



IoT for Beginners



AKA.MS/IOT-BEGINNERS

GETTING STARTED | INTRODUCTION TO IOT

- WHAT IS "IOT"?
- IOT DEVICES AROUND US
- SETUP YOUR IOT DEVICE
- APPLICATIONS OF IOT

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A DEEP DIVE!

- COMPONENTS OF IOT APPLICATIONS
- MICRO-CONTROLLERS A DEEPER DIVE
- SINGLE BOARD COMPUTERS A DEEPER DIVE

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INTERACT WITH THE PHYSICAL WORLD

- SENSORS TO GATHER DATA
- ACTUATORS TO SEND FEEDBACK
- PROJECT: BUILD A NIGHTLIGHT

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CONNECT YOUR DEVICES TO THE INTERNET

- LEARN TO:
 - SEND & RECEIVE MESSAGES
 - CONNECT LIGHT TO MQTT BROKER
 - CONNECT DEVICE TO INTERNET

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PREDICT PLANT GROWTH USING TEMPERATURE DATA

- USE SENSED TEMPERATURE TO PREDICT PLANT GROWTH

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DETECT SOIL MOISTURE & CALIBRATE SENSOR

- SOIL MOISTURE
- HOW SENSORS COMMUNICATE WITH IOT DEVICES
- MEASURE DATA
- CALIBRATE

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AUTOMATE PLANT WATERING

- CONTROL HIGH POWER DEVICES FROM LOW POWER IOT DEVICE
- CONTROL A RELAY!
- CONTROL YOUR PLANT OVER MQTT
- SENSOR AND ACTUATOR TIMING
- ADD TIMING TO YOUR PLANT CONTROL

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MIGRATE YOUR PLANT TO THE CLOUD!

- WHAT IS THE CLOUD?
- CREATE SUBSCRIPTION
- CLOUD IOT SERVICES
- CREATE IOT SERVICE
- COMMUNICATE
- CONNECT DEVICE

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MIGRATE YOUR APPLICATION LOGIC TO THE CLOUD!

- WHAT IS SERVERLESS?
- CREATE A SERVERLESS APP
- CREATE AN IOT HUB EVENT TRIGGER
- SEND DIRECT METHOD REQUESTS
- DEPLOY SERVERLESS CODE

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KEEP YOUR PLANT SECURE

- WHY DO YOU NEED SECURE IOT DEVICES?
- CRYPTOGRAPHY
- SECURE YOUR DEVICES
- GENERATE AND USE AN X.509 CERTIFICATE

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LOCATION TRACKING

- CONNECTED VEHICLES
- GEOSPATIAL COORDINATES
- GLOBAL POSITIONING SYS.
- READ GPS SENSOR DATA
- NMEA GPS DATA
- DECODE GPS SENSOR DATA

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STORE LOCATION DATA

- STRUCTURED AND UNSTRUCTURED DATA
- SEND GPS DATA TO AN IOT HUB
- HOT, WARM, AND COLD, PATHS
- HANDLE GPS EVENTS USING SERVERLESS CODE
- AZURE STORAGE ACCOUNTS
- CONNECT YOUR SERVERLESS CODE TO STORAGE

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VISUALIZE LOCATION DATA

- WHAT IS DATA VISUALIZATION?
- MAP SERVICES
- CREATE AN AZURE MAPS RESOURCE
- ON A WEB PAGE
- JSON FORMAT
- PLOT GPS USING JSON

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GEOFENCES

- WHAT ARE GEOFENCES?
- DEFINE A GEOFENCE
- TEST POINTS AGAINST GEOFENCES
- USE GEOFENCES FROM SERVERLESS

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TRAIN A FRUIT QUALITY DETECTOR

- USING AI/ML TO SORT FOOD
- IMAGE CLASSIFICATION VIA MACHINE LEARNING
- TRAIN AN IMAGE CLASSIFIER
- TEST YOUR IMAGE CLASSIFIER
- RETRAIN YOUR IMAGE CLASSIFIER

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CHECK FRUIT QUALITY FROM AN IOT DEVICE!

- CAMERA SENSORS
- CAPTURE AN IMAGE...
- PUBLISH CLASSIFIER...
- CLASSIFY IMAGES...
- IMPROVE THE MODEL!

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RUN YOUR FRUIT DETECTOR ON THE EDGE

- EDGE COMPUTING
- AZURE IOT EDGE REGISTER EDGE DEVICE
- SETUP EDGE DEVICE
- RUN YOUR CLASSIFIER ON EDGE

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TRIGGER FRUIT QUALITY DETECTION FROM A SENSOR

- ARCHITECT COMPLEX IOT APPLICATIONS
- DESIGN A FRUIT QUALITY CONTROL SYSTEM
- TRIGGER FRUIT QUALITY CHECKING FROM SENSOR DATA USED FOR A FRUIT QUALITY DETECTOR
- USE DEVELOPER DEVICES TO SIMULATE MULTIPLE IOT BY MOVING TO 1 PRODUCTION

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TRAIN A STOCK DETECTOR TO COUNT THE STOCK (INVENTORY) IN STORE

- TRAIN AND USE AN OBJECT DETECTOR!
- ANOTHER CUSTOM VISION SCENARIO!
- OBJECT DETECTION
- USE OBJECT DETECTION IN RETAIL
- TRAIN AN OBJECT DETECTOR
- TEST YOUR OBJECT DETECTOR
- RETRAIN YOUR OBJECT DETECTOR

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CHECK STOCK FROM AN IOT DEVICE

- RESTOCKING REQUIRED ON PALE IOT?
- SALE
- STOCK COUNTING
- INVOKING OBJECT DETECTOR FROM IOT DEVICE
- BOUNDING BOXES
- RETRAIN THE MODEL
- COUNT STOCK

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RECOGNIZE SPEECH FROM AN IOT DEVICE

- MICROPHONES
- CAPTURE AUDIO FROM IOT DEVICE
- SPEECH TO TEXT
- CONVERT SPEECH TO TEXT
- SAMPLING AUDIO FOR DIGITAL VALUES

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UNDERSTAND LANGUAGE

- LANGUAGE UNDERSTANDING
- CREATE LANGUAGE UNDERSTANDING MODEL
- INTENTS & ENTITIES
- USE LANGUAGE UNDERSTANDING MODEL

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SET A TIMER PROVIDE SPOKEN FEEDBACK

- TEXT TO SPEECH
- SET THE TIMER
- CONVERT TEXT TO SPEECH
- SMART ASSISTANTS ARE ABOUT 2-WAY COMMUNICATIONS!
- TEXT ANALYSIS
- WORDS
- LINGUISTIC ANALYSIS
- PHONEMES
- WAVEFORM GENERATOR
- SPEECH!

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SUPPORT MULTIPLE LANGUAGES WITH TRANSLATIONS

- TRANSLATE TEXT
- CREATE TRANSLATOR RESOURCE
- TRANSLATION SERVICES
- SUPPORT MULTIPLE LANGUAGES WITH TRANSLATIONS
- TRANSLATE TEXT
- ENGLISH TEXT
- AZURE IOT HUB
- AZURE FUNCTIONS
- LUIS
- MICROPHONE
- SPEECH
- TRANSLATOR
- SPEAKER
- SPEECH
- TRANSLATOR

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CONGRATULATIONS

You made it!!
#IOT4Beginners

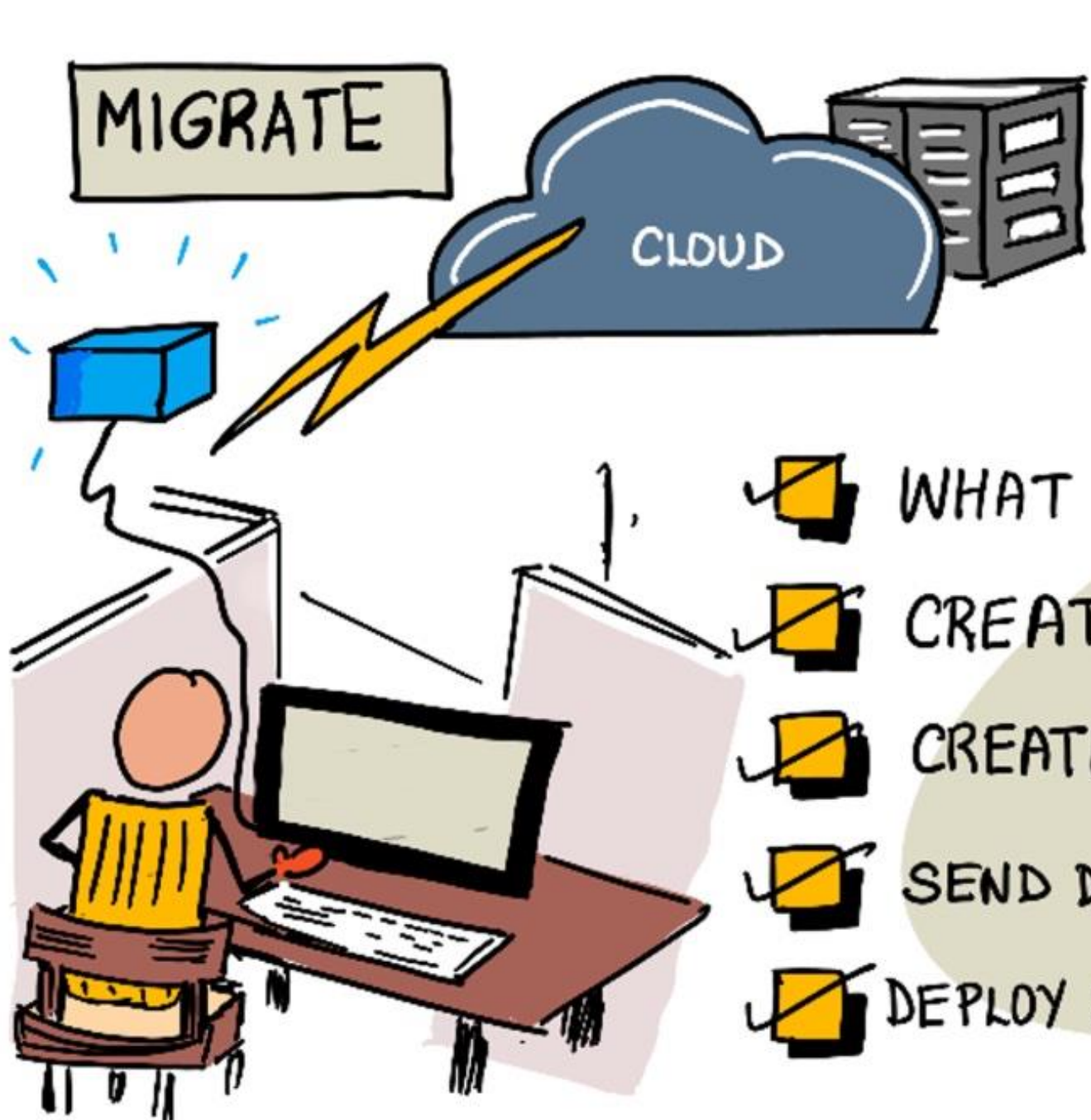


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MIGRATE

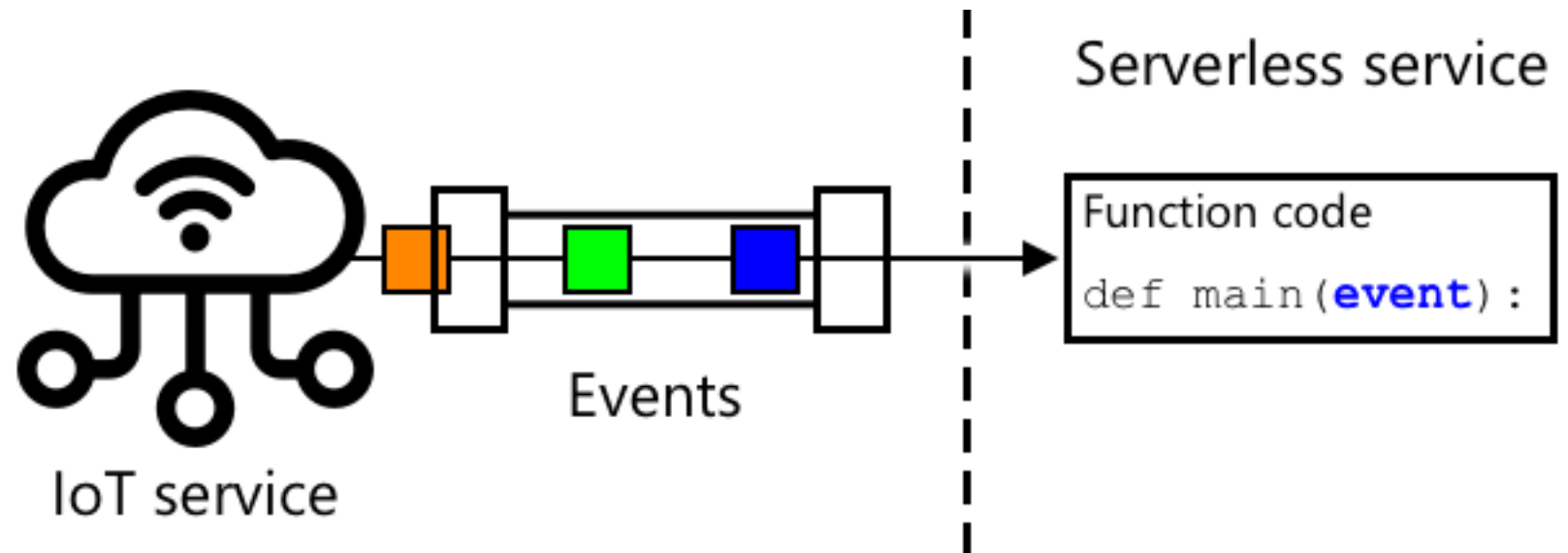
CLOUD

YOUR APPLICATION LOGIC
TO THE CLOUD!

- 
- ✓ WHAT IS SERVERLESS?
 - ✓ CREATE A SERVERLESS APP
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 - ✓ SEND DIRECT METHOD REQUESTS
 - ✓ DEPLOY SERVERLESS CODE

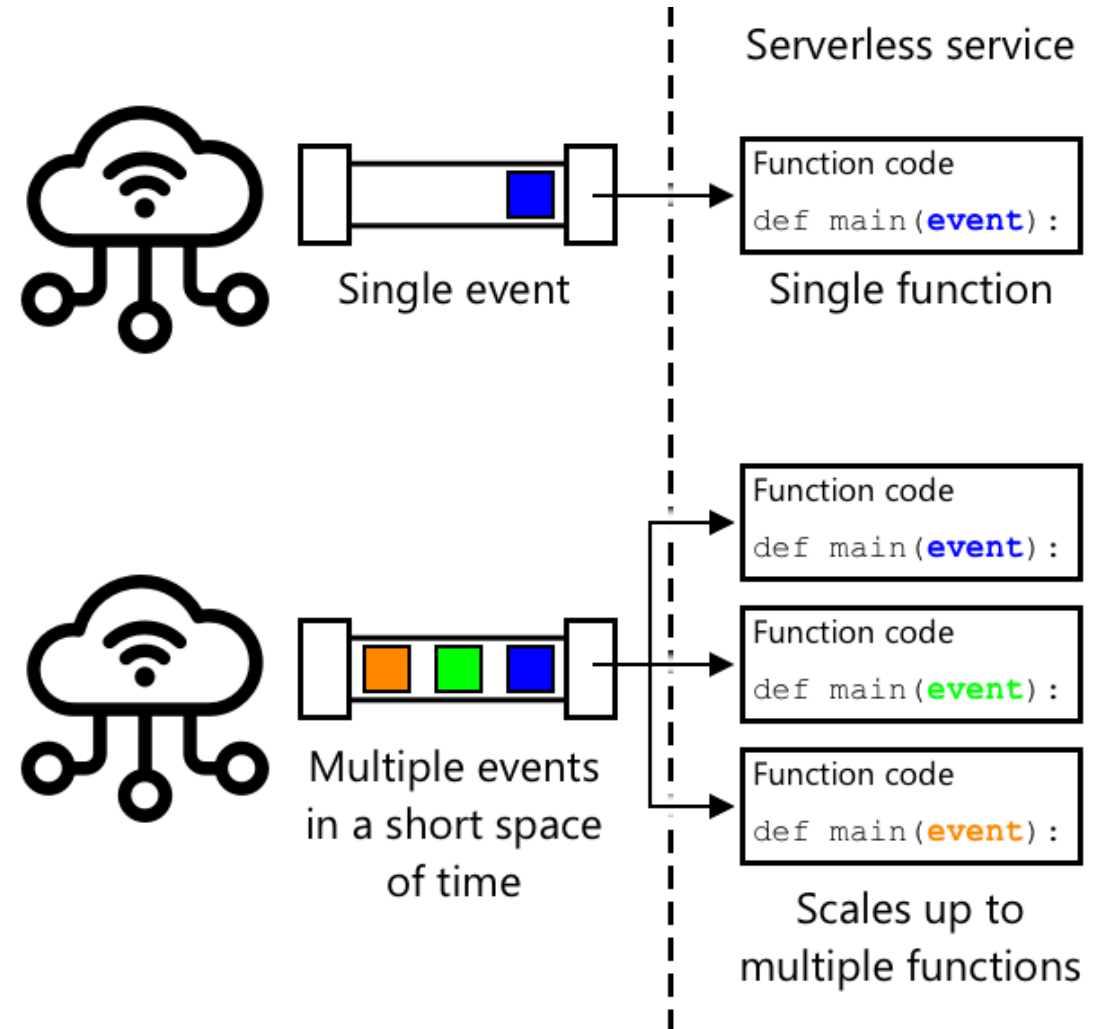
WHAT IS SERVERLESS?

- The biggest lie in cloud computing - there is a server!
- Serverless means you don't care about servers
- Small blocks of code that are run in the cloud in response to events



WHAT IS SERVERLESS?

- Serverless because managing where the code is run is handled by the cloud
- Scales up and down automatically depending on need



SERVERLESS FOR IOT

- IoT telemetry is events sent by a device
- If you need to run code to respond to this telemetry, serverless is ideal
- Code is only run, and you only pay when a device sends data
- Can store events if the function app is offline and process them when it starts up

AZURE FUNCTIONS

- The serverless offering from Azure
- Write your event code in Python, JavaScript, typescript, C#, F#, Java, PowerShell or any language using an extension host
- Functions needs some storage for tracking



DEMO: CREATE AN AZURE FUNCTION

Launch Azurite

Create an Azure Functions project

Create an event trigger

Run the event trigger

DEMO: CONTROL THE DEVICE FROM AN AZURE FUNCTION

Connect to the registry manager

Send a direct method request

DEMO: DEPLOY THE FUNCTIONS APP TO THE CLOUD

Create cloud resources

Upload application settings

Deploy the functions app