Azure Certified AI Engineer Associate Crash Course

Reza Salehi

August/2020

Reza Salehi

Cloud Consultant and Trainer

@zaalion

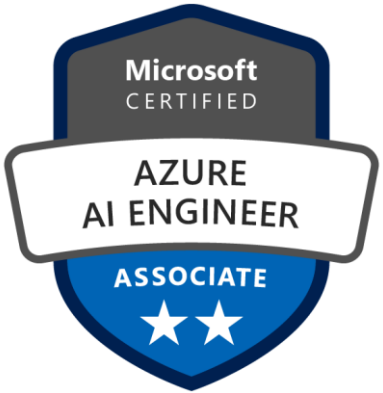
Microsoft CERTIFIED Trainer

2008 - 2018

Microsoft CERTIFIED AZURE AI ENGINEER ASSOCIATE

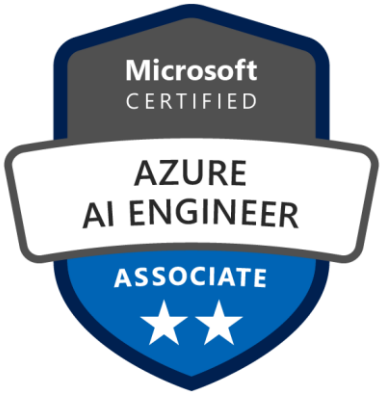
Course Overview

AI-100 Candidate Profile



- Should have subject matter expertise in:
  - Using Azure Cognitive Service (%40-50)
  - Azure Machine Learning
  - Other related Azure services (storage, security, integration, monitoring, etc.)

Azure Security Engineer Role



Product-based vs. role-based

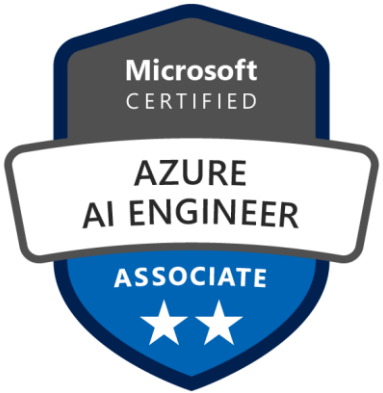
Use the Azure Machine Learning product family, and

Other Azure services to develop AI solutions.

- Data ingestion, preparation
- Security
- Integration
- Monitoring

Skills Measured on AI-100

- Azure Cognitive Services
- Azure Machine Learning
- Azure Bot Service (framework)
- Azure Cognitive Search
- Data storage options in Azure
- Security (data and AI services)



- Solid general knowledge of Azure services
  - Like an architecture exam (AZ-300, AZ-301)

AI (Artificial Intelligence)

AI enables machines to do tasks which are normally done by humans:

- Language translation
- Process images and audio
- Mathematic-based predictions
- ...

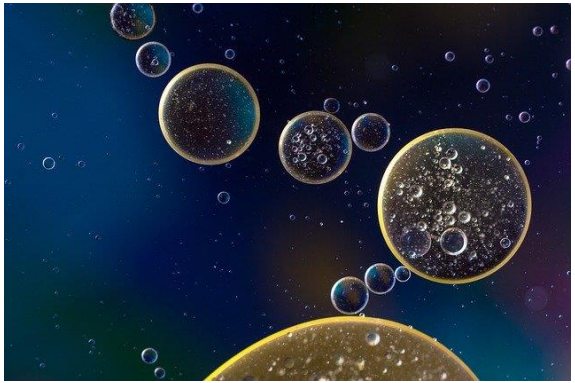
Machine Learning

- ML is a subset of AI.
- Enables computers to use data from past to forecast future behaviors or trends.
- Machine learning enables computers to learn without being- explicitly programmed.

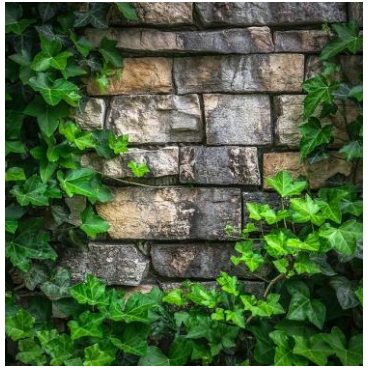
Machine Learning

- Machine Learning algorithms/models
  - Classification (non-numeric)
  - Regression (numeric)
  - Clustering
  - Deep Learning,
  - …

Machine Learning



Machine Learning



Machine Learning

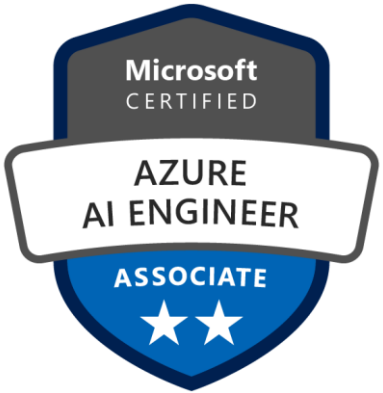
Machine Learning

- Workflow
  - Collect data; lots of it !
  - Prepare, clean up the data
  - Choose the right ML algorithm for your scenario
  - Train the algorithm with your data to get a “**trained model**”
  - Deploy and use the “model”

You are not expected to be a “Data Scientist” or have deep Machine Learning expertise to pass AI-100.

You don’t need to write code in the AI-100 exam. It is all about recognizing the best service for the AI project in hand and how to configure it!

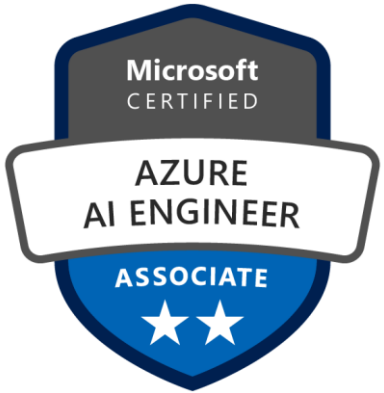
The Course Structure



- Crash course, fast paced.
- Demos are scoped to what you see in the exam
- We will cover a lot :
  - AI-100 is like an architecture exam
  - AI, storage, security, compliance, monitoring
- The topics are based on the exam blueprint.
  - https://docs.microsoft.com/en-us/learn/certifications/exams/ai-100

Questions & Resources

- Post questions in the QnA box
- Resources in the course repository
  - https://github.com/zaalion/oreilly-ai-100
- Reach out:
  - Twitter: @**zaalion**



AI-100

- Azure Machine Learning
- Azure Cognitive Search
- Azure Data Factory
- Azure SQL Database
- Azure Cosmos DB
- Azure Storage Account Blob
- Azure Storage Account Table
- Azure Storage Account Queue
- Azure Storage Account File
- Azure Functions
- Azure Logic Apps
- Azure Stream Analytics
- Azure Data Explorer
- Azure Virtual Machines
- Azure Virtual Network
- Network Security Groups (NSG)
- Azure Cognitive Services Vision
- Azure Cognitive Services Speech
- Azure Cognitive Services Decision
- Azure Cognitive Services Language
- Azure Cognitive Services Search
- Azure Event Grid
- Azure Kubernetes Services
- Azure Container Services
- Azure Container Registry
- Azure Databricks
- Azure Active Directory
- Azure IoT Hub
- Azure IoT Edge
- Azure Security Center
- Azure Key Vault
- Azure Sentinel
- Azure Web Application Firewall
- Azure App Services
- Azure API Management
- Azure Bot Services/framework
- Azure Service Bus
- Azure Synapse
- Azure HDInsight

AI-100 is a service identification exam!

Analyze Solution Requirements

Recommend Azure Cognitive Services APIs

- Microsoft offers several AI products
  - Available processing architectures for AI solutions
  - Available data processing technologies
  - Identify automation options

Available Processing Architectures for AI Solutions

- IaaS
  - Manage VM > Create AI Experiments > Use the AI model
- PaaS
  - Create AI Experiments > Use the AI model
- SaaS
  - Use the pre-trained AI model

Available Processing Architectures for AI Solutions

- IaaS
  - Microsoft Machine Learning Server
  - SQL Server Machine Learning Services

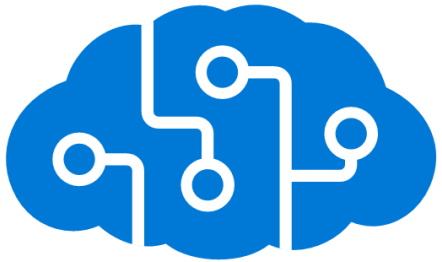
- Also available as Azure VMs

Available Processing Architectures for AI Solutions

- PaaS
  - Azure Machine Learning (v2)
  - Azure Machine Learning Studio (v1, classic)
  - HDInsight & Azure Databricks
  - Hadoop vs. Spark

Available Processing Architectures for AI Solutions

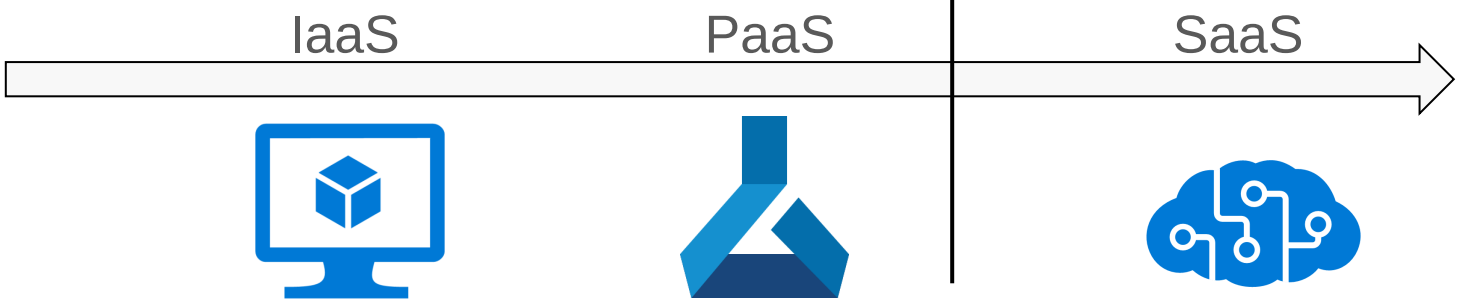
- SaaS
  - Azure Cognitive Services
  - Azure Cognitive Search



Available Processing Architectures for AI Solutions

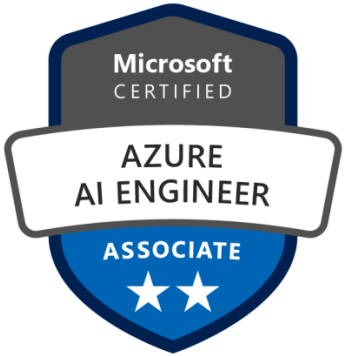
- Harder to use. Data science and ML expertise is required.
- Very flexible, more AI tasks can be solved

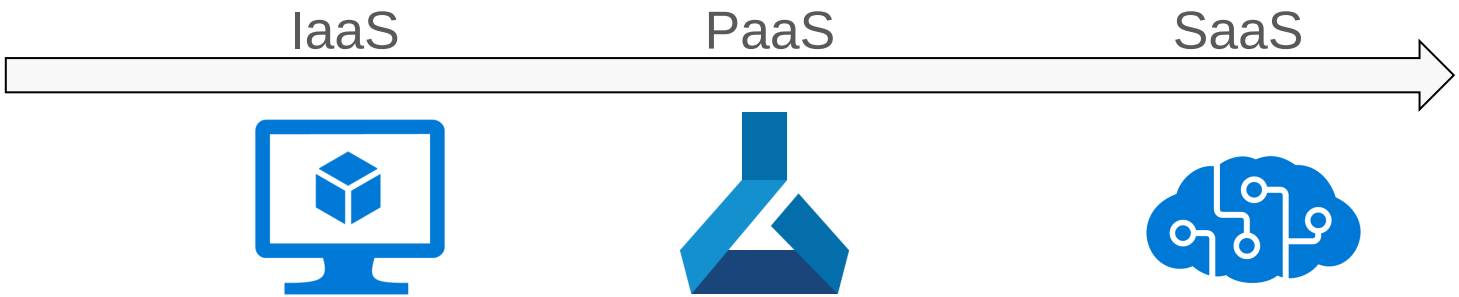
- Easier to use, less domain expertise is needed.
- Less flexibility, generalized AI tasks



Available Processing Architectures for AI Solutions

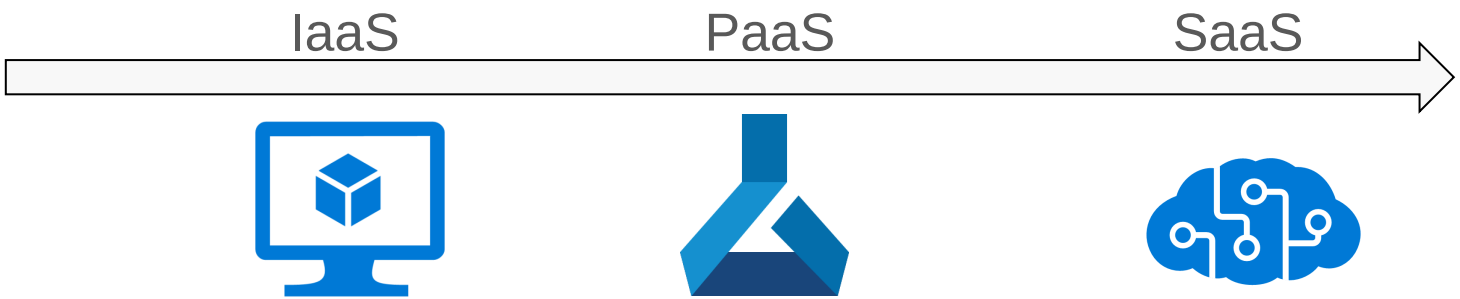
- AI-100 focus is on:
  - Azure Cognitive Services, and
  - Azure Machine Learning





Recommend an AI Processing Architectures

- Start looking in Azure Cognitive Services.
- If no luck, try other Azure machine learning options
  - PaaS first



Recommend an AI Processing Architectures

- Azure Machine Learning
  - Can be used for any kind of machine learning
    - Deep learning, supervised, and unsupervised learning.
  - Provides all the tools developers and data scientists need for their ML workflows

Recommend an AI Processing Architectures

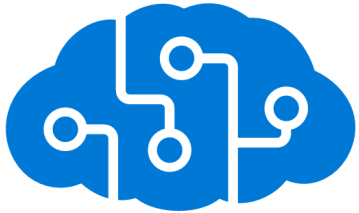
- Azure Machine Learning versions:
  - V2: Azure Machine Learning
  - V1: Azure Machine Learning Studio (classic)

Recommend an AI Processing Architectures

- Connect to Azure Machine Learning models:
  - REST API
- You will need
  - API endpoint & API key or token

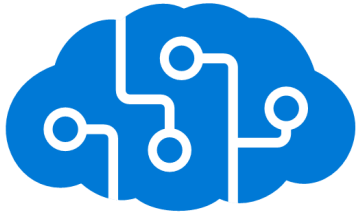
Recommend an AI Processing Architectures

- Azure Cognitive Services
  - No ML or data science expertise
  - Models are pre-trained by Microsoft
  - Simply use the trained models
  - Covering general use cases
  - There is a level of customization
  - Five main categories



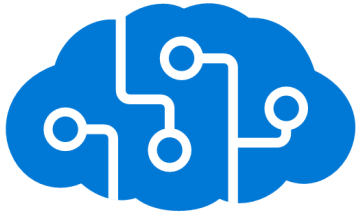
Recommend an AI Processing Architectures

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



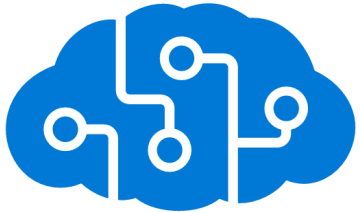
Recommend an AI Processing Architectures

- Use the Azure Cognitive Services
  - REST API
  - SDK (language specific)
- You will need
  - API endpoint & API key or token
  - Azure Active Directory authentication (RBAC)



Recommend an AI Processing Architectures

- Both Azure Cognitive Services & Azure Machine Learning models can be deployed to *Docker* containers.
  - Deploy to on-premises machines
  - Deploy to Azure AKS
  - Deploy to Azure ACI
  - Deploy to an IoT edge device
    - Why?



Azure Machine Learning gives you a trained model file.

You can download it and deploy it anywhere you desire!

Choosing the Right Data Storage

- Relational databases
- Document databases
- Key/Value databases
- Graph databases
- Column family databases
- Object storage
- File share
- Data analytics databases
- Search Engine databases
- Time Series databases





Choosing the Right Data Storage

- Store logs / Azure Cognitive Services output
  - Azure Blob Storage
- Low latency document database
  - Azure Cosmos DB Core API
- Database for social media
  - Azure Cosmos DB Graph API
- Migrating from MongoDB
  - Azure Cosmos MongoDB API

Choosing the Right Data Storage

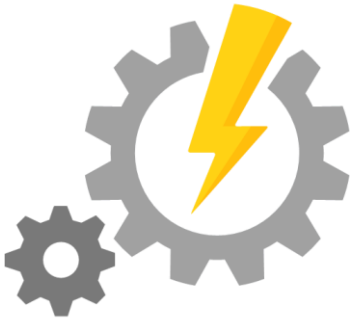
- Building search around your existing data
  - Azure Cognitive Search
- Fast cache store
  - Azure Cache for Redis (Azure Redis)
- Highly relational data
  - Azure SQL Database
- Cheap column database
  - Azure Table Storage
- Data Warehouse
  - Azure Synapse Analytics

Choosing the Right Data Storage

- Structured data
  - Azure SQL Database, MySQL, PostgreSQL, MariaDB
- Unstructured data
  - Azure Cosmos DB, Azure Table Storage
- Blobs / files
  - Azure Blob Storage, Data Lake Gen 2

Automation Options

- Provisioning and deployment automation
  - You can create an Azure resource:
    - Azure Portal
    - Azure CLI / PowerShell / ARM templates / REST
  - Automate your AI solution deployment
    - Azure Automation Runbooks
    - Azure Blueprints



Securing Azure AI Solutions

1. Securing AI APIs and interfaces
2. Protecting customer data
    a. Protecting AI solution data
    b. Data privacy and regulatory compliance
3. Auditing

Securing AI APIs and Interfaces

- Azure Machine Learning
  - REST API
    - API key, or security tokens
      - Keep them safe (in Azure Key Vault)

Securing AI APIs and Interfaces

- Azure Cognitive Services
  - REST API or SDK
    - API key, or
    - Security token (time sensitive), or
    - Azure Active Directory authentication (RBAC)

Securing AI APIs and Interfaces

- Azure Cognitive Services
  - API key
    - All Services support keys except Text-to-speech.
    - They don’t expire but can be rotated.
    - Keep them safe (Azure Key Vault)

Securing AI APIs and Interfaces

- Azure Cognitive Services
  - API security tokens
    - Obtain them on-the-fly using an API key
    - They expire after 10 minutes
    - Keep them safe (in Azure Key Vault)

Securing AI APIs and Interfaces

- Azure Cognitive Services
  - Azure Active Directory
    - Create a service principal or Managed Identity
    - Assign permission over the service to this identity
    - Can apply RBAC

Not all Azure Cognitive Services support security tokens or Azure Active Directory authentication!

Securing AI APIs and Interfaces

- Azure Cognitive Services
  - Azure Active Directory authentication
    - Computer Vision, Face, Text Analytics, Immersive Reader
  - Security token (time sensitive)
    - Text translation, speech-to-text, text-to-speech
  - API key
    - All services except Text-to-speech

Protecting Customer Data

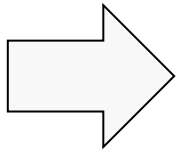
- Azure helps you protect client data
  - Data storage authentication/authorization
  - Data storage firewall
  - Data storage private endpoint
  - At-rest data protection
  - In-transit data protection

Protecting Customer Data

- Azure helps you protect client data
  - Data segregation
  - Data redundancy
  - Data retention
  - Data destruction

Data Storage Authentication/Authorization

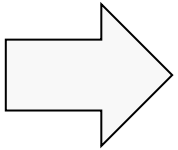
- Azure SQL Database
- Azure Storage Account
- Azure Cosmos DB
- Azure Cognitive Search
- Azure Cache for Redis
- MariaDB
- etc.



- Database keys
- DB Credentials
- AAD Managed Identity
- RBAC

Data Storage Firewall

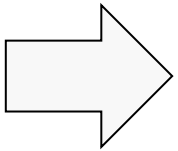
- Azure SQL Database
- Azure Storage Account
- Azure Cosmos DB
- Azure Cognitive Search
- Azure Cache for Redis
- MariaDB
- etc.



- VNET integration
- Incoming IP addresses
- Allow Azure services

Data storage Private Endpoint

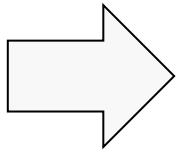
- Azure SQL Database
- Azure Storage Account
- Azure Cosmos DB
- Azure Cognitive Search
- Azure Cache for Redis
- MariaDB
- etc.



- Only private access

At-rest Data Protection

- Azure Storage Account SSE
- Azure SQL Database TDE
- Azure Disk Encryption
- Managed Disk Encryption
  - (+CMK)
- Azure Cosmos DB encryption



- Key management:
  - System managed
  - Customer managed

In-transit Data Protection

- All communications are encrypted using SSL/TLS
- TLS 1.2
- TLS version is configurable

Data Segregation

- Azure is a multi-tenant service
  - Multiple customer data is stored on the same hardware.
- Azure uses logical isolation to segregate customers’ data

Data Redundancy

- In-country / in-region storage for compliance or latency considerations.
- Out-of-country/out-of-region storage for security or disaster recovery purposes.

Data Redundancy

- Azure Storage Account
- Azure SQL Database
- Azure VM Backups
- Azure Cosmos DB

Data Retention

- How long to keep the data?
  - Azure Storage Accounts
  - Azure SQL Database backups
  - Logs
  - ...

Data Destruction

- When customers delete data or leave Azure, Microsoft follows strict standards for overwriting storage resources before their reuse,
- As well as the physical destruction of decommissioned hardware

Data Ownership

- Microsoft does not inspect, approve, or monitor applications that customers deploy to Azure
- Microsoft does not know what kind of data customers choose to store in Azure
- Microsoft does not claim data ownership over the customer information that's entered Azure.

Regulatory Compliance and Governance

- Regulatory compliance refers to the discipline and process of ensuring that a company follows the laws enforced by governing bodies in their geography.
  - The company follows government laws concerning customer data.
  - Changes by region
- Use Azure Policy to enforce compliance

Regulatory Compliance and Governance

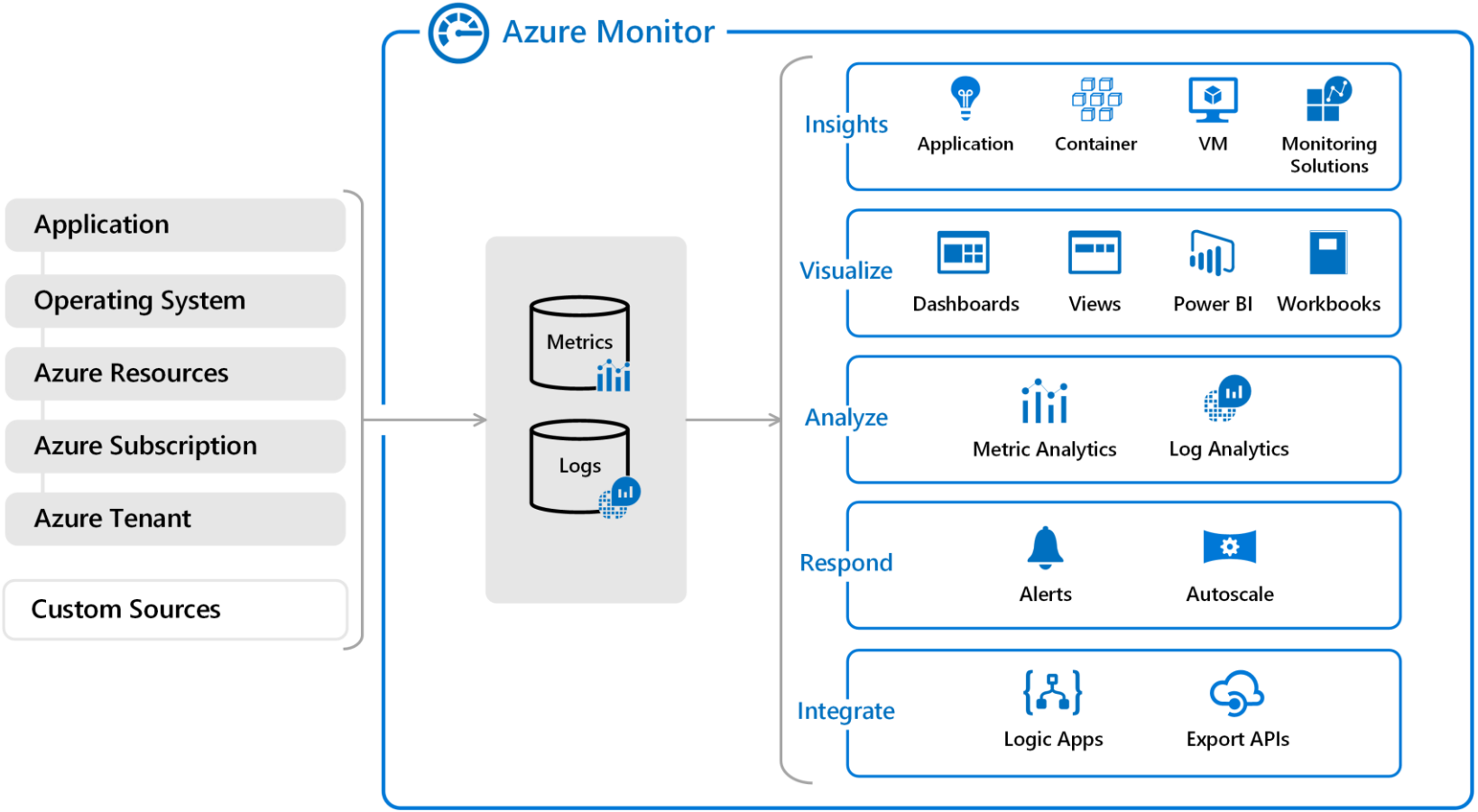
- Regulatory compliance
  - HIPAA
  - PCI
  - Personal data, PPI
  - GDPR
- Azure Data classification

Azure Policy to Enforce Compliance

- Azure Policy can help you comply!
  - All resources should have taxonomy tags
  - No resource should be created outside USA
  - Only small VM sizes should be created for DEV
- Easy integration with Azure Blueprints

Logs and Security Tools in Azure

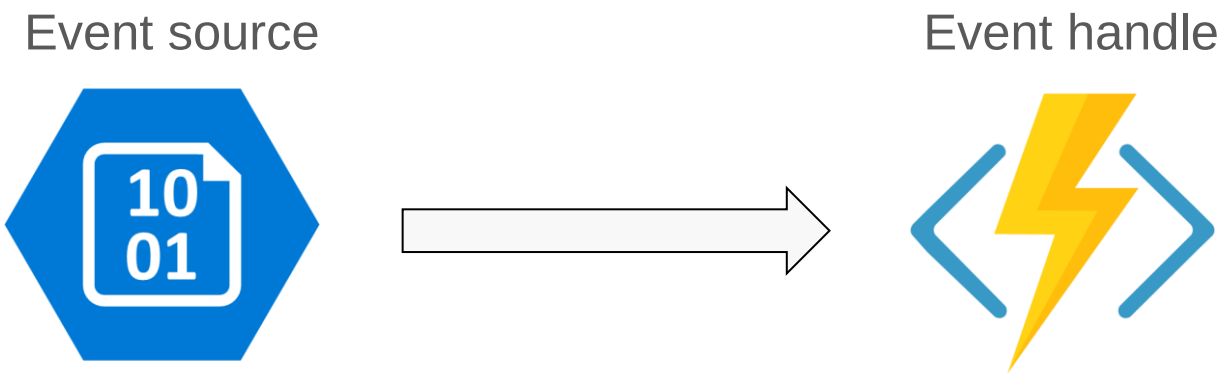
- Azure Log Analytics Workspace
- App Insights
- Azure Monitor
- Azure Security Center
- Azure Sentinel



https://docs.microsoft.com/en-us/azure/azure-monitor/overview#overview

Service and Data Integration

- Connect, chain multiple pipeline elements



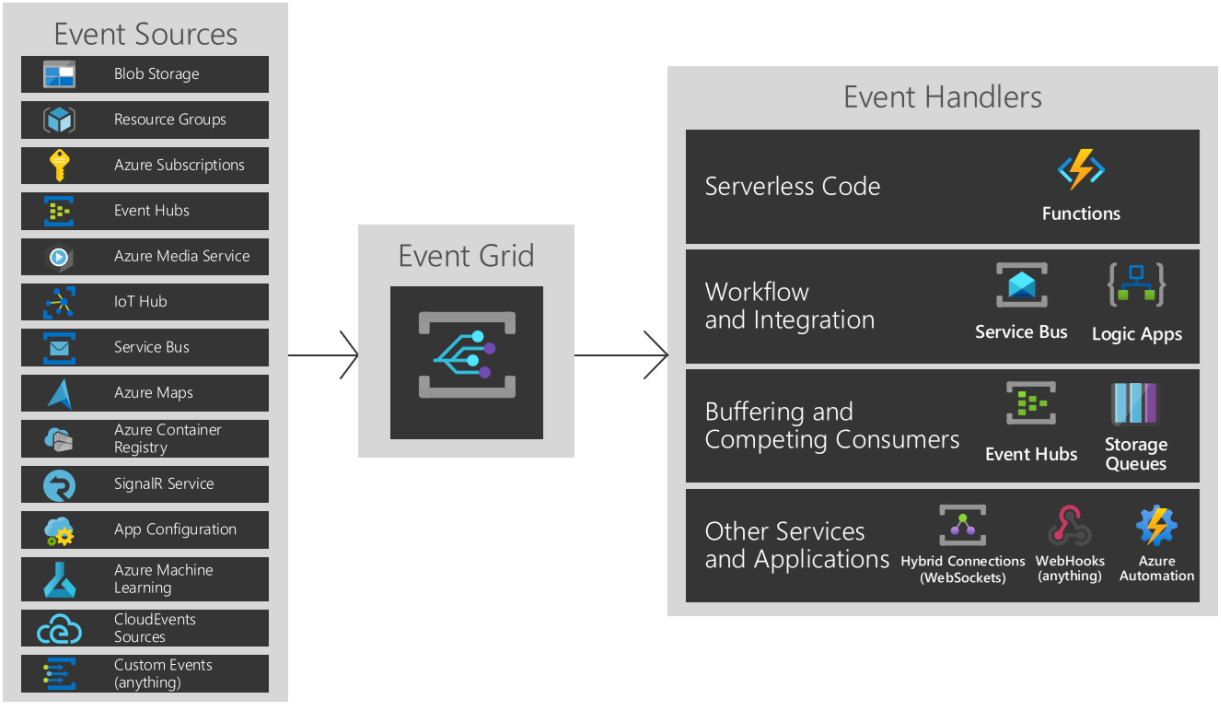
Service and Data Integration

- Connect, chain multiple pipeline elements
- Event source
  - Azure Event Hubs
  - Azure IoT Hub
  - Azure Storage Account
  - Azure Service Bus (queues, topics)
  - Azure Container Registry

Service and Data Integration

- Connect, chain multiple pipeline elements
- Event handler
  - Azure Logic Apps
  - Azure Functions
  - Azure Stream Analytics
  - Azure Data Factory
  - Event Hubs
  - Azure Automation

Service and Data Integration



https://docs.microsoft.com/en-us/azure/event-grid/overview

Questions

Break (5 minutes)

Design AI Solutions

Agenda: Design AI Solutions

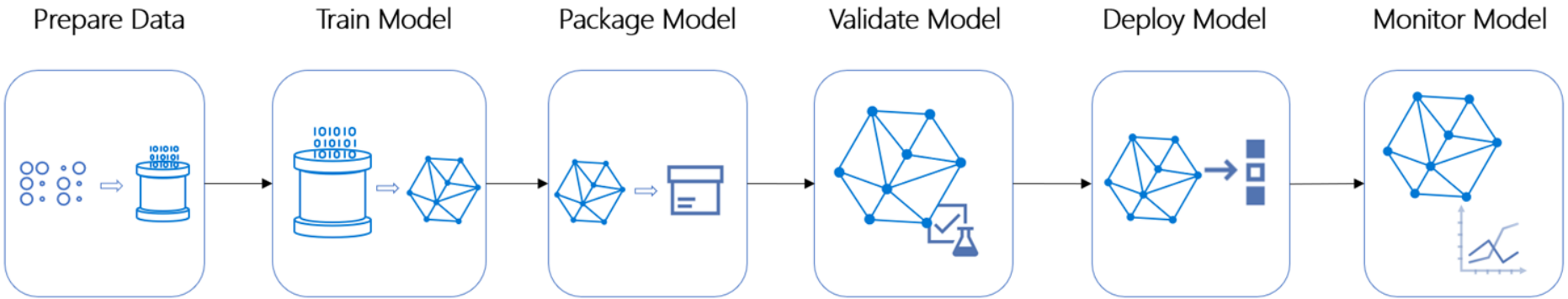
- Define AI Workflows
- Design Cognitive Services solutions
- Design solutions using the Microsoft Bot Framework
- Design the compute infrastructure

Define AI Workflow

- Azure pipeline technologies
  - Azure Machine Learning Pipelines
    - Model orchestration (Train the model)
  - Azure Data Factory pipelines
    - Data orchestration (Data prep)
  - Azure DevOps Pipelines
    - Code & app orchestration (CI/CD)

Define AI Workflow

- Using Azure Machine Learning pipelines
  - Designer or Python/R SDK



Define AI Workflow

- Using Azure Machine Learning pipelines
  - Designer or Python/R SDK
    - Run in the context of an Azure ML Experiment
    - Prepare data, train and validate a model and deploy it

Define AI Workflow

- Building a pipeline in Azure Machine Learning workspace
  - Using Python / R SDKs
  - Using the Designer

Define AI Workflow

- Automated Machine Learning (preview)
  - How do you choose the best ML algorithm?

New
Home
Author
Notebooks
Automated ML (preview)
Designer (preview)
Assets
Datasets
Experiments
Pipelines
Models
Endpoints
Manage
Compute
Datastores
Data Labeling

Run 1 Completed

Refresh Cancel

Details | Data guardrails | Models | Outputs + Logs | Child runs | Snapshot

Properties

Status
Completed

Created
Aug 4, 2020 12:19 PM

Duration
30m 21.15s

Compute target
cpu-compute-01

Run ID
AutoML_158d8baa-b954-4c91-8cd5-ab4646c508dc

Run number
1

Script name
--

Created by
Reza Tester

Input datasets
Input name: input_data, ID: 4fe97a63-7df6-494d-8456-f9c0d96fb289

Best model summary

Algorithm name
VotingEnsemble

Spearman correlation
0.49281 View all other metrics

Sampling
100%

Registered models
No registration yet

Deploy status
No deployment yet

Run summary

Task type
Regression View all run settings

Primary metric
Spearman correlation

Run status
Completed

Design Cognitive Services Solutions

- Azure Cognitive Services
  - Is an Azure SaaS AI offering
  - Many general AI tasks can be addressed
  - Customizable to some level (will see later)
  - No AI or data science expertise is needed
  - Use REST APIs or SDKs (if applicable) to call the services

Design Cognitive Services Solutions

- Provisioning
  - Azure Portal
  - Azure CLI
  - Azure PowerShell
  - ARM
  - SDK (management)
  - REST API

Design Cognitive Services Solutions

- Authentication / Authorization
  - API Key, or
  - Bearer token, or
  - Azure Active Directory and RBAC
    - Only *Computer Vision, Face, Text Analytics, Immersive Reader, Form Recognizer, Anomaly Detector, and all Bing services except Bing Custom Search*

Design Cognitive Services Solutions

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

Design Cognitive Services Solutions

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

Design Cognitive Services Solutions

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

Design Cognitive Services Solutions

- Azure Cognitive Services **Language**
  - Translator
    - Custom Translator
  - Text Analytics
  - QnA Maker
  - Language Understanding (LUIS)
  - Immersive Reader

Design Cognitive Services Solutions

- Azure Cognitive Services **Decision**
  - Content Moderator
  - Personalizer
  - Anomaly Detector

Design Cognitive Services Solutions

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

Design Cognitive Services Solutions

- 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

- 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

- 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

- 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

- 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

- 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

- 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.

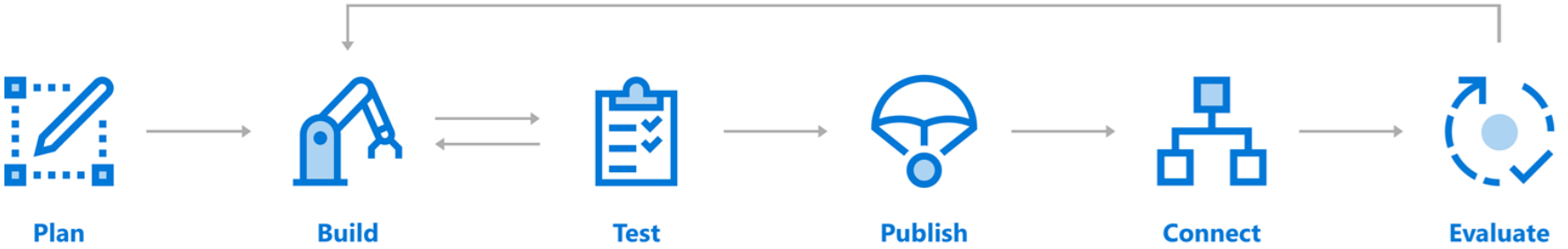
Questions

Design Microsoft Bot Framework Solutions

- 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”

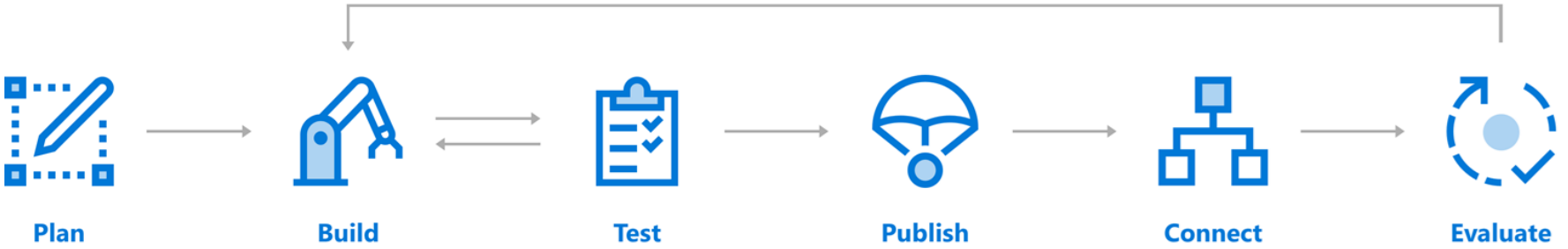
Design Microsoft Bot Framework Solutions

- Steps to build a bot



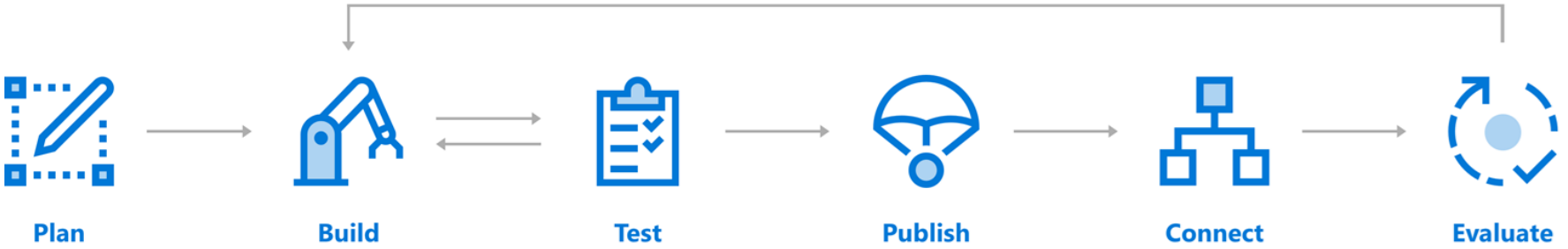
Design Microsoft Bot Framework Solutions

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



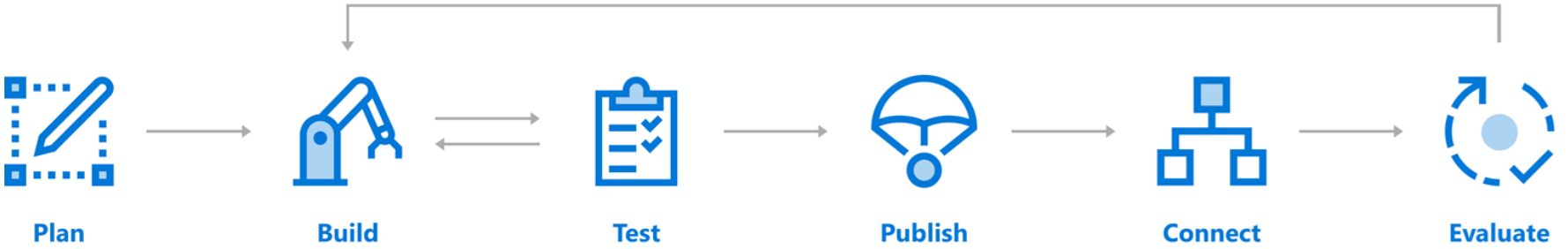
Design Microsoft Bot Framework Solutions

- 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.



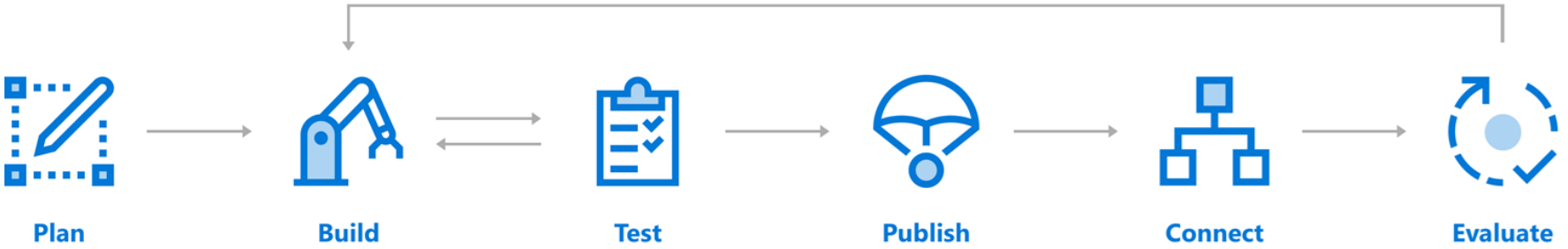
Design Microsoft Bot Framework Solutions

- Publish your bot
  - To Azure
  - Your own website



Design Microsoft Bot Framework Solutions

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

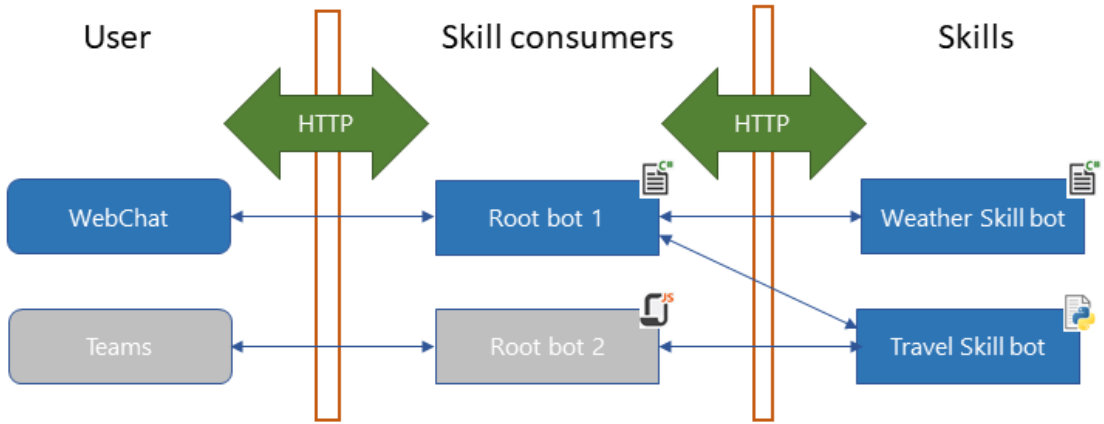


Design Microsoft Bot Framework Solutions

- 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



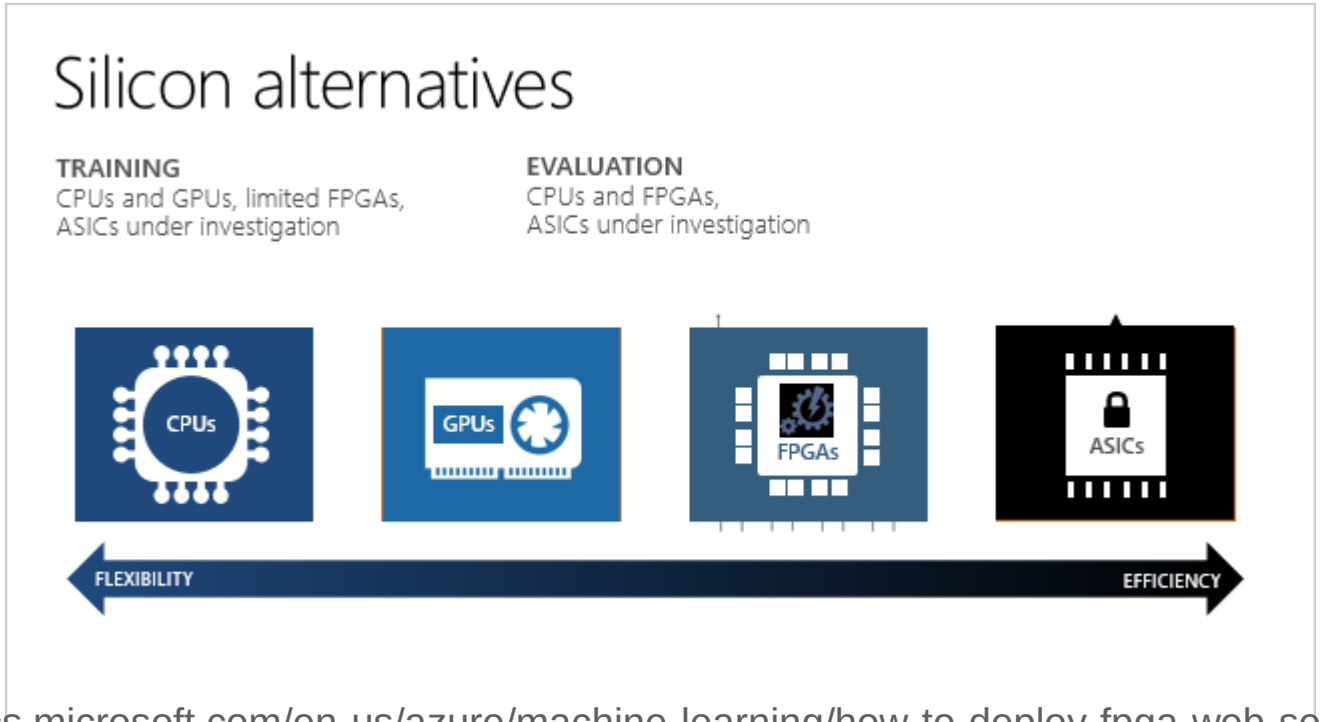
Design Microsoft Bot Framework Solutions

- 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

Design the Compute Infrastructure

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

Design the Compute Infrastructure



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

Design the Compute Infrastructure

- 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

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

Design the Compute Infrastructure

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

Design the Compute Infrastructure

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

Design the Compute Infrastructure

- 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

- 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

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

Decide on Compute Infrastructure

- 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

Break (5 minutes)

Implement and Monitor AI solutions

Implement and Monitor AI solutions

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

Integration with Azure Cognitive Services

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

Custom AI Services

- Azure 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

- 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

- 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

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

Custom AI Services

- Content Moderator Human Review Tool
  - Used in conjunction with the machine-assisted moderation APIs
  - Review the already-applied moderation tags

Custom AI Services

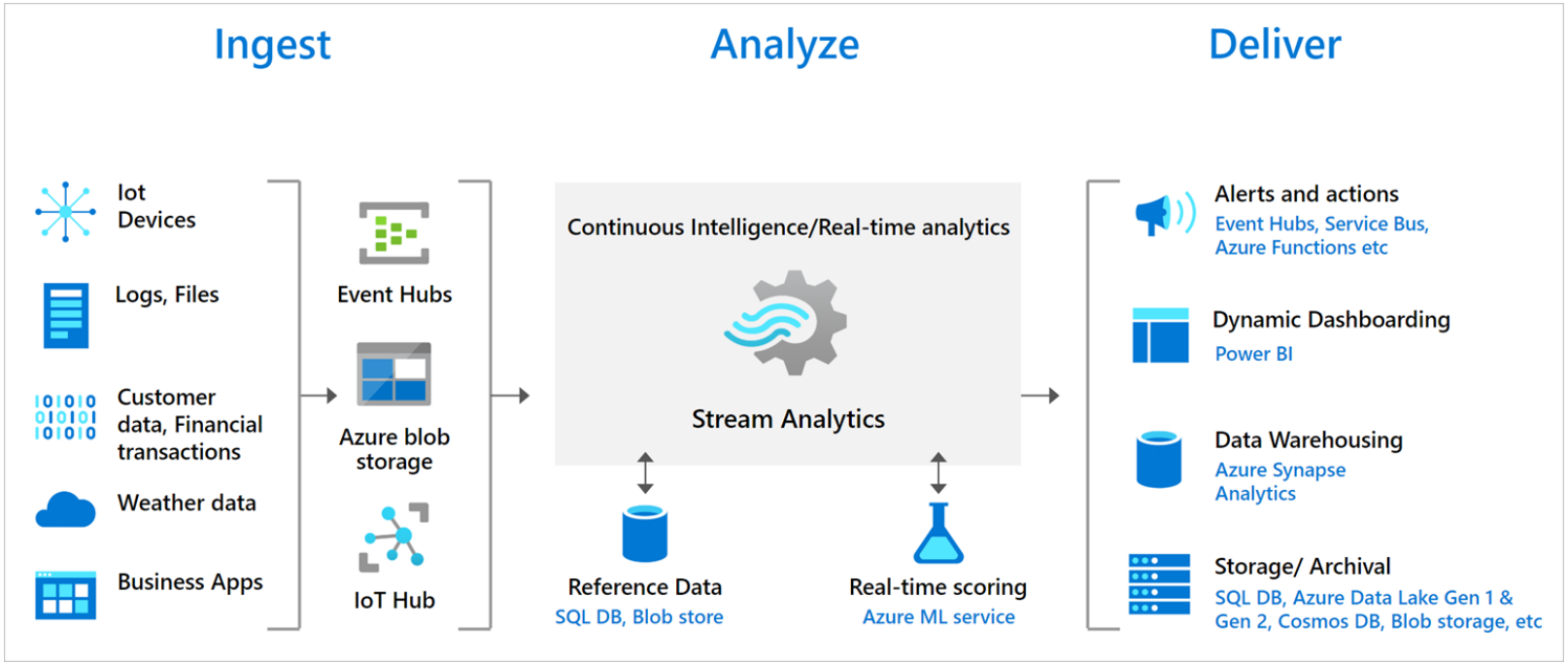
- Bing Custom Search
  - Use it when standard Cognitive Web Search services are not enough
  - Custom ranking and filtering
  - …
  - https://azure.microsoft.com/en-us/services/cognitive-services/bing-custom-search/

Develop Streaming Solutions

- 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

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

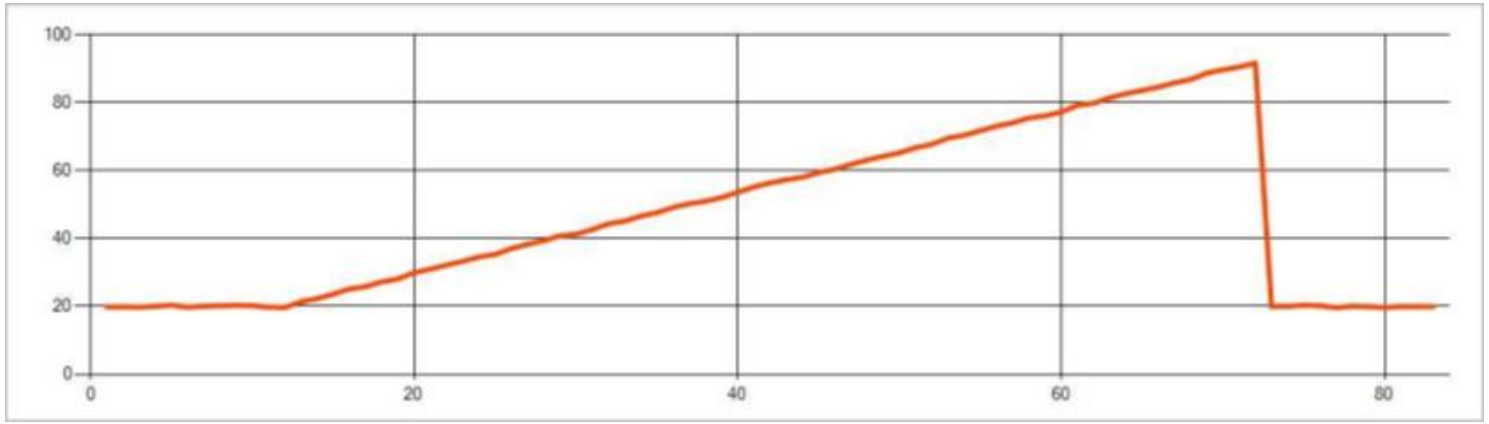
Develop Streaming Solutions

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

Examples of Spike and Dip anomalies

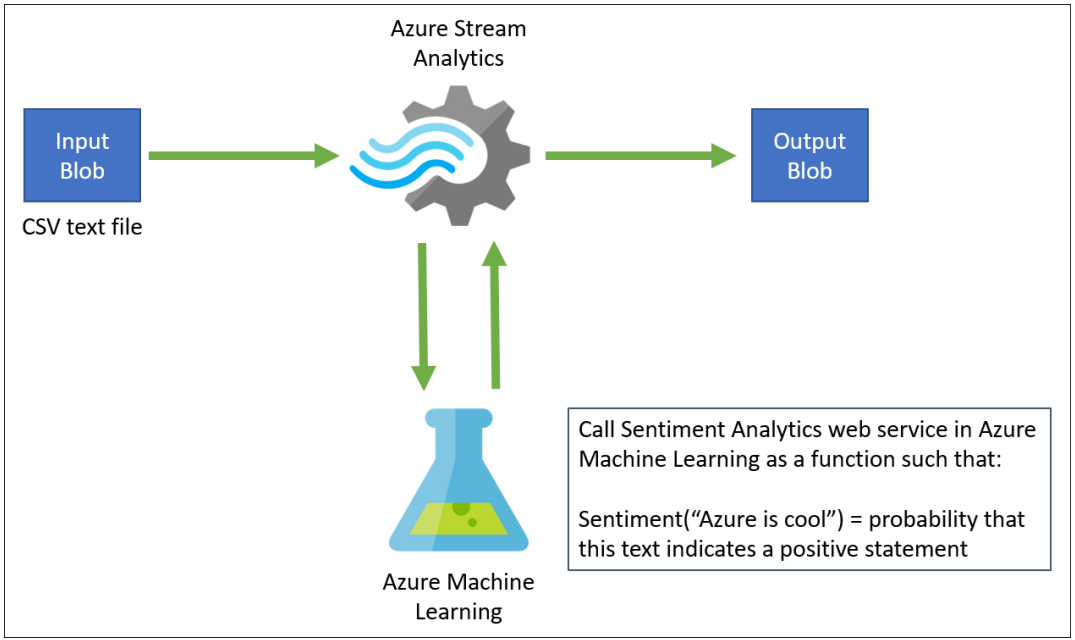
Develop Streaming Solutions

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



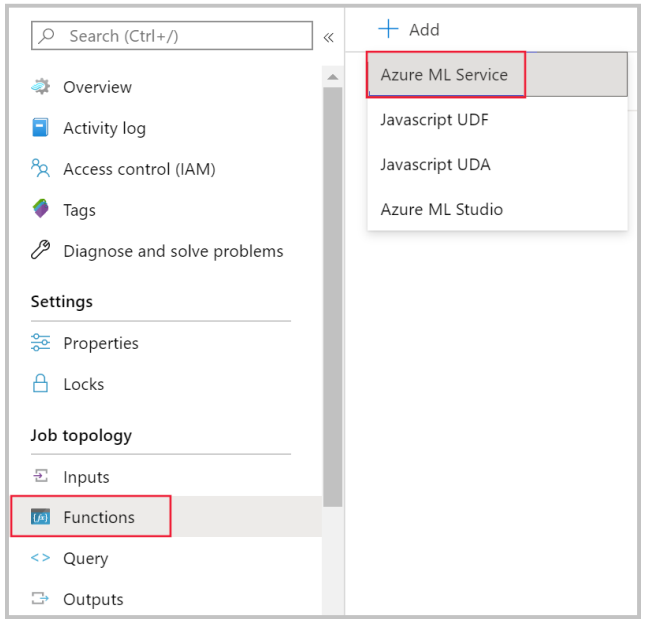
Develop Streaming Solutions

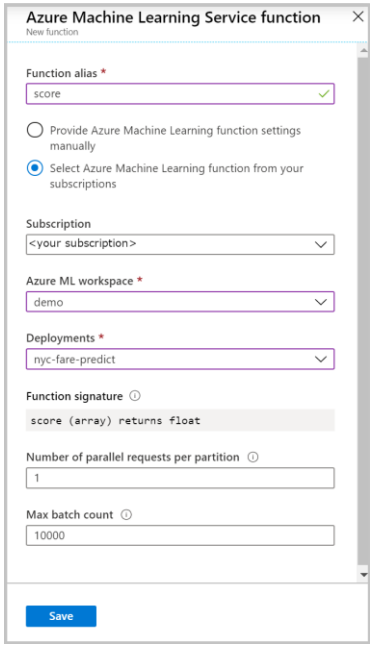
- Azure Stream Analytics: Integrate with Machine Learning



Develop Streaming Solutions

- Azure Stream Analytics: Integrate with Machine Learning





Implement Azure Cognitive Search

What is Azure Cognitive Search?

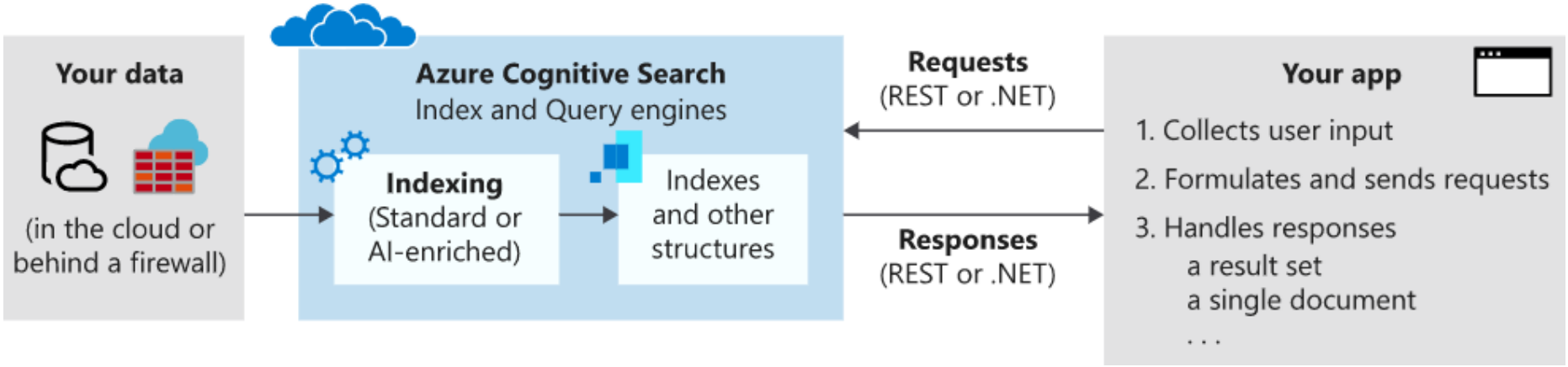
06/30/2020 • 13 minutes to read •  +1

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

- 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



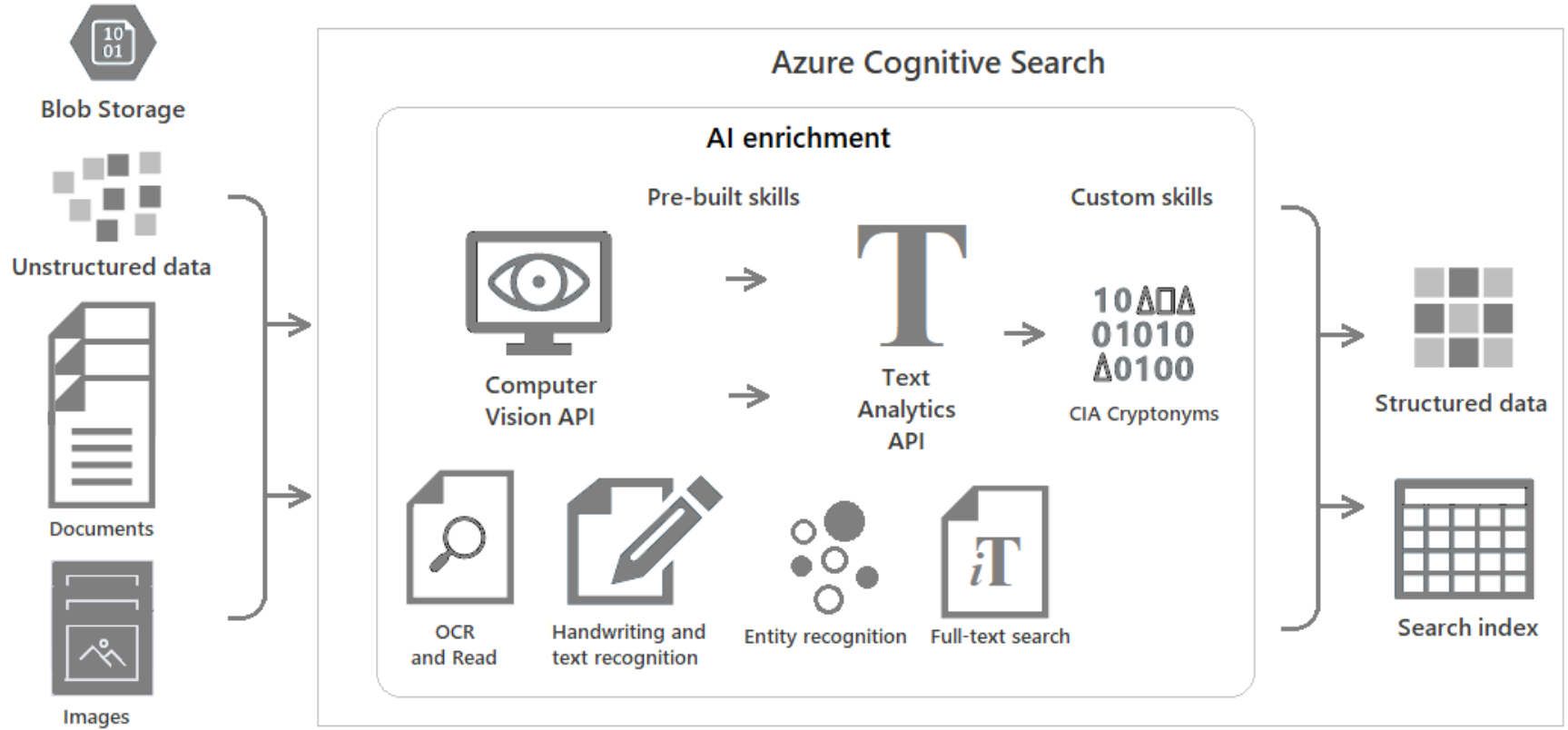
Implement Azure Cognitive Search

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

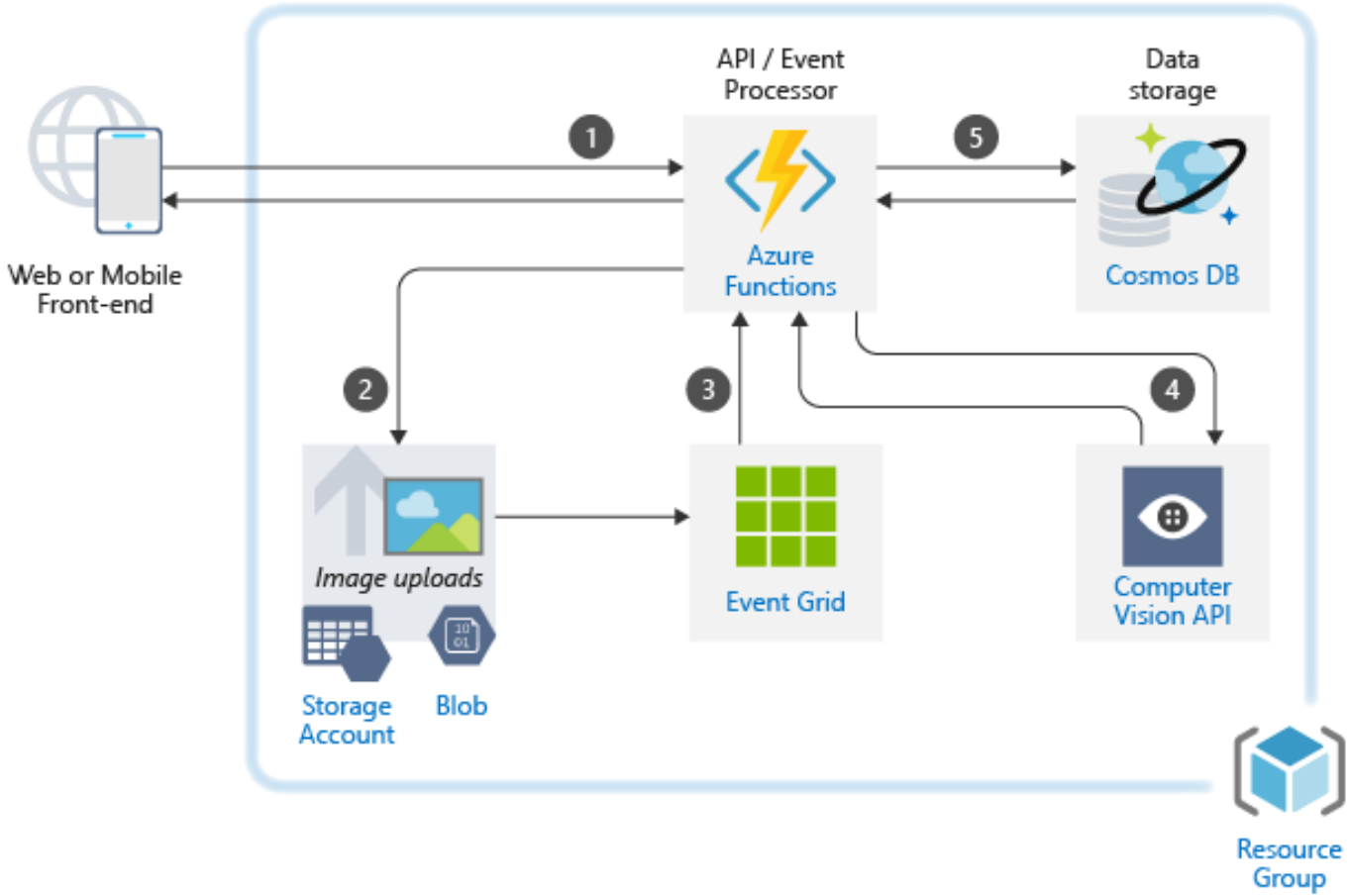
Questions

Break (5 minutes)

https://docs.microsoft.com/en-us/azure/architecture/browse/

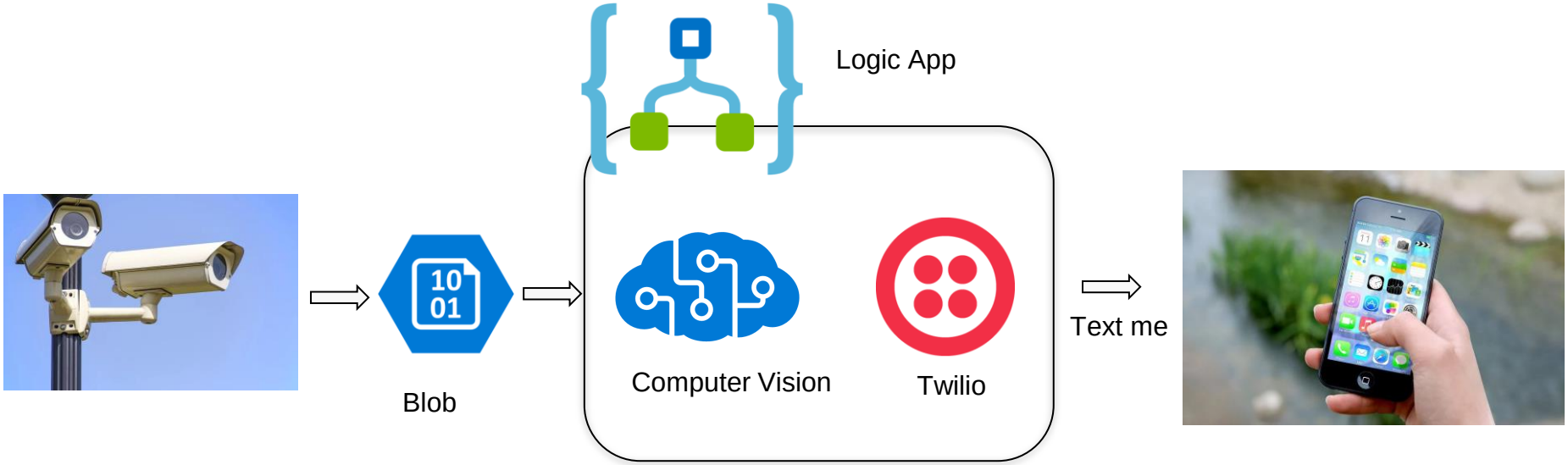


https://docs.microsoft.com/en-us/azure/architecture/solution-ideas/articles/cognitive-search-with-skillsets

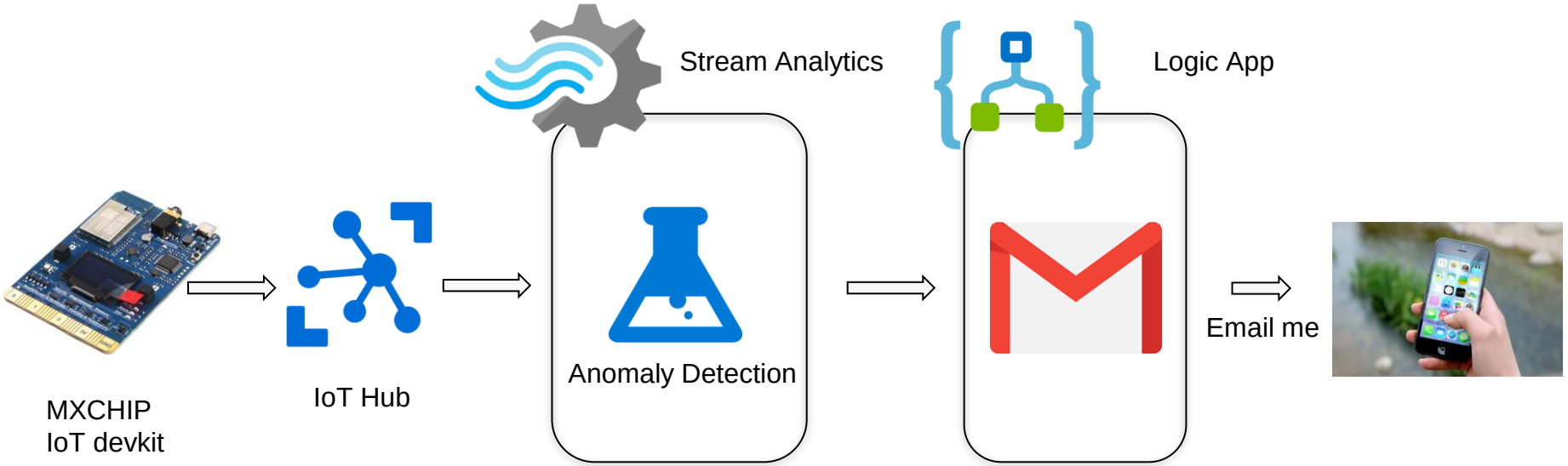


https://docs.microsoft.com/en-us/azure/architecture/example-scenario/ai/intelligent-apps-image-processing

Text Me When a Person is in the Building



Send an Email When Humidity is Too High



An all-in-one IoT kit built for the

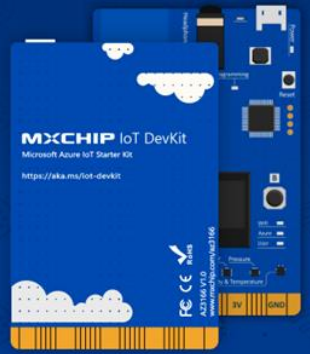
microsoft.github.io/azure-iot-developer-kit/

IoT DevKit Get Started Docs Projects Tools Blog v1.6.5/v1.9.11-preview

An all-in-one IoT kit built for the cloud

All the sensors and parts you love, no soldering needed. Welcome to cloud IoT development.

Get a Kit > Project Catalog >



Microsoft Azure Certified

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

Benefits

Questions

The Exam

Questions in AI-100

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

AI-100

- 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
- Question types : https://www.youtube.com/watch?v=7X5ZMqQvwIA

the appropriate tools and technologies, and designing and implementing AI solutions that meet scalability and performance requirements.

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.

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.

Part of the requirements for: Microsoft Certified: Azure AI Engineer Associate
Related exams: none
Important: See details
Go to Certification Dashboard

Schedule exam

Exam AI-100: Designing and Implementing an Azure AI Solution

Languages: English, Japanese, Chinese (Simplified), Korean
Retirement date: none

This exam measures your ability to accomplish the following technical tasks: analyze solution requirements; design solutions; integrate AI models into solutions; and deploy and manage solutions.

Schedule exam >

United States

$165 USD*

Price based on the country in which the exam is proctored.

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%)

Verify exam discount eligibility

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 Certiport, 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).

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.

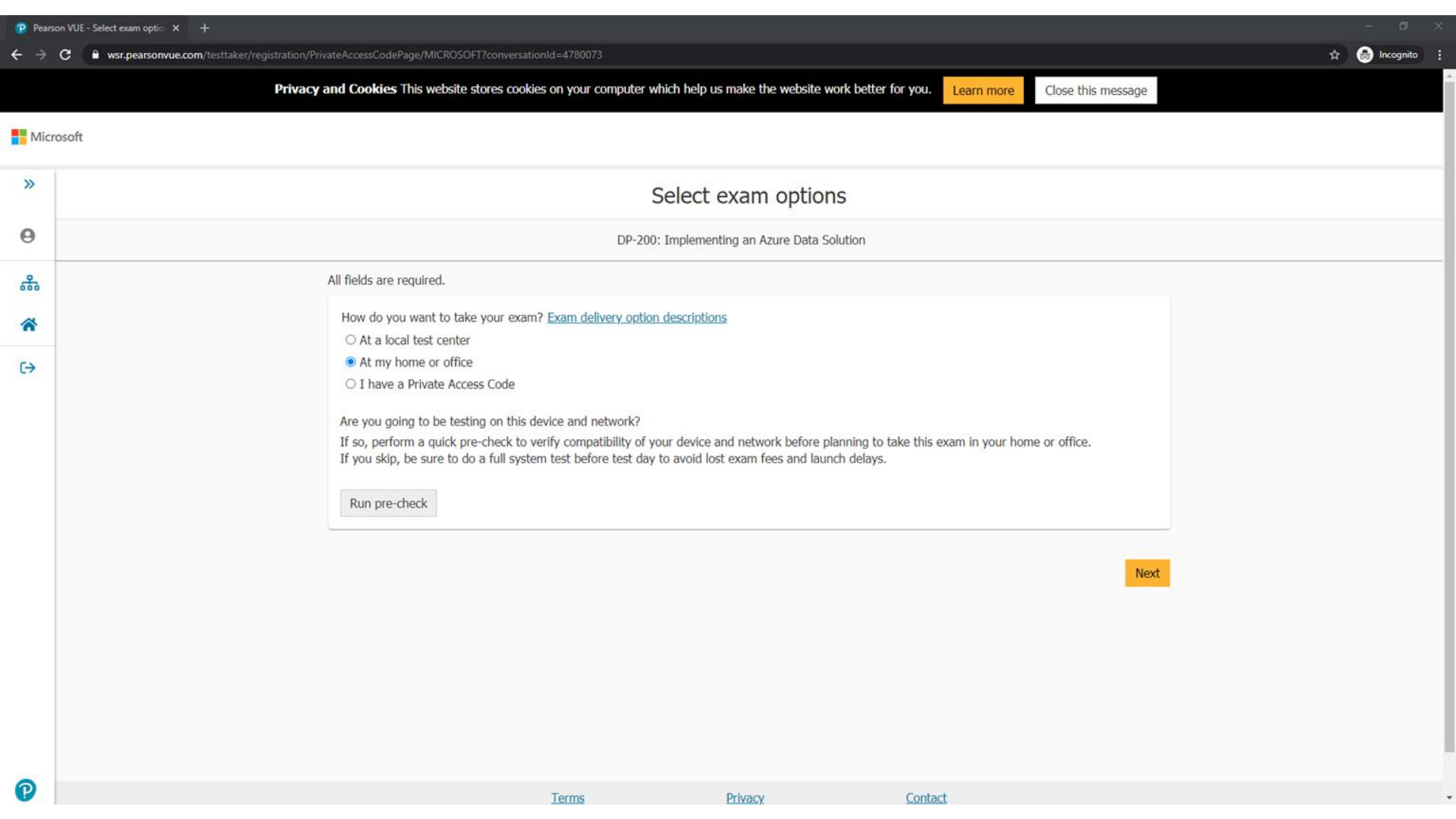
Microsoft Ignite 2019, Orlando

Verify account

Continue scheduling exam

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

Go to Pearson VUE


Pearson VUE - Select exam optio
wsr.pearsonvue.com/testtaker/registration/PrivateAccessCodePage/MICROSOFT?conversationId=4780073
Incognito
Privacy and Cookies This website stores cookies on your computer which help us make the website work better for you.
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
Terms
Privacy
Contact

Pearson VUE - Select exam optic | System Check

systemcheck.proctorcam.com/systemcheck?candidateId=247036059

Incognito

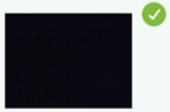
Pearson | VUE

System check - Checking your requirements

Microphone

Default - Microphone (SI

Internet speed



Webcam

Integrated Webcam (0c4

Next

Course Repository

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

Q&A

O'REILLY®

Thank you!

Reza Salehi

@zaalion