



# Connected Fish Tank – Fish + Azure IoT = Awesome!

Jasper Siegmund



Microsoft Azure



# About me

## Jasper Siegmund

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## What I did

2000 > PHP Web Developer

2006 > ASP.NET Developer

2008 > SharePoint Developer

## What I do

2011 > SharePoint Architect

2012 > Windows Azure Applications

2013 > Office 365

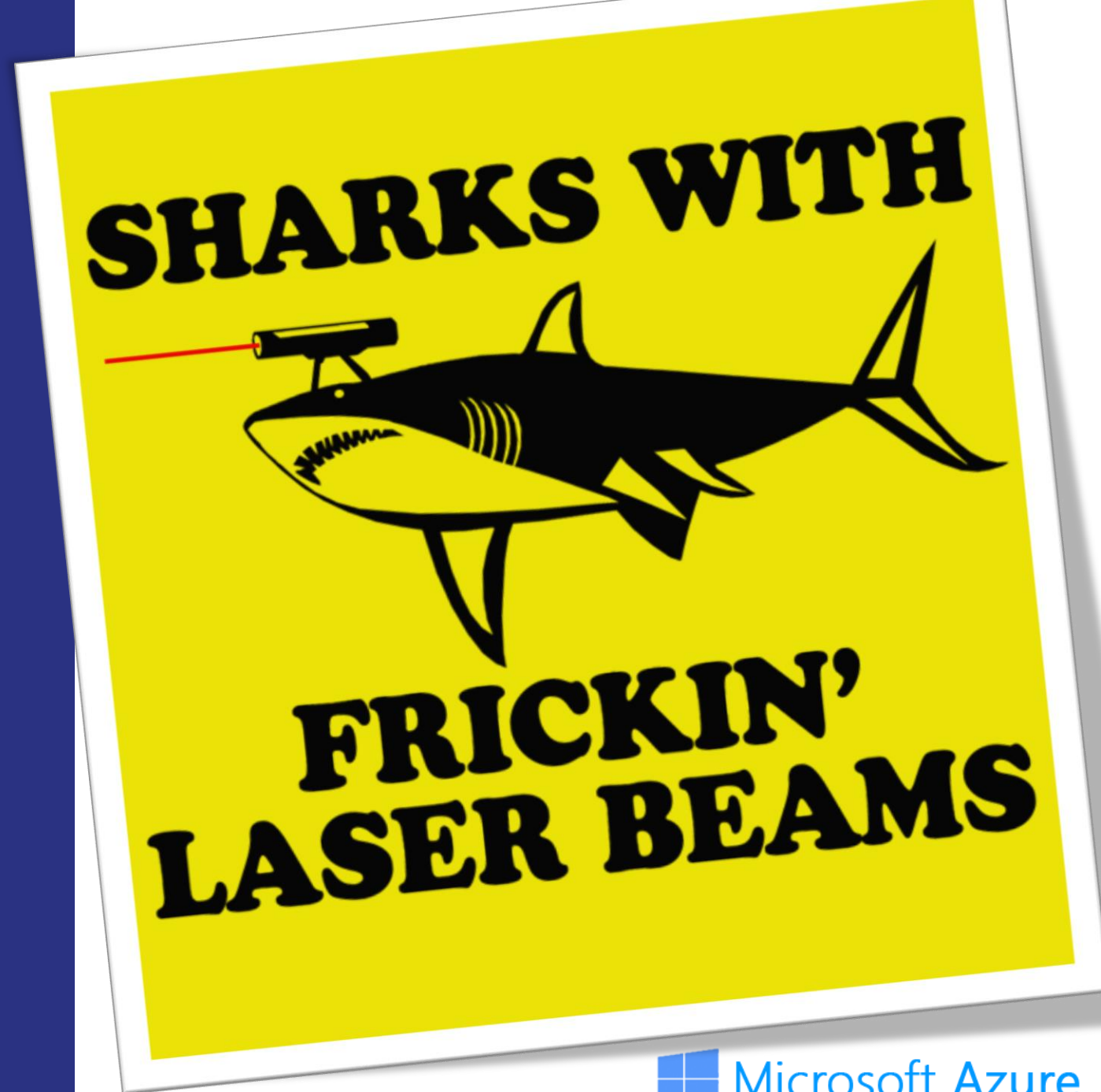
2015 > Azure IoT hobbyist ☺





# Session Overview

- Solution Architecture
- Getting data to Azure
- Storing data
- Acting on data
- Surfacing everything in an app
- Sending commands back





# IoT 2016



Medication adherence



Health monitoring



Pet tracking



Behavior modification



Object tracking



Child and elder monitoring



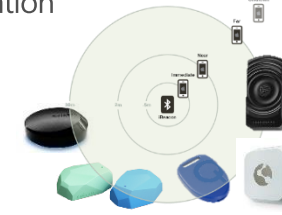
Sports and fitness



Smart lighting



Indoor navigation



Beacons and proximity



Trip tracking and car health



HOME



Smart appliances



Food and nutrition tracking



WORKPLACE



Identity



Office equipment



Aquariums



Bike ride stats and protection



HOME



Sleep tracking



Air conditioning and temperature control



Environmental sensors



Information capture



Control



Home security



Home automation



Leak detection



Garden, lawn and plant care

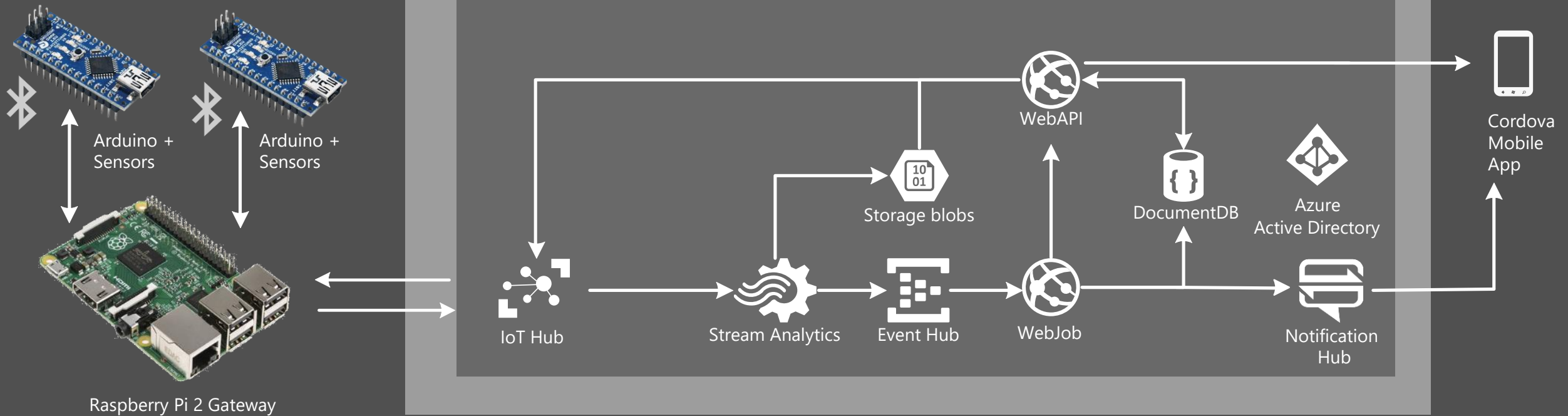


New devices and sensors



Entertainment systems

# Azure solution Architecture



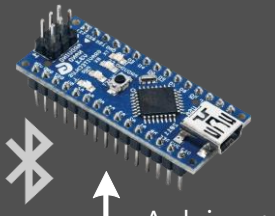
# Azure solution Architecture

## Tank module

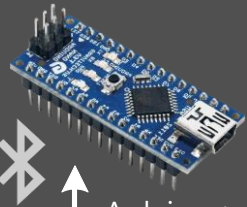
pH  
In-tank temp  
Room temp

## Cabinet module

Leak detection  
Relay control



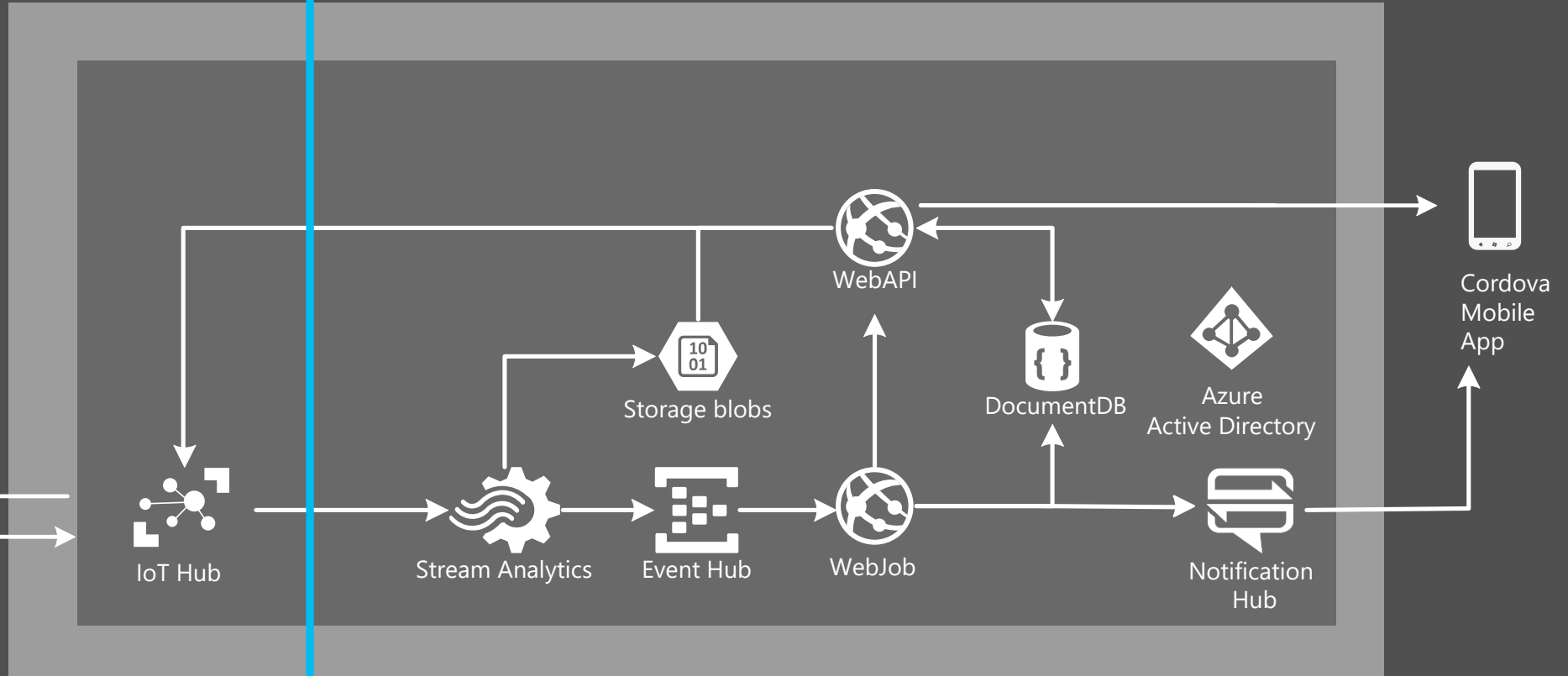
Arduino +  
Sensors



Arduino +  
Sensors



Raspberry Pi 2 Gateway



Getting data to Azure



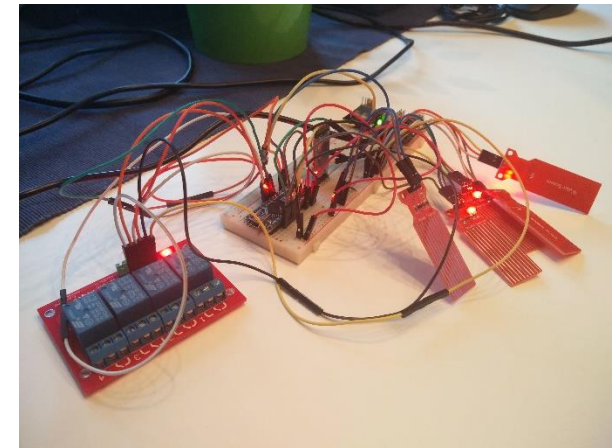
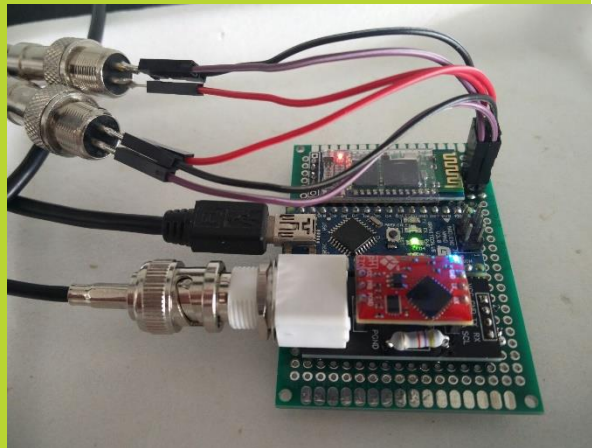
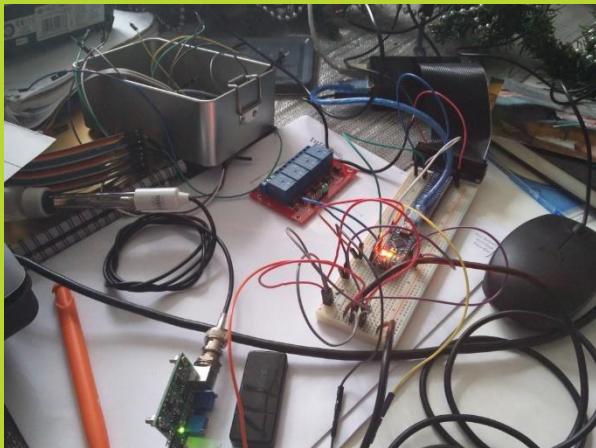
# Getting data to Azure



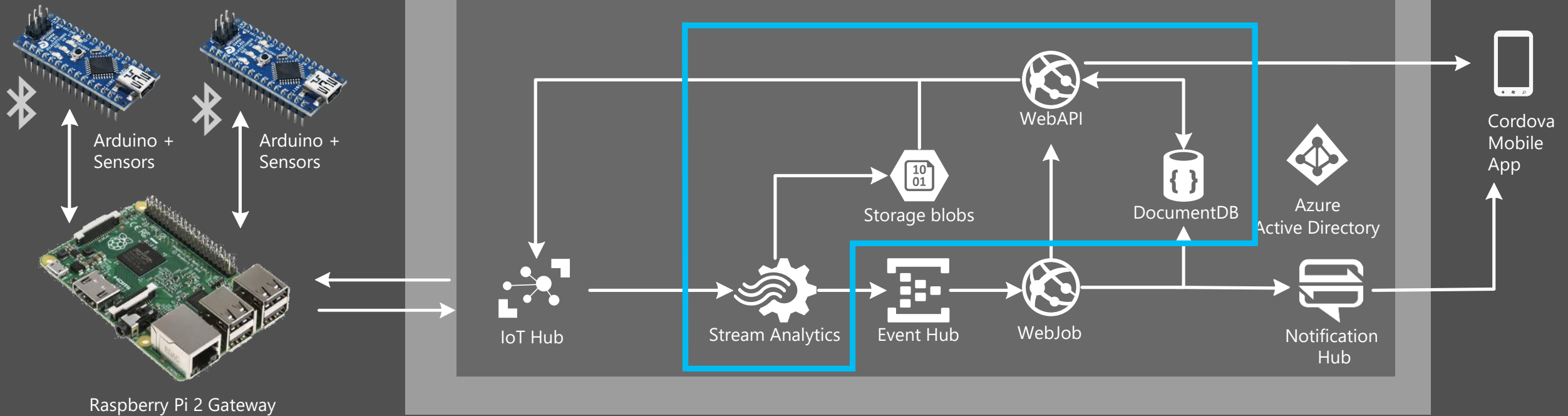
## Azure IoT Hub

Connect, secure, communicate, monitor and manage billions of devices

- Sending data from your Gateway device to Azure IoT Hub
- Default security via SSL
- Device 2 cloud messaging
- Every device communicating needs to be registered!



# Azure solution Architecture



## Storing data





# Getting data to Azure

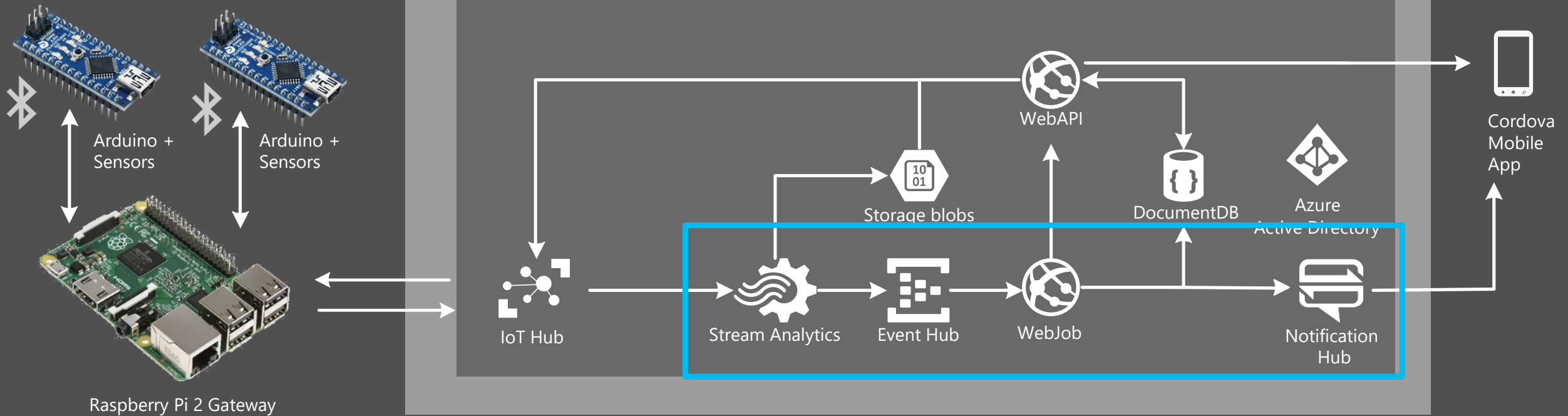


## Azure Storage

Blob, SQL, DocumentDB, Data Lake. Storage to meet every need at the scale of IoT

- BLOB storage = low cost for lots of (long term) space
- DocumentDB = better suited for configuration-type data
- Stream analytics output options:
  - SQL database
  - Blob storage
  - Event hub
  - Table storage
  - Service bus Queue
  - Service bus Topic
  - DocumentDB
  - Power BI

# Azure solution Architecture



Acting on data



# Acting on data



## Azure Stream Analytics

Real time stream processing for billions of IoT devices



## Azure Event Hub

Real time stream processing for billions of IoT devices

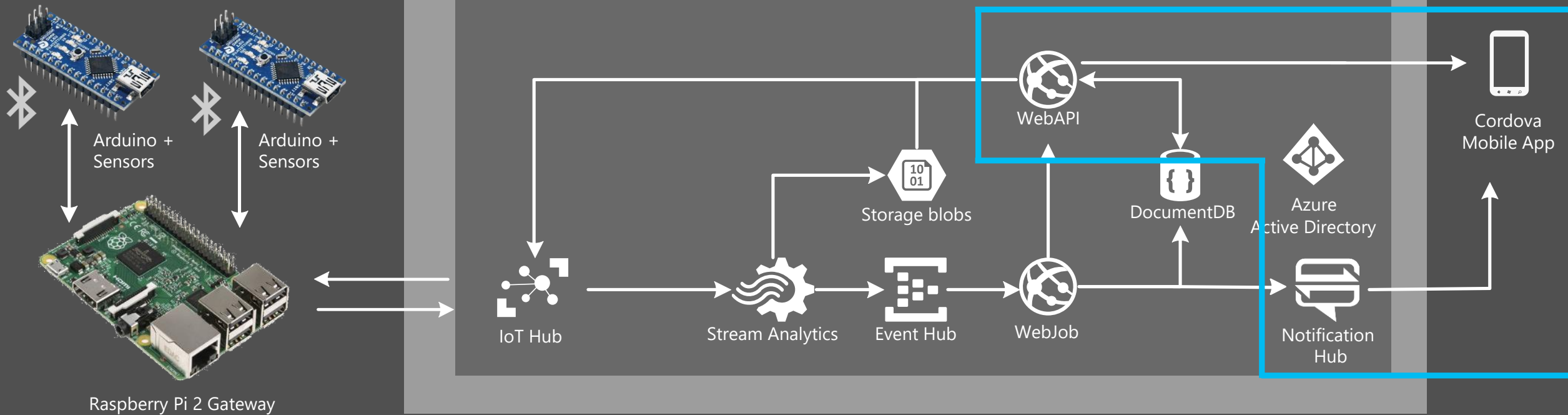


## Azure App Service

Web and mobile apps for any platform on any device

- Using reference data to route actionable data to event hub.
- WebJob connected to event hub monitors output events and takes appropriate action.
- Do you need an action on every event?
- Option to handle events: logic apps.

# Azure solution Architecture



Surfacing everything in an app





# Surfacing in an app



## Azure Notification Hub

Push notifications for consumer and enterprise apps—from any backend to any device platform

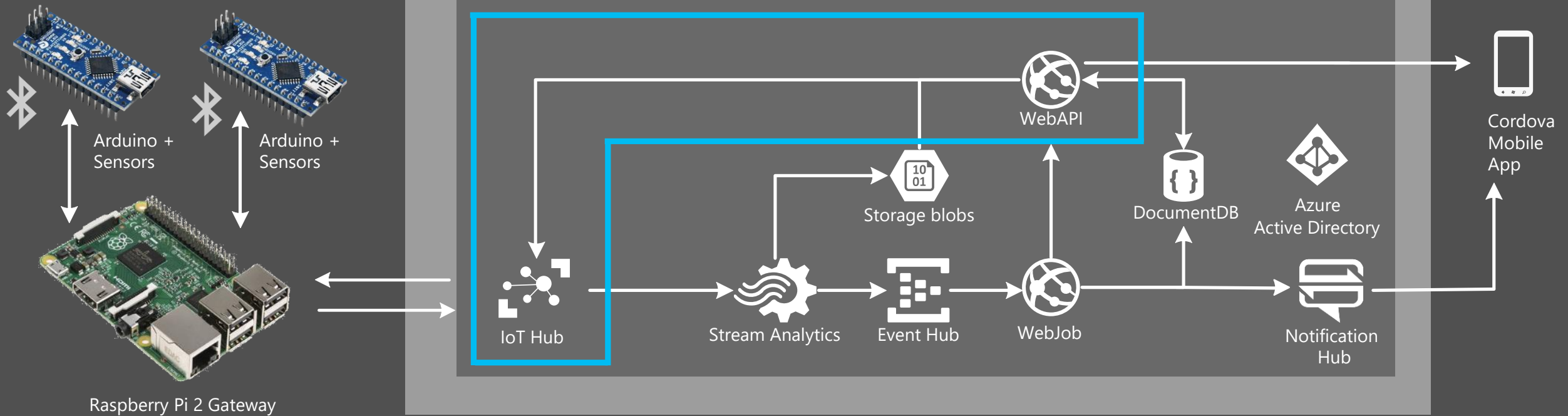


## Azure App Service

Web and mobile apps for any platform on any device

- Using Mobile Service Client JavaScript library to connect Cordova app to Azure
  - Authentication (ADAL)
  - InvokeApi
  - Push messages
- Supported notification services:
  - Apple (APNS)
  - Google (GCM)
  - Windows (WNS)
  - Windows Phone (MPNS)
  - Amazon (ADM)
  - Baidu (Android China)

# Azure solution Architecture



Sending commands back

# Sending commands



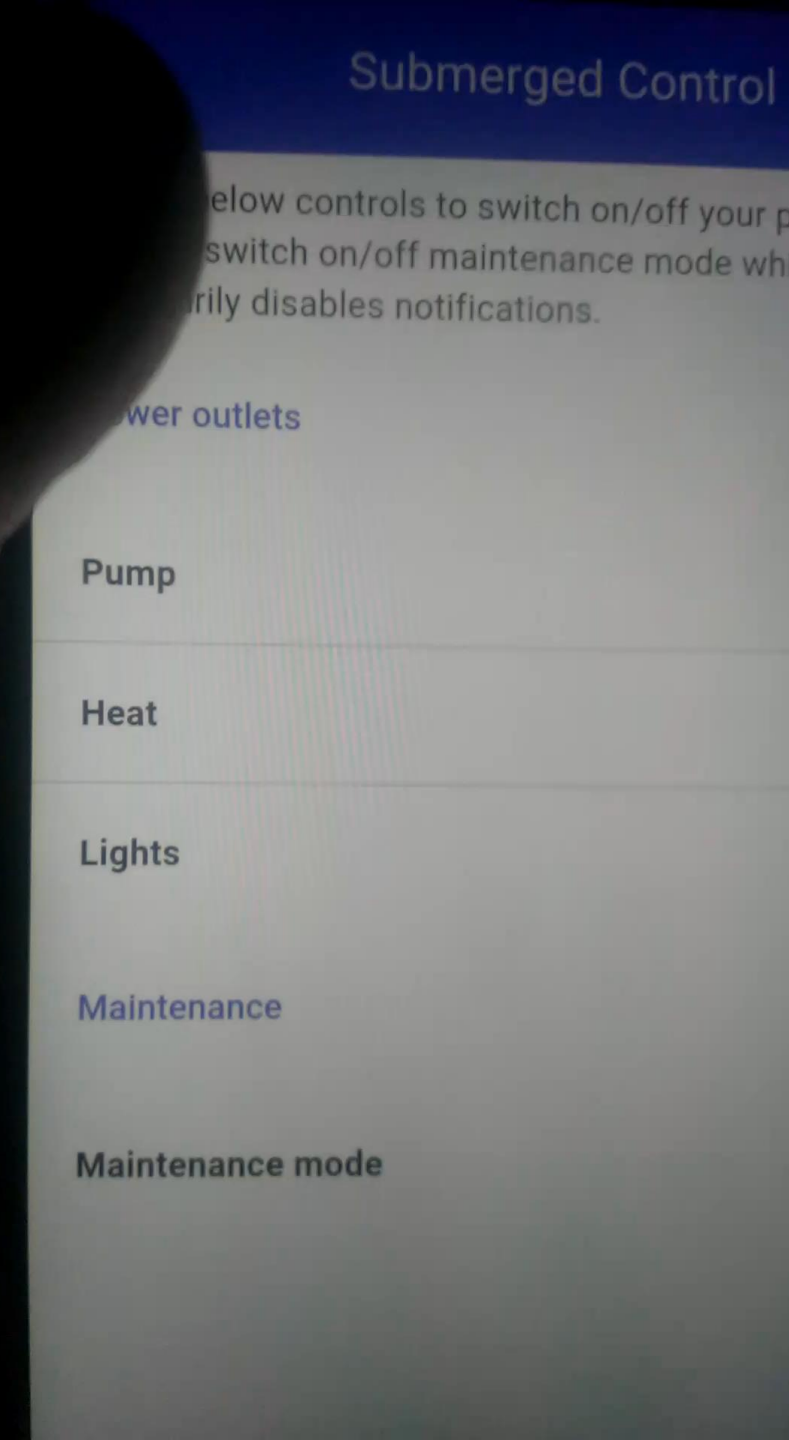
Azure App Service

Web and mobile apps for any platform or device



Azure IoT Hub

Connect, secure, communicate, manage billions of devices



and messaging

```
receivedMessage = await  
ReceiveAsync();
```

usually received and processed by  
within a second.

Live demo!



# Learning More

## Remote monitoring sample

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

## Get started with Visual Studio Tools for Apache Cordova

<https://taco.visualstudio.com/en-us/docs/get-started-first-mobile-app/>

## Aquarium Monitor blog series

<http://blog.repsaj.nl/index.php/2016/01/iot-my-steps-to-an-aquarium-monitor/>

## //build 2016 IoT codelabs

<https://github.com/Microsoft-Build-2016/CodeLabs-IoTDev>

## MyDriving sample application + guide

<https://azure.microsoft.com/en-us/campaigns/mydriving/>

## Get in touch!

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# Detailed architecture

