

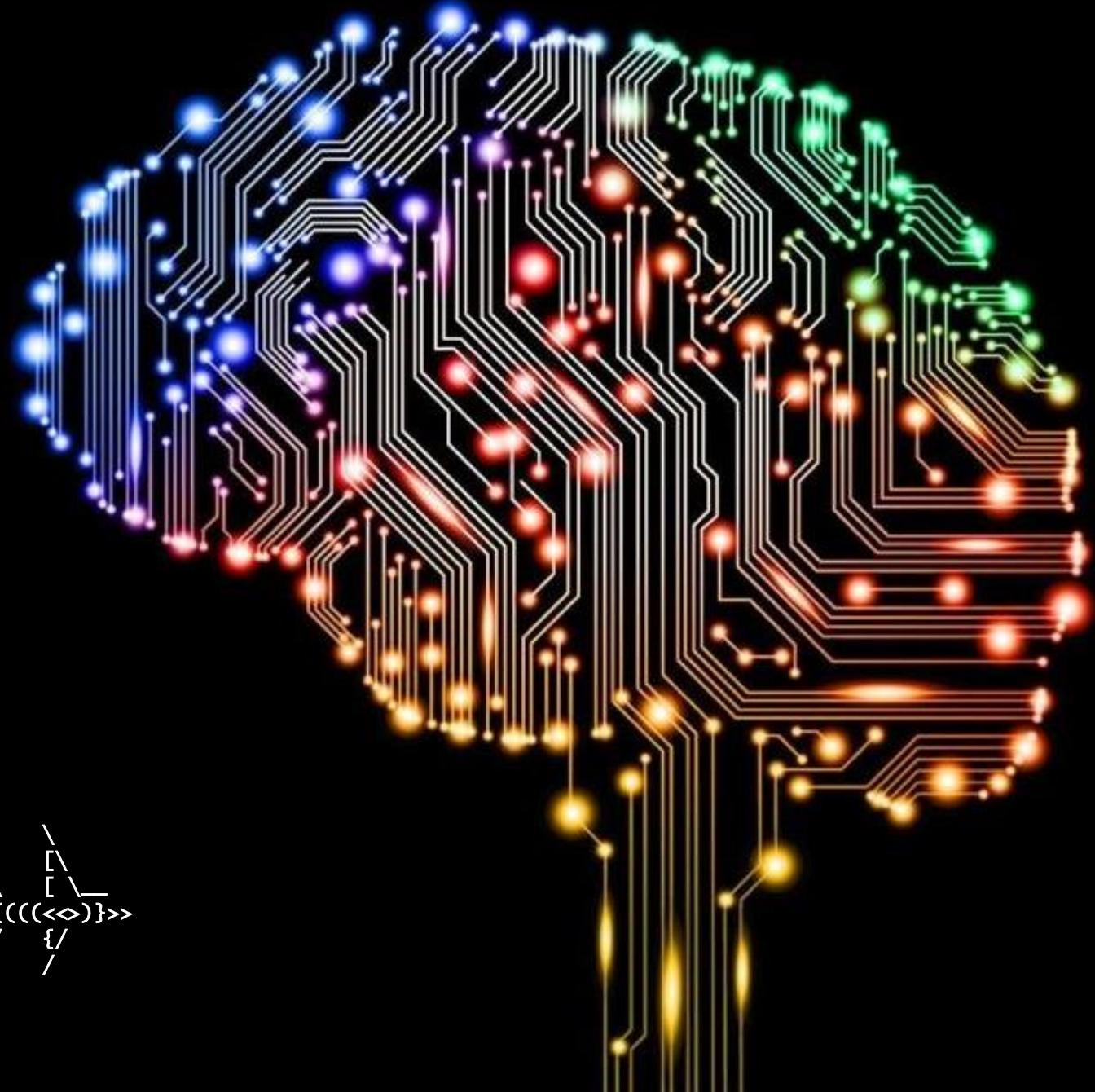
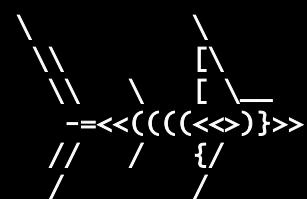
# Make Smarter Bots with Azure Machine Learning

Jeff Barnes

Cloud / Data Solution Architect

US National Customer Success Team

[jbarnes@Microsoft.com](mailto:jbarnes@Microsoft.com)





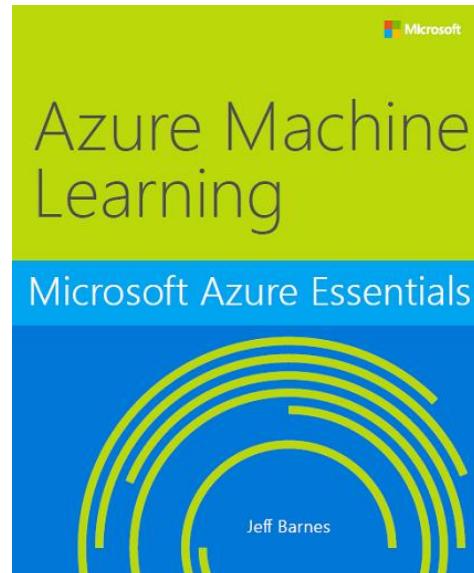
**Jeff Barnes** is a Cloud & Data Solution Architect based in the Southeast U.S. (Florida). As part of the U.S. National Cloud Solution Architect team, Jeff will be responsible for helping Microsoft's top customers on their cloud journey by providing guiding architectural support for Microsoft Azure solution development activities.

**Prior to this role:** Jeff Spent 7+ years in Microsoft Consulting Services (MCS) as a Service Line Architect. He also spent 10+ years in the Microsoft Developer Platform Evangelism (DPE) / Developer Experience organization as a .NET architect Evangelist. Most recently, Jeff served as a Cloud /Data Solution Architect on the WW EPG Partner Enterprise Architect Team (PEAT) where he assisted Microsoft's strategic Global SI Partners with accelerating their cloud and Azure adoption.

**Outside of work:** Jeff really enjoys spending time with family, hiking, biking, boating, fishing, and always learning about new technology. Jeff has written books on Azure Machine Learning and Cortana Intelligence Suite.

**Free Azure ML ebook:**

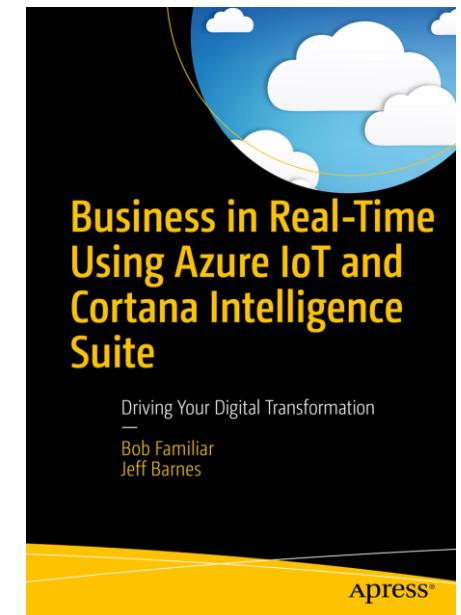
[http://aka.ms/AzureML\\_pdf](http://aka.ms/AzureML_pdf)



**Business in Real-Time Using Azure IoT and Cortana Intelligence Suite:**

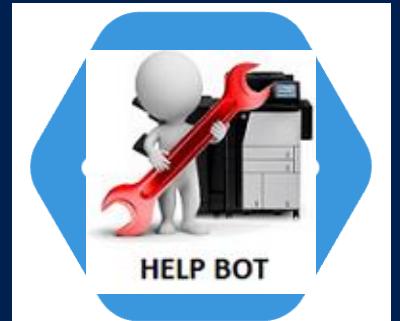
<http://www.apress.com/us/book/9781484226490>

\*Code: <https://github.com/brtbook/brt>

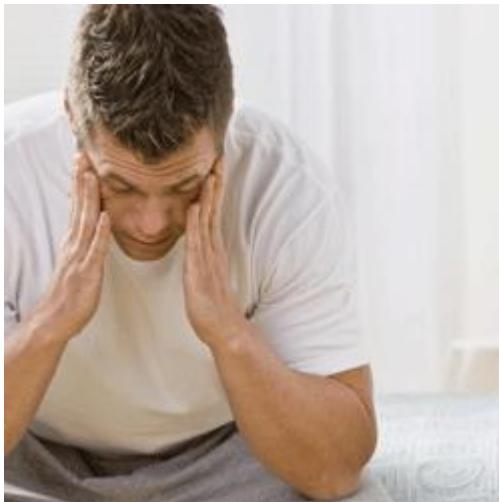


# Agenda:

- Azure Machine Learning
- Azure Bot Framework
- LUIS: Language Understanding Intelligence Service
- Putting it All Together
  - -> Printer Support Bot
- Links & Resources



# A Brief Public Service Announcement...



# Azure Machine Learning

**“AI is the best thing that  
ever happened to the  
Human Race...”**



**Robama 9000**

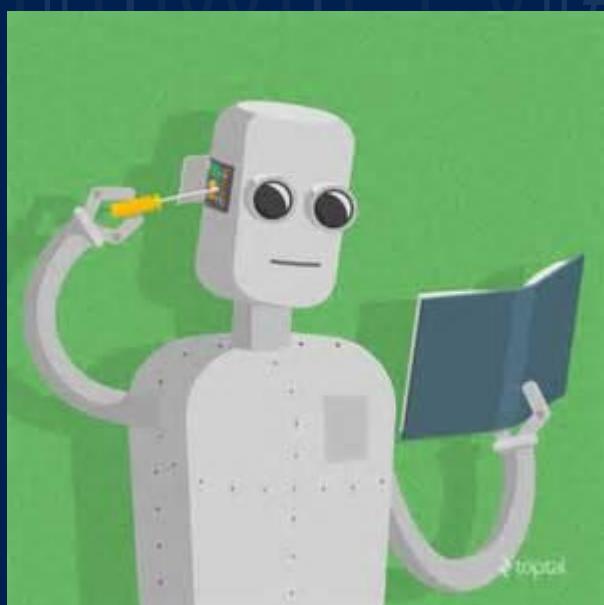
Newly elected leader of Mankind

What is  
Machine Learning?

Computing systems that  
improve with experience

# Machine Learning

- Finding (and exploiting) patterns in data
- Replacing “human writing code” with “human supplying data”...
  - System figures out what the person wants based on examples.
  - Use “training” data to “teach” by example.



# Predictive Analytics is EVERYWHERE...



Telemetry Data Analysis



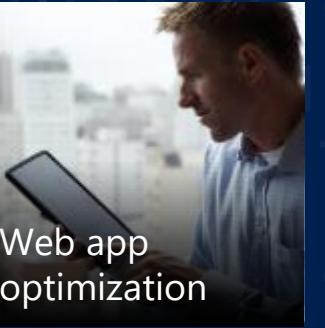
Buyer Propensity Models



Social network analysis



Predictive Maintenance



Web app optimization



Churn Analysis



Natural resource exploration



Weather forecasting



Healthcare outcomes



Fraud detection



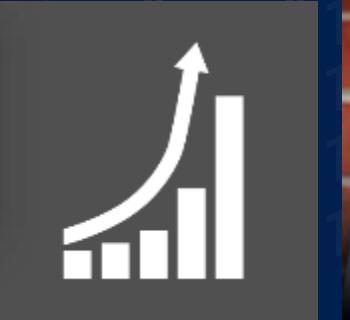
Life sciences research



Targeted Advertising



Network Intrusion Detection



Smart meter monitoring

# It's already happening...



News Video TV Opinions More...

Search CNN



U.S. World Politics Tech Health Entertainment Living Travel Money Sports

## Cepheus, the poker-playing computer program that can't be beat

By Steve Almasy, CNN

Updated 10:09 PM ET, Thu January 8, 2015

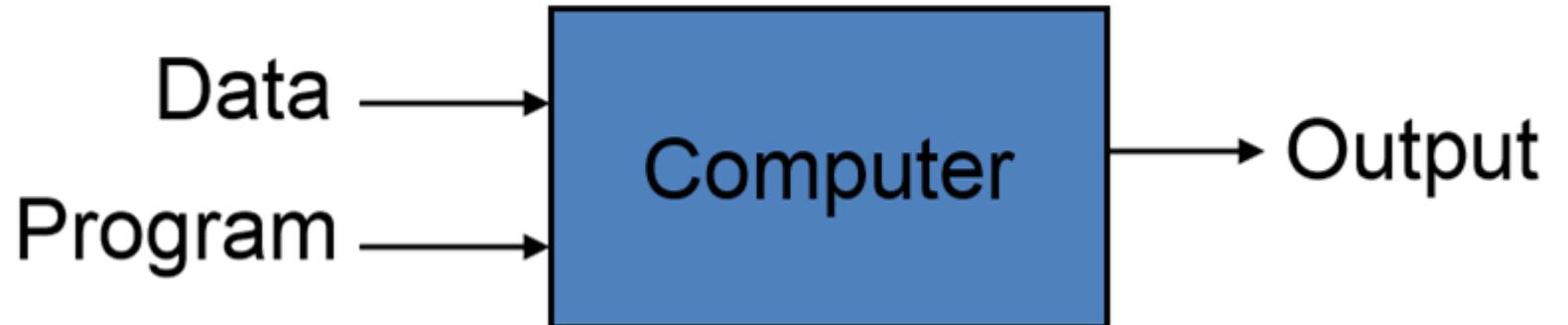


<http://www.cnn.com/2015/01/08/tech/cepheus-unbeatable-poker-program/index.html>

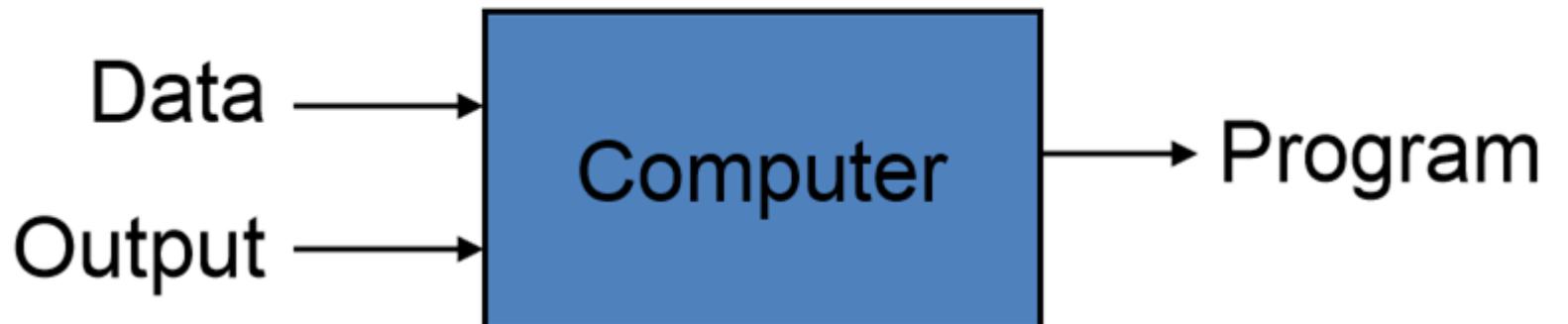
<http://poker.srv.ualberta.ca/about>

# Understanding Machine Learning..

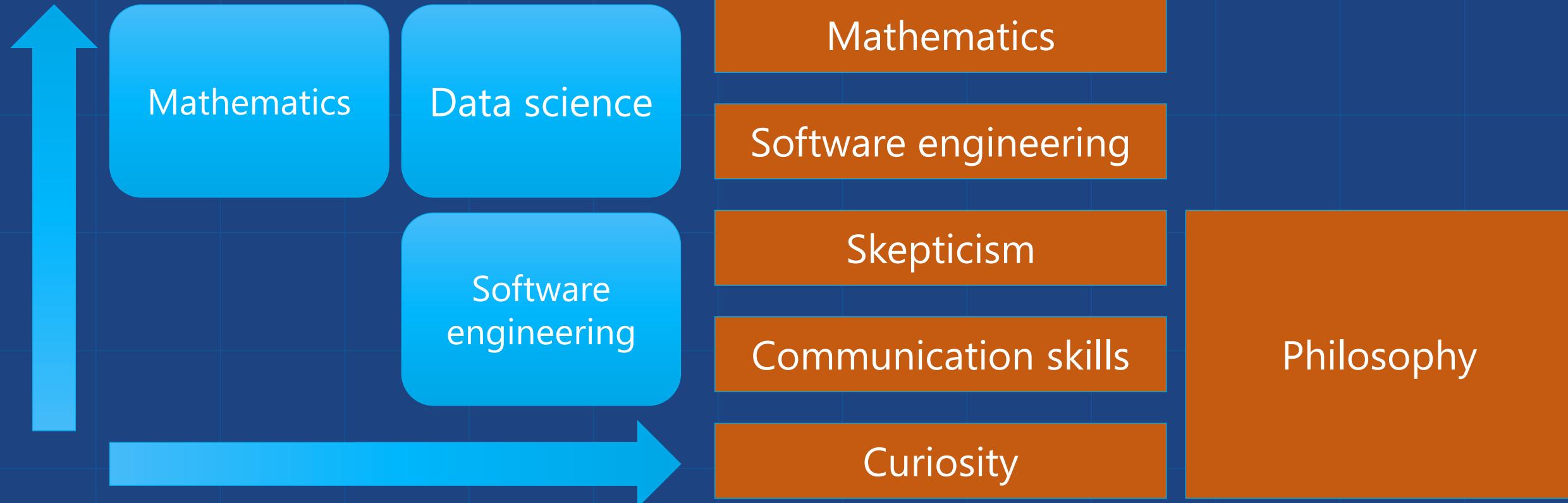
## Traditional Programming



## Machine Learning



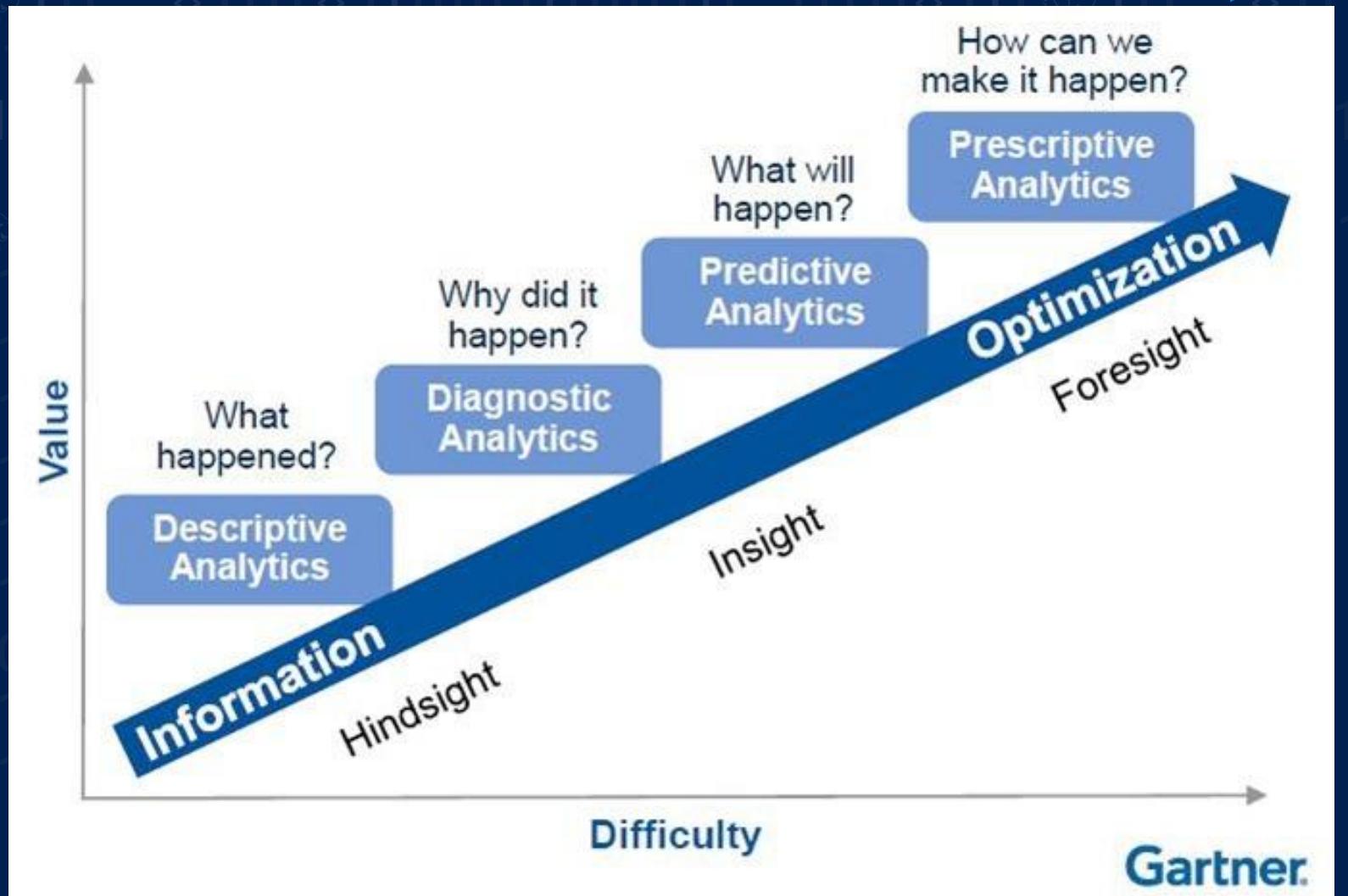
# Today's Data Scientist Skills...



# Types of Analytics

Traditional BI

Machine learning



Future -> Predictions

Present -> Dashboards

Past -> Reports

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# Early ML History: U.S. Post Office

The United States Postal Service processed over 150 billion pieces of mail in 2013—far too much for efficient human sorting.

But as recently as 1997, only 10% of hand-addressed mail was successfully sorted automatically.

The challenge in automation is enabling computers to interpret endless variation in handwriting.

Today, with the help of machine learning, over 98% of all mail is successfully processed by machines.

# Neat Applications

## Design. Develop. Deploy.

Kinect for Windows v2 brings the business and developer community more of the precision, responsiveness, and capabilities that you need to delight and engage your customers. →

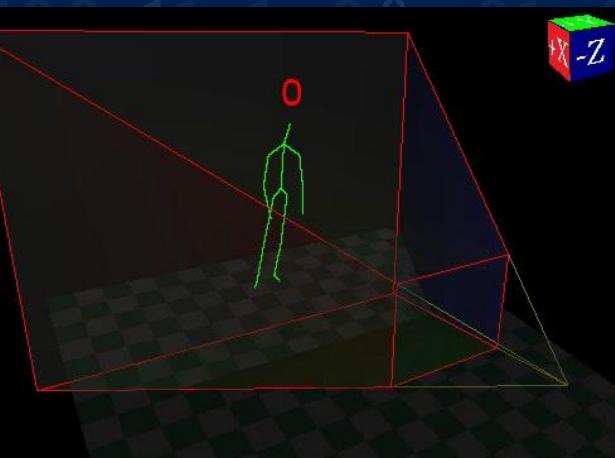


# XBOX KINECT Training...



training data (expensive)

synthetic training data (cheaper)



ML System

# Today's "Perfect Storm" for Machine Learning



- Exponential data growth
- Cheap global digital storage
- Ubiquitous computing power
- The rise of "big data" analytics

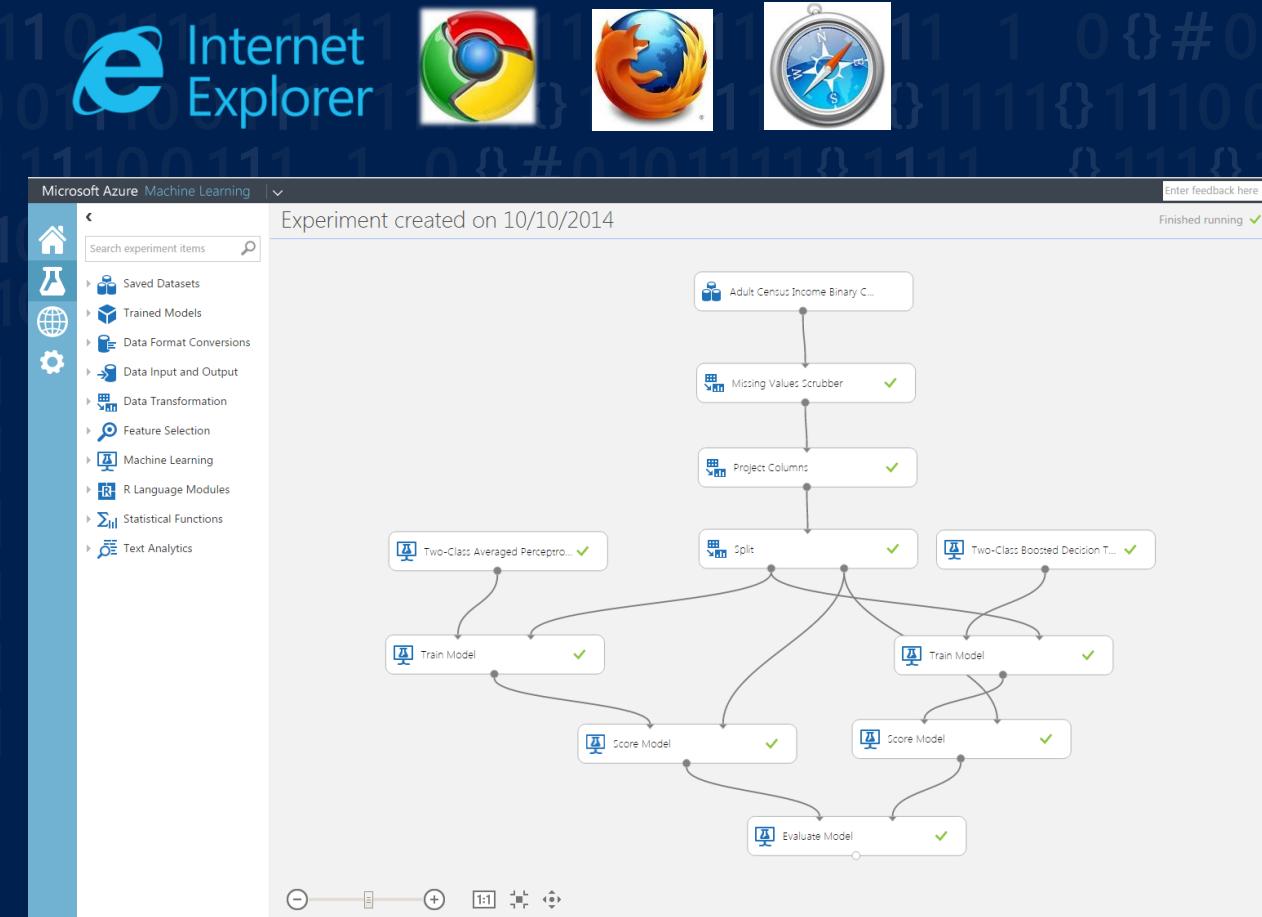
# Azure Machine Learning

# Microsoft Azure Machine Learning

## Features and Benefits

Lowering the Barriers:

- Accessible through a web browser, zero software to install;
- Collaborative: work with anyone, anywhere via Azure workspace
- Visual composition with end2end support for data science workflow;
- Best-in-class ML algorithms;
- Extensible, support for R, OSS.



# Microsoft Azure Machine Learning

## Features and Benefits

- Rapid experimentation to create a better model
- Large library of models, search, discover, and reuse;
- Rapidly try a range of features, ML algorithms and modeling strategies;
- Quickly deploy a model as Azure web service to our ML API service.

The screenshot shows the Microsoft Azure Machine Learning studio interface. On the left is a vertical toolbar with icons for Home, Experiment, Data, and Settings. The main area has a search bar at the top labeled "Search experiment items". Below the search bar is a list of experiment items categorized into three sections: Classification, Clustering, and Regression. Each section contains several model options, each with a preview icon and a "..." button. The "Classification" section includes: Multiclass Decision Forest, Multiclass Decision Jungle, Multiclass Logistic Regression, Multiclass Neural Network, One-vs-All Multiclass, Two-Class Averaged Perceptron, Two-Class Bayes Point Machine, Two-Class Boosted Decision Tree, Two-Class Decision Forest, Two-Class Decision Jungle, Two-Class Logistic Regression, Two-Class Neural Network, and Two-Class Support Vector Machine. The "Clustering" section includes: K-Means Clustering. The "Regression" section includes: Bayesian Linear Regression Model, Boosted Decision Tree Regression, Decision Forest Regression, Linear Regression, Neural Network Regression, Ordinal Regression, and Poisson Regression. At the bottom right, there is a "Score" button.

- Classification
  - Multiclass Decision Forest
  - Multiclass Decision Jungle
  - Multiclass Logistic Regression
  - Multiclass Neural Network
  - One-vs-All Multiclass
  - Two-Class Averaged Perceptron
  - Two-Class Bayes Point Machine
  - Two-Class Boosted Decision Tree
  - Two-Class Decision Forest
  - Two-Class Decision Jungle
  - Two-Class Logistic Regression
  - Two-Class Neural Network
  - Two-Class Support Vector Machine
- Clustering
  - K-Means Clustering
- Regression
  - Bayesian Linear Regression Model
  - Boosted Decision Tree Regression
  - Decision Forest Regression
  - Linear Regression
  - Neural Network Regression
  - Ordinal Regression
  - Poisson Regression

▶ Score

# Machine Learning Algorithms:

Split into two main categories:

- Supervised learning

- Predicting the future
- Learn from known past examples to predict future

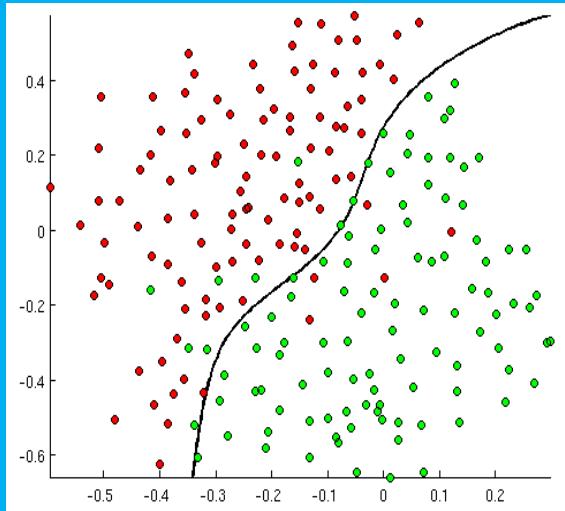
- Un-supervised learning

- Making sense of data
- Understanding the past
- Learning the structure of data
- Compressing data for consumption

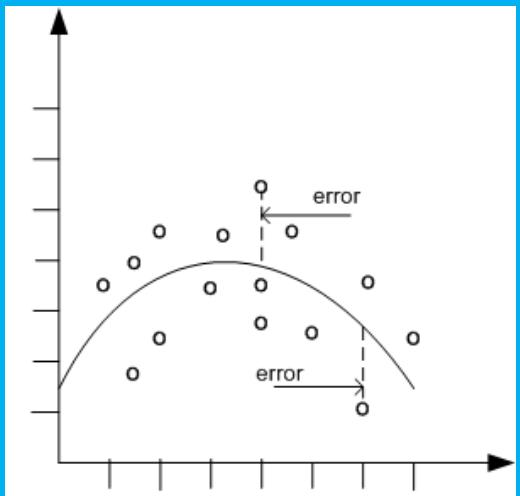
# Azure Machine Learning Capabilities

State-of-the-Art Machine Learning Algorithms:

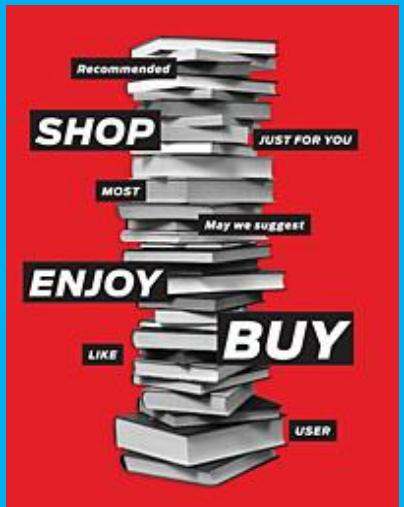
Classification



Regression



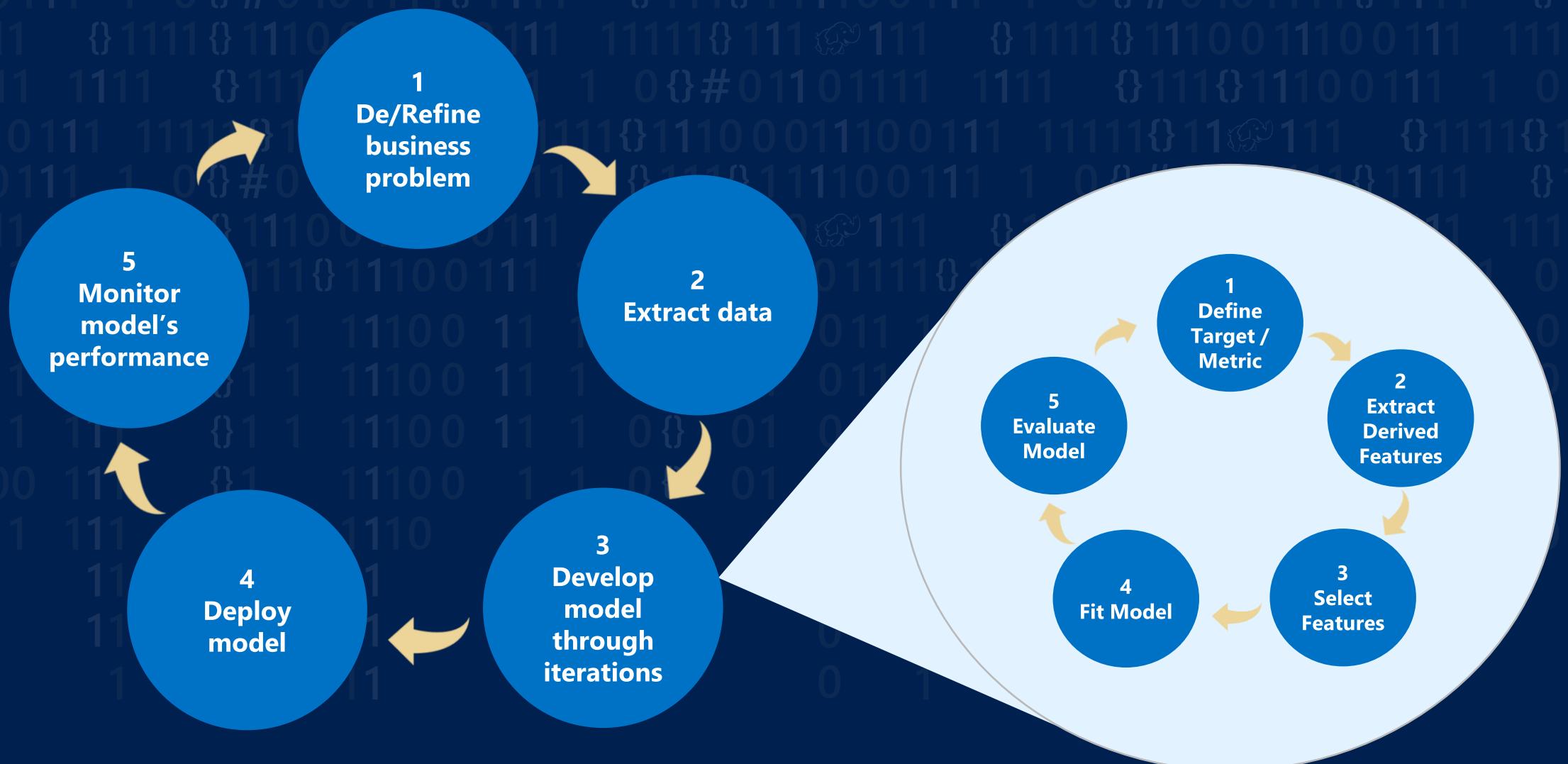
Recommenders



Clustering

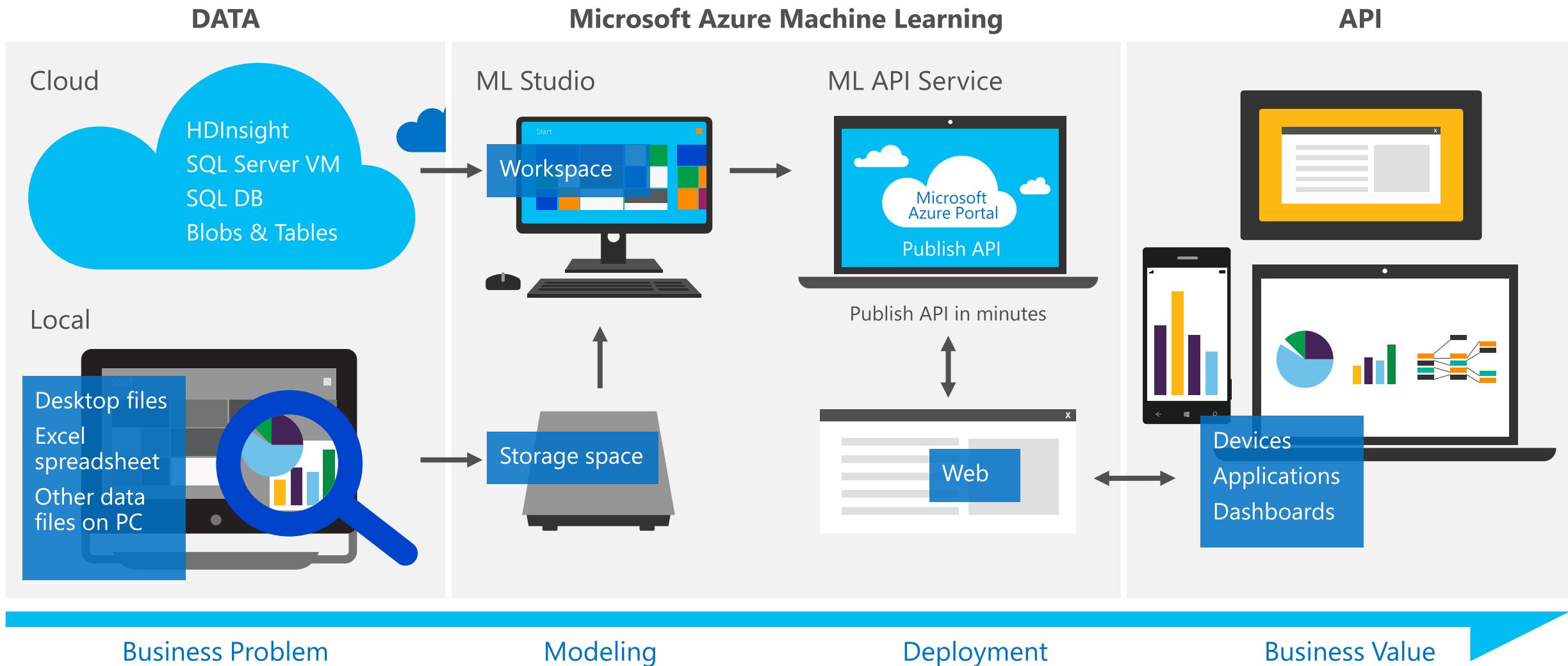


# General Steps to Build a Machine Learning Solution:



# Making machine learning accessible

## Microsoft Azure Machine Learning



# Demo: Sample Application – Predicting Income Level

- Goal

- Predict whether an adult's income is  $>50K$  or  $\leq 50K$  using census income data.

- Data sources

- 1. Census Income Dataset
    - Source: [UCI Machine Learning Repository](#)

- Dataset Description

- <http://archive.ics.uci.edu/ml/machine-learning-databases/adult/adult.names>
  - Numeric fields: age, fnlwgt, education-num, capital-gain, capital-loss, hours-per-week.
  - Categorical fields: workclass, education, marital-status, occupation, relationship, race, sex, native-country.

# Adult Census Income Dataset

age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race	sex	capital-gain	capital-loss	hours-per-week	native-country	income
39	State-gov	77516	Bachelors		13	Never-married	Adm-clerical	Not-in-family	White	Male	2174	0	40	United-States <=50K
50	Self-emp-no-ho	83311	Bachelors		13	Married-civ-spou	Exec-manager	Husband	White	Male	0	0	13	United-States <=50K
38	Private	215646	HS-grad		9	Divorced	Handlers-cleaner	Not-in-family	White	Male	0	0	40	United-States <=50K
53	Private	234721	11th		7	Married-civ-spou	Handlers-cleaner	Husband	Black	Male	0	0	40	United-States <=50K
28	Private	338409	Bachelors		13	Married-civ-spou	Prof-specialty	Wife	Blk-fair	Female	0	0	40	United-States <=50K
37	Private	1582	Masters		14	Married-civ-spou	Exec-manager	Wife	Asian-Pac-Islander	Male	0	0	40	United-States <=50K
49	Private	177	9th		5	Married-spouse-absent	Other-service	Not-in-family	White	Female	0	0	40	Jamaica <=50K
52	Self-emp-no-ho	205596	HS-grad		9	Married-civ-spou	Exec-manager	Husband	White	Male	0	0	40	United-States >50K
31	Private	45787	Masters		14	Never-married	Prof-specialty	Not-in-family	White	Female	14084	0	40	United-States >50K
42	Private	159449	Bachelors		13	Married-civ-spou	Exec-manager	Husband	White	Male	5178	0	40	United-States >50K
37	Private	280464	Some-college		10	Married-civ-spou	Exec-manager	Husband	Black	Male	0	0	80	United-States >50K
30	State-gov	141297	Bachelors		13	Married-civ-spou	Prof-specialty	Husband	Asian-Pac-Islander	Male	0	0	40	India >50K
23	Private	1222	HS-grad		1	Married	Adm-clerical	Own-child	White	Female	0	0	40	United-States <=50K
32	Private	2050	HS-grad		1	Married	Sales	Not-in-family	Black	Male	0	0	40	United-States <=50K
40	Private	1217	HS-grad		1	Married	Craft-repair	Husband	Asian-Pac-Islander	Male	0	0	40	United-States >50K
34	Private	2454	HS-grad		1	Married	Transport-moving	Husband	Amer-Ind-Mex	Male	0	0	45	Mexico <=50K
25	Self-emp-no-ho	1767	HS-grad		1	Married	Farming-fisher	Own-child	White	Male	0	0	35	United-States <=50K
32	Private	186824	HS-grad		9	Never-married	Machine-op-insrt	Unmarried	White	Male	0	0	40	United-States <=50K
38	Private	28887	11th		7	Married-civ-spou	Sales	Husband	White	Male	0	0	50	United-States <=50K
43	Self-emp-no-ho	292175	Masters		14	Divorced	Exec-manager	Unmarried	White	Female	0	0	45	United-States >50K
40	Private	193524	Doctorate		16	Married-civ-spou	Prof-specialty	Husband	White	Male	0	0	60	United-States >50K
54	Private	302146	HS-grad		9	Separated	Other-service	Unmarried	Black	Female	0	0	20	United-States <=50K
35	Federal-gov	76845	9th		5	Married-civ-spou	Farming-fisher	Husband	Black	Male	0	0	40	United-States <=50K
43	Private	117037	11th		7	Married-civ-spou	Transport-moving	Husband	White	Male	0	2042	40	United-States <=50K
59	Private	109015	HS-grad		9	Divorced	Tech-support	Unmarried	White	Female	0	0	40	United-States <=50K
56	Local-gov	216851	Bachelors		13	Married-civ-spou	Tech-support	Husband	White	Male	0	0	40	United-States >50K
19	Private	168294	HS-grad		9	Never-married	Craft-repair	Own-child	White	Male	0	0	40	United-States <=50K
54	?	180211	Some-college		10	Married-civ-spou	?	Husband	Asian-Pac-Islander	Male	0	0	60	South >50K
39	Private	367260	HS-grad		9	Divorced	Exec-manager	Not-in-family	White	Male	0	0	80	United-States <=50K

Potential target Fields:  
workclass, education,  
occupation, etc.

String fields are  
categorical

Wonder if it'd impact  
the model performance

Missing values

# \*\*ALERT: New Technical Term\*\*



## yak shaving!

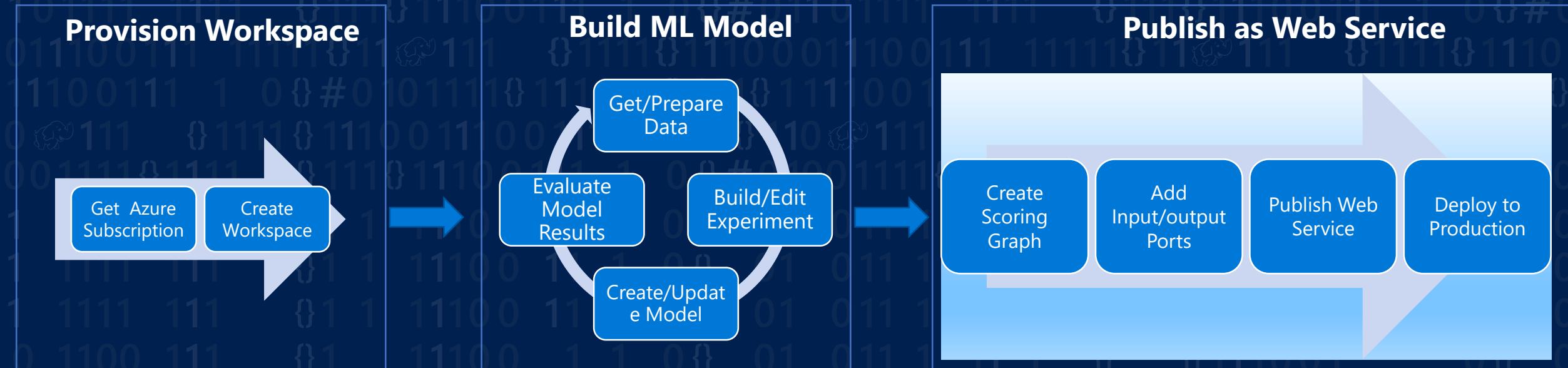
"Any seemingly pointless activity which is actually necessary to solve a problem which solves another problem which, several levels of recursion later, solves the real problem you're working on..."

# Azure ML Demo: Predicting Income From A-Z

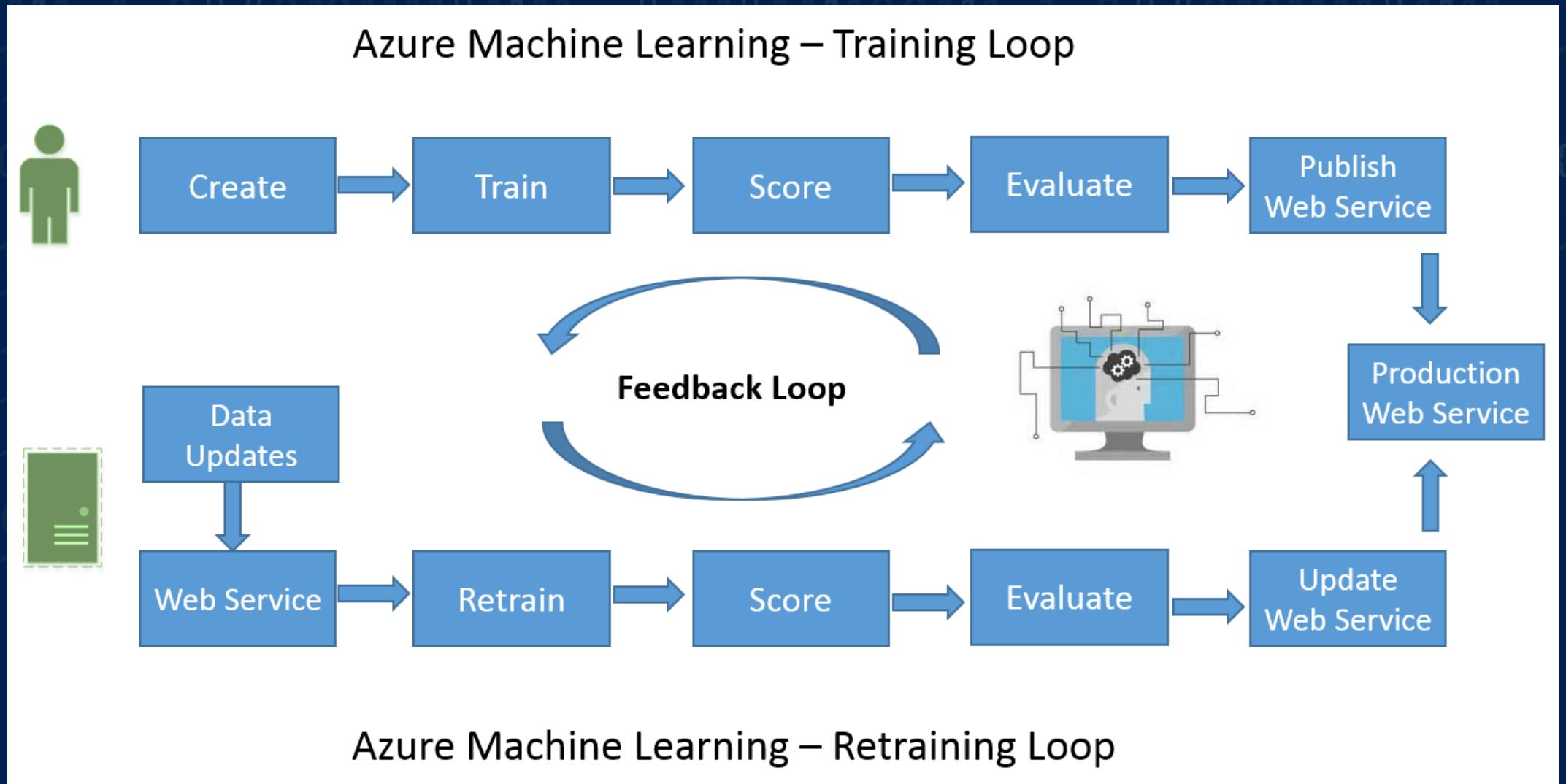
<http://mlwebapi.azurewebsites.net/>

`http://mlwebapi.azurewebsites.net/api/IncomePrediction/GetPrediction?age=53&workclass=Self-emp-not-inc&fnlwgt=209642&education=HS-grad&education-num=9&marital-status=Married-civ-spouse&occupation=Exec-managerial&relationship=Husband&race=White&sex=Male&capital-gain=0&capital-loss=0&hours-per-week=45&native-country=United-States`

# Recap: Publishing an ML API Web Service



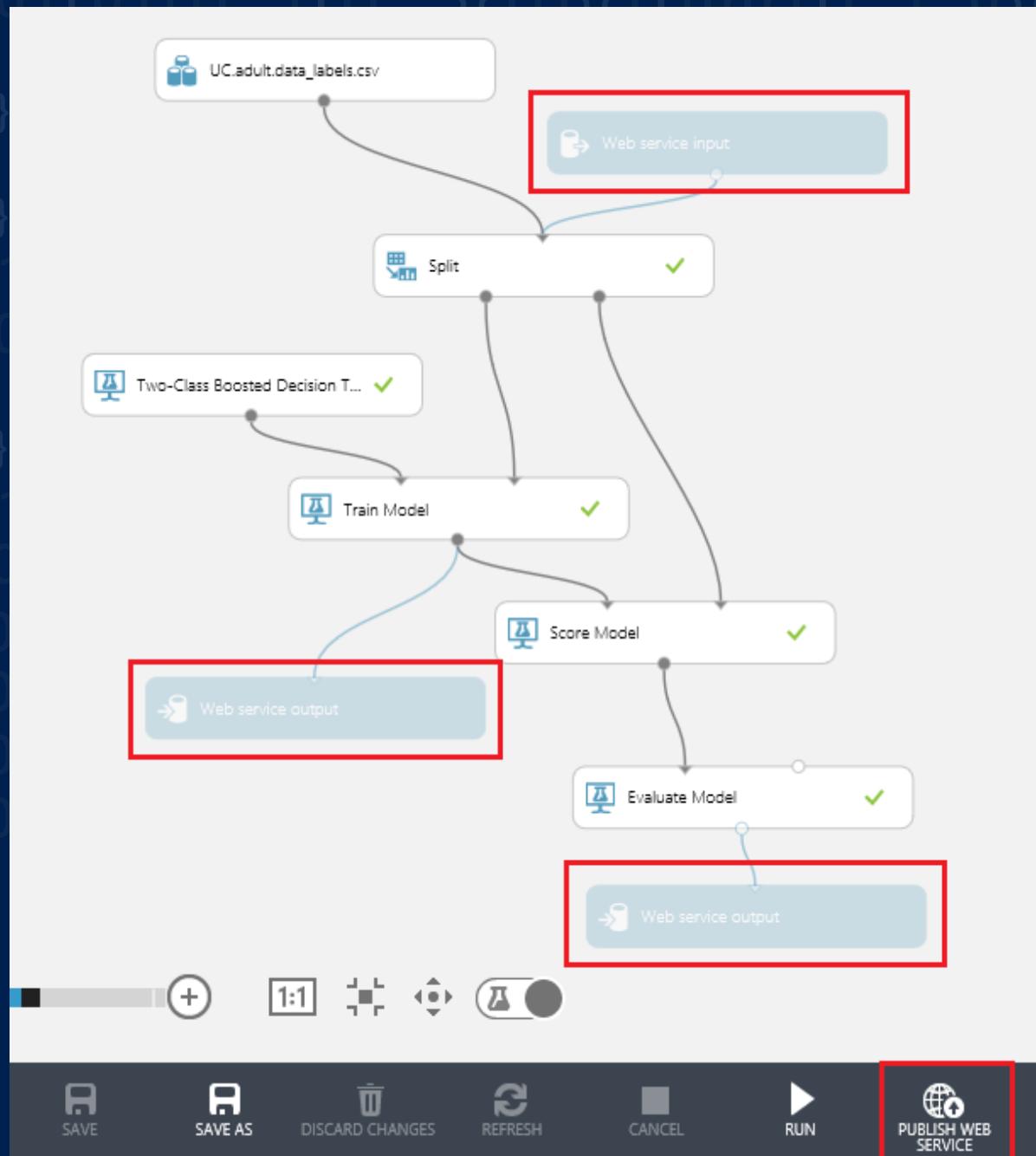
# Re-Training an ML Model...



# Create a Re-Training Experiment:

- **Add a Web Service Input module** and connect it to the top of the “Split” module. This will provide a means to insert a new dataset into the workflow
- **Add a Web Service output module** and connect it to the bottom of the “Train” module. This web service will provide us the newly trained model.
- **Add a Web Service output module** and connect it to the bottom of the “Evaluate” module. This web service will return the module’s “Evaluate Model” output.

**\*Important Note\*** the only way to retrain Azure ML models is by using the Batch Execution API method.



## 5\_income\_prediction\_train\_score\_evaluate\_publish\_ws

endpoints

NAME	VERSION	UPDATE AVAILABLE	MAX CONCURRENT...	SEARCH
default	→ 6/3/2015 10:39:43 PM	false	20	
retraining	6/3/2015 10:39:43 PM	false	20	

quick glance

 Edit in Studio

WEB SERVICE ID

36500064077b45dd920eb0a842594677

DESCRIPTION

No description provided for this web service.

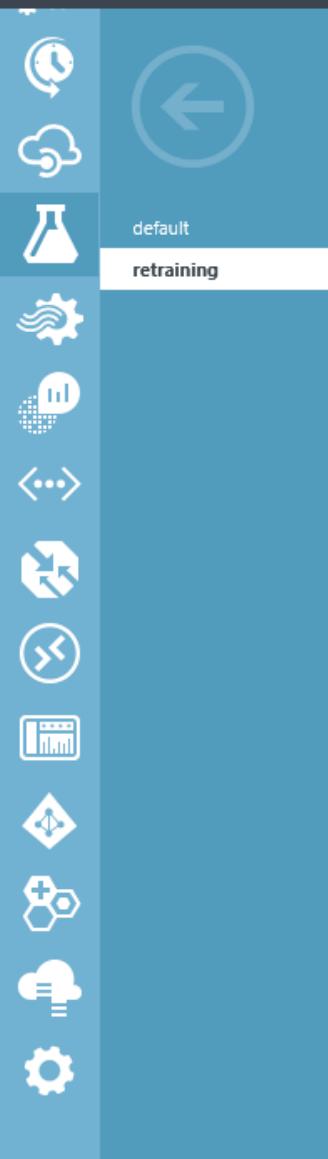
SUBSCRIPTION NAME

Windows Azure Internal Consumption

LOCATION

South Central US

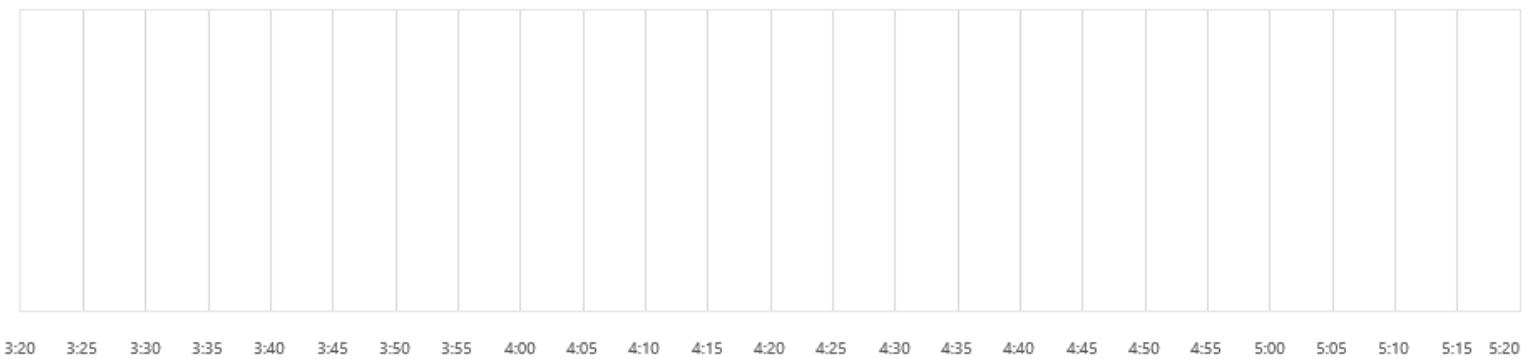




## retraining

[DASHBOARD](#) [CONFIGURE](#) COMPUTE  FAILED PREDICTIONS  PREDICTIONS

RELATIVE ▾ 2 HOURS ▾

[retraining endpoint](#)[quick glance](#)[Publish to Azure data marketplace](#)[Edit in Studio](#)

WEB SERVICE NAME

5\_Income\_Prediction\_Train\_Score\_Evaluate\_Publish\_WS

WEB SERVICE ID

36500064077b45dd920eb0a842594677

ENDPOINT NAME

retraining

[methods](#)[REQUEST/RESPONSE](#) ➔[BATCH EXECUTION](#) ➔[UPDATE RESOURCE](#) ➔

NEW

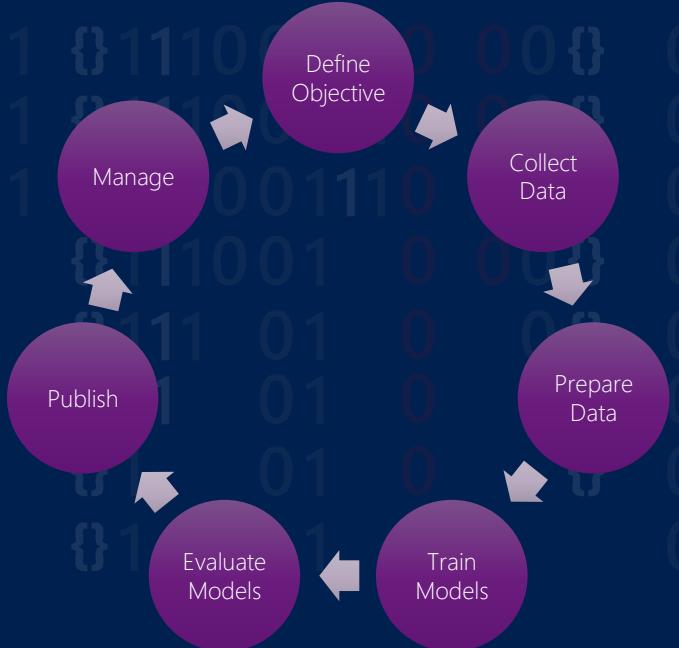
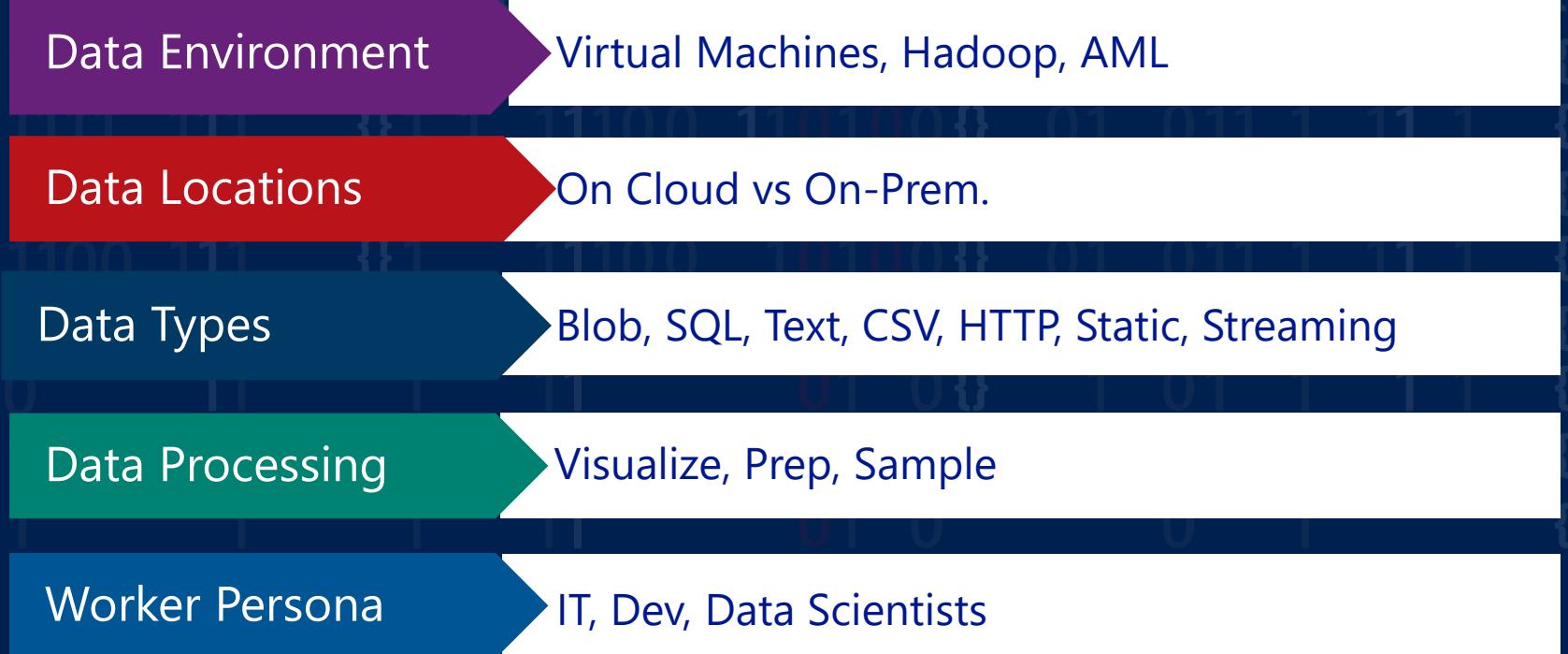
UPDATE ENDPOINT

1 ⚡ 1 🔍 ?

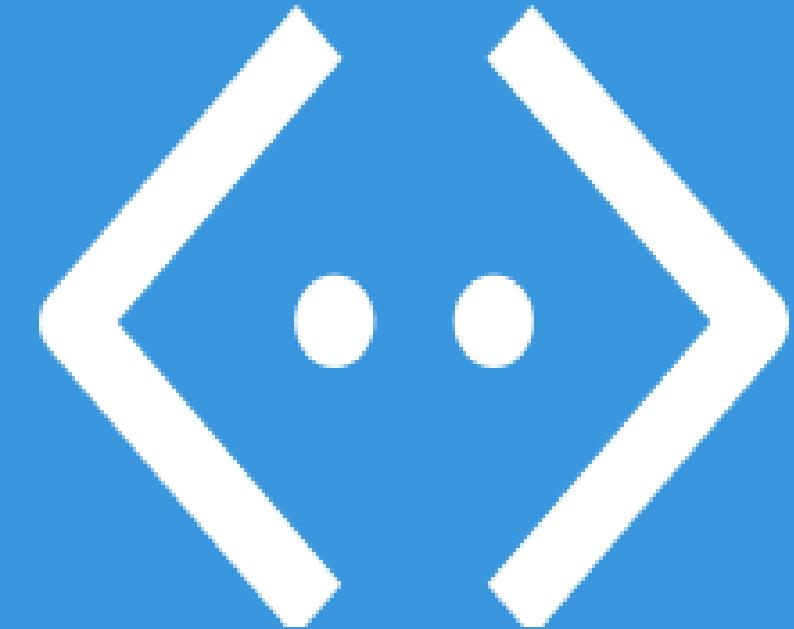
# Advanced Analytics Process

A playbook that demonstrates how end-end data science solutions can be developed & deployed for various business scenarios, both in-cloud and on-prem. (<http://aka.ms/adap>)

Hands-on experience with walkthroughs including re-usable code



# Microsoft Bot Framework



# What is the bot framework?

## What?

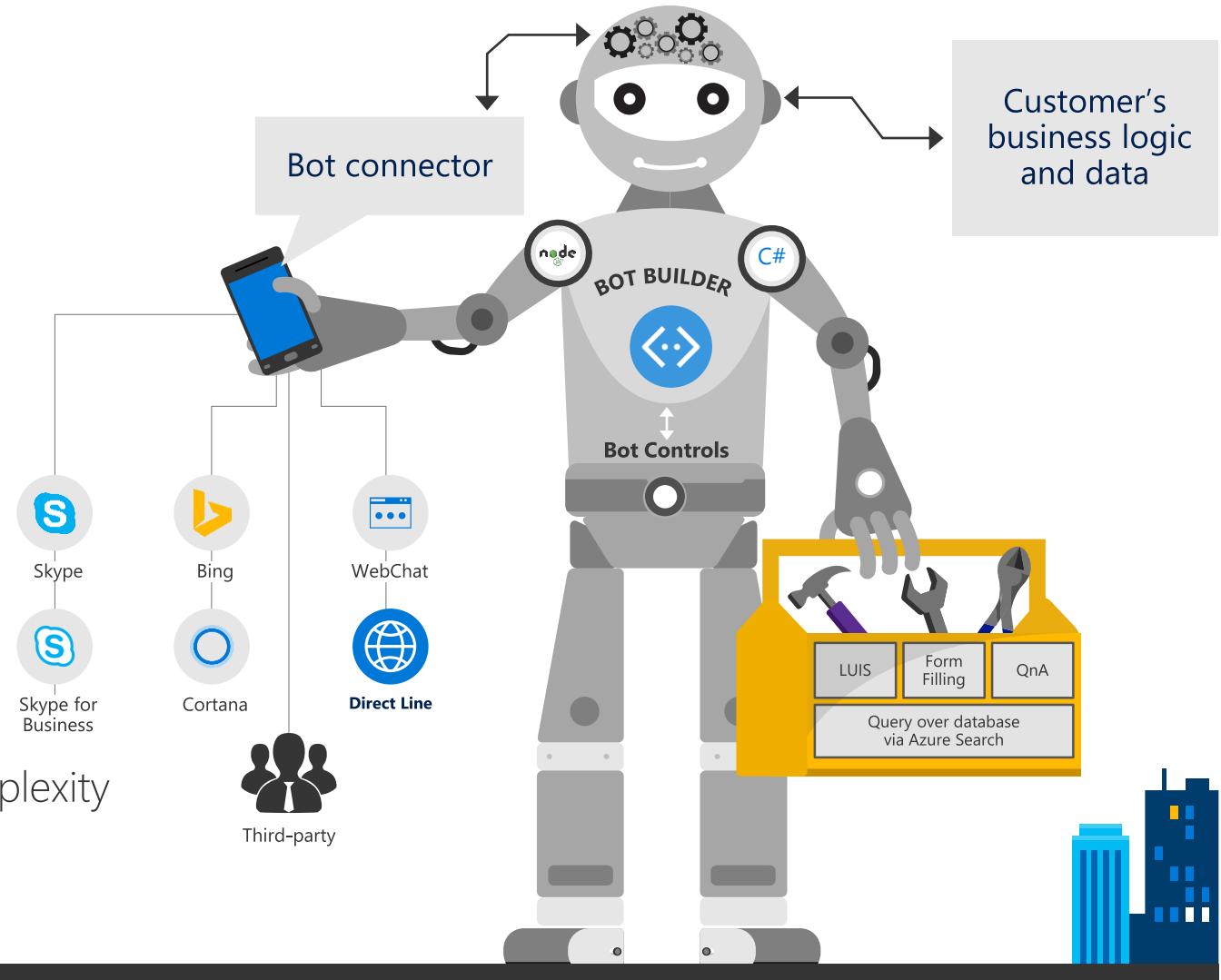
- Tools for building REST websites
- Services to enrich
- Mechanisms for receive events
- Data to debug and tools to analyze

## Why?

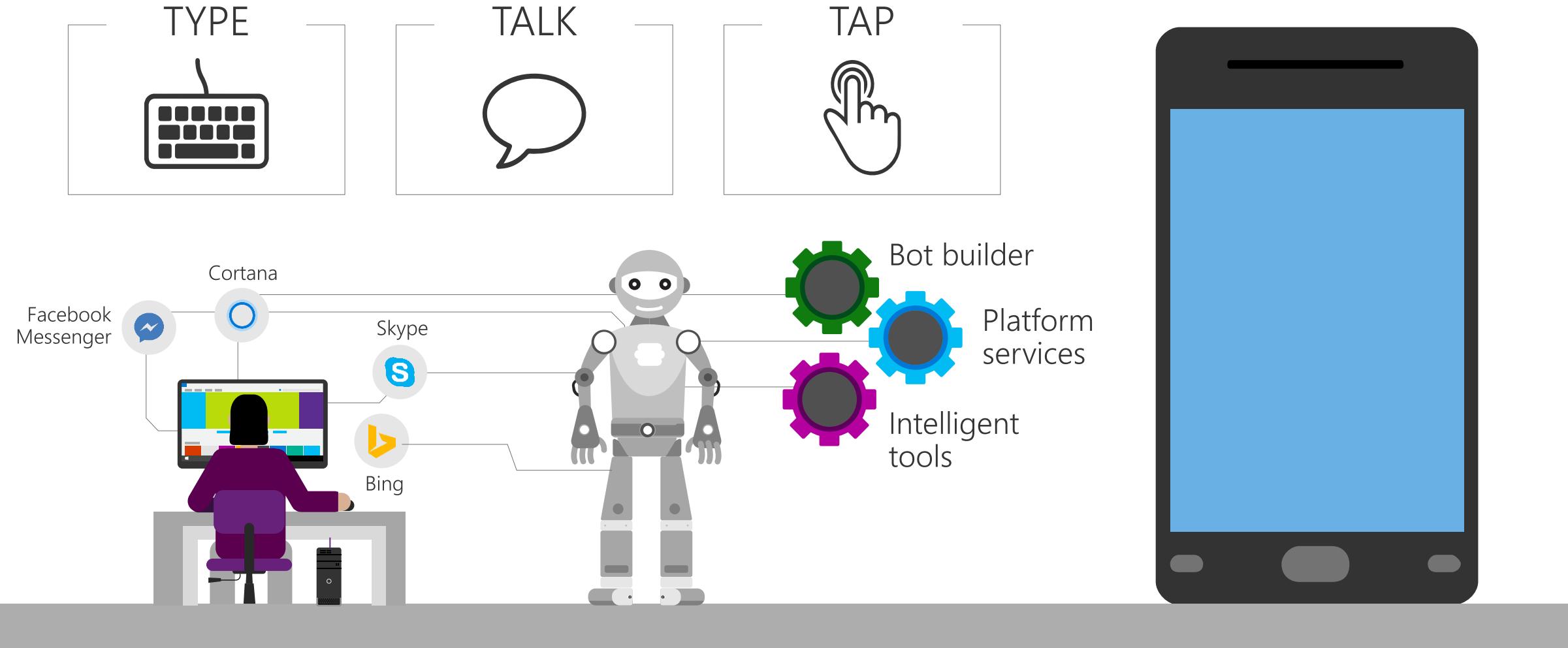
- Implements standard protocols
- Modeling conversations is hard; tools help!
- UI across multiple canvases is hard; cards rock!
- Language understanding is hard
- Common and well understood patterns

## Goals

- Start simple; add complexity; no dead-ends
- Bot adapts to the user, based on context
- Composable and intelligent controls to manage complexity



# Why a bot?

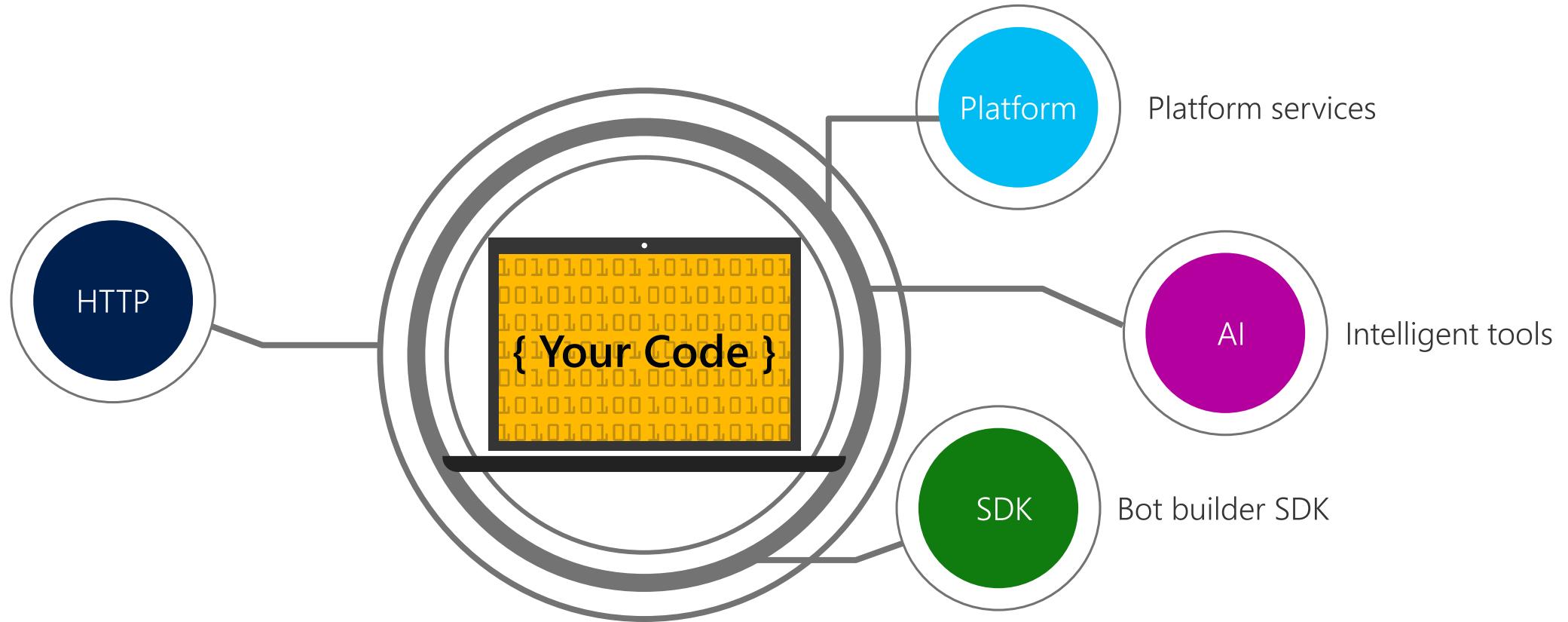


# Kinds of bots

1,000+ companies engaging us

Scenario	Retail	Finance	Insurance	Telecoms	Government	Automotive	Manufacturing	Healthcare	Media	Events
Customer service	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Customer retail	✓	✓	✓	✓				✓		
Audio/speech analysis	✓	✓	✓	✓	✓				✓	
Translation		✓	✓							
Surveillance		✓			✓					
Knowledge extraction	✓	✓	✓	✓			✓			
Video/photo analysis		✓			✓				✓	
Product identification	✓						✓		✓	
Digital assistant						✓				
Footfall analysis	✓									✓
HD maps and object detection						✓				

# What is a bot?



REST endpoint  
[Direct Line Protocol](#)

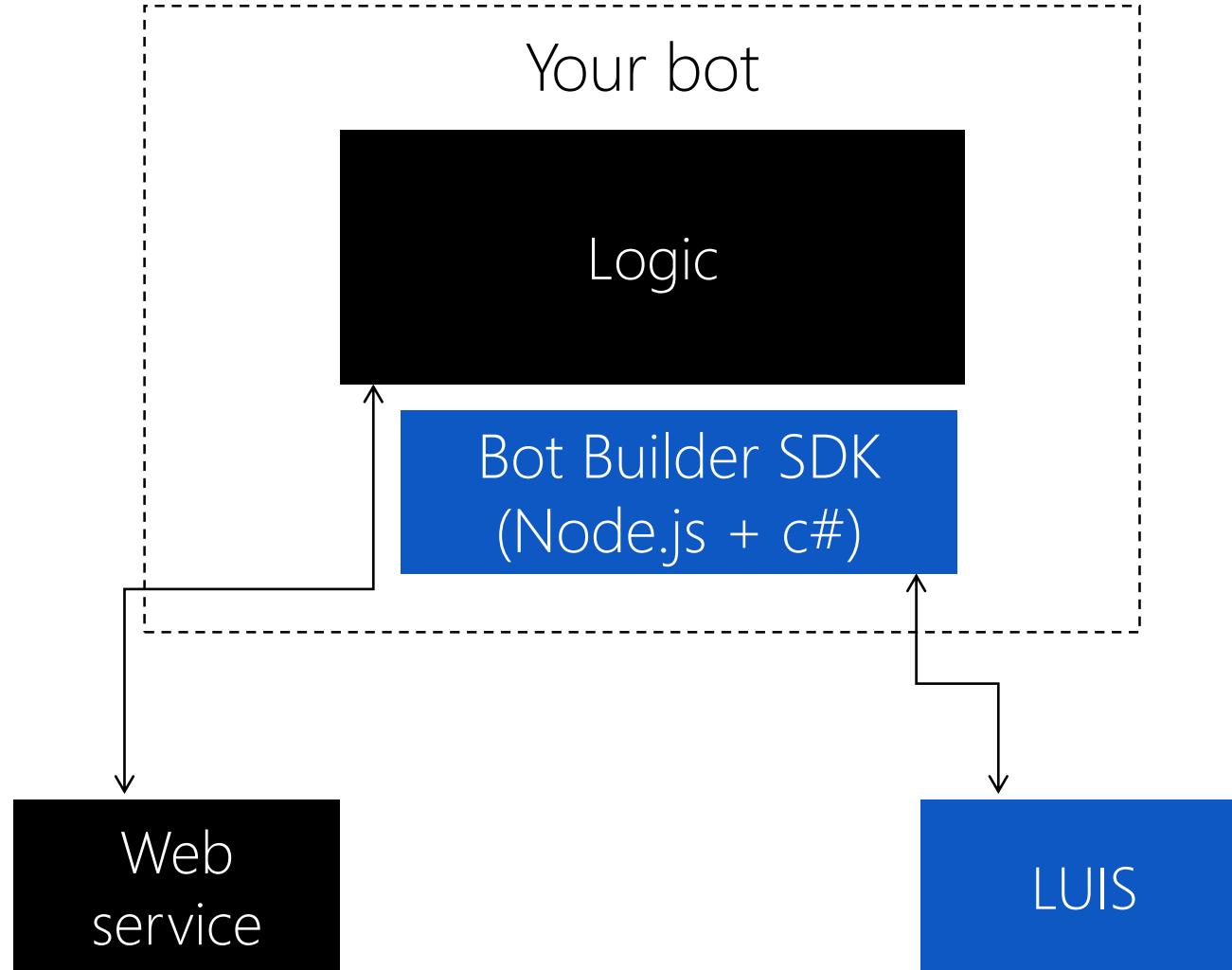


Conversational and  
business logic

Canvas aware

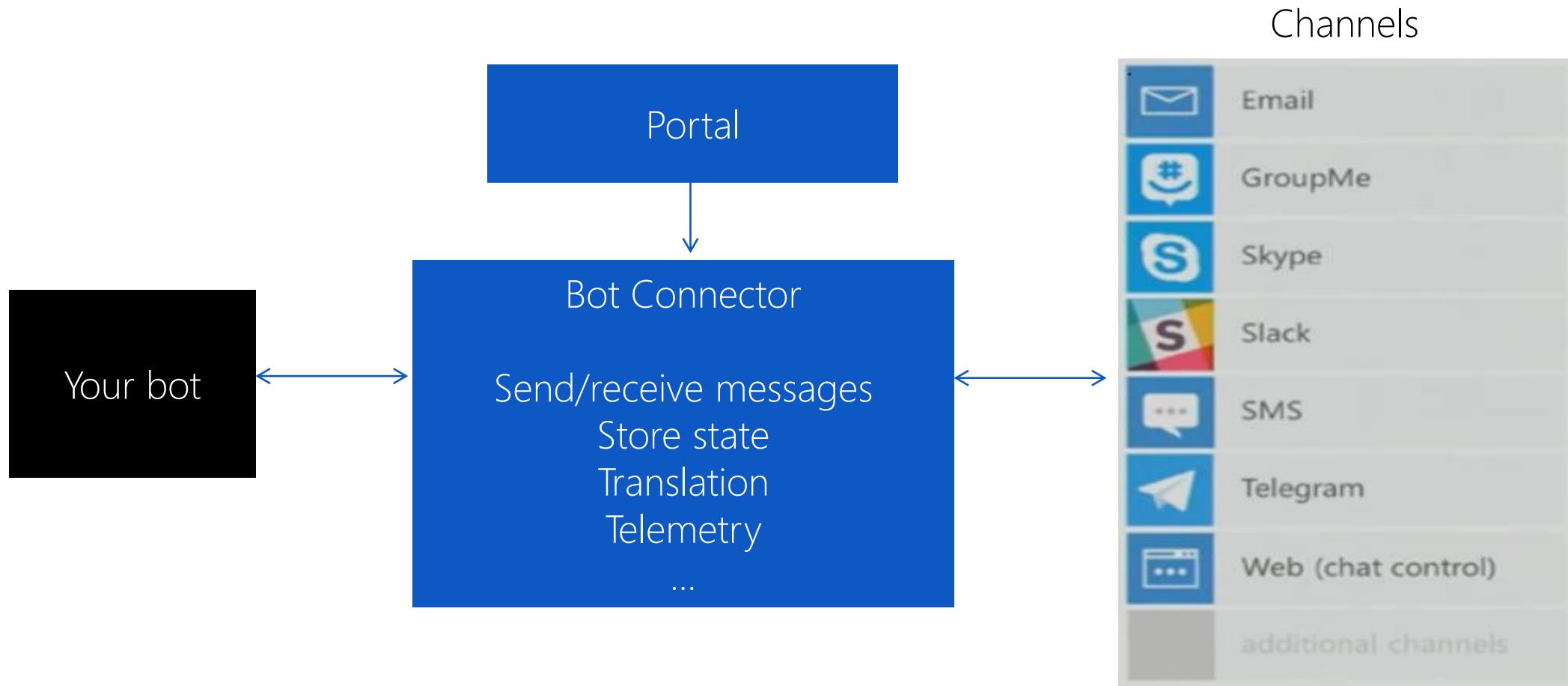
Context  
sensitive

# Bot Framework – Part 1



# Bot Framework – Part 2

## *Bot Connector*



# Language Understanding Intelligence Service

## LUIS

Real-World:

"book me a flight to Paris"

"Reserve me a flight to Paris"

"book me a ticket to Paris"

"Get me a ticket to Paris"

"Fly me to Paris"

"Take me on a flight to Paris"

# How LUIS works

1

## Create a New App

Go to [luis.ai](https://luis.ai):

Sign in with your Microsoft account (MSA). If you don't have MSA, you will have an option to create one.

Get started by creating a New App and entering some basic information.

Next, you will be presented with the Application Editor Workspace that will allow you to create and train your own language understanding model.

The screenshot shows the LUIS Application Editor interface. At the top, there's a navigation bar with links for 'Go to Preview', 'My Applications', 'About', 'Help Docs', 'Support', 'Julia N', and 'Sign Out'. Below the navigation bar, the main area is titled 'LUIS' and shows the 'Weather Bot' application. On the left, there's a sidebar with sections for 'App Settings' (which is currently selected), 'Intents' (None), 'Entities' (None), 'Pre-built Entities' (None), 'Regex Features' (None), and 'Phrase List Features' (None). In the center, there's a text input field with the placeholder 'Please, enter an utterance.' and a yellow 'Train' button. To the right of the input field, there's a note: 'Label some utterances and click "train", and then I can predict likely errors for your intents and entities.' At the bottom of the screen, there's a green footer bar with the 'Train' button and the Microsoft logo.

# How LUIS works

2

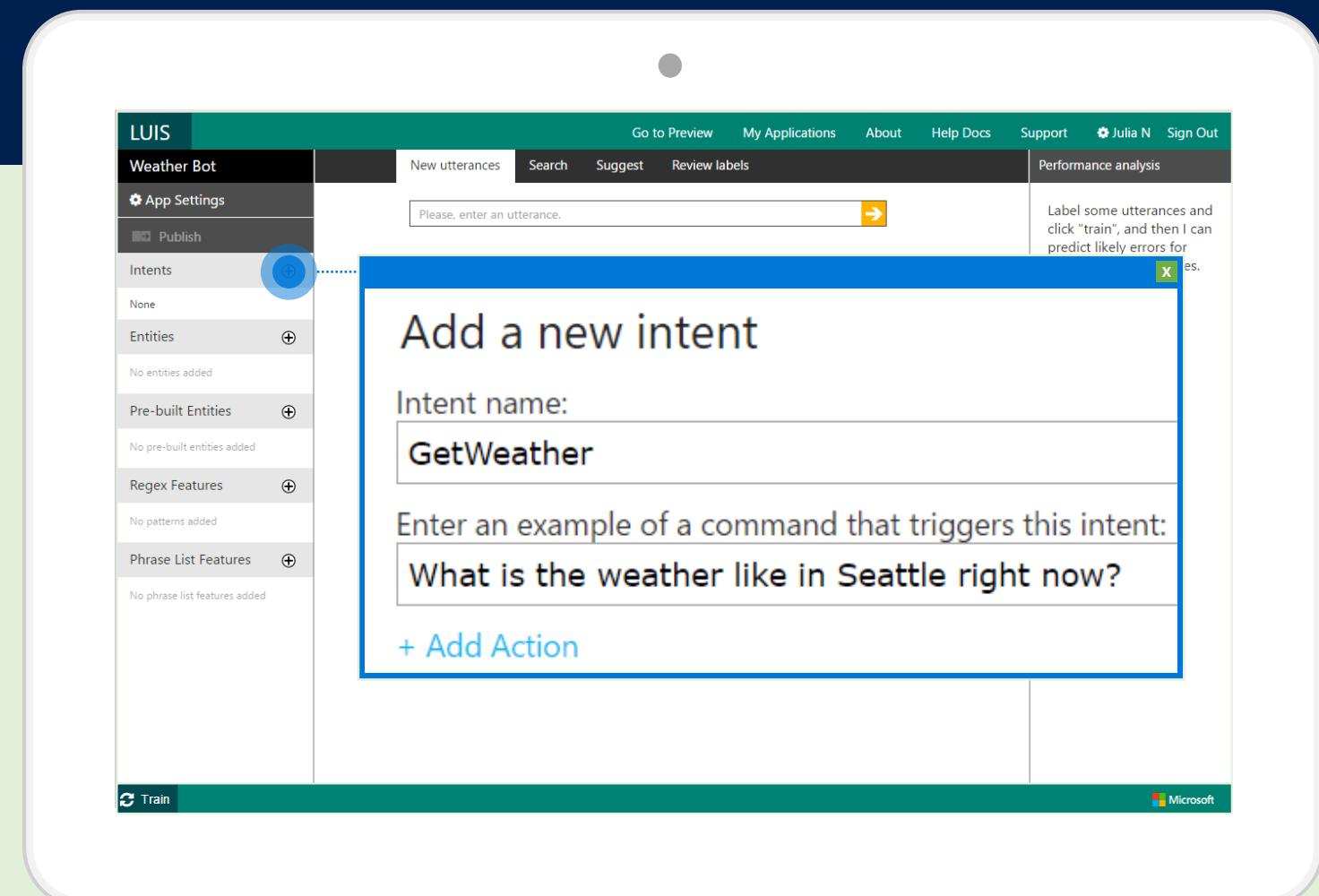
## Add intents and entities

### Intents:

Intents are actions that a user wants your app to take or the information they would like to obtain.

Example intents could include getting weather, booking tickets, adding a calendar entry or operating a light fixture.

Add one or more of user intents that you expect your app to handle by clicking + next to **Intents** item in the left-hand panel of the Editor Workspace.



# How LUIS works

2

## Add intents and entities

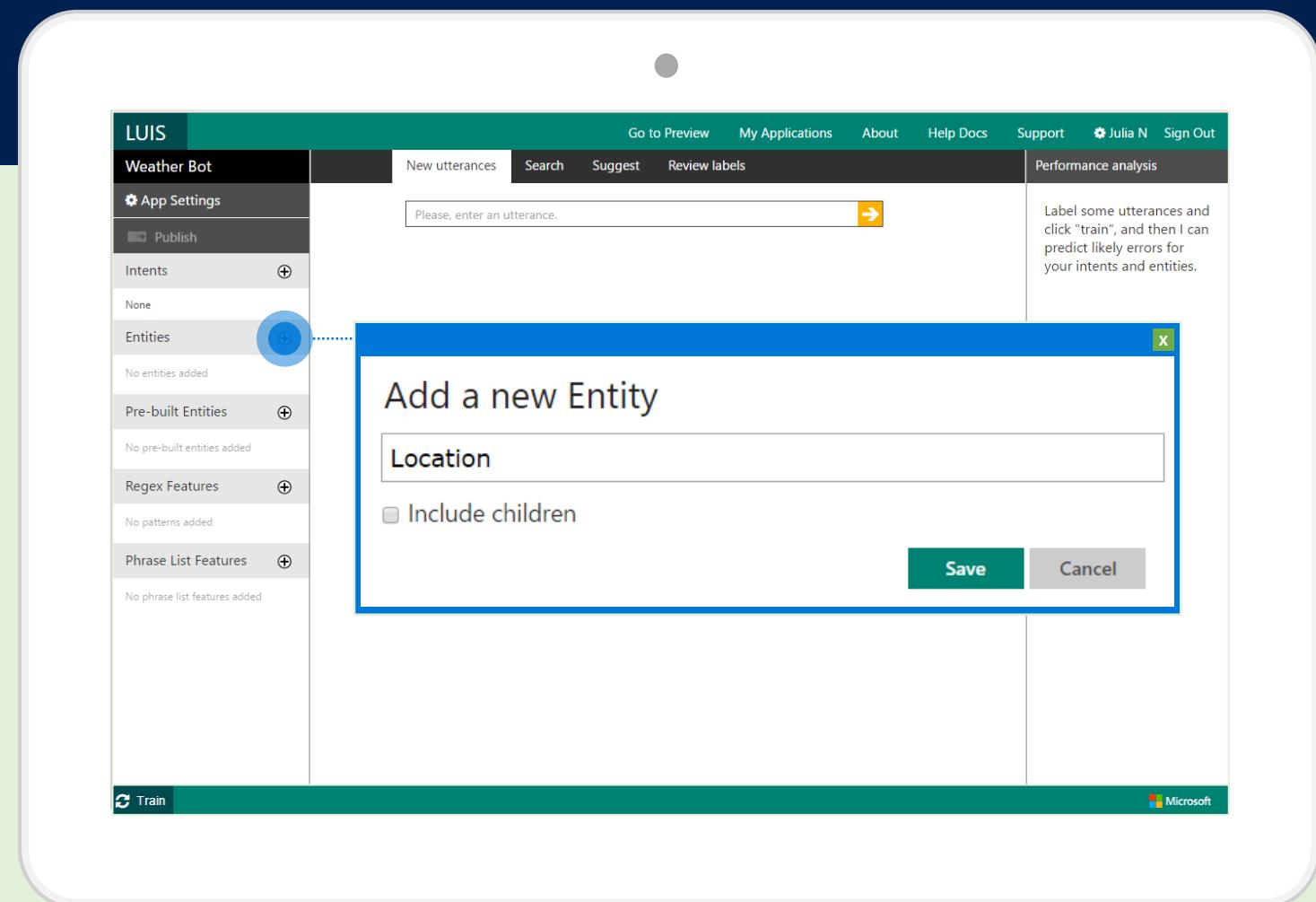
### Entities:

Entities are real world objects such as persons, locations, organizations, products, etc. that can be denoted with a proper name. Entities can be abstract or have a physical existence.

Entities can be generic (location, celebrity, datetime) or more specific (Seattle, Satya Nadella, June)

Add one or more entities that you expect your app to recognize by clicking + next to **Entities** item in the left-hand panel of the Editor Workspace.

Several commonly used pre-built entities (e.g. datetime, number) are also available to be added to the app by clicking + next to **Pre-built Entities**.



# How LUIS works

3

Provide more labeled examples

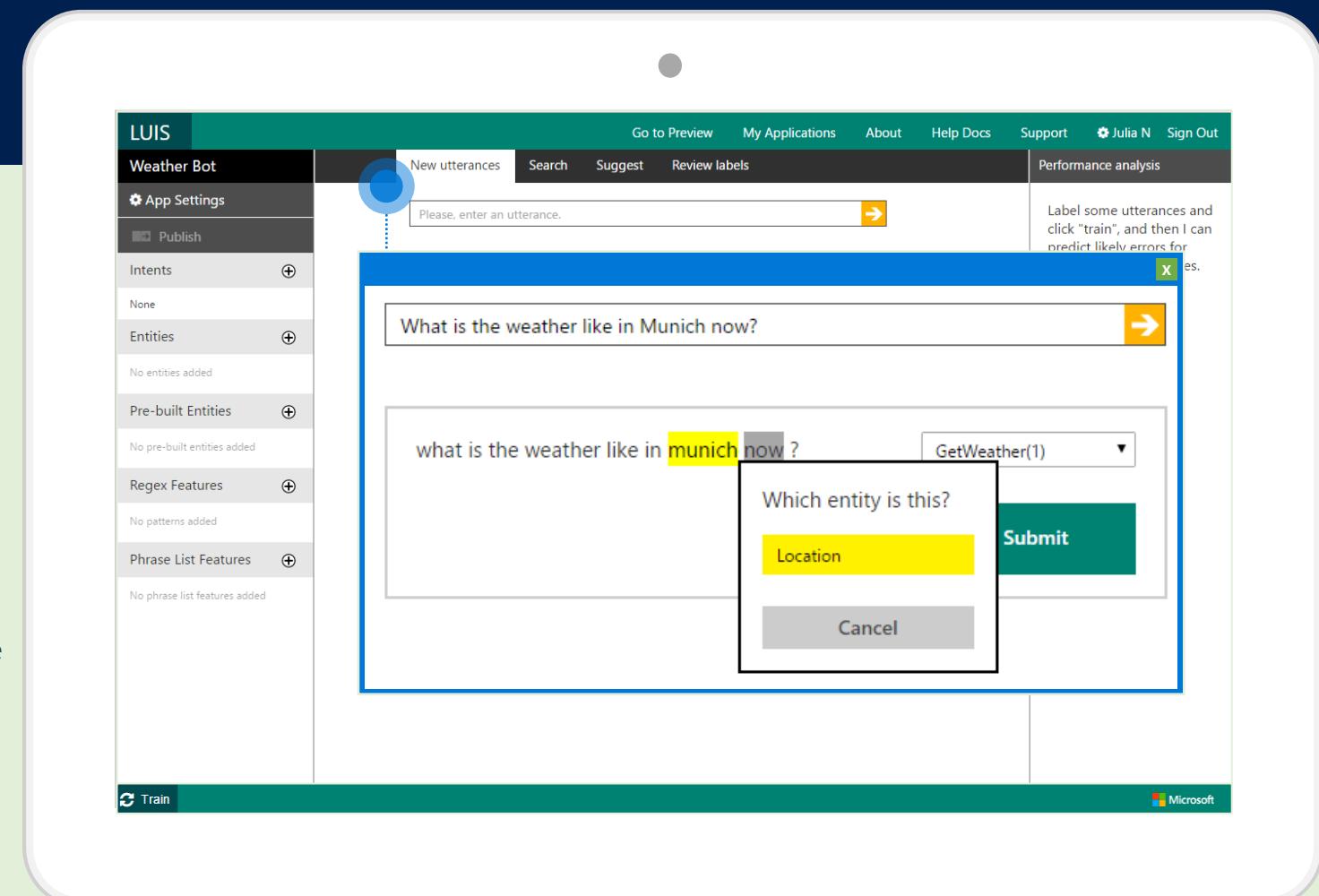
Seed the system with more examples of utterances:

Enter more examples of queries that you expect your users to make.

As you enter each one, you will need to:

- select the name of the correct intent from the dropdown
- label your entities that appear in each utterance by clicking on the entity and choosing corresponding label from the list
- pre-built entities get automatically labeled in grey

The more examples you provide, the more accurate the predictions.



# How LUIS works

4

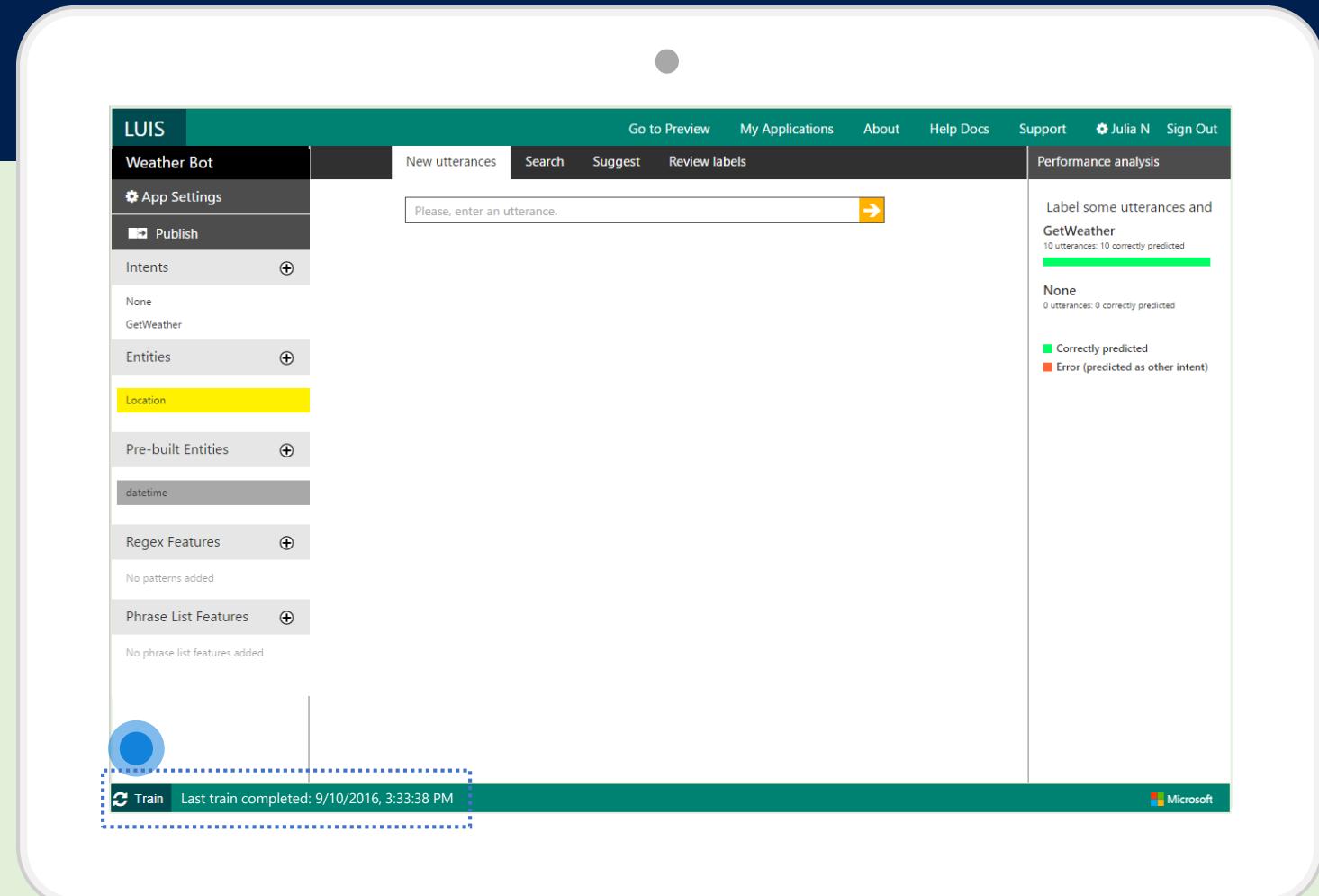
## Train your model

As you click Train at left bottom corner of the page, LUIS:

Generalizes from the examples you provided.

Uses logistic regression classifiers to recognize intents.

Uses conditional random field to determine the entities.



# How LUIS works

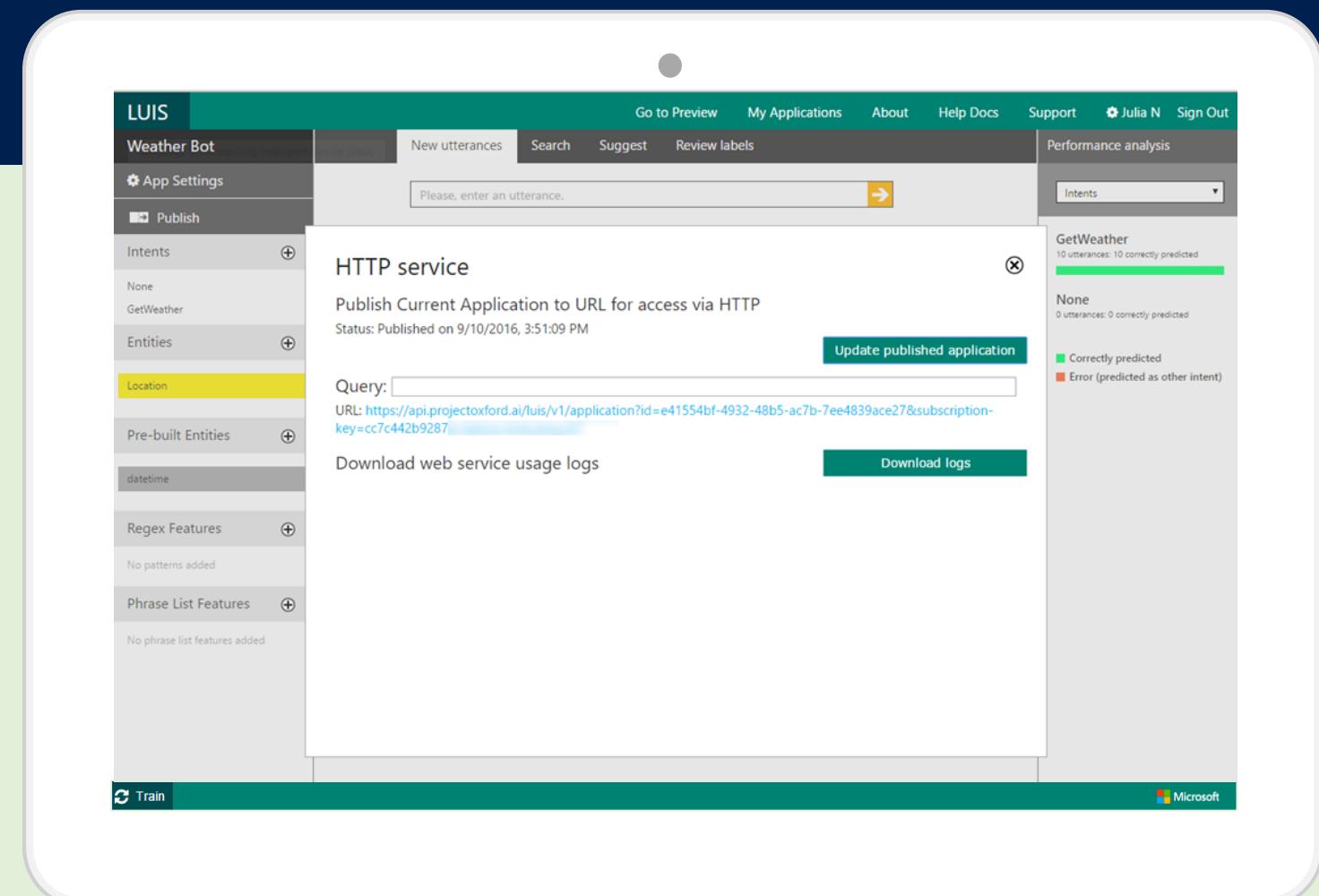
5

## Publish your model

Deploy the model to an HTTP endpoint:

Click the Publish button in the upper left-hand corner.

The URL that you see appear after a few moments makes your model available as a web service.



# How LUIS works

6

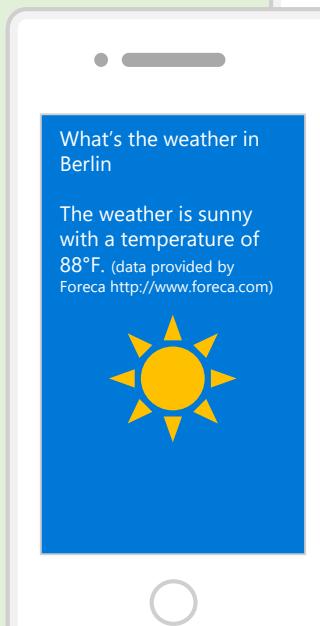
Use the model in your application

Activate model from your application on any device:

Update the URL with the parameter for the user query.

The response received from LUIS will contain the list of detected intents and entities together with the confidence scores.

You can now use this information in your app. For our example, we could next call the weather service and display the response in our app UI:



The screenshot shows the Microsoft LUIS Studio interface. On the left, there is a code editor with the following JavaScript code:

```
var httpRequest;
function getWeather() {
    httpRequest = new XMLHttpRequest();
    var params = txtUserQuery.value; // the user enters their query about the weather into txtUserQuery
    var subscriptionKey = "[your subscription key goes here]";
    var url = "https://api.projectoxford.ai/luis/v1/application?id=e41554bf-4932-48b5-ac7b-7ee4839ace27";
    httpRequest.open('GET', url + "&q=" + params);
    httpRequest.setRequestHeader("Ocp-Apim-Subscription-Key", subscriptionKey);
    httpRequest.onreadystatechange = handler;
    httpRequest.send();
}

function handler() {
    if (httpRequest.readyState == XMLHttpRequest.DONE) {
        if (httpRequest.status == 200) {
            // TODO: now handle httpRequest.responseText received from LUIS
            // ...
        } else {
            alert('There was a problem with the request: ' + httpRequest.statusText);
        }
    }
}
```

To the right of the code editor, the LUIS API response is displayed as a JSON object:

```
{
  "query": "what's the weather in Berlin?",
  "intents": [
    {
      "intent": "GetWeather",
      "score": 0.9999938
    },
    {
      "intent": "None",
      "score": 0.06616603
    }
  ],
  "entities": [
    {
      "entity": "berlin",
      "type": "Location",
      "startIndex": 22,
      "endIndex": 27,
      "score": 0.5652004
    }
  ]
}
```

# DEMO: LUIS in action!

Microsoft Azure

SALES 1-800-867-1389 | MY ACCOUNT | PORTAL | Search | FREE ACCOUNT >

Why Azure | Solutions | Products | Documentation | Pricing | Training | Marketplace | Partners | Support | Blog | More |

See Language Understanding in action

Remote light control

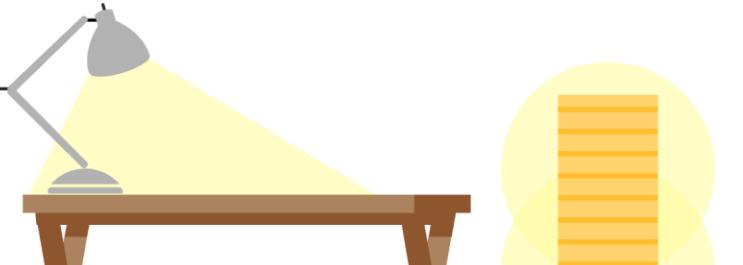
Type a command to control the lights:  
all on

Submit

OR pick one of ours:

turn the right light on  
switch all lights to green  
turn on the left light  
all on  
switch floor lamp to green  
turn the table light off  
all lights off

Smart light application in action i



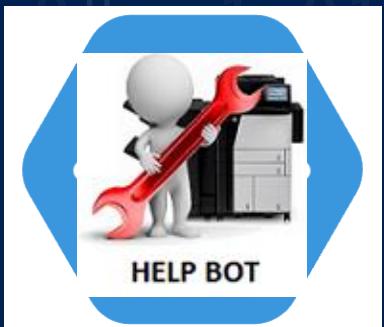
LUIS application response i

```
{  
  "query": "all on",  
  "topScoringIntent": {  
    "intent": "TurnAllOn",  
    "score": 0.995185554  
  },  
  "entities": []  
}
```

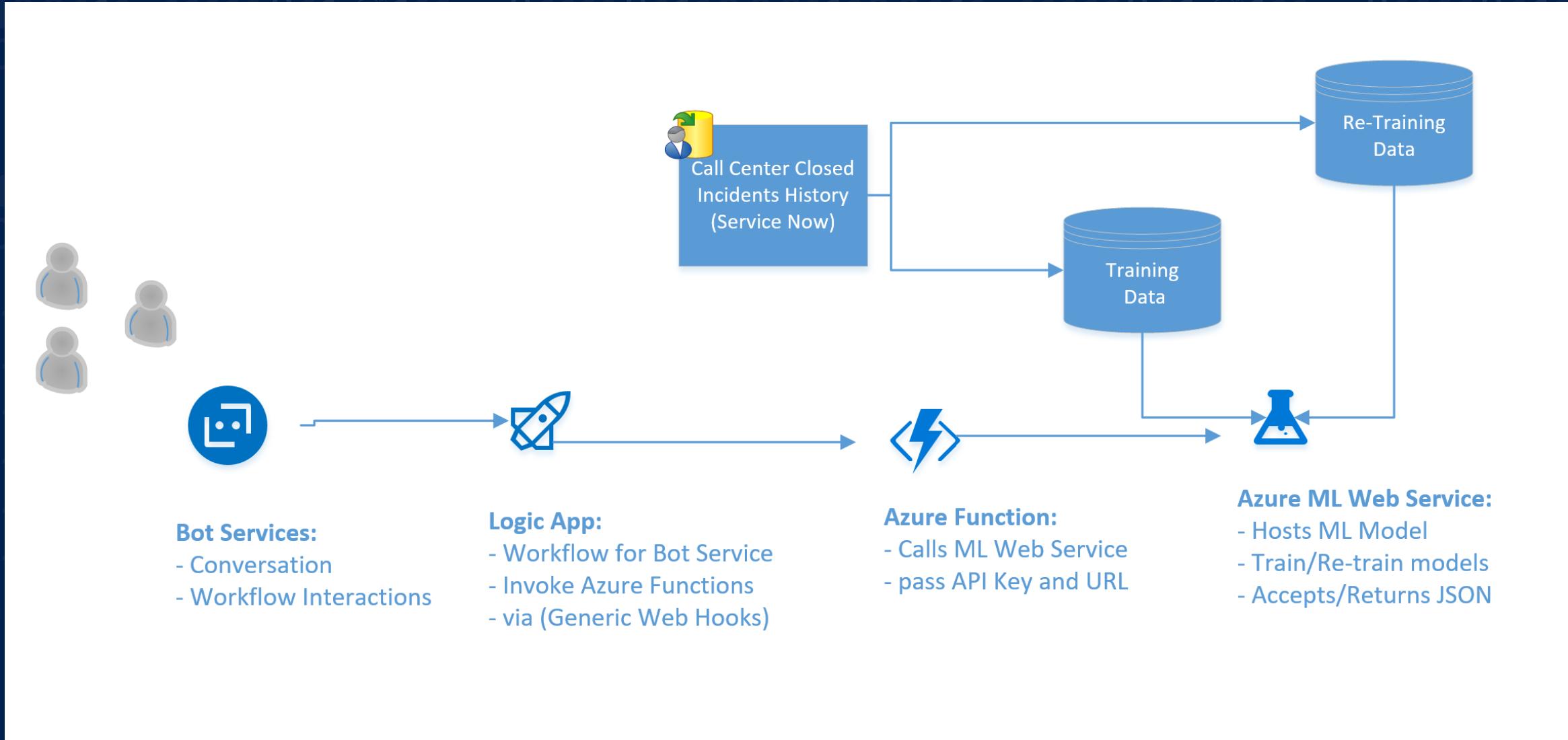
<https://azure.microsoft.com/en-us/services/cognitive-services/language-understanding-intelligent-service/>

*Putting it all Together:*

# Machine Learning “Infused” Printer Help Support Bot

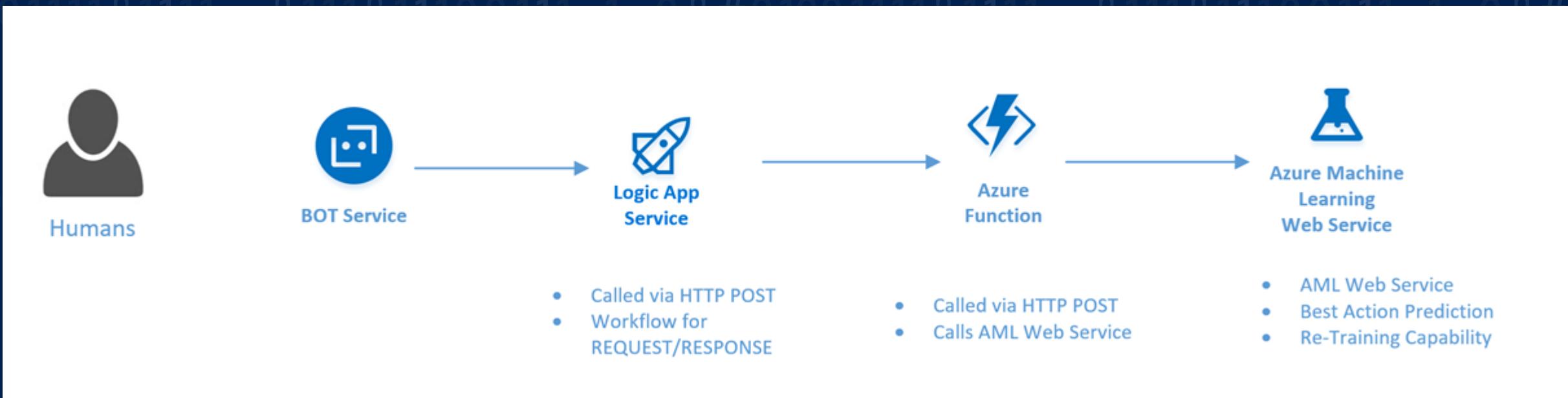


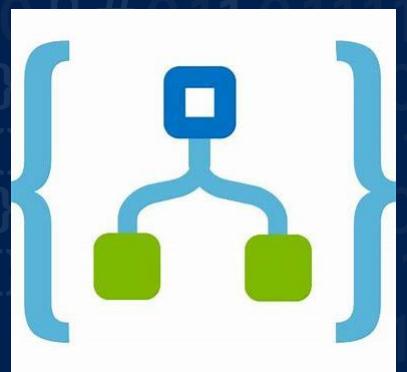
# High-Level Architecture - Scenario Flow:



# Printer Help Support Bot

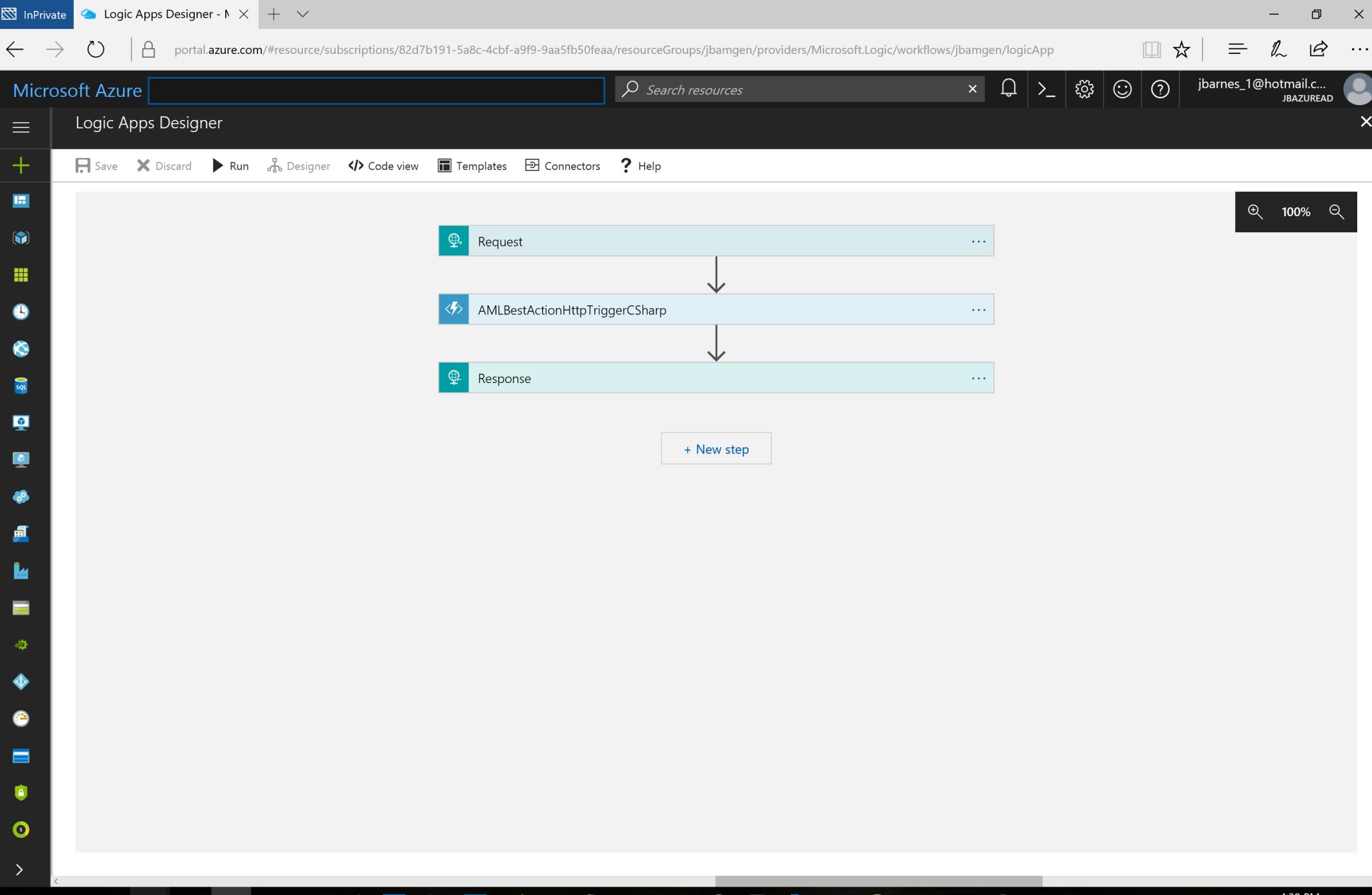
- Queries User for Symptoms
- Calls Azure ML Web Service
- Returns Prediction -> Best action to take





## Azure Logic App:

- Handles Incoming Web Request (Passed Parameters)
- Calls Azure Function
  - Process Web Request (maps parameters)
  - Calls Azure Machine Learning (AML) Web Service
    - > Returns AML Prediction Result
- Provides HTTP Response with Prediction
- Why Logic App?
  - Can easily extend logic workflow..



InPrivate Logic Apps Designer - Microsoft Edge

portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/providers/Microsoft.Logic/workflows/jbamgen/logicApp

Microsoft Azure Logic Apps Designer

Save Discard Run Designer Code view Templates Connectors Help

Request

HTTP POST URL: https://prod-22.eastus2.logic.azure.com:443/workflows/0196838a62a...  
Request Body JSON Schema:

```
{ "properties": { "Printer_Solution": { "type": "string" }, "Printer_Drivers_Installed": { "type": "string" }, "Printer_IP_Reachable": { "type": "string" } }}
```

Use sample payload to generate schema  
Show advanced options

AMLBestActionHttpTriggerCSharp

Response

+ New step

```
graph TD; Request[Request] --> Trigger[AMLBestActionHttpTriggerCSharp]; Trigger --> Response[Response]
```

InPrivate Logic Apps Designer - Microsoft Edge

portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/providers/Microsoft.Logic/workflows/jbamgen/logicApp

Microsoft Azure Logic Apps Designer

Save Discard Run Designer Code view Templates Connectors Help

Request

HTTP POST URL: https://prod-22.eastus2.logic.azure.com:443/workflows/0196838a62a...

Request Body JSON Schema:

```
{  
    "properties": {  
        "Printer_Solution": {  
            "type": "string"  
        },  
        "Printer_Drivers_Installed": {  
            "type": "string"  
        },  
        "Printer_IP_Reachable": {  
            "type": "string"  
        }  
    }  
}
```

Use sample payload to generate schema  
Show advanced options

AMLBESTActionHttpTriggerCSharp

Request Body:

```
{  
    "Printer_Solution": "Printer Solution",  
    "Printer_Drivers_Installed": "Printer_Drivers_Installed",  
    "Printer_IP_Reachable": "Printer_IP_Reachable",  
    "Printer_Network_Connection_Type": "Printer_Network_Co...",  
    "Printer_Paper_OK": "Printer_Paper_OK",  
    "Printer_Power_On": "Printer_Power_On"  
}
```

Show advanced options

Save Discard Run Designer Code view Templates Connectors Help

Search resources

jbarnes\_1@hotmail.c... JBAZUREAD

100%

4:39 PM 8/9/2017

InPrivate Logic Apps Designer - Microsoft Azure

portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/providers/Microsoft.Logic/workflows/jbamgen/logicApp

Microsoft Azure Logic Apps Designer

Save Discard Run Designer Code view Templates Connectors Help

Show advanced options ↘

AMLBESTActionHttpTriggerCSharp

Request Body

```
{  
    "Printer_Solution": "Printer Solution",  
    "Printer_Drivers_Installed": "Printer_Drivers_Instal...",  
    "Printer_IP_Reachable": "Printer_IP_Reachable",  
    "Printer_Network_Connection_Type": "Printer_Network_Co...",  
    "Printer_Paper_OK": "Printer_Paper_OK",  
    "Printer_Power_On": "Printer_Power_On"  
}
```

Show advanced options ↘

Response

\* Status Code: 200

Headers: Enter key | Enter value

Body: Body

+ New step

The screenshot shows the Microsoft Azure Logic Apps Designer interface. At the top, there's a navigation bar with 'InPrivate' and 'Logic Apps Designer - Microsoft Azure'. Below it is a header bar with 'Search resources' and various icons. The main area is titled 'Logic Apps Designer' and shows a workflow step. The step is labeled 'AMLBESTActionHttpTriggerCSharp'. It has a 'Request Body' section containing JSON data about printer status. Below it is a 'Response' section set to a 200 OK status code with an empty body. On the left, there's a vertical toolbar with icons for different connector categories like Database, File, and Cloud.

# Azure Function:



- Handles Incoming Web Request
  - Maps Passed Parameters
- Calls Azure ML Web Service
  - Obfuscates credentials
- Returns result

InPrivate JBAMLBestAction - AML X +

← → 🔍 portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/overview

Microsoft Azure Search resources x 🔍 > ⚙️ 😊 🌐 ? jbarnes\_1@hotmail.c... JBAREAD

JBAMLBestAction - AMLBestActionHttpTriggerCSharp

Function Apps

+ "JBAMLBestAction" x

All subscriptions

Function Apps

JBAMLBestAction

Functions

AMLBestActionHttpTriggerCSharp

Integrate

Manage

Monitor

Proxies (preview)

Slots (preview)

run.csx Save Run </> Get function URL

```
1 #r "Newtonsoft.Json"
2
3 using System;
4 using System.Collections.Generic;
5 using System.IO;
6 using System.Net.Http;
7 using System.Net.Http.Formatting;
8 using System.Net.Http.Headers;
9 using System.Text;
10 using System.Threading.Tasks;
11 using System.Resources;
12 using System.Net;
13 using Newtonsoft.Json;
14
15 public class StringTable
16 {
17     public string[] ColumnNames { get; set; }
18     public string[,] Values { get; set; }
19 }
20 public class Value
21 {
22     public List<string> ColumnNames { get; set; }
23     public List<string> ColumnTypes { get; set; }
24     public List<List<string>> Values { get; set; }
25 }
26 public class Output1
27 {
28     public string type { get; set; }
29     public Value value { get; set; }
30 }
31 public class Results
32 {
33     public Output1 output1 { get; set; }
34 }
35 public class RootObject
36 {
37     public Results Results { get; set; }
38 }
39 public class AMLBestAction
```

Logs

View files Test

InPrivate JBAMLBestAction - AML X +

← → ⌂ portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/overview

Microsoft Azure Search resources x 🔍 > \_ 🚧 🛡️ 🤖 🤔 jbarnes\_1@hotmail.c... JBASUREAD

JBAMLBestAction - AMLBestActionHttpTriggerCSharp

Function Apps

+ "JBAMLBestAction" x

All subscriptions

Function Apps

JBAMLBestAction

Functions

AMLBestActionHttpTriggerCSharp

Integrate

Manage

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Proxies (preview)

Slots (preview)

Save Run </> Get function URL

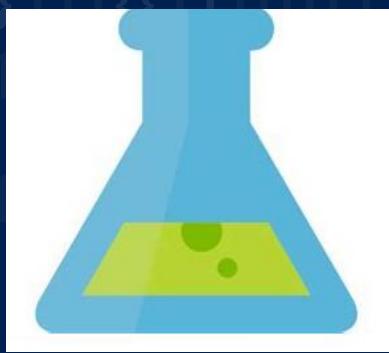
View files Test

run.csx

```
57 log.Info("C# HTTP trigger function processed a new request.");
58
59
60
61     // Get request body
62     dynamic data = await req.Content.ReadAsAsync<object>();
63
64     string Data1 = data[ "Printer_Power_On"].ToString();
65     string Data2 = data[ "Printer_IP_Reachable"].ToString();
66     string Data3 = data[ "Printer_Network_Connection_Type"].ToString();
67     string Data4 = data[ "Printer_Paper_OK"].ToString();
68     string Data5 = data[ "Printer_Drivers_Installed"].ToString();
69     string Data6 = data[ "Printer_Solution"].ToString();
70
71     log.Info("Data=" + data.ToString());
72     log.Info("Data1=" + data[ "Printer_Power_On"].ToString());
73     log.Info("Data2=" + data[ "Printer_IP_Reachable"].ToString());
74     log.Info("Data3=" + data[ "Printer_Network_Connection_Type"].ToString());
75     log.Info("Data4=" + data[ "Printer_Paper_OK"].ToString());
76     log.Info("Data5=" + data[ "Printer_Drivers_Installed"].ToString());
77     log.Info("Data6=" + data[ "Printer_Solution"].ToString());
78
79     using (var client = new HttpClient())
80     {
81         var scoreRequest = new
82         {
83
84             Inputs = new Dictionary<string, StringTable>()
85             {
86                 "input1",
87                 new StringTable()
88                 {
89                     ColumnNames = new string[] {"Printer_Power_On", "Printer_IP_Reachable", "Printer_Network_Connection_Type"},
90                     // Values = new string[,] { { "Y", "Y", "Wireless", "Y", "Y", " " }, { "N", "Y", "Wireless", "Y", "Y", " " },
91                     // Values = new string[,] { { "Y", "Y", "Wireless", "Y", "Y", " " }, { "Data1", "Data2", "Data3", "Data4", "Data5", "Data6" } }
92                     Values = new string[,] { { Data1, Data2, Data3, Data4, Data5, Data6 } }
93                 },
94             },
95         },
96         GlobalParameters = new Dictionary<string, string>()
97     }
98 }
```

Logs

# Azure Machine Learning:



- Training Data (Excel Worksheet )
- Training Experiment (Manual Training)
- Predictive Experiment (Web Service)
  - Handles Incoming Web Request
  - Invokes AML Model
  - Returns Results
- Re-Training Experiment
  - Expose re-training endpoint

# Training Data: Common Printer Support Q's, Resolutions

AML\_Printer\_Issue\_Best\_Action\_Data\_v1\_TAB.csv - Excel

Jeff Barnes

File Home Insert Draw Page Layout Formulas Data Review View Add-ins LOAD TEST OFFICE REMOTE Power BI Power Pivot Team Tell me what you want to do Share

Clipboard Font Alignment Number Styles Cells Editing

A14

A	B	C	D	E	F	G	H	I	J
Printer_Power_On	Printer_IP_Reachable	Printer_Network_Connection_Type	Printer_Paper_OK	Printer_Drivers_Installed	Printer_Solution				
Y	Y	Wireless	Y	Y	Run Windows Printer Troubleshooter				
Y	Y	Wired	Y	Y	Run Windows Printer Troubleshooter				
Y	Y	Wireless	Y	N	Run Windows Printer Troubleshooter				
Y	Y	Wired	Y	N	Run Windows Printer Troubleshooter				
N	Y	Wireless	Y	Y	Fix Printer Power				
N	Y	Wired	Y	Y	Fix Printer Power				
Y	N	Wireless	Y	Y	Fix Printer Networking				
Y	N	Wired	Y	Y	Fix Printer Networking				
Y	Y	Wireless	N	Y	Fix Printer Paper				
Y	Y	Wired	N	Y	Fix Printer Paper				
Y	Y	Wireless	Y	N	Install Correct Printer Drivers				
Y	Y	Wireless	Y	N	Install Correct Printer Drivers				
Y	Y	Wired	Y	Y	Check Wireless Connection				
Y	Y	Wired	Y	Y	Check Wireless Connection				
Y	Y	Wireless	Y	Y	Run Windows Printer Troubleshooter				
Y	Y	Wireless	Y	N	Run Windows Printer Troubleshooter				
Y	Y	Wired	Y	N	Run Windows Printer Troubleshooter				
N	Y	Wireless	Y	Y	Fix Printer Power				
N	Y	Wired	Y	Y	Fix Printer Power				
Y	N	Wireless	Y	Y	Fix Printer Networking				
Y	N	Wired	Y	Y	Fix Printer Networking				
Y	Y	Wireless	N	Y	Fix Printer Paper				
Y	Y	Wireless	N	Y	Fix Printer Paper				
Y	Y	Wireless	Y	N	Install Correct Printer Drivers				
Y	Y	Wired	Y	N	Install Correct Printer Drivers				
Y	Y	Wireless	Y	Y	Check Wireless Connection				
Y	Y	Wireless	Y	Y	Check Wireless Connection				
Y	Y	Wired	Y	Y	Run Windows Printer Troubleshooter				
Y	Y	Wired	Y	Y	Run Windows Printer Troubleshooter				
N	Y	Wireless	Y	Y	Fix Printer Power				
N	Y	Wired	Y	Y	Fix Printer Power				
V	N	Wireless	Y	Y	Fix Printer Networking				

JBPrinterHelpBot - Microsoft | Connectors for Azure Logic | Experiments - Microsoft | JBPtrHelpBotApp - Microsoft Azure | jbamgen - Microsoft Azure +

studio.azureml.net/Home/ViewWorkspaceCached/12e23496953e4285a7cc2d669c0cc1aa#Workspaces/Experiments/Experiment/12e23496953e4285a7cc2d669c0cc1aa.f-id.1767f8ac

Microsoft Azure Machine Learning Studio

JBPrinterHelpBot ? 🔍 🌐 🎁 😊 🚫

## Printer Predict Best Action - Base Experiment

Search experiment items

- Saved Datasets
- Trained Models
- Data Format Conversions
- Data Input and Output
- Data Transformation
- Feature Selection
- Machine Learning
- OpenCV Library Modules
- Python Language Modules
- R Language Modules
- Statistical Functions
- Text Analytics
- Time Series
- Web Service
- Deprecated

AML\_Printer\_Issue\_Best\_Act...

Multiclass Neural Network

Train Model

Score Model

Evaluate Model

Split Data

```
graph TD; A[AML_Printer_Issue_Best_Act...] --> B[Split Data]; B --> C[Multiclass Neural Network]; C --> D[Train Model]; D --> E[Score Model]; E --> F[Evaluate Model];
```

NEW RUN HISTORY SAVE SAVE AS DISCARD CHANGES RUN SET UP WEB SERVICE PUBLISH TO GALLERY

2:19 PM 8/14/2017

JBPrinterHelpBot - Microsoft | Connectors for Azure Logic | Experiments - Microsoft | JBPtrHelpBotApp - Microsoft | jbamgen - Microsoft Azure +

studio.azureml.net/Home/ViewWorkspaceCached/12e23496953e4285a7cc2d669c0cc1aa#Workspaces/Experiments/Experiment/12e23496953e4285a7cc2d669c0cc1aa.f-id.9a93c7f4l

Microsoft Azure Machine Learning Studio

JBPrinterHelpBot ? ⚡ 🤖 ☺ 🧑

Training experiment Predictive experiment

Printer\_Predict\_Best\_Action [Predictive Exp.]

Finished running ✓

Search experiment items

Saved Datasets

Trained Models

Data Format Conversions

Data Input and Output

Data Transformation

Feature Selection

Machine Learning

OpenCV Library Modules

Python Language Modules

R Language Modules

Statistical Functions

Text Analytics

Time Series

Web Service

Deprecated

AML\_Printer\_Issue\_Best\_Acti...

Printer\_Predict\_Best\_Action [...]

Score Model ✓

Web service input

Web service output

```
graph TD; A[Saved Datasets] --> B[Printer_Predict_Best_Action]; B --> C[Score Model]; C --> D[Web service output]
```

NEW RUN HISTORY SAVE SAVE AS DISCARD CHANGES RUN DEPLOY WEB SERVICE PUBLISH TO GALLERY



# Azure Bot Function:

- Queries User for Symptoms
- Calls Azure Logic App
  - Calls Azure Function
  - Calls ML Web Service
- Returns Prediction



JBPtrHelpBotApp  
Bot Service

JBPtrHelpBotApp

DEVELOP

CHANNELS

ANALYTICS

SETTINGS

← Test

Save

Configure continuous integration - manage your code in your repo of choice and edit locally.

```
32 *          // one of these will have an interface and process it
33 * switch (activity.GetActivityType())
34 {
35 *     case ActivityTypes.Message:
36 *         await Conversation.SendAsync(activity, () => new MainDialog());
37 *         break;
38 *     case ActivityTypes.ConversationUpdate:
39 *         var client = new ConnectorClient(new Uri(activity.ServiceUrl));
40 *         IConversationUpdateActivity update = activity;
41 *         if (update.MembersAdded.Any())
42 *         {
43 *             var reply = activity.CreateReply();
44 *             var newMembers = update.MembersAdded? Where(t => t.Id != activity.Recipient.Id);
45 *             foreach (var newMember in newMembers)
46 *             {
47 *                 reply.Text = "Welcome to the Helpful Printer Fix-It bot! - Powered by Azure Machine Learning";
48 *                 await client.Conversations.ReplyToActivityAsync(reply);
49 *             }
50 *         }
51 *         break;
52 *     case ActivityTypes.ContactRelationUpdate:
53 *     case ActivityTypes.Typing:
54 *     case ActivityTypes.DeleteUserData:
55 *     case ActivityTypes.Ping:
56 *     default:
57 *         log.Error($"Unknown activity type ignored: {activity.GetActivityType()}");
58 *         break;
59 *
60 }
```

Log

2017-08-09T21:11:39 No new trace in the past 8 min(s).

Clear

- JBptrHelpBotApp
  - .gitignore
  - Bot.sln
  - commands.json
  - debughost.cmd
  - host.json
  - messages
    - BasicForm.csx
    - function.json
    - MainDialog.csx
  - project.json
  - project.lock.json
  - run.csx
- PostDeployScripts
- readme.md

JBPtrHelpBotApp  
Bot Service

JBPtrHelpBotApp

DEVELOP

CHANNELS

ANALYTICS

SETTINGS

← Test

Save

Configure continuous integration - manage your code in your repo of choice and edit locally.

JBPtrHelpBotApp

.gitignore

Bot.sln

commands.json

debughost.cmd

host.json

messages

BasicForm.csx

function.json

MainDialog.csx

project.json

project.lock.json

run.csx

PostDeployScripts

readme.md

```
42    }
43
44    public virtual async Task MessageReceivedAsync(IDialogContext context, IAwaitable<IMessageActivity> argument)
45    {
46        var message = await argument;
47        context.Call(BasicForm.BuildFormDialog(FormOptions.PromptInStart), FormComplete);
48    }
49
50    private async Task FormComplete(IDialogContext context, IAwaitable<BasicForm> result)
51    {
52        try
53        {
54            string ResponseOutput = "";
55            var form = await result;
56            if (form != null)
57            {
58
59                //Make the AML Call
60                AMLBestActionIN BotBestActionIN = new AMLBestActionIN();
61                BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
62                BotBestActionIN.Printer_IP_Reachable = form.Printer_IP_Reachable.ToString();
63                BotBestActionIN.Printer_Network_Connection_Type = form.Printer_Network_Connection_Type.ToString();
64                BotBestActionIN.Printer_Paper_OK = form.Printer_Paper_OK.ToString();
65                BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
66                BotBestActionIN.Printer_Drivers_Installed = form.Printer_Drivers_Installed.ToString();
67                BotBestActionIN.Printer_Solution = "?";
68                await context.PostAsync("Calling Azure ML Web Service...Please stand-by");
69            }
70        }
71    }
```

Log

2017-08-09T21:11:39 No new trace in the past 8 min(s).
2017-08-09T21:12:39 No new trace in the past 9 min(s).
2017-08-09T21:13:39 No new trace in the past 10 min(s).

Clear

JBPtrHelpBotApp  
Bot Service

# JBPtrHelpBotApp

DEVELOP

## CHANNELS

ANALYTICS

SETTINGS

← Test

Save

[Configure continuous integration](#) - manage your code in your repo of choice and edit locally.

```
1 using System;
2 using Microsoft.Bot.Builder.FormFlow;
3
4 public enum Printer_Power_On_Options { Y=1, N };
5 public enum Printer_IP_Reachable_Options { Y=1, N };
6 public enum Printer_Network_Connection_Type_Options { Wireless=1, Wired };
7 public enum Printer_Paper_OK_Options { Y=1, N };
8 public enum Printer_Drivers_Installed_Options { Y=1, N };
9
10 // For more information about this template visit http://aka.ms/azurebots-csharp-form
11 [Serializable]
12 public class BasicForm
13 {
14     [Prompt("Is the Printer POWER ON? {||}")]
15     public Printer_Power_On_Options Printer_Power_On { get; set; }
16
17     [Prompt("Is the Printer IP ADDRESS Reachable? {||}")]
18     public Printer_IP_Reachable_Options Printer_IP_Reachable { get; set; }
19
20     [Prompt("Which NETWORK TYPE is the printer connected to? {||}")]
21     public Printer_Network_Connection_Type_Options Printer_Network_Connection_Type { get; set; }
22
23     [Prompt("Is the printer PAPER OK? {||}")]
24     public Printer_Paper_OK_Options Printer_Paper_OK { get; set; }
25
26     [Prompt("Are the Correct PRINTER DRIVERS Installed? {||}")]
27     public Printer_Drivers_Installed_Options Printer_Drivers_Installed { get; set; }
28 }
```

88

Clear

JBPtrHelpBotApp  
Bot Service

# JBPtrHelpBotApp

DEVELOP

CHANNELS

ANALYTICS

SETTINGS

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**Configure continuous integration** - manage your code in your repo of choice and edit locally.

## JBPtrHelpBotApp

 .gitignore

 Bot.sln

## commands.json

 debughost.cmd

 host.json

## messages

## BasicForm.csx

 function.json

## MainDialog.csx

project.json

## project.lock.json

## ruh.csx

## PostDeployScripts

## readme.md

```
public virtual async Task MessageReceivedAsync(IDialogContext context, IAwaitable<IMessageActivity> argument)
{
    var message = await argument;
    context.Call(BasicForm.BuildFormDialog(FormOptions.PromptInStart), FormComplete);
}

private async Task FormComplete(IDialogContext context, IAwaitable<BasicForm> result)
{
    try
    {
        string ResponseOutput = "";
        var form = await result;
        if (form != null)
        {

            //Make the AML Call
            AMLBestActionIN BotBestActionIN = new AMLBestActionIN();
            BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
            BotBestActionIN.Printer_IP_Reachable = form.Printer_IP_Reachable.ToString();
            BotBestActionIN.Printer_Network_Connection_Type = form.Printer_Network_Connection_Type.ToString();
            BotBestActionIN.Printer_Paper_OK = form.Printer_Paper_OK.ToString();
            BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
            BotBestActionIN.Printer_Drivers_Installed = form.Printer_Drivers_Installed.ToString();
            BotBestActionIN.Printer_Solution = "?";
            await context.PostAsync("Calling Azure ML Web Service...Please stand-by");

        }
    }
}
```

Log

Clea

JBPtrHelpBotApp  
Bot Service

# JBPtrHelpBotApp

DEVELOP

CHANNELS

ANALYTICS

SETTINGS

← Test

Save

**Configure continuous integration** - manage your code in your repo of choice and edit locally.

The screenshot shows a file explorer on the left with several files listed:

- JBPtrHelpBotApp
- .gitignore
- Bot.sln
- commands.json
- debughost.cmd
- host.json
- messages
- BasicForm.csx
- function.json
- MainDialog.csx

The code editor on the right contains C# code. A red box highlights the following line of code:

```
await context.PostAsync("Calling Azure ML Web Service...Please stand-by");
```

The rest of the code is as follows:

```
59 //Make the AML Call
60
61 AMLBestActionIN BotBestActionIN = new AMLBestActionIN();
62 BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
63 BotBestActionIN.Printer_IP_Reachable = form.Printer_IP_Reachable.ToString();
64 BotBestActionIN.Printer_Network_Connection_Type = form.Printer_Network_Connection_Type.ToString();
65 BotBestActionIN.Printer_Paper_OK = form.Printer_Paper_OK.ToString();
66 BotBestActionIN.Printer_Power_On = form.Printer_Power_On.ToString();
67 BotBestActionIN.Printer_Drivers_Installed = form.Printer_Drivers_Installed.ToString();
68 BotBestActionIN.Printer_Solution = "?";
69 await context.PostAsync("Calling Azure ML Web Service...Please stand-by");
70
71 try
72 {
73     string ServiceURL = "https://prod-22.eastus2.logic.azure.com:443/workflows/0196838a62ab40858929c8f9d10356cd/triggers/manual/paths/invoke?api-version=7.0&kind=Http";
74     //string ResponseOutput = "";
75     using (HttpClient client = new HttpClient())
76     {
77         client.BaseAddress = new Uri(ServiceURL);
78         HttpResponseMessage response = await client.PostAsJsonAsync(ServiceURL, BotBestActionIN);
79         string results = "";
80         if (response.IsSuccessStatusCode)
81         {
82             results = await response.Content.ReadAsStringAsync();
83             ResponseOutput = results;
84         }
85     }
86 }
```

Log

Clea

JBPtrHelpBotApp  
Bot Service

JBPtrHelpBotApp

## DEVELOP

## CHANNELS

ANALYTICS

SETTINGS

← Test

Save

**Configure continuous integration** - manage your code in your repo of choice and edit locally.

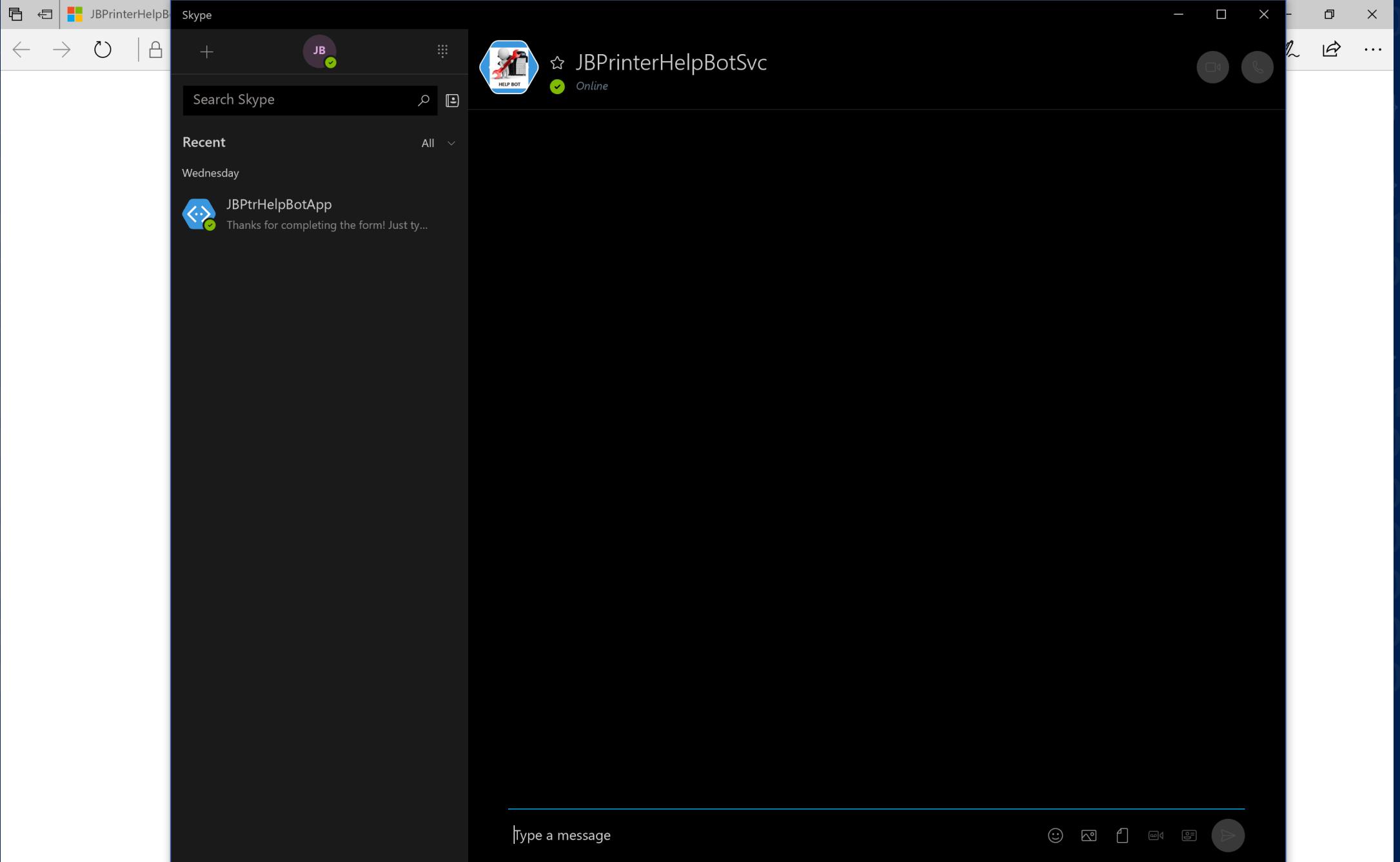
```
86         string responseContent = await response.Content.ReadAsStringAsync();
87     }
88     }
89     }
90     catch (WebException ex)
91     {
92         throw ex;
93     }
94
95     await context.PostAsync("") + ResponseOutput.ToString());
96
97     await context.PostAsync("Thanks for completing the form! Just type anything to restart it.");
98 }
99 else
100 {
101     await context.PostAsync("Form returned empty response! Type anything to restart it.");
102 }
103
104 }
105 catch (OperationCanceledException)
106 {
107     await context.PostAsync("You canceled the form! Type anything to restart it.");
108 }
109
110 context.Wait(MessageReceivedAsync);
111 }
112 }
113 }
```

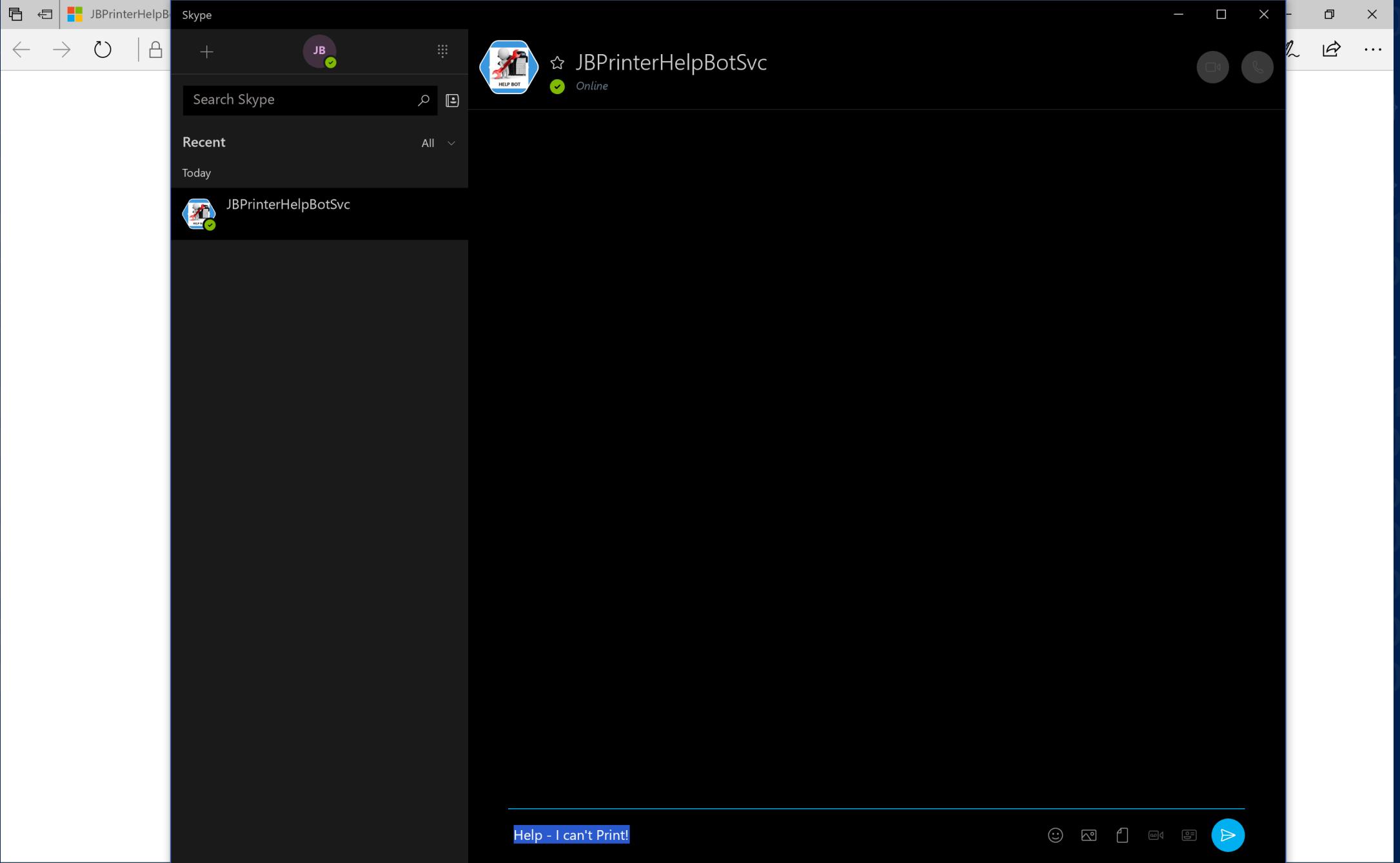
Log

Clear

# Printer Help Bot - in Action!







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3:49 PM  
8/14/2017

Skype

join.skype.com

JB

Search Skype

Recent All

Today

JBPrinterHelpBotSvc sent you a card

JBPrinterHelpBotSvc, 3:55 PM  
Is the Printer POWER ON  
Y  
N

JBPrinterHelpBotSvc, 3:55 PM  
Is the Printer IP ADDRESS Reachable  
Y  
N

JBPrinterHelpBotSvc, 3:55 PM  
Which NETWORK TYPE is the printer connected to  
Wireless  
Wired

Type a message

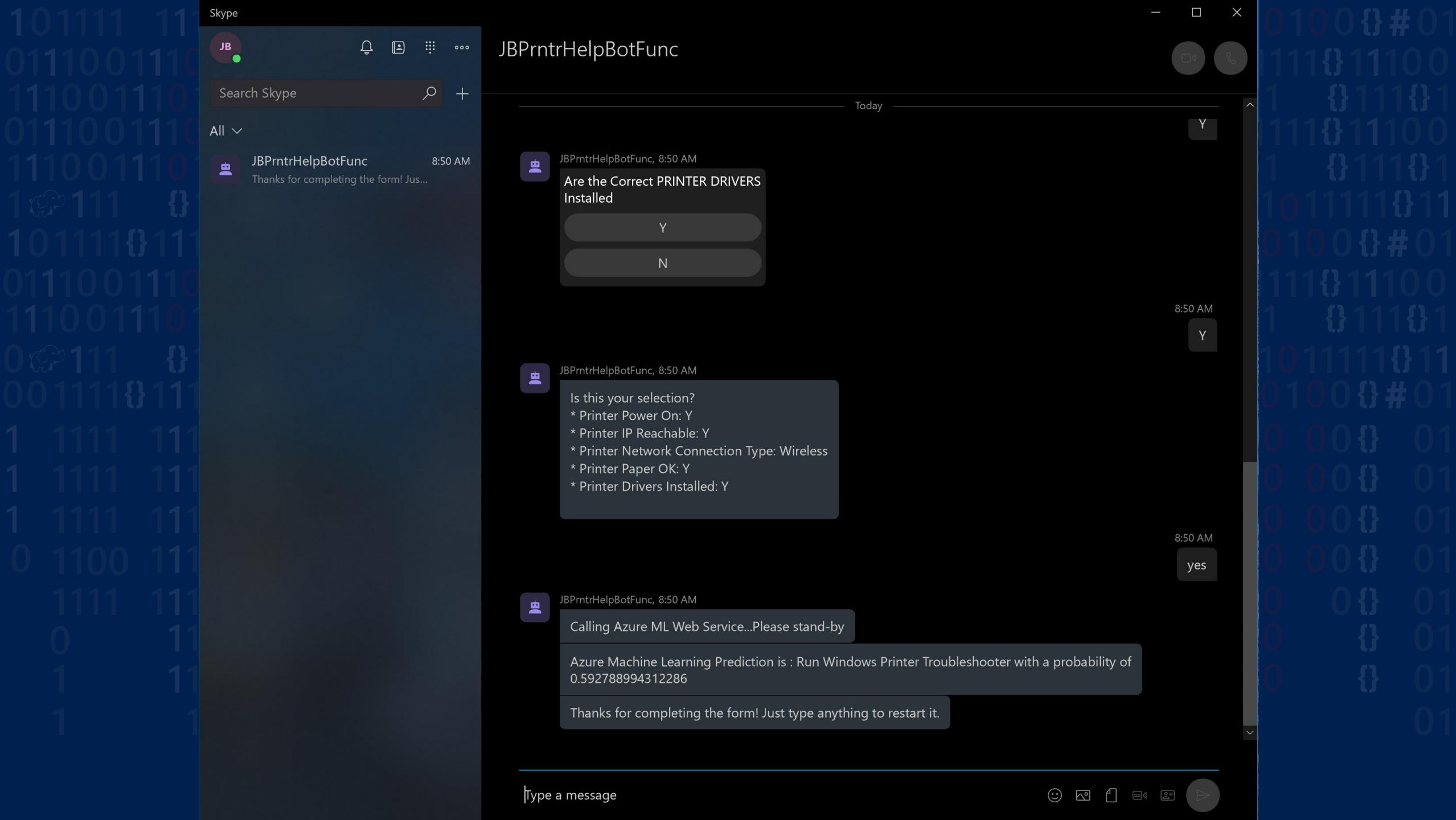
3:55 PM clear

3:55 PM Y

3:55 PM Y

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InPrivate Logic app run - Microsc Experiments - Microsoft Azu +

portal.azure.com/#resource/subscriptions/82d7b191-5a8c-4cbf-a9f9-9aa5fb50fea/resourceGroups/jbamgen/providers/Microsoft.Logic/workflows/jbamgen/logicApp

Microsoft Azure < jbamgen > jbamgen > Runs history > Logic app run

Search resources

Runs history jbamgen

Refresh Run Details Resubmit Cancel Run

All Start time earlier than Pick a date Pick a time Search to filter items by identifier

START TIME	DURATION
8/9/2017 10:15 PM	841 Milliseconds
8/9/2017 10:13 PM	8.77 Seconds
8/9/2017 9:48 PM	561 Milliseconds
8/9/2017 9:47 PM	512 Milliseconds
8/9/2017 9:46 PM	1.23 Seconds
8/9/2017 9:44 PM	503 Milliseconds
8/9/2017 9:43 PM	685 Milliseconds
8/9/2017 9:31 PM	7.93 Seconds
8/7/2017 12:15 PM	9.86 Seconds
7/26/2017 2:37 PM	733 Milliseconds
7/26/2017 2:35 PM	7.2 Seconds
7/26/2017 2:22 PM	8.28 Seconds
7/25/2017 10:26 ...	713 Milliseconds
7/25/2017 10:23 ...	7.2 Seconds
7/25/2017 9:46 PM	7.97 Seconds
7/25/2017 7:17 PM	462 Milliseconds

Request 0s

AMLBestActionHttpTriggerCSharp 0s

Response 0s

OUTPUTS Show raw outputs >

Status code  
200

Body  
Azure Machine Learning Prediction is : Fix Printer Power with a probability of 0.996662318706512

10:20 PM 8/9/2017

{ } Runs history  
jbamgen

+ Refresh

All

Start time earlier than

Pick a date Pick a time

Search to filter items by identifier

## START TIME DURATION

	8/9/2017 10:15 PM	841 Milliseconds
	8/9/2017 10:13 PM	8.77 Seconds
	8/9/2017 9:48 PM	561 Milliseconds
	8/9/2017 9:47 PM	512 Milliseconds
	8/9/2017 9:46 PM	1.23 Seconds
	8/9/2017 9:44 PM	503 Milliseconds
	8/9/2017 9:43 PM	685 Milliseconds
	8/9/2017 9:31 PM	7.93 Seconds
	8/7/2017 12:15 PM	9.86 Seconds
	7/26/2017 2:37 PM	733 Milliseconds
	7/26/2017 2:35 PM	7.2 Seconds
	7/26/2017 2:22 PM	8.28 Seconds
	7/25/2017 10:26 ...	713 Milliseconds
	7/25/2017 10:23 ...	7.2 Seconds
	7/25/2017 9:46 PM	7.97 Seconds
	7/25/2017 7:17 PM	462 Milliseconds

## Logic app run

08586992774041919015513174603

Run Details Resubmit Cancel Run

## Body

```
{  
    "Printer_Solution": null,  
    "Printer_Drivers_Installed": "Y",  
    "Printer_IP_Reachable": "Y",  
    "Printer_Network_Connection_Type": "Wireless",  
    "Printer_Paper_OK": "Y",  
    "Printer_Power_On": "N"
```

... Less

## Method

POST

## OUTPUTS

Show raw outputs &gt;

## Status code

200

## Headers

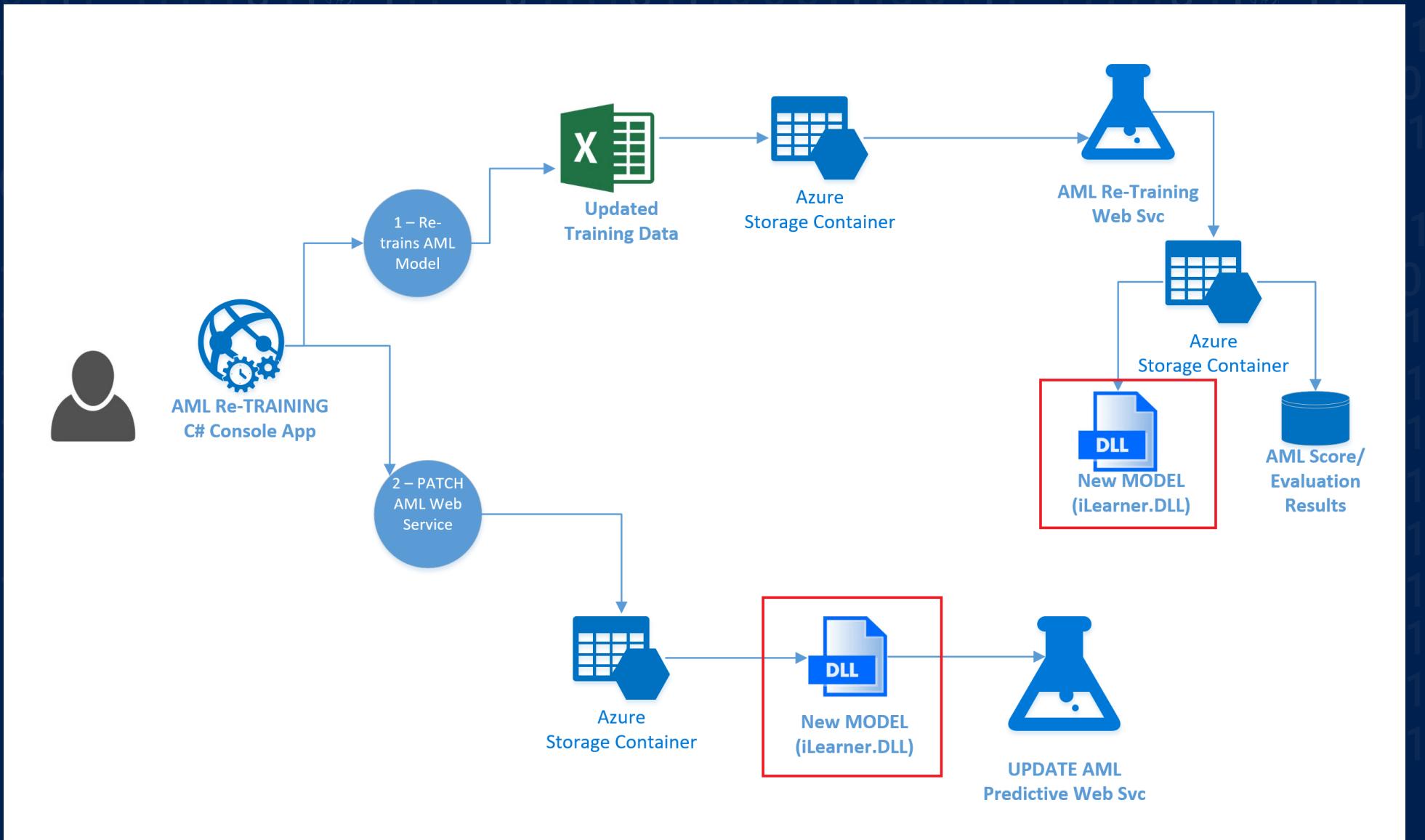
```
{  
    "Pragma": "no-cache",  
    "Cache-Control": "no-cache",  
    "Date": "Thu, 10 Aug 2017 01:44:41 GMT",  
    "Server": "Microsoft-IIS/8.0",  
    "X-AspNet-Version": "4.0.30319",  
    "X-Powered-By": "ASP.NET",  
    "Content-Length": "98",  
    "Content-Type": "application/json; charset=utf-8",  
    "Expires": "1"
```

## Body

Azure Machine Learning Prediction is : Fix Printer Power with a probability of 0.996662318706512

# Machine Learning: Re-Training the Bot

# AML – Re-Training Overview:



# Updated Training Data:

AML\_Printer\_Issue\_Best\_Action\_Data\_v2\_TAB.csv - Excel

Jeff Barnes

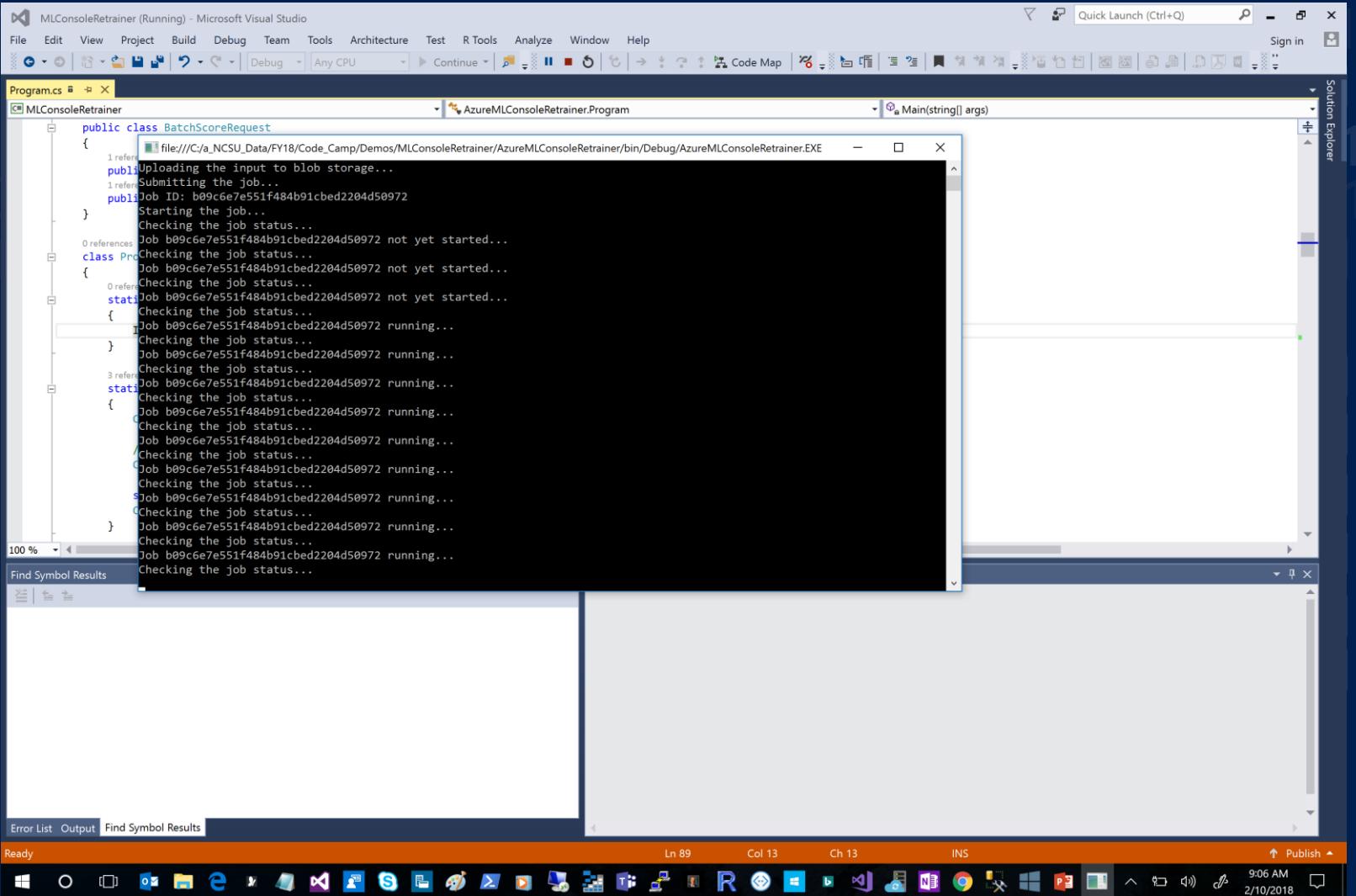
File Home Insert Draw Page Layout Formulas Data Review View Add-ins LOAD TEST OFFICE REMOTE Power BI Power Pivot Team Tell me what you want to do Share

Cut Copy Format Painter Paste Font Alignment Protection Number Styles Cells Editing

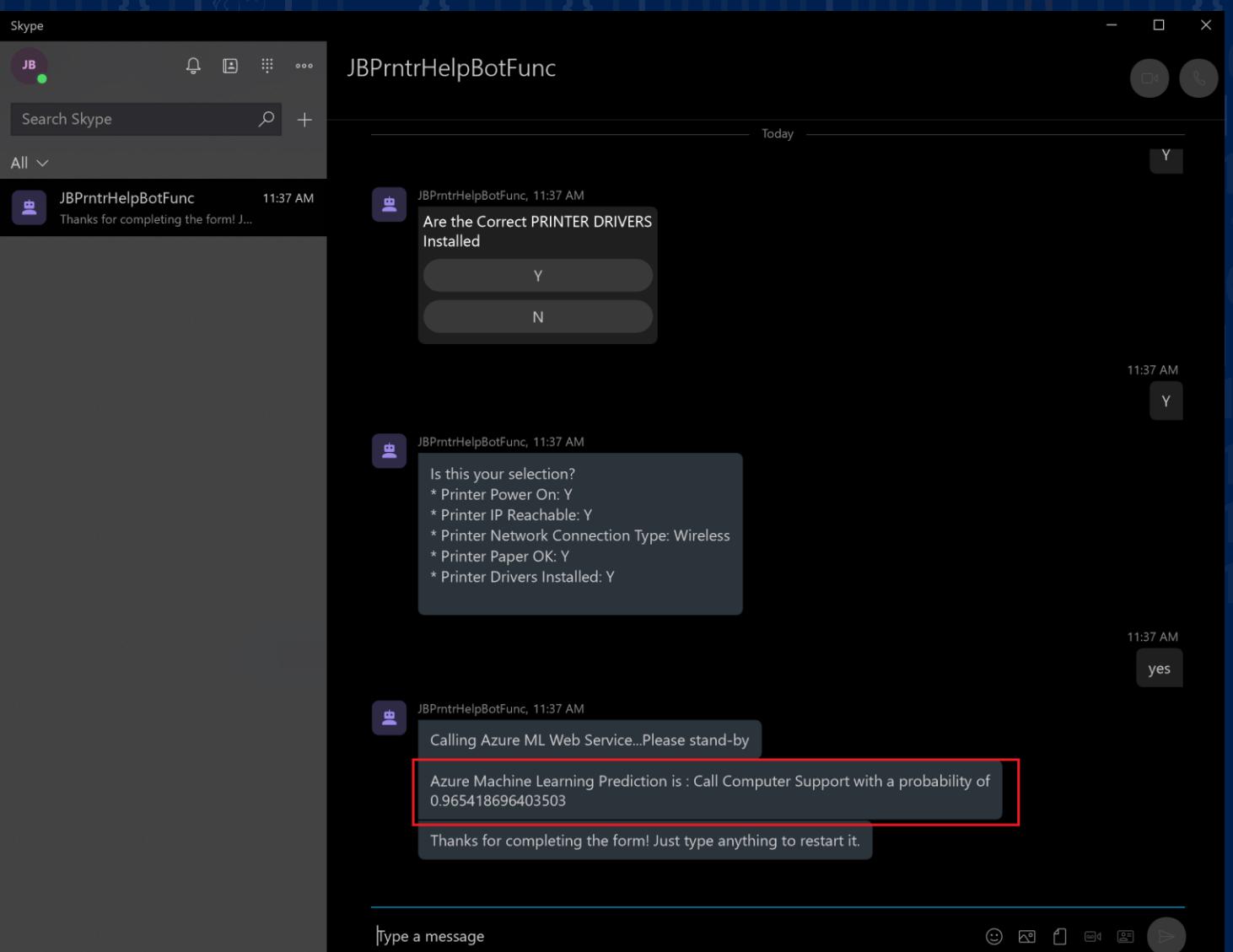
G19

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Printer_Power_On	Printer_IP_Reachable	Printer_Network_Connection_Type	Printer_Paper_OK	Printer_Drivers_In Printer Solution								
2	Y	Y	Wireless	Y	Y	Call Computer Support							
3	Y	Y	Wired	Y	Y	Call Computer Support							
4	Y	Y	Wireless	Y	N	Run Windows Printer Troubleshooter							
5	Y	Y	Wired	Y	N	Run Windows Printer Troubleshooter							
6	N	Y	Wireless	Y	Y	Fix Printer Power							
7	N	Y	Wired	Y	Y	Fix Printer Power							
8	Y	N	Wireless	Y	Y	Fix Printer Networking							
9	Y	N	Wired	Y	Y	Fix Printer Networking							
10	Y	Y	Wireless	N	Y	Fix Printer Paper							
11	Y	Y	Wired	N	Y	Fix Printer Paper							
12	Y	Y	Wireless	Y	N	Install Correct Printer Drivers							
13	Y	Y	Wired	Y	N	Install Correct Printer Drivers							
14	Y	Y	Wireless	Y	Y	Call Computer Support							
15	Y	Y	Wired	Y	Y	Call Computer Support							
16	Y	Y	Wireless	Y	N	Run Windows Printer Troubleshooter							
17	Y	Y	Wired	Y	N	Run Windows Printer Troubleshooter							
18	N	Y	Wireless	Y	Y	Fix Printer Power							
19	N	Y	Wired	Y	Y	Fix Printer Power							
20	Y	N	Wireless	Y	Y	Fix Printer Networking							
21	Y	N	Wired	Y	Y	Fix Printer Networking							
22	Y	Y	Wireless	N	Y	Fix Printer Paper							
23	Y	Y	Wired	N	Y	Fix Printer Paper							
24	Y	Y	Wireless	Y	N	Install Correct Printer Drivers							
25	Y	Y	Wired	Y	N	Install Correct Printer Drivers							
26	Y	Y	Wireless	Y	Y	Call Computer Support							
27	Y	Y	Wired	Y	Y	Call Computer Support							
28	Y	Y	Wireless	Y	N	Run Windows Printer Troubleshooter							
29	Y	Y	Wired	Y	N	Run Windows Printer Troubleshooter							
30	N	Y	Wireless	Y	Y	Fix Printer Power							
31	N	Y	Wired	Y	Y	Fix Printer Power							
32	Y	N	Wireless	Y	Y	Fix Printer Networking							
33	Y	N	Wired	Y	Y	Fix Printer Networking							
34	Y	Y	Wireless	N	Y	Fix Printer Paper							
35	Y	Y	Wired	N	Y	Fix Printer Paper							
36	Y	Y	Wireless	Y	N	Install Correct Printer Drivers							

# Re-Train ML model via C# Console App



# Re-Trained ML model – New Results



# Questions?

# Useful Links & Resources:

Free Azure trial offer at:

<http://azure.microsoft.com/en-us/pricing/free-trial>

Free Azure Machine Learning Trial offer at:

<https://studio.azureml.net/Home>

Azure Machine Learning:

<http://azure.microsoft.com/en-us/services/machine-learning/>

Azure Machine Learning Data Market:

<http://datamarket.azure.com/browse?query=machine%20learning>

# Bot Resources:

## Vital Links:

<https://apps.dev.microsoft.com/>  
<https://dev.botframework.com/>  
<https://www.luis.ai/>  
<https://portal.azure.com/>

## Walk-Thru Links:

### Getting Started:

<https://docs.botframework.com/en-us/csharp/builder/sdkreference/gettingstarted.html>

### Bot Framework - Solving Business Problems with the Microsoft Bot Framework:

<https://msdn.microsoft.com/en-us/magazine/mt788623.aspx>

### Use Bot Framework for Anytime, Anywhere Access to Application Data - Dec 2016

<http://msdn.microsoft.com/magazine/mt790202>

<https://github.com/ssrikantan/botlobapps#botlobapps>

<https://blog.botframework.com/2016/12/13/More-Ways-to-Make-Smart-Bots/>

<https://github.com/Microsoft/BotBuilder-Samples/tree/master/CSharp/demo-ContosoFlowers>

### Developing and Deploying Intelligent Chat Bots

<https://github.com/Azure/bot-education/wiki/Syllabus-for-2-Day-Workshop>

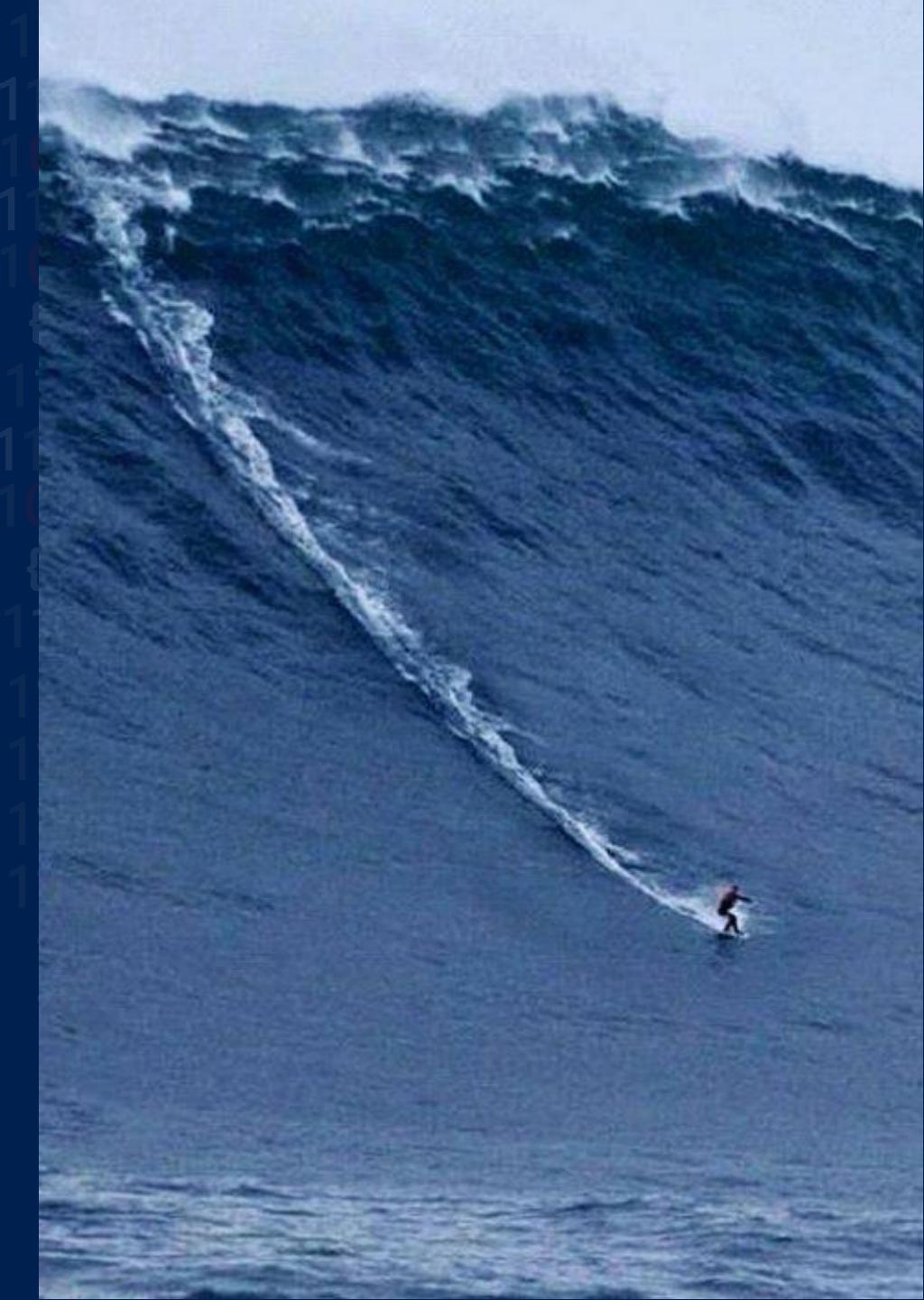
<https://github.com/Azure/bot-education/>

## Bot Sample Code:

<https://github.com/Microsoft/BotBuilder-Samples/>  
<https://github.com/Microsoft/BotFramework-Samples>  
<https://github.com/Microsoft/BotBuilder>

# Wrapping-Up

- Microsoft is continuing to provide **Massive Waves of Innovation** in the cloud – and on premise.
- Microsoft's core business **IS Technology**...we design, build, test, and support Azure on a global scale.
- We are continuing to invest heavily and make it easier to build, test, deploy, and manage **YOUR** applications and services in Azure.



# Thank You!



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Free ebook: Microsoft Azure Essentials: Azure Machine Learning:  
[http://blogs.msdn.com/b/microsoft\\_press/archive/2015/04/15/free-ebook-microsoft-azure-essentials-azure-machine-learning.aspx](http://blogs.msdn.com/b/microsoft_press/archive/2015/04/15/free-ebook-microsoft-azure-essentials-azure-machine-learning.aspx)

[http://aka.ms/AzureML\\_pdf](http://aka.ms/AzureML_pdf)

