How to Leverage Azure IoT Services for Fun and ~~Profit~~ Creating Value… *Today*!

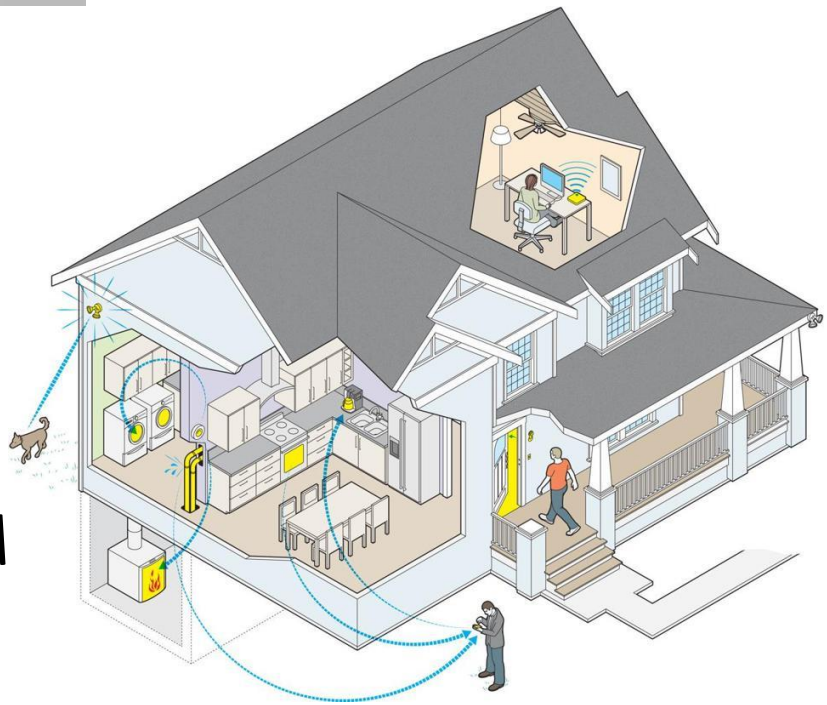
Nino Benvenuti
@ninob

What is IoT?

30 billion devices by 2020!

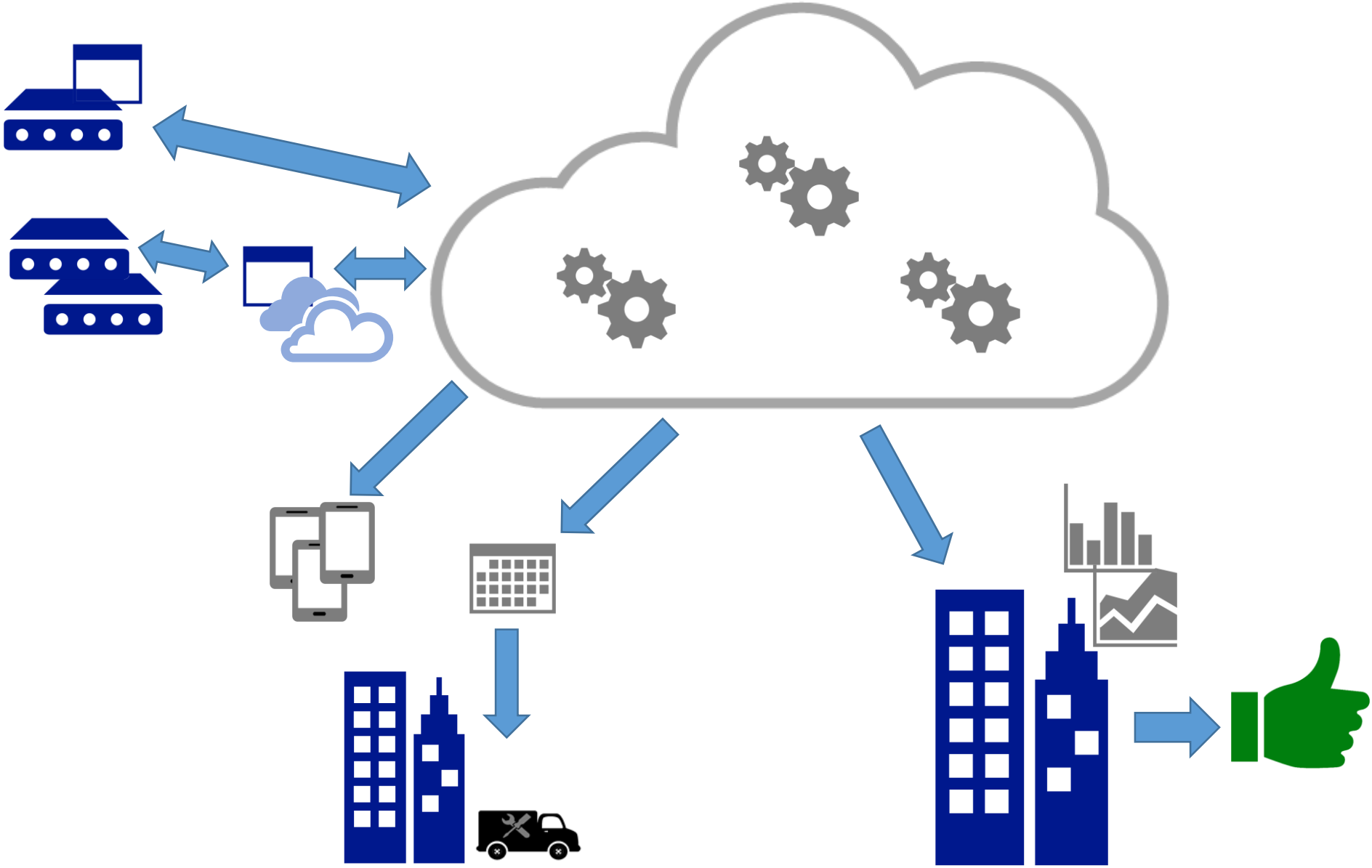
My refrigerator tells me that it's ordered more milk because I am almost out

The lawn mower walks the dog and tweets me when it's done!



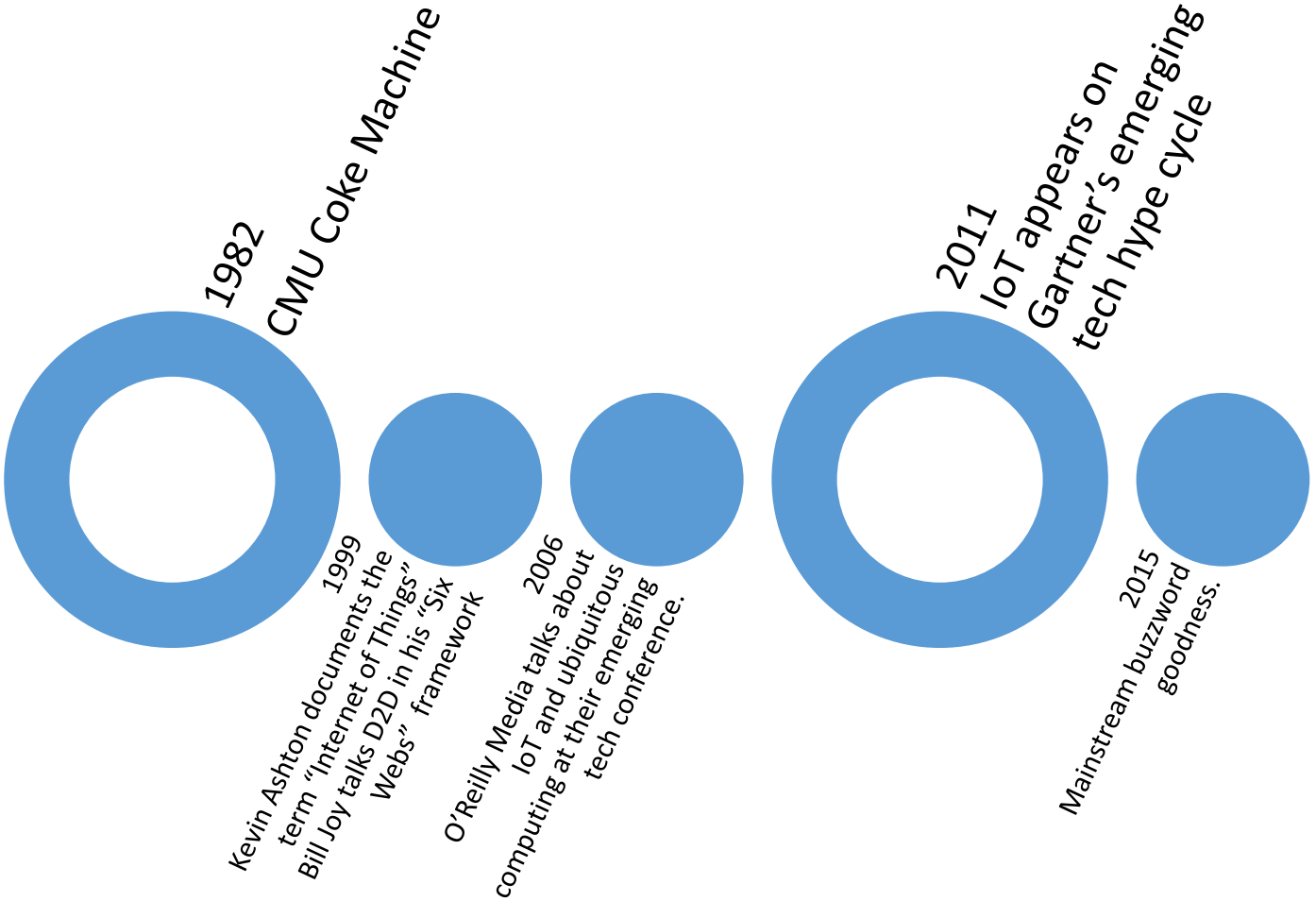
So… that IoT thing. What is it, really?

- Collecting information from a multitude of devices
- Merging perspectives between devices, systems, and humans to build a better understanding of the world
- Tying together insight with action, *the* promise of IoT.



History of IoT

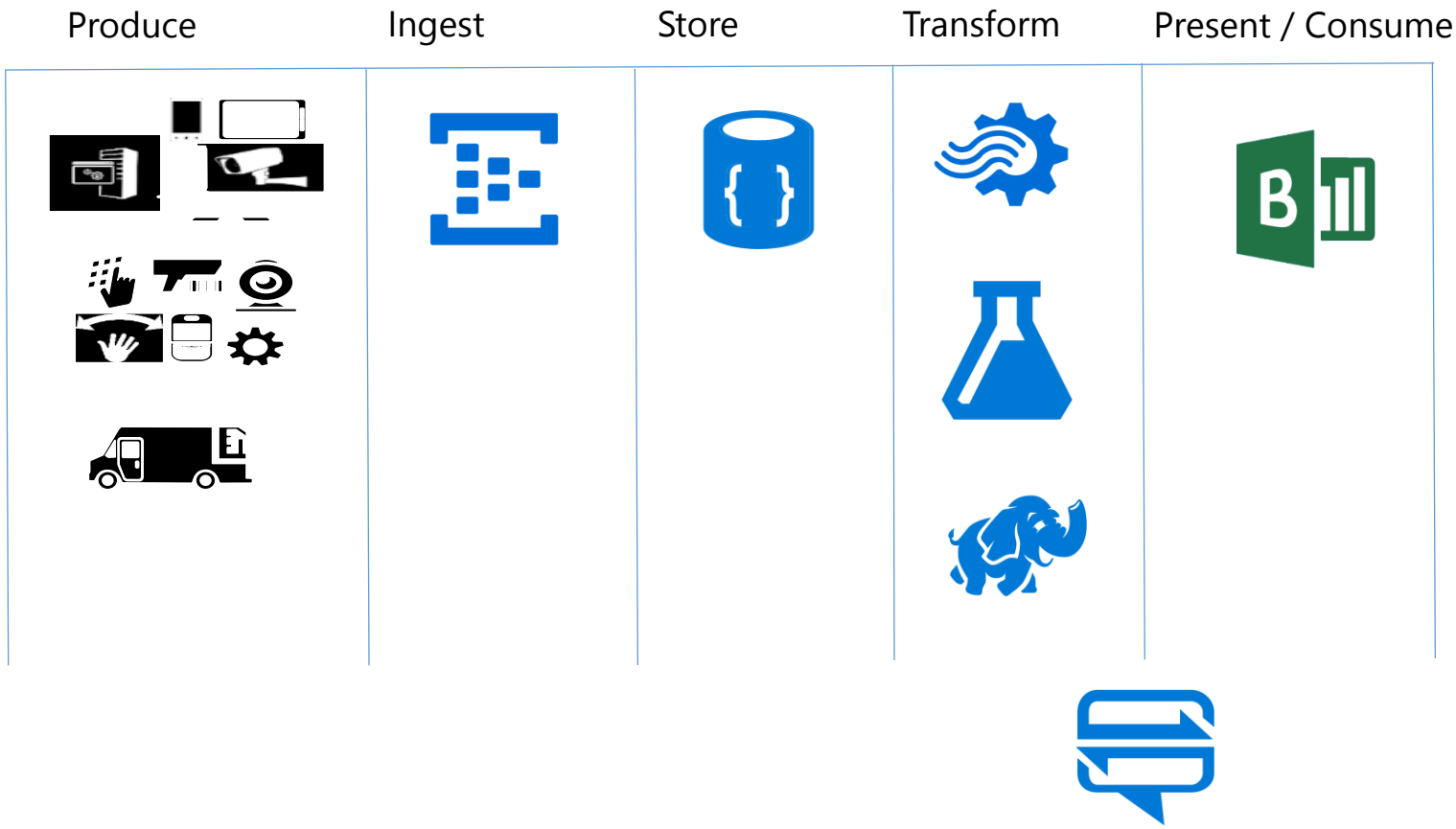
IoT History

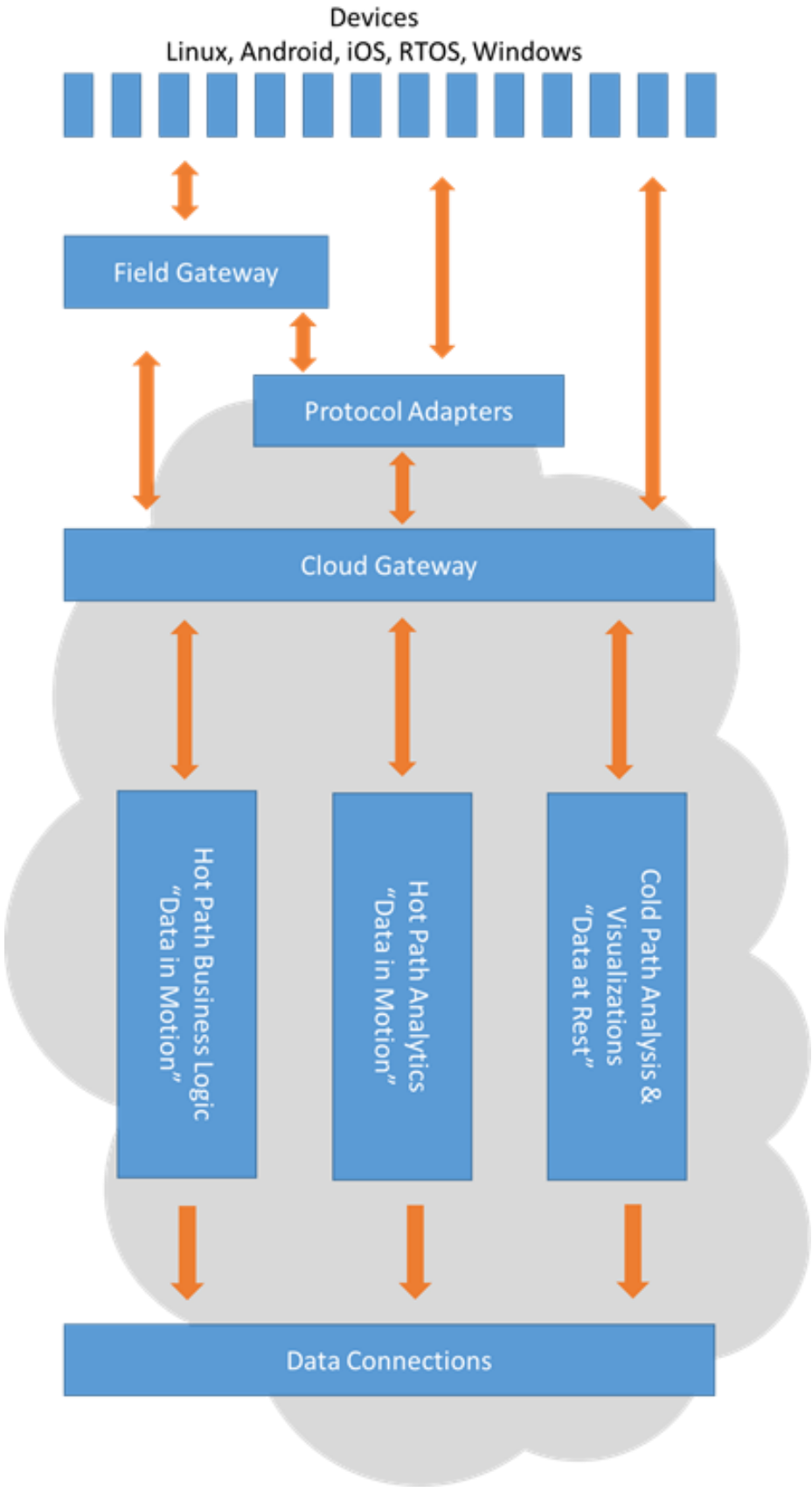

1982
CMU Coke Machine
1999
Kevin Ashton documents the term "Internet of Things"
Bill Joy talks D2D in his "Six Webs" framework
2006
O'Reilly Media talks about IoT and ubiquitous computing at their emerging tech conference.
2011
IoT appears on Gartner's emerging tech hype cycle
2015
Mainstream buzzword goodness.

IoT Value

Credit: GE Aviation

Microsoft Azure IoT Services




Devices
Linux, Android, iOS, RTOS, Windows
Field Gateway
Protocol Adapters
Cloud Gateway
Hot Path Business Logic
"Data in Motion"
Hot Path Analytics
"Data in Motion"
Cold Path Analysis &
Visualizations
"Data at Rest"
Data Connections

Information Exchange Patterns

Telemetry

Information flowing from a device to other systems for conveying status of device and environment

Inquiries

Requests from devices looking to gather required information or asking to initiate activities

Commands

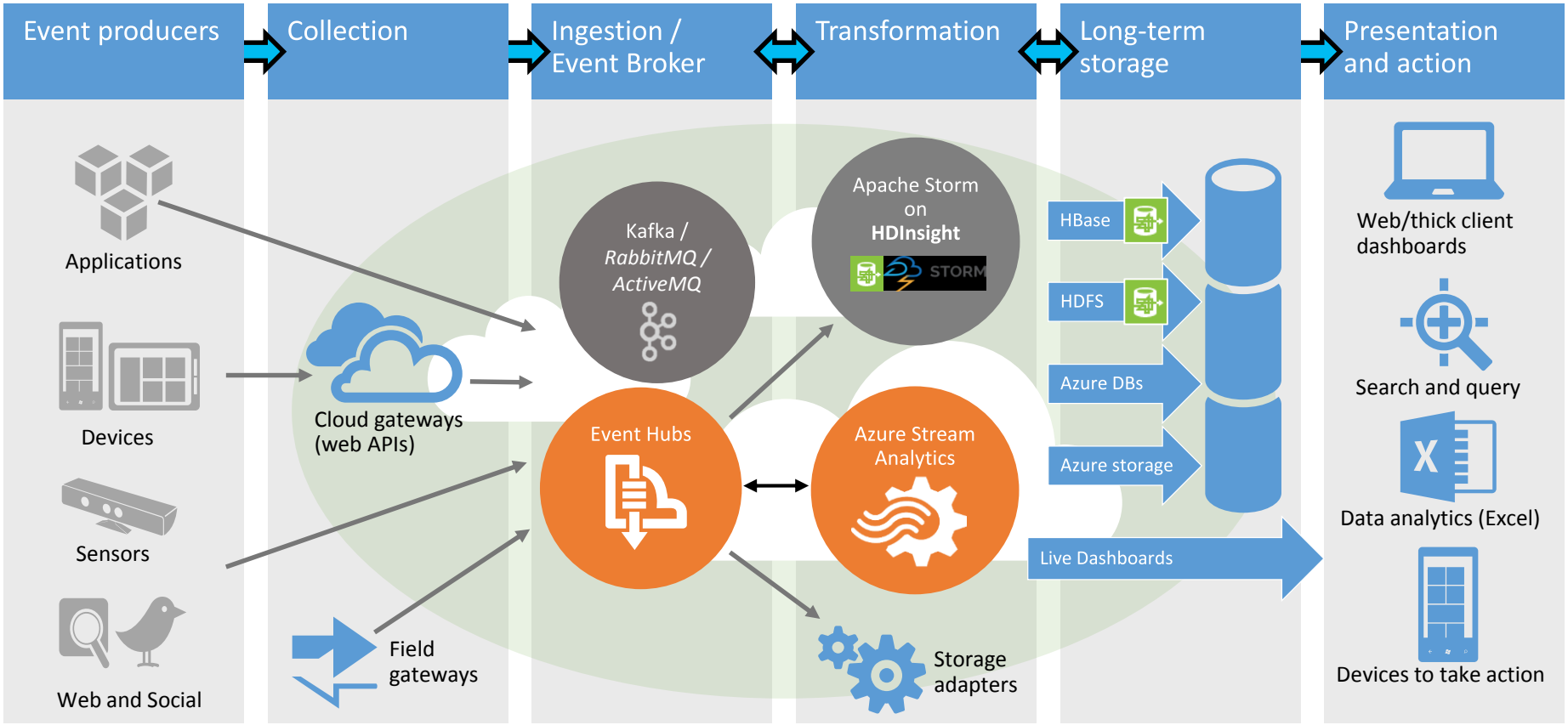
Commands from other systems to a device or a group of devices to perform specific activities

Notifications

Information flowing from other systems to a device (-group) for conveying status changes in the rest of the world

Slide content via Microsoft

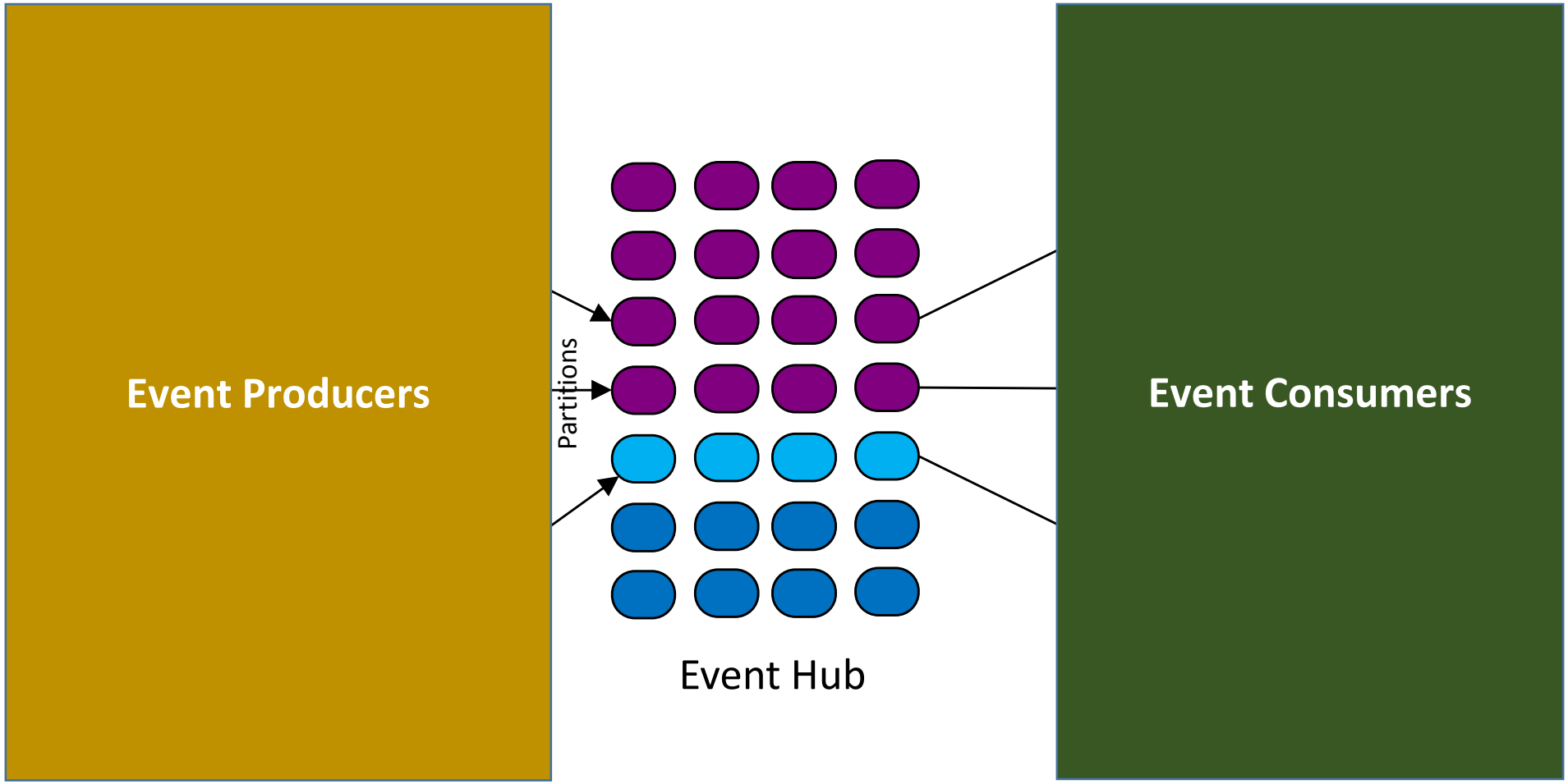
IoT Data Flow



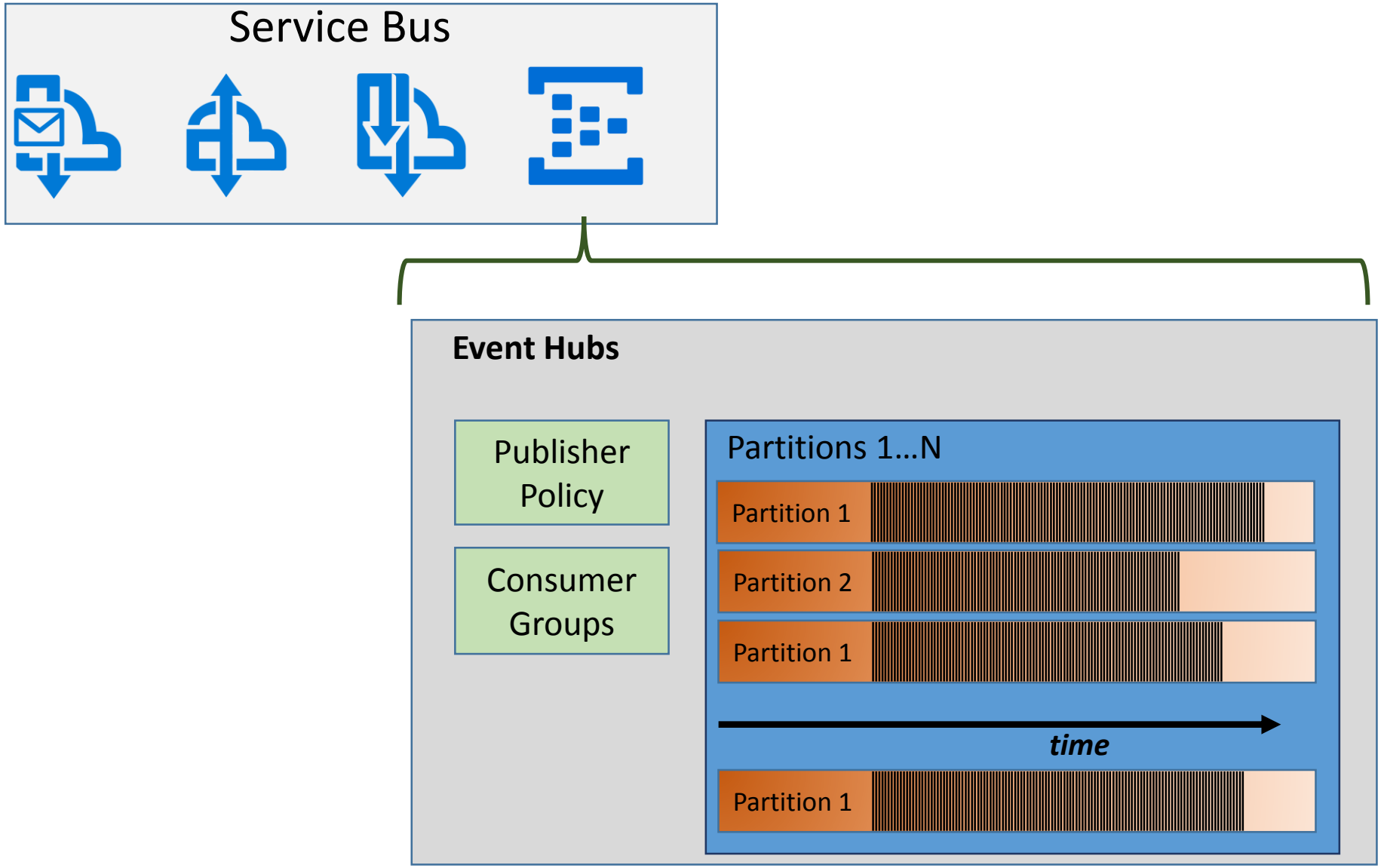
Slide content via Microsoft

Event Hubs

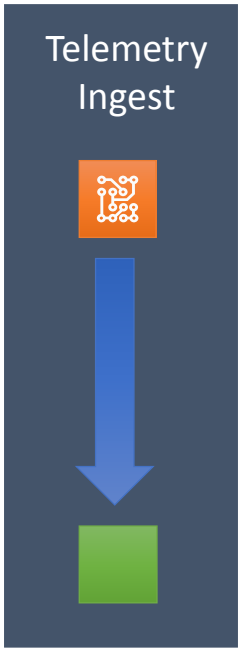
Event broker to enable the collection of event streams at high throughput, from a diverse set of devices and services



Ingress 1 MB/s | 1K events/s | 2MB Egress/TU


Service Bus
Event Hubs
Publisher Policy
Consumer Groups
Partitions 1…N
Partition 1
Partition 2
Partition 1
time
Partition 1

Communication Patterns



Let‘s do math …

2,400,000	**X**	**24**	**=**	**57,600,000**
ingests/ hour		**hour / day**		**ingests / day**

On a 24/7 basis

Dan Rosanova
@DanRosanova

Following

#Azure #EventHubs real scale... now

One BILLION Events Per Day

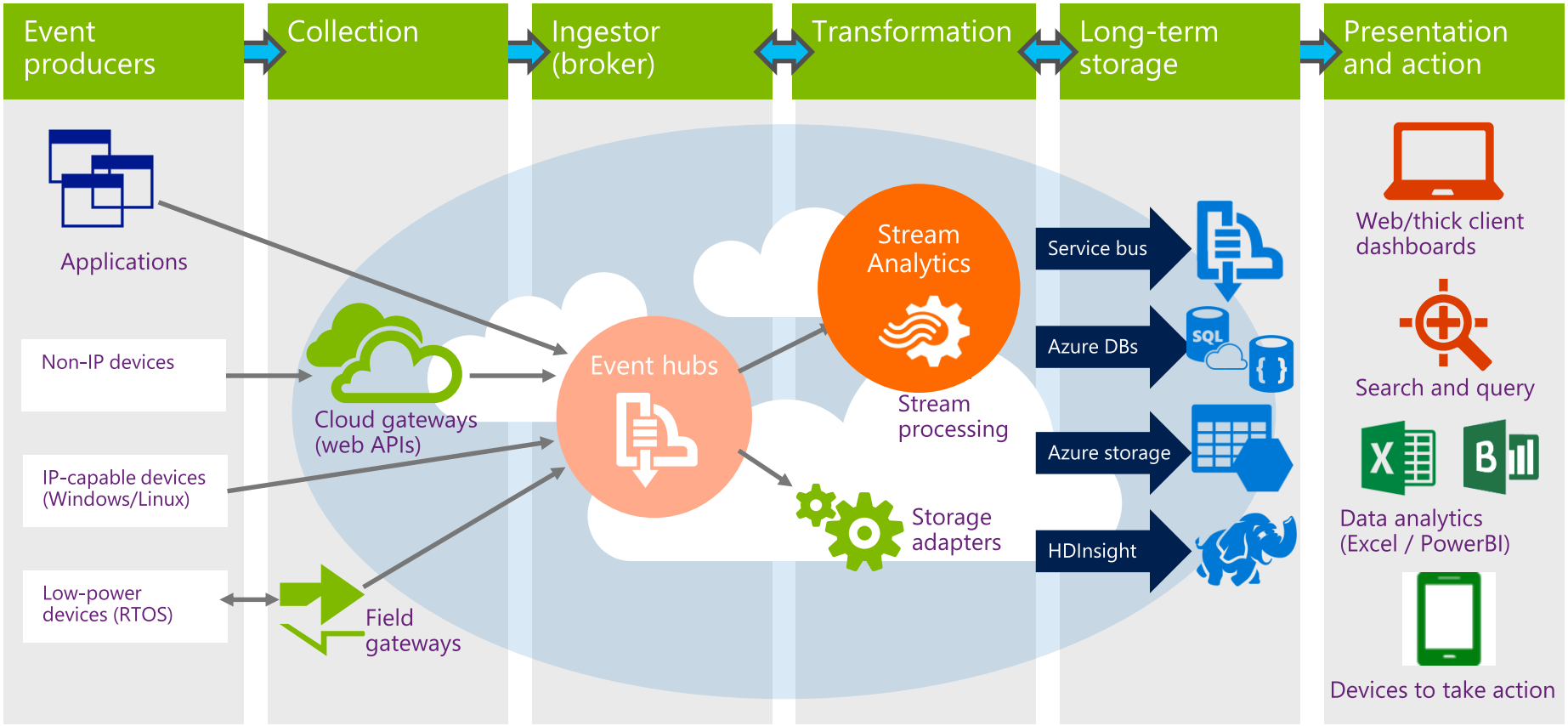
Dan Rosanova @DanRosanova · Apr 8

@michael_stephen The real boss part: it costs $37.6704 USD per day to ingress that billion events.

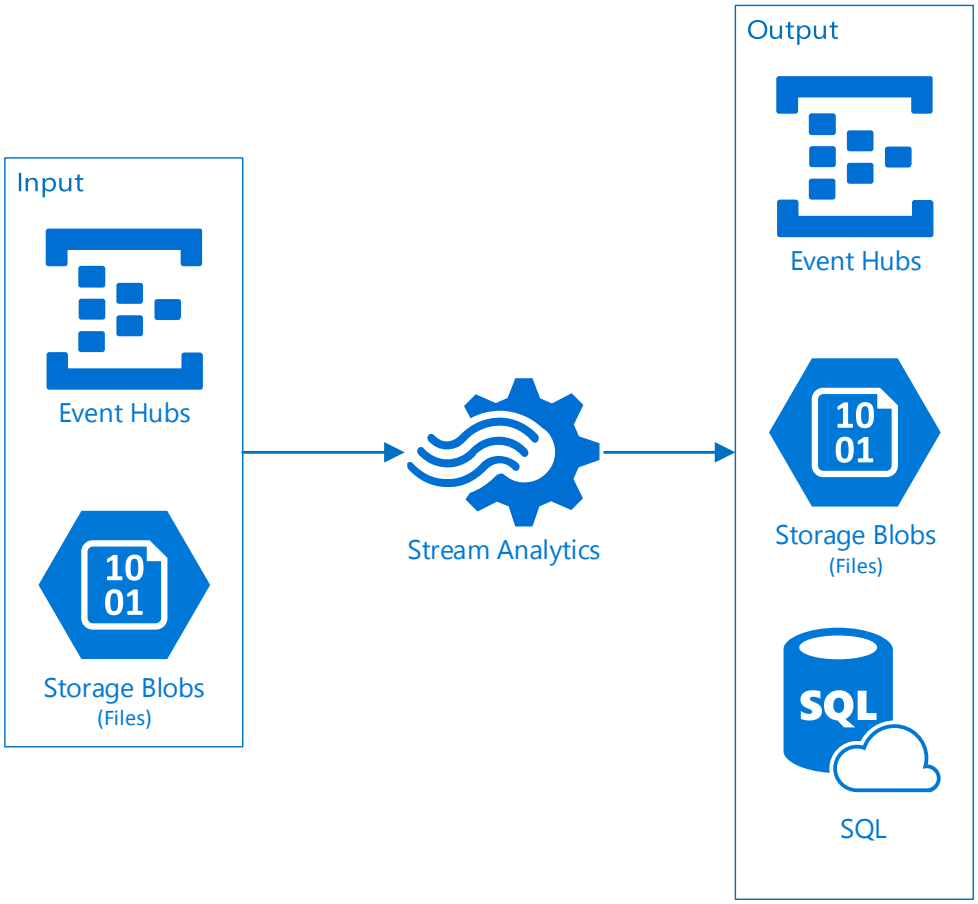
Stream Analytics

an event processing engine that helps uncover real-time insights from devices, sensors, infrastructure, applications and data

Event-Driven Scenario



Slide Credit: Microsoft



SQL Based Syntax | Windowing | Real Time | Jobs

Azure Stream Analytics

Analyze large amount of data

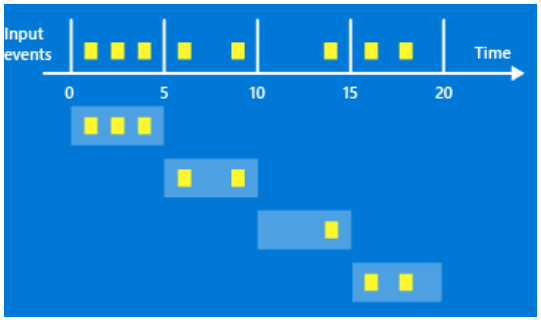
Query language similar to SQL

Can be integrated with Event Hub, Blobs, SQL

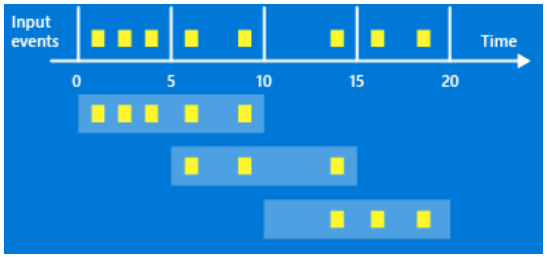
Multiple input stream with correlation support

Tumbling, Hopping, Sliding support

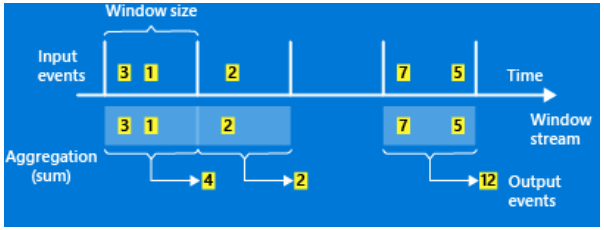
Tumbling Window



Hopping Window



Sliding Window



Projections

Show me the Controller ID and OutputPower as mW for all motors

SELECT AS FROM

1, LV70027001, 2.347
2, LV70031001, 1.399
3, LV70031003, 2.400
4, LV70031001, 2.678

Filters

Show me the Controller ID of drives operating at over 100F.

SELECT FROM WHERE

LV70027001
LV70031001

Demo

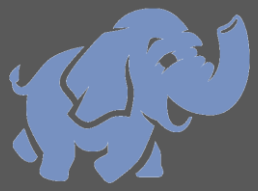
DocumentDB

A NoSQL database designed to natively support JSON and Javascript directly in the database engine.

DocumentDB

- SQL language based on Javascript type system
- UDFs, Stored Procedures
- LINQ provider
- Tunable consistency
- RESTful HTTP interface

Demo



HDInsight

Hadoop distribution powered by the cloud, scalable from terabytes to petabytes on demand.

Azure HDInsight

- Includes Hadoop technologies:
  - Ambari
  - Avro
  - Hbase
  - HDFS
  - Hive
  - Mahout
  - MapReduce / YARN
  - Oozie
  - Pig
  - Sqoop
  - Storm
  - Zookeeper

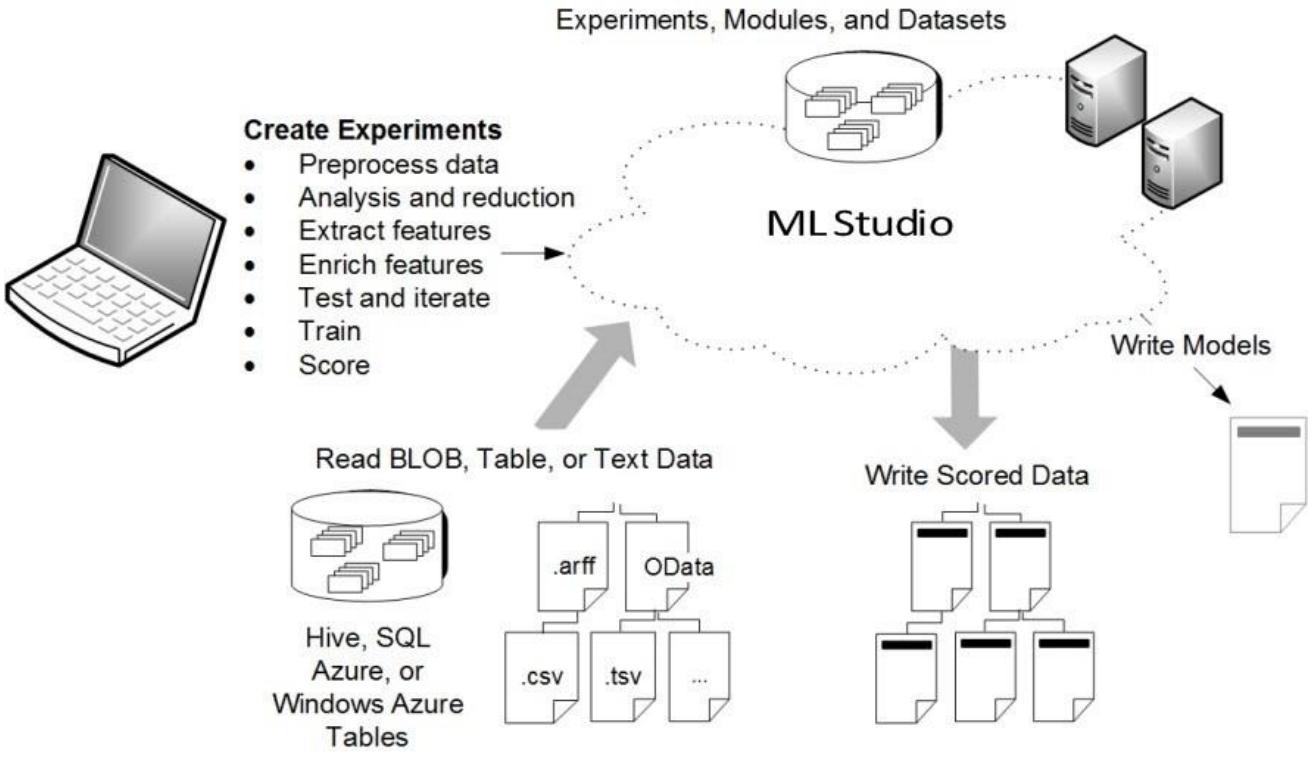
Azure HDInsight

- Develop in your favorite language: C#, Java, Python
- Scales on-demand
- Integrates with Excel
- Includes Apache Storm
- Easy integration with Azure services

Machine Learning

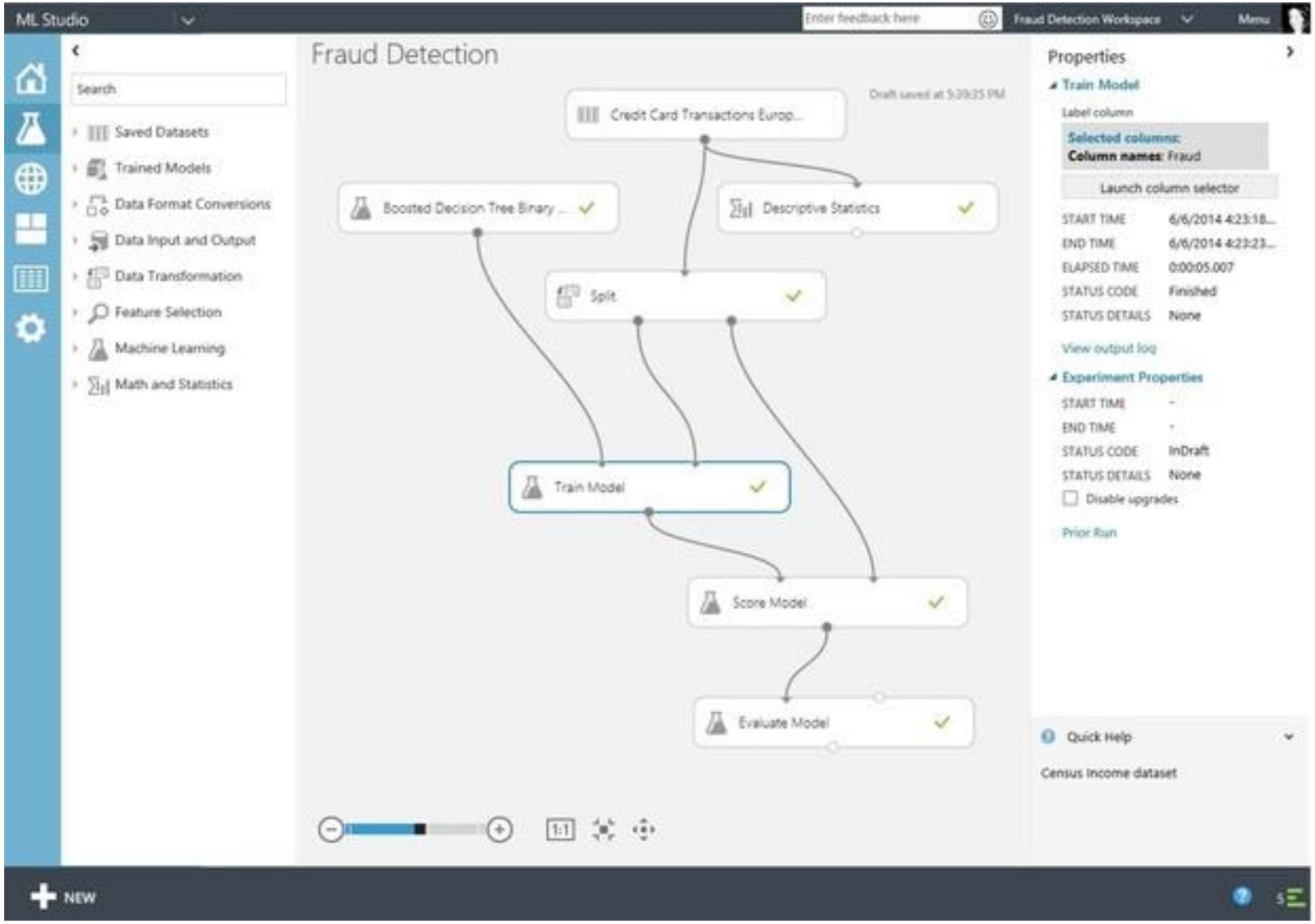
an event processing engine that helps uncover real-time insights from devices, sensors, infrastructure, applications and data

Azure Machine Learning



Easy to Train | OOB algorithms | Easy to Deploy | Extensible

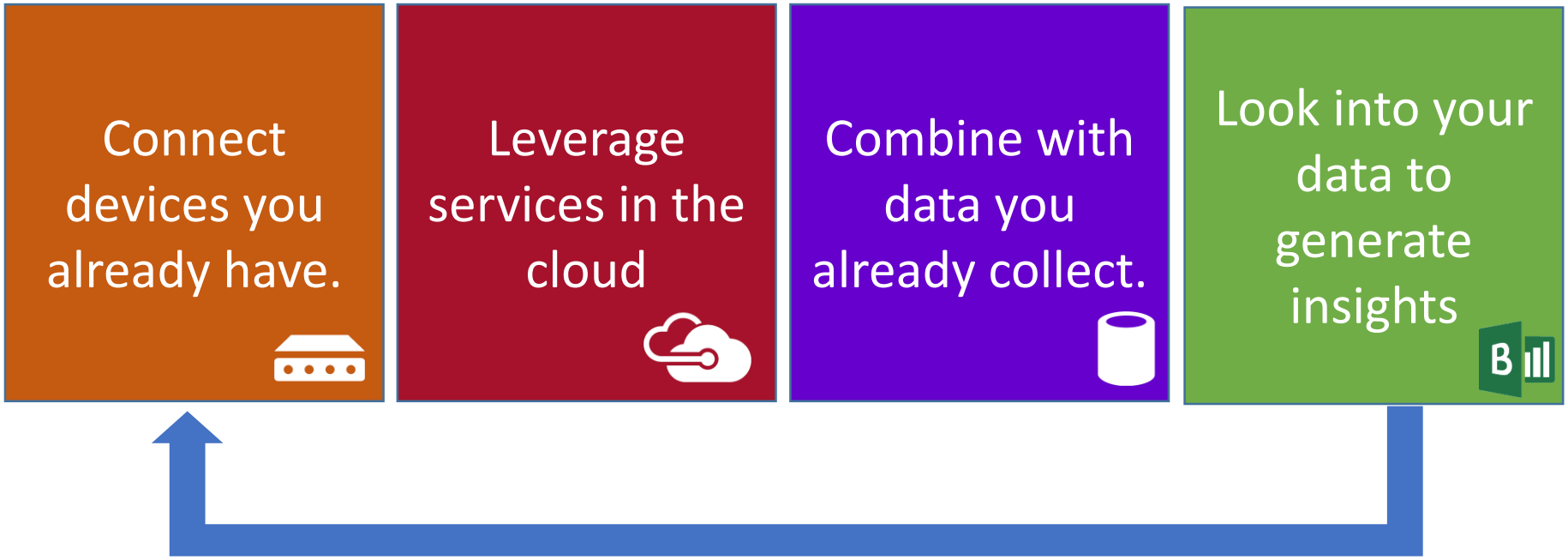
Machine Learning



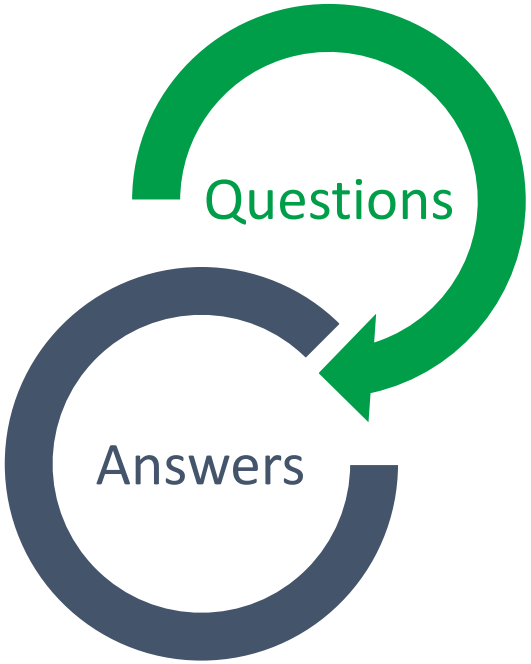
Resources

http://www.microsoft.com/InternetOfYourThings

What next?



Expand your efforts by adding new devices, new services, and new data.


Questions
Answers

Thank You!

@ninob