Azure IoT Suit

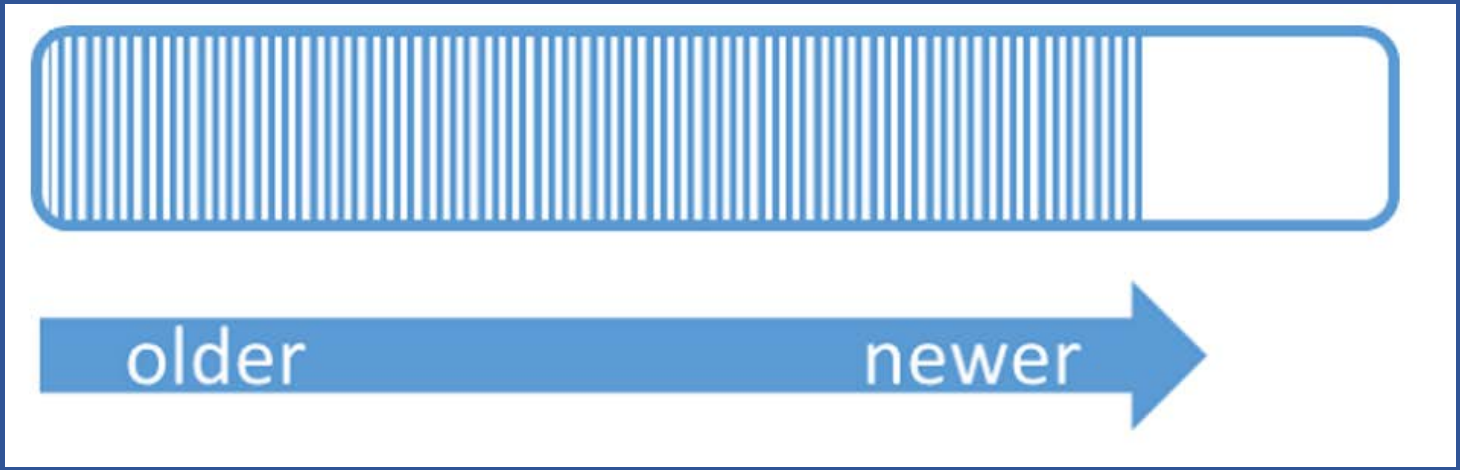
- Azure Event Hubs
- Azure Storage
- Azure Stream Analytics
- Microsoft Power BI
- IoT Security consideration

Azure Event Hubs

- is a managed platform service
- provides a foundation for large-scale data intake
  - mobile apps traffic information from web farms
  - in-game event capture in console games
  - telemetry data collected from industrial machines
  - connected vehicles.
- "front door" event ingestor.

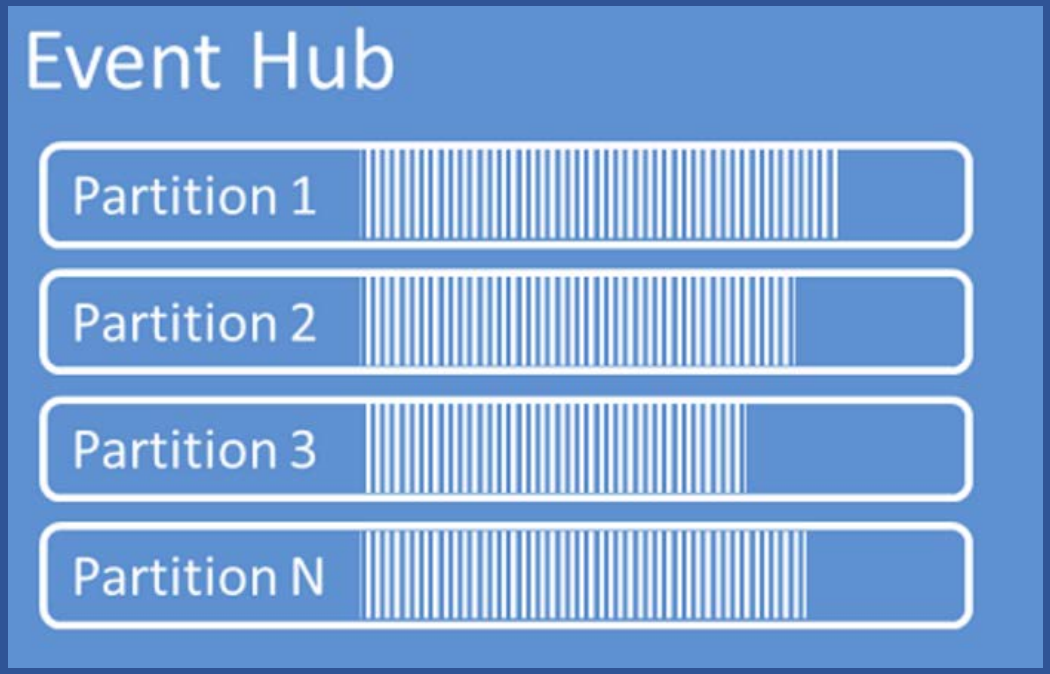
Partitions

- A partition is an ordered sequence of events that is held in an Event Hub.
- As newer events arrive, they are added to the end of this sequence.
- A partition can be thought of as a "commit log."

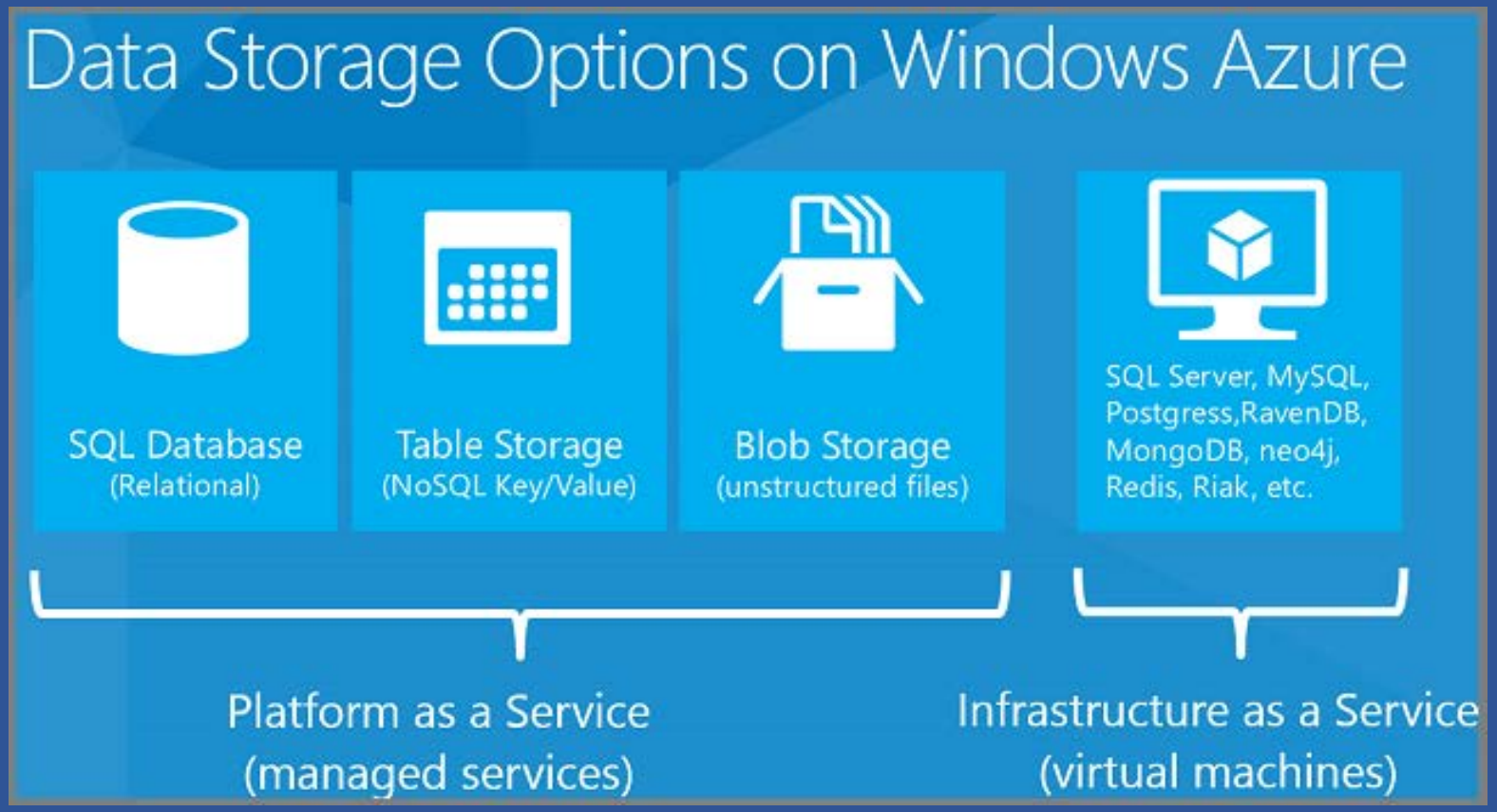


Event Hub / Partition

- Events expire on a time basis;
- you cannot explicitly delete them.
- An Event Hub contains multiple partitions.
- Each partition is independent and contains its own sequence of data.
- As a result, partitions often grow at different rates.



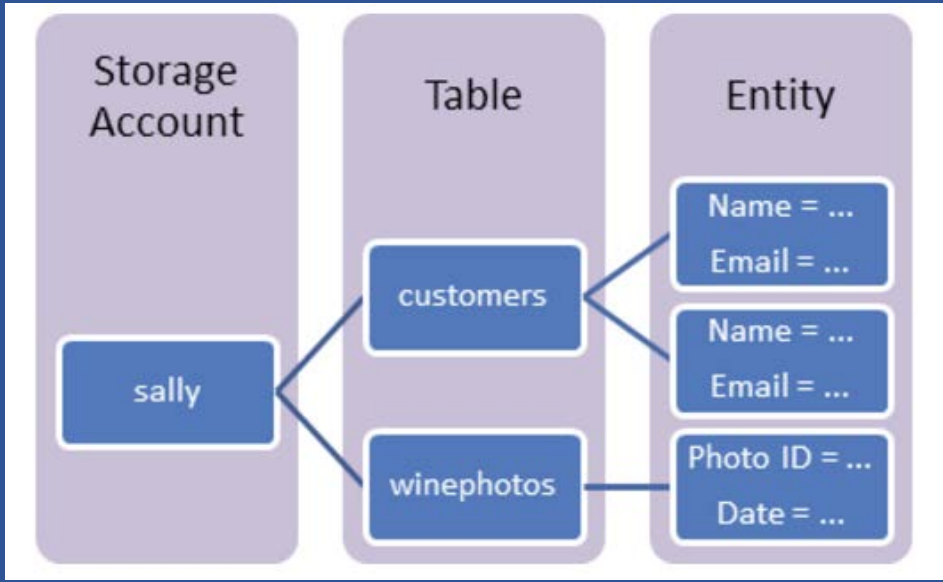
Azure Storage



Azure Storage features

- Highly available
- Large-scale applications
- Storage foundation for Azure Virtual Machines
- Massively scalable
- Support the big data
- Support small business website
- Handles millions of requests per second
- Elastic, in terms of the amount of data stored and the number of request
- You pay only for what you use, and only when you use it.
- Automatically load-balances
- Accessible from anywhere in the world
- Supports Windows and Linux
- Support .NET, Java, Node.js, Python, Ruby, PHP and C++ and mobile programming languages)

Azure Table Service



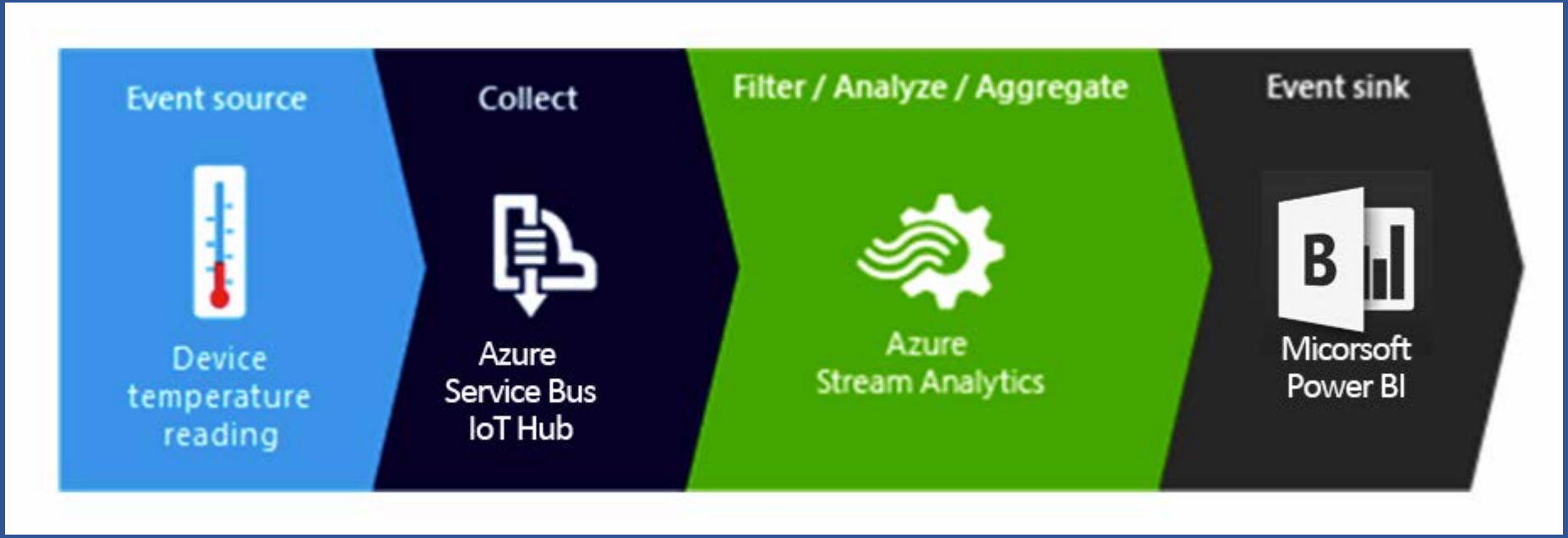
- Large amounts of structured data
- NoSQL
- Accepts authenticated calls from inside and outside the Azure cloud
- Non-relational data
- Storing TBs of structured data
- Storing datasets that don't require complex joins, foreign keys, or stored procedures
- LINQ queries

Azure Stream Analytics

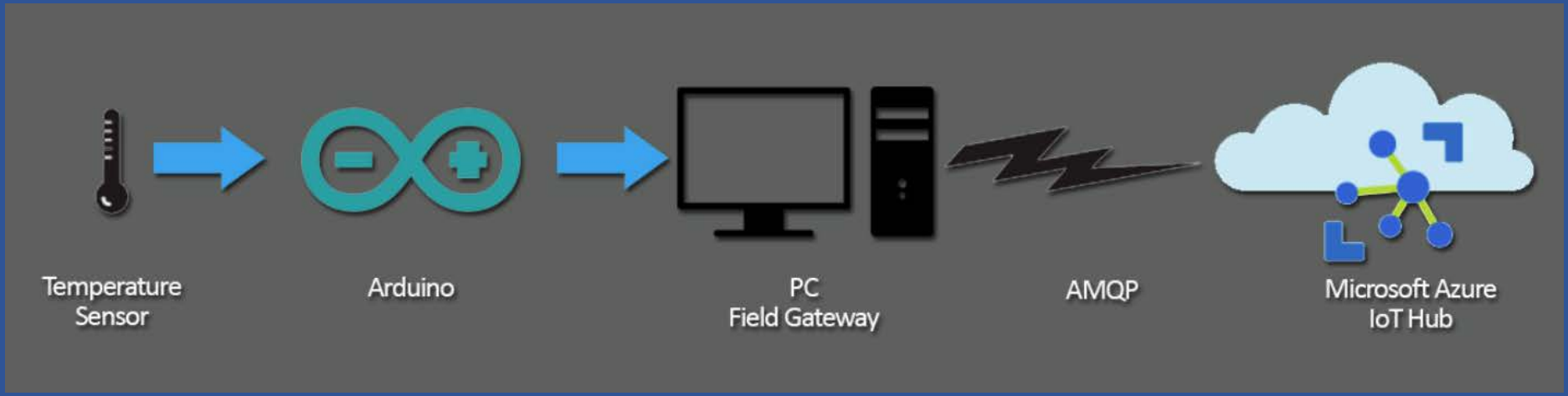
- Perform real-time analytics for your Internet of Things solutions
- Stream millions of events per second
- Get mission-critical reliability and performance with predictable results
- Create real-time dashboards and alerts over data from devices and applications
- Correlate across multiple streams of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

In this session

1. Create Temperature sensing device
2. Sending telemetry data to Azure IoT Hub
3. Send data to Azure Stream Analytics
4. Sink event to BI
5. Create data visualization in Microsoft Power BI

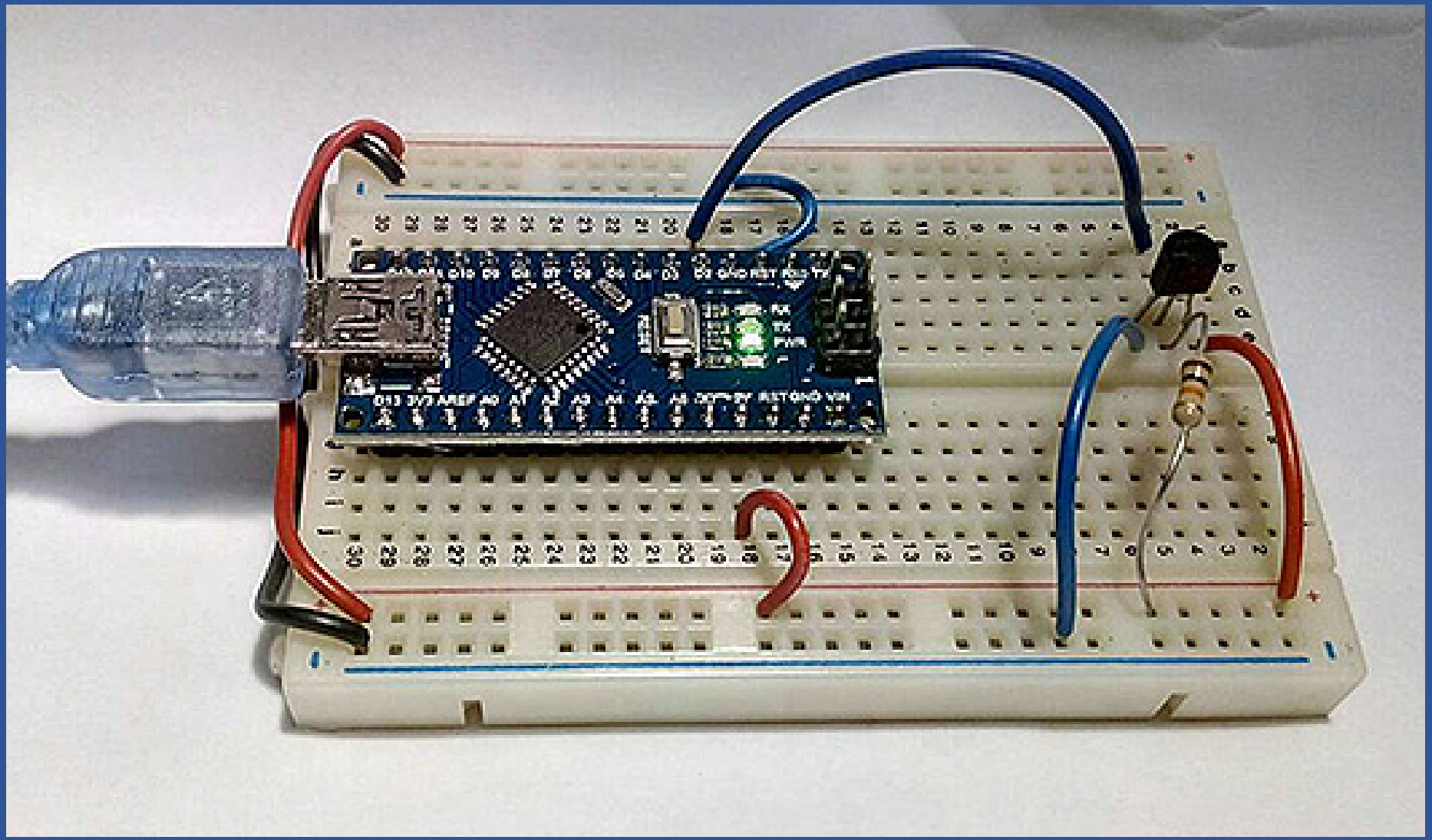


Sending telemetry data from device to Cloud

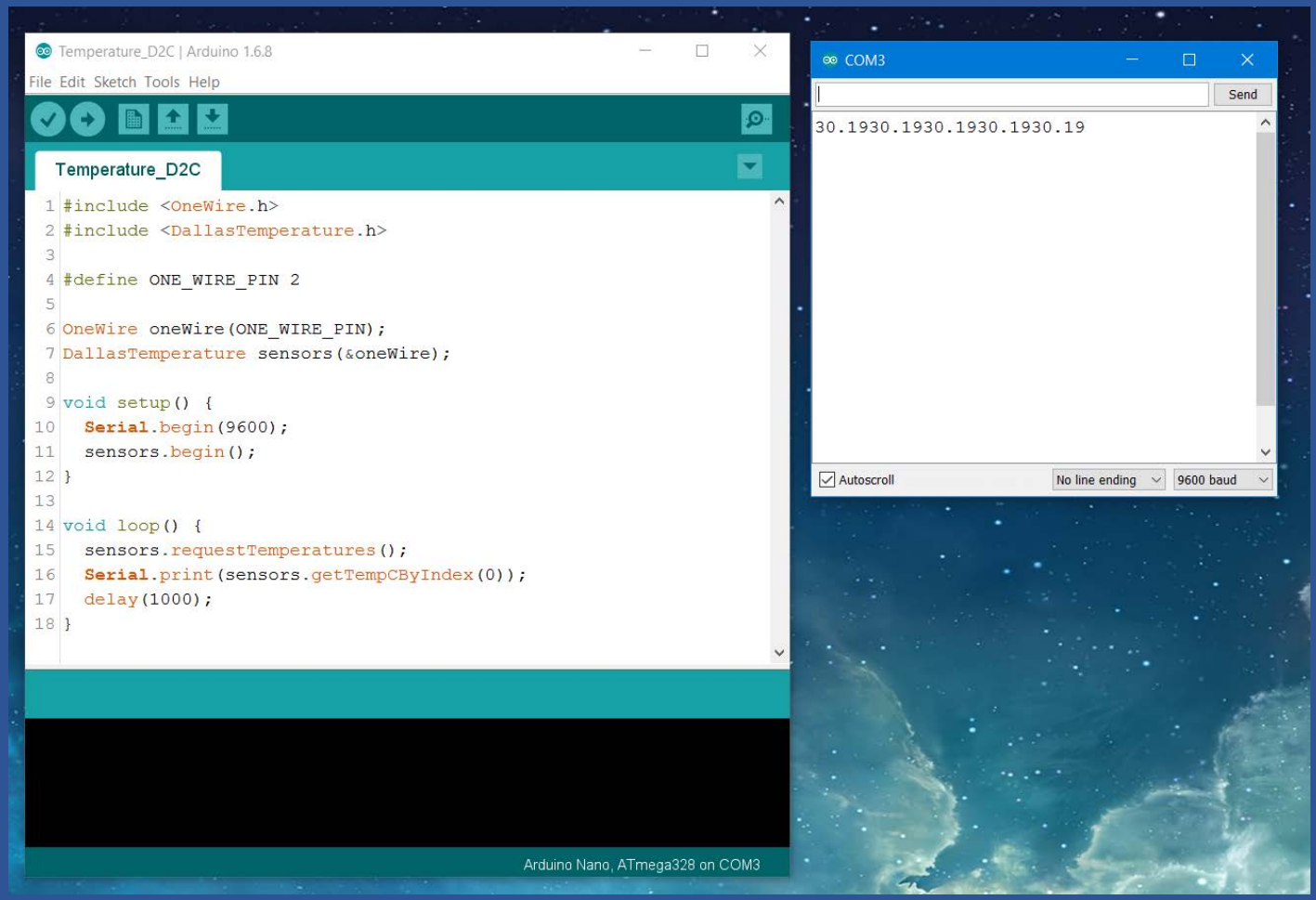


1. Make temperature circuit
2. Run Arduino Code and test
3. Run WinApp and test with Device Explorer

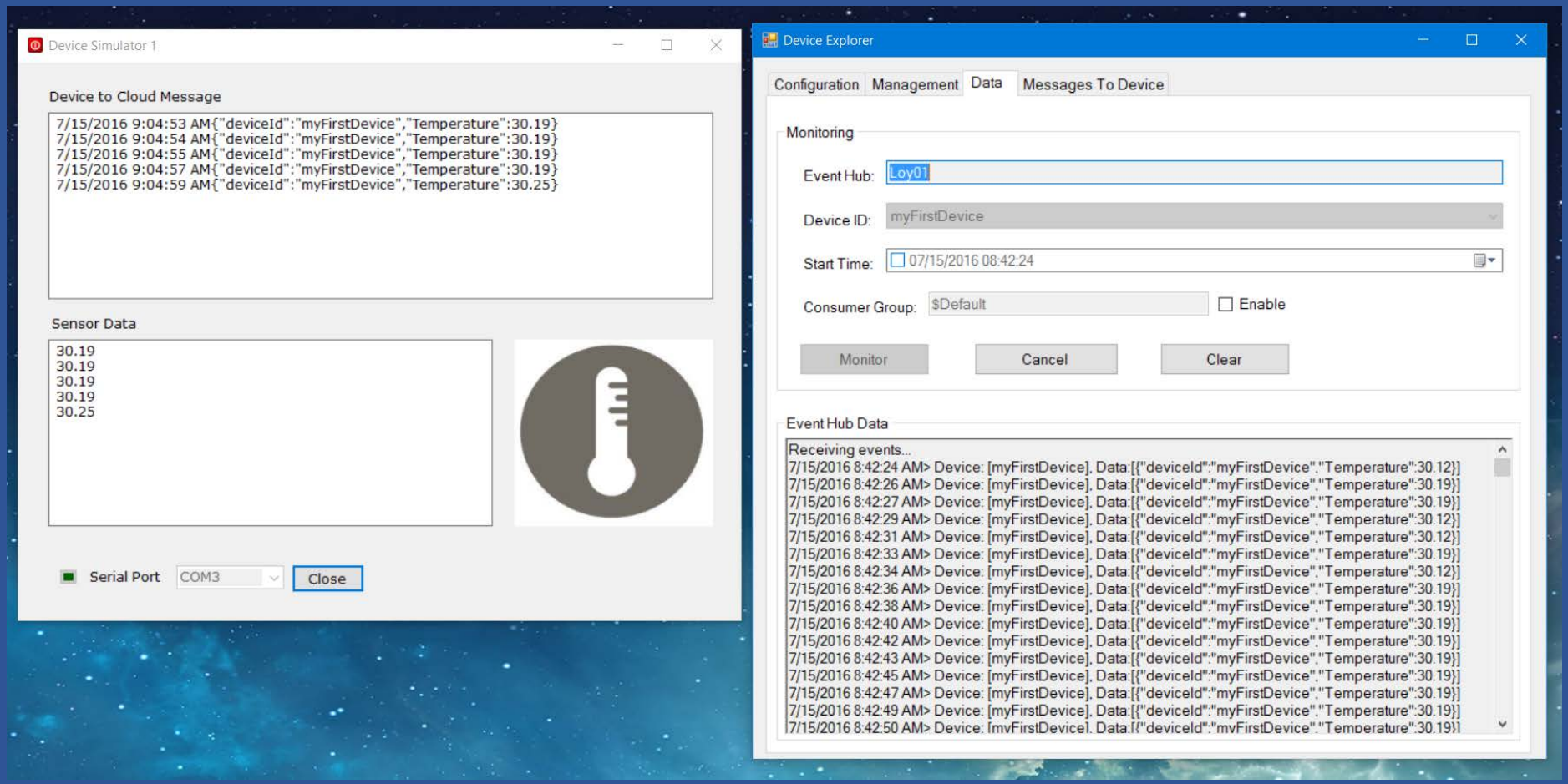
Make temperature circuit



Run Arduino Code and test



Run WinApp and test with Device Explorer

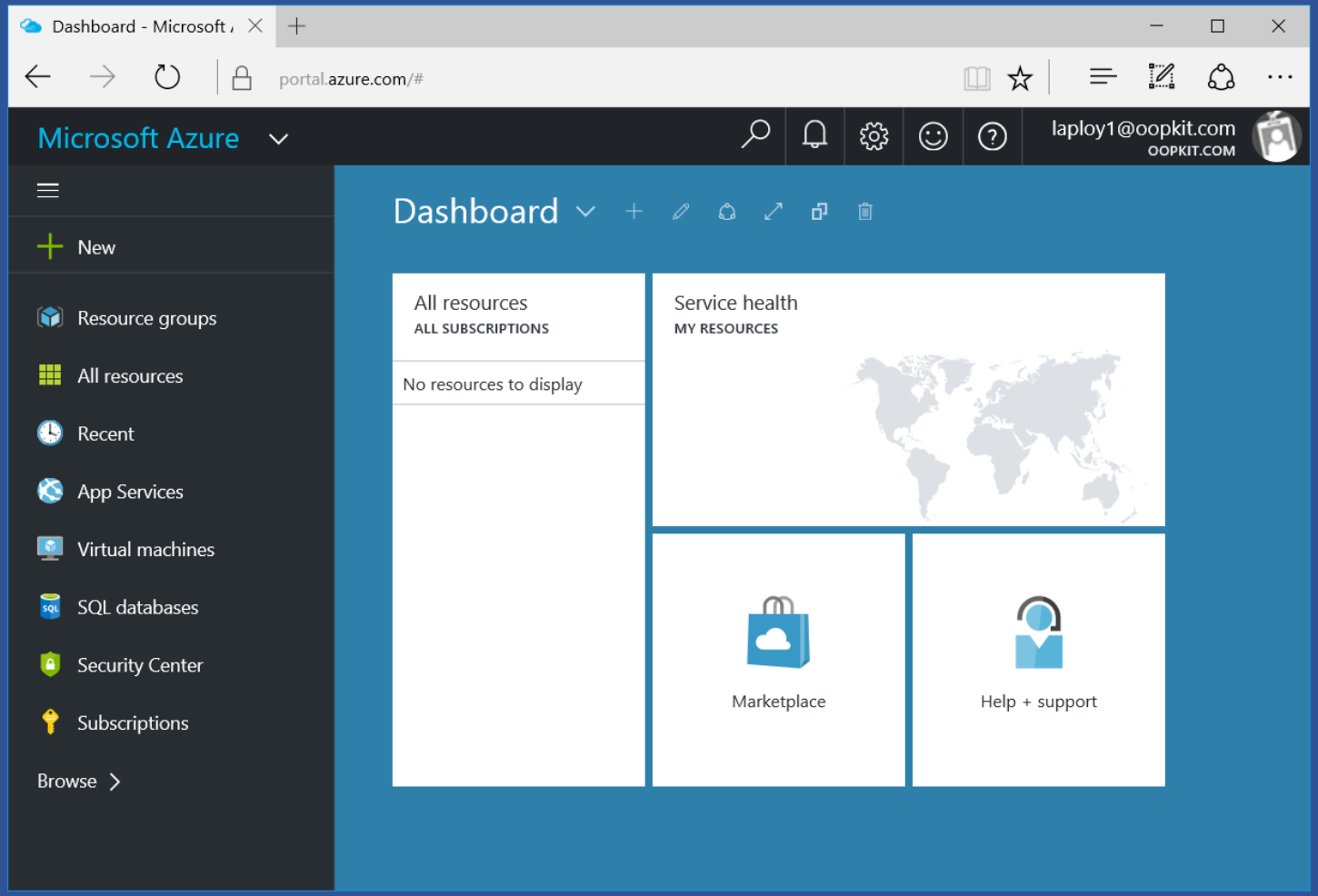


Create Azure Stream Analytics Job

1. Open Azure Dashboard
2. Create New Stream Analytics Job
3. Setup Input
4. Setup Output
5. Write query

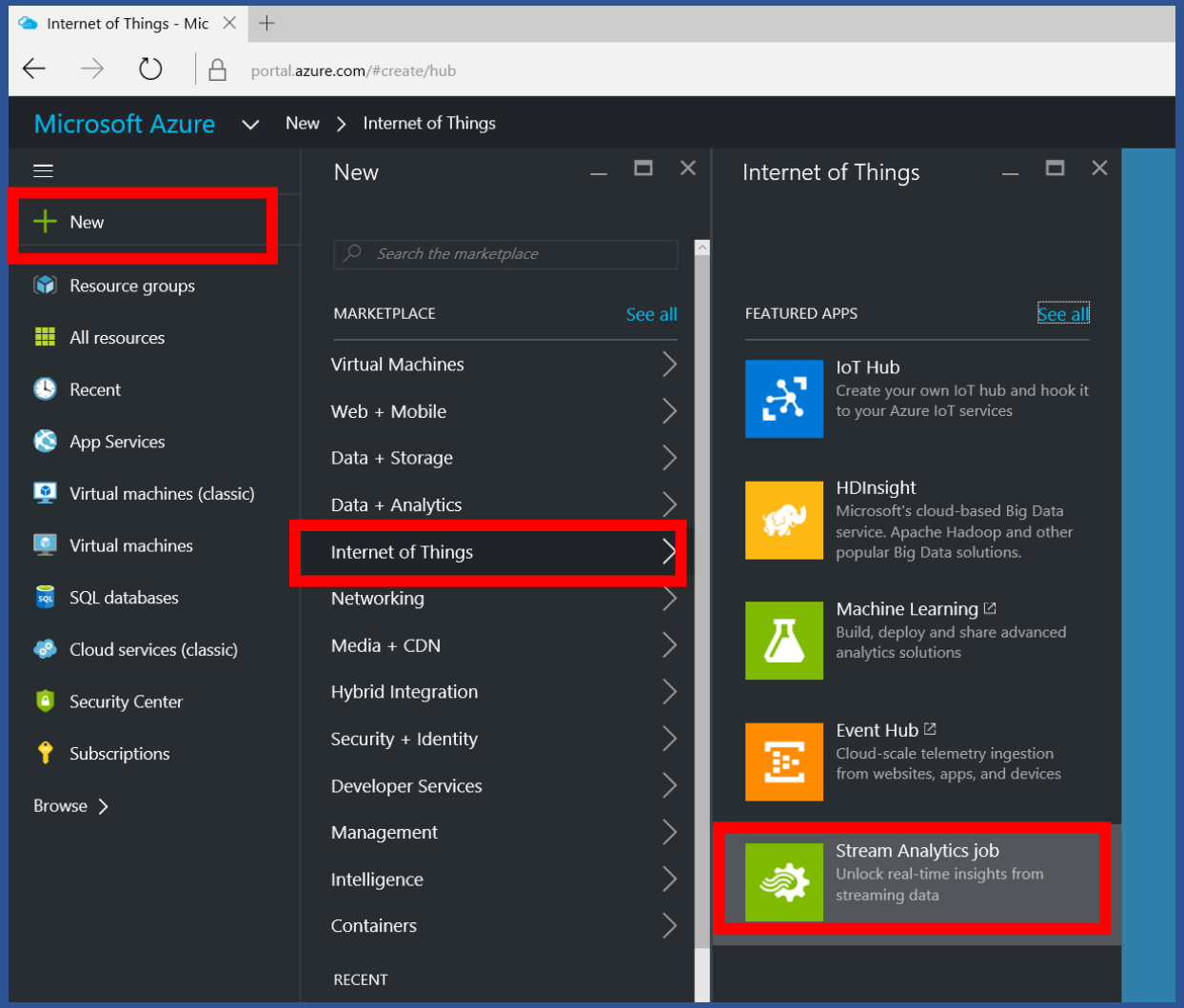
Go to Azure Dashboard

https://portal.azure.com/



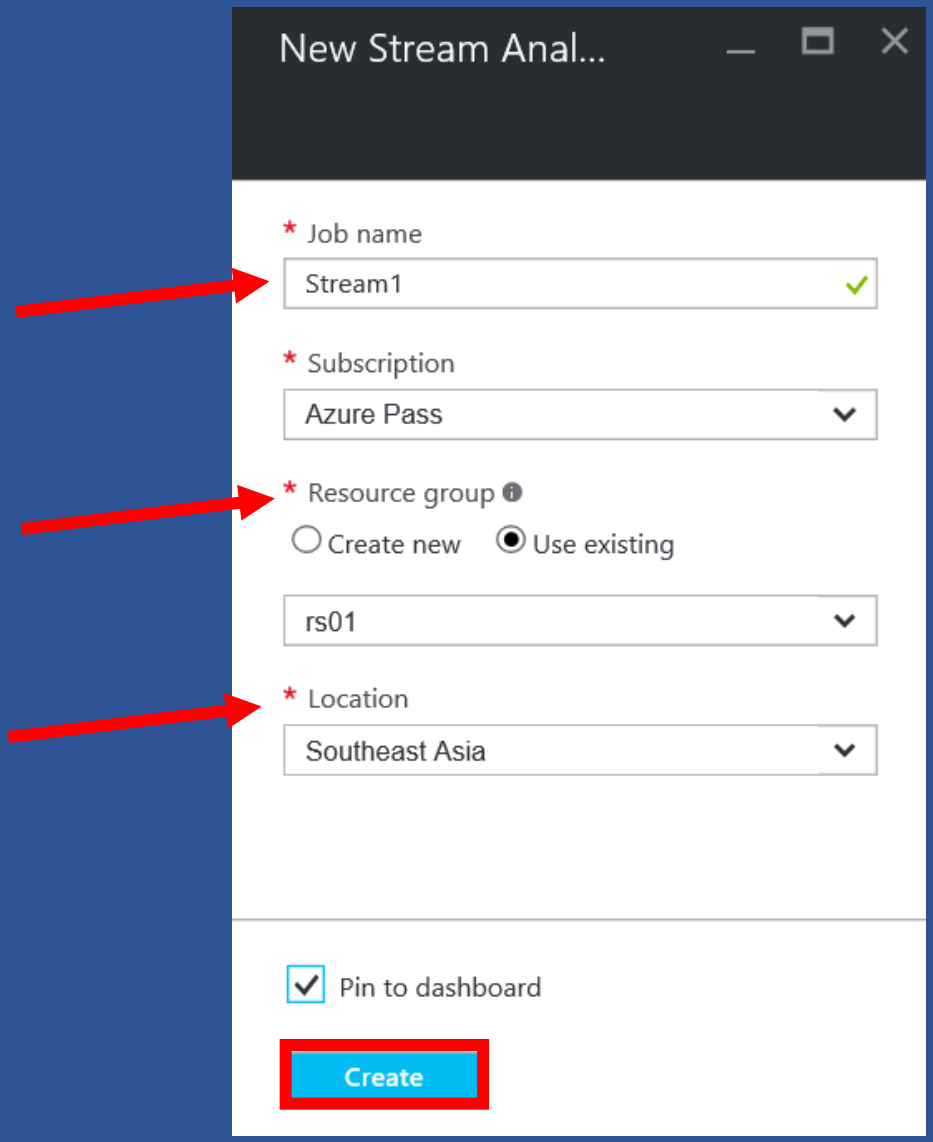
Create new Stream Analytics Job

New / Internet of Things / Stream Analytics Job

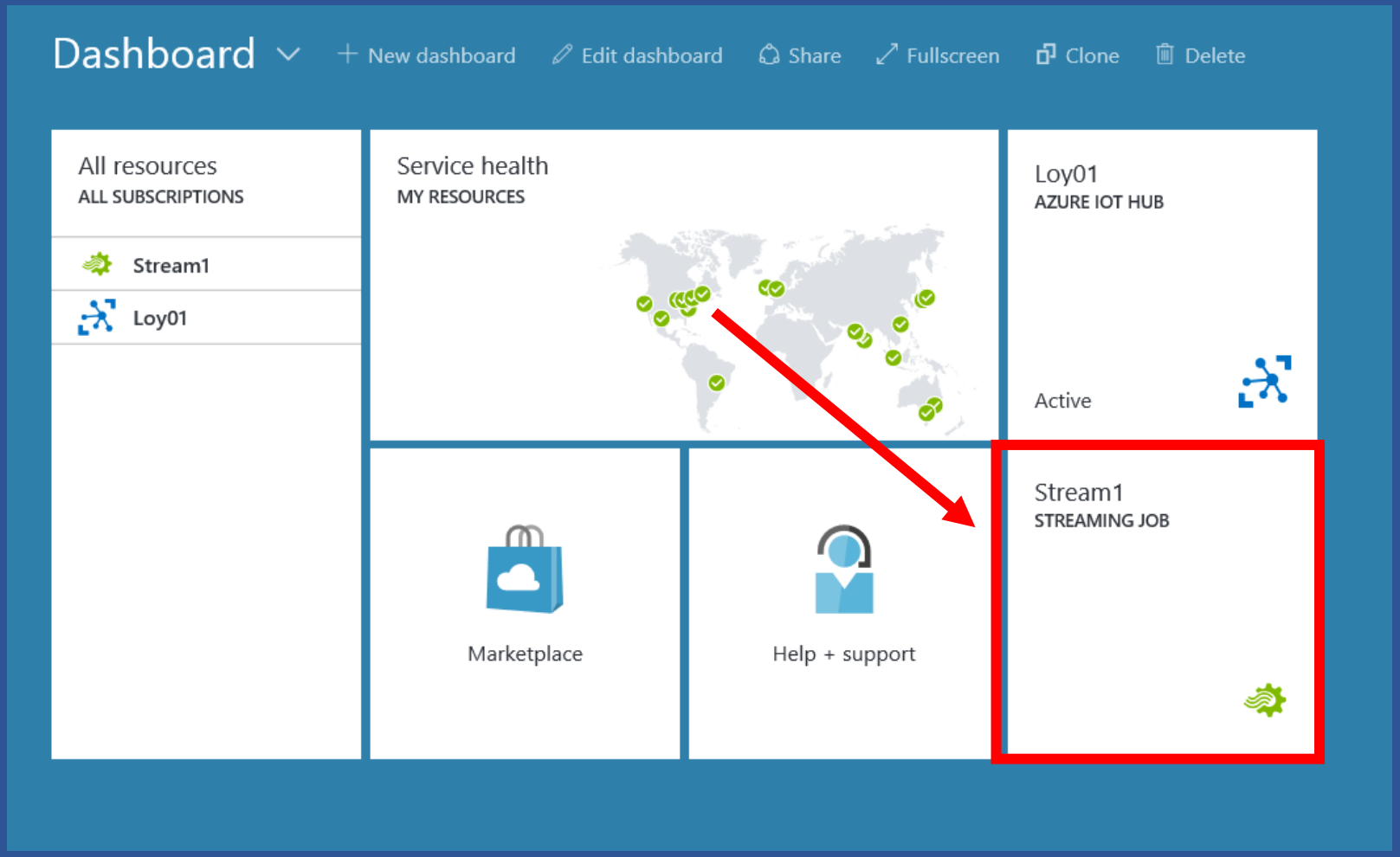


Create New Stream Analytics Job

Provide name / Resource group / location

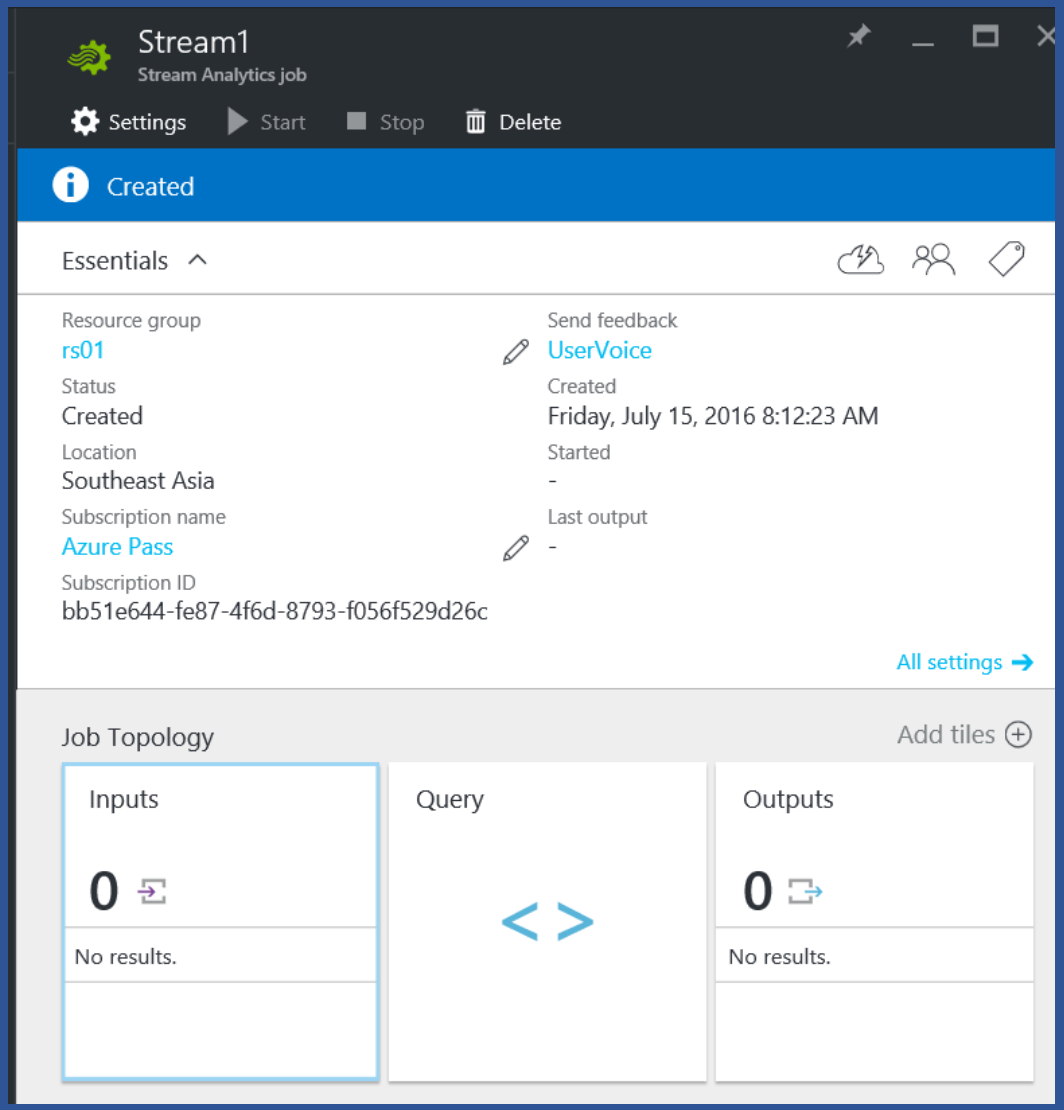


Wait for Stream1 to be created

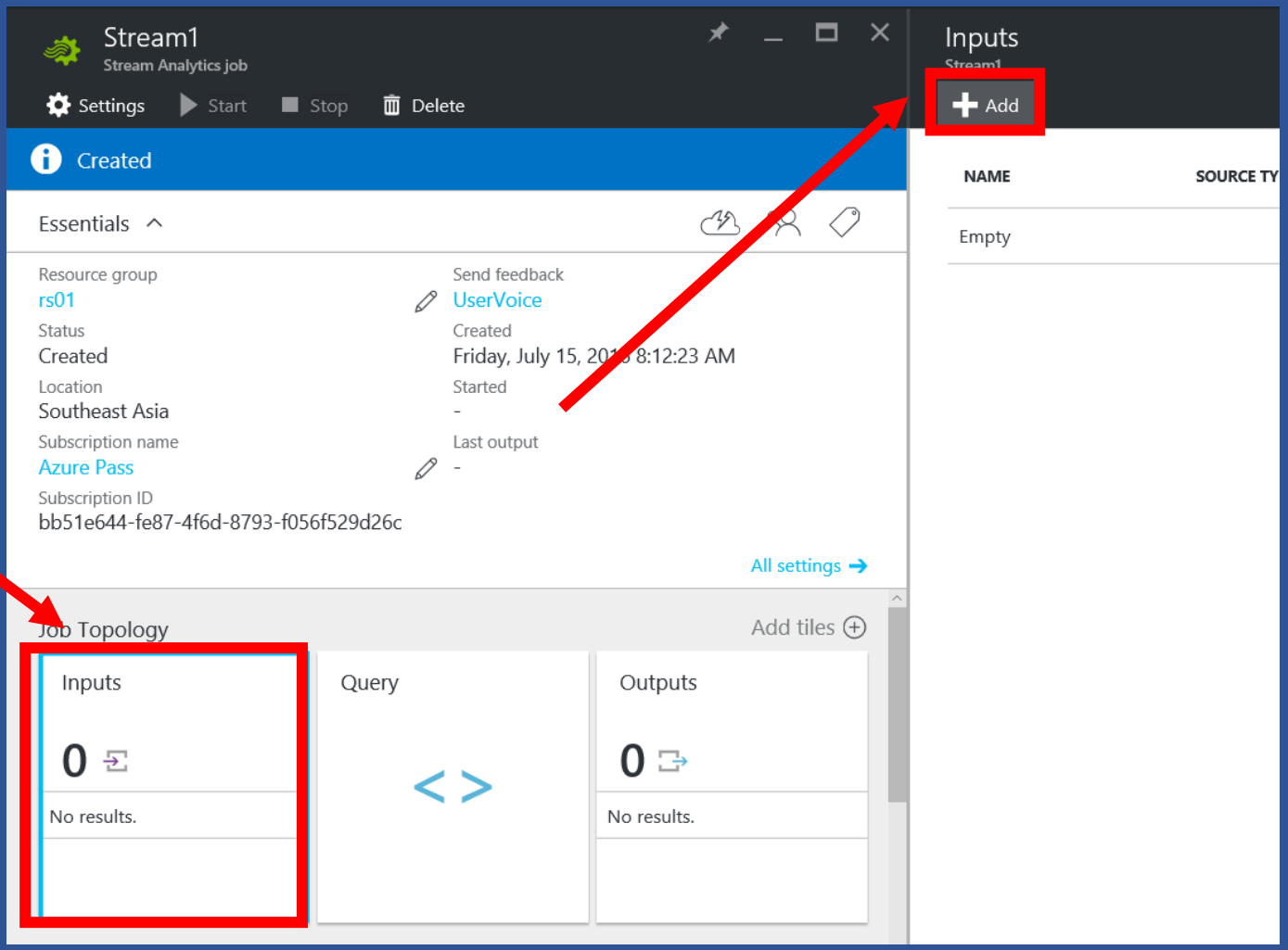


Create Stream Analytics Job Input

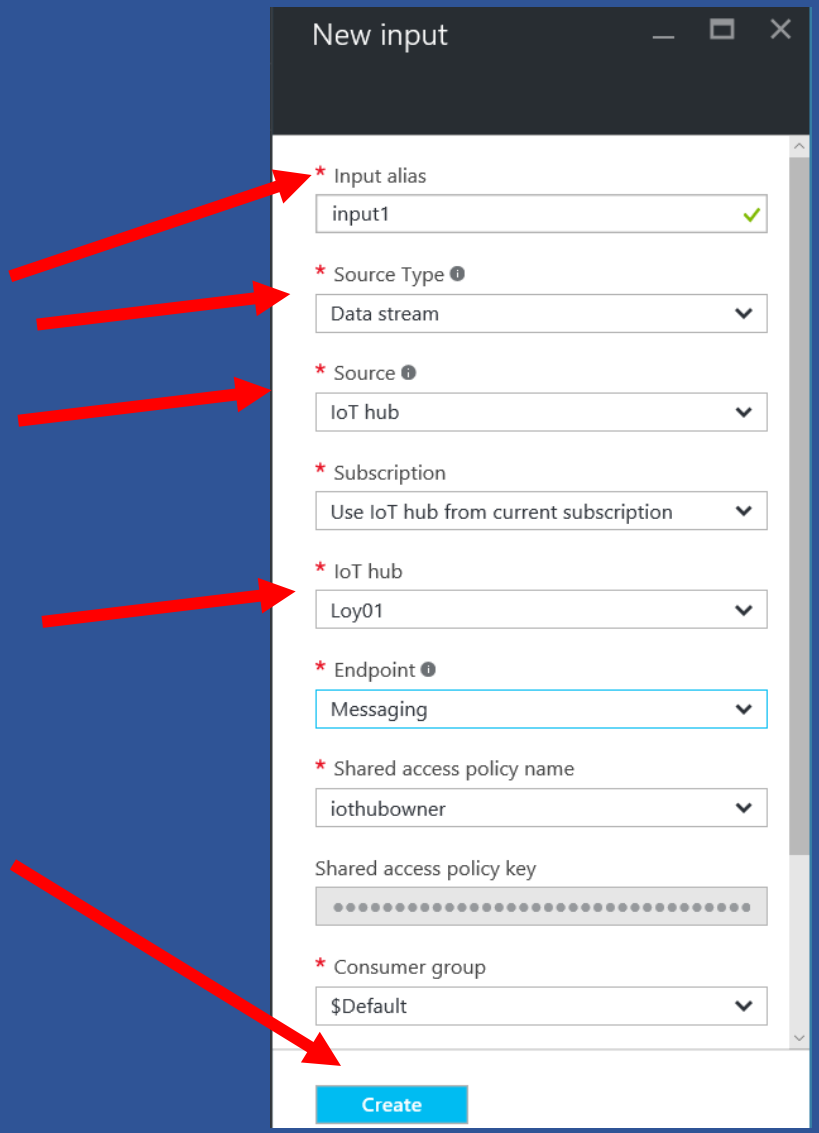
Open Stream1



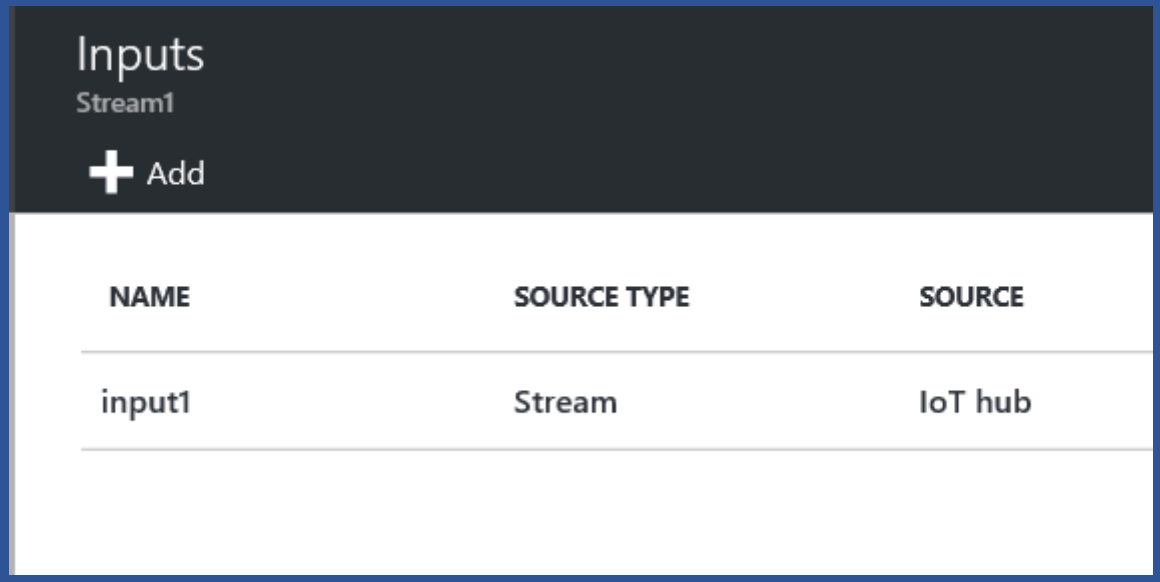
Input / + Add


Stream1
Stream Analytics job
Settings
Start
Stop
Delete
Created
Essentials
Resource group
rs01
Status
Created
Location
Southeast Asia
Subscription name
Azure Pass
Subscription ID
bb51e644-fe87-4f6d-8793-f056f529d26c
Send feedback
UserVoice
Created
Friday, July 15, 201
8:12:23 AM
Started
-
Last output
-
All settings
Job Topology
Add tiles
Inputs
0
No results.
Query
Outputs
0
No results.
Inputs
Add
NAME
SOURCE TY
Empty

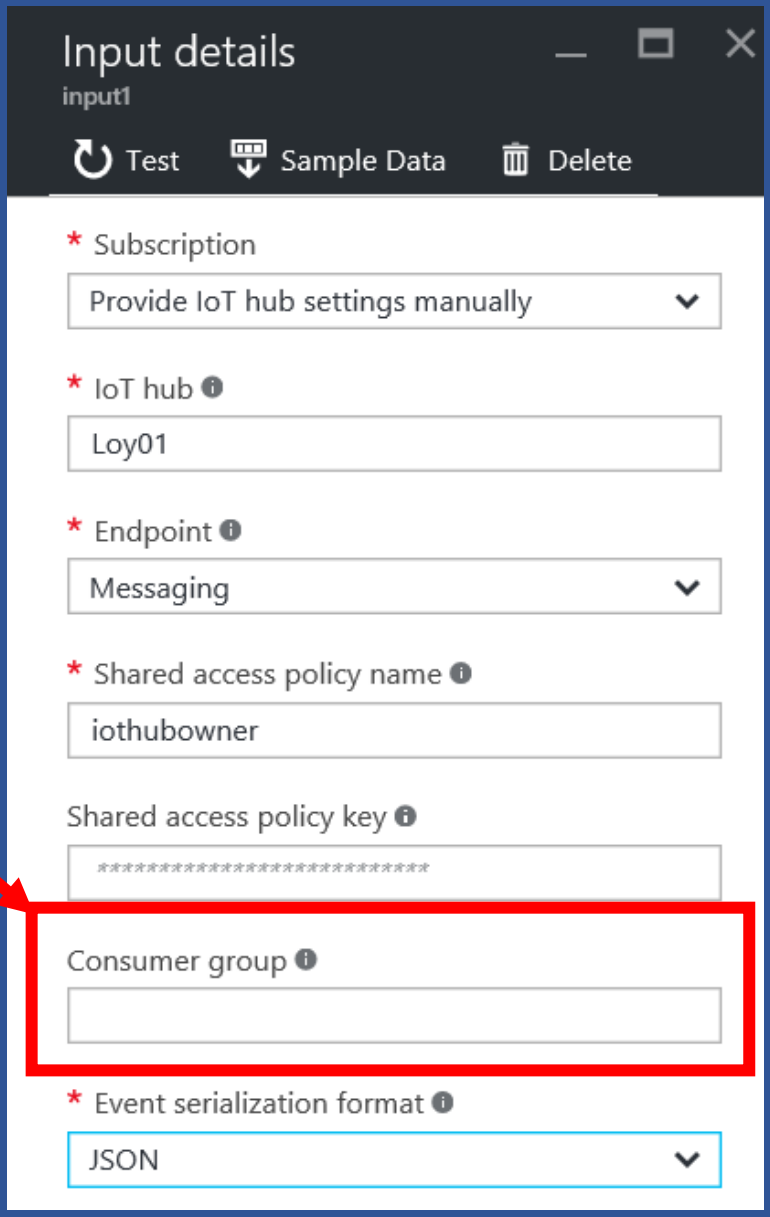
Set alias / source



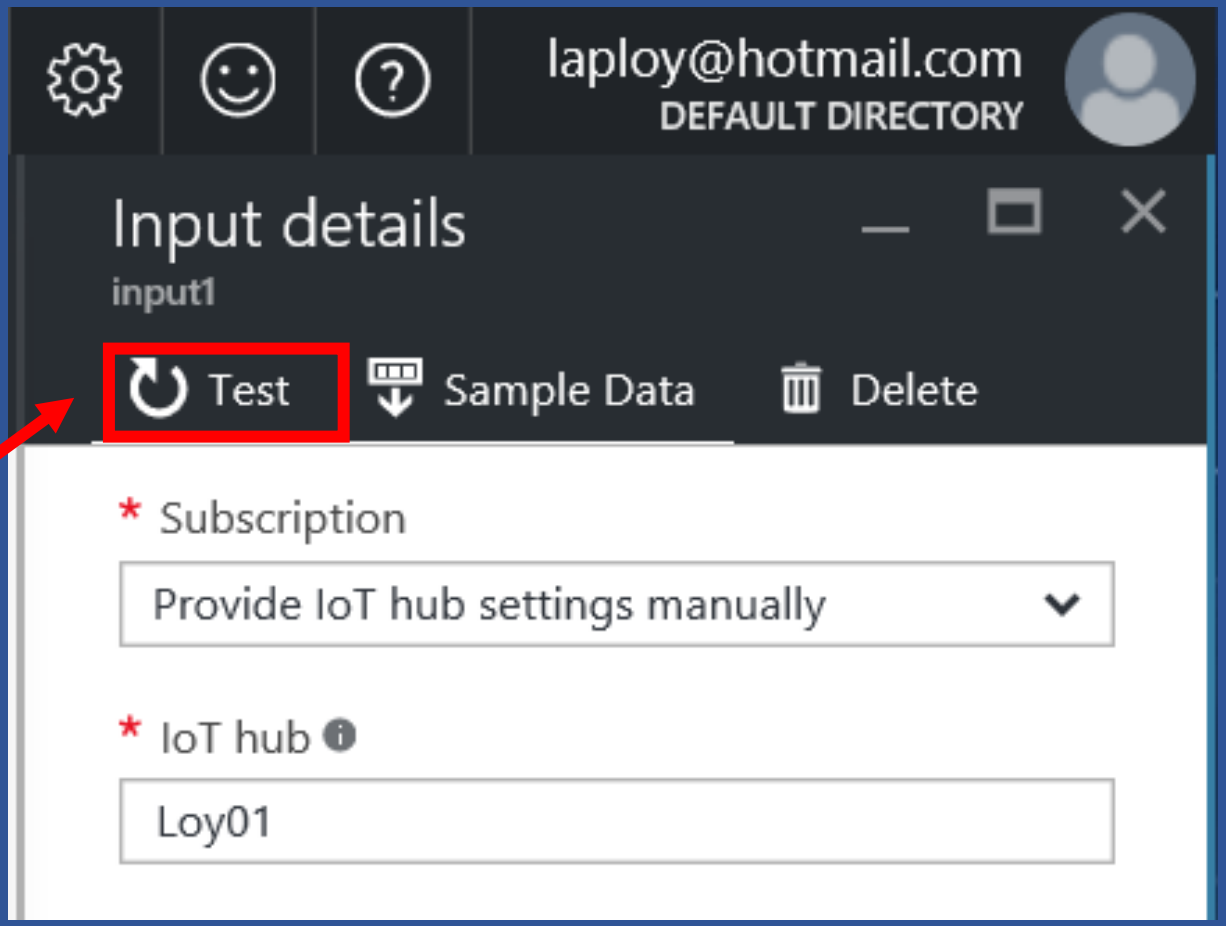
Wait for input1 to be created



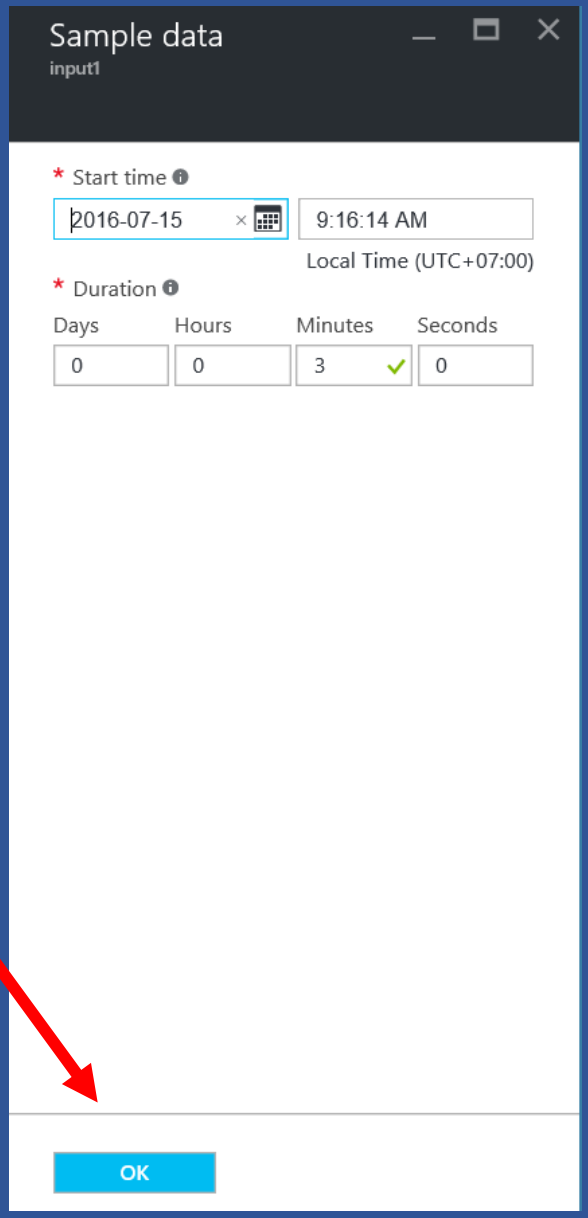
Clear Consumer group name



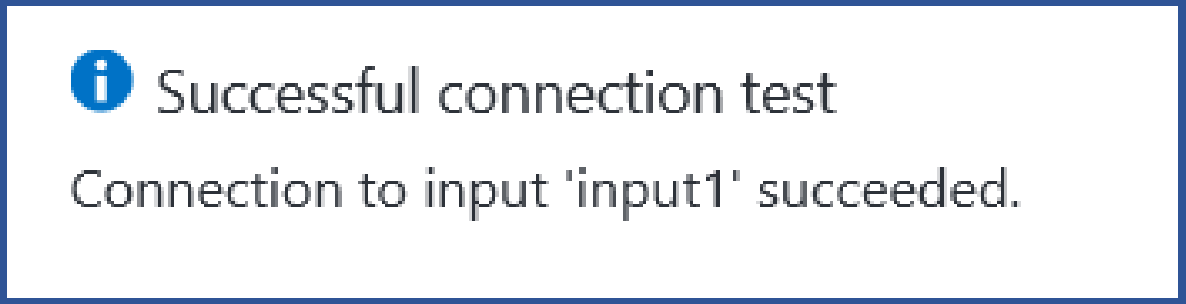
Click "Test" button to test connection



In Sample Data box, click “OK”

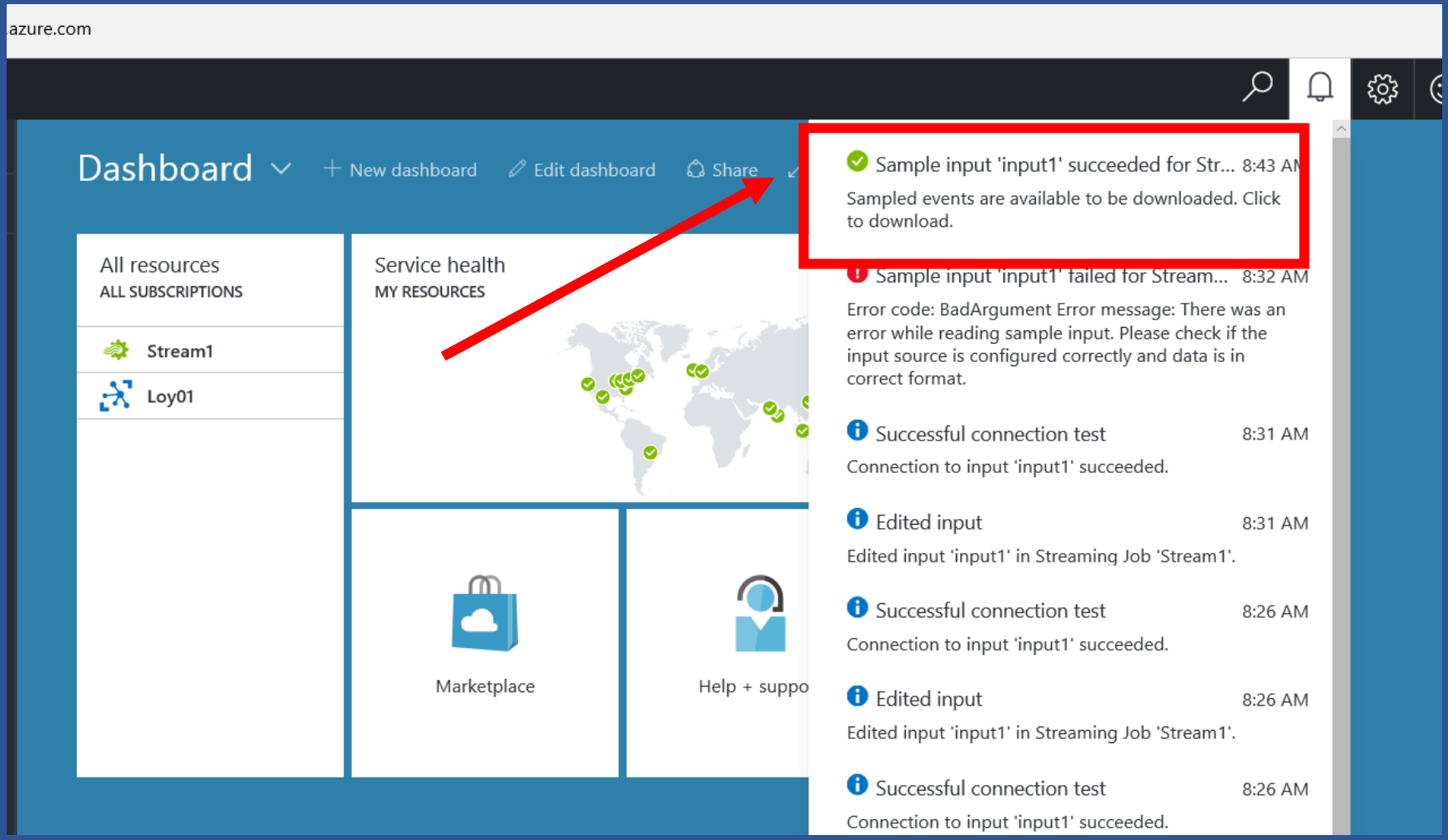


Look for “Successful connection test” message

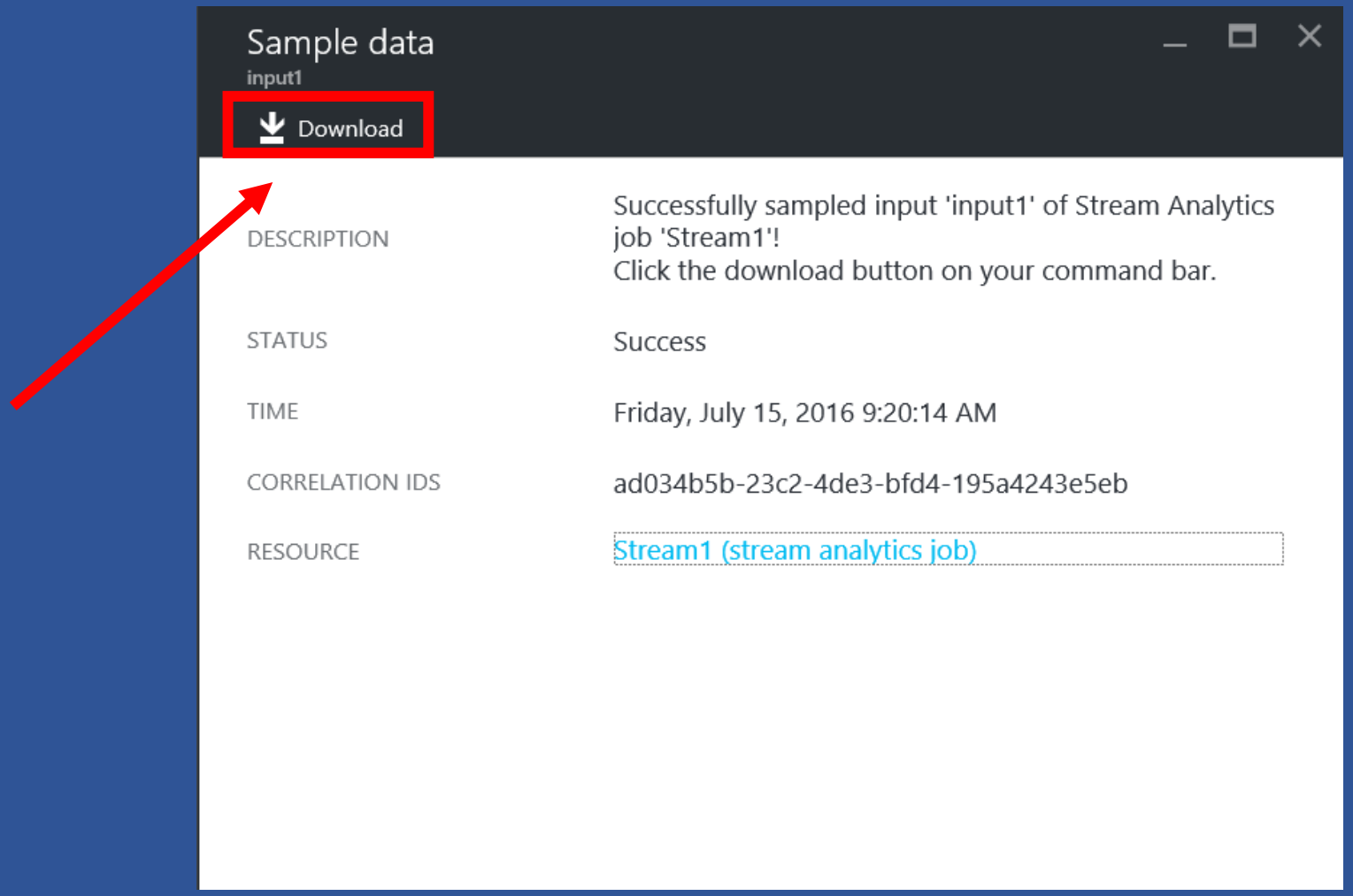


Down load sample data

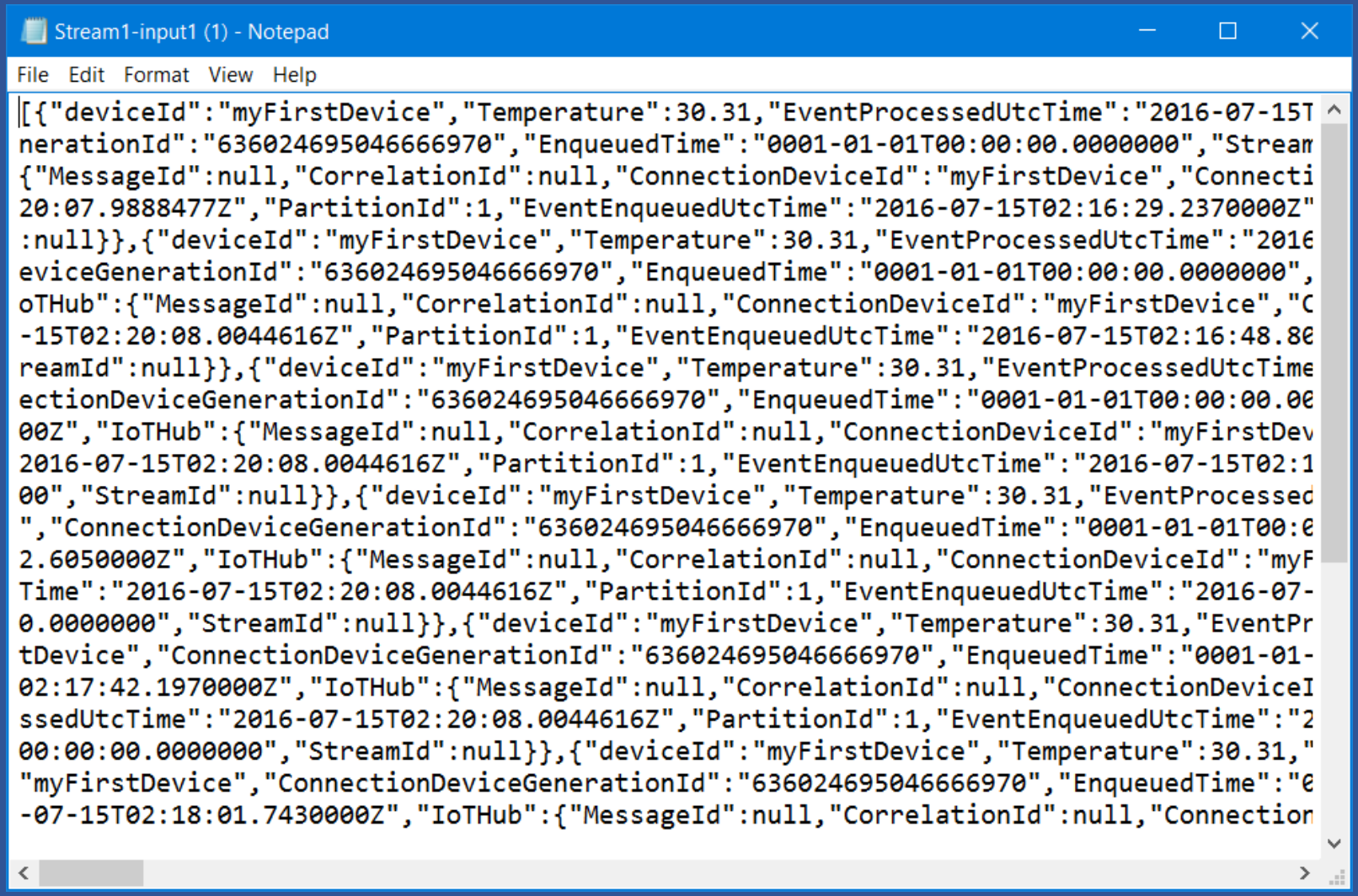
Click the message



In sample data pane, click download button



View Sample data in Text Editor



JSON message Analytics

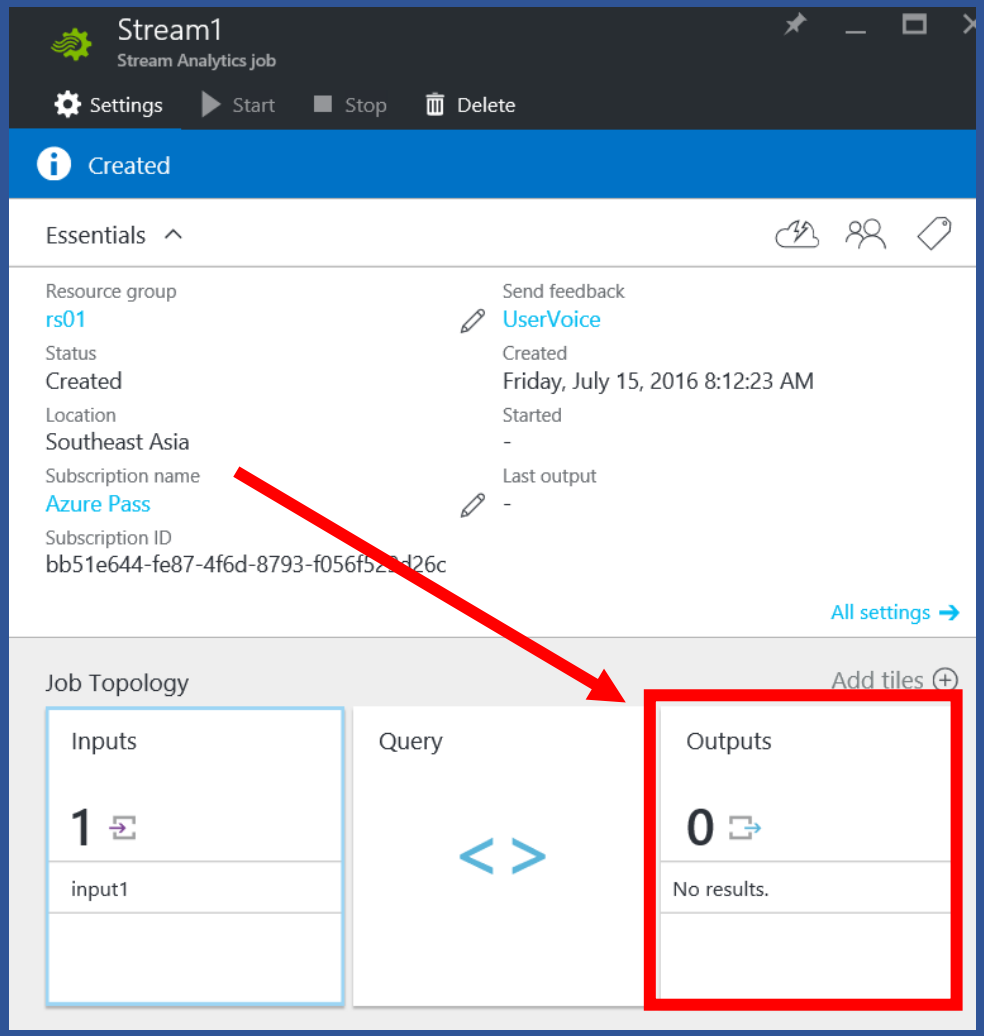
```
"deviceId":"myFirstDevice",
"Temperature":30.31,
"EventProcessedUtcTime":"2016-07-15T02:20:07.9888477Z",
"PartitionId":1,
"EventEnqueuedUtcTime":"2016-07-15T02:16:15.0130000Z",
"IoTHub":
{
    "MessageId":null,
    "CorrelationId":null,
    "ConnectionDeviceId":"myFirstDevice",
    "ConnectionDeviceGenerationId":"636024695046666970",
    "EnqueuedTime":"0001-01-01T00:00:00.0000000",
    "StreamId":null
}
```

More on IoT hub message

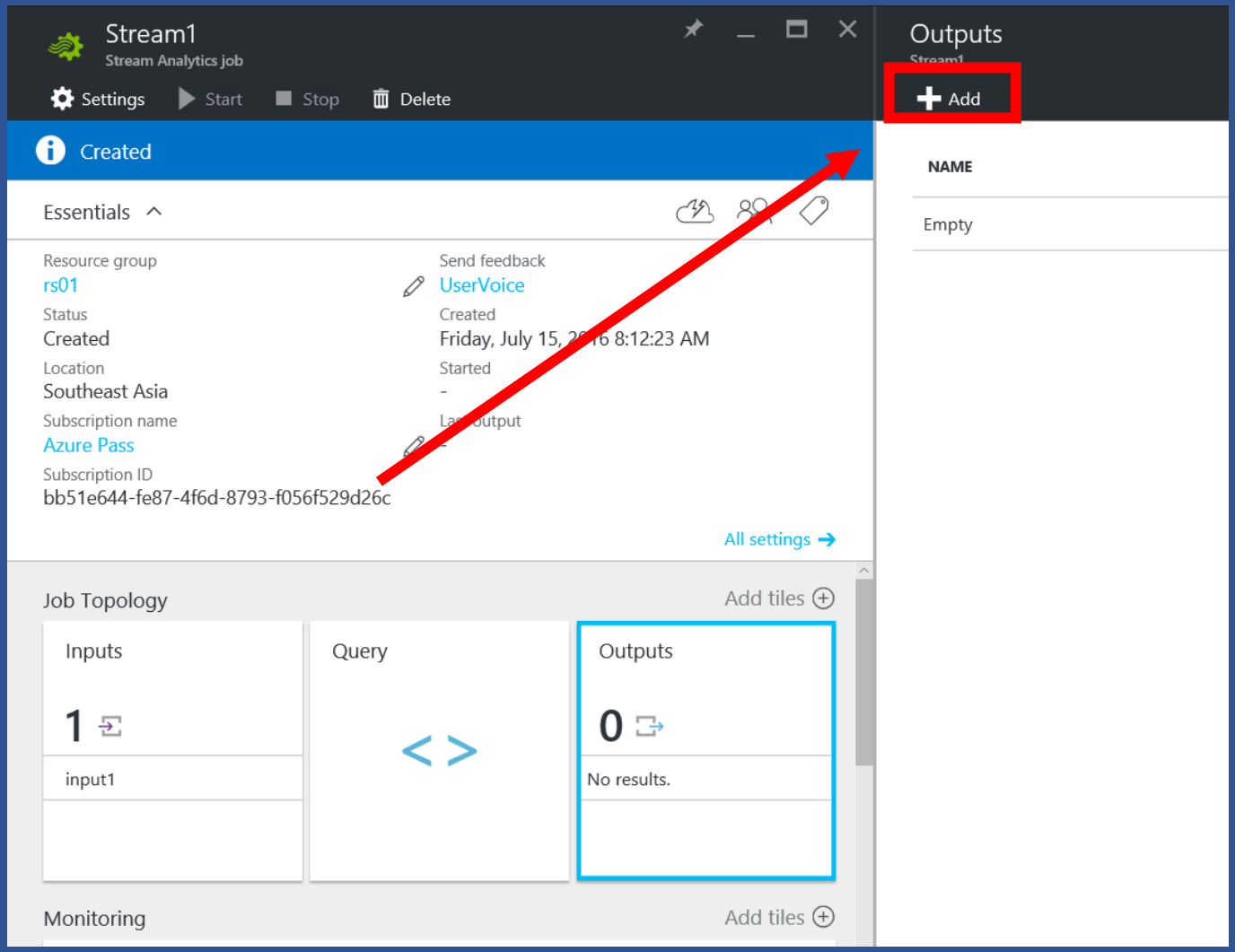
- https://azure.microsoft.com/en-us/documentation/articles/iot-hub-csharp-csharp-process-d2c/
- https://azure.microsoft.com/en-us/documentation/articles/iot-hub-devguide/
- https://azure.microsoft.com/en-us/documentation/articles/event-hubs-overview

Create Stream Analytics Job Output

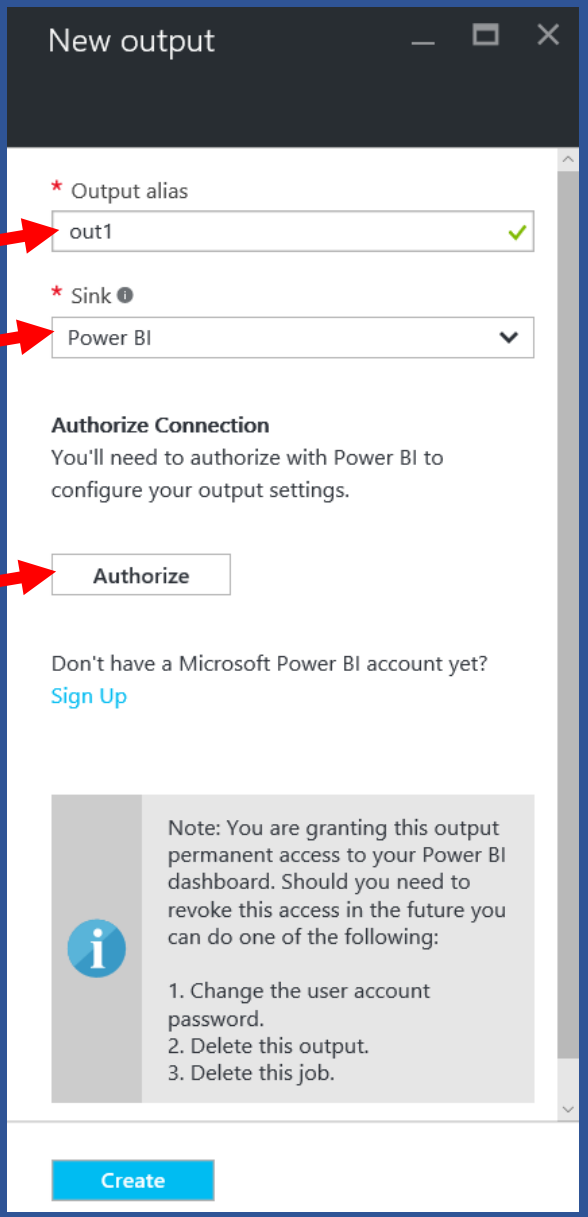
Click Output



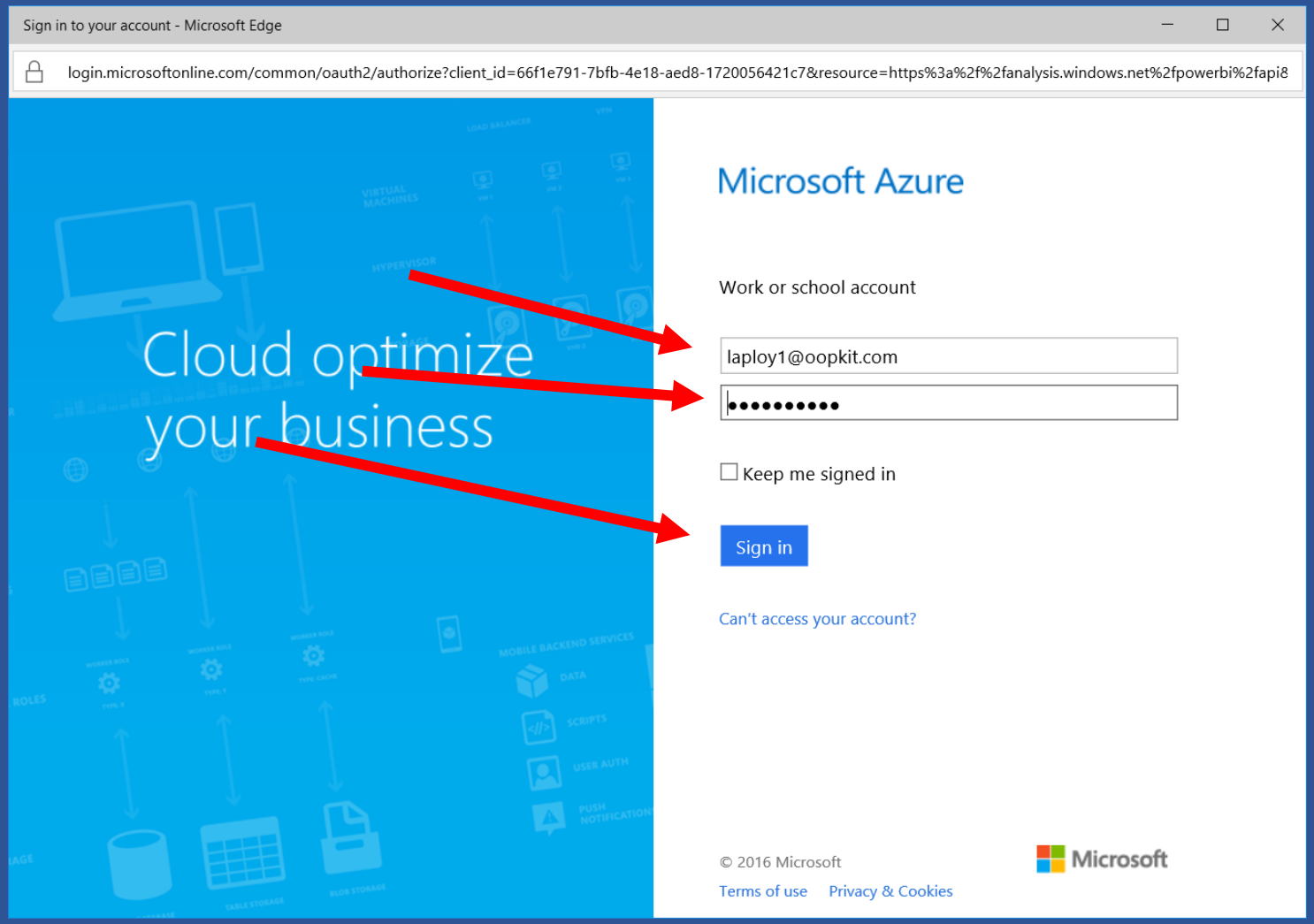
Click +Add


Stream1
Stream Analytics job
Settings
Start
Stop
Delete
Created
Essentials
Resource group
rs01
Status
Created
Location
Southeast Asia
Subscription name
Azure Pass
Subscription ID
bb51e644-fe87-4f6d-8793-f056f529d26c
Send feedback
UserVoice
Created
Friday, July 15, 2016 8:12:23 AM
Started
-
All settings
Job Topology
Add tiles
Inputs
1
input1
Query
Outputs
0
No results.
Monitoring
Add tiles
Outputs
Add
NAME
Empty

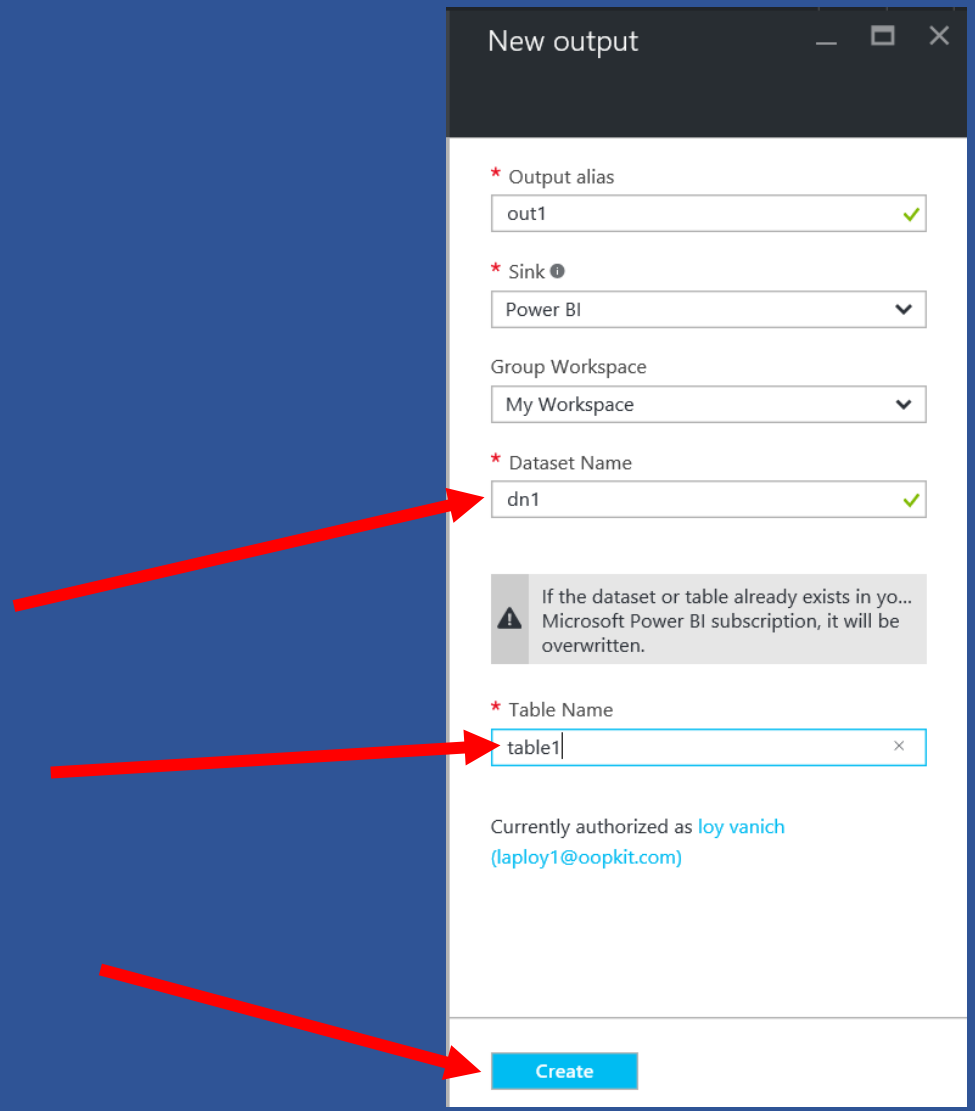
Set Output alias / Sink Power BI / Authorize



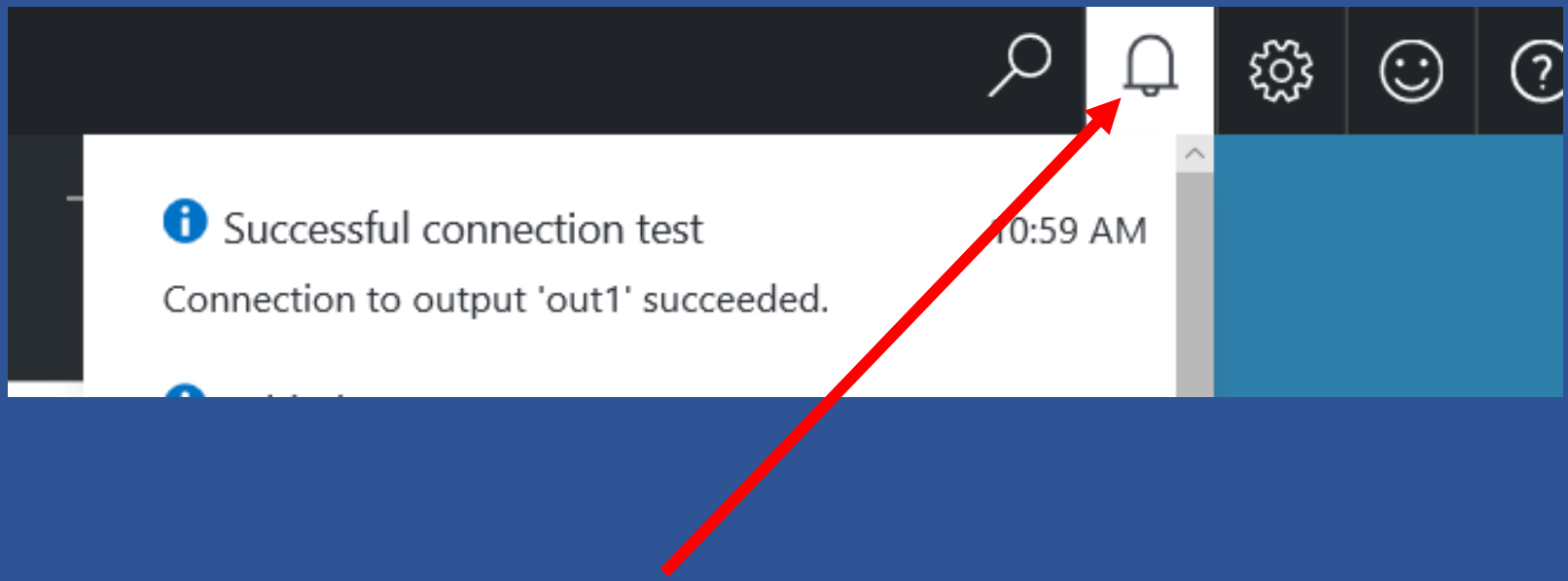
Provide Power BI credential



Enter Dataset Name / Table Name / Create

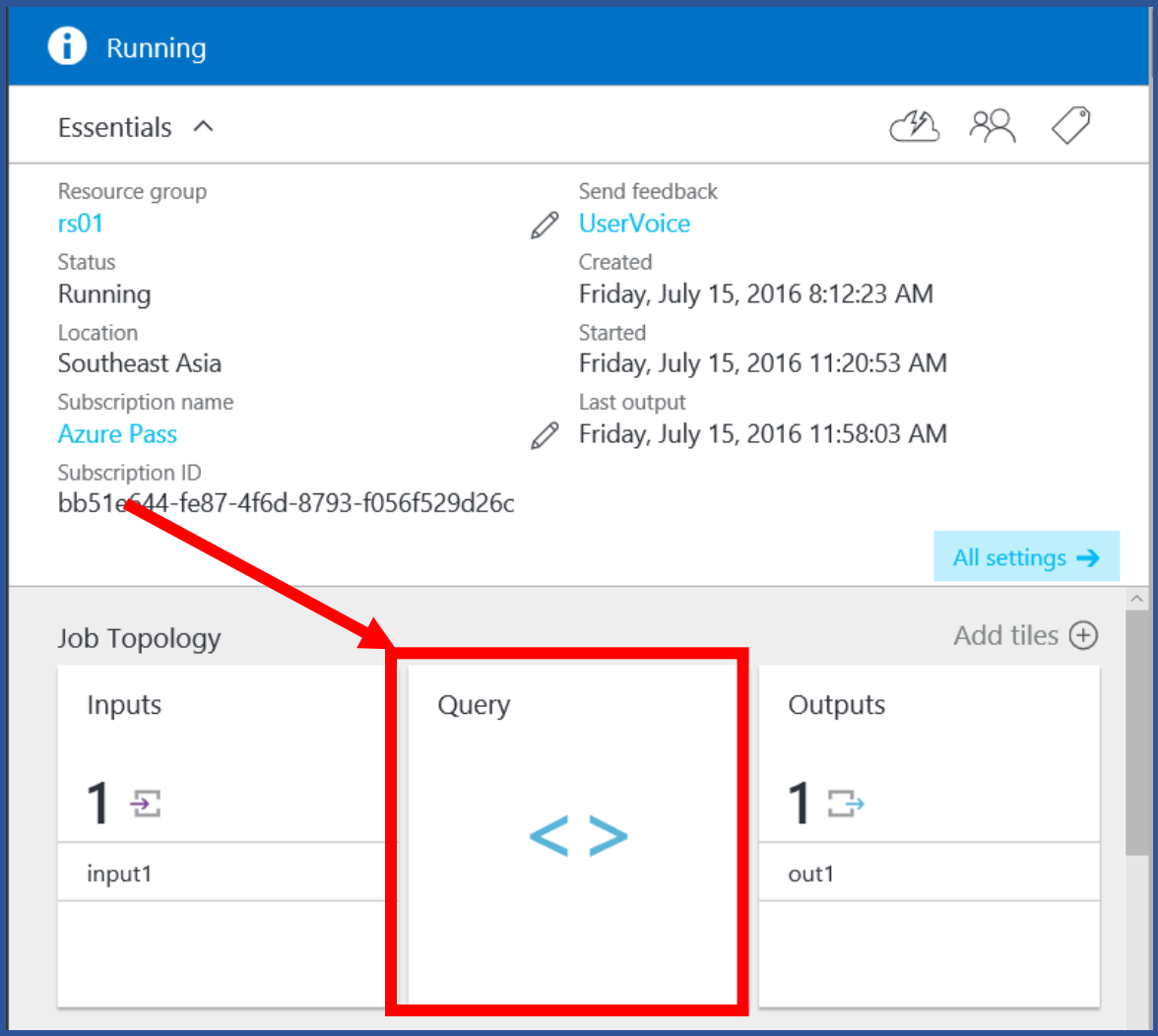


Look for Successful message

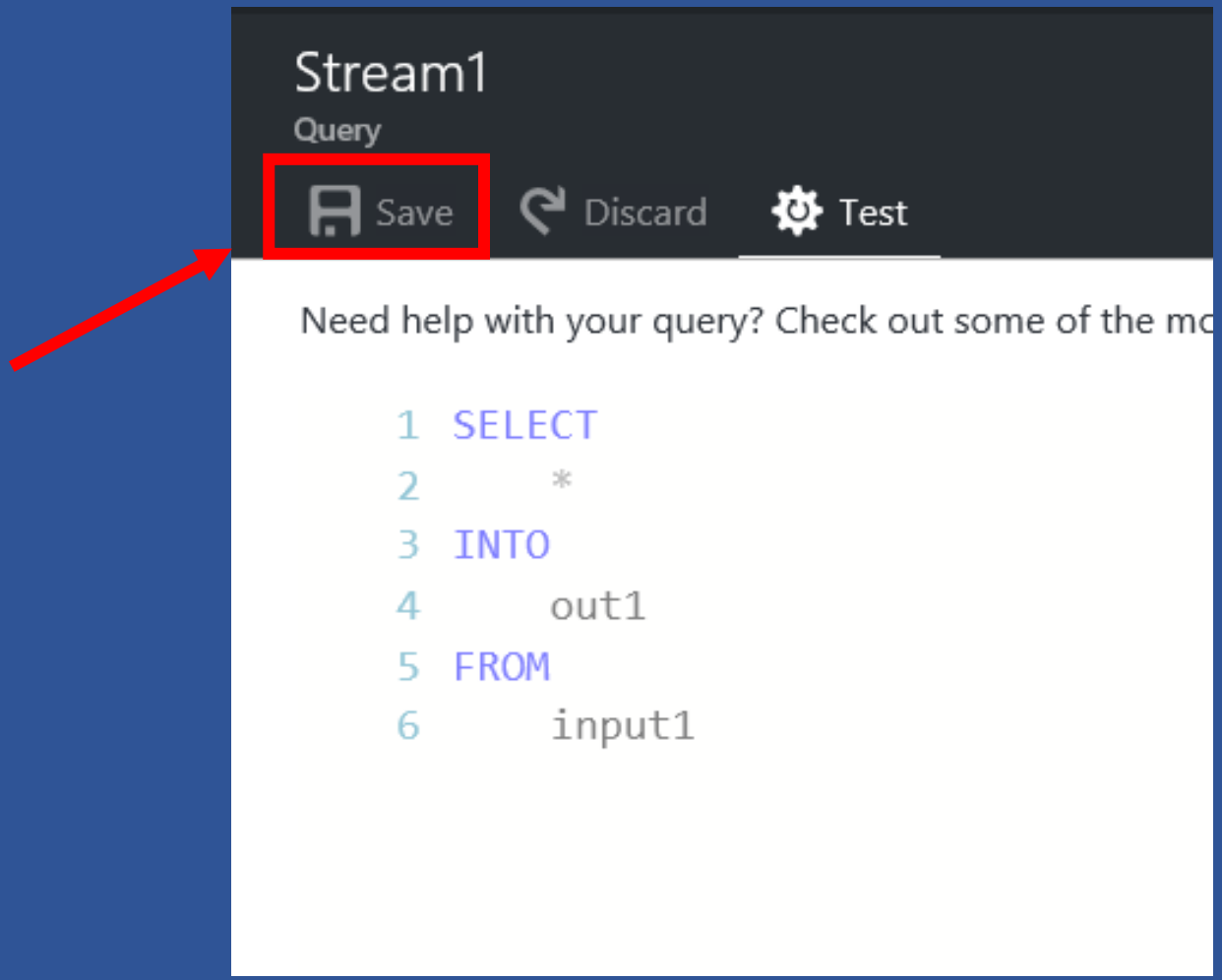


Create Stream Analytics Job query

Click Query

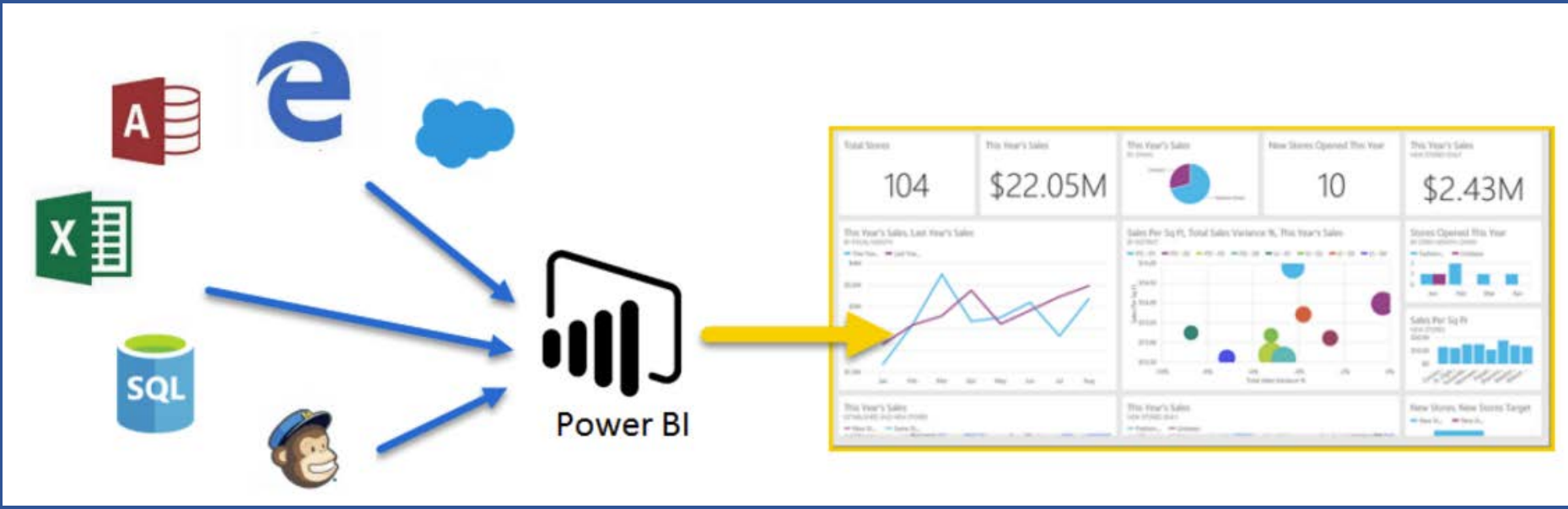


Enter the Query and save



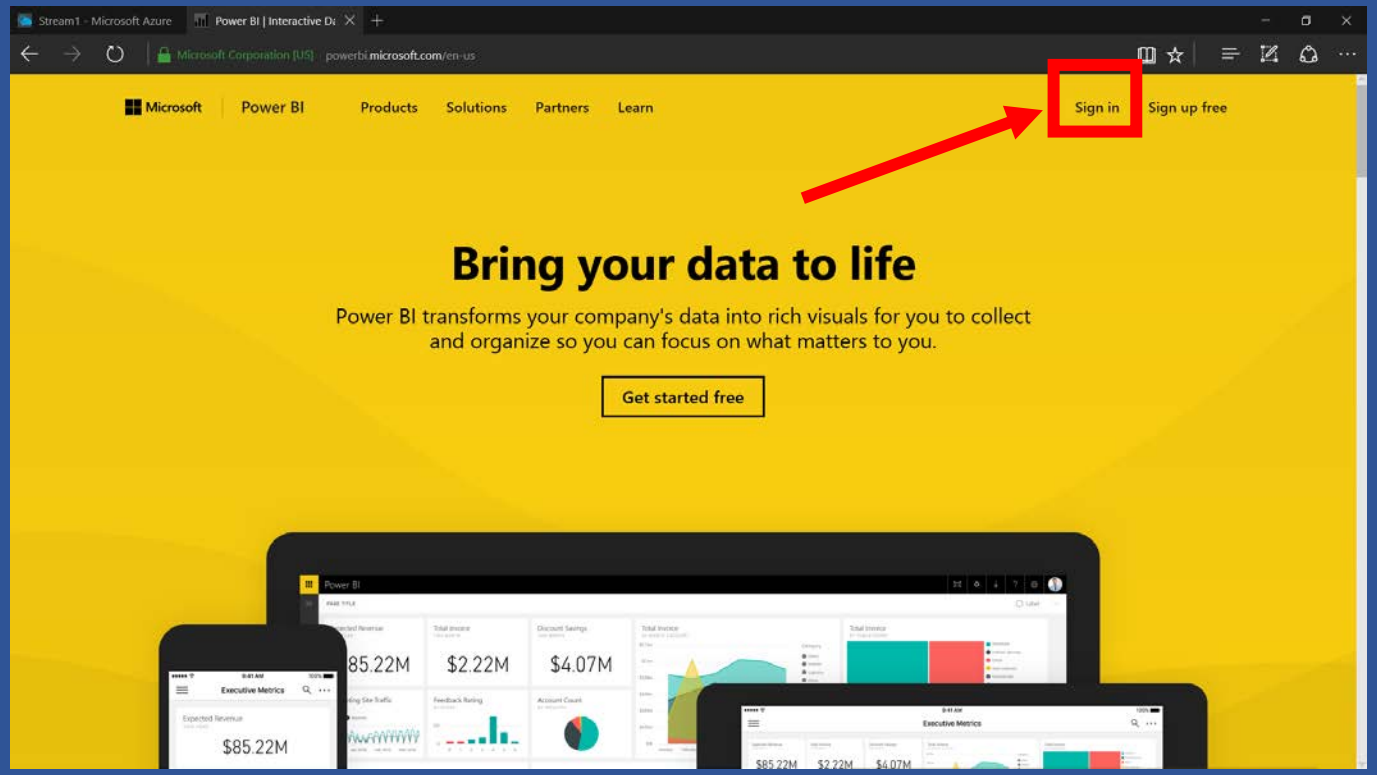
What is Microsoft Power BI?

- A collection of software services, apps, and connectors
- Turn unrelated sources of data into interactive insights.
- Easily connect to data sources
- Visualize
- Share with anyone
- Simple and fast
- Robust and enterprise-grade
- Real-time analytics

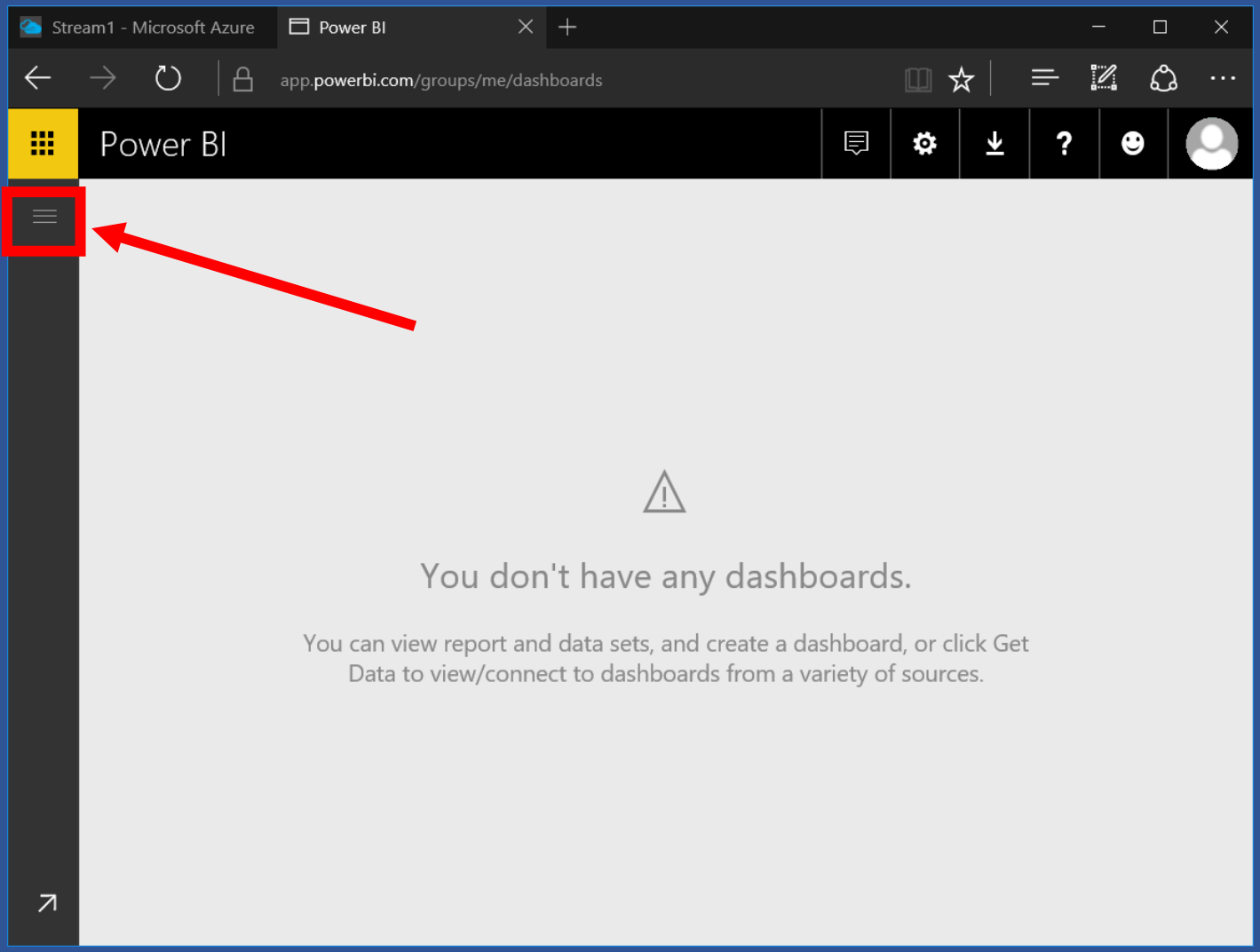


Create simple IoT data visualization in Power BI

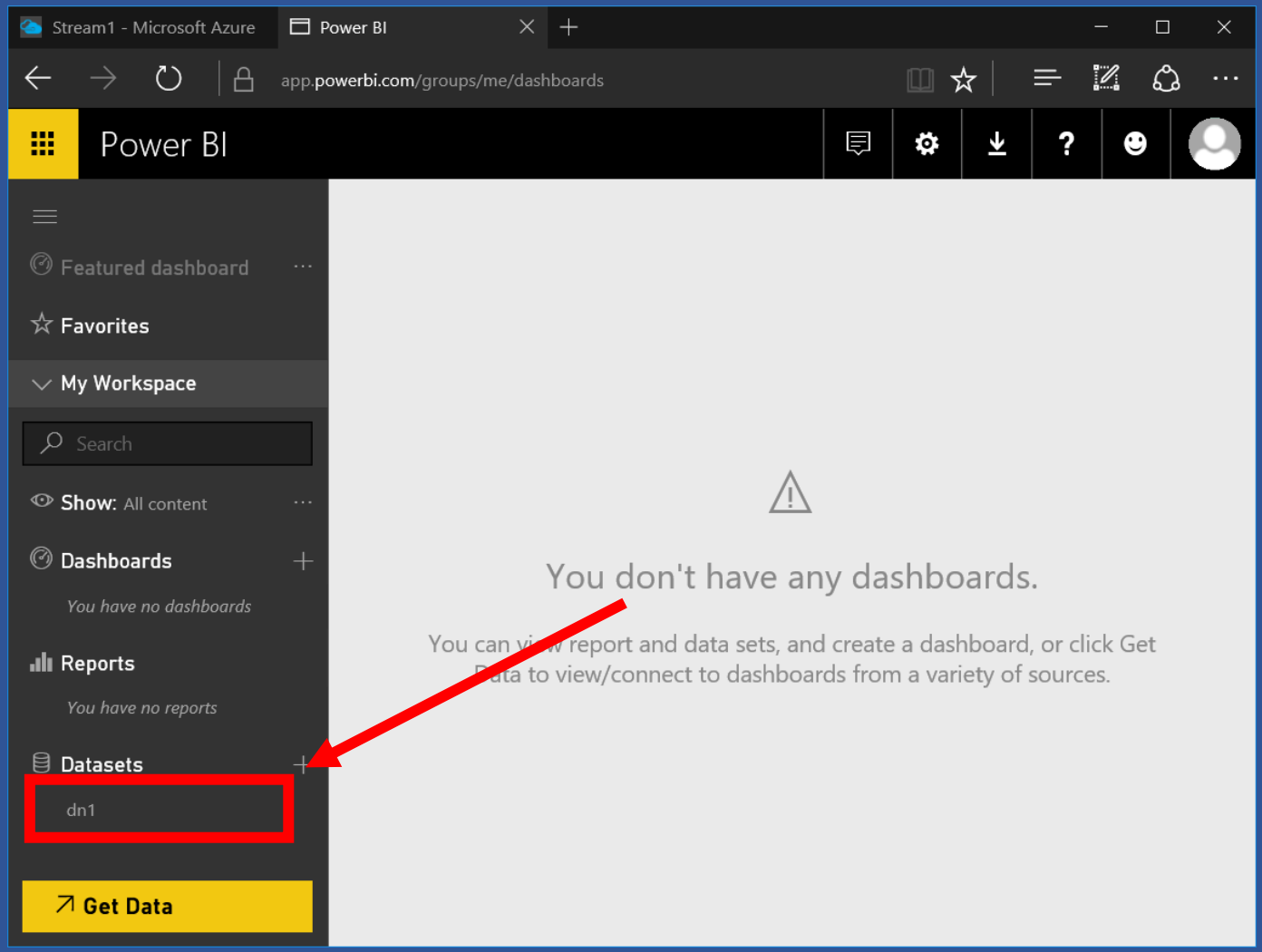
Go to Microsoft Power BI page https://powerbi.microsoft.com/en-us/



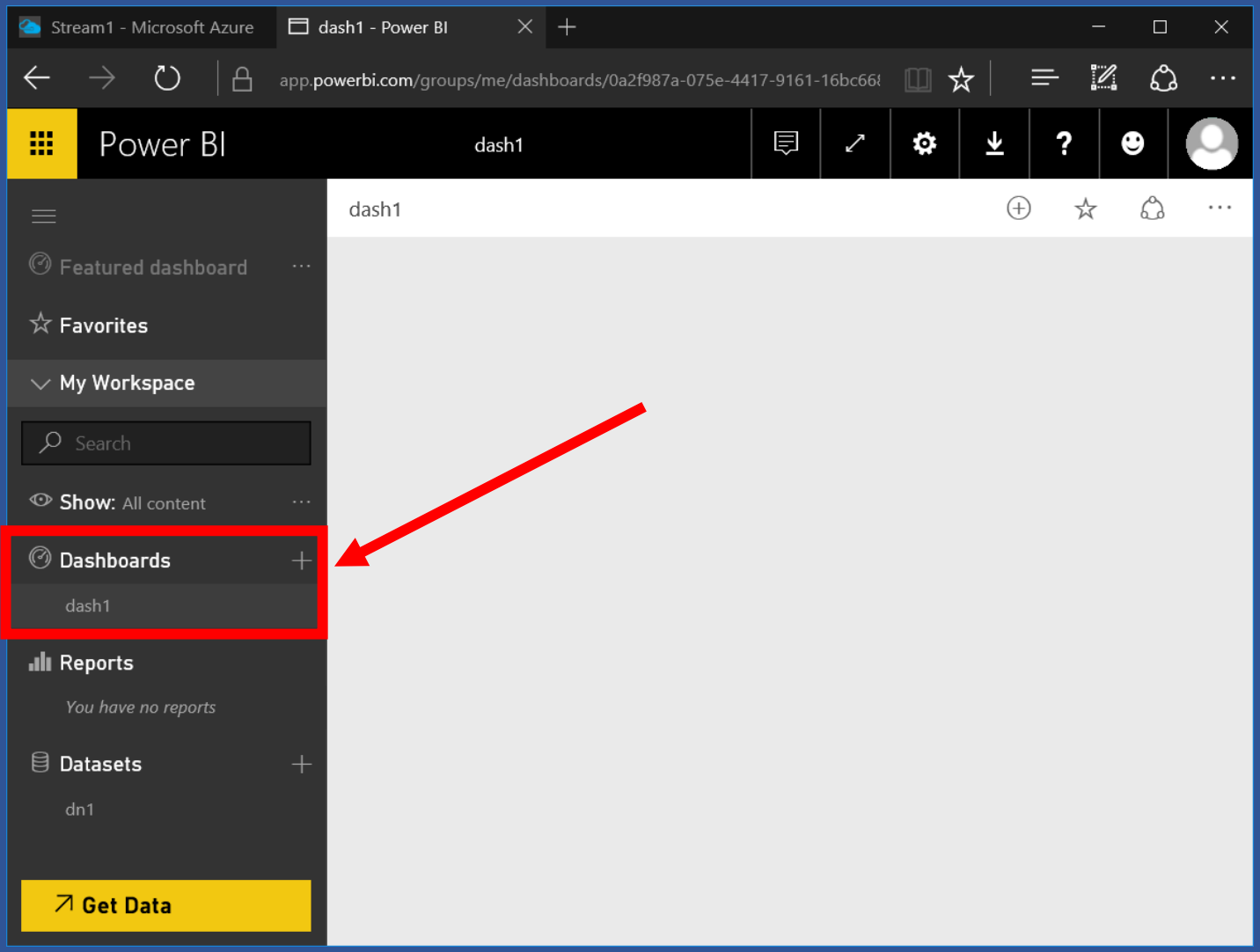
Click menu button to show Jumpbar



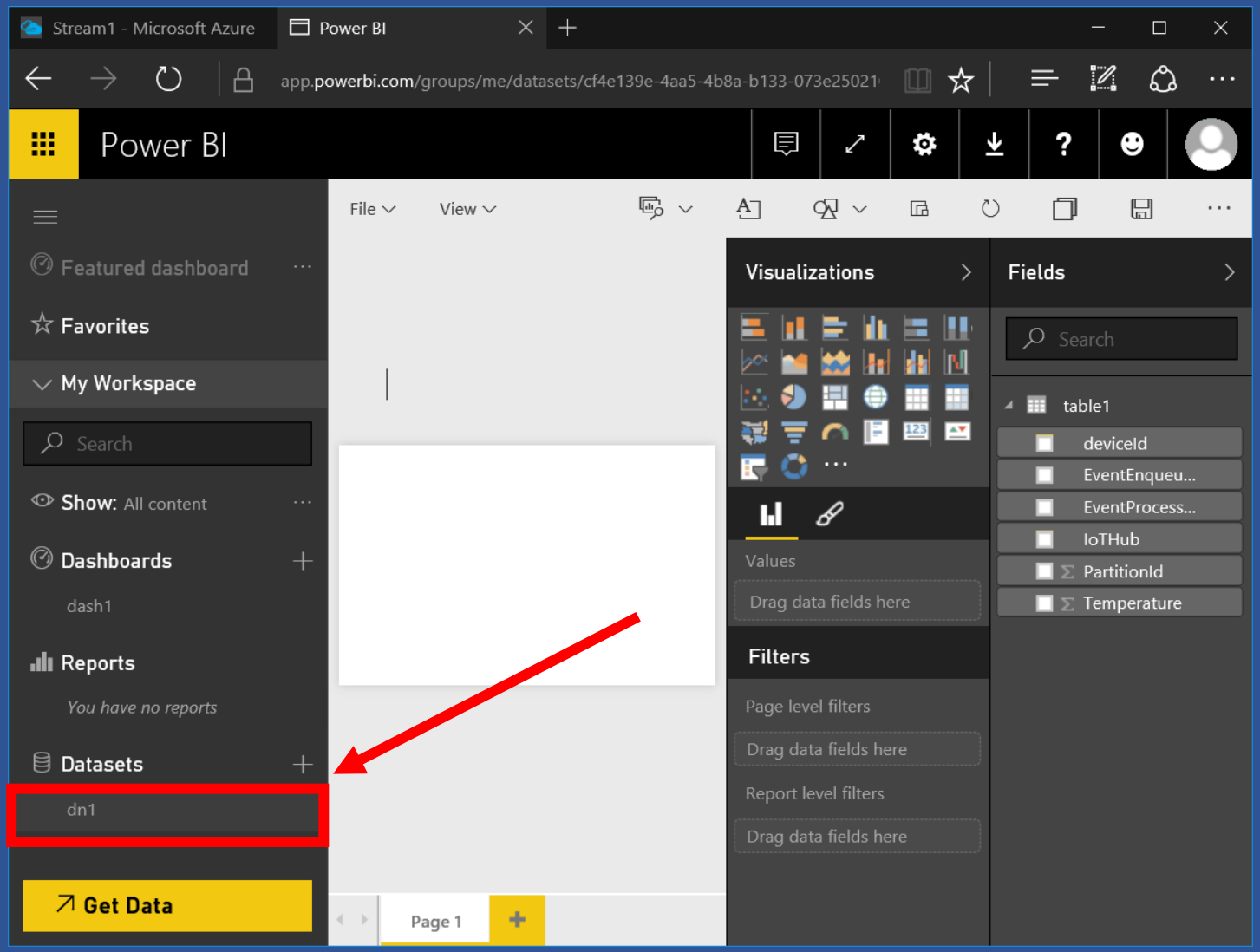
Note the Dataset



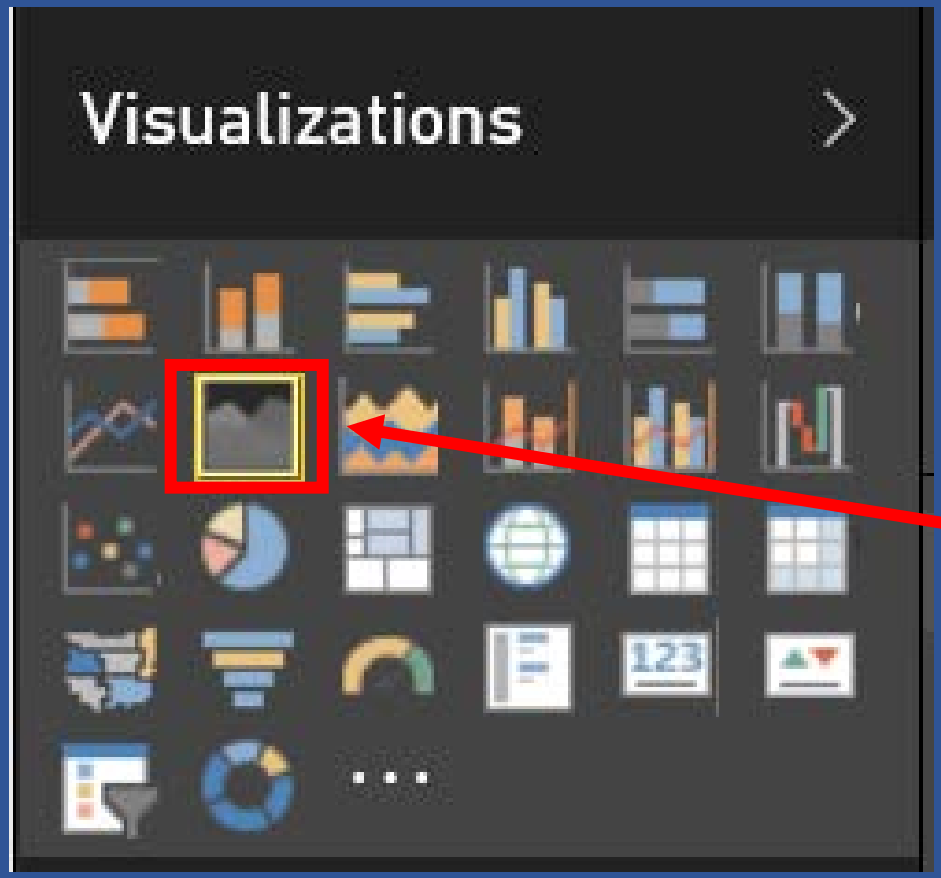
Create new Dashboard



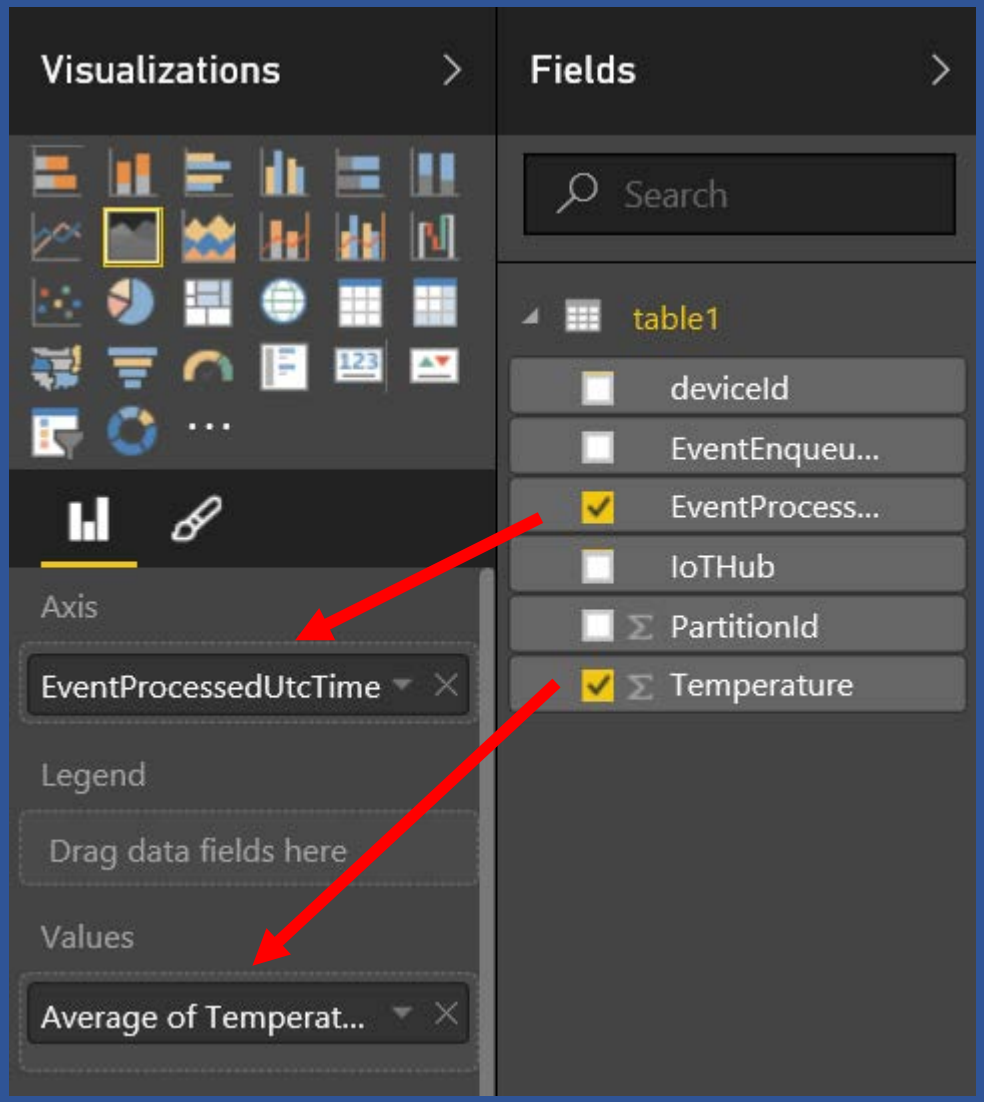
Click Dataset Name



Select Area chart

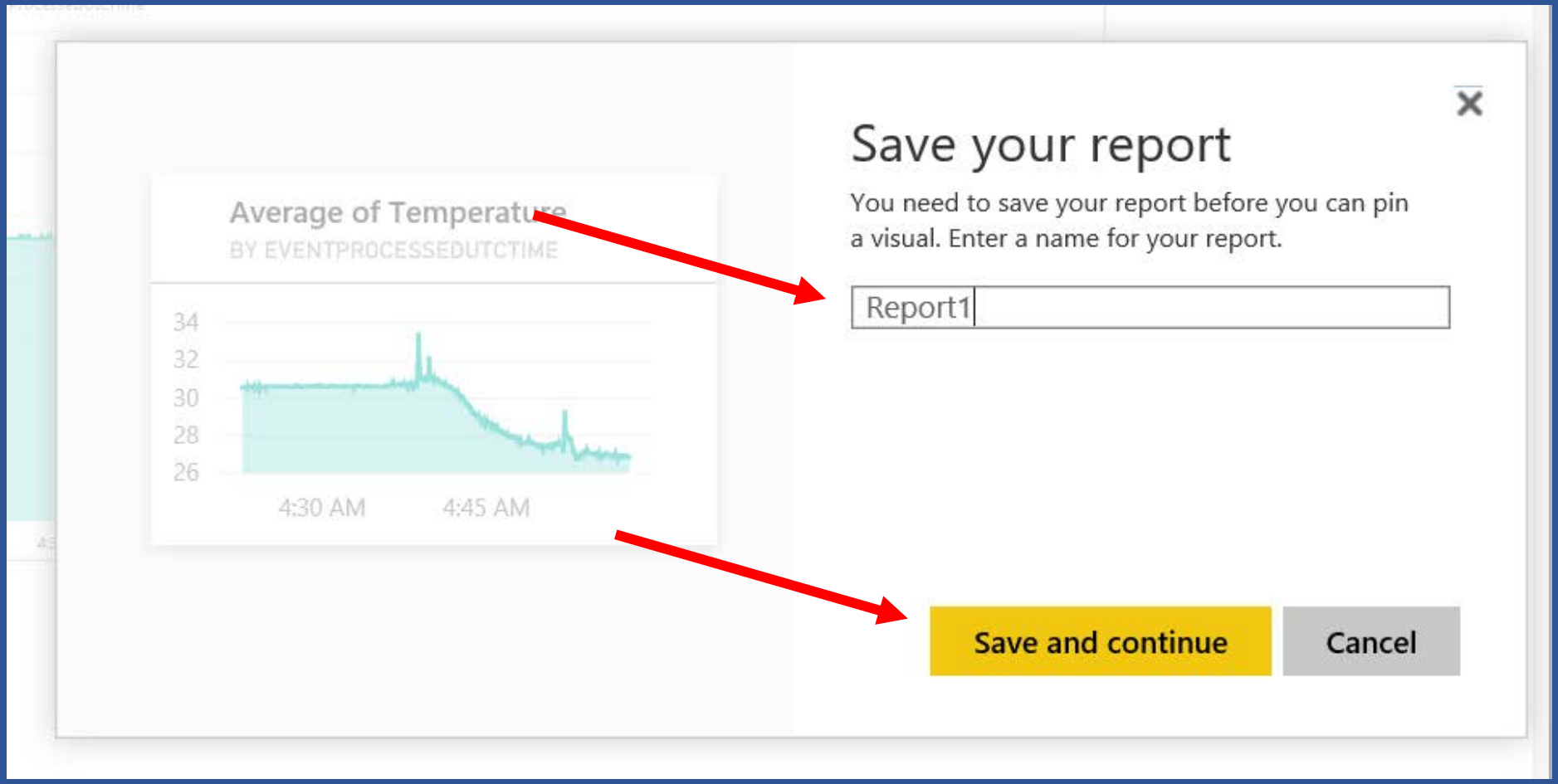


Set Axis / Value

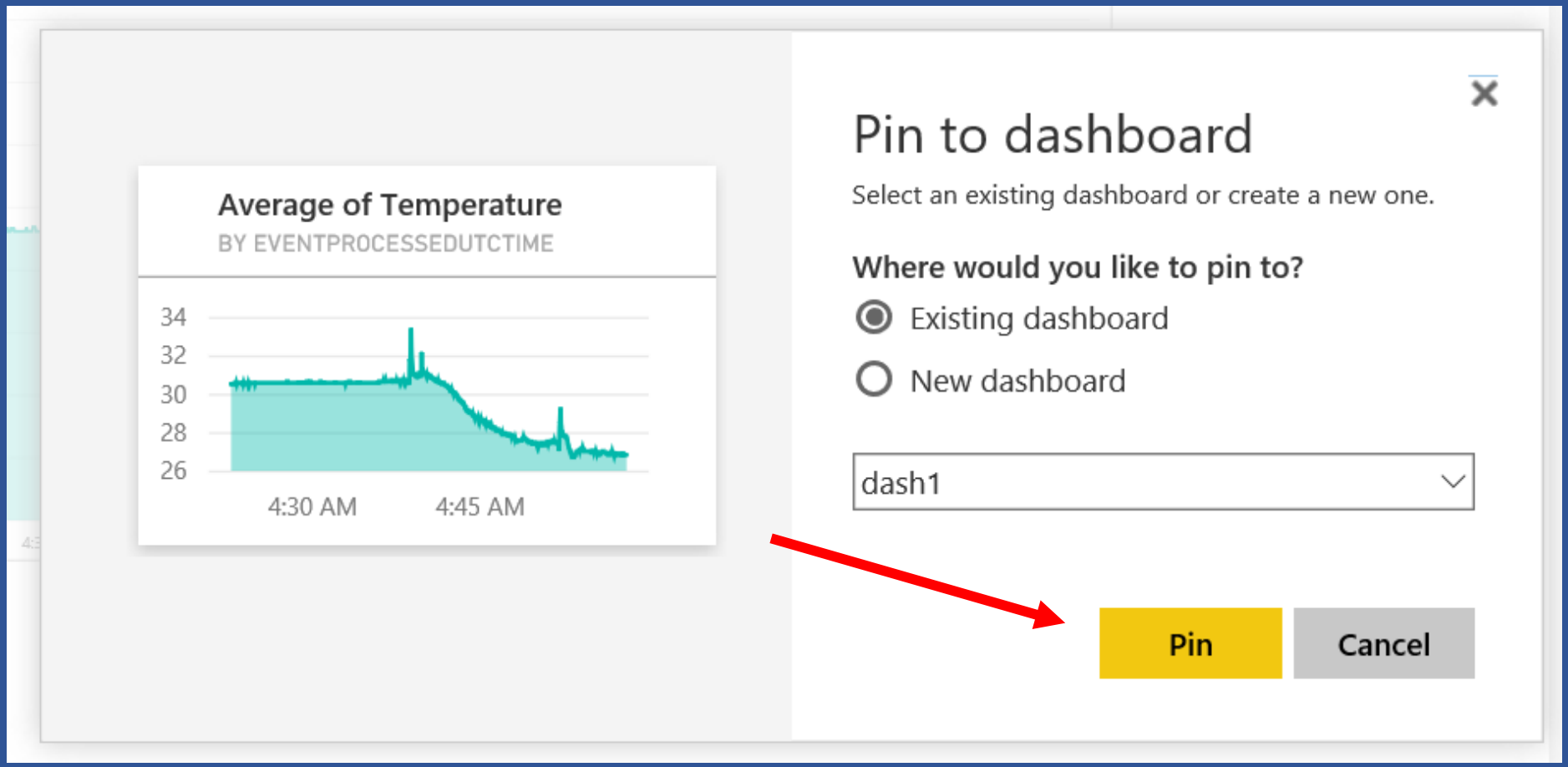


Adjust chart size and pin to Dashboard

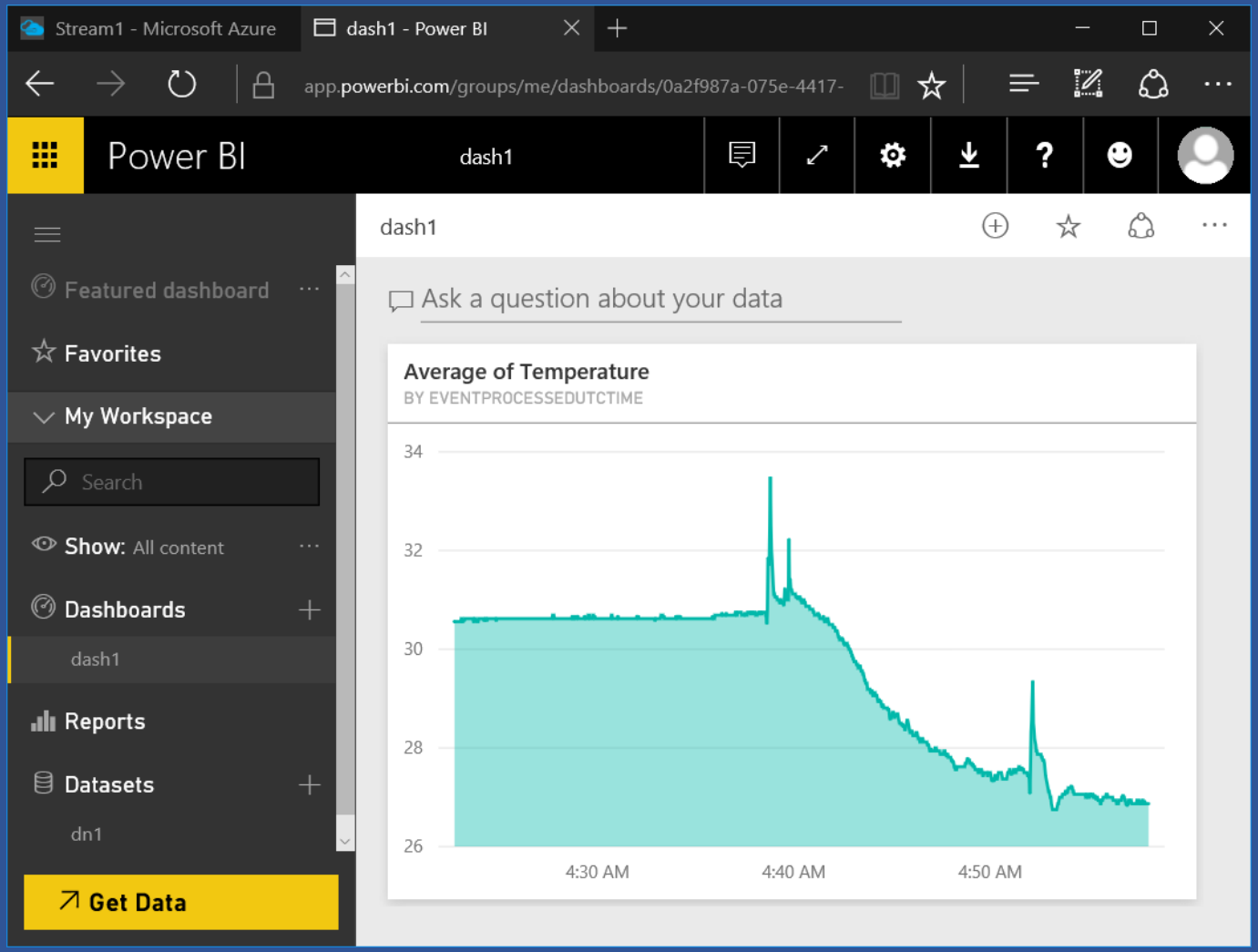
Specify report name and save



Select dashboard to pin



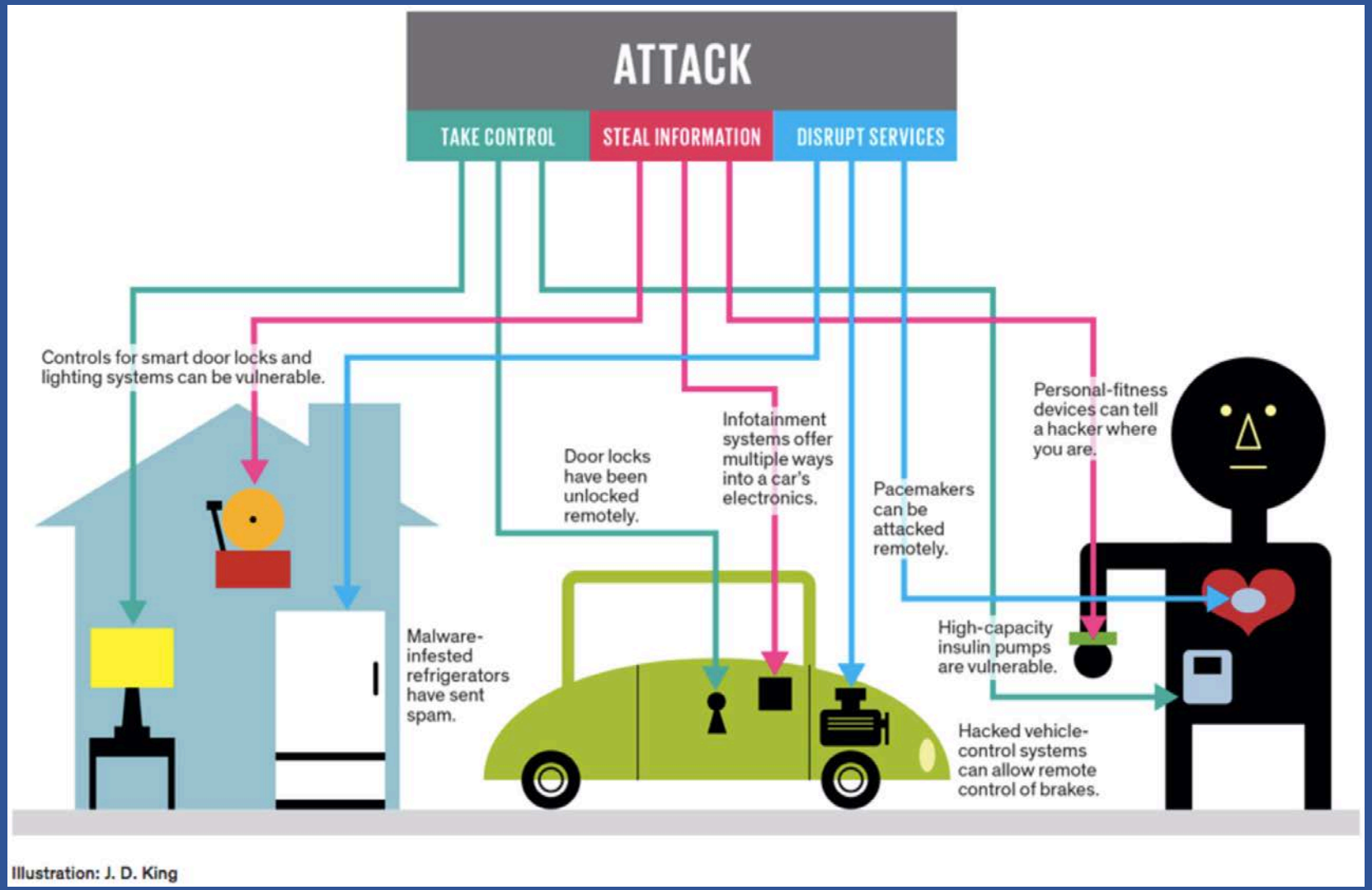
View dashboard



More on Stream Data Analytics

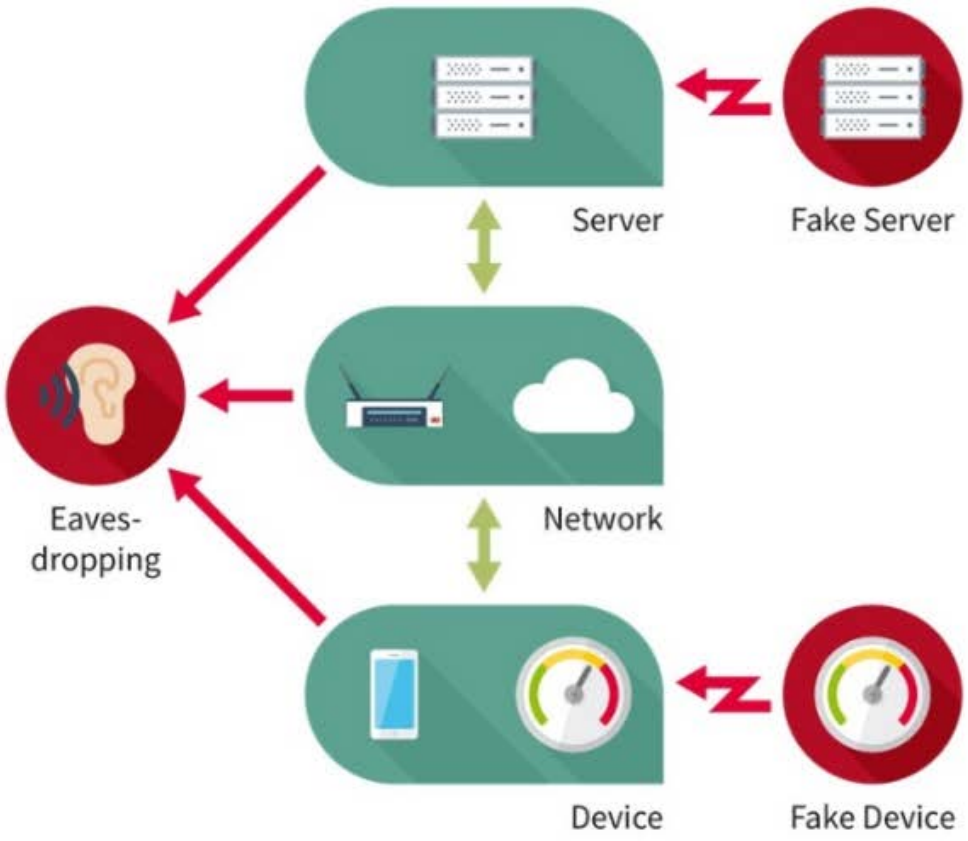
- https://powerbi.microsoft.com/en-us/guided-learning/
- https://azure.microsoft.com/en-us/services/stream-analytics/
- https://azure.microsoft.com/en-us/documentation/articles/stream-analytics-power-bi-dashboard/
- https://azure.microsoft.com/en-us/documentation/articles/iot-hub-csharp-csharp-process-d2c/

IoT Security consideration

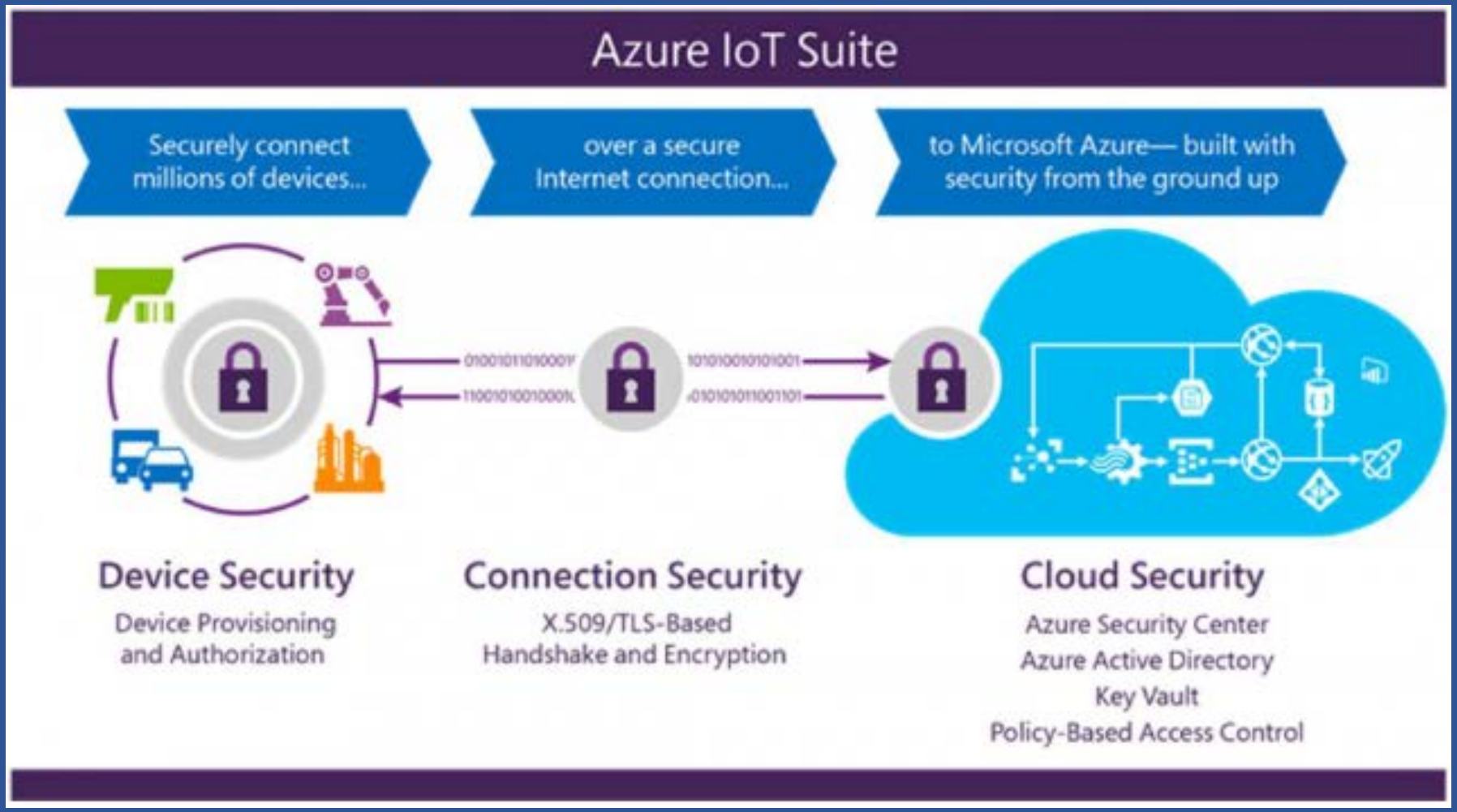


IoT Attack area

An **Eavesdropper** listening in on data or commands can reveal confidential information about the operation of the infrastructure.



A **Fake Server** sending incorrect commands can be used to trigger un-planned events, to send some physical resource (water, oil, electricity, etc.) to an unplanned destination, and so forth.

A **Fake Device** injecting fake measurements can disrupt the control processes and cause them to react inappropriately or dangerously, or can be used to mask physical attacks.*

Azure IoT Suite security features