Device Hacking 101

Building a Serverless Application for an IoT Device

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aws

About me

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- Senior Developer Advocate – Serverless
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Previously:

- Developer / Hardware hacker - Octoblu (Citrix)
- Hardware Evangelist – Hologram.io
- Director – HeatSync Labs, Non-profit hackerspace
- Arizona State University - Arts, Media, & Engineering
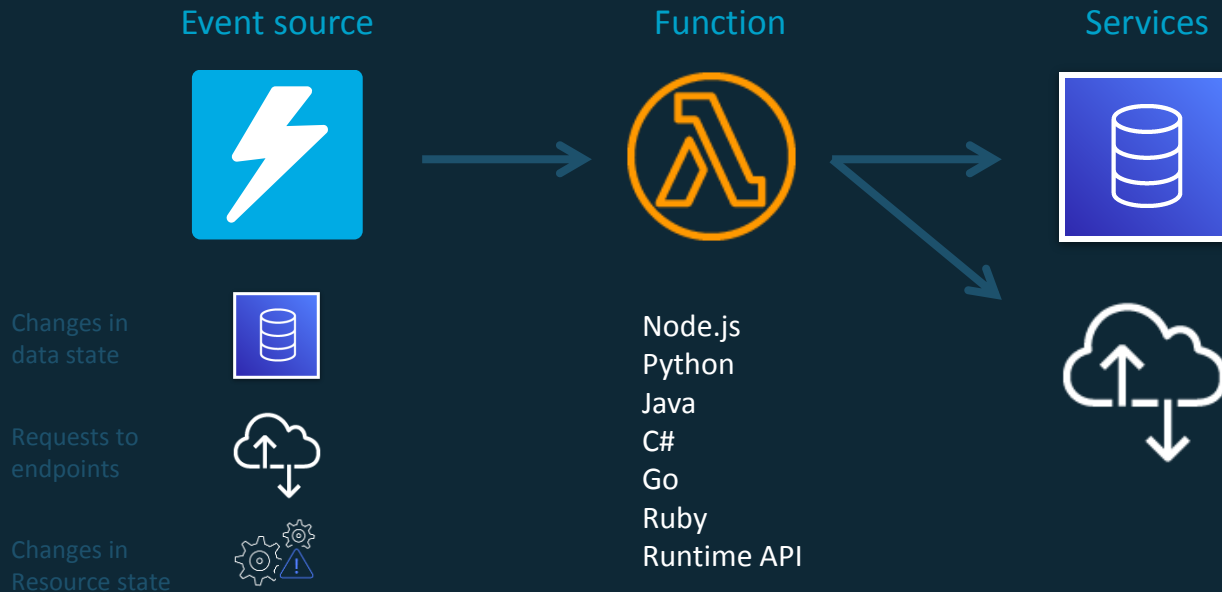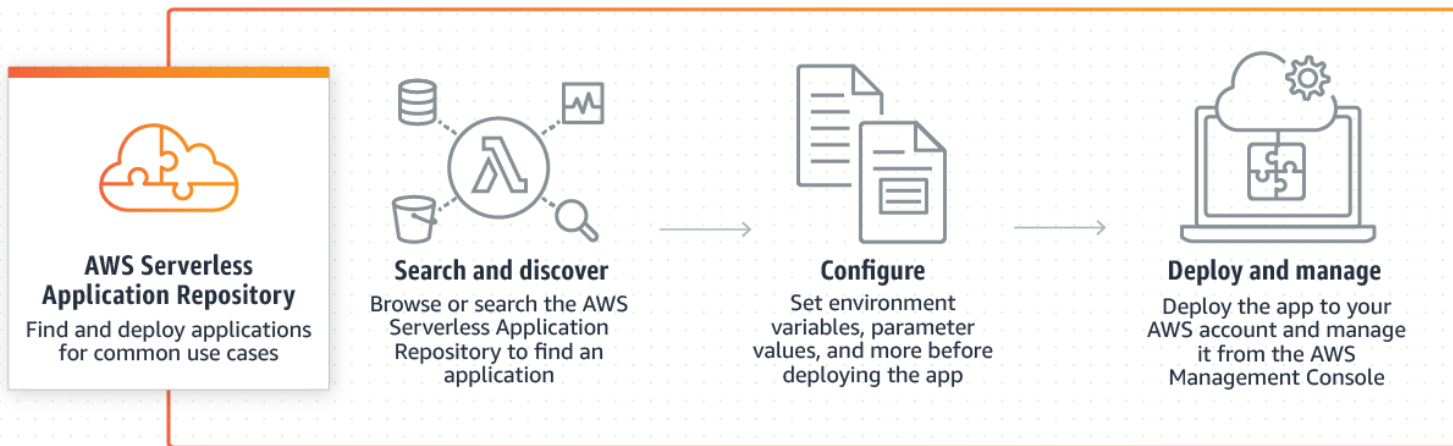
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Why are we here?

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Objectives

- Learn about IoT development devices.

- Program an ESP32 Wi-Fi microntroller to connect to AWS IoT

- Deploy an application from the AWS Serverless Application Repository

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What is Serverless?

A typical Serverless Application

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AWS Serverless Application Repository

AWS Serverless Application Repository
Find and deploy applications for common use cases

Search and discover
Browse or search the AWS Serverless Application Repository to find an application

Configure
Set environment variables, parameter values, and more before deploying the app

Deploy and manage
Deploy the app to your AWS account and manage it from the AWS Management Console

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AWS Serverless Application Model (SAM)

AWS CloudFormation extension optimized for serverless

Special serverless resource types: functions, APIs, tables, layers, and applications

Supports anything AWS CloudFormation supports

Open specification (Apache 2.0)

https://aws.amazon.com/serverless/sam

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AWS Serverless Application Model (SAM)

```yaml
AWSTemplateFormatVersion: "2010-09-09"
Transform: AWS::Serverless-2016-10-31
Resources:
  IoTLambdaFunction:
    Type: AWS::Serverless::Function
    Properties:
      Handler: index.handler
      Runtime: nodejs10.x
      CodeUri: src/
      Policies:
        - DynamoDBCrudPolicy:
            TableName: !Ref MyTable
      Environment:
        Variables:
          TABLE_NAME: !Ref MyTable
      Events:
        IoT:
          Type: IoTRule
          Properties:
            AwsIotSqlVersion: 2016-03-23
            Sql: "SELECT * FROM 'topic_2'"
```

A few lines deploys:

- AWS Lambda function

- Amazon DynamoDB table

- AWS IoT rule that will invoke the Lambda function whenever a message is published to an IoT topic

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AWS IoT

AWS IoT Core

- Provides an MQTT broker for publishing and subscribing to message topics.

- Secure and managed device credentials.

- IoT rules engine for routing events to multiple targets, such as AWS Lambda.

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What we're going to deploy..
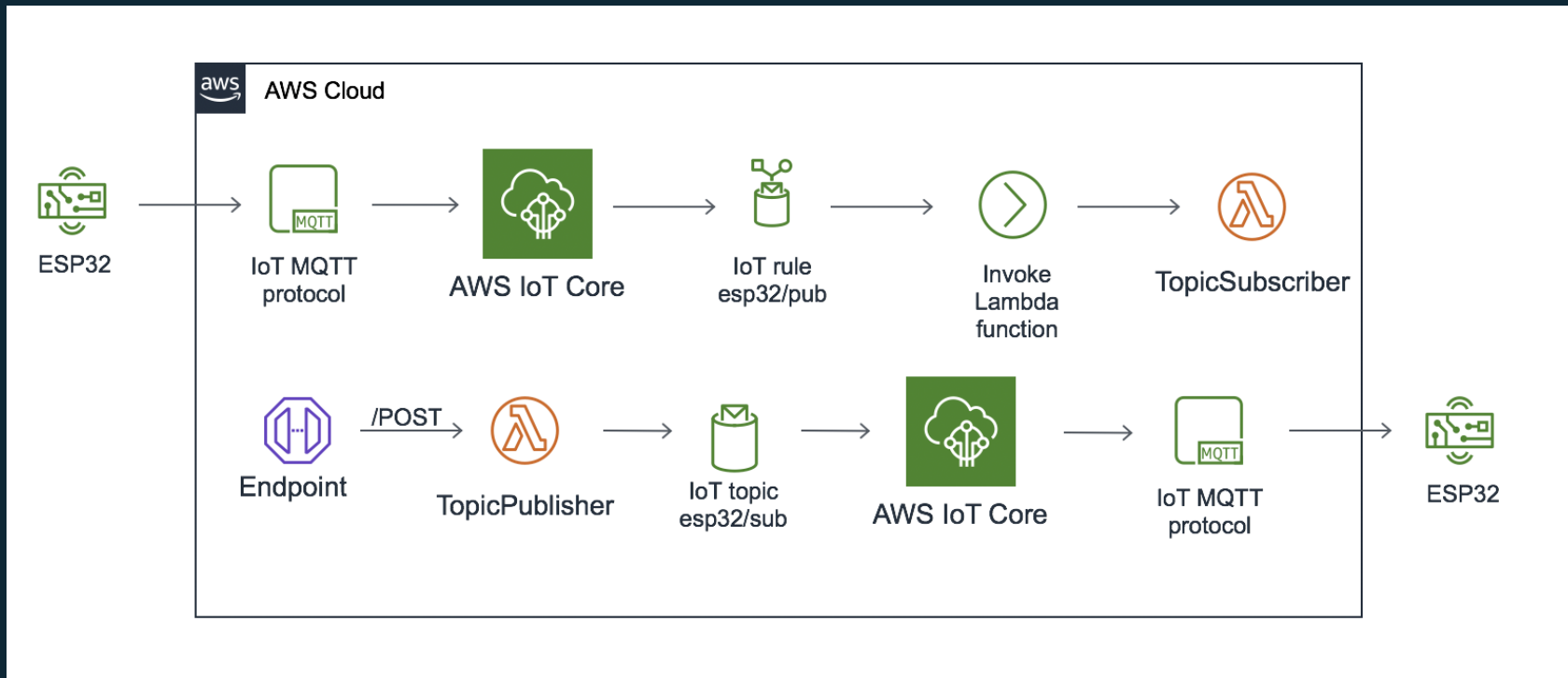
Why should you connect a device to a Serverless application?

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Use cases

Serverless lets us take advantage of AWS Services:

- Physical displays for alerts. (Amazon CloudWatch)

- Sensor data collection and analysis. (Amazon QuickSight)

- Machine Learning and Artificial Intelligence. (AWS SageMaker)

- Enable language translation on edge devices. (Amazon Translate)

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# What is a microcontroller?

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Microcontollers

- Integrated circuits designed to perform specific operations in an embedded system.

- Typically have a processor and some memory

- Provide input and output (I/O).

- Come in all shapes and sizes.

- Can be reprogrammed.

- NOT the same as a single-board computer, such as a the Raspberry Pi or BeagleBone.
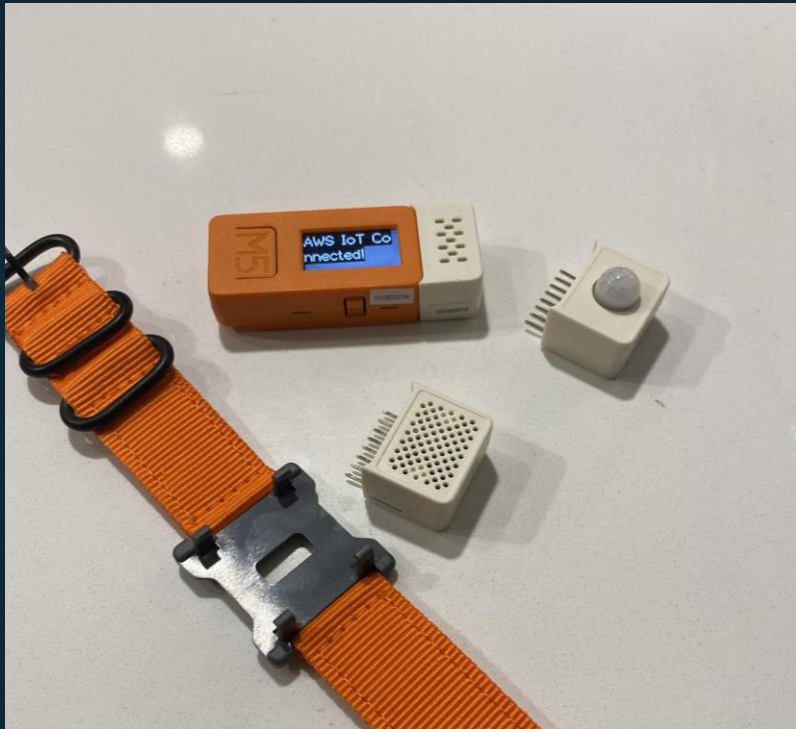
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ESP32

- Created by Espressif Systems

- Low-cost, low-power

- System on a chip microcontrollers (SoC)

- Multi-core

- Includes Wi-Fi + Bluetooth radios

- Heavily supported by the open-source community

- Arduino compatible

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ESP32 modules come in all varieties..
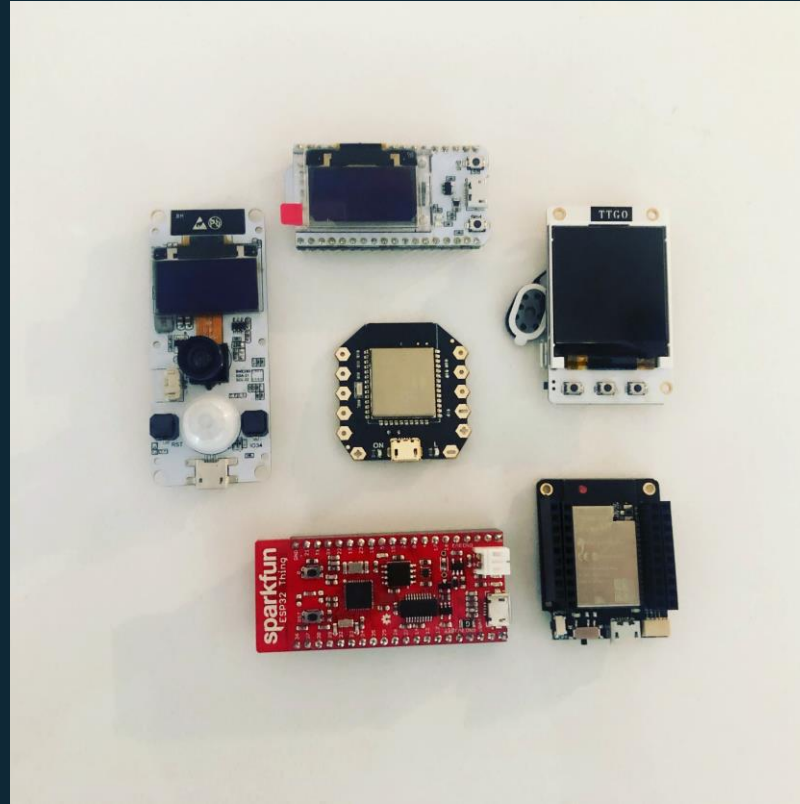
M5StickC (used in this demo)

Lets build!

bit.ly/esp32hax

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Thank You!

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