

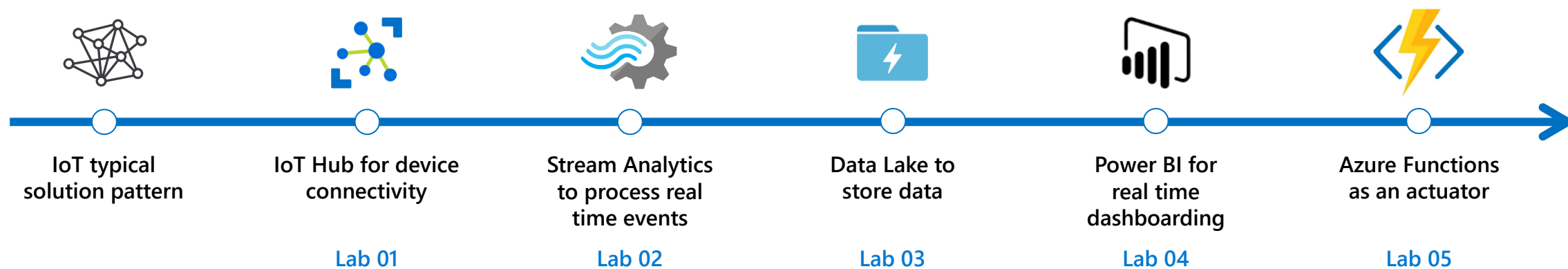
A low-angle, upward-looking photograph of several modern skyscrapers with glass facades. The buildings are reflected in each other, creating a complex pattern of blue and gold. The sky is a clear, pale blue. The perspective makes the buildings appear to converge towards the top of the frame.

Azure IoT 101 Workshop

Rui Félix Pereira

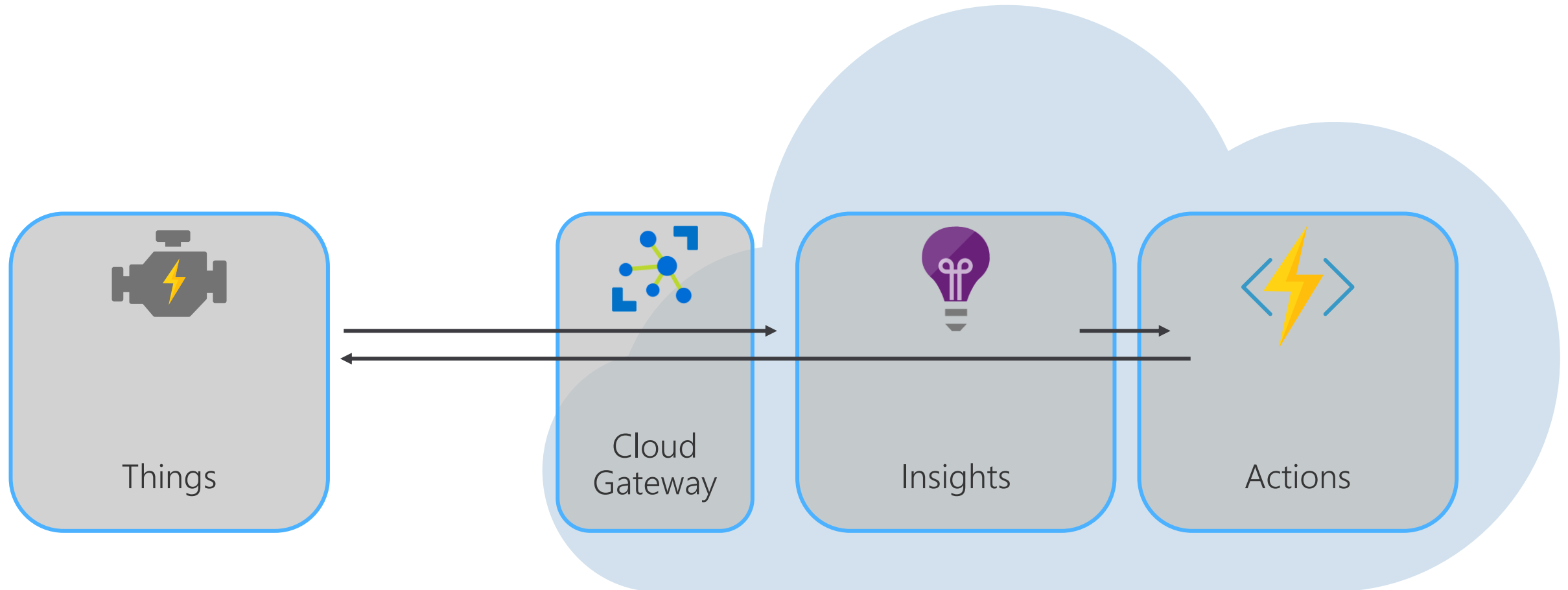
2020.05.26

Azure IoT 101 workshop

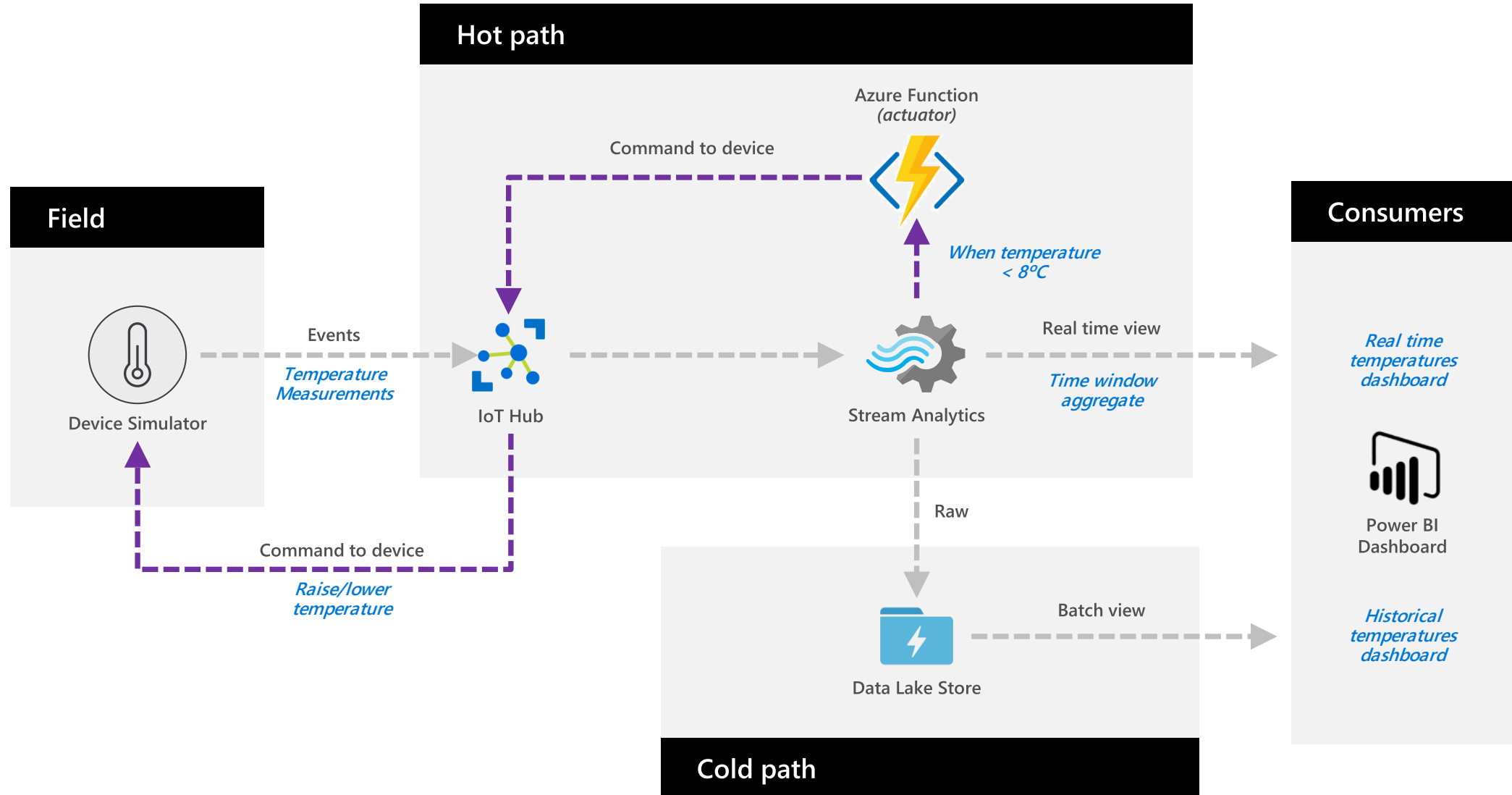


Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

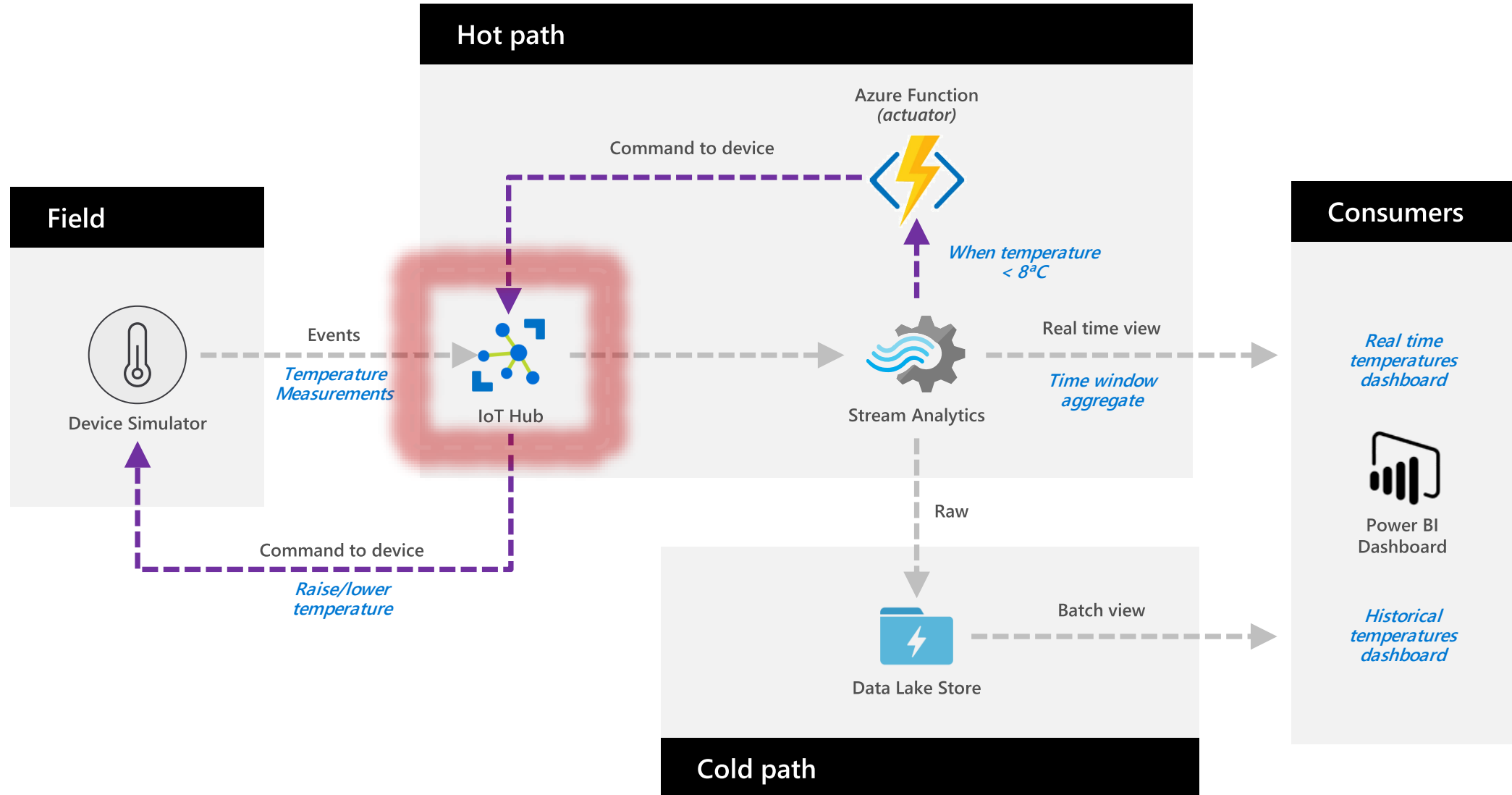
IoT solutions have a common pattern



Sample IoT solution architecture

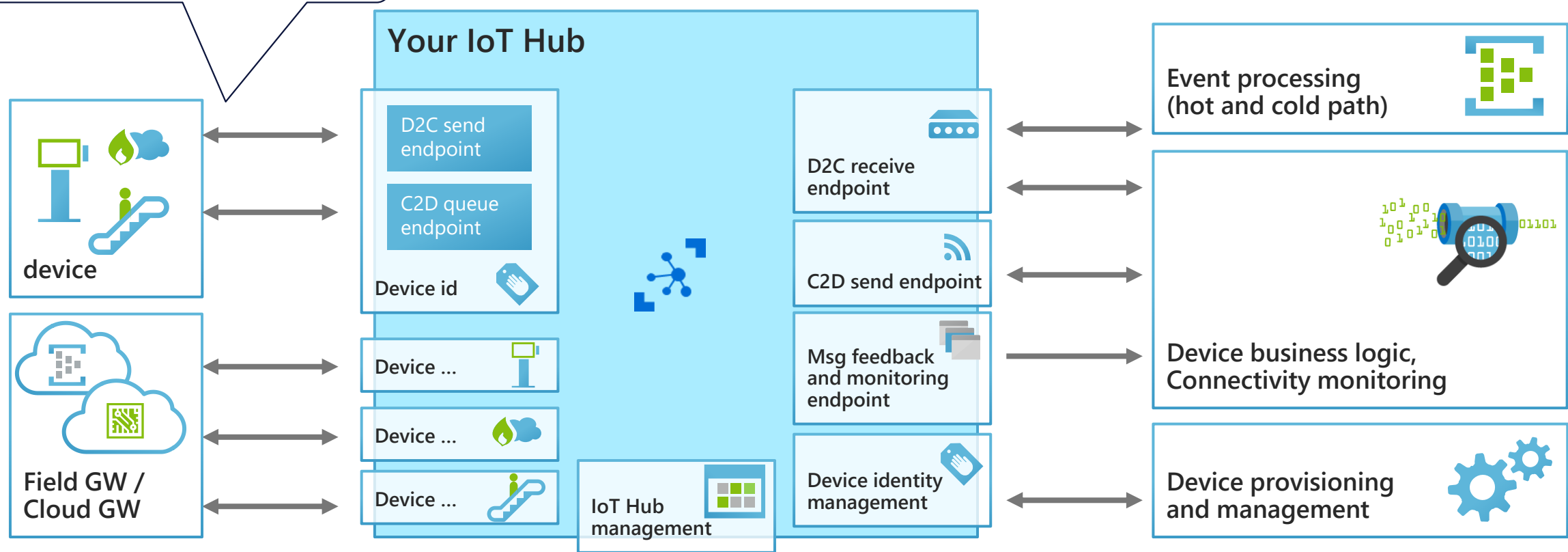


IoT Hub for device connectivity



Storage and persistence on AKS

AMQP/WS, MQTT, AMQP, HTTP



Telemetry

Monitoring

Command Control

File Upload

Device Management

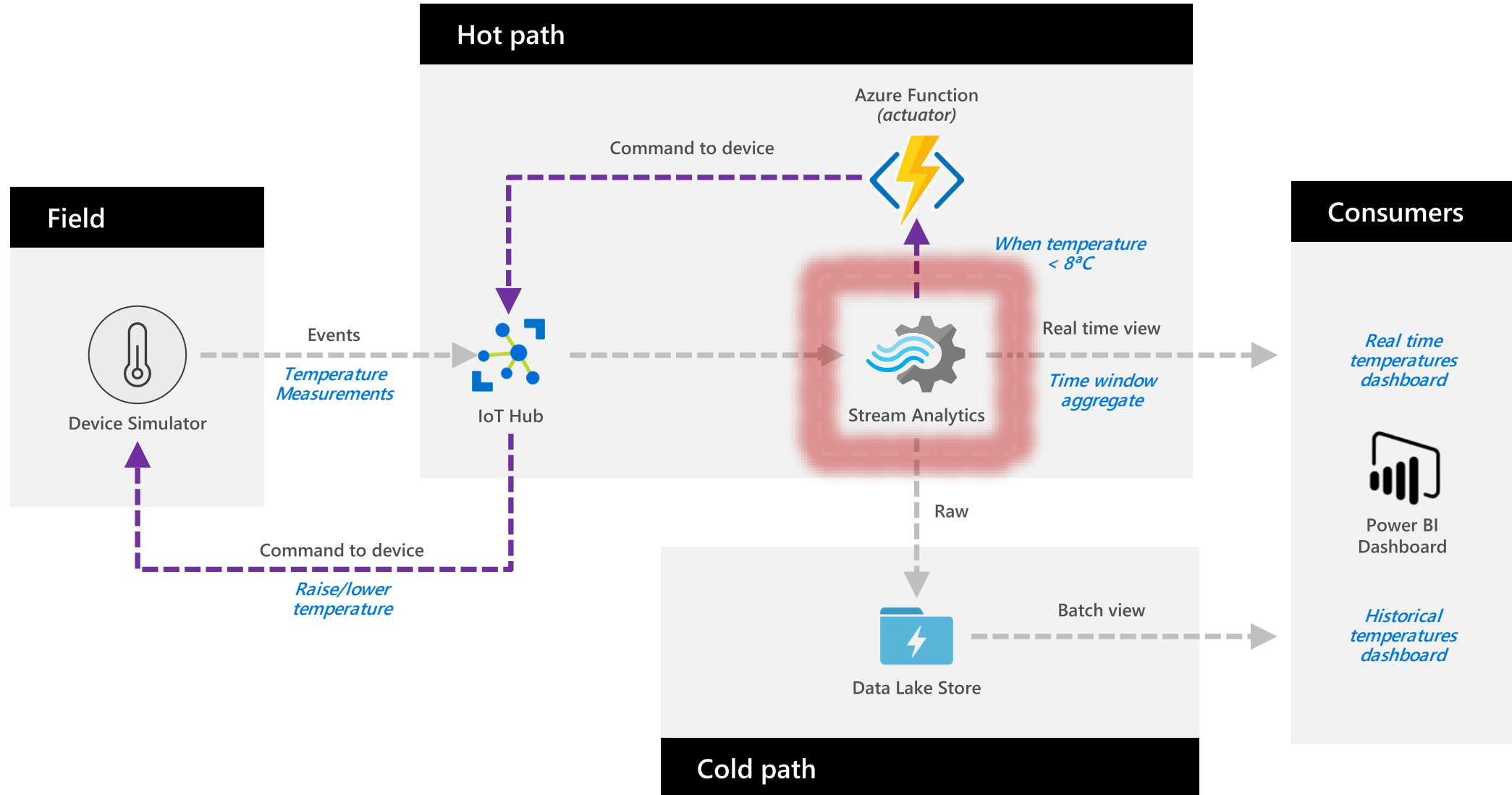
Secure

IoT Hub for device connectivity

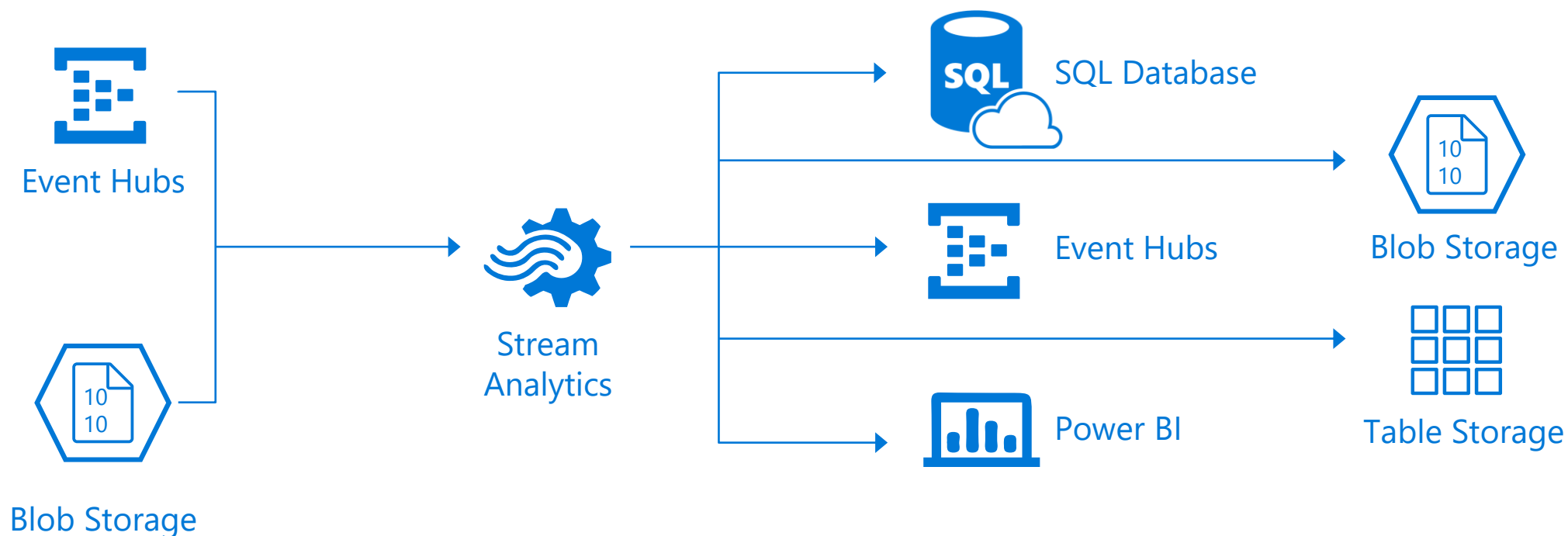
LAB 01

Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

Stream Analytics to process real time events

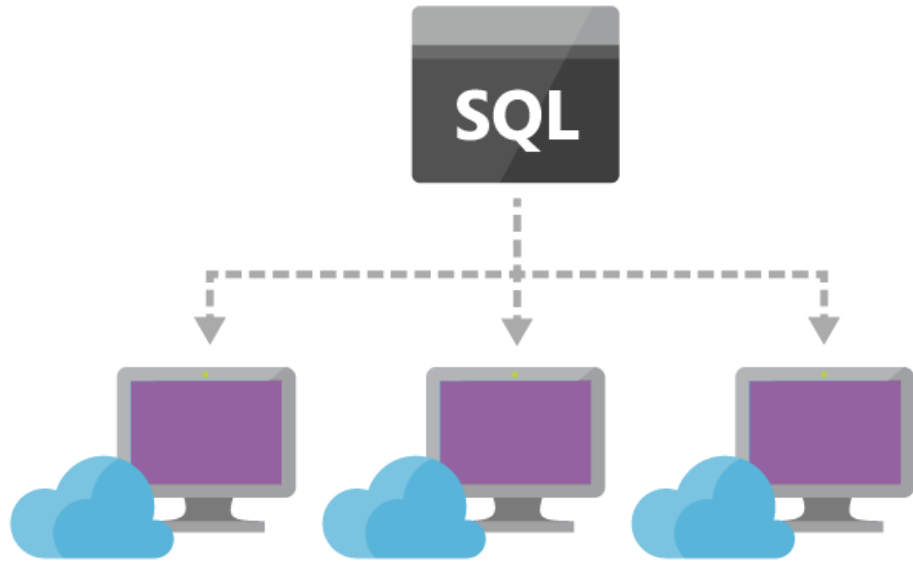


Stream Analytics to stream millions of events per second



- Perform real-time analytics for your Internet of Things solutions
- Stream millions of events per second
- Get mission-critical reliability and performance with predictable results
- Create real-time dashboards and alerts over data from devices and applications
- Correlate across multiple streams of data
- Use familiar SQL-based language for rapid development

Stream Analytics rapid development



Data Manipulation

SELECT, FROM, WHERE GROUP
BY, HAVING, CASE WHEN THEN
ELSE, INNER/LEFT OUTER
JOIN, UNION, CROSS/OUTER
APPLY, CAST, INTO, ORDER
BY ASC, DSC

Date and Time Functions

DateName, DatePart, Day
Month, Year, DateDiff
DateTimeFromParts, DateAdd

Temporal Functions

Lag, IsFirst, Last
CollectTop

Windowing Extensions

TumblingWindow
HoppingWindow
SlidingWindow

Mathematical Functions

ABS, CEILING, EXP, FLOOR
POWER, SIGN, SQUARE, SQRT

String Functions

Len, Concat, CharIndex
Substring, Lower
Upper, PatIndex

Scaling Extensions

WITH, PARTITION BY
OVER

Aggregate Functions

SUM, COUNT, AVG, MIN,
MAX, STDEV, STDEVP, VAR
VARP, TopOne

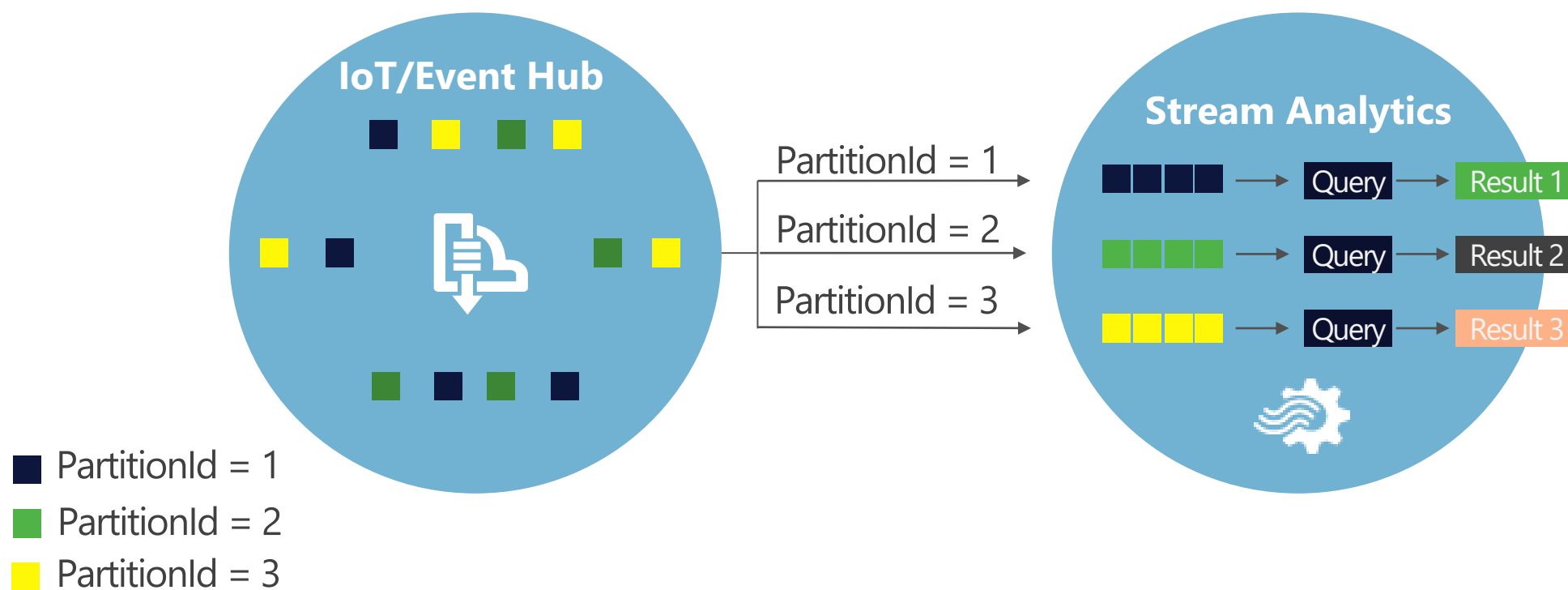
Geospatial Functions

CreatePoint
CreatePolygon
CreateLineString
ST_DISTANCE
ST_INTERSECTS
ST_OVERLAPS
ST_WITHIN

Stream Analytics partitions & time windows

Partitioning allows for parallel execution over scaled-out resources

```
SELECT Count(*) AS Count, Topic  
FROM TwitterStream PARTITION BY PartitionId  
GROUP BY TumblingWindow(minute, 3), Topic, PartitionId
```

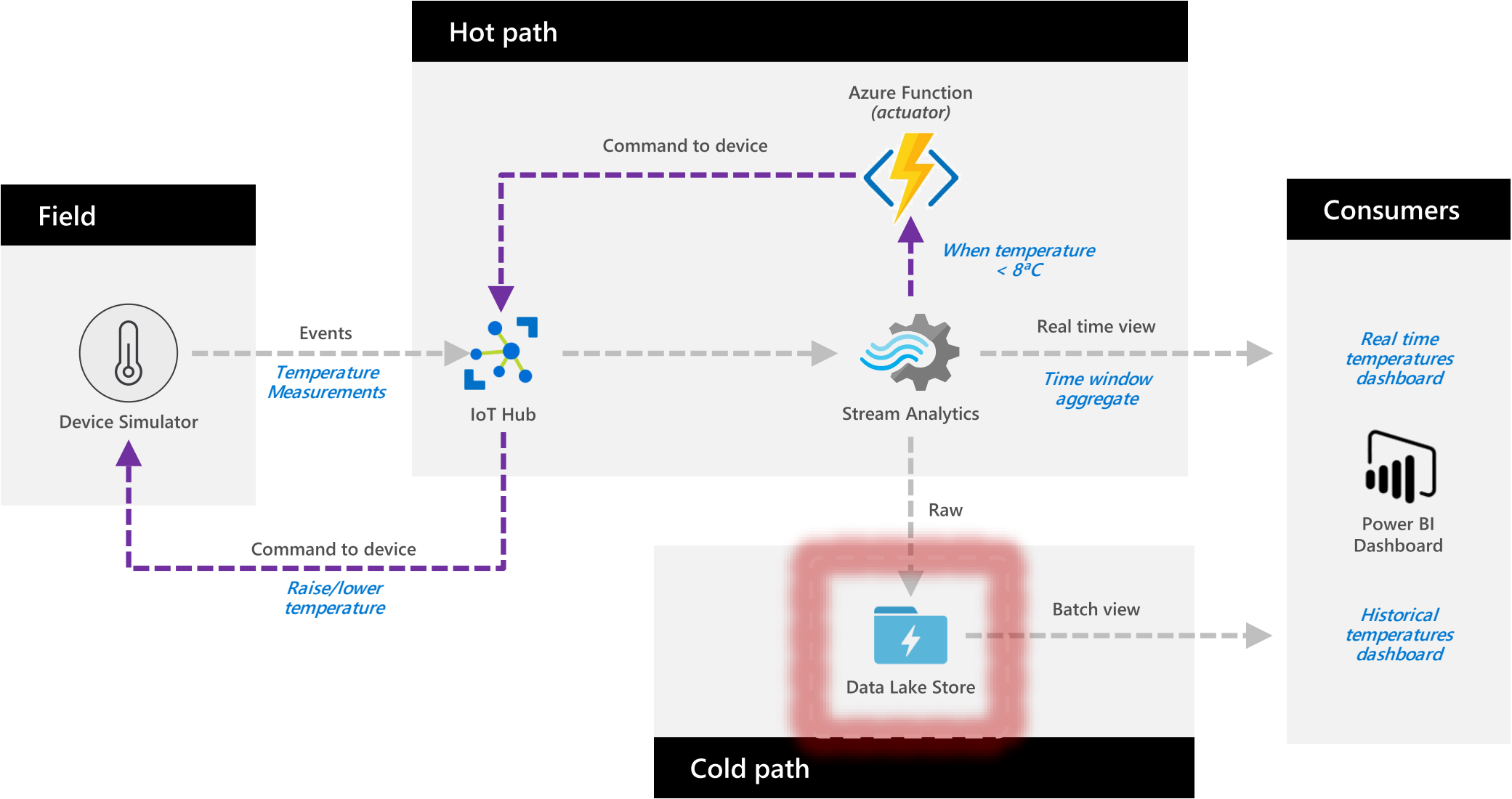


Stream Analytics to process real time events

LAB 02

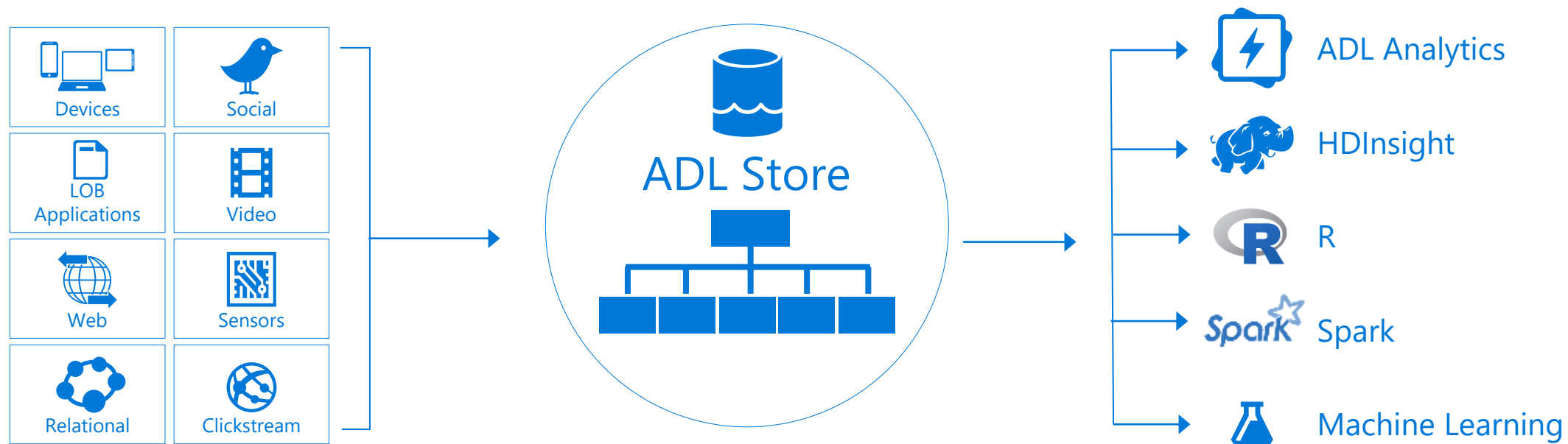
Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

Data Lake to store data



Data Lake Storage, a hyper-scale repository for big data

HDFS as a Service



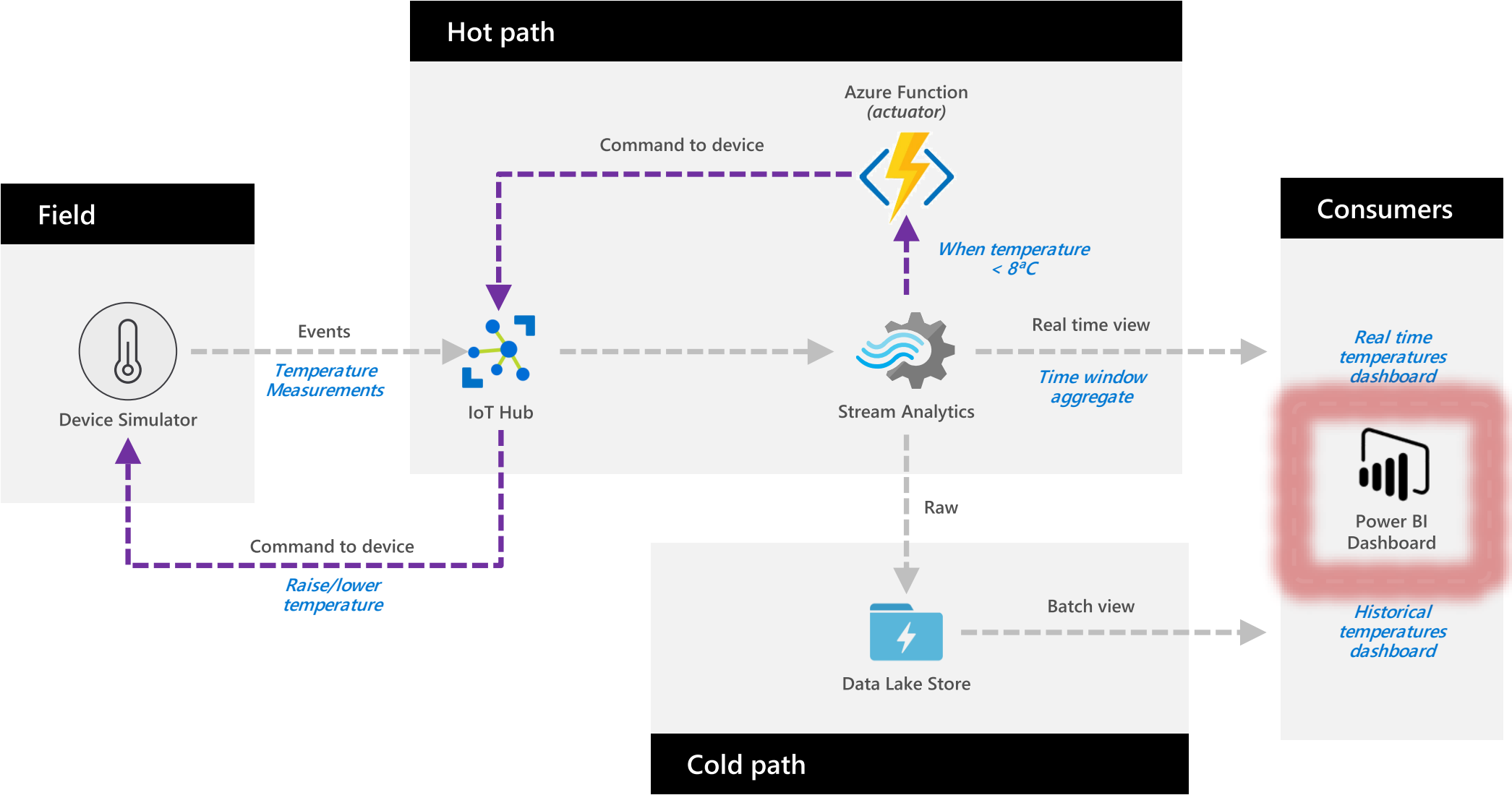
- A Hadoop Distributed File System for the cloud
- No fixed limits on file size
- No fixed limits on account size
- Unstructured and structured data in their native format
- Massive throughput to increase analytic performance
- High durability, availability, and reliability
- Azure Active Directory access control

Data Lake to store data

LAB 03

Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

Power BI for real time dashboarding




Power BI “no code” dashboarding

Data sources

-  SaaS solutions
E.g. Marketo, Salesforce, GitHub, Google analytics
-  On-premises data
E.g. Analysis Services
-  Organizational content packs
Corporate data sources, or external data services
-  Azure services
E.g. Azure SQL, Stream Analytics
-  Excel files
Workbook data or data models
-  Power BI Desktop files
Related data from files, databases, Azure, and other sources

Power BI service

 Content packs


 Live dashboards

 Visualizations

 Reports

 Datasets

 Data refresh

 Natural language query

 Sharing & collaboration

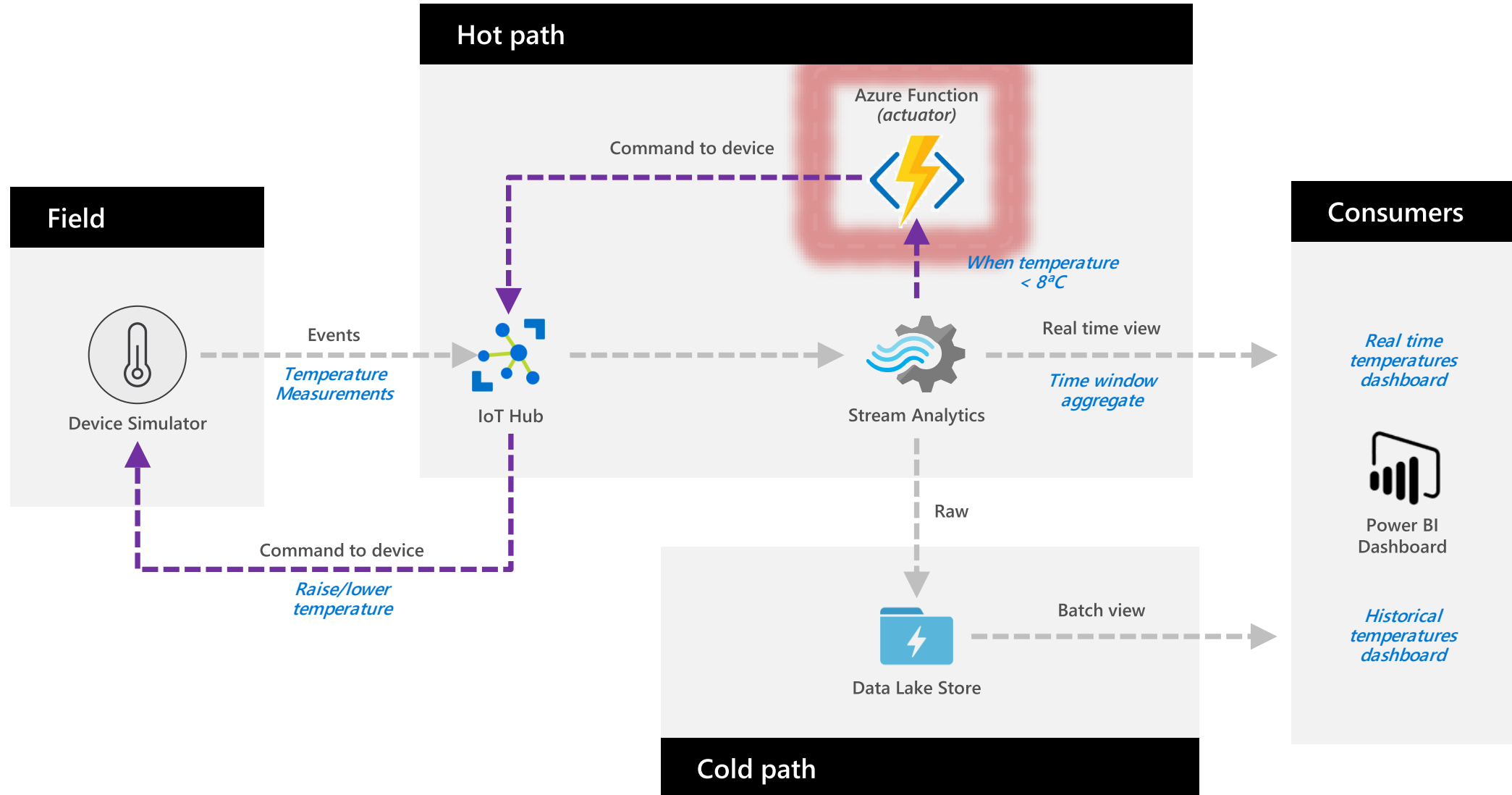


Power BI for real time dashboarding

LAB 04

Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

Azure Functions as an actuator



Azure Functions = Functions-as-a-Service

Event-based, serverless compute experience that accelerates app development



No infrastructure management

Developers can just focus on their code - there are no distractions around server management, capacity planning, or availability



Instant, event-driven scalability

Application components react to events and triggers in near real-time with virtually unlimited scalability; compute resources are used as needed



Pay only for what you use

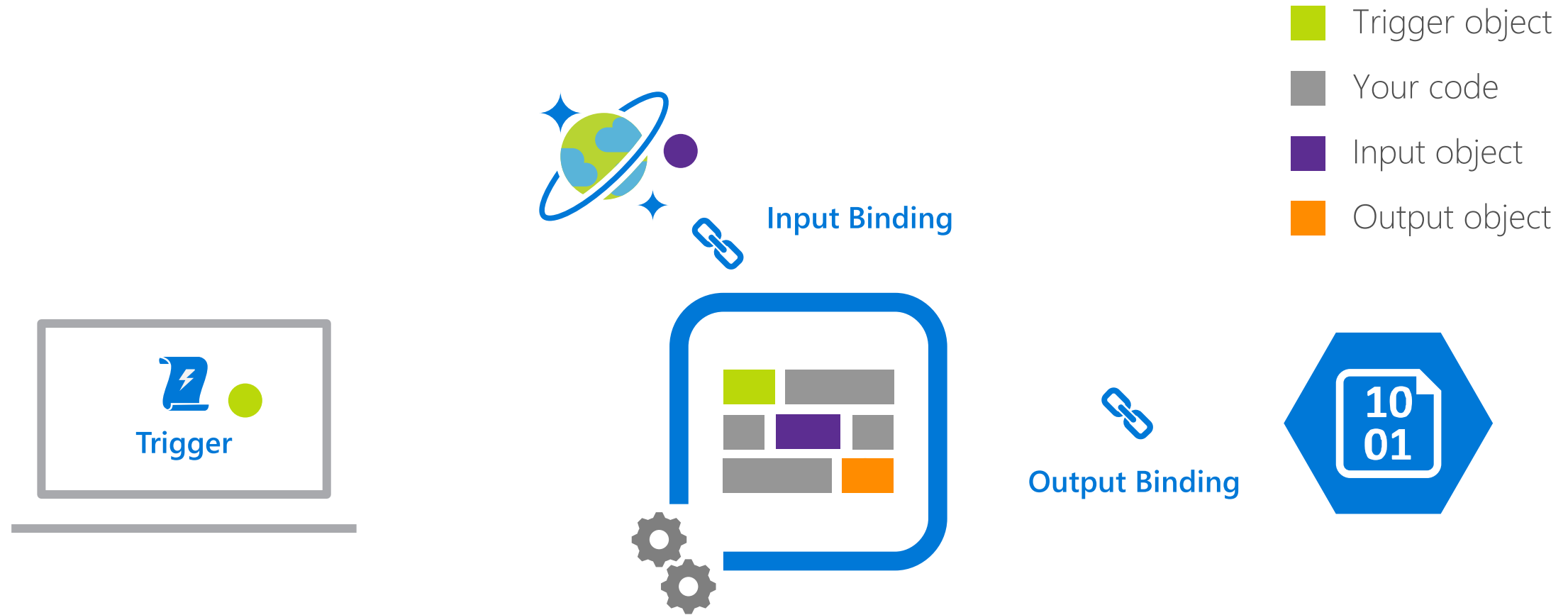
No wasted resources, only pay for what you use: billing calculated on the number of function calls and code execution time



Multiple languages

Write code in C#, JavaScript, F#, Java and Python with continuous investment in new, experimental languages

Azure Functions programming model based on triggers and bindings



Azure Functions as an actuator

LAB 05

Workshop labs repository: <https://github.com/ruifelixpereira/iot-101>

Resources

Azure IoT	https://docs.microsoft.com/en-us/azure/iot-fundamentals/
Azure IoT Reference Architectures	https://docs.microsoft.com/en-us/azure/architecture/reference-architectures/iot
Learn Azure IoT	https://docs.microsoft.com/en-us/learn/browse/?products=azure&term=iot
IoT Hub	https://docs.microsoft.com/en-us/azure/iot-hub/
Stream Analytics	https://docs.microsoft.com/en-us/azure/stream-analytics/
Data Lake Storage	https://docs.microsoft.com/en-us/azure/storage/blobs/data-lake-storage-introduction
Power BI	https://docs.microsoft.com/en-us/power-bi/
Azure Functions	https://docs.microsoft.com/en-us/azure/azure-functions/

Thank you