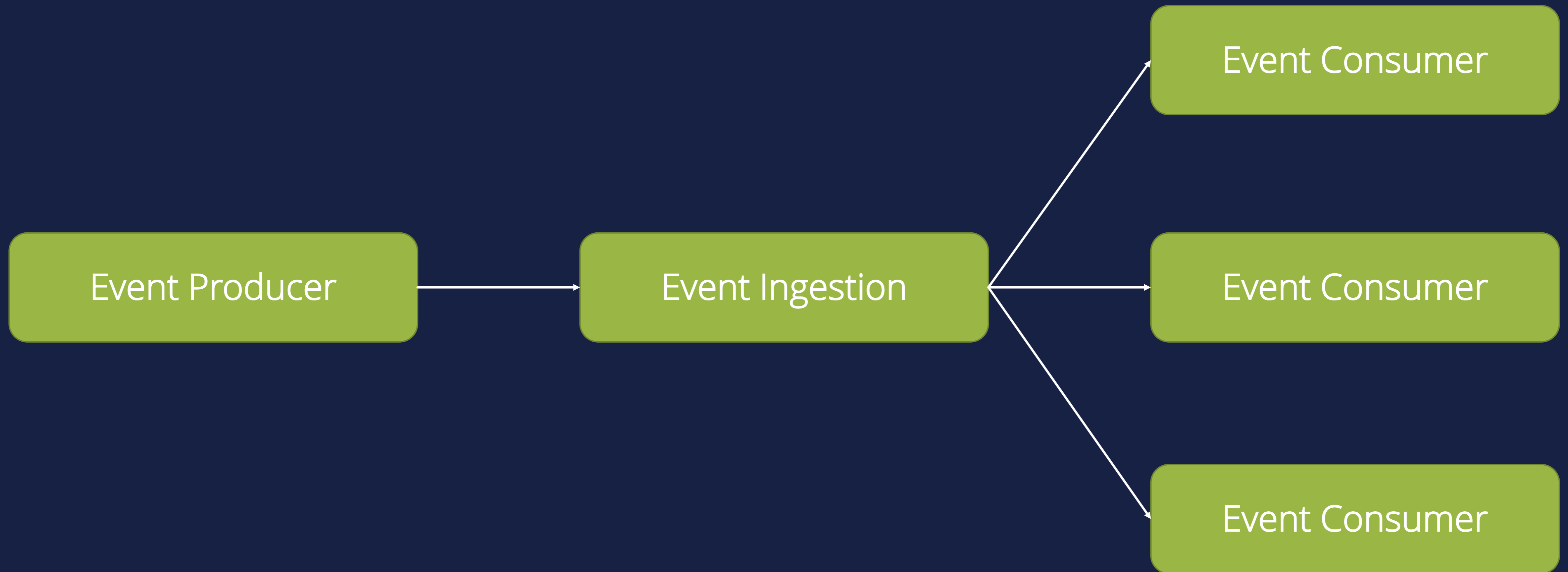
Scalable



Open

Event-Driven Architecture

Simple, secure, and scalable real-time data ingestion



Throughput Units

Azure Event Hubs

Variable reserved capacities assigned to
the Event Hub namespace

Ingress

1-Mb or 1,000 events

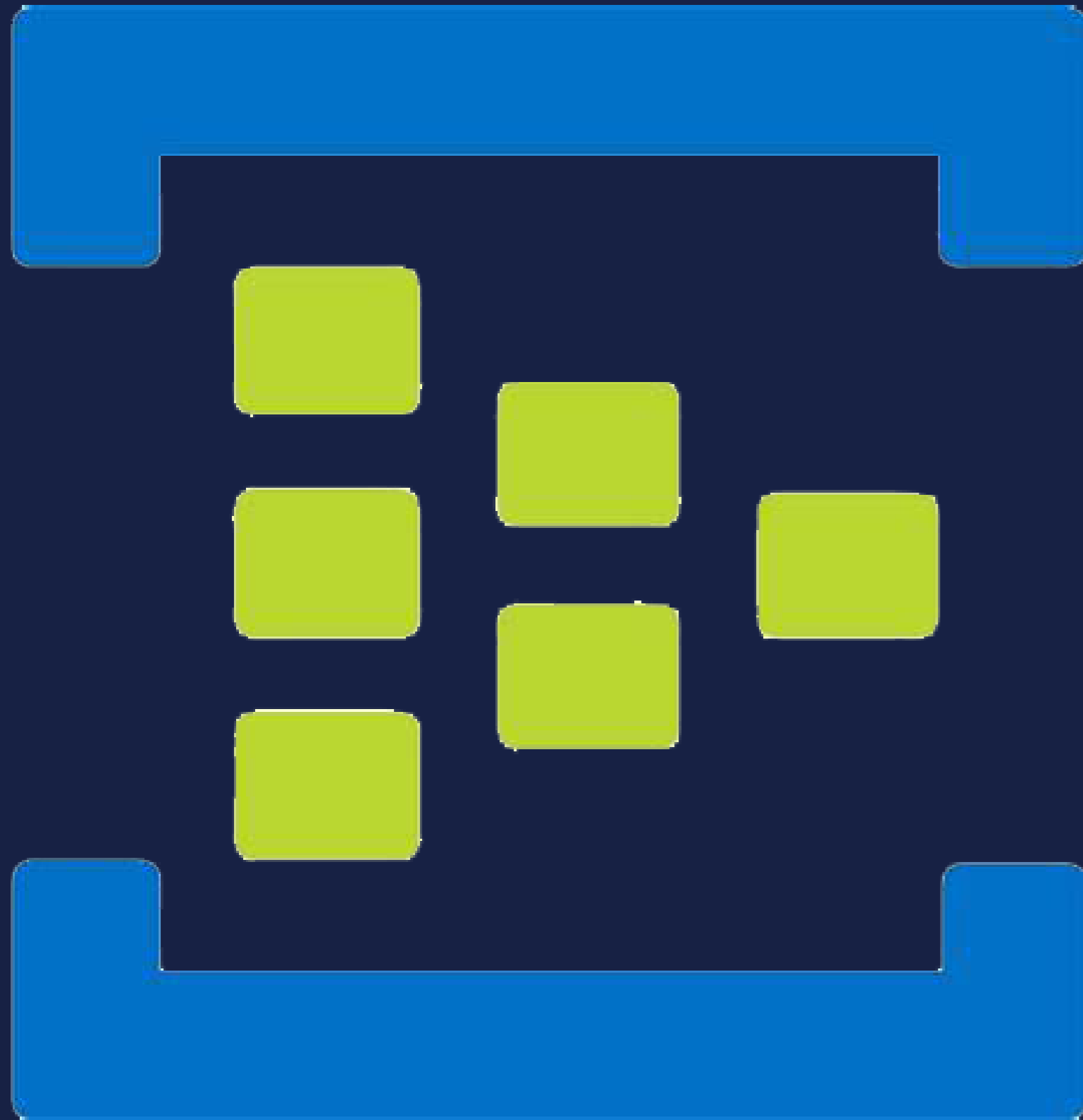
Egress

2-Mb or 4,096 events

Up to 20 TUs via Portal
Up to 40 TUs via Support Ticket

Provisioning

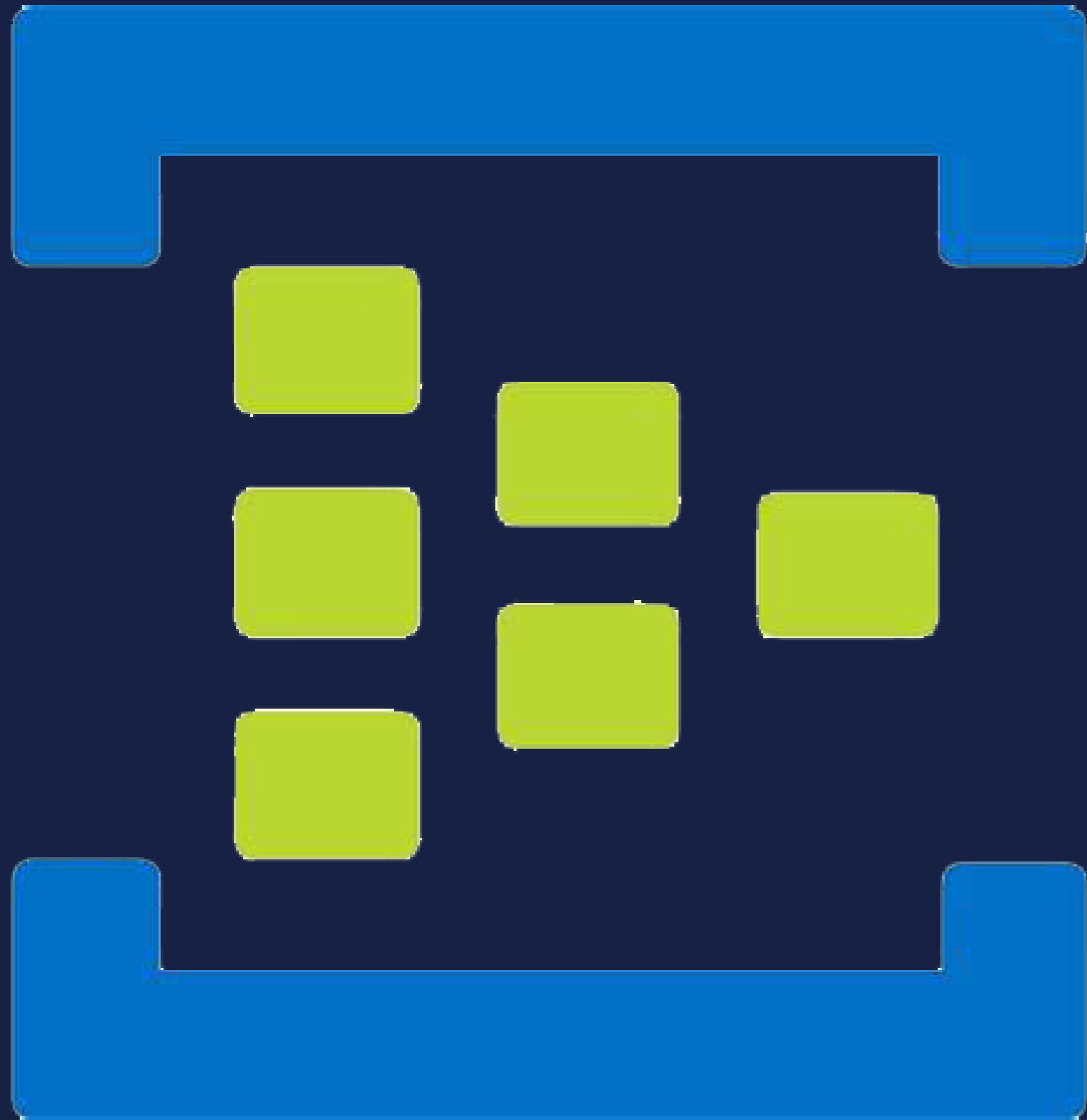
Consuming Data Through Event Hubs



Demo
Provision Azure Event Hubs

Sending Data to Event Hubs

Consuming Data Through Event Hubs



Demo
Sending Data to Event Hubs



Analyzing Data with Stream Analytics

Delivering Real-Time Data with Azure

Azure Stream Analytics

Serverless real-time analytics



Deliver powerful insights from
your streaming data with
ease, in real time.

Potential Use Cases

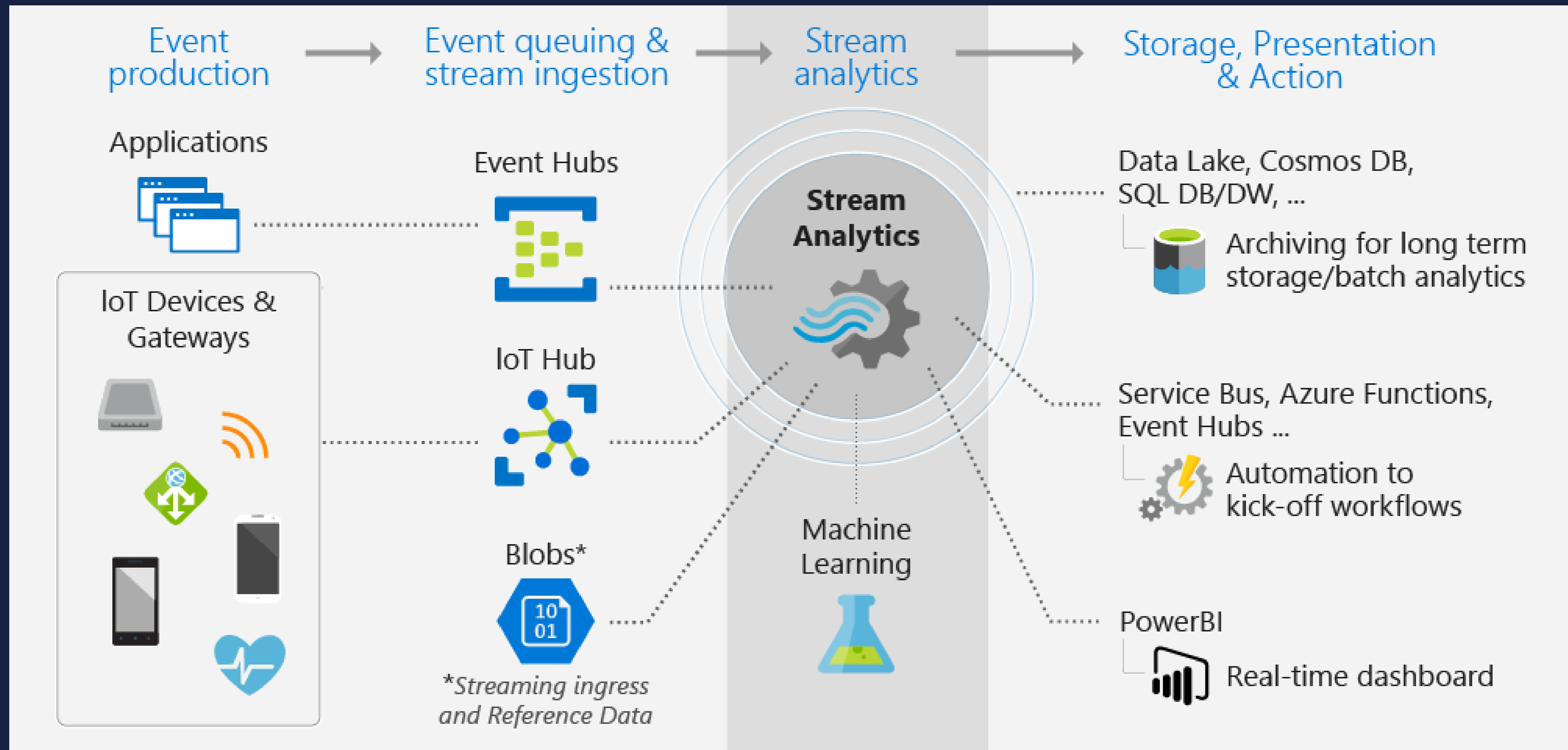
Azure Stream Analytics



- Analyze real-time telemetry streams from IoT devices
- Web logs/clickstream analytics
- Geospatial analytics for fleet management and driverless vehicles
- Remote monitoring and predictive maintenance of high value assets
- Real-time analytics on Point of Sale data for inventory control and anomaly detection

How does Stream Analytics work

Azure Stream Analytics



Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Source/Sink Integration

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Declarative SQL like query language

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Serverless/No Cluster Provisioning

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Pay As You Go

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

Enterprise Grade SLA

Key Capabilities and Benefits

Azure Stream Analytics

Ease of
Getting
Started

Programmer
Productivity

Fully
Managed

Low Total
Cost of
Ownership
(TCO)

Reliability

Performance

In-Memory Data Processing
Multi-Nodes Scalability

Provisioning

Analyzing Data with Stream Analytics



Demo Create a Stream Analytics Job

Stream Analytics Query Language

Analyzing Data with Stream Analytics

- Aggregate
- Analytic
- Array
- GeoSpatial
- Input Metadata
- Record
- Windowing
- Scalar

Stream Analytics Query Language

Analyzing Data with Stream Analytics

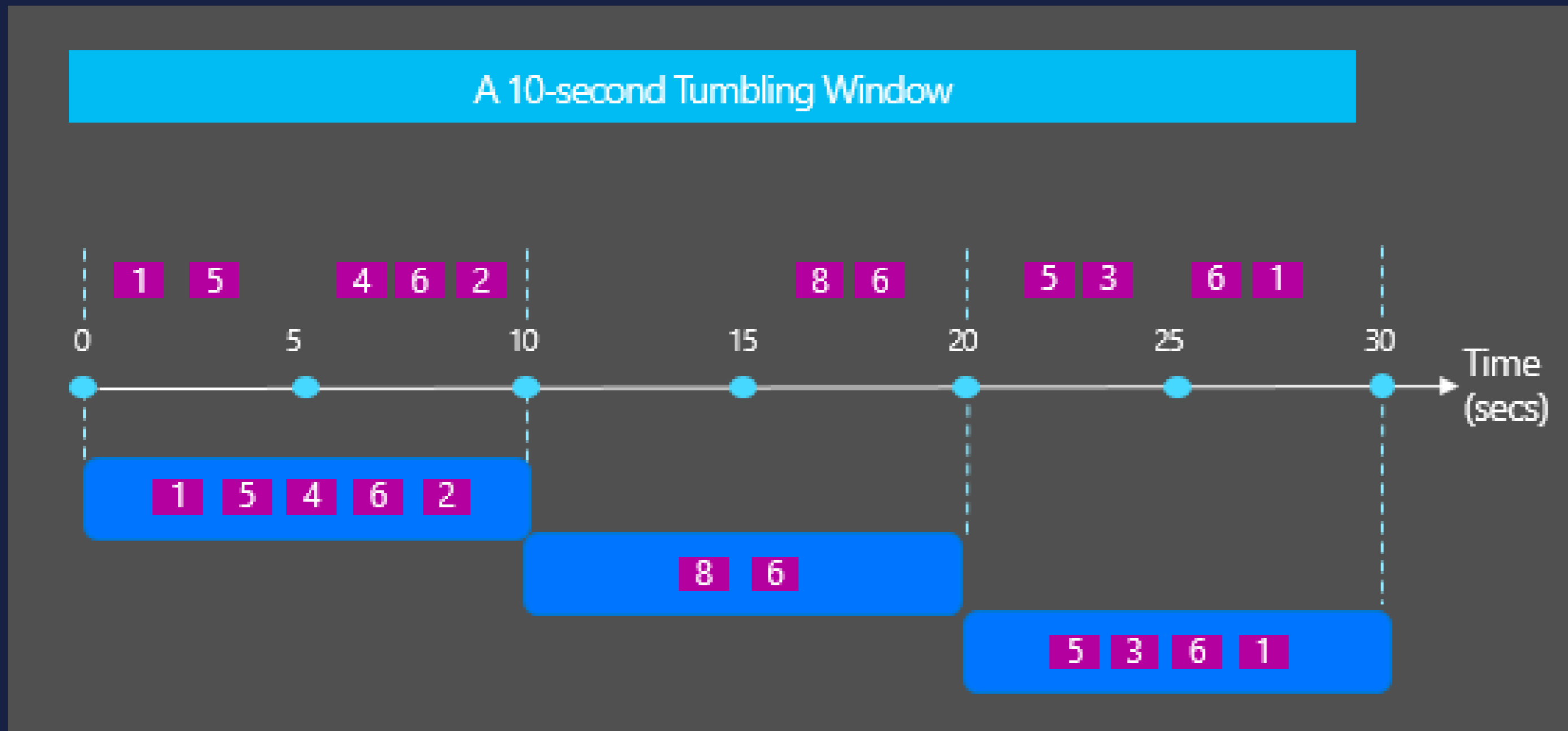
Events and Time

```
SELECT * FROM SensorReadings TIMESTAMP BY time
```

```
SELECT System.Timestamp AS Time FROM SensorReadings
```

Stream Analytics Query Language – Windowing

Analyzing Data with Stream Analytics

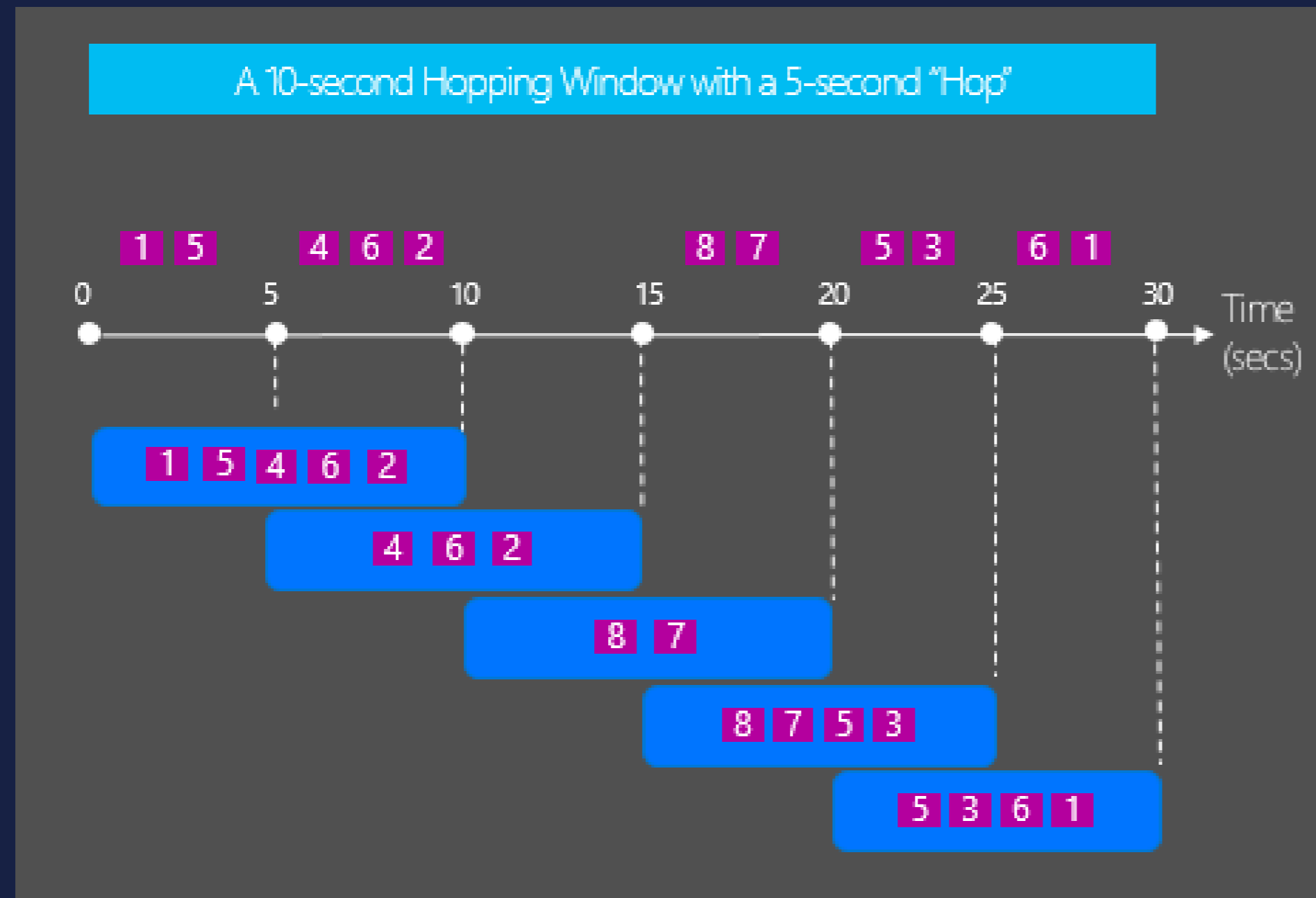


Tumbling

```
SELECT sensorId, COUNT(*) AS Count
FROM SensorReadings TIMESTAMP BY time
GROUP BY sensorId, TumblingWindow(second, 10)
```

Stream Analytics Query Language – Windowing

Analyzing Data with Stream Analytics

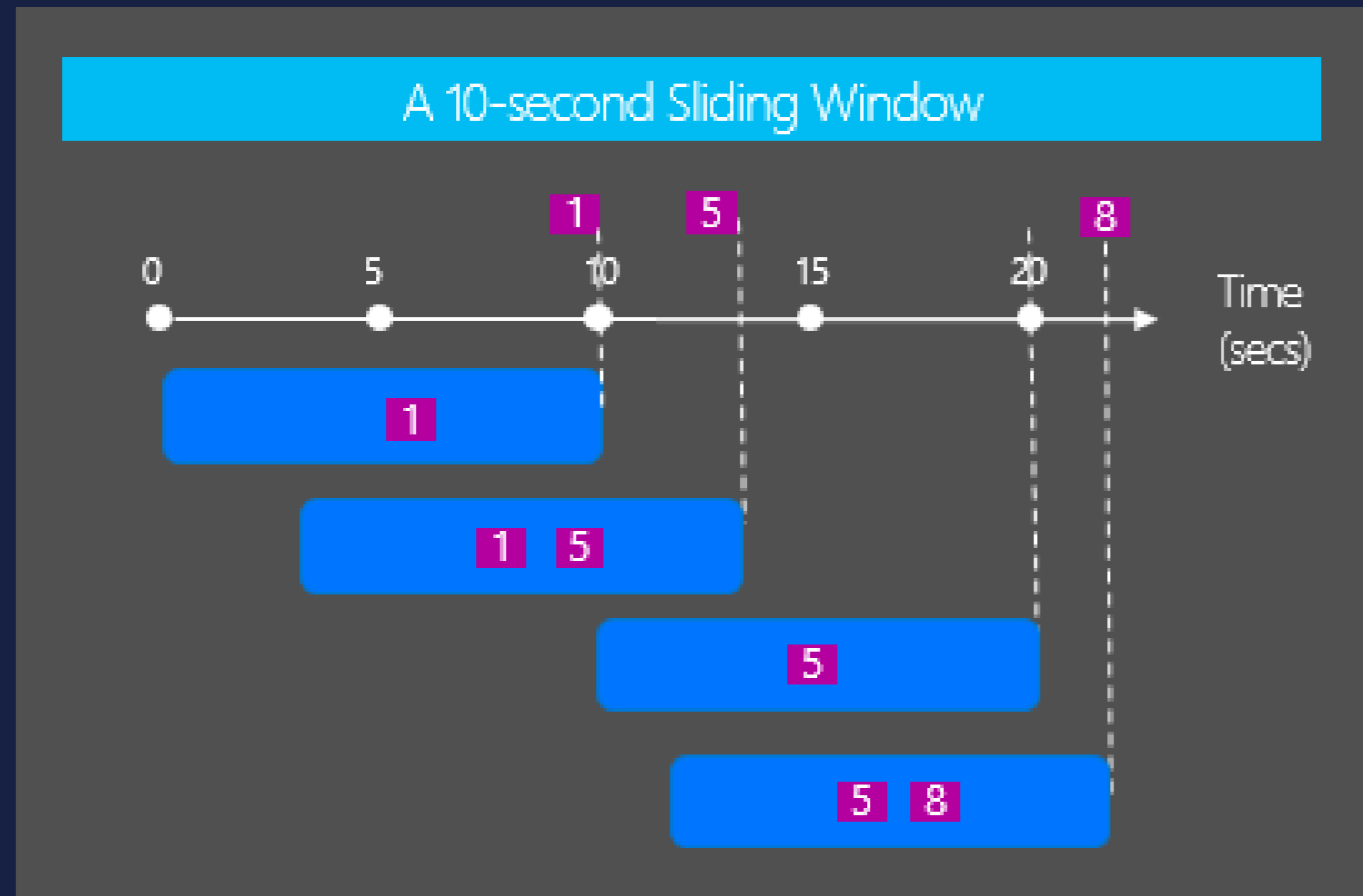


Hopping

```
SELECT sensorId, COUNT(*) AS Count, AVG(temp)
FROM SensorReadings TIMESTAMP BY time
GROUP BY sensorId, HoppingWindow(second, 10 , 5)
```

Stream Analytics Query Language – Windowing

Analyzing Data with Stream Analytics



Sliding

```
SELECT sensorId, MIN(temp) as temp
FROM SensorReadings
TIMESTAMP BY time
GROUP BY sensorId, SlidingWindow(second, 5)
HAVING MIN(temp) > 75
```

Stream Analytics Query Language – Joining Multiple Steams

Analyzing Data with Stream Analytics

```
SELECT s1.time, s1.dspl, s1.hmdt as previousHmdt,  
       s2.hmdt as newHmdt,  
       datediff(ss, s1.time, s2.time) as secondsApart  
FROM SensorData s1 timestamp by time  
JOIN SensorData s2 timestamp by time  
  ON s1.dspl = s2.dspl  
  AND DATEDIFF(s, s1, s2) BETWEEN 0 AND 5  
WHERE (s2.hmdt – s1.hmdt >= .1) or (s1.hmdt – s2.hmdt >= .1)
```

Stream Analytics Query Language – Reference Data JOIN

Analyzing Data with Stream Analytics

```
SELECT SensorReadings.sensorID, SensorReadings.temp  
FROM SensorReadings  
JOIN thresholdRefData  
ON SensorReadings.sensorID = thresholdRefData.sensorID  
WHERE SensorReadings.temp > thresholdRefData.value
```

Stream Analytics Query Language – Multiple Outputs

Analyzing Data with Stream Analytics

```
SELECT *  
INTO outputLog  
FROM SensorReadings
```

```
SELECT *  
INTO outputTempAlert  
FROM SensorReadings  
WHERE temp > 75
```

Querying

Analyzing Data with Stream Analytics



Demo Query a Stream

An aerial view of a city at night, with a yellow-to-blue gradient overlay. Various circular icons representing different data sources (shopping cart, lightbulb, heart, gears, cloud, house, etc.) are connected by dotted lines and arrows, suggesting a data flow. Two white curved lines are also present, one pointing towards the title and another pointing away from it.

Ingesting Streaming Data into Power BI

Delivering Real-Time Data with Azure

Microsoft Power BI

Ingesting Streaming Data into Power BI



Provides interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards.

Microsoft Power BI

Ingesting Streaming Data into Power BI

Create



Collaborate and Share



Access Insights from Anywhere



Microsoft Power BI

Ingesting Streaming Data into Power BI

Create



Collaborate and Share



Access Insights from Anywhere



Microsoft Power BI

Ingesting Streaming Data into Power BI

Create



Collaborate and Share



Access Insights from Anywhere



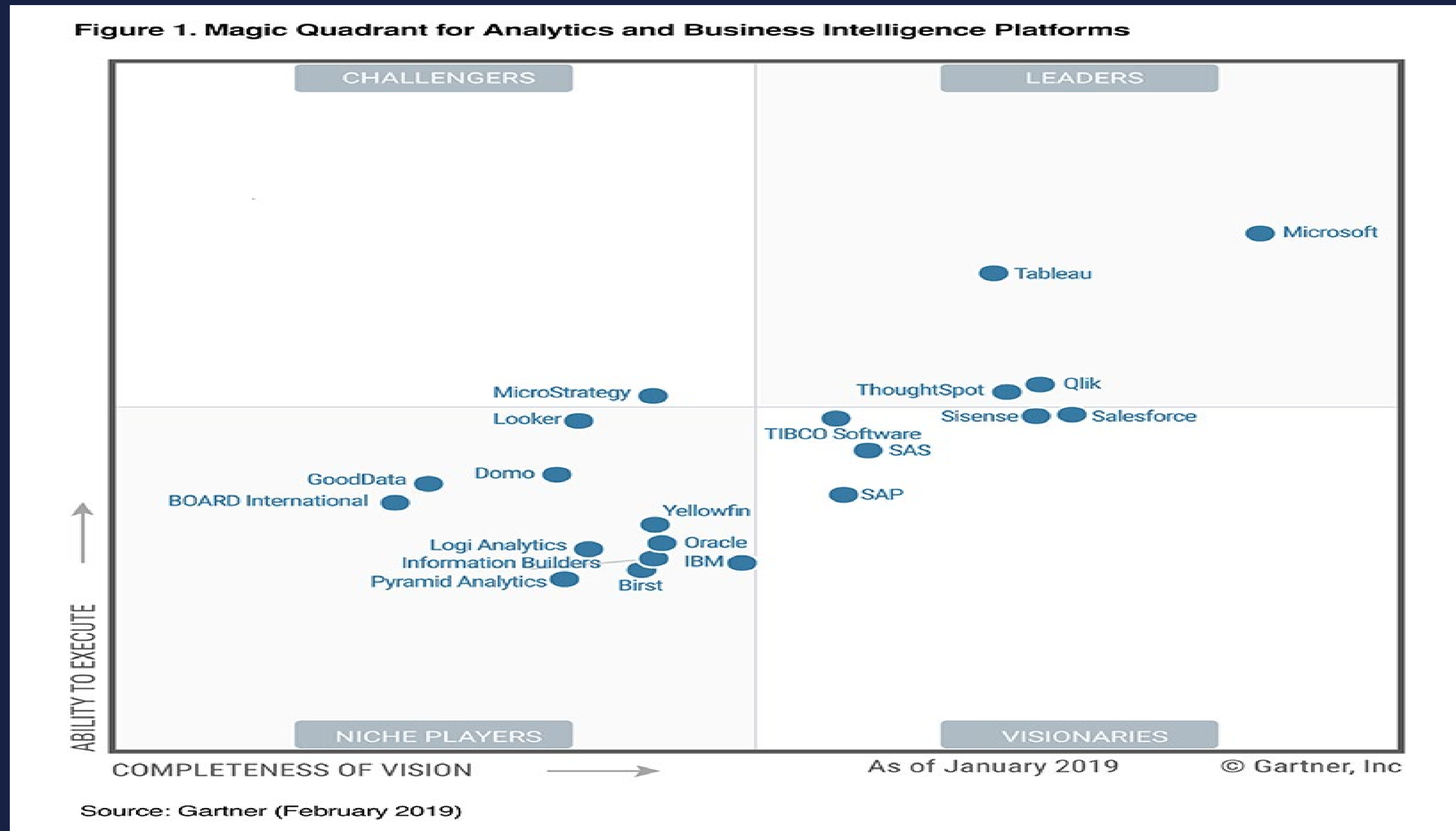
Why Microsoft Power BI

Ingesting Streaming Data into Power BI



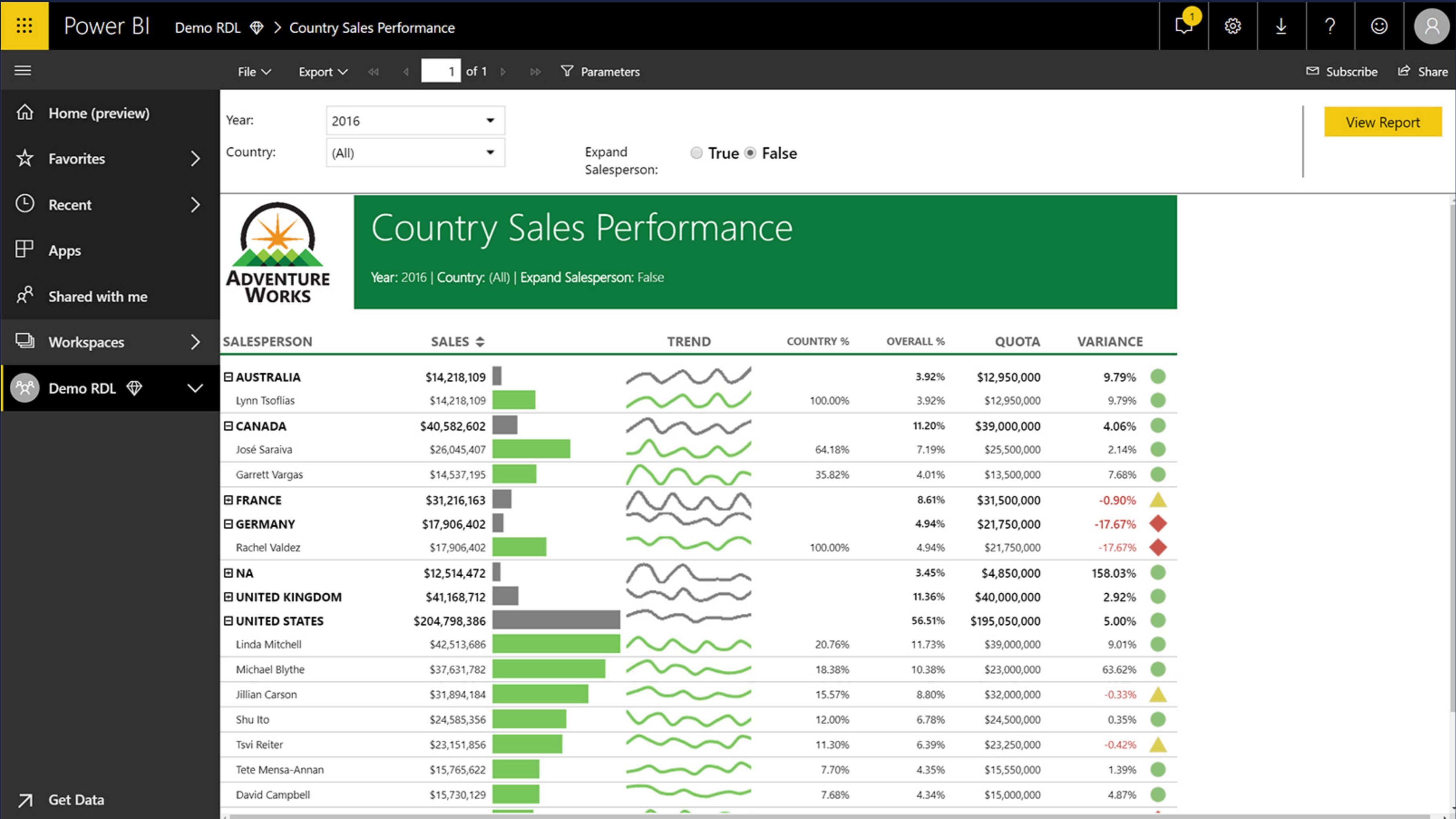
Why Microsoft Power BI

Ingesting Streaming Data into Power BI



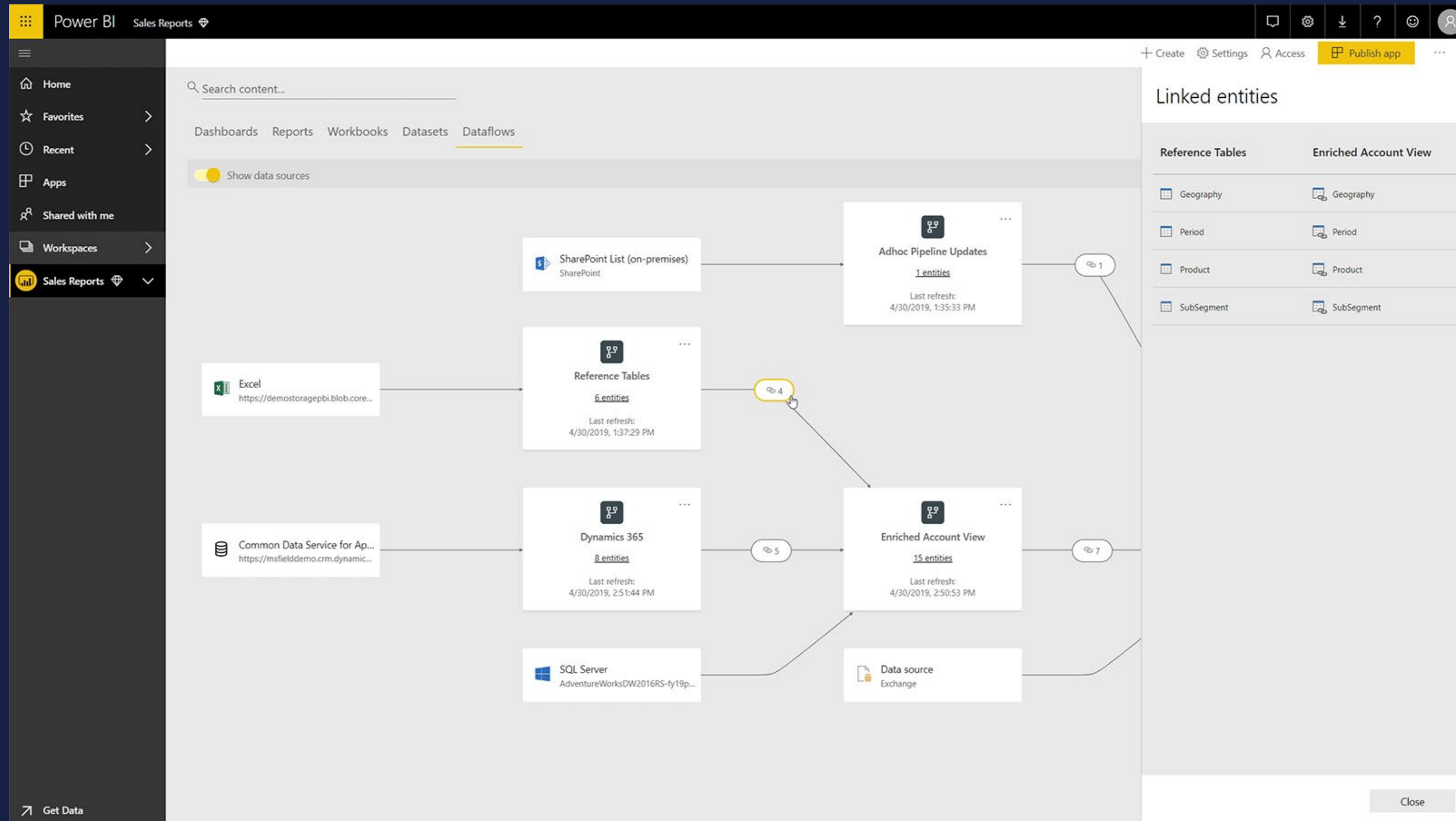
Why Microsoft Power BI

Ingesting Streaming Data into Power BI



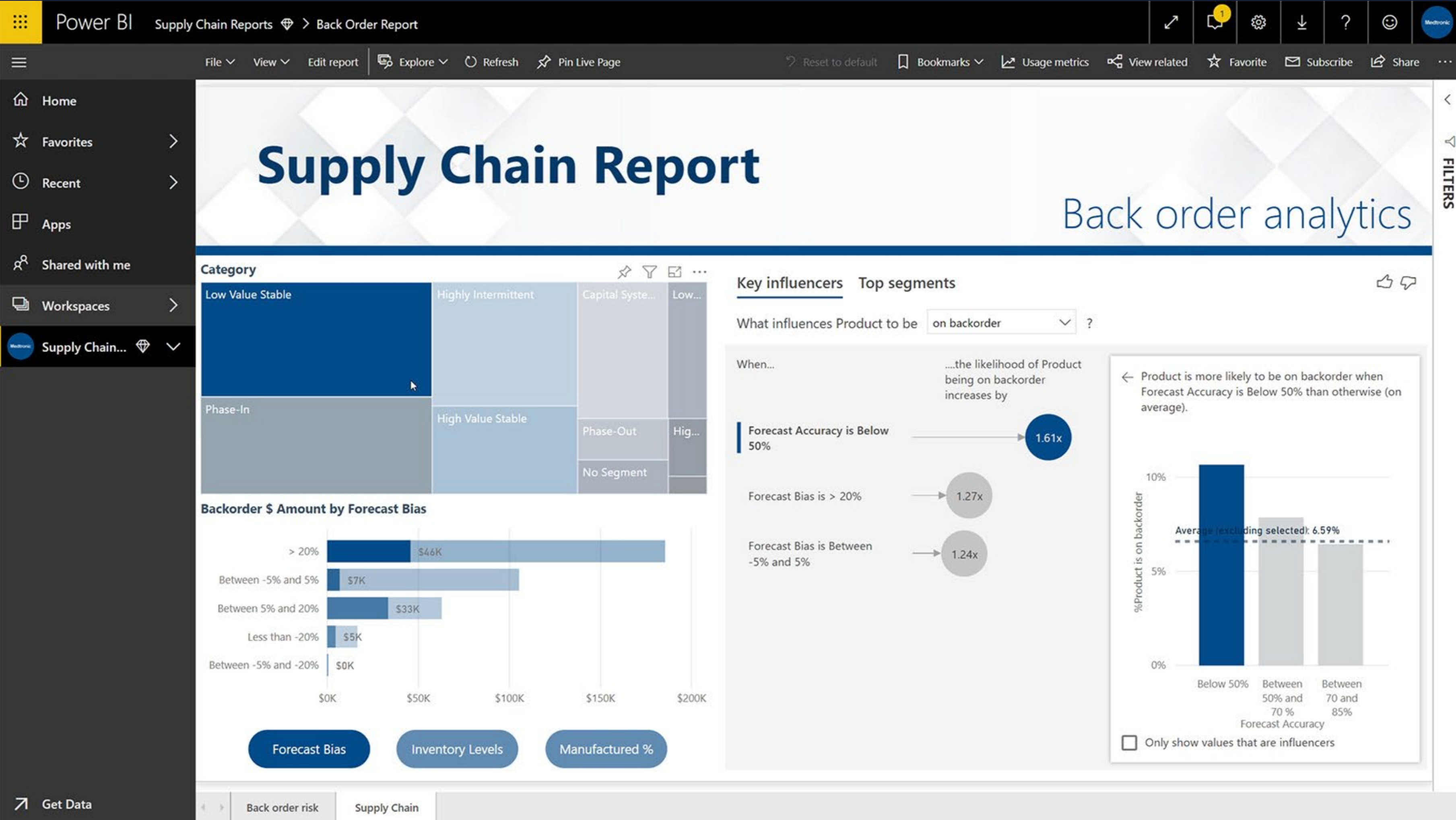
Why Microsoft Power BI

Ingesting Streaming Data into Power BI

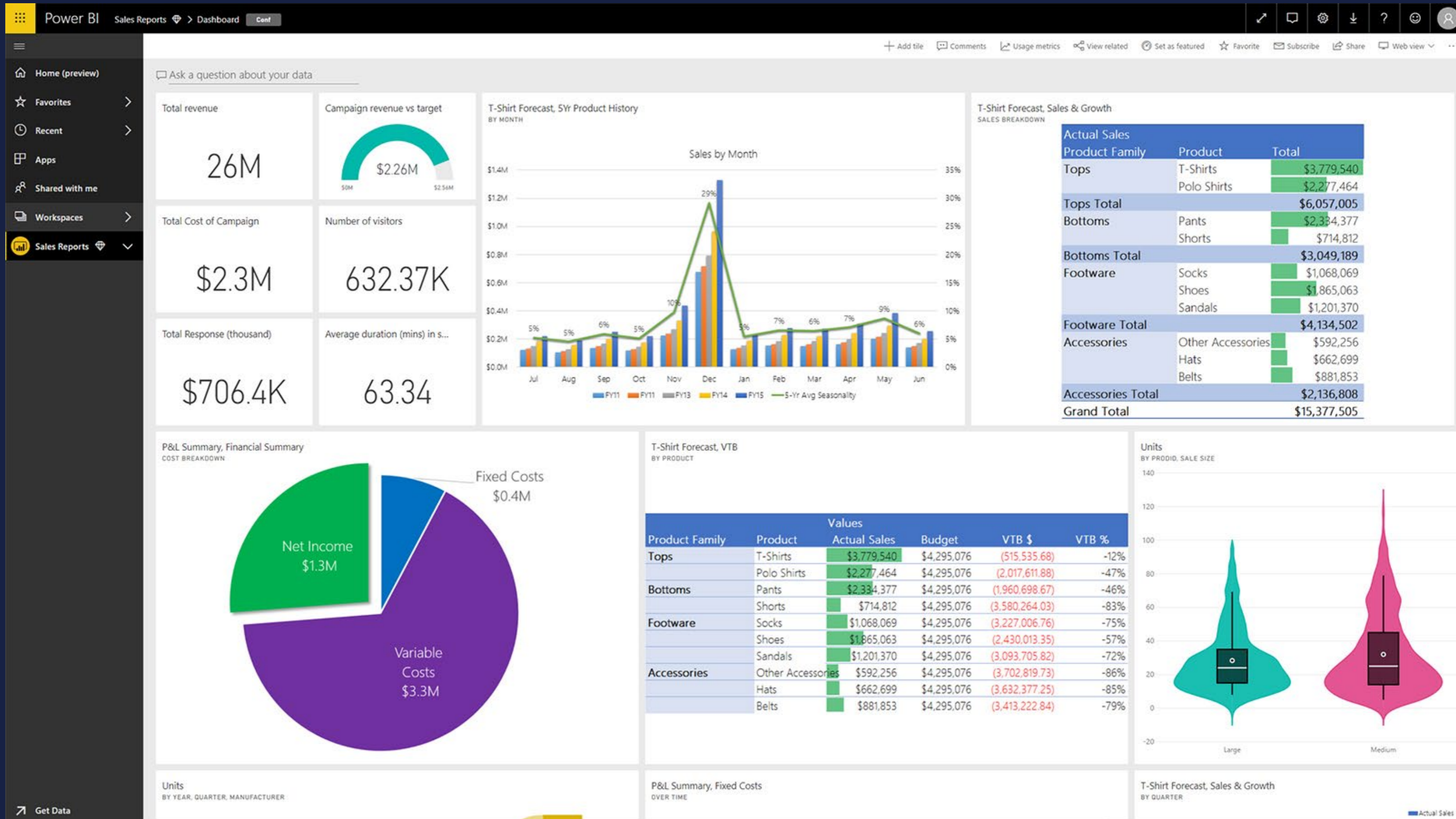


Why Microsoft Power BI

Ingesting Streaming Data into Power BI

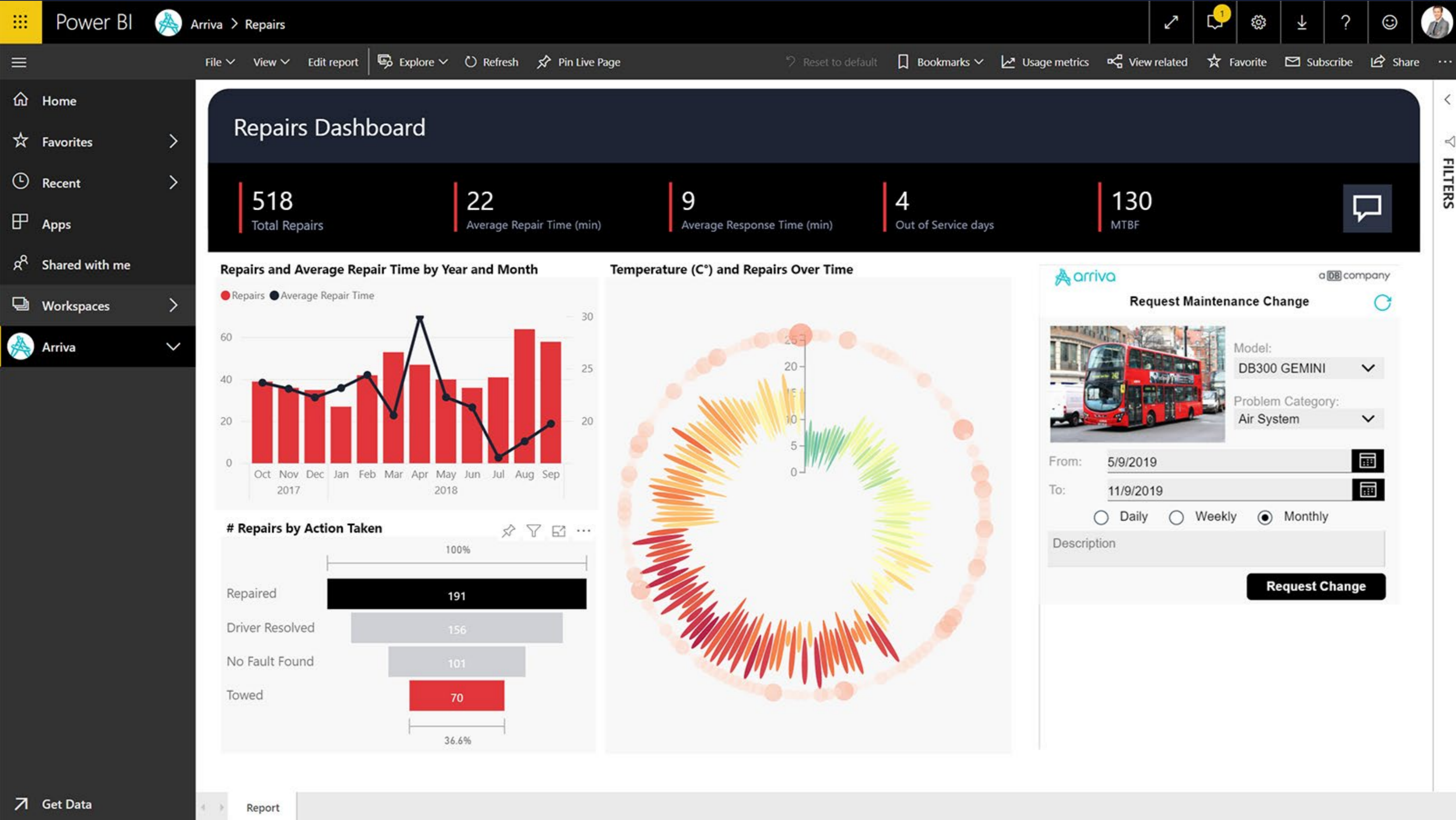


Ingesting Streaming Data into Power BI



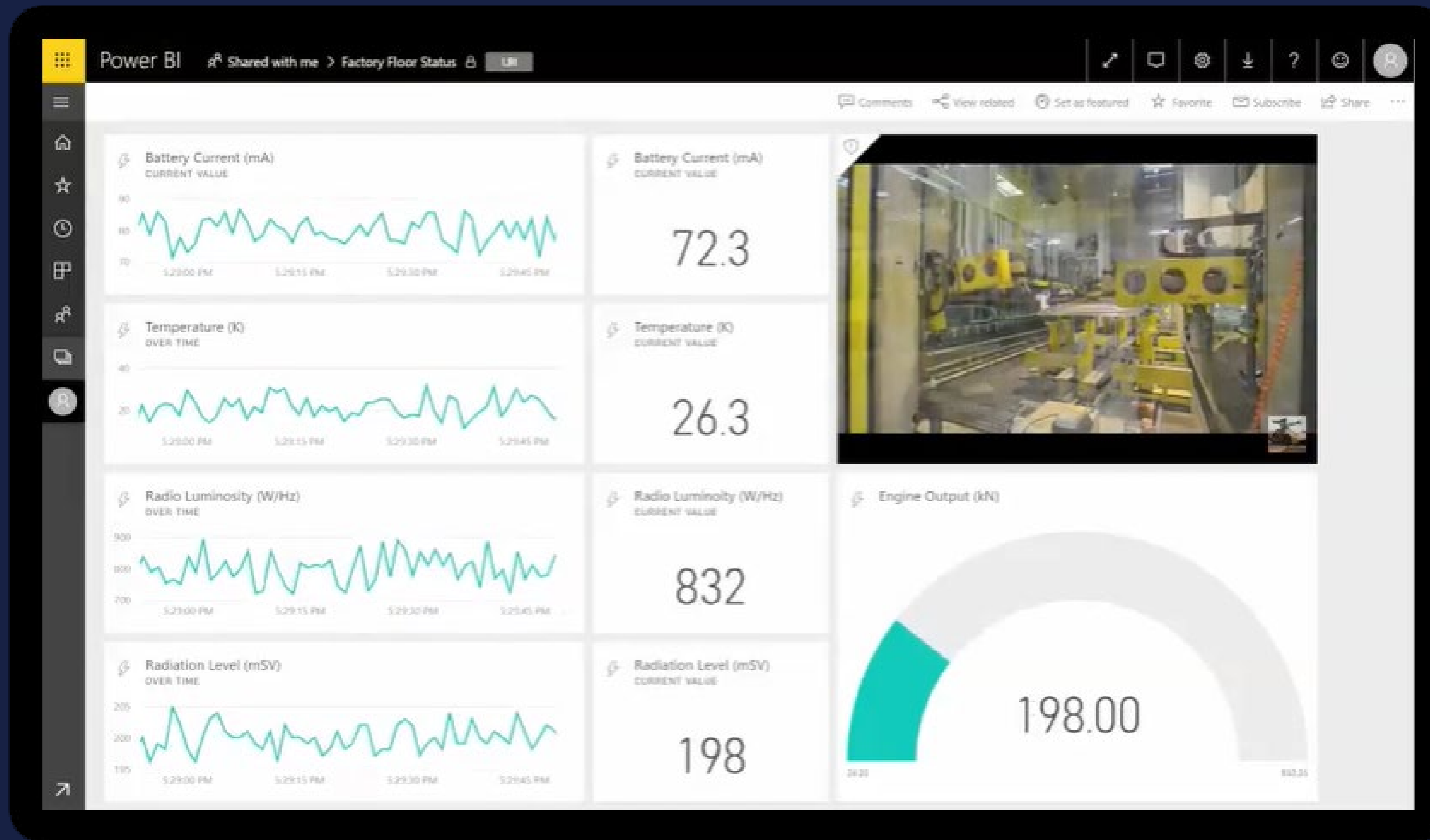
Why Microsoft Power BI

Ingesting Streaming Data into Power BI



Why Microsoft Power BI

Ingesting Streaming Data into Power BI



Power BI Real-Time Datasets

Ingesting Streaming Data into Power BI

- Support very fast dashboard tiles
- Limited graphic options
- Uses a Redis cache under the covers
- Keeps approximately one hour of data

Real-Time Datasets

Ingesting Streaming Data into Power BI



Demo

Creating a Real-Time Dataset
with Stream Analytics

Real-Time Datasets

Ingesting Streaming Data into Power BI



Demo
Power BI Streaming Titles

Real-Time Datasets

Ingesting Streaming Data into Power BI



Demo Real-Time Custom Report Visualizations



Chad Green

*Director of Software Development
ScholarRx*

✉ chadgreen@chadgreen.com

in chadwickegreen

🐦 ChadGreen

🌐 ChadGreen.com

