



# Design Cognitive Services Solutions

- Azure Cognitive Services Categories
  - Vision
  - Speech
  - Language
  - Decision
- Web Search (*formerly Search*)

# Design Cognitive Services Solutions

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- Azure Cognitive Services Vision
  - Computer Vision
  - Custom Vision
  - Face
  - Video Indexer
- Form Recognizer PREVIEW
- Ink Recognizer PREVIEW





# Design Cognitive Services Solutions

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- Azure Cognitive Services Speech
  - Speech to Text
  - Text to Speech
  - Speech Translation
  - Speaker Recognition PREVIEW

# Design Cognitive Services Solutions

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- Azure Cognitive Services Language
- Translator
  - Custom Translator
- Text Analytics
- QnA Maker
- Language Understanding
- Immersive Reader PREVIEW





# Design Cognitive Services Solutions

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- Azure Cognitive Services Decision
- Content Moderator
  - Human review tool
- Personalizer
- Anomaly Detector PREVIEW

# Design Cognitive Services Solutions

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- Anomaly Detector
- Azure SQL Database Advanced Data Security
- Azure Stream Analytics Anomaly Detection
- Azure Data Explorer Anomaly Detection
- ...



# Design Cognitive Services Solutions

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- Azure Cognitive Services Web Search (Bing Search, formerly Search)
  - Bing [\*] Search
    - \* Web, Visual, Video, News, Image, Entity
  - Bing Custom Search
  - Bing Autosuggest
  - Bing Spell Check





# Authenticate to Azure Cognitive Services

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- Authentication options:
  - Authenticate with a single-service subscription key
  - Authenticate with a multi-service subscription key
  - Authenticate with a token (*Bearer*)
  - Authenticate with Azure Active Directory (AAD)



# Authenticate to Azure Cognitive Services

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- Authenticate with a **single-service** subscription key:
- Create a specific Cognitive Service
  - Portal, PowerShell, CLI, ARM, REST
  - Use the endpoint and API key to authenticate
- Header: *Ocp-Apim-Subscription-Key*

# Authenticate to Azure Cognitive Services

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- Authenticate with a **multi-service** subscription key:
  - Create a multi-purpose Cognitive Service
    - Portal, PowerShell, CLI, ARM, REST
    - Use the endpoint and API key to authenticate
  - The subscription key is not tied to a specific service
  - Header: *Ocp-Apim-Subscription-Key*



# Authenticate to Azure Cognitive Services

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- Specifying region in the API call:
  - For most services:
    - <REGION>.api.cognitive.microsoft.com
    - westus.api.cognitive.microsoft.com
  - For the *Translator* service:
    - -H 'Ocp-Apim-Subscription-Region: eastus'



# Authenticate to Azure Cognitive Services

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- Authenticate with a security token (Bearer):
- Supported services:
  - *Text Translation API*
  - Speech Services: *Speech-to-text REST API*
  - Speech Services: *Text-to-speech REST API*
- First, get a token with your subscription key
- Then, -H 'Authorization: Bearer YOUR\_AUTH\_TOKEN'



# Authenticate to Azure Cognitive Services

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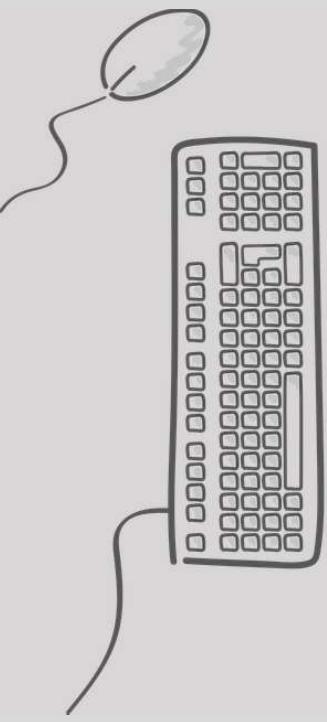
- Currently, only the following support AAD authentication:
  - *Computer Vision API, Face API, Text Analytics API, Immersive Reader, Form Recognizer, Anomaly Detector*
  - All Bing services except *Bing Custom Search*
- Can be configured in the Azure Portal or programmatically
  - PowerShell, CLI, etc.



# Demo

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- Azure Cognitive Services & authentication options
  - Vision (Computer Vision, Face)
  - Speech (Speech-to-text, Text-to-speech)
  - Language (Translator, LUIS, QnA Maker)
  - Decision (Content moderator)
  - Web Search (Image search)





# Questions



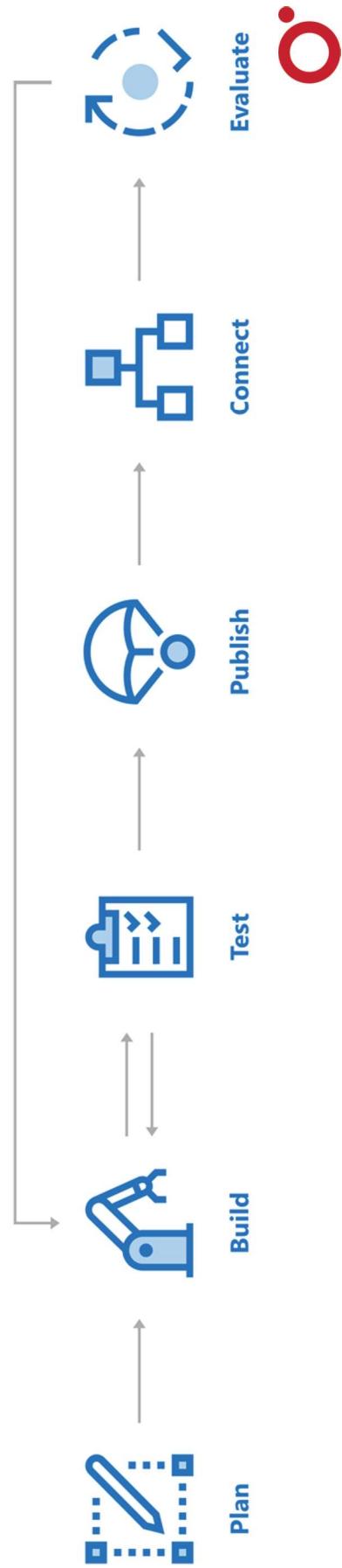
## Design Microsoft Bot Framework Solutions

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- Bots provide an experience that feels less like using a computer and more like dealing with a person.
- “Azure Bot Service and Bot Framework offer an integrated set of tools and services to facilitate this process”

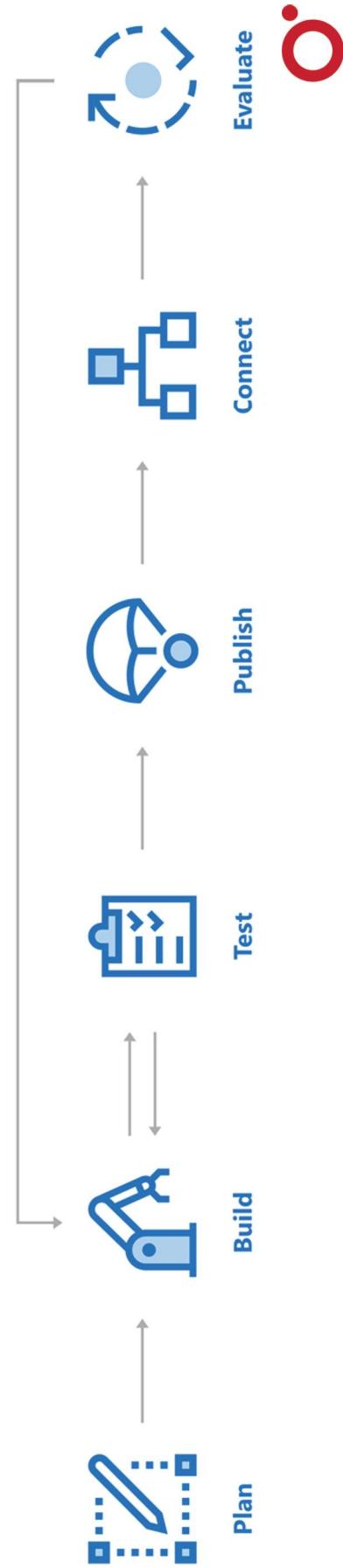
# Design Microsoft Bot Framework Solutions

- Steps to build a bot



# Design Microsoft Bot Framework Solutions

- Build your bots
  - Azure portal, or
  - C#, JavaScript and Python templates



# Design Microsoft Bot Framework Solutions

As part of the Azure Bot Service and Bot Framework, we offer additional components you can use to extend your bot's functionality:

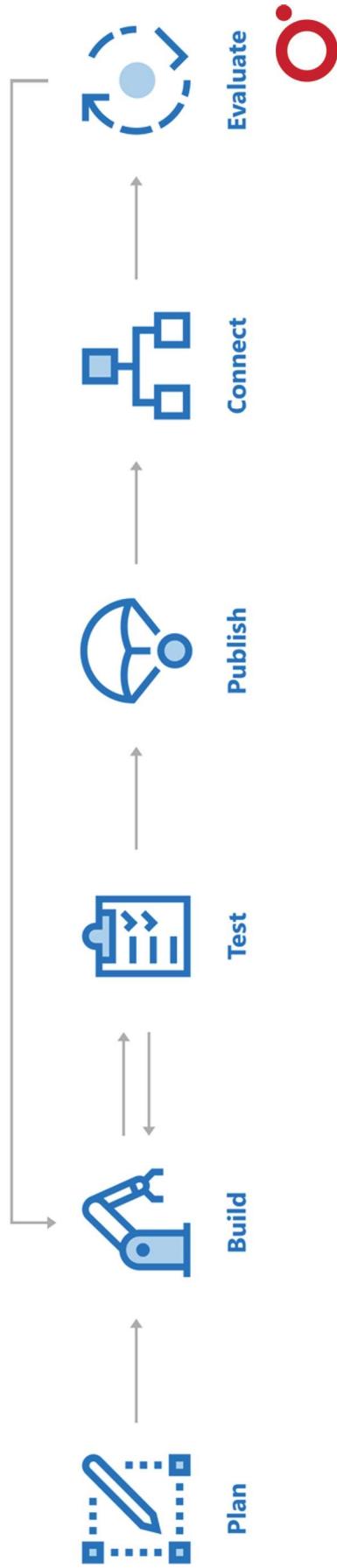
Feature	Description	Link
Add natural language processing	Enable your bot to understand natural language, understand spelling errors, use speech, and recognize the user's intent processing	<a href="#">How to use LUIS</a>
Answer questions	Add a knowledge base to answer questions users ask in a more natural, conversational way	<a href="#">How to use QnA Maker</a>
Manage multiple models	If using more than one model, such as for LUIS and QnA Maker, intelligently determine when to use which one during your bot's conversation	<a href="#">Dispatch tool</a>
Add cards and buttons	Enhance the user experience with media other than text, such as graphics, menus, and cards	<a href="#">How to add cards</a>

<https://docs.microsoft.com/en-us/azure/bot-service/bot-service-overview-introduction?view=azure-bot-service-4.0#build>



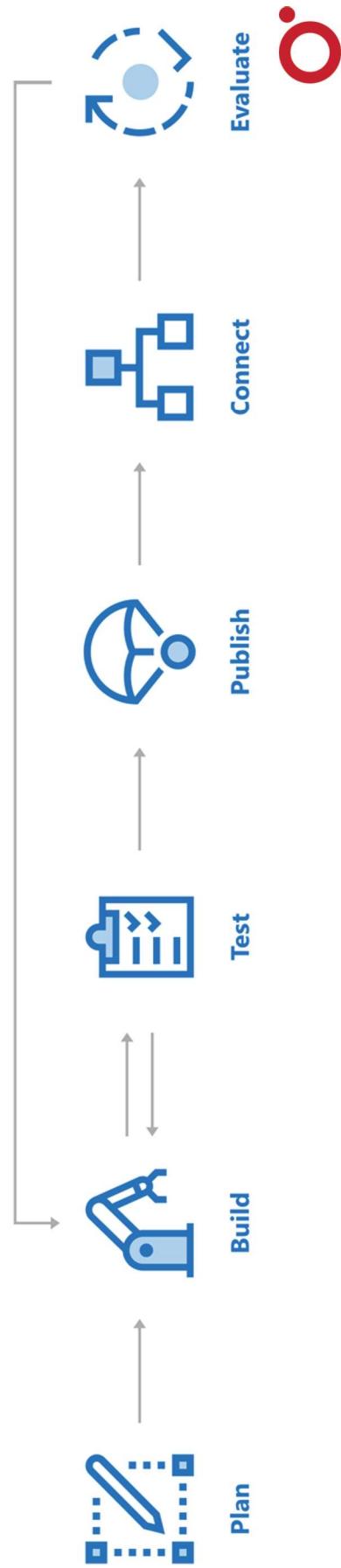
# Design Microsoft Bot Framework Solutions

- Test your bot before deployment
  - Test your bot locally with the “Bot Framework Emulator”.
  - Test your bot on the web using “Web App Bot”
  - Unit Test your bot with the July update of Bot Framework SDK.



# Design Microsoft Bot Framework Solutions

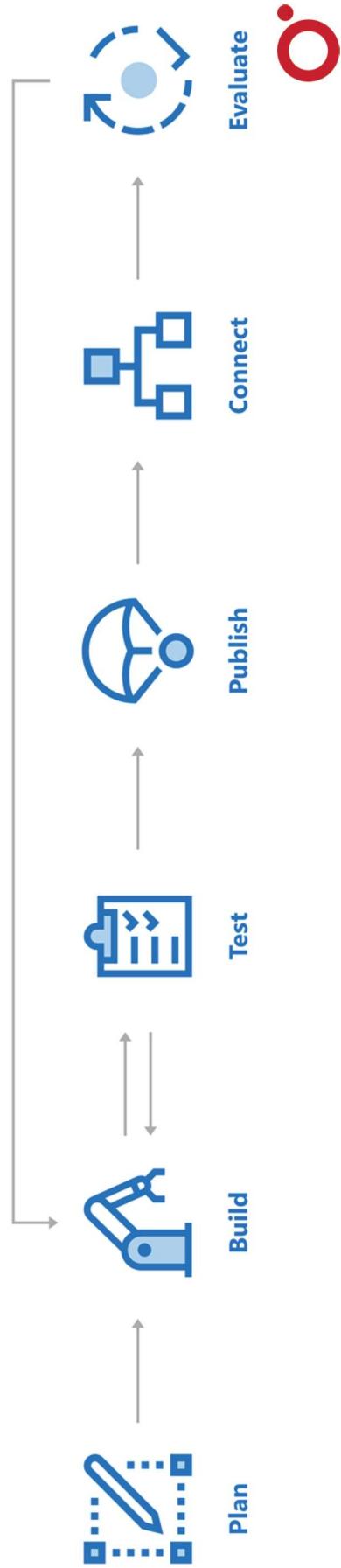
- Publish your bot
  - To Azure
  - Your own website



# Design Microsoft Bot Framework Solutions

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- Connect your bot to channels
  - Facebook, Messenger, Kik, Slack, Microsoft Teams, Telegram, text/SMS, Twilio, Cortana, etc.





# Design Microsoft Bot Framework Solutions

## What's new May 2020

05/18/2020 • 8 minutes to read • +3

### APPLIES TO:

**SDK v4**

**SDK v3**

The Bot Framework SDK v4 is an Open Source SDK that enables developers to model and build sophisticated conversation using their favorite programming language.

This article summarizes key new features and improvements in Bot Framework and Azure Bot Service.

	C#	JS	Python	Java
Release	4.9.1 (GA)	4.9.0 (GA)	4.9.0 (GA)	4.6 Preview
Samples	.NET Core, WebAPI	Node.js, TypeScript, es6	Python	

<https://docs.microsoft.com/en-us/azure/bot-service/what-is-new?view=azure-bot-service-4.0>



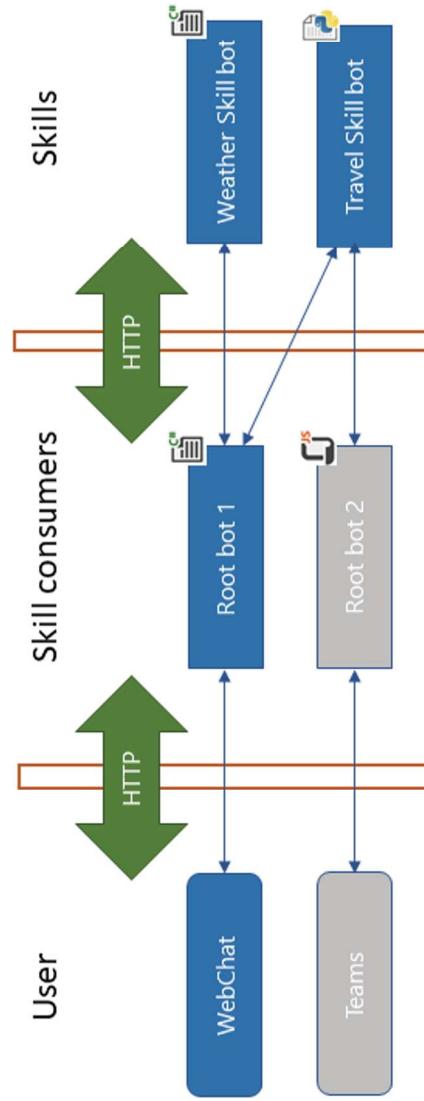
# Design Microsoft Bot Framework Solutions

- Channels
  - A channel is a connection between the bot and communication apps.
    - Cortana
    - Alexa
    - Email
    - Facebook
    - Skype
    - Telegram
    - Slack
    - Twilio
    - ...



# Design Microsoft Bot Framework Solutions

- Bot Framework Skills
  - A skill is a bot that can perform a set of tasks for another bot.
  - A skill consumer is a bot that can call one or more skills



# Design Microsoft Bot Framework Solutions

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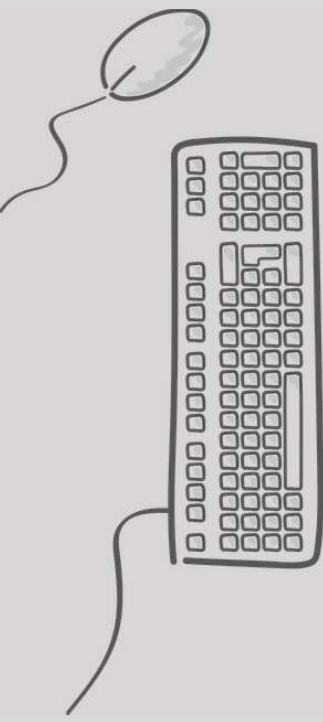
- Use a Bot to add a conversational layer on top of your AI models
  - Azure Cognitive Services integration
    - QnA Maker (Knowledge)
    - Language Understanding (LUIS)
  - Azure Cognitive Search integration



# Demo

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- Create a bot with the Bot Framework SDK for .NET
- Create a bot with Azure Bot Service
- Connecting with QnA Maker





## Design the Compute Infrastructure

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- Azure Machine Learning compute instance
  - FPGA based
  - GPU based
  - CPU based

# Design the Compute Infrastructure

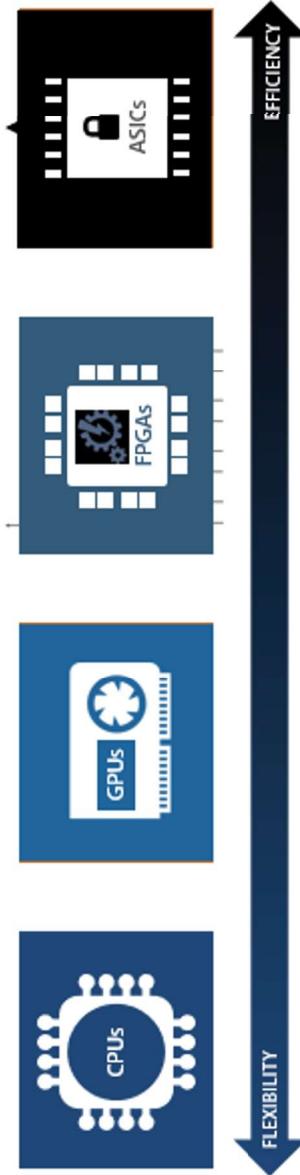
## Silicon alternatives

### TRAINING

CPUs and GPUs, limited FPGAs,  
ASICs under investigation

### EVALUATION

CPUs and FPGAs,  
ASICs under investigation



<https://docs.microsoft.com/en-us/azure/machine-learning/how-to-deploy-fpga-web-service>





# Design the Compute Infrastructure

- FPGAs





## Design the Compute Infrastructure

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- FPGAs
  - Contain an array of programmable logic blocks, and
  - A hierarchy of reconfigurable interconnects
  - The interconnects allow these blocks to be configured in various ways after manufacturing
  - Provide a combination of programmability and performance.



## Design the Compute Infrastructure

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- FPGAs
  - FPGAs on Azure are based on Intel's FPGA devices
  - Used to accelerate real-time AI calculations
  - This FPGA-enabled architecture offers performance, flexibility, and scale
  - Make it possible to achieve low latency for real-time requests



## Design the Compute Infrastructure

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- Use FPGA-based compute for:
  - Image classification and recognition scenarios
  - TensorFlow deployment (requires *Tensorflow 1.x*)



## Design the Compute Infrastructure

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- FPGAs
- FPGAs are available in these Azure regions:
  - East US
  - Southeast Asia
  - West Europe
  - West US 2

# Design the Compute Infrastructure

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- Deploy models on FPGAs
- Deploy a model as a web service on FPGAs with Azure Machine Learning Hardware Accelerated Models.
- Quickstart





## Design the Compute Infrastructure

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- GPU-based compute:
  - Offer parallel processing capabilities,
  - Making it faster at image rendering than CPUs.
  - Makes it a good choice for image and video processing



## Design the Compute Infrastructure

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- CPU-based compute:
  - General-purpose processors
    - Their performance isn't ideal for graphics and video processing.

## Decide on Compute Infrastructure

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- Which compute infrastructure should I choose if:
  - I need real-time AI and I am in *eastus*?
  - I am using TensorFlow.
- I am processing security video footage in “canada central”?
- I am looking for the cheapest option and I don’t need real-time processing?





## Cloud-based, On-premises, or Hybrid

- Cloud-based vs. on-premises vs. hybrid cloud
- Choose SaaS over PaaS anywhere possible
- Choose PaaS over IaaS anywhere possible
- Choose cloud-based over on-premises if possible
- Main reasons for choosing on-premises or hybrid solutions:
  - Security
  - Latency
  - Legacy solutions
  - Data or code migration challenges



# Questions



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# Break (5 minutes)

# Implement and Monitor AI solutions



# Implement and Monitor AI solutions

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- Integration with Azure Cognitive Services
- Custom AI services
- Develop Streaming Solutions
- Implement Azure Cognitive Search
- Implement data logging processes

# Integration with Azure Cognitive Services

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- Integrate Cognitive Services REST API with:
  - Logic Apps
  - Function Apps
  - App Services
  - Azure Data Factory
- More integrations via event handlers
  - Azure Storage accounts, Azure Service Bus, Event Hubs, etc.

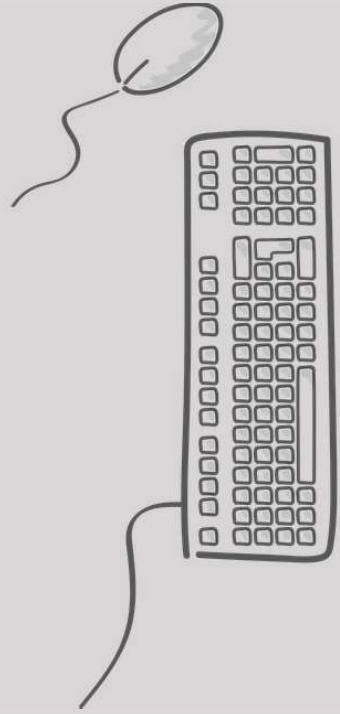


# Integration with Azure Cognitive Services

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- Integrate Cognitive Services REST API with:
  - Logic Apps
  - Function Apps, App Services
  - Azure Data Factory
  - ...
- More integrations via event handlers
  - Azure Storage accounts, Azure Service Bus, Event Hubs, etc.





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# Demo

- Integrate Cognitive Services with Azure Functions and Blobs

# Custom AI Services

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- Cognitive Service
  - Custom Translator
  - Custom Vision
  - Custom text-to-speech
  - Custom speech-to-text
- Content Moderator Human Review Tool
  - Bing Custom Search
- Azure Machine Learning
  - Sky's the limit!



# Custom AI Services

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- Custom Translator
  - Can be used to customize the Cognitive Services Language
  - Tailor the translation to your industry
- Technology
  - Health
  - Physics
- There is a custom portal





# Custom AI Services

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- Custom Vision
- Use it when standard Computer Vision is not sufficient
- Use it for classification scenarios
  - Sugar maple vs. Japanese maple, etc.
- There is a custom portal

# Custom AI Services

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- Custom text-to-speech
  - Create a custom Voice
- Custom speech-to-text
  - Create voice profiles for different accents and environments





# Custom AI Services

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- Content Moderator Human Review Tool
  - The Review tool, when used in conjunction with the machine-assisted moderation APIs
  - Review the already-applied moderation tags

# Custom AI Services

---

- Custom Translator
  - Can be used to customize the Cognitive Services Language
  - Tailor the translation to your industry
- Technology
  - Health
  - Physics
  - ...



# Custom AI Services

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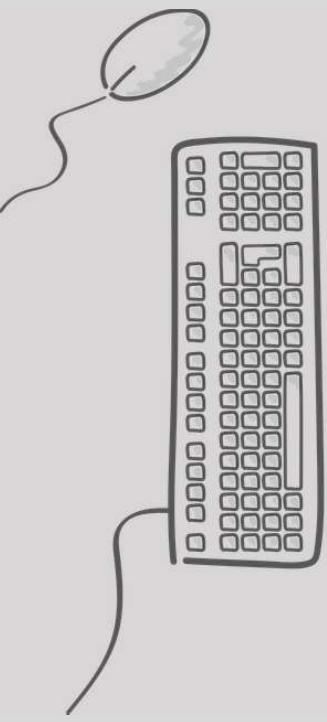
- Bing Custom Search
- Use it when standard Cognitive Web Search services are not enough
- Custom ranking and filtering
- ...
- <https://azure.microsoft.com/en-us/services/cognitive-services/bing-custom-search/>



# Demo

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- Custom Translator
- Custom Vision
- Content Moderator Human Review Tool



# Develop Streaming Solutions

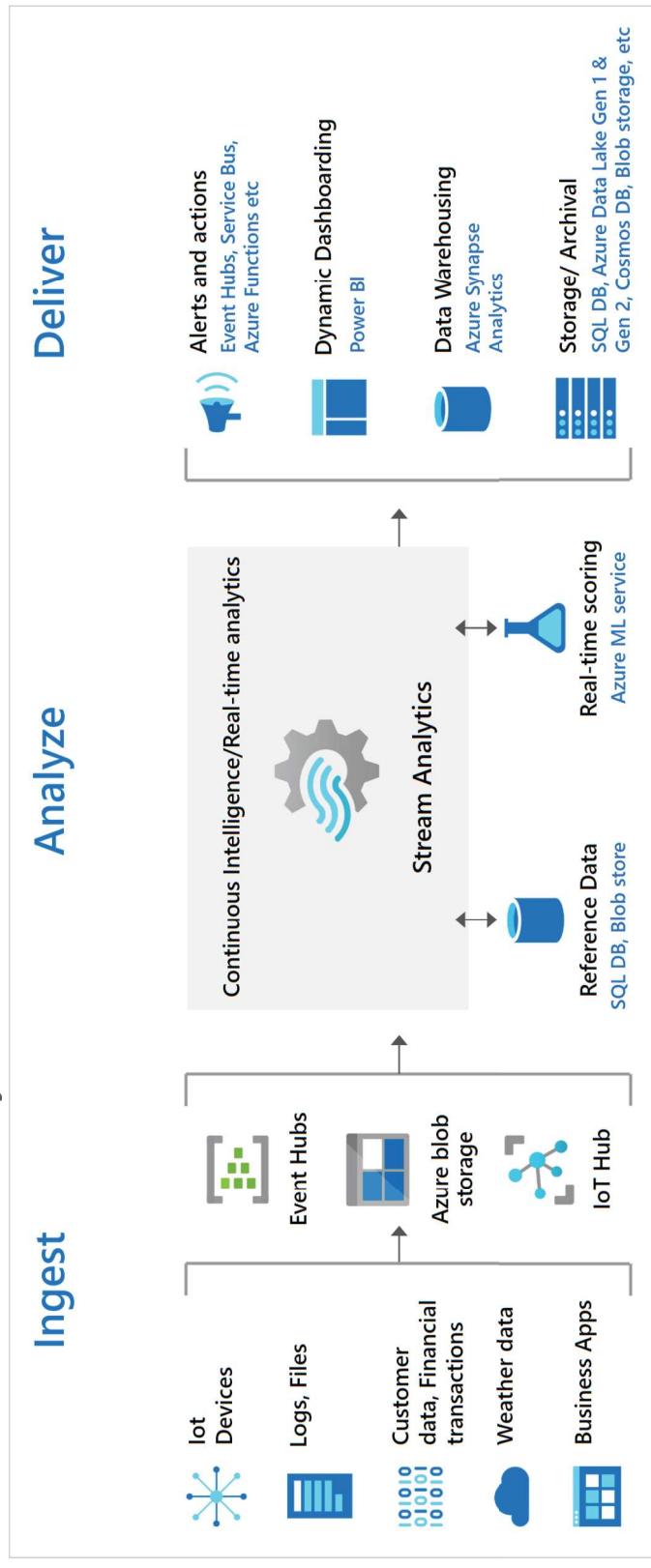
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- Azure Stream Analytics
- Ingest and process real-time data
  - Ingest from *IoT Hub, Event Hubs and Blob Storage*
  - Process using a *SQL-like language*
  - Output to several services such as *Event Hubs, Power BI, Logic Apps, etc.*
- Does support AI-backed anomaly detection
  - Alternative to *Anomaly Detector (preview)*



# Develop Streaming Solutions

- Azure Stream Analytics





# Develop Streaming Solutions

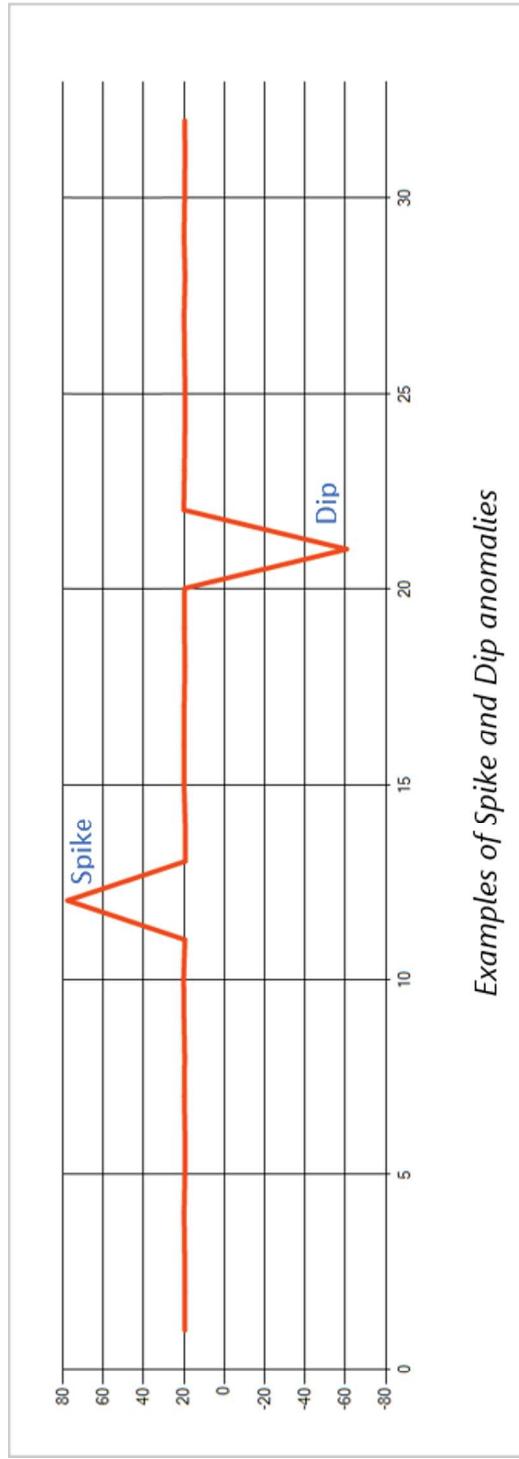
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- Azure Stream Analytics
- Integrate with Machine Learning
  - Stream Analytics functions
  - Azure Machine Learning
  - Azure Machine Learning Studio (classic)
- Anomaly Detection

# Develop Streaming Solutions

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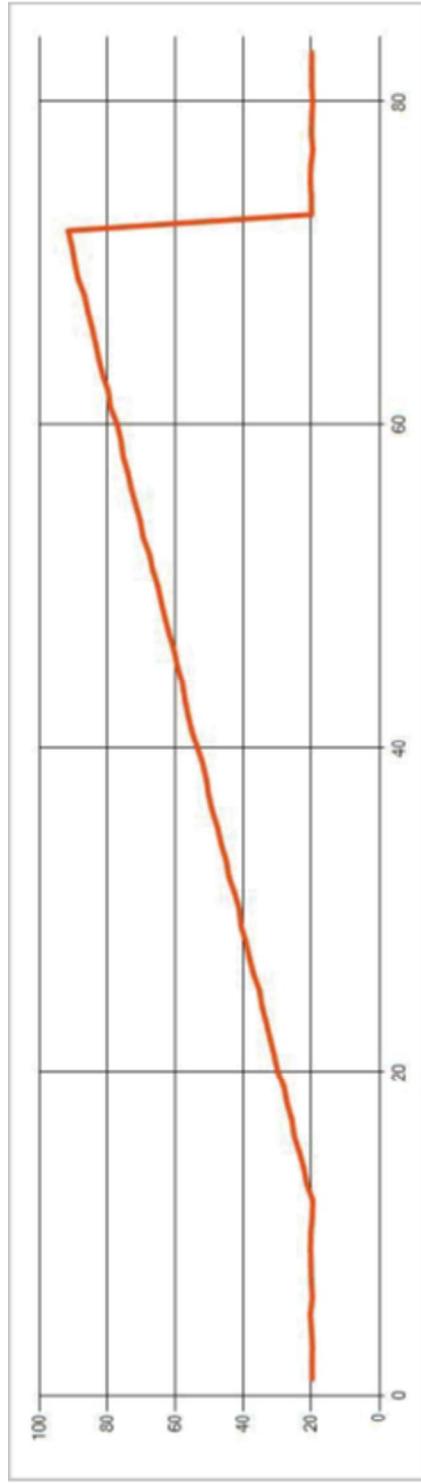
- Azure Stream Analytics: Anomaly Detection
  - Stream Analytics functions : `AnomalyDetection_SpikeAndDip`



# Develop Streaming Solutions

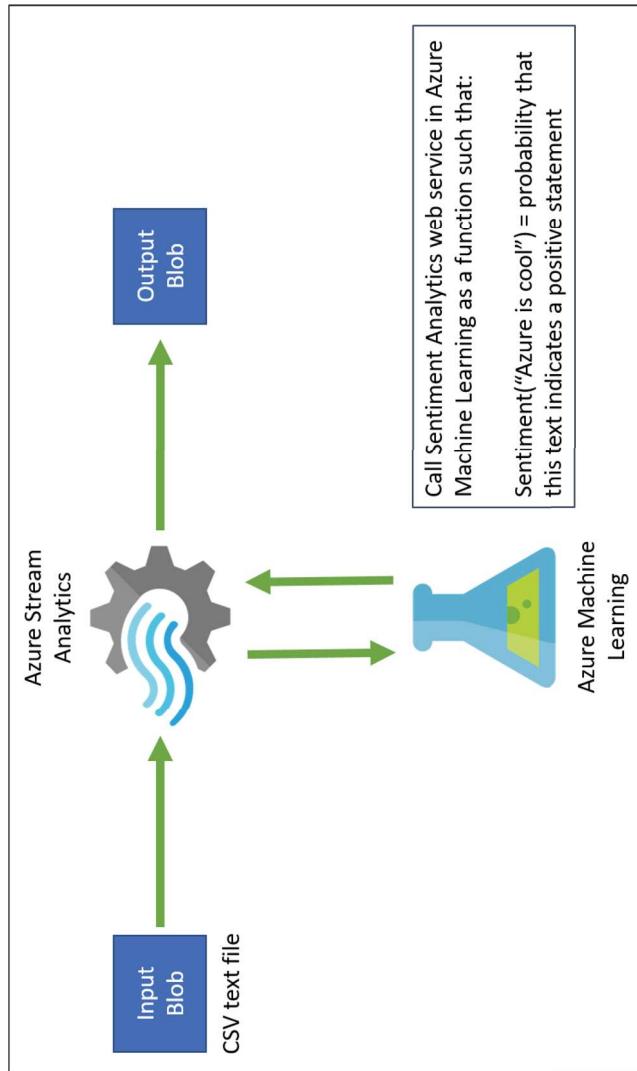
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- Azure Stream Analytics: Anomaly Detection
  - Stream Analytics functions : `AnomalyDetection_ChangePoint`



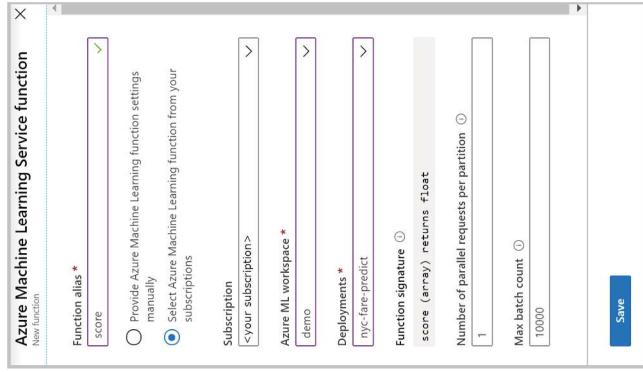
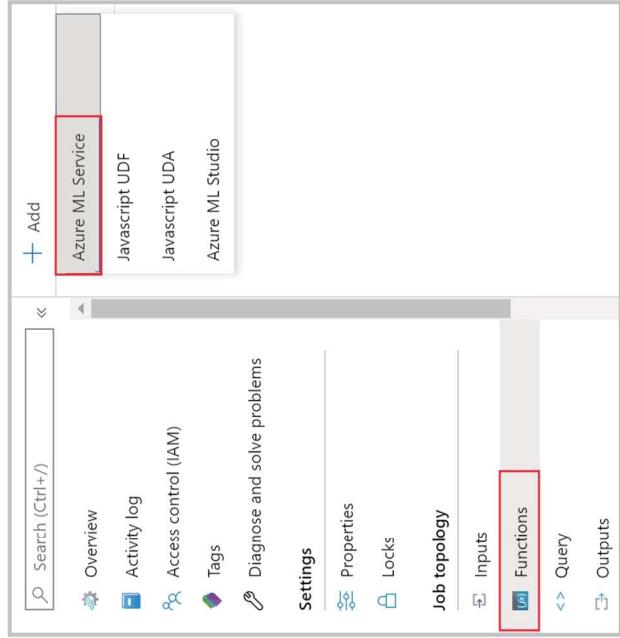
# Develop Streaming Solutions

- Azure Stream Analytics: Integrate with Machine Learning



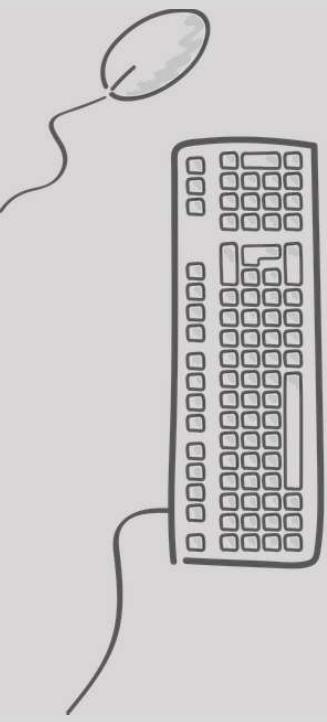
# Develop Streaming Solutions

- Azure Stream Analytics: Integrate with Machine Learning





# Demo



- Azure Stream Analytics Anomaly Detection
- Azure Stream Analytics UDF (Machine Learning)



# Implement Azure Cognitive Search

## What is Azure Cognitive Search?

06/30/2020 • 13 minutes to read • +1

Azure Cognitive Search (formerly known as "Azure Search") is a search-as-a-service cloud solution that gives developers APIs and tools for adding a rich search experience over private, heterogeneous content in web, mobile, and enterprise applications.



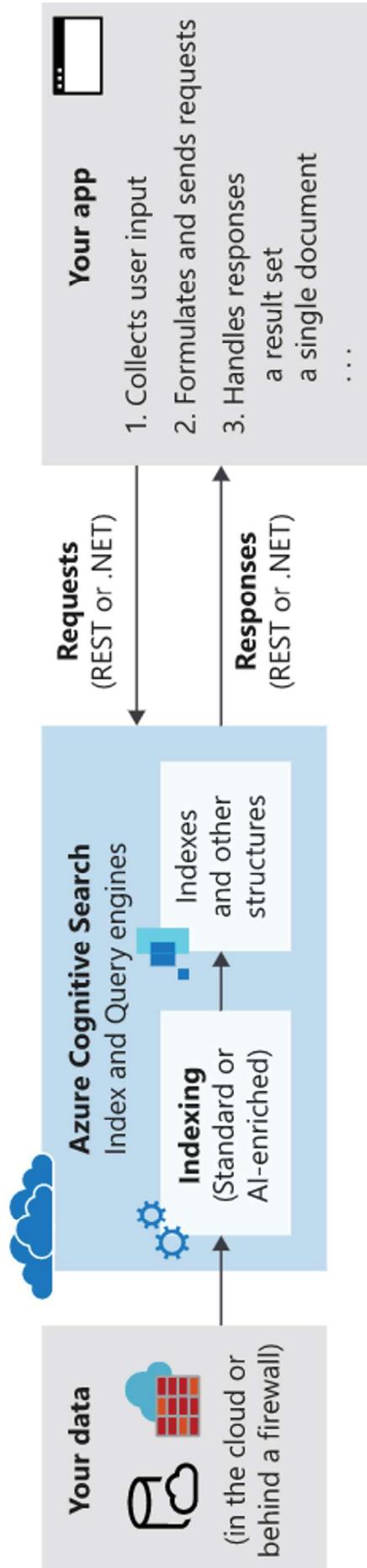
# Implement Azure Cognitive Search

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- Sits on top of your existing data
  - Azure SQL Database, Cosmos DB, etc.
- Ingests and indexes the data
  - A client can query the data via REST APIs



# Implement Azure Cognitive Search





# Implement Azure Cognitive Search

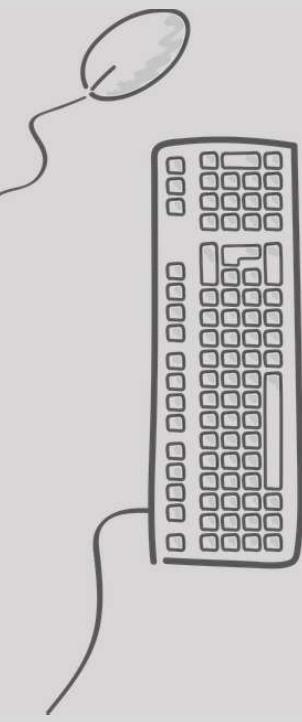
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- AI enrichment extracts and enriches data
  - To make it searchable in Azure Cognitive Search.
    - Skills and skill sets



# Demo

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- Azure Cognitive Search
  - Configuration with Azure SQL Database
  - Creating a Skill
  - Query the data
  - Integration with a bot



# Questions



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# Break (5 minutes)

# Orchestrating Azure Services to Develop AI Solutions

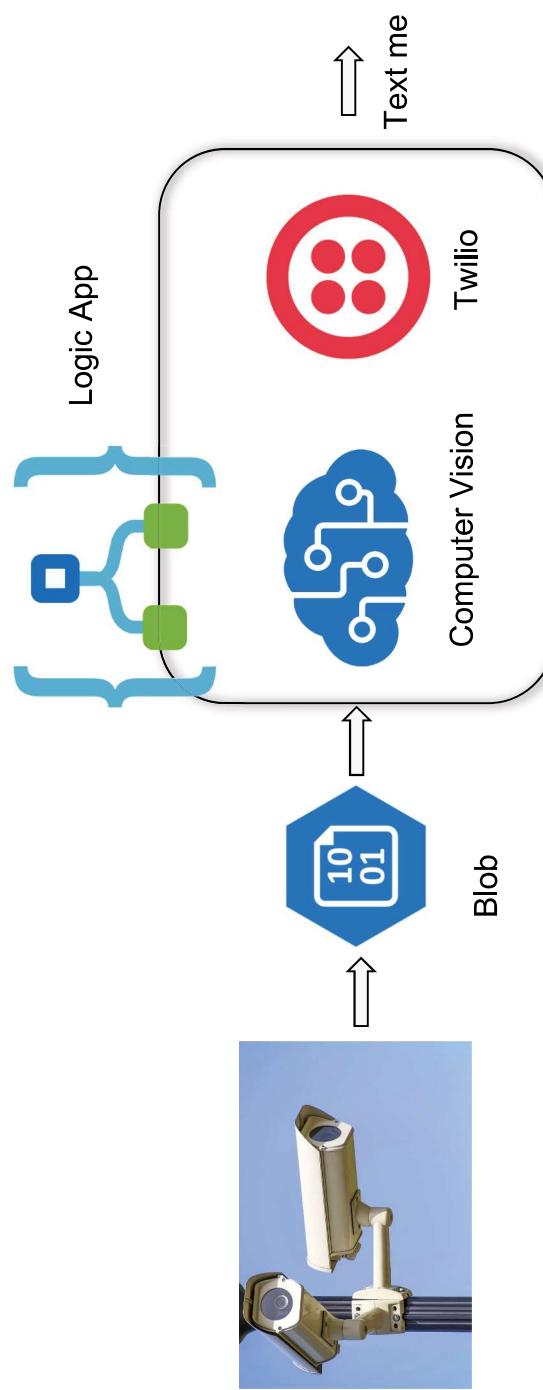


# Azure Cognitive Services Scalability

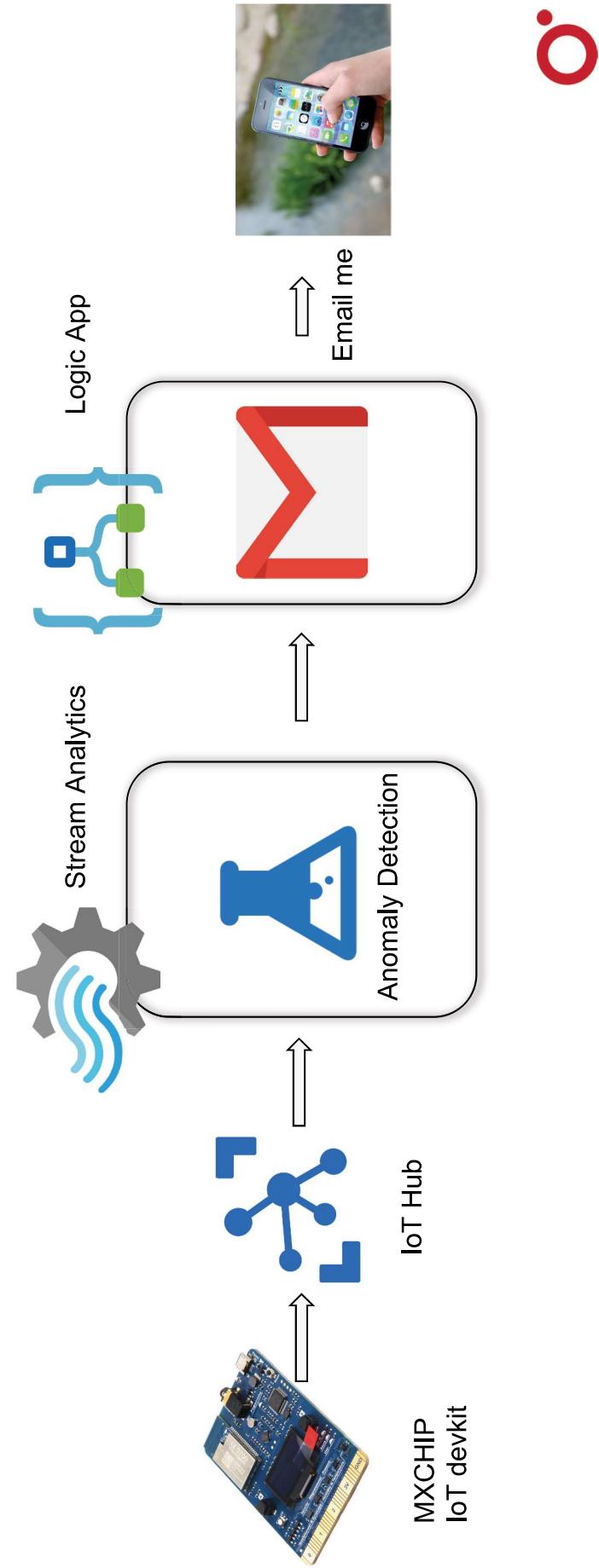
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- Text me when a person is in the building
- Send an email when humidity is too high

# Text Me When a Person is in the Building



# Send an Email When Humidity is Too High



The screenshot shows a web browser displaying the Microsoft Azure IoT DevKit website. The page has a dark blue background with a repeating pattern of white IoT-related icons (Wi-Fi, clouds, sensors, etc.).

**Page Headers:**

- Address bar: An all-in-one IoT kit built for the Microsoft IoT DevKit
- Page title: IoT DevKit
- Top navigation: Get Started, Docs, Projects, Tools, Blog

**Main Content Area:**

- Section Header:** An all-in-one IoT kit built for the cloud
- Image:** A photograph of the Microsoft Azure IoT DevKit, which is a blue printed circuit board (PCB) with various components like a microcontroller, sensors, and connectors.
- Text:** All the sensors and parts you love, no soldering needed. Welcome to cloud IoT development.
- Buttons:** Project Catalog > and Get a Kit >
- Badges:** Microsoft Azure Certified
- Version:** v1.6.5/v1.9.11-preview

**Footer:**

- What's New
- 8/23: Learn connect the DevKit to Azure IoT Central application within minutes via IoT Plug and Play
- IoT Plug and Play

**Right Side Elements:**

- Cloud icon
- Gear icon
- Plug icon



# Questions

# The Exam



# Questions in AI-100

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- Multiple choice
- Drag and drop
- Scenario based
- There will be hands-on labs



# AI-100

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- Exam AI-100 :
- <https://docs.microsoft.com/en-us/learn/certifications/exams/ai-100>
- Skills measured :

<https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE3VC6C>

The screenshot shows a Microsoft Edge browser window with the following details:

- Title Bar:** Exam AI-100: Designing and Implementing an Azure AI Solution
- Address Bar:** docs.microsoft.com/en-us/learn/certifications/exams/ai-100
- Content Area:**
  - Description:** The appropriate tools and technologies, and designing and implementing AI solutions that meet scalability and performance requirements.
  - Aim:** Azure AI Engineers translate the vision from solution architects and work with data scientists, data engineers, IoT specialists, and software developers to build complete end-to-end solutions.
  - Requirements:** A candidate for this exam should have knowledge and experience designing and implementing AI apps and agents that use Microsoft Azure Cognitive Services, Azure Bot Service, Azure Cognitive Search, and data storage in Azure. In addition, a candidate should be able to recommend solutions that use open source technologies, understand the components that make up the Azure AI portfolio and the available data storage options, and understand when a custom API should be developed to meet specific requirements.
  - Related exams:** none
  - Important:** See details
  - Go to Certification Dashboard:** [Link](#)
- Schedule Exam Section:**
  - Section Title:** Schedule exam
  - Exam Information:** Exam AI-100: Designing and Implementing an Azure AI Solution
  - Languages:** English, Japanese, Chinese (Simplified), Korean
  - Retirement date:** none
  - Price:** \$165 USD\*
  - Price based on the country in which the exam is proctored.
  - Schedule Exam:** [Schedule exam >](#)
- Skills Measured:**
  - The content of this exam was updated on May 20, 2020. Please download the exam skills outline below to see what changed.
  - Analyze solution requirements (25-30%)
  - Design AI solutions (40-45%)
  - Implement and monitor AI solutions (25-30%)

The screenshot shows a Microsoft Learning page with a navigation bar at the top. The main content area is titled "Verify exam discount eligibility". It contains two sections: "For Microsoft employees" and "For Microsoft event attendees".

**For Microsoft employees**

Microsoft employees are eligible for discounted exams. The discount will be reflected at the end of the checkout process. For MoS exams at Certipoint, please request a voucher through the Microsoft Employee Voucher Portal.

To verify you are a Microsoft employee, link your Microsoft work account ([alias@microsoft.com](mailto:alias@microsoft.com)).

[Link account](#)

**For Microsoft event attendees**

If you recently attended a Microsoft event, you may be eligible for a discounted Microsoft Certification exam. To check eligibility, select an event you attended and verify the account used to register for the event.

[Terms and Conditions apply.](#)

**Microsoft Ignite 2019, Orlando**

[Verify account](#)

**Continue scheduling exam**

Proceed to the Pearson VUE website to complete the exam scheduling process.

[Go to Pearson VUE](#)

P Pearson VUE - Select exam options

wst.pearsonvue.com/testtaker/registration/PrivateAccessCodePage/MICROSOFT/conversationId=4780073

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Learn more Close this message

Microsoft

## Select exam options

DP-200: Implementing an Azure Data Solution

All fields are required.

How do you want to take your exam? [Exam delivery option descriptions](#)

At a local test center

At my home or office

I have a Private Access Code

Are you going to be testing on this device and network?

If so, perform a quick pre-check to verify compatibility of your device and network before planning to take this exam in your home or office.  
If you skip, be sure to do a full system test before test day to avoid lost exam fees and launch delays.

Run pre-check

Next

P

Contact

Privacy

Terms

P Pearson VUE - Select exam option X  System Check

← → C ↻ systemcheck.proctorcam.com/systemcheck?candidateId=247033c59

P Pearson | VUE

### System check - Checking your requirements

Internet speed

Microphone

WebCam

Integrated Webcam (0c-)

Default - Microphone (51)

Next

The screenshot shows a 'System check - Checking your requirements' window. It lists three items: Internet speed, Microphone, and WebCam. Each item has a green checkmark icon and a small icon representing the requirement. Below each requirement is a link to its configuration or status. A 'Next' button is visible at the bottom right of the window.



<https://github.com/zaalion/oreilly-ai-100>

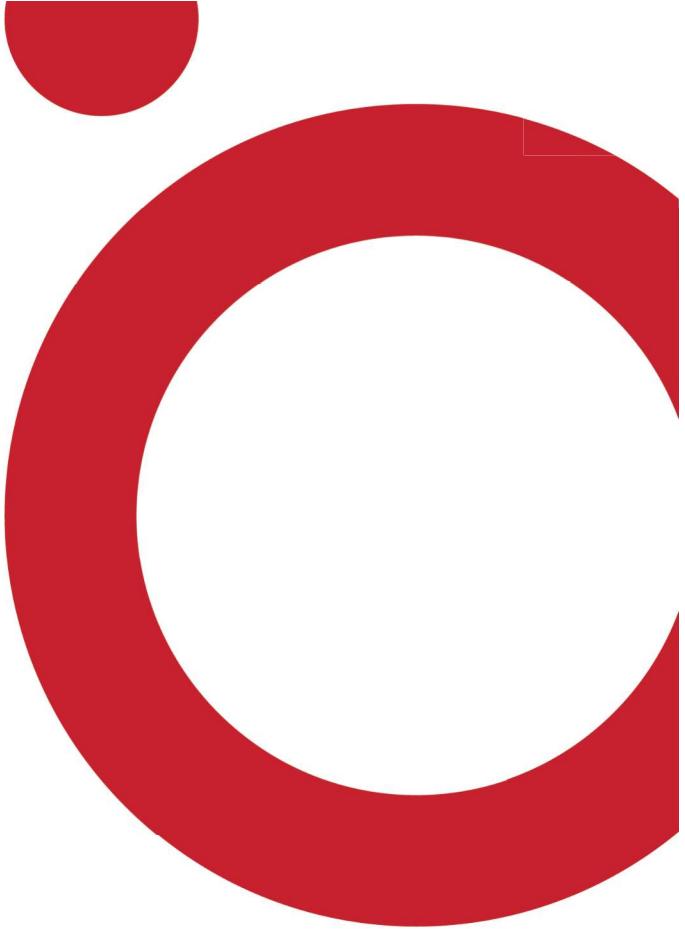
# Course Repository

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## Q&A



O'REILLY®  
Thank you!

Reza Salehi



@zaalion



[linkedin.com/in/rezasalehi2008](https://linkedin.com/in/rezasalehi2008)