

Introduction to Azure IoT Suite

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#Azure, #IoT, #Cloud

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ABOUT ME



Ehsan Eskandari

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Senior .NET developer with over 15 years of experience. He's been developing desktop, mobile and web enterprise applications using Microsoft .NET Framework, SQL Server and Azure in government, banking, insurance and utility sectors.

He is co-organizer of Toronto .NET Meetup and achieved a couple of Microsoft certifications in Azure, .NET and SQL Server i.e. MCSD, MCPD, MCTS.

He's passionate about learning new technologies and sharing his experience with fellow peers in the community.

Microsoft
CERTIFIED
Solutions Developer
Azure Solutions Architect

Microsoft
CERTIFIED
Solutions Expert
Cloud Platform and Infrastructure

Microsoft
Specialist
Developing Microsoft Azure Solutions

Agenda

- What is IoT
- IoT Messaging and Gateways
- Azure IoT Suite
- Demo
- Resources

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- What is IoT?
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What is IoT?

The network of physical objects that contain embedded technology to communicate and interact with their internal states or the external environment.

Source: Gartner



What is IoT?

Things



Connectivity



Data

10101
01010
00100

Analytics



IoT

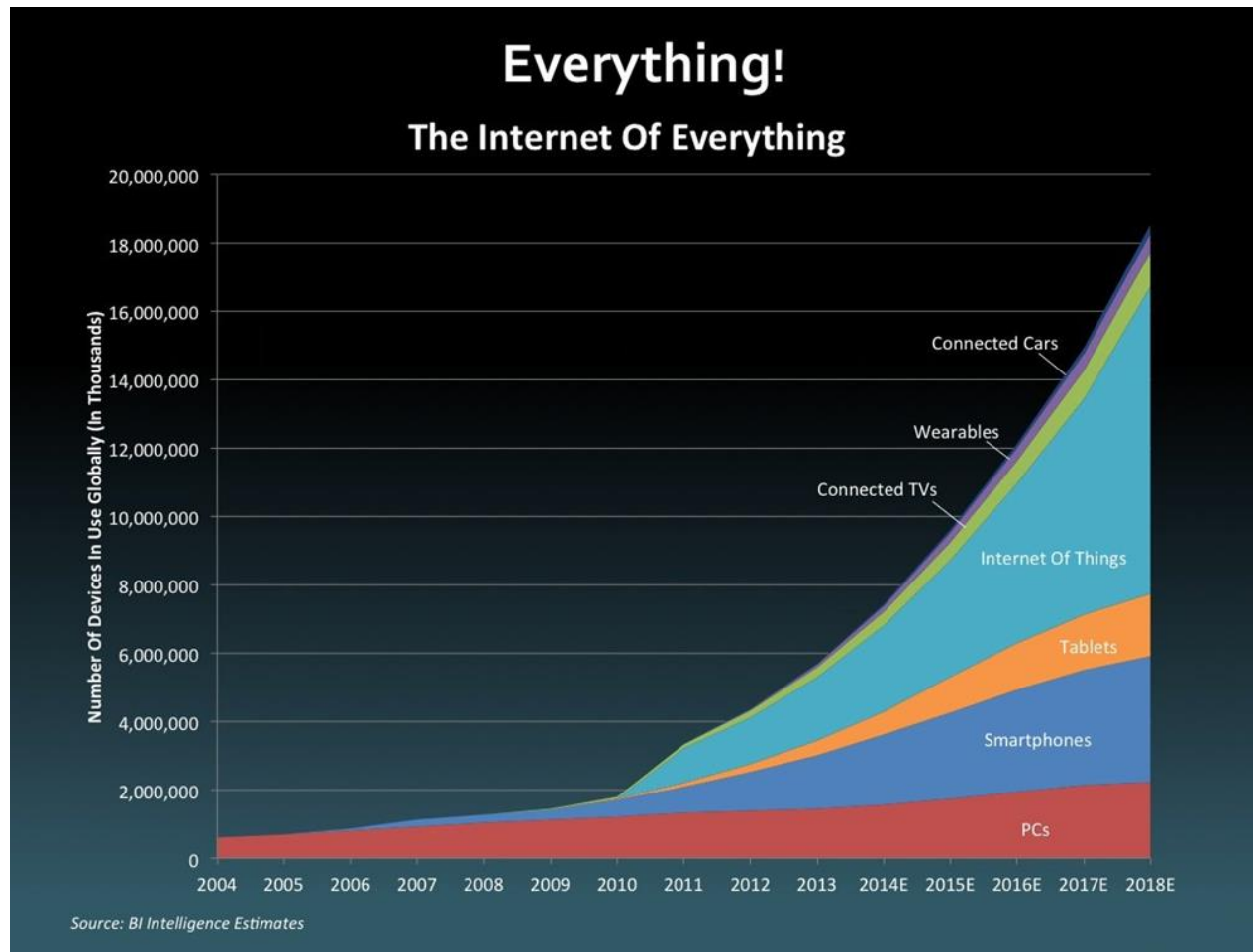
2010



Now



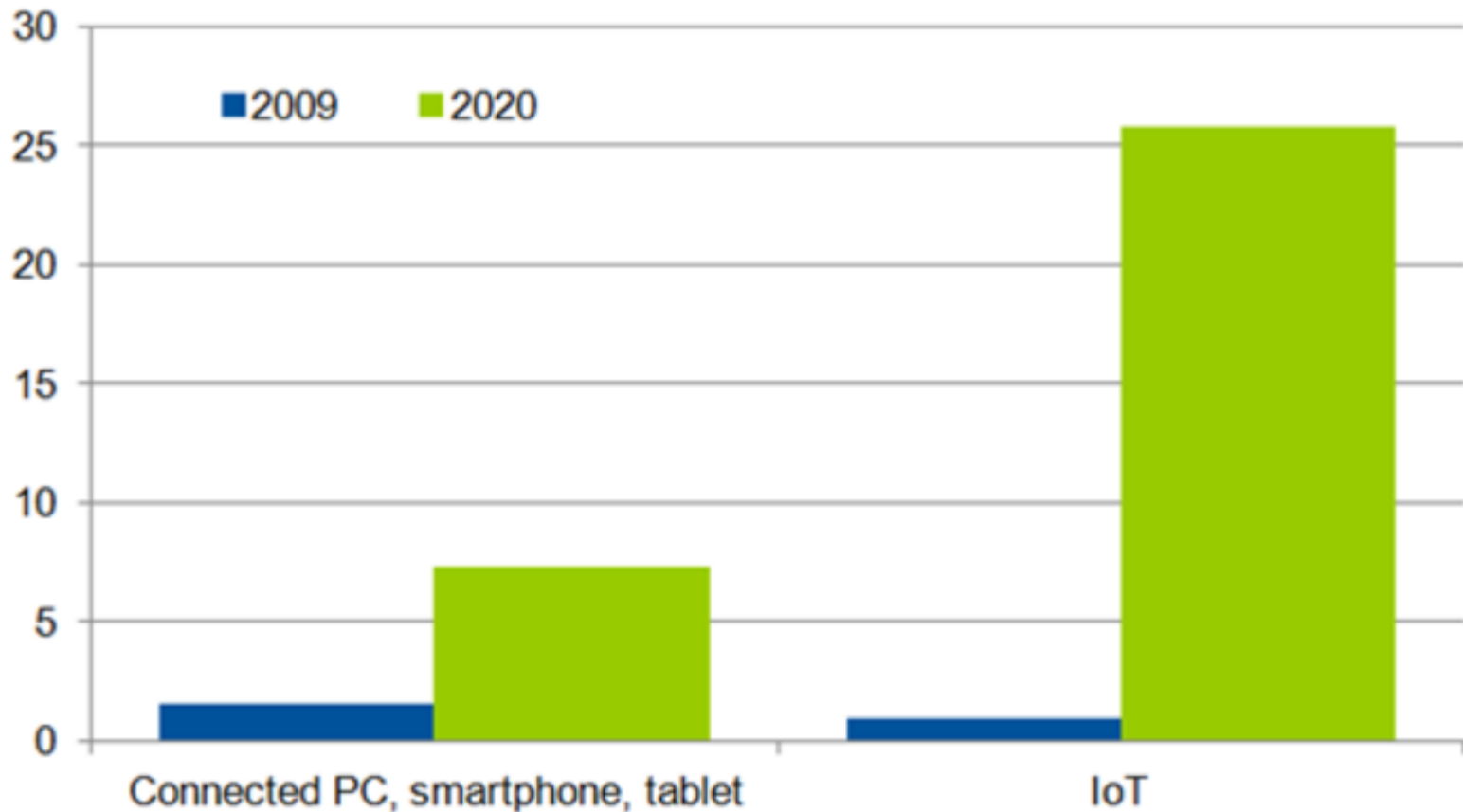
Computing History: IoT is Next



IoT Growth Factors

- Developer Tools and SDK
- The ubiquity of internet
- Affordable Cloud Services and Storage
- Cheaper Hardware (Past 10 years)
 - Cost of sensors dropped 2X
 - Cost of bandwidth dropped 40X
 - Cost of processing dropped 60X

Total of connected Devices, Billions of Units



Source: Gartner

What is IoT about?



Monitoring & Collecting Data

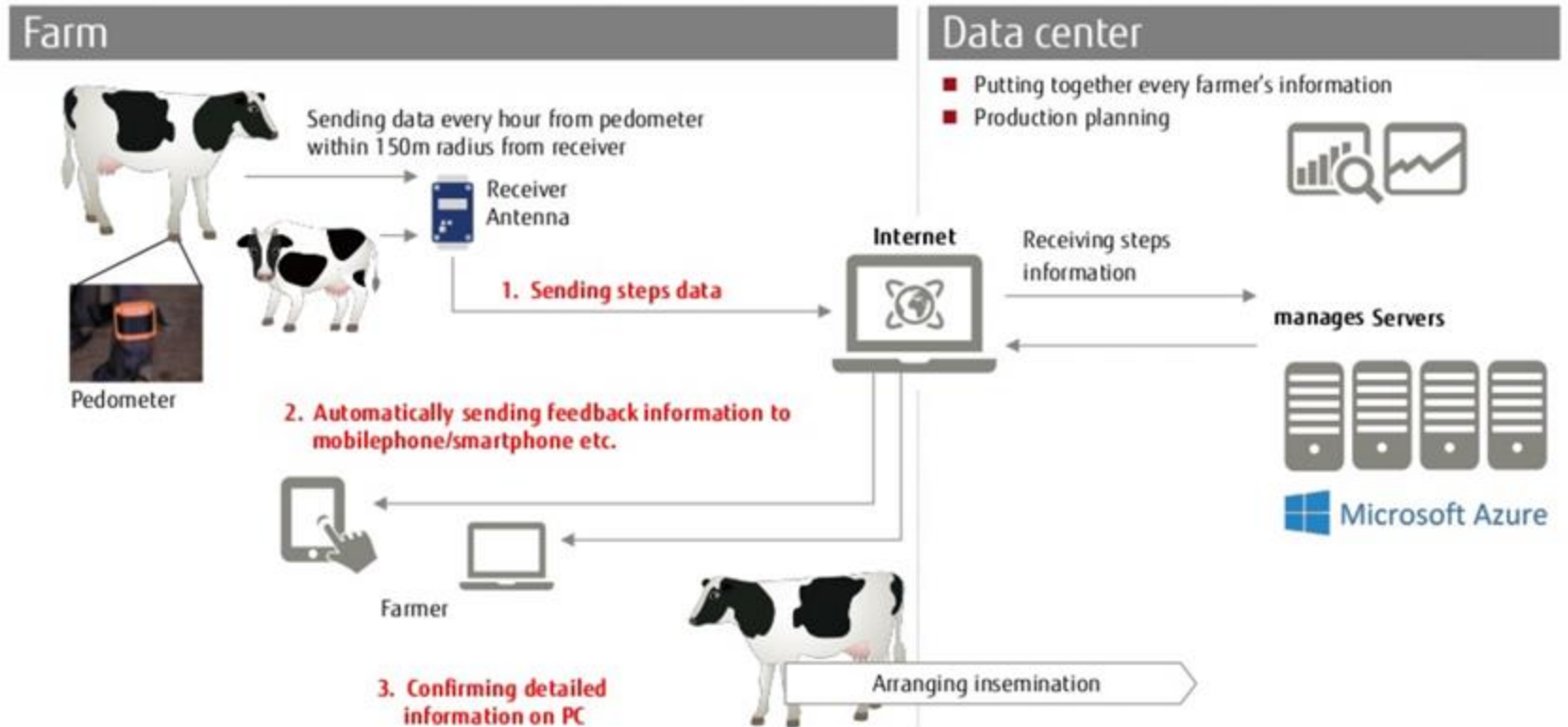


Analysis Data for Patterns & Insights



Prediction for smarter decision

Example of using IoT in Farming



Azure IoT case studies

See the amazing things people are doing with Azure

Industry

Product

Solution

Customer Location


All

All

Internet of Things


All

☐ Only show technical customer stories




Grundfos

Smart moves help save water, money ... and the planet



Zion China


Zion China uses Azure IoT, Stream Analytics, and Machine Learning to evolve its Intelligent Diabetes Management solution



STOCKROSE
SMART BUILDINGS-AS-A-SERVICE

Stockrose


Swedish firm uses IoT technologies to save energy, water, and millions of dollars for property owners



Johnson Controls


Johnson Controls

Connecting Buildings to the Cloud for a Greener Planet




MARS DRINKS

Connecting beverage machines to the cloud to power productivity




Rolls-Royce

Rolls-Royce and Microsoft collaborate to create new digital capabilities



Schneider Electric

Schneider Electric extends access to electricity



Honeywell Inc.

Tracking a building's vital signs to keep it safe and healthy

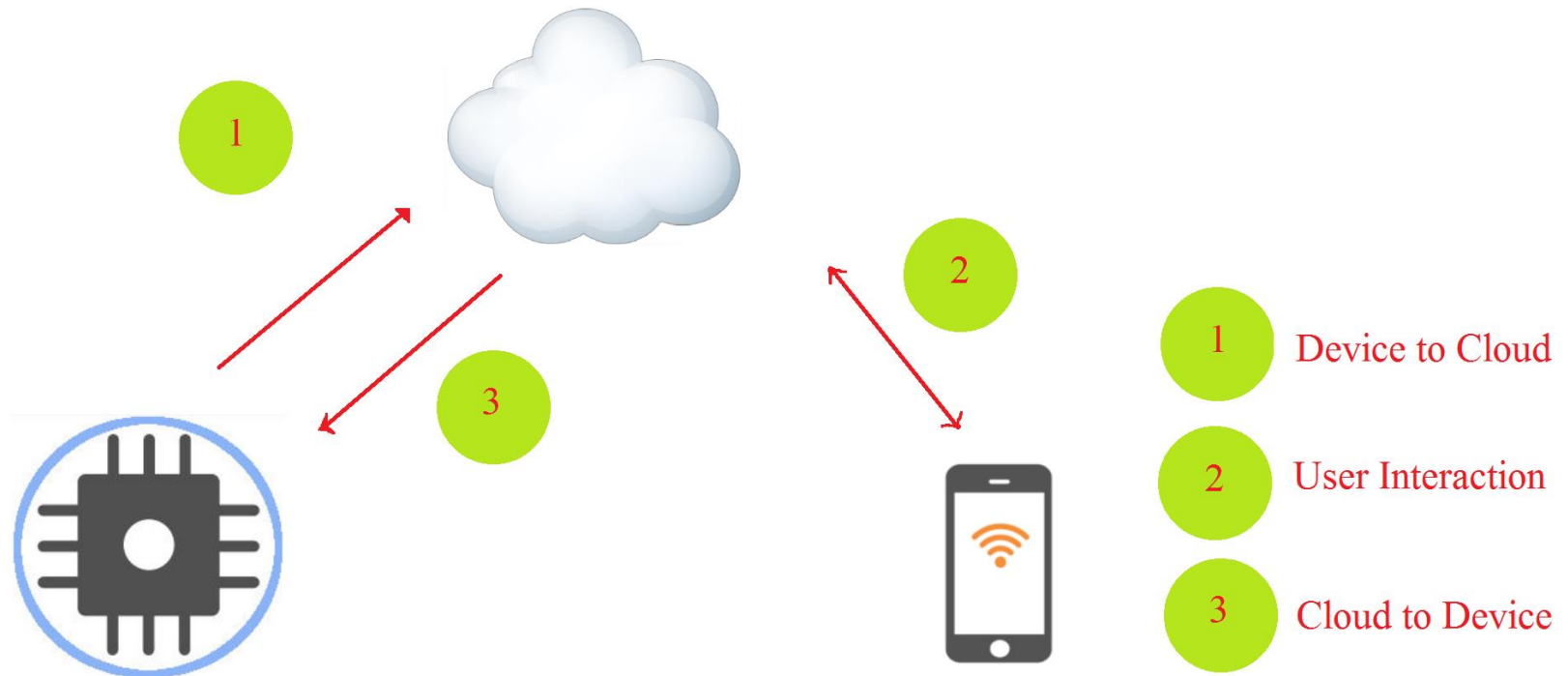
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- **IoT Messaging and Gateways**
- Azure IoT Suite
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Messaging Types

- Device to Cloud
 - Send messages from device to clouds
 - Message Queue for processing
- Cloud to Device
 - Send control commands or other message from cloud to device e.g. turn on/off, update firmware etc.

IoT 2-way Messaging



Messaging Protocols

- IoT message communication is enabled through the messaging protocols.
- MQTT Message Queuing Telemetry Transport
 - Specifically designed for IoT use
 - Light way & Simple
 - Supports both publish & subscribe messaging
 - Minimize bandwidth useful for high message volume

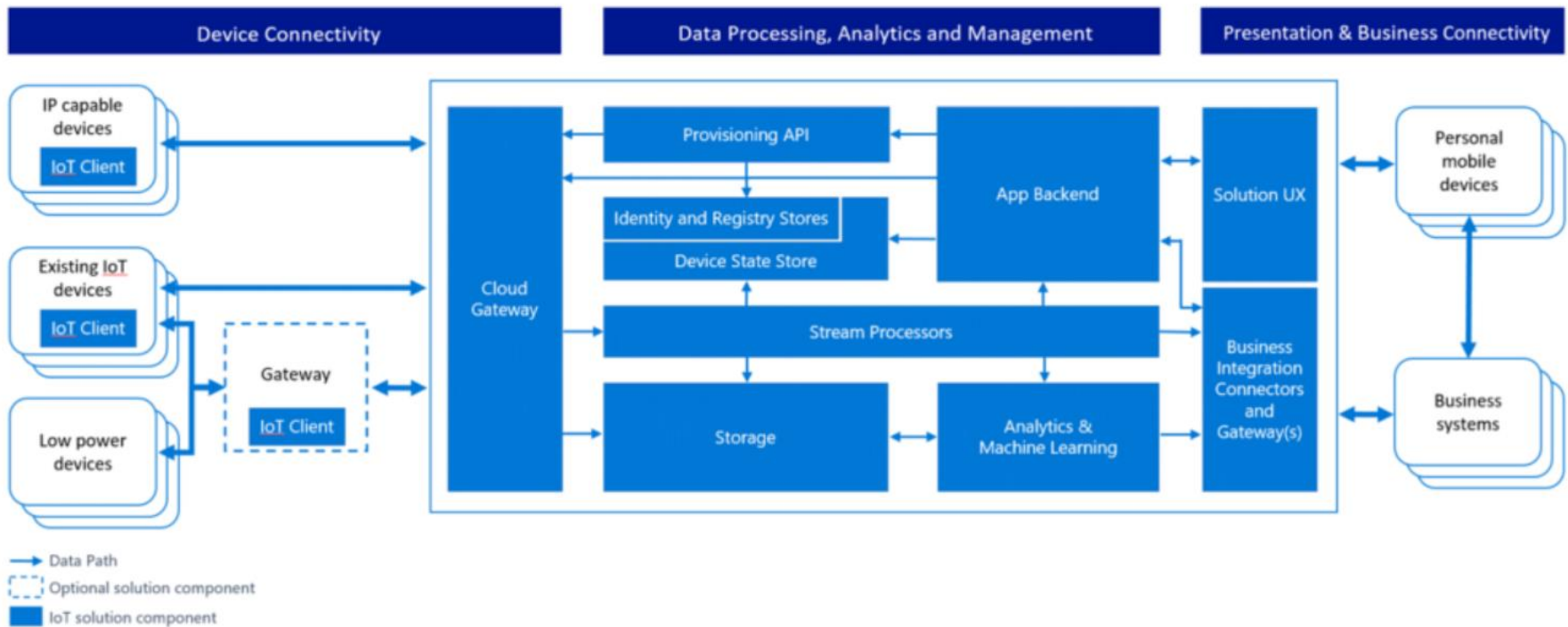
Other Messaging Protocols

- AMQP (Advanced Message Queuing Protocol)
- HTTP: Standard web protocol
- Other
 - XMPP, CoAP and more
 - Legacy and other proprietary, device specific

Gateways

- Aggregation point for device communication
Connecting multiple IoT devices problematic
- Gateway Types
 - **Field Gateway:** Connecting low power or simple devices. Helpful when device not capable of encryption such as SSL or TLS
 - **Protocol Gateway:** providing protocol adaptation. Useful when device not support certain protocol which the cloud services support. The protocol gateways is used to translate the communication from the device's protocol to one supported by the cloud services. This can be used such as for a proprietary protocol being translate to MQTT for example.

Gateways

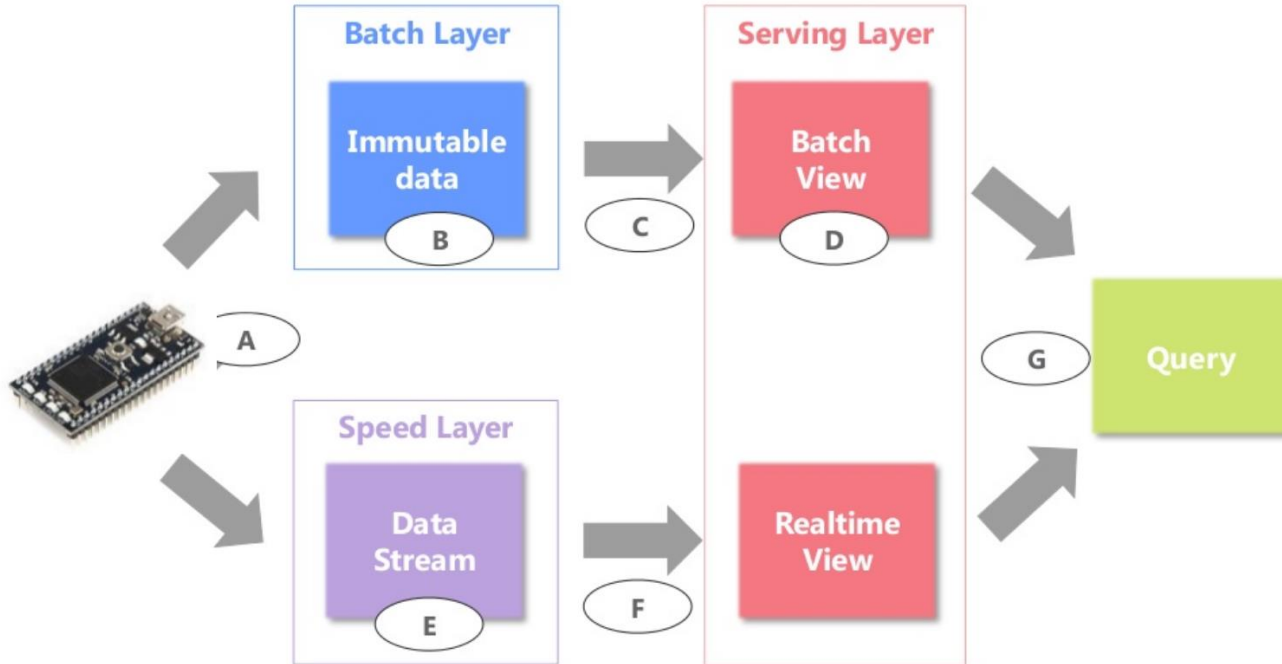


Message Processing

with the internet of things solutions as well as many big data scenarios there are concepts of hot and cold message processing.

- **Fast / Hot** processing
 - Used for Real-Time Processing and Analytics
- **Slow / Cold**
 - Used for Batch Processing

Lambda Architecture



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What does Azure offer IoT?

- Scale to millions of devices
- Easily integrate with existing systems
- Ability to analyze and visualize Big Data
- Built-in security and device management features

Azure IoT Suite

- Package of multiple Azure services
 - Collect data from devices
 - Analyze data streams
 - Store/query large data sets, from IoT solutions
 - Visualize real time & historical data in the cloud
 - Integrate IoT solution with back-office systems

Azure IoT Suite Key Services

-  IoT Hub: messaging system between azure/devices
-  Notification Hubs: integrate mobile push notification
-  Stream Analytics: real time analysis capabilities
-  Machine Learning: utilize AI to give insight/prediction
-  Power BI: integrate visualization to analysis/prediction

Azure IoT Services

Any azure services can be used with IoT solution

- Background Processing



Azure App Service Web Jobs



Azure Functions

- Storage



Azure Storage Blobs, Tables, Queues

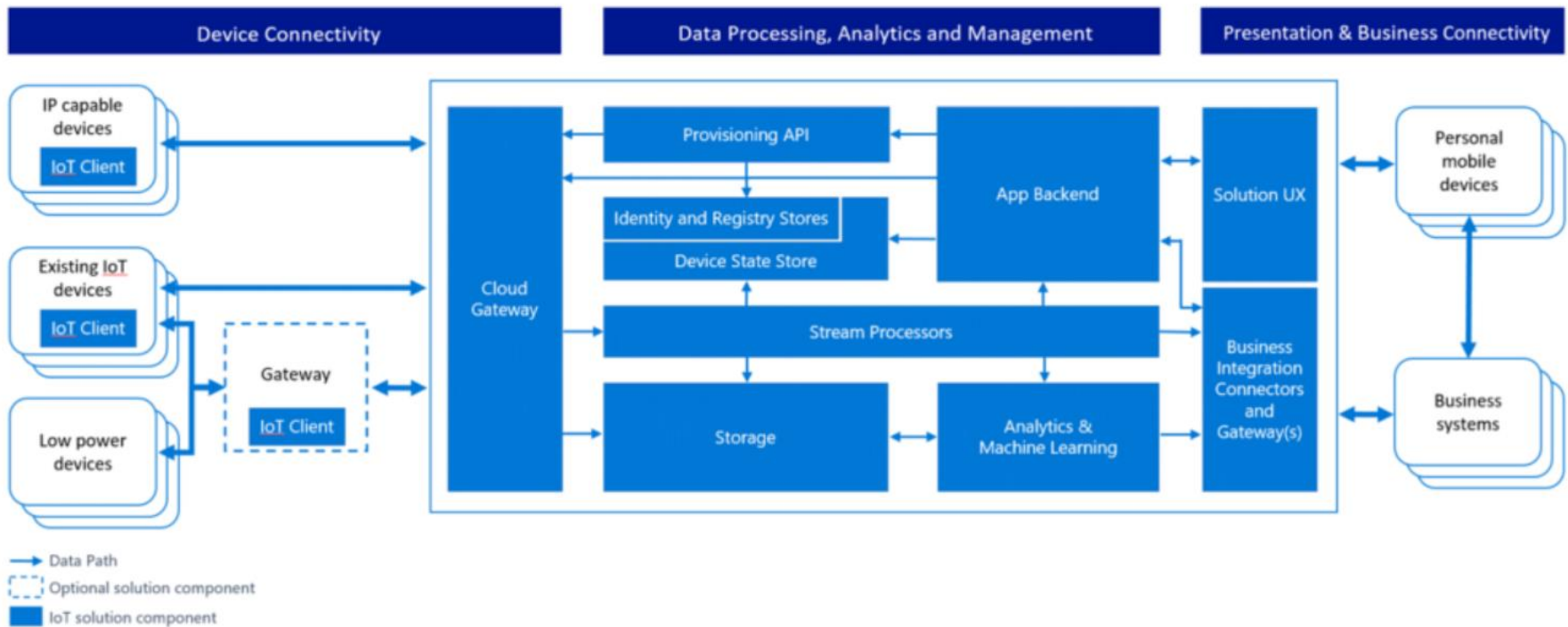


CosmosDB

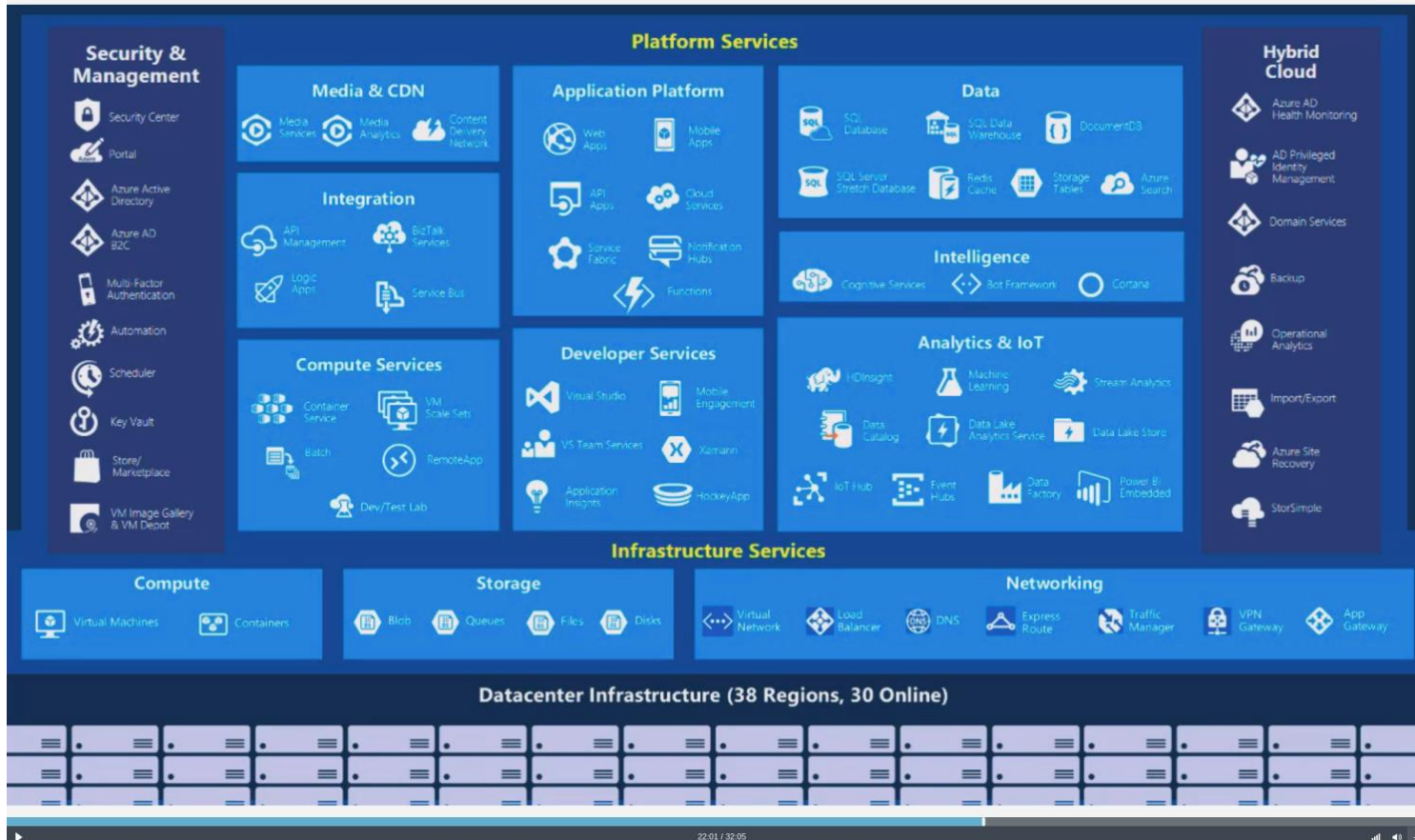


SQL Database

Azure Services



All Azure Services



Azure Preconfigured IoT Solutions

Provisioned from <http://azureiotsuite.com>

Solution types



Remote monitoring

Connect and monitor your devices to analyze untapped data and improve business outcomes by automating processes.

Select



Remote monitoring

Connect and monitor your devices to analyze untapped data and improve business outcomes by automating processes.

Preview highlights include:

- Redesigned user interface
- Microservices-based architecture
- Availability in both .NET and Java
- View an [interactive demo](#)

Select



Connected factory

Accelerate your journey to Industrie 4.0 – connect, monitor and control industrial devices for insights using OPC UA to drive operational productivity and profitability.

Select



Predictive maintenance

Anticipate maintenance needs and avoid unscheduled downtime by connecting and monitoring your devices for predictive maintenance.

Select



Device simulation

Streamline your IoT solution development by using simulated IoT devices to both build and test your solution throughout the software development lifecycle.

Select

Remote Monitoring Solution

- Connect & monitor your devices to analyze untapped data & improve business outcomes by automating processes.



<https://github.com/azure/azure-iot-remote-monitoring>

Connected Factory Solution

- Accelerate your move to Industry 4.0 to drive operational productivity & profitability
- Connect & monitor your industrial equipment & devices in the cloud



<https://github.com/azure/azure-iot-connected-factory>

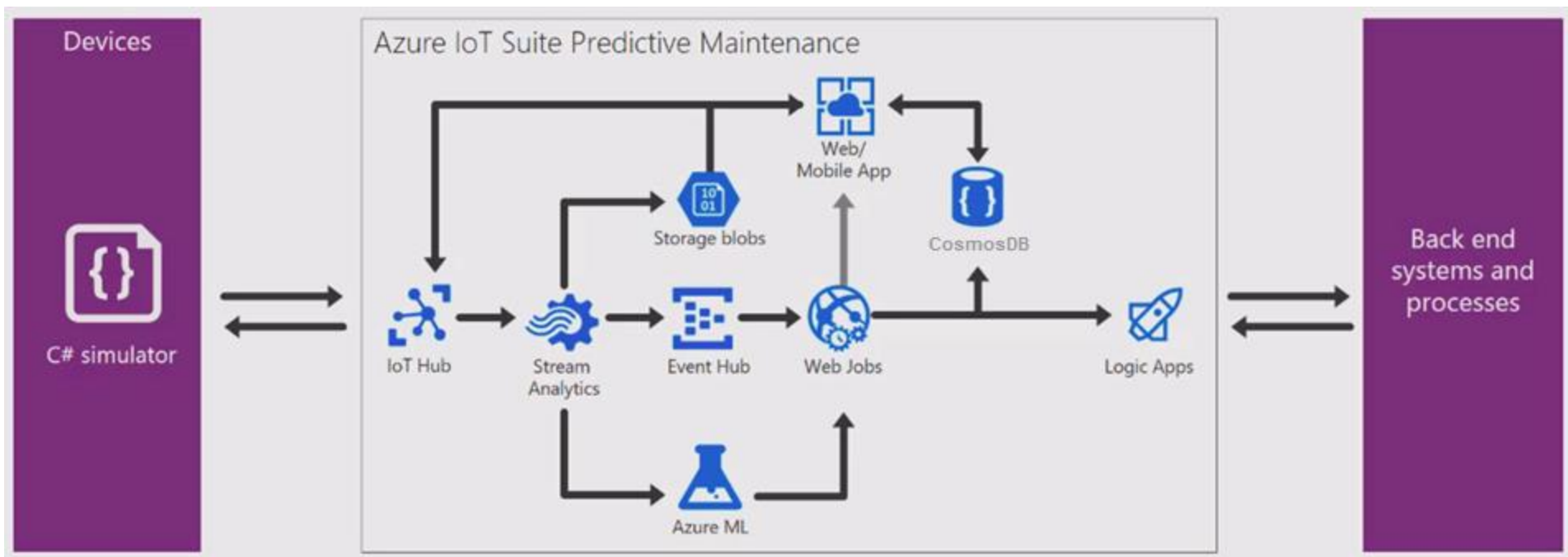
Predictive Maintenance Solution

- Anticipate maintenance needs & avoid unscheduled downtime by connecting & monitoring your devices for predictive maintenance.



<https://github.com/azure/azure-iot-predictive-maintenance>

Azure IoT Suite - Predictive Maintenance Solution



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- IoT Messaging
- IoT Architecture
- Azure IoT Suite
- **Demo**
- Resources



Resources

- <https://azure.microsoft.com/en-us/case-studies/?service=iot-suite>
- <http://mqtt.org>