



Azure ML service workshop

Lundi 25 novembre 2019



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Azure AI Overview: Machine Learning options in Azure



Azure

54+

Azure regions
worldwide

>90

Compliance
certifications

Machine Learning on Azure

Domain specific pretrained models

To simplify solution development



Vision



Speech



Language



Search

Familiar Data Science tools

To simplify model development



Visual Studio Code



Azure Notebooks



Jupyter



Command line

Popular frameworks

To build advanced deep learning solutions



PyTorch



TensorFlow



Scikit-Learn



ONNX

Productive services

To empower data science and development teams



Azure
Databricks



Azure Machine
Learning



Machine
Learning VMs

Powerful infrastructure

To accelerate deep learning



CPU



GPU



FPGA



From the Intelligent Cloud to the Intelligent Edge





Azure Cognitive Services

Azure Cognitive Services

Deploy and run as a cloud service or anywhere as a container

5B

transactions a
month



Vision



Speech



Web Search



Language



Decision

Sophisticated pretrained models

Infuse apps with powerful, pre-trained AI models

Customize easily and tailor to your needs



Vision



Computer Vision | Video Indexer | Face | Content Moderator

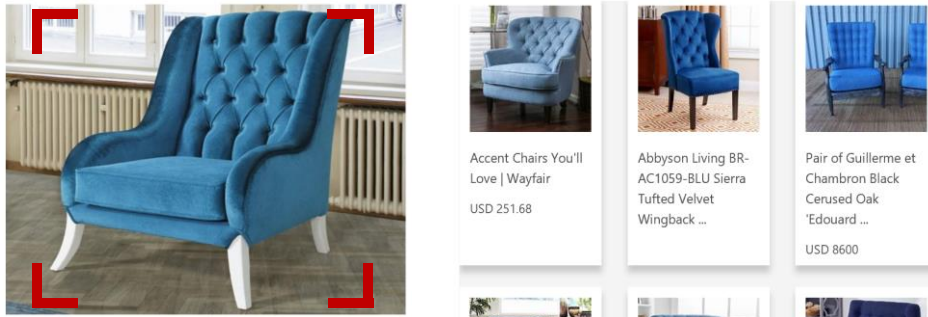


Language

Text Analytics | Spell Check | Language Understanding | Text Translation | QnA Maker



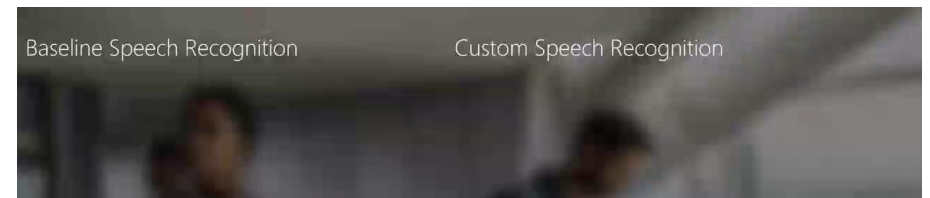
Bing Search



Big Web Search | Video Search | Image Search | Visual Search | Entity Search | News Search | Autosuggest



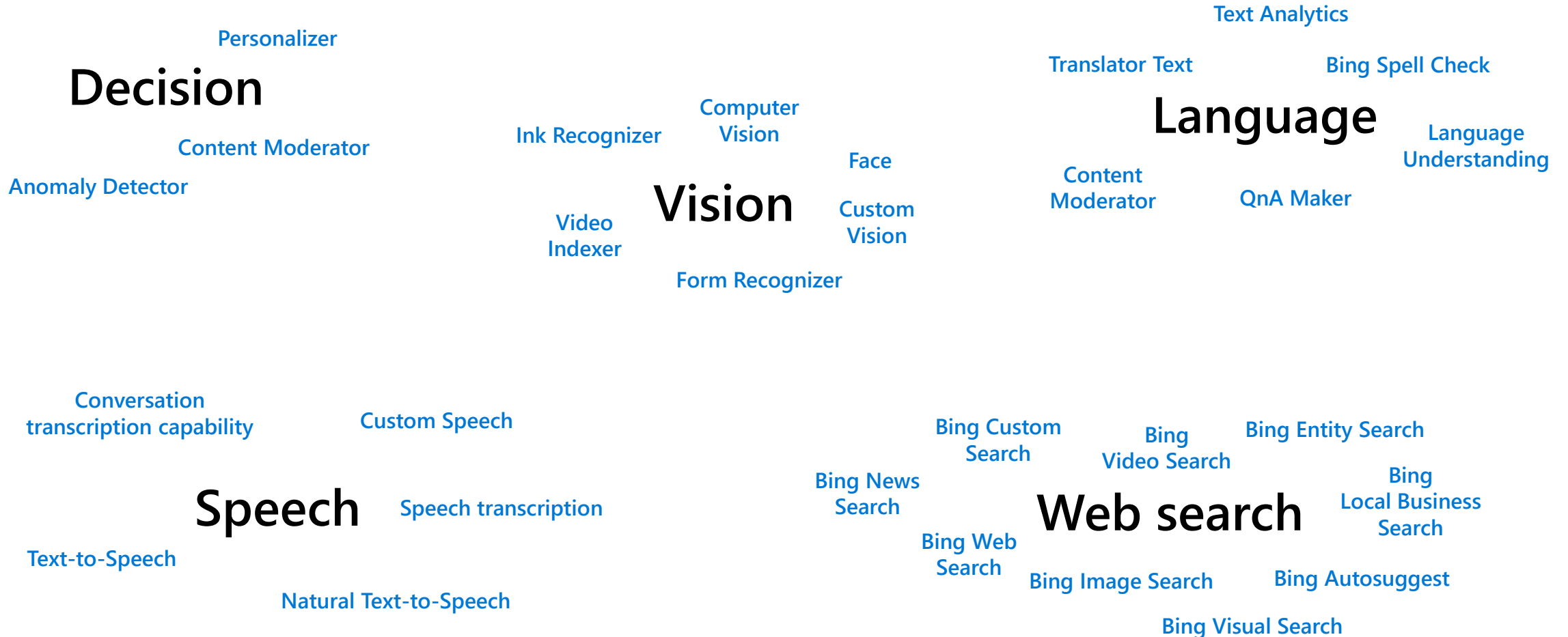
Speech



Speech to Text | Text to Speech | Speech Translation | Speaker Recognition

Azure Cognitive Services

The most comprehensive pre-trained AI





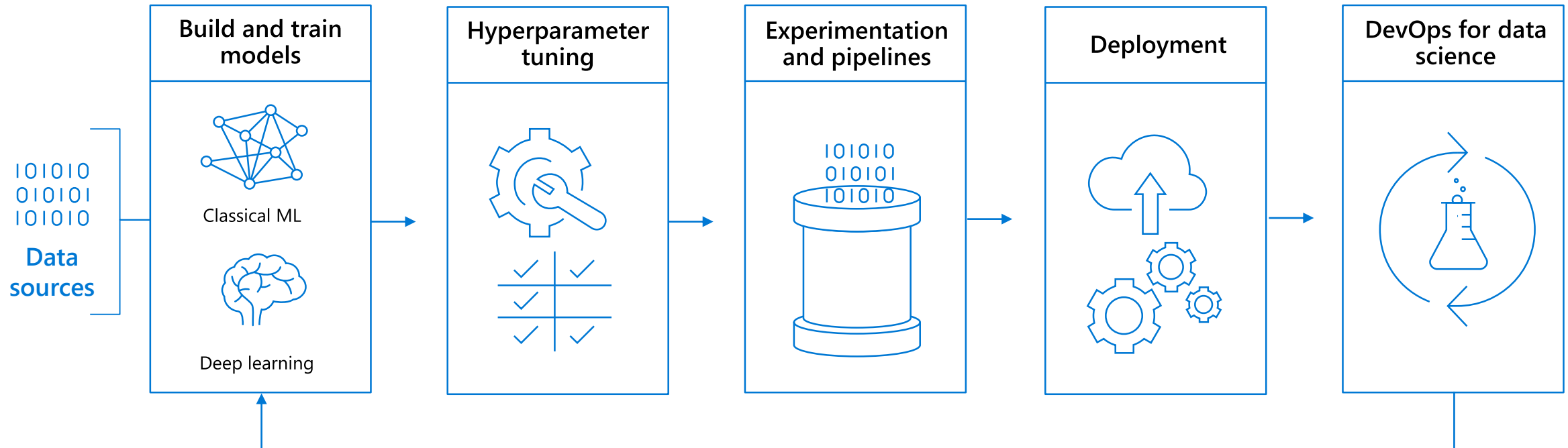
Azure ML Service Technical Overview



Azure Machine Learning service

<https://docs.microsoft.com/en-us/azure/machine-learning/>

Building blocks for a Data Science Project



Azure Machine Learning service

Set of Azure Cloud
Services



Python
SDK & R

That enables you to:

- ✓ Prepare Data
- ✓ Build Models
- ✓ Train Models

- ✓ Manage Models
- ✓ Track Experiments
- ✓ Deploy Models

Composants Azure ML service

Azure Machine Learning components

Experience

SDK, Notebooks, Drag-n-drop, Wizard

MLOps

Reproducible, Automatable, GitHub, CLI, REST

Datasets

Profiling, Drift, Labeling

Training

Experiments, Runs

Model Registry

Models, Images

Inferencing

Batch, Realtime

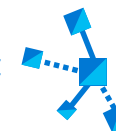
Compute

Jobs, Clusters, Instances



Azure IoT Edge

Security, Mgmt., Deployment



Cloud

CPU, GPU, FPGA



Edge

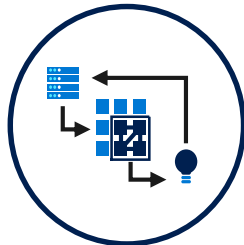
CPU, GPU, NPU



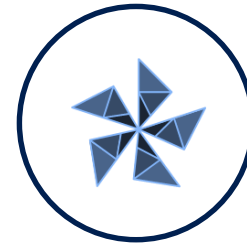
Azure Machine Learning



For all skill levels



Industry leading MLOps



Open & Interoperable

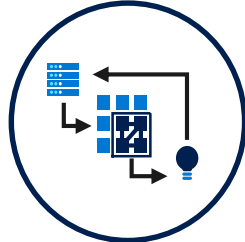


Trusted

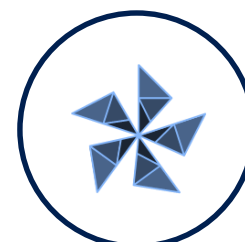
Azure Machine Learning



For all skill levels



Industry leading MLOps



Open & Interoperable



Trusted

Access machine learning for all skills and boost productivity.

Rapidly build and deploy machine learning models using tools that meet your needs regardless of skill level. Use the no-code designer to get started with machine learning or use built-in Jupyter notebooks for a code first experience. Accelerate model creation with the automated machine learning UI and access built-in feature engineering, algorithm selection, and hyperparameter sweeping, to develop high accuracy models.

Operationalize at scale with robust MLOps.

MLOps or DevOps for machine learning, streamlines the machine learning lifecycle, from building models to deployment and management. Use ML pipelines to build repeatable workflows and use a rich model registry to track your assets. Manage production workflows at scale using advanced alerts and automation capabilities. Profile, validate and deploy machine learning models anywhere from the cloud to the edge.

Innovate on an open and interoperable platform.

Take advantage of built-in support for popular open-source tools and frameworks for model training and inferencing. Use familiar frameworks like PyTorch, TensorFlow, scikit-learn and more, or the open and interoperable ONNX format. Choose the development tools that best meet your needs, including popular IDEs, Jupyter notebooks and CLIs or languages like Python and R. After you've built and trained your model, use ONNX Runtime to optimize and accelerate inferencing across cloud and edge devices.

Build responsible AI solutions on a secure trusted platform.

Access state-of-the-art technology for fairness and model transparency. Use model interpretability for explanations about predictions, to better understand model behavior. Reduce model bias by applying common fairness metrics, automatically making comparisons and using recommended mitigations. Enterprise-grade security with role based access control, and virtual network support to protect your assets. Audit trail, quota and cost management capabilities for advanced governance and control.



Azure Machine Learning

For all skill levels
studio web experience

The screenshot displays the Azure Machine Learning studio web experience. On the left is a navigation sidebar with sections: Home, Author (containing Automated ML, Designer, and Notebooks), Assets (containing Datasets, Experiments, Models, and Endpoints), and Manage (containing Compute, Datastores, and Notebook VMs). The main content area is titled 'Welcome!' and features four cards: 'Create new' with a plus icon, 'Automated ML' with a lightning bolt icon and description 'Automatically train and tune a model using a target metric.', 'Designer' with a flowchart icon and description 'Drag-n-drop interface from prepping data to deploying models.', and 'Notebooks' with a document icon and description 'Code with Python SDK and run sample experiments.' Each card has a 'Start now' button. Below these is a section 'My recent resources' containing a table of runs.

Run Number	Experiment	Status Updated Time	Status
1	Sample_1_-_Regression...	9/27/2019, 1:38:37 PM	Completed
1474	category-based-prope...	9/18/2019, 4:37:10 PM	Completed
1475	category-based-prope...	9/18/2019, 3:49:21 PM	Completed
158	data-profiling	9/18/2019, 3:40:23 PM	Completed

[View all experiments →](#)

AutoML

Azure Machine Learning accelerates model development

with automated machine learning

Input

Intelligently test multiple models in parallel

101010
010101
101010

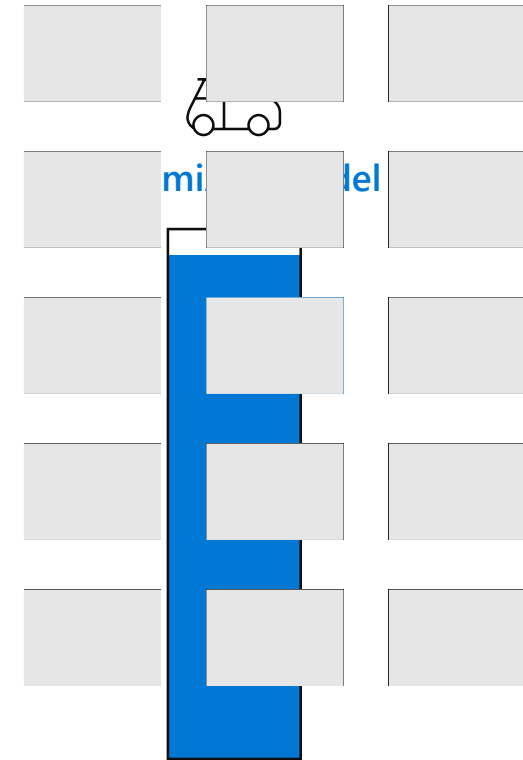
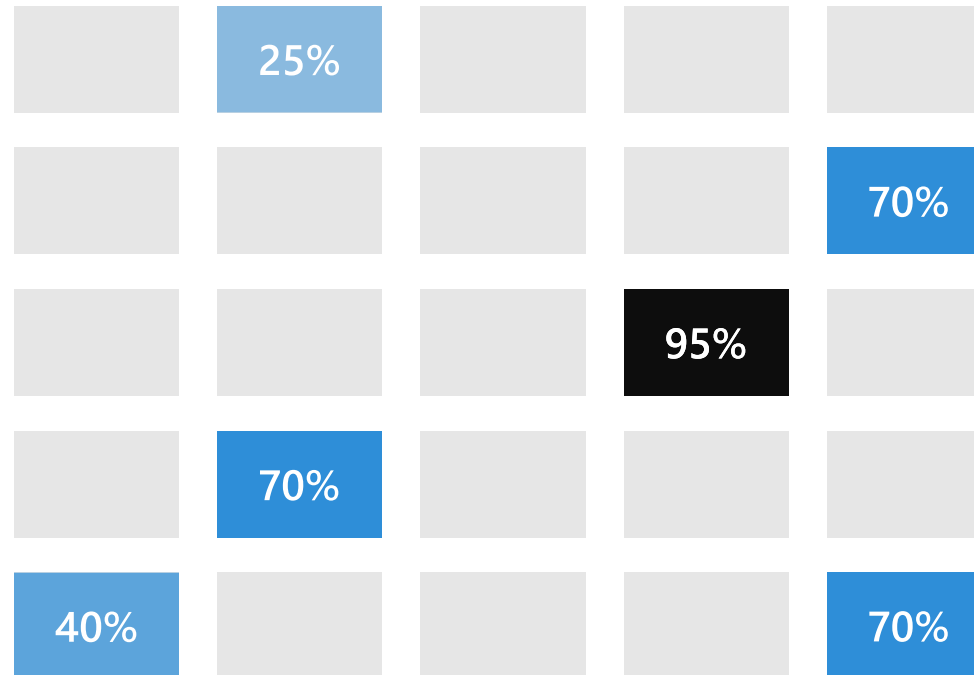
Enter data



Define goals



Apply constraints



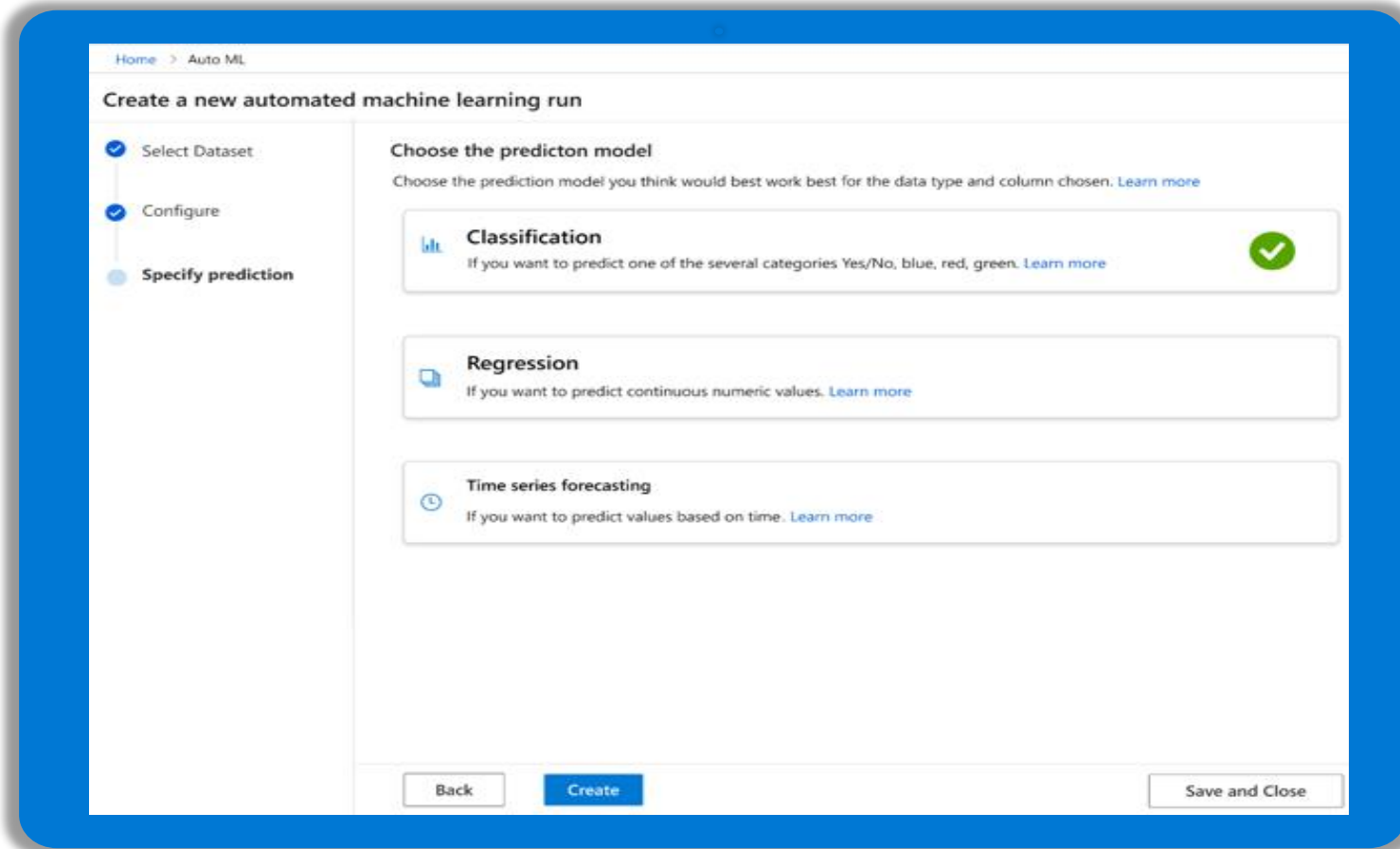
Automated ML

Automatically build and deploy predictive models using the no-code UI or through a code-first notebooks experience.

Increase productivity with easy data exploration and profiling and with intelligent feature engineering.

Easily create accurate models customized to your data and refined by a wide array of algorithms and hyperparameters.

Build responsible AI solutions with model interpretability, and fine-tune your models to improve accuracy.



Automated Machine Learning

What's new

Automated ML UI

New look & feel

Datasets integration: more data sources supported

Featurizer customization

Out-of-the-box model explainability

Automated ML SDK

Deep learning

Text Classification with BERT (GPU) & BiLSTM (CPU)

Time series forecasting with ForecastTCN & HyperDrive

Automatic feature engineering

Customizable featurization

Feature transparency: retrieve generated features

sacartac_ws > Welcome

Automated machine learning

Let automated machine learning train and find the best model based on your data without writing a single line of code. [Learn more](#)

[+](#) New automated ML run

Recent automated ML runs

[View all runs](#) →

Experiment	Id	Status	Created on	Duration
automl-model-explanation	AutoML_a1b187e1-2fe7-46d1-b389-c797cc97f389	Failed	10/22/2019, 10:50:15 AM	00:00:31
automl-forecasting-energydemand	AutoML_8aa09cc9-c638-4243-ab62-09cec68fe891	Completed	10/21/2019, 9:51:24 PM	09:01:50
automl-forecasting-energydemand	AutoML_5c9aa9d0-9b86-4506-9ad6-8c1c8a360502	Completed	10/21/2019, 9:51:50 PM	00:27:46
automl-forecasting-energydemand	AutoML_fa9f88bf-e72c-41fe-93b3-530c05bc6656	Completed	10/21/2019, 9:40:55 PM	00:05:19
automl-forecasting-energydemand	AutoML_f7a65713-997b-4b56-b38b-6f147968ab2c	Completed	10/21/2019, 9:29:36 PM	00:15:15
automl-forecasting-energydemand	AutoML_c013e6ea-d3f5-4a06-8e3a-afb90b26664a	Completed	10/21/2019, 4:31:07 PM	00:25:10

Documentation

[View all documentation](#)

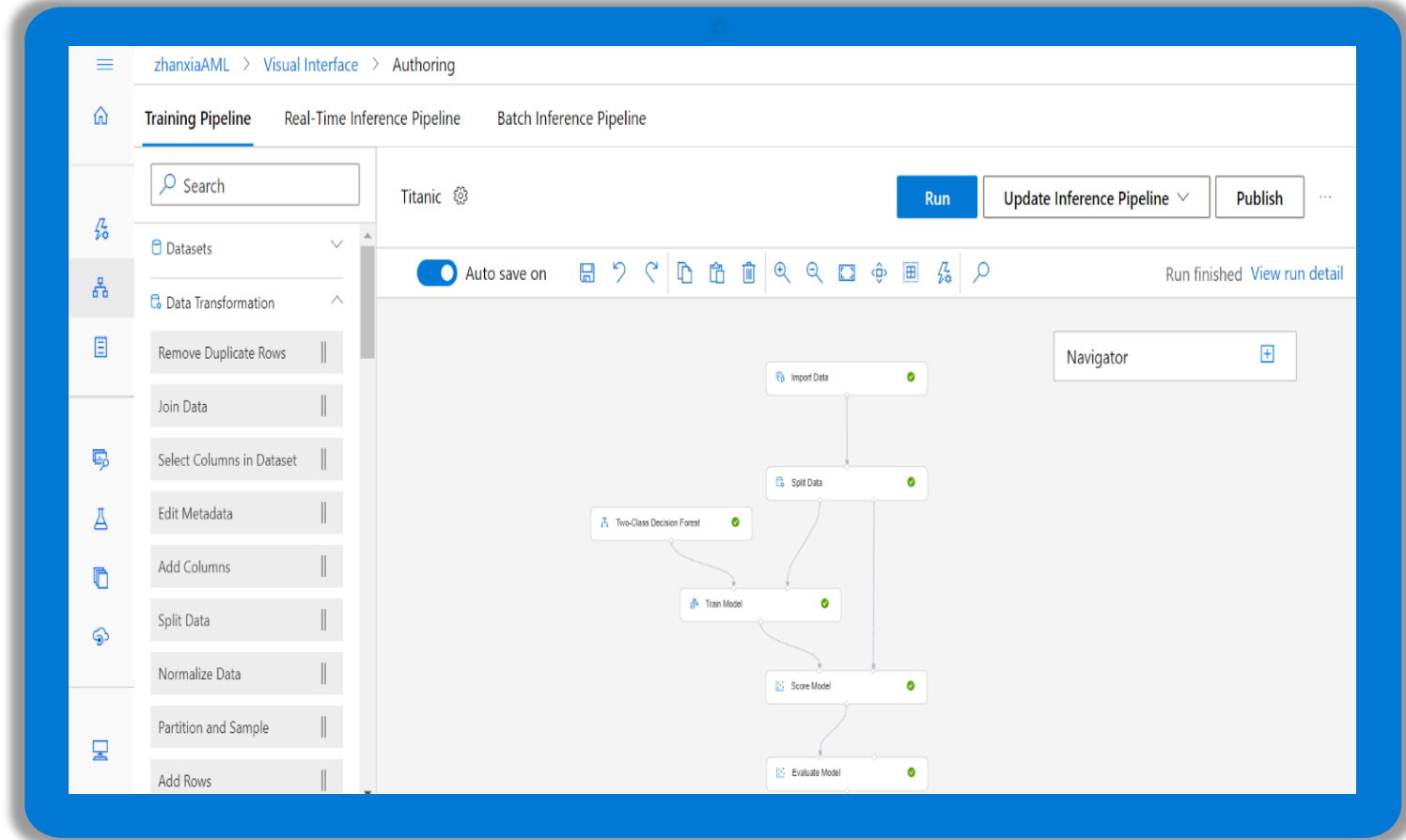


Concept: What is automated machine learning?
06/19/2019

Designer

Designer

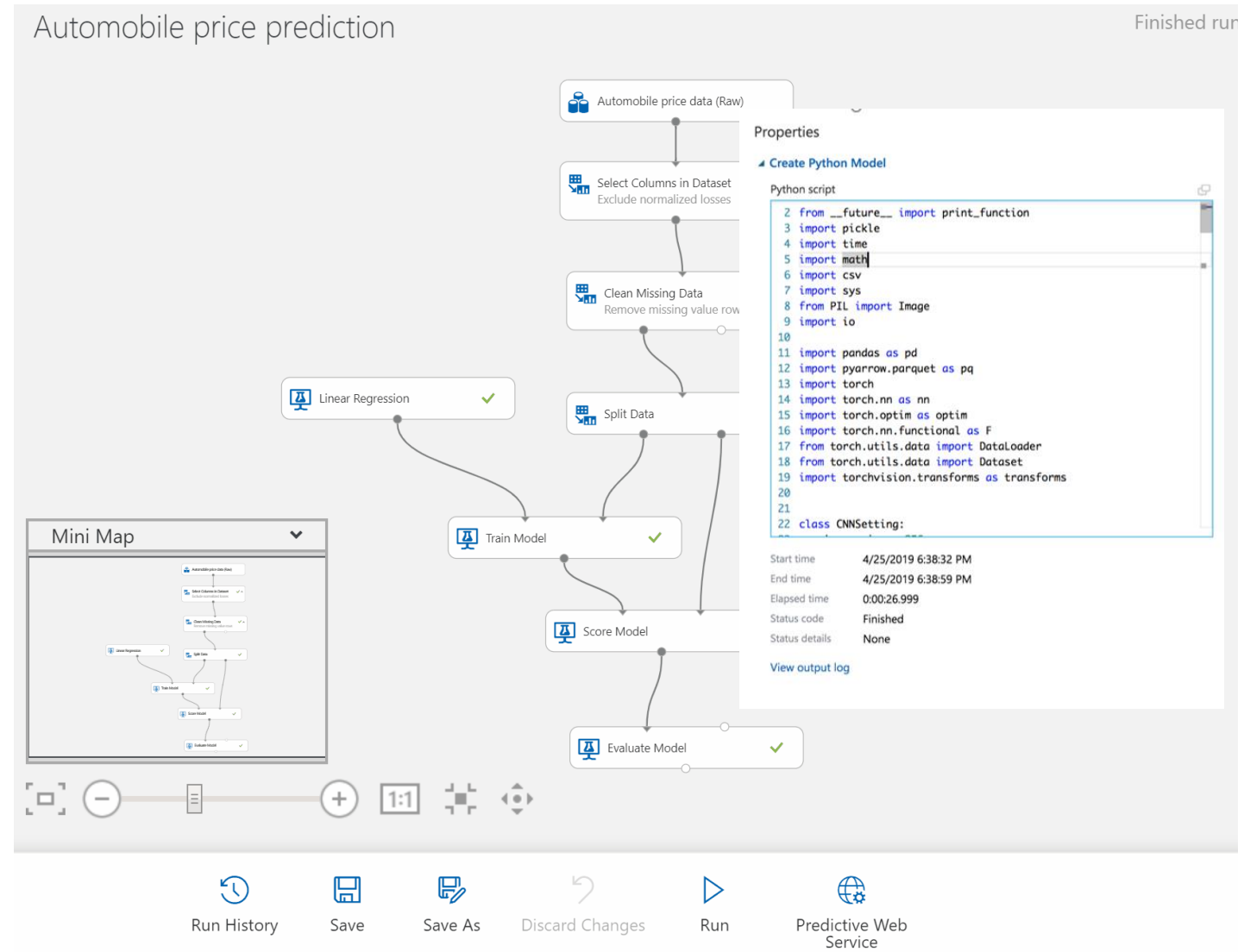
- drag-n-drop workflow capability
- simplify the process of building, testing, and operating machine learning models
- Create new pipelines



Drag and drop modeling with Azure Machine Learning Designer

Designer

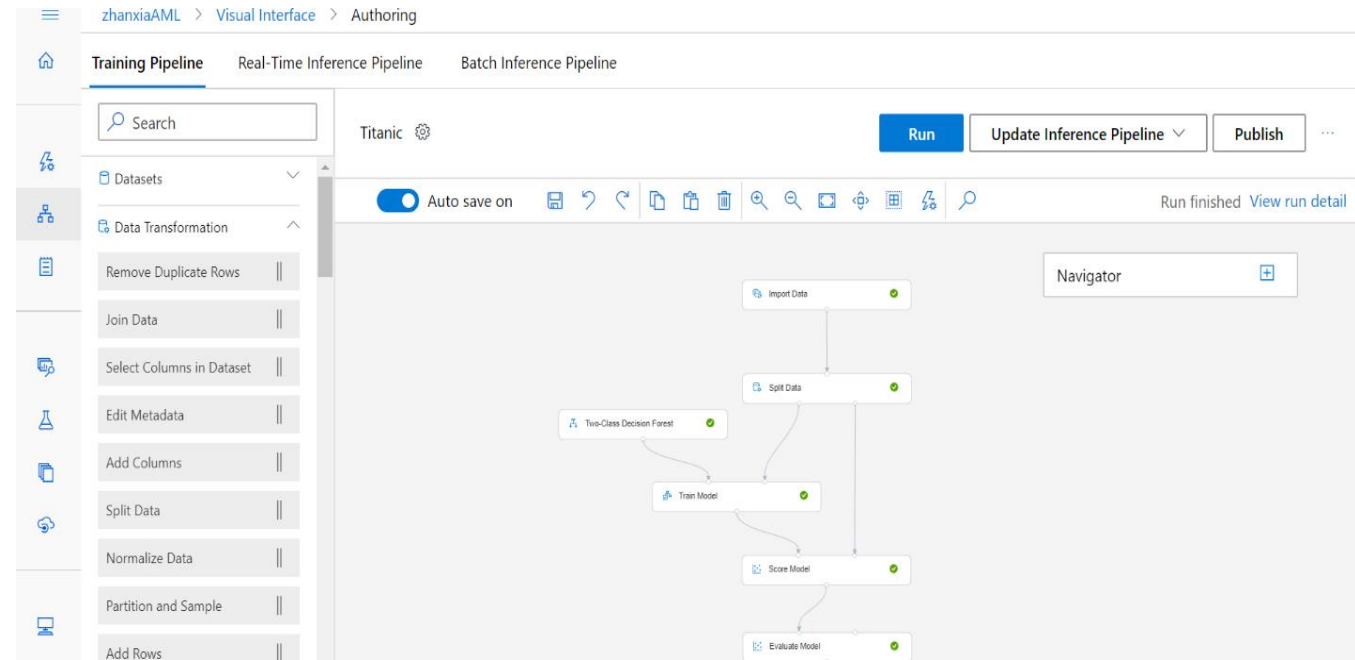
- User built in modules, data visualization, model evaluation
- Automatically generate scoring files, register models and build images using AKS for scale
- Custom code to run Python and R



Machine Learning designer

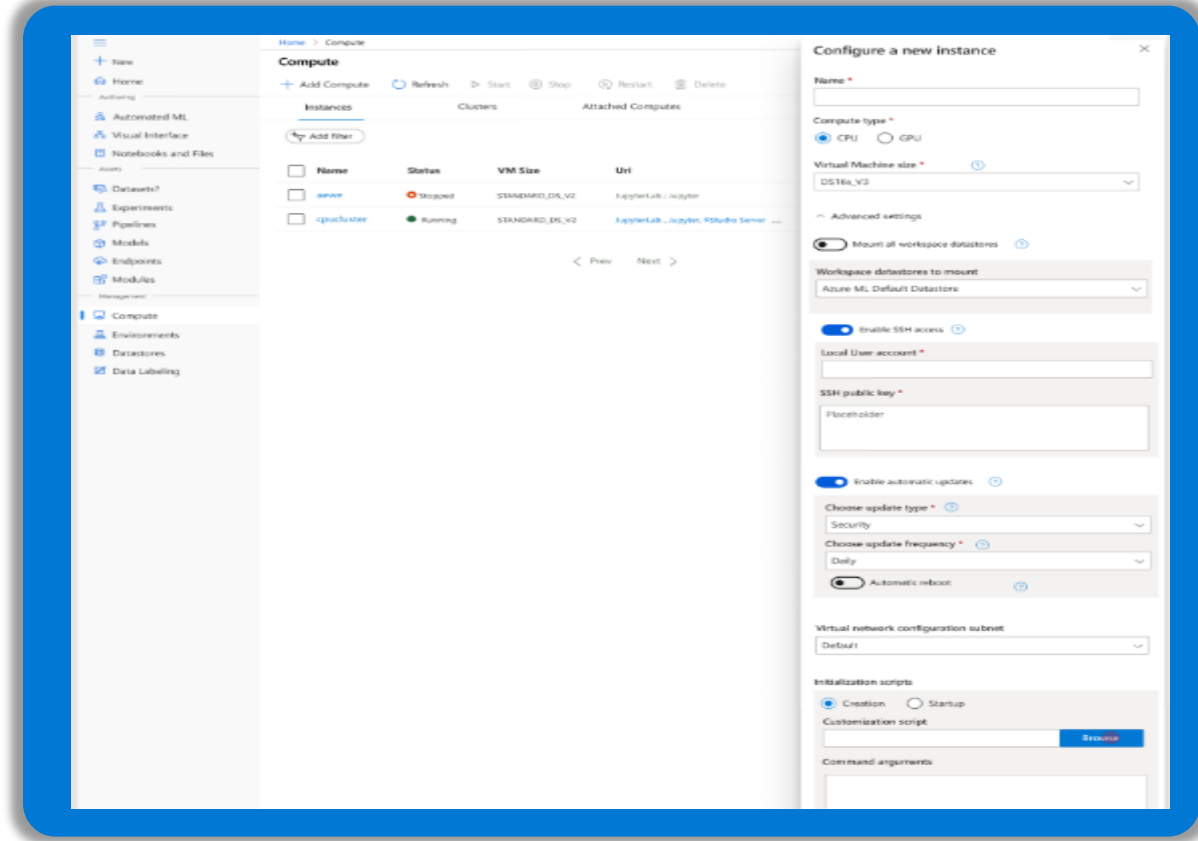
What's new

brings drag-n-drop workflow
capability
simplify the process of building,
testing, and operating machine
learning models
Create new pipelines



Machine Learning notebooks

- Fully managed cloud-based solution for data scientists to get started with ML machine learning
- Deeply integrated with Azure ML workspaces and datastores
- first-class experience for model authoring through integrated notebooks using Azure ML Python and R SDK.
- Management and enterprise readiness capabilities for IT administrators.



Machine Learning Notebooks

What's new in compute instance

Productive

Build and deploy models easily using integrated notebooks and popular tools. Collaboratively debug models and share notebooks within the boundaries of workspace.

Managed and secure

Managed VM form-factor ensures compliance with enterprise security requirements.

Preconfigured for ML

Pre-configured and up-to-date ML packages, GPU drivers and everything Data Scientist needs to save time on setup tasks.

Fully customizable

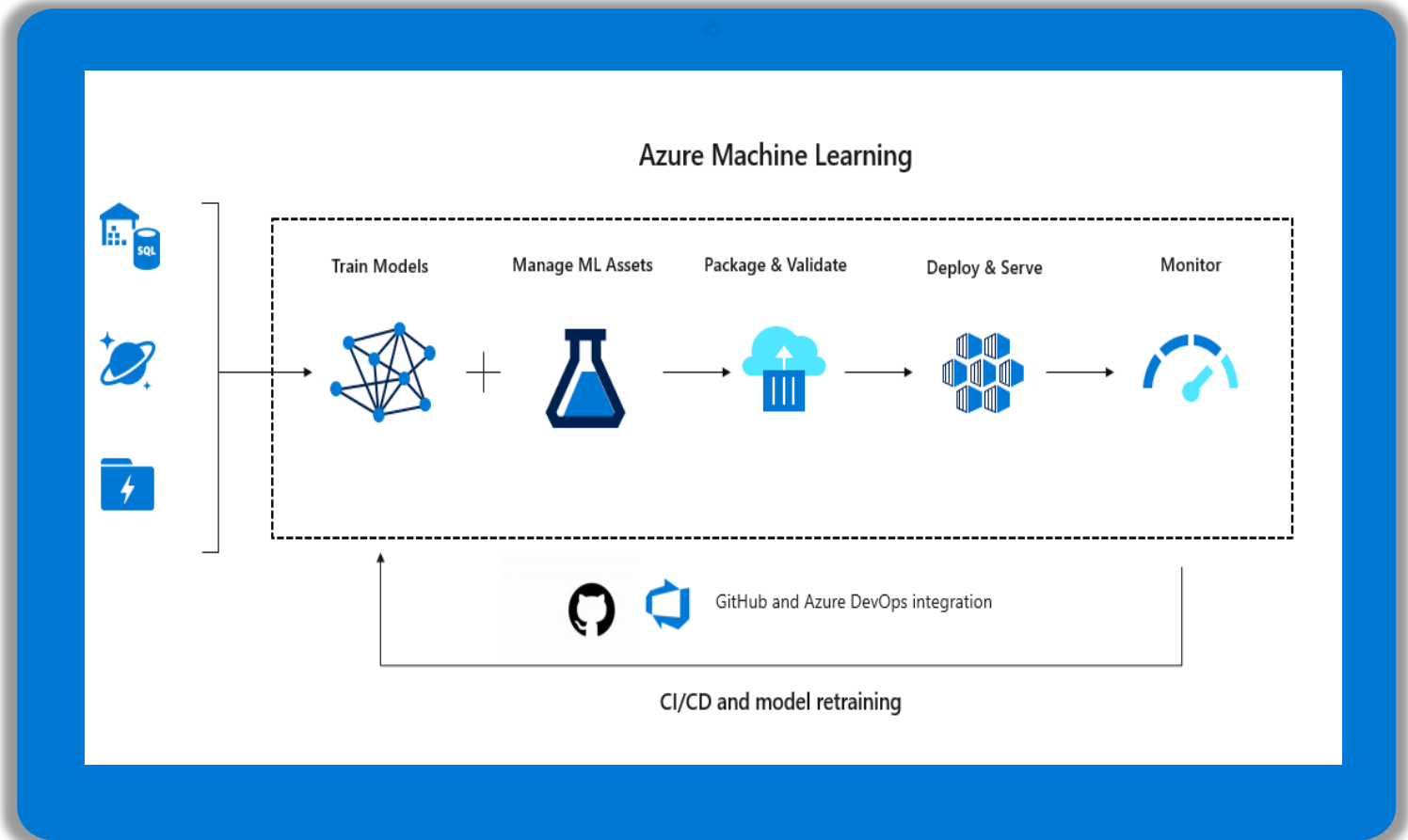
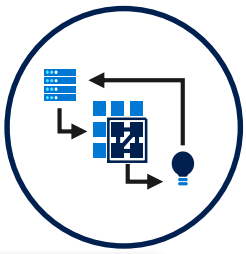
Broad support for Azure VM types and persisted low-level customization makes advanced scenarios a breeze.

The screenshot displays the 'New Compute Instance' configuration page. It includes the following sections and fields:

- Compute name ***: A text input field with a help icon.
- Virtual Machine size ***: A dropdown menu with a help icon.
- Enable SSH access**: A toggle switch that is currently turned on, with a help icon.
- Administrator account username ***: A text input field containing 'azureuser'.
- SSH public key ***: A large text area for pasting a public key, with a help icon.
- Advanced settings**: A section header with a downward arrow.
- CONFIGURE VIRTUAL NETWORK**: A section header with a help icon.
- Resource group**: A dropdown menu with the text 'Select a resource group'.
- Virtual network**: A dropdown menu with the text 'Select or search by name'.
- Subnet**: A dropdown menu with the text 'Select or search by name'.
- Create** and **Cancel** buttons at the bottom.

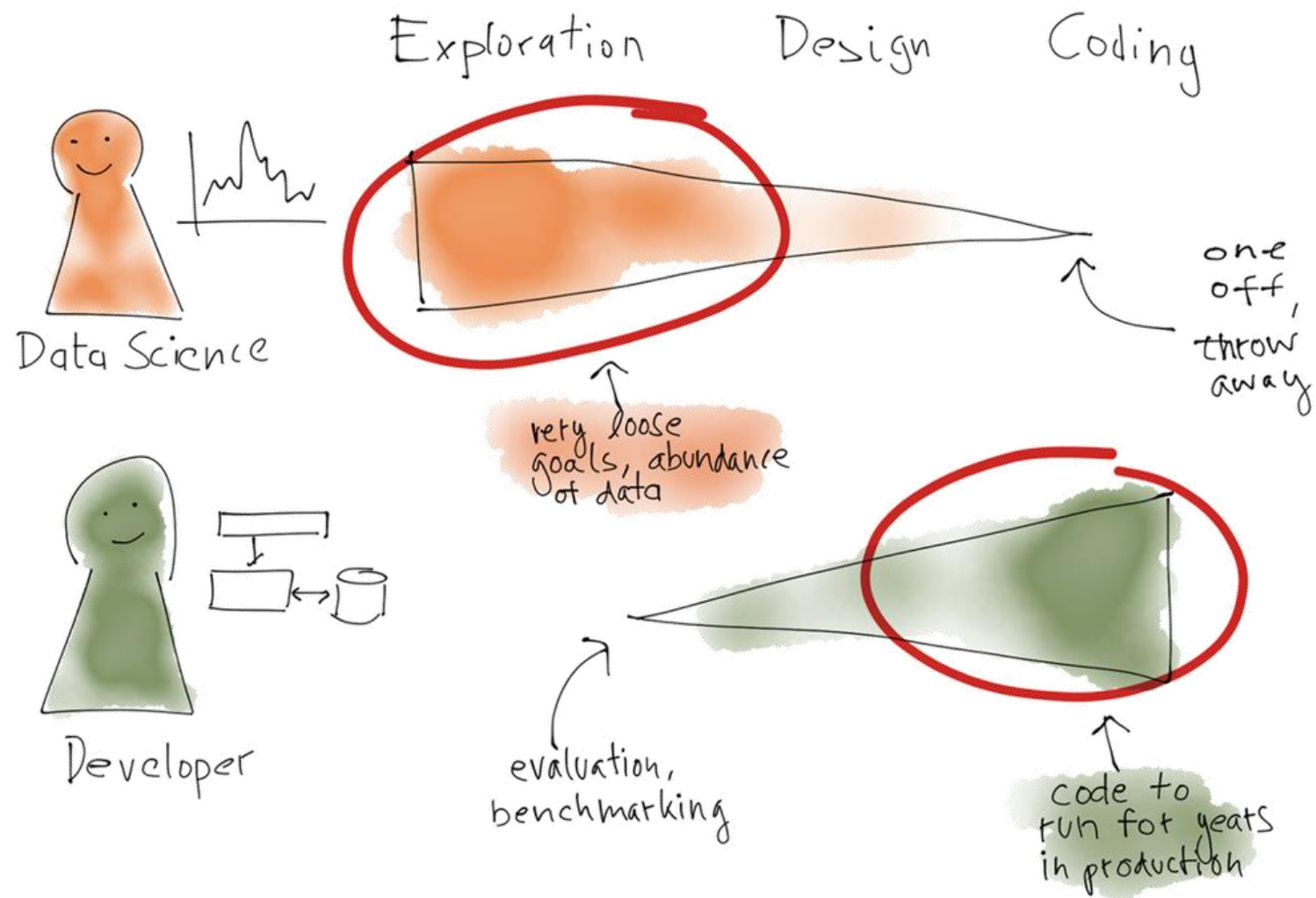
Azure Machine Learning

Industry leading MLOps

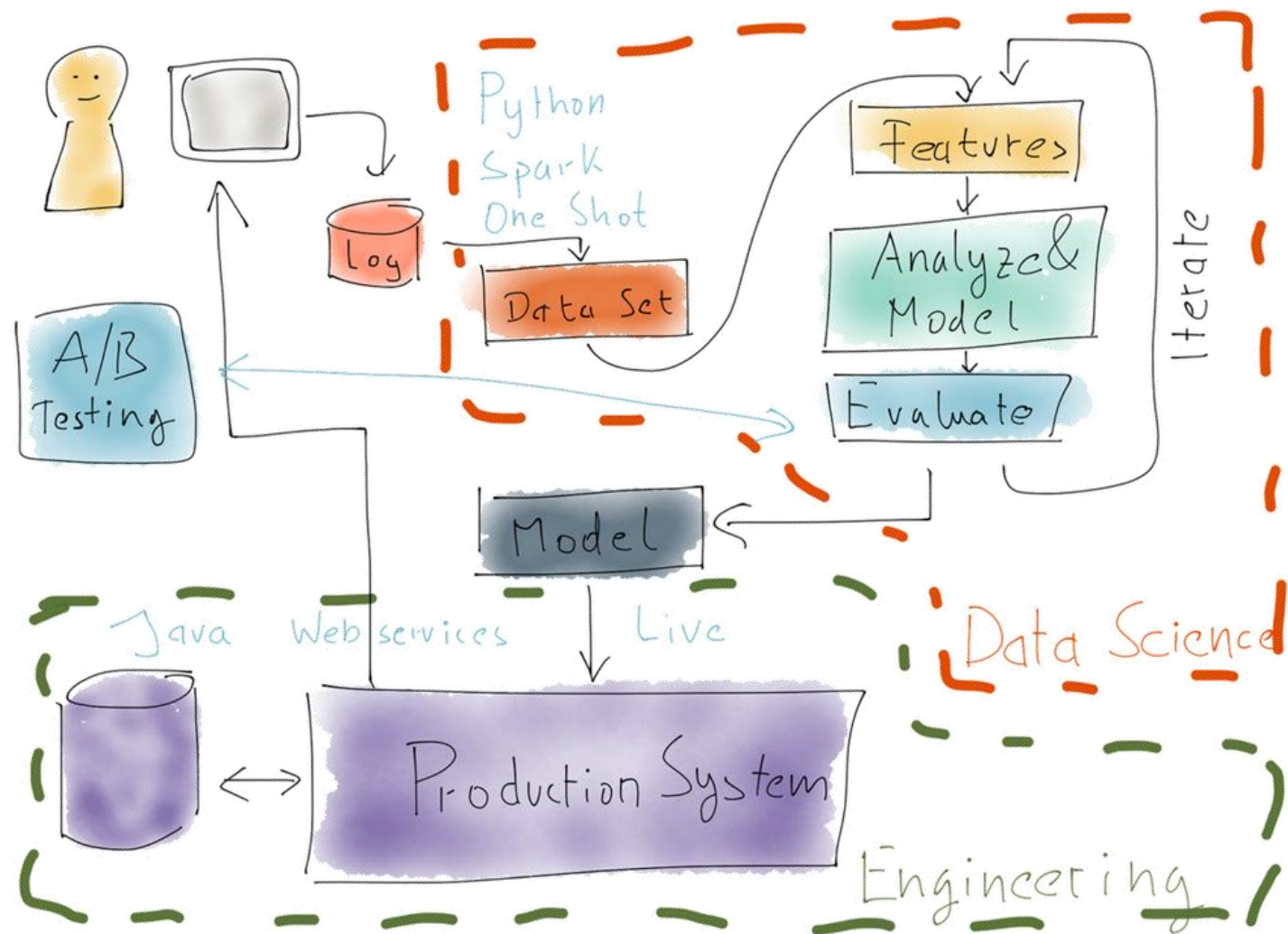


MLOps

Current situation



How to manage?



DevOps



Code reproducibility



Code testing



App deployment

MLOps



Model reproducibility



Model validation

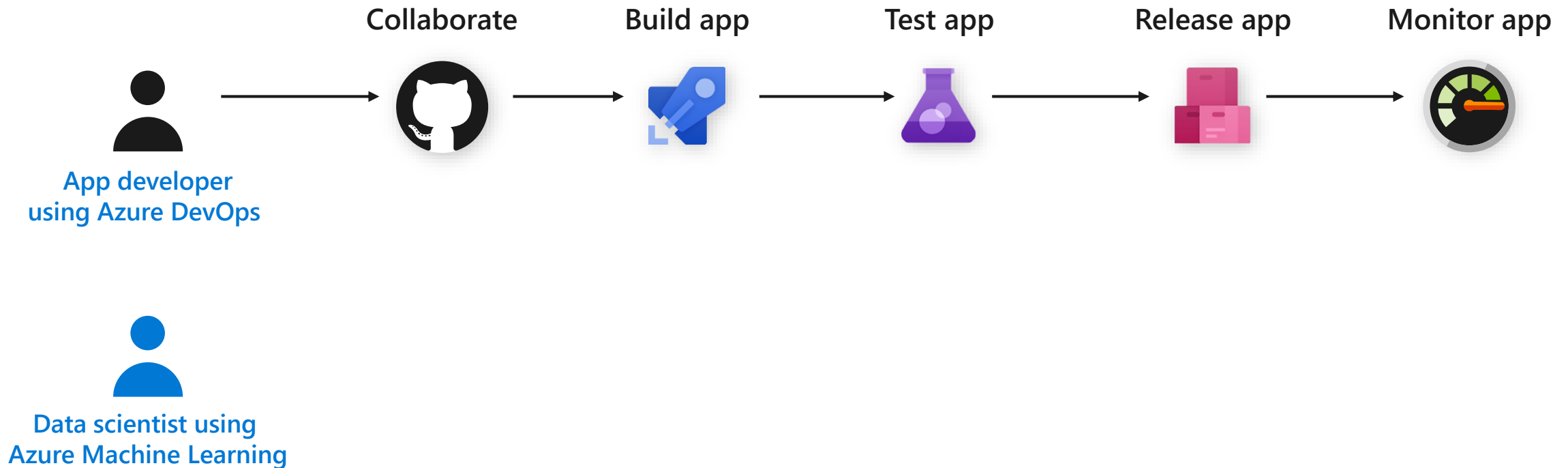


Model deployment



Model retraining

MLOps with Azure Machine Learning



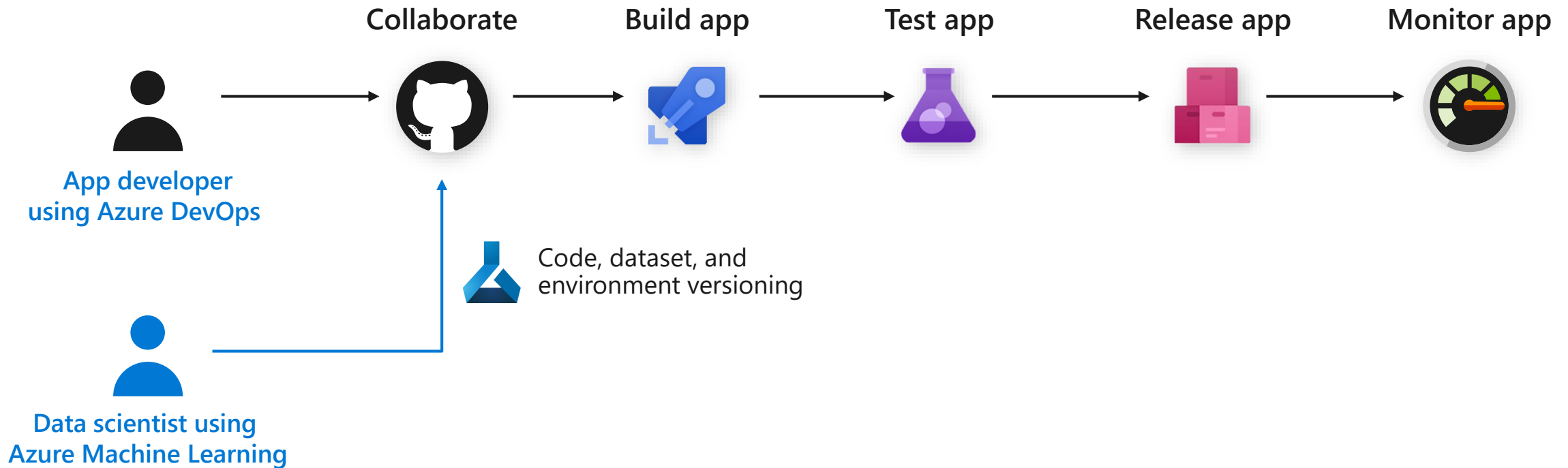
☐ Model reproducibility

☐ Model validation

☐ Model deployment

☐ Model retraining

MLOps with Azure Machine Learning



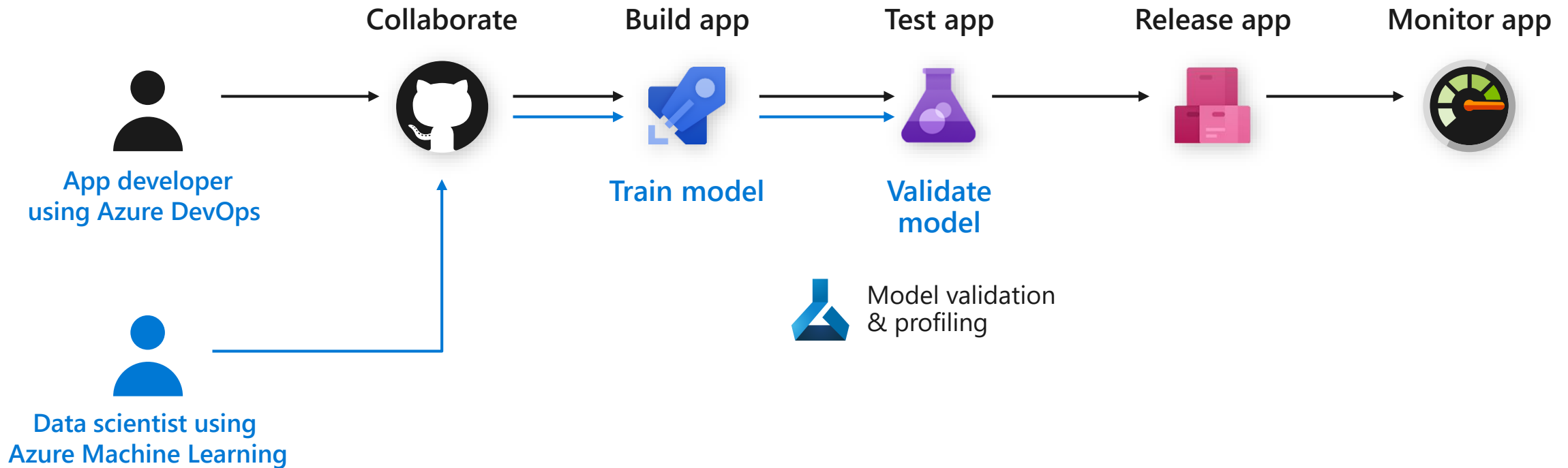
☒ Model reproducibility

☐ Model validation

☐ Model deployment

☐ Model retraining

MLOps with Azure Machine Learning



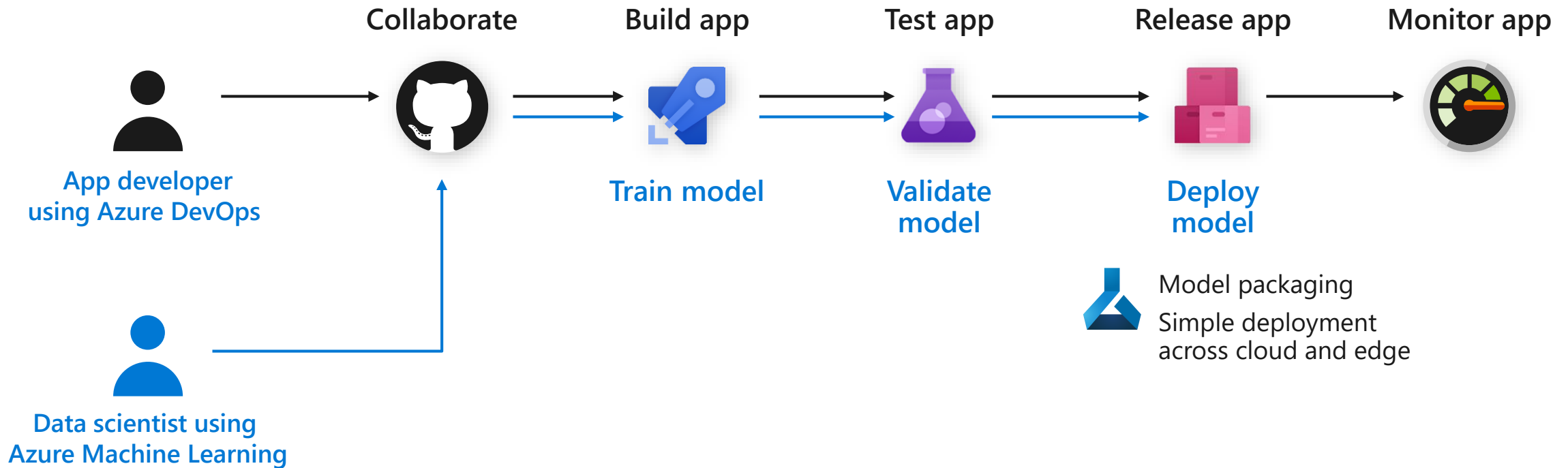
☒ Model reproducibility

☒ Model validation

☐ Model deployment

☐ Model retraining

MLOps with Azure Machine Learning



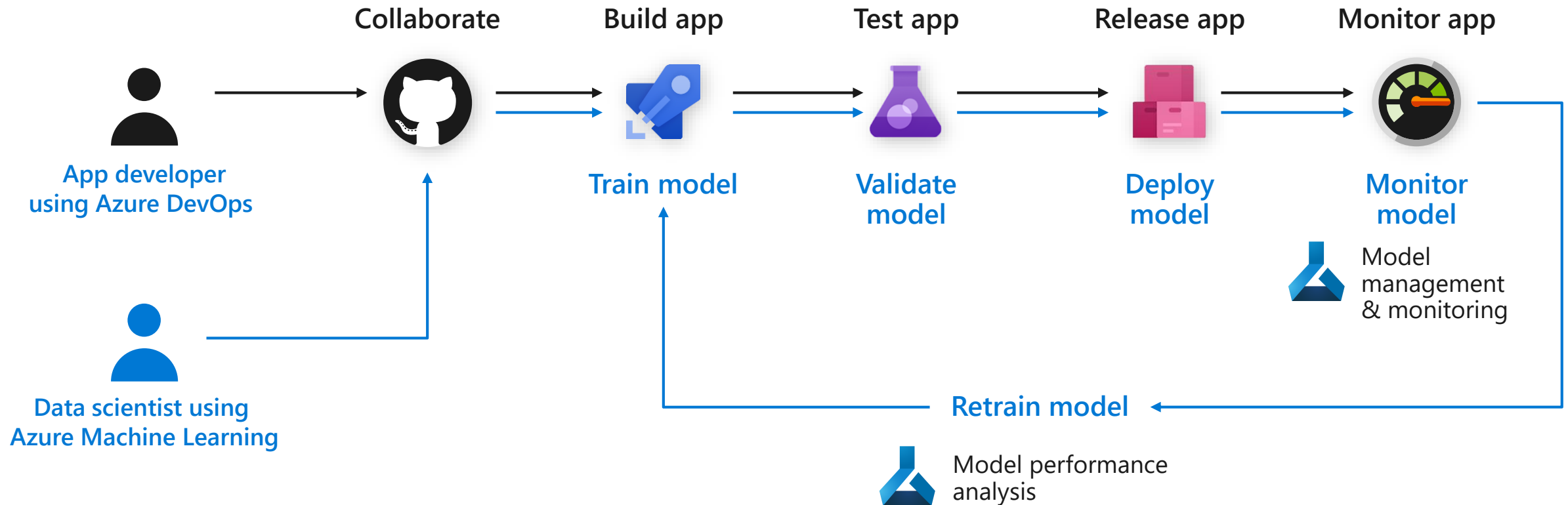
☒ Model reproducibility

☒ Model validation

☒ Model deployment

☐ Model retraining

MLOps with Azure Machine Learning



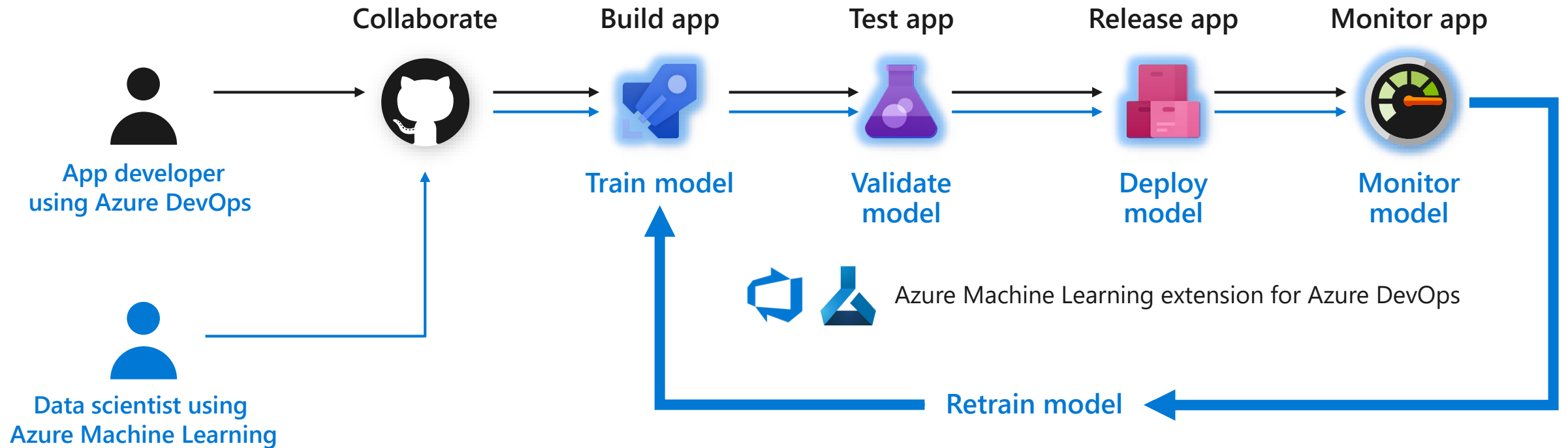
☑ Model reproducibility

☑ Model validation

☑ Model deployment

☑ Model retraining

MLOps with Azure Machine Learning



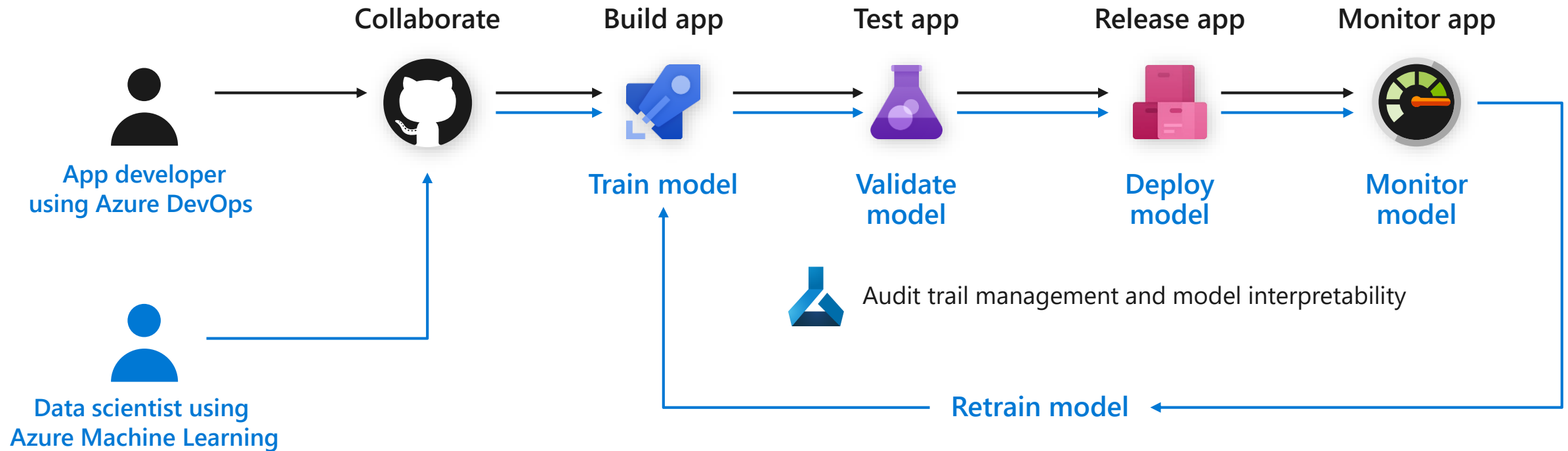
☑ Model reproducibility

☑ Model validation

☑ Model deployment

☑ Model retraining

MLOps with Azure Machine Learning

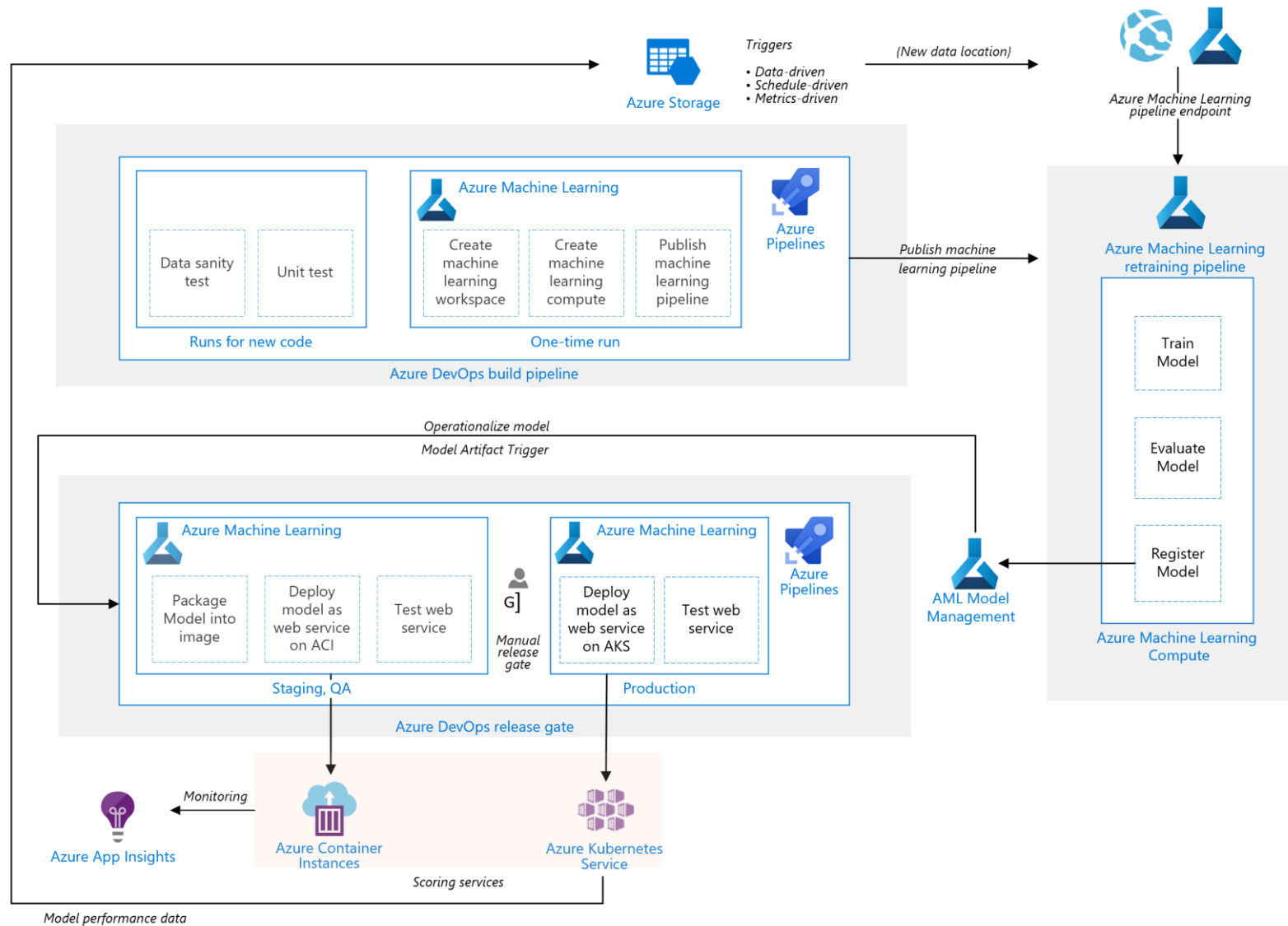


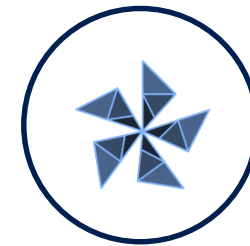
☑ Model reproducibility

☑ Model validation

☑ Model deployment

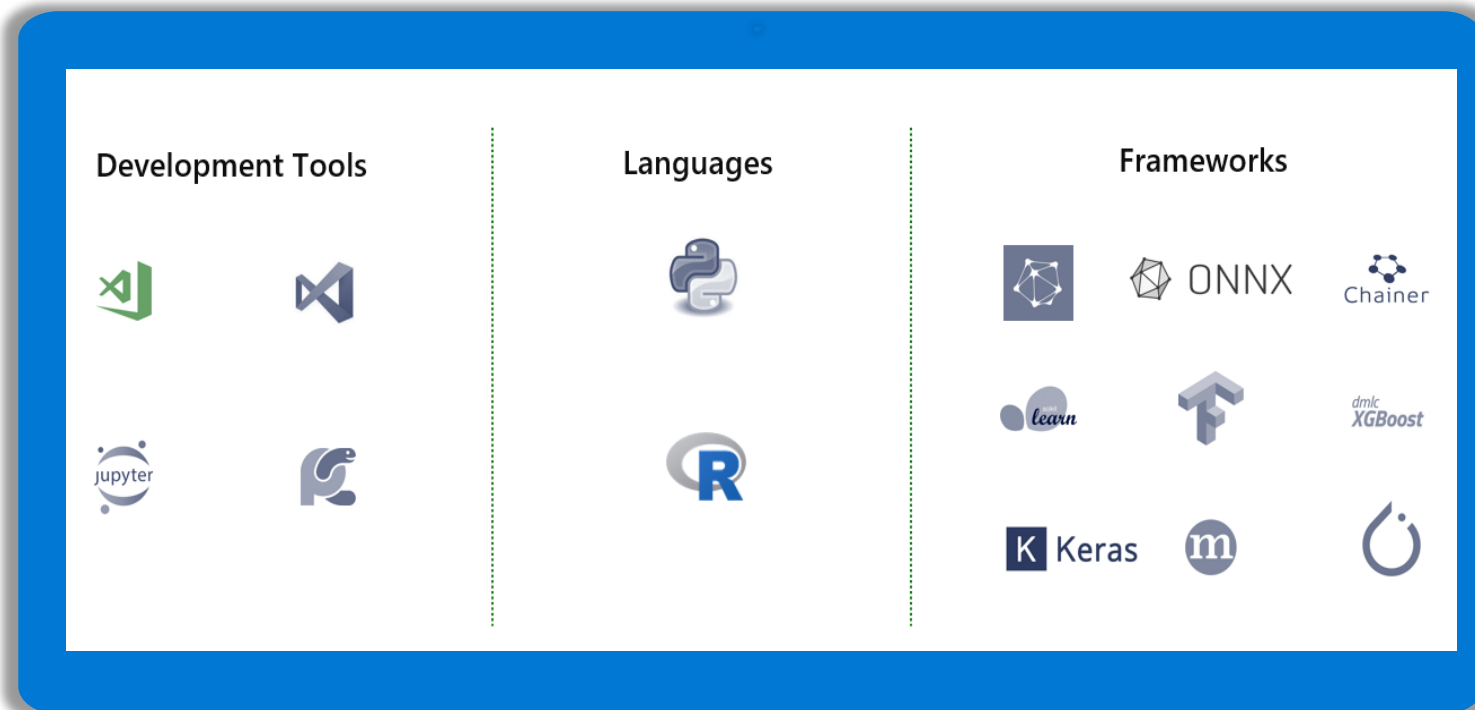
☑ Model retraining





Azure Machine Learning

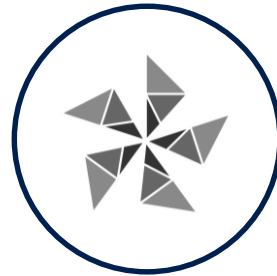
Open and interoperable platform



Open platform



Native MLflow support



ONNX Runtime updates

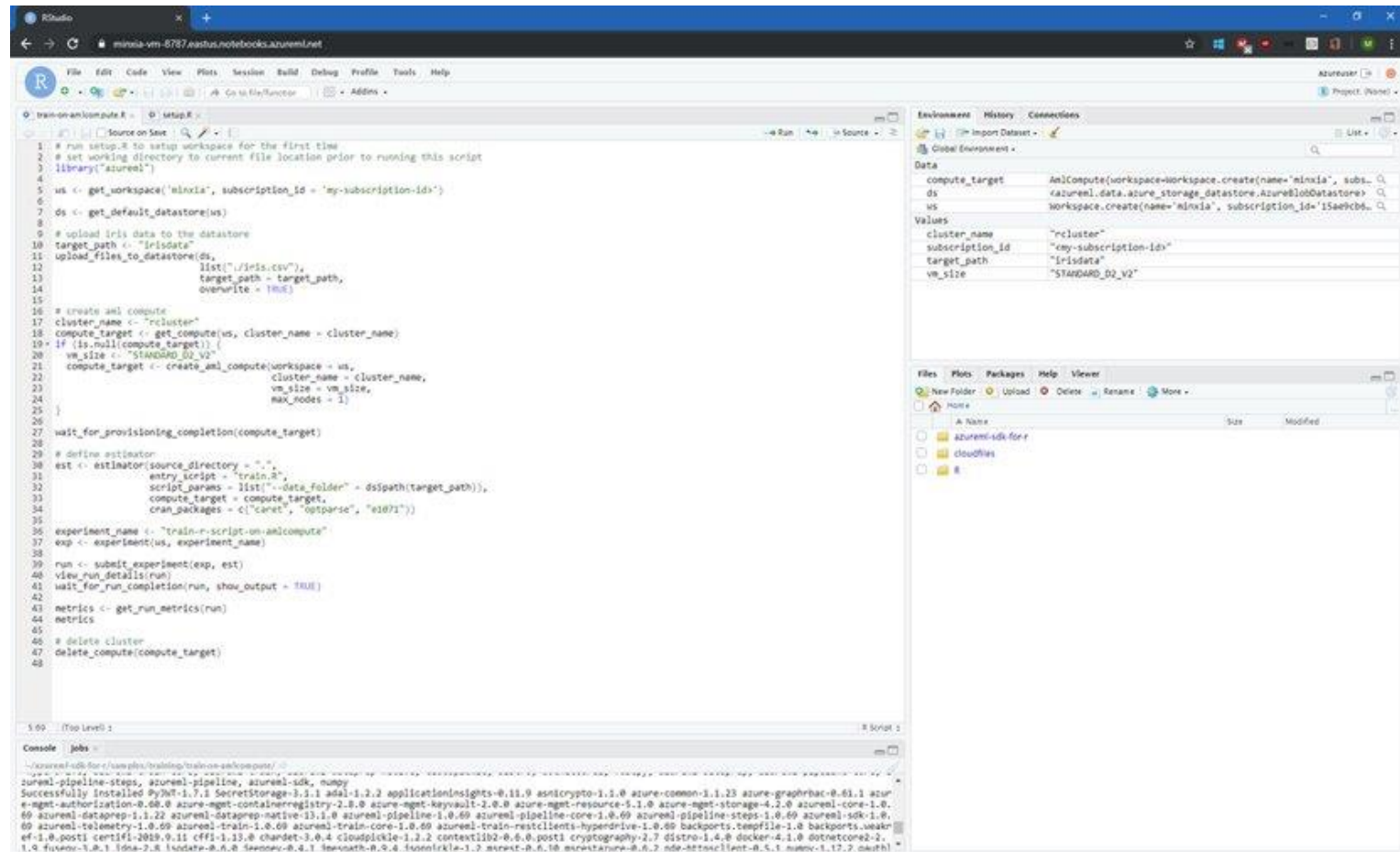


Azure Open Datasets

What's new

R capabilities

- enable data scientists to scale out their R-based machine learning workloads on Azure.



Machine Learning on Azure

Domain specific pretrained models

To simplify solution development



Vision



Speech



Language



Search

Familiar Data Science tools

To simplify model development



Visual Studio Code



Azure Notebooks



Jupyter



Command line

Popular frameworks

To build advanced deep learning solutions



PyTorch



TensorFlow



Scikit-Learn



ONNX

Productive services

To empower data science and development teams



Azure
Databricks



Azure Machine
Learning



Machine
Learning VMs

Powerful infrastructure

To accelerate deep learning



CPU



GPU



FPGA



From the Intelligent Cloud to the Intelligent Edge



Powerful infrastructure

Accelerate deep learning



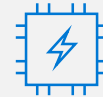
CPUs

General purpose
machine learning
D, F, L, M, H Series



GPUs

Deep learning
N Series



FPGAs

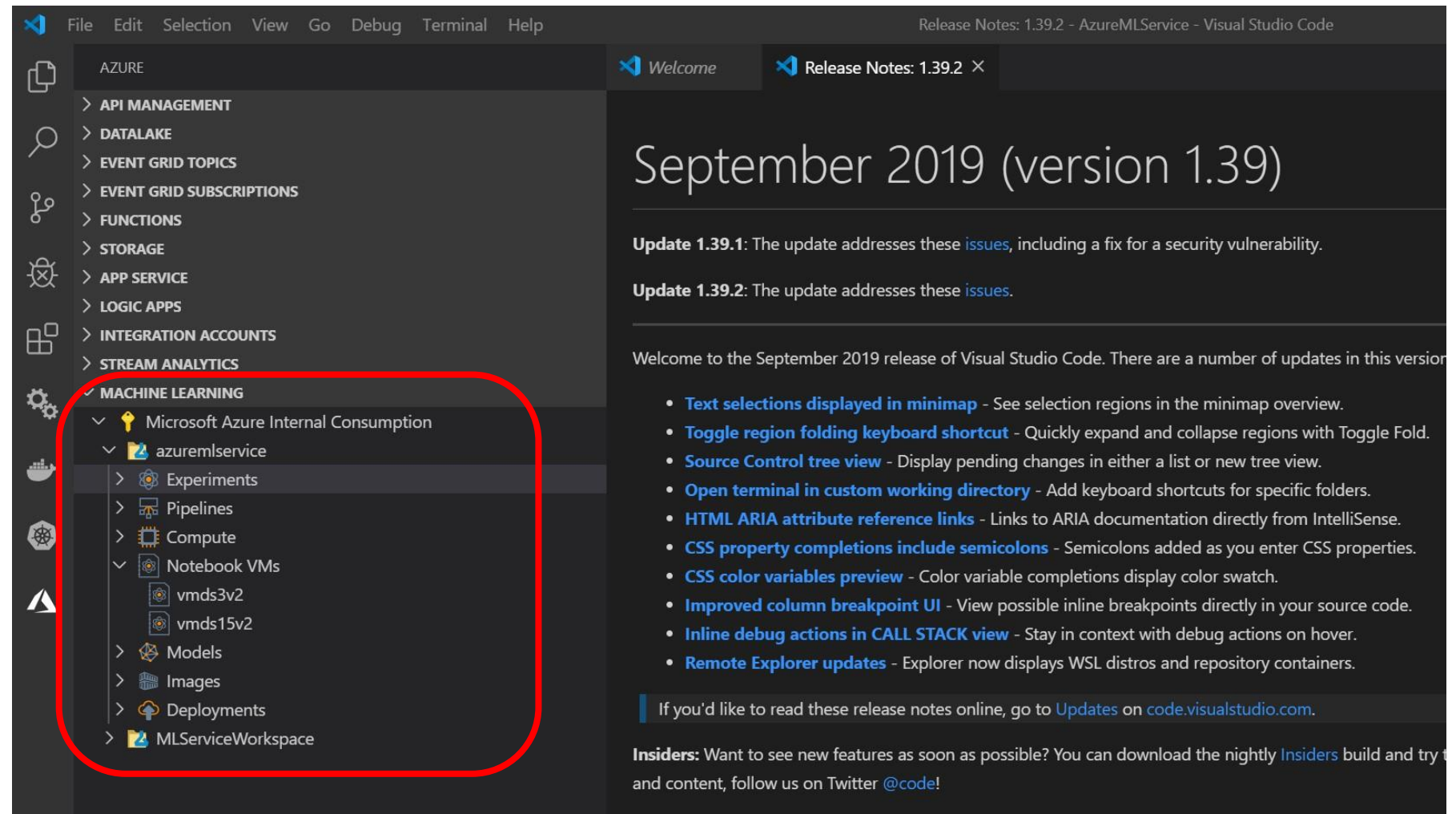
Specialized hardware
accelerated deep learning
AML hardware accelerated
models (Project Brainwave)

← Optimized for flexibility

→ Optimized for performance

Integration with VS Code

Integration with Visual Studio



The screenshot displays the Visual Studio Code interface with the Azure extension sidebar on the left and the release notes for September 2019 (version 1.39) on the right. The sidebar is categorized into several sections: API MANAGEMENT, DATALAKE, EVENT GRID TOPICS, EVENT GRID SUBSCRIPTIONS, FUNCTIONS, STORAGE, APP SERVICE, LOGIC APPS, INTEGRATION ACCOUNTS, STREAM ANALYTICS, and MACHINE LEARNING. The MACHINE LEARNING section is expanded, showing a tree view of resources including Microsoft Azure Internal Consumption, azuremlservice, Experiments, Pipelines, Compute, Notebook VMs (vmds3v2, vmds15v2), Models, Images, Deployments, and MLServiceWorkspace. A red rounded rectangle highlights the MACHINE LEARNING section and its sub-items. The release notes on the right provide details about updates 1.39.1 and 1.39.2, as well as a list of new features and improvements for the September 2019 release.

File Edit Selection View Go Debug Terminal Help

Release Notes: 1.39.2 - AzureMLService - Visual Studio Code

WELCOME

September 2019 (version 1.39)

Update 1.39.1: The update addresses these [issues](#), including a fix for a security vulnerability.

Update 1.39.2: The update addresses these [issues](#).

Welcome to the September 2019 release of Visual Studio Code. There are a number of updates in this version:

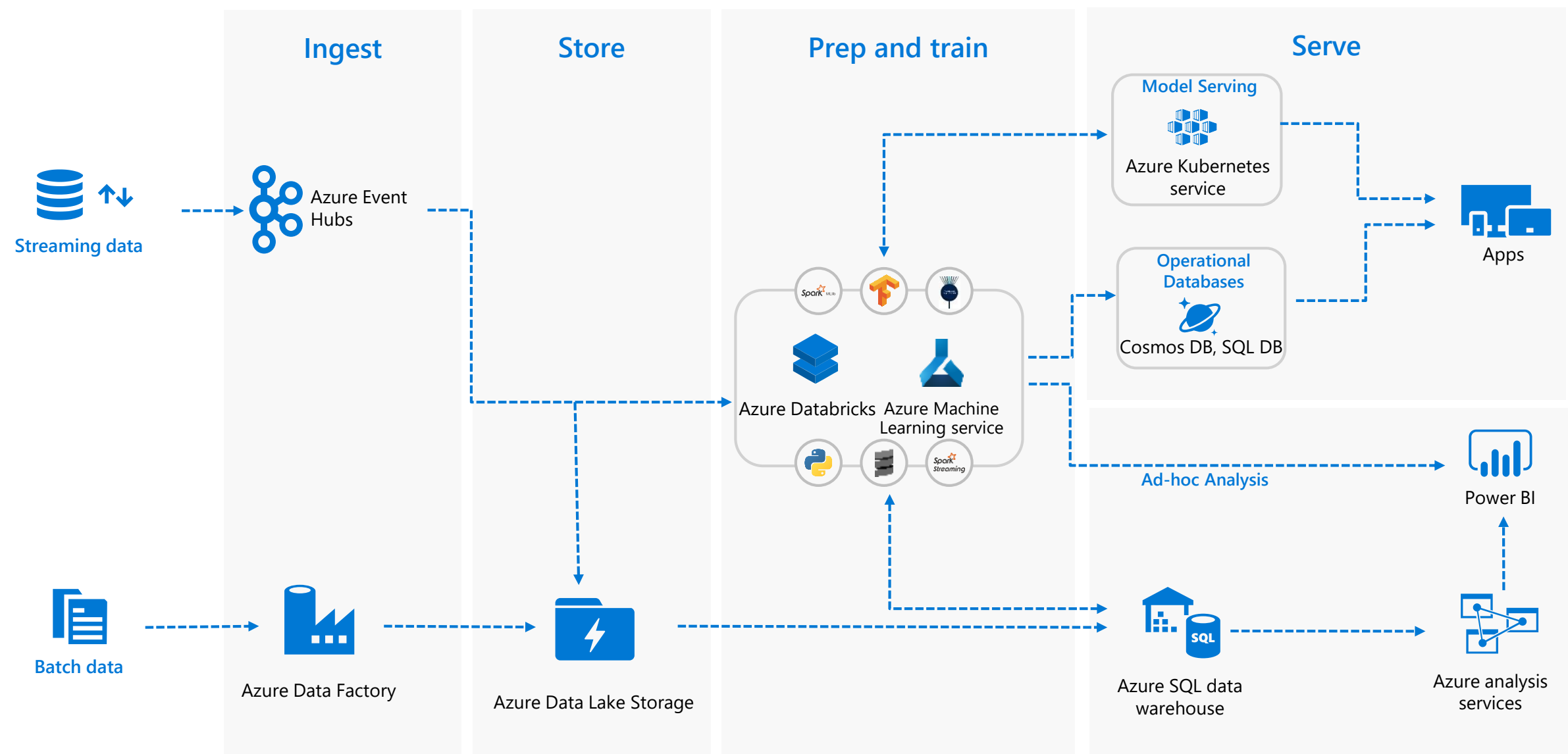
- **Text selections displayed in minimap** - See selection regions in the minimap overview.
- **Toggle region folding keyboard shortcut** - Quickly expand and collapse regions with Toggle Fold.
- **Source Control tree view** - Display pending changes in either a list or new tree view.
- **Open terminal in custom working directory** - Add keyboard shortcuts for specific folders.
- **HTML ARIA attribute reference links** - Links to ARIA documentation directly from IntelliSense.
- **CSS property completions include semicolons** - Semicolons added as you enter CSS properties.
- **CSS color variables preview** - Color variable completions display color swatch.
- **Improved column breakpoint UI** - View possible inline breakpoints directly in your source code.
- **Inline debug actions in CALL STACK view** - Stay in context with debug actions on hover.
- **Remote Explorer updates** - Explorer now displays WSL distros and repository containers.

If you'd like to read these release notes online, go to [Updates](#) on [code.visualstudio.com](#).

Insiders: Want to see new features as soon as possible? You can download the nightly [Insiders](#) build and try it out. For more information and content, follow us on Twitter [@code](#)!

Architecture

Recommended architecture to build e2e ML solutions





Azure ML Service Demo



DEMO



Documentation & ressources

Documentation Azure ML service



Lien général :

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

Pricing :

<https://azure.microsoft.com/en-us/pricing/details/machine-learning-service/>

Documentation :

<https://docs.microsoft.com/en-us/azure/machine-learning/service/>

Concepts :

<https://docs.microsoft.com/en-us/azure/machine-learning/service/concept-azure-machine-learning-architecture>

Forum

<https://social.msdn.microsoft.com/Forums/en-US/home?forum=AzureMachineLearningService>

Addin Visual Studio

<https://marketplace.visualstudio.com/items?itemName=ms-toolsai.vscode-ai#overview>

PowerBI Intégration

<https://docs.microsoft.com/en-us/power-bi/service-machine-learning-automated>

AutoML with Azure ML service

References

Schneider Electric :

<https://customers.microsoft.com/en-us/story/schneider-electric-power-utilities-azure>

BP:

<https://news.microsoft.com/transform/bp-ai-drilling-data-fueling-smarter-decisions/>

Boots:

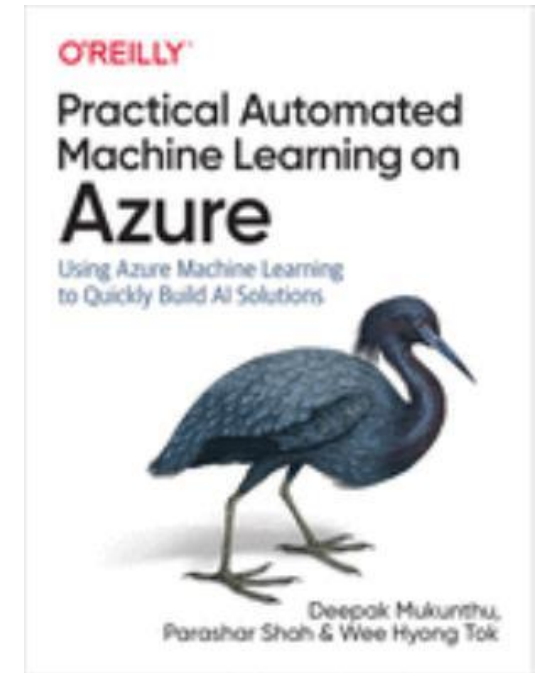
<https://customers.microsoft.com/en-us/story/733091-walgreens-boots-alliance-pharmaceuticals-azure>

AutoML integration with PowerBI:

<https://customers.microsoft.com/en-us/story/724164-macaw-partner-professional-services-power-bi>

Blog : <https://azure.microsoft.com/blog/announcing-automated-ml-capability-in-azure-machine-learning/>

Book: https://www.amazon.com/Practical-Automated-Machine-Learning-Azure-ebook/dp/B07Y8X2HH4/ref=sr_1_1?keywords=automl+azure&qid=1573050215&s=digital-text&sr=1-1

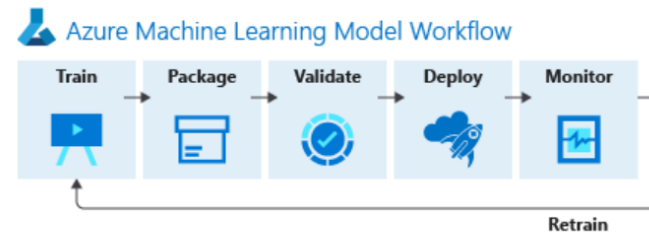


Azure ML service Git

<https://github.com/Azure/MachineLearningNotebooks/>

Azure Machine Learning service example notebooks

This repository contains example notebooks demonstrating the [Azure Machine Learning](#) Python SDK which allows you to build, train, deploy and manage machine learning solutions using Azure. The AML SDK allows you the choice of using local or cloud compute resources, while managing and maintaining the complete data science workflow from the cloud.



Quick installation

```
pip install azureml-sdk
```

Read more detailed instructions on [how to set up your environment](#) using Azure Notebook service, your own Jupyter notebook server, or Docker.

How to navigate and use the example notebooks?

If you are using an Azure Machine Learning Notebook VM, you are all set. Otherwise, you should always run the [Configuration](#) notebook first when setting up a notebook library on a new machine or in a new environment. It configures your notebook library to connect to an Azure Machine Learning workspace, and sets up your workspace and compute to be used by many of the other examples.



Get Started Guide for Azure Developers



Azure Application Architecture Guide



Free Azure Courses from Pluralsight

Get Started

Products

SDKs/Tools

Architecture

All

Compute

Networking

Storage

Web

Compute



Linux Virtual Machines



Windows Virtual Machines



App Service



Functions



Batch

Networking



Networking Overview



Content Delivery Network



ExpressRoute



Azure DNS



Virtual Network

Storage



Storage



StorSimple



Data Lake Storage Gen2



Data Lake Storage Gen1



Blob Storage

Web



App Service - Web Apps



API Management



Content Delivery Network



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Azure Reference Architectures

Our reference architectures are arranged by scenario. Each architecture includes recommended practices, along with considerations for scalability, availability, manageability, and security. Most also include a deployable solution or reference implementation.

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AI and machine learning



Training of Python scikit-learn models

Recommended practices for tuning the hyperparameters of a scikit-learn Python model.



Distributed training of deep learning models

Run distributed training of deep learning models across clusters of GPU-enabled VMs.



Batch scoring of Python models

Batch score many Python models in parallel on a schedule using Azure Machine Learning.



Batch scoring for deep learning models



Real-time scoring of Python and deep learning models



MLOps for Python models using Azure Machine Learning

Architectures Microsoft

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

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