



# Workshop interfaces graphiques Azure ML

18 mars 2020



# Vos interlocuteurs



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# Version du document

- V 1.0
- 18 mars 2020

# Contenu du workshop

<http://aka.ms/WorkshopAzureMLUI>

# Agenda

Présentation générale Azure ML

(10 min)

Présentation Azure ML Studio

(20 min)

Présentation AutoML

(60 min)

Présentation Designer

(60 min)

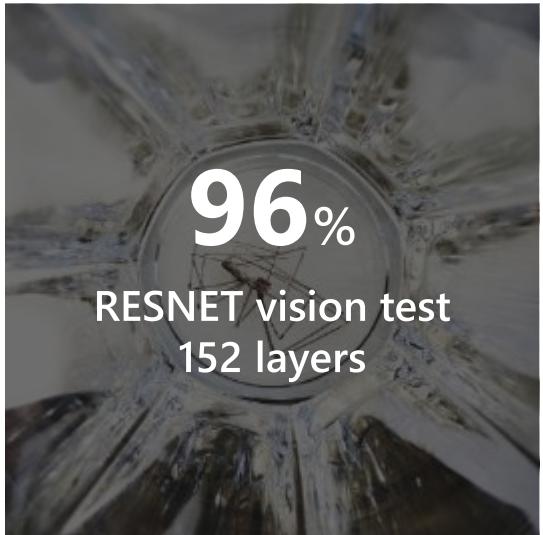
Intégration AutoML avec Power BI (10 min)

Questions & réponses

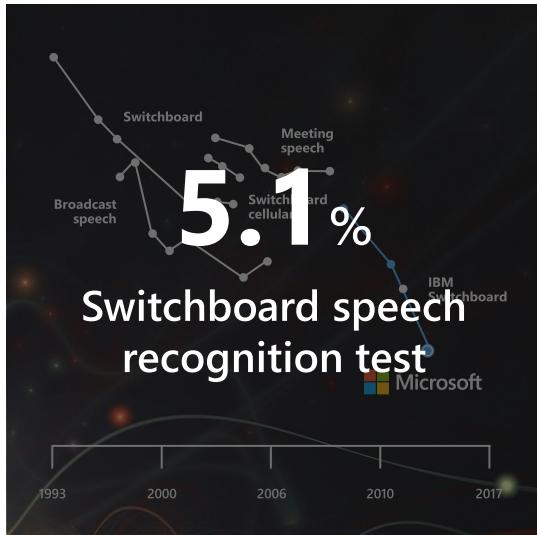
(20 min)

# Microsoft AI

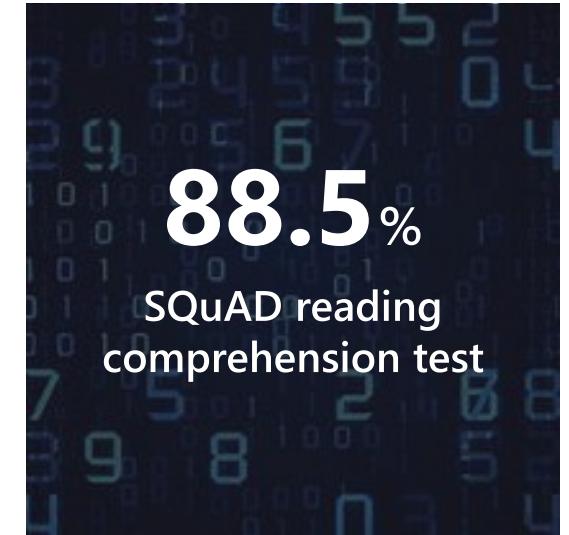
## Vision



## Speech



## Language



2016

First to achieve  
Object recognition  
Human parity

2017

First to achieve  
Speech recognition  
Human parity

March 2018

First to achieve  
Machine translation  
Human parity

January 2018

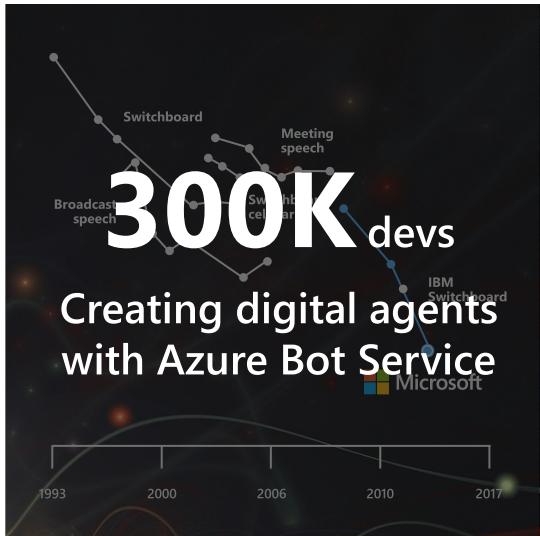
First to achieve  
Machine reading comprehension  
Human parity

# Ongoing Momentum

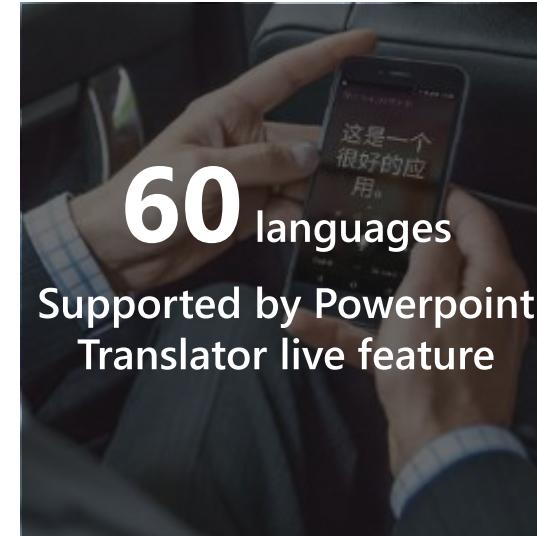
## Vision



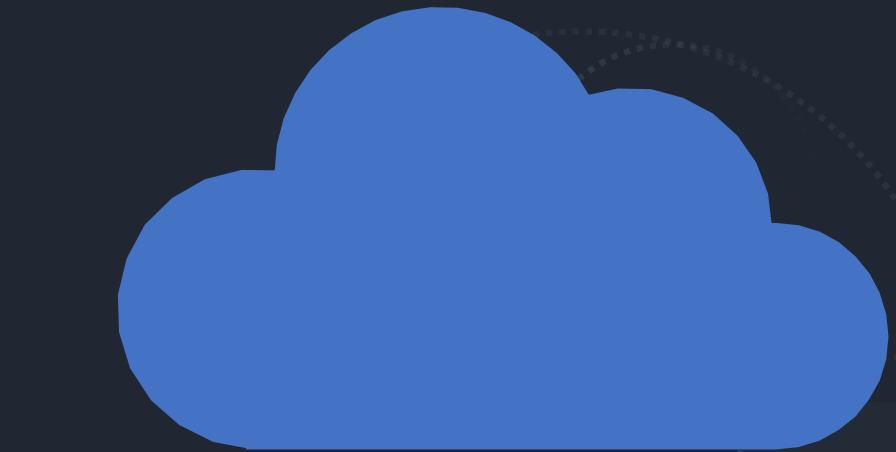
## Speech



## Language



# Présentation Azure ML



# Machine Learning dans 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

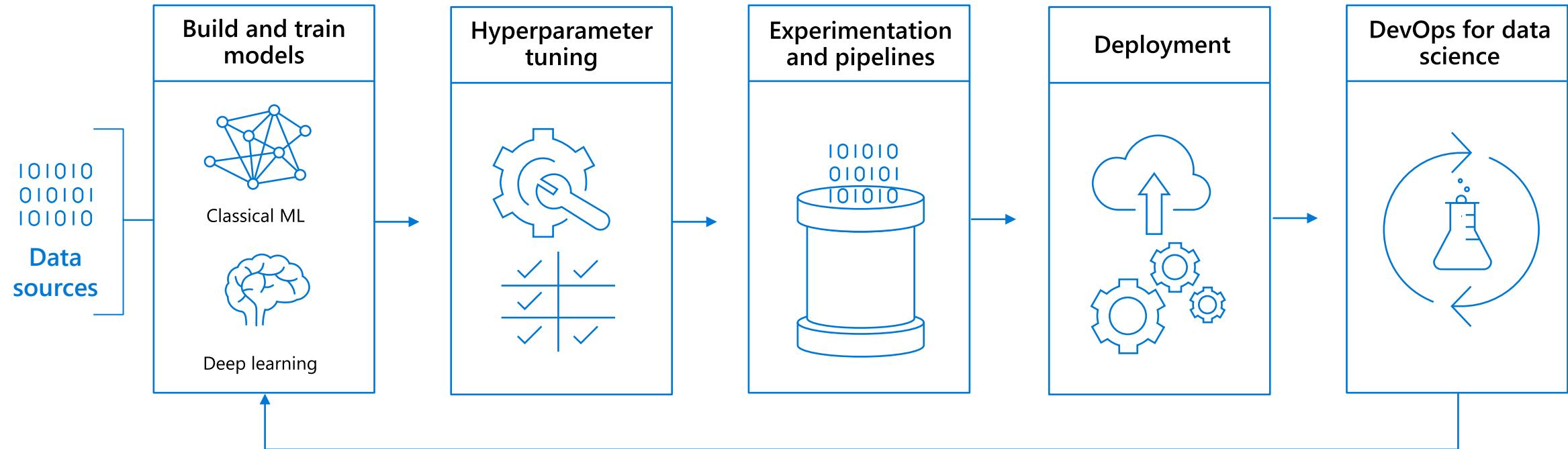




# Azure Machine Learning

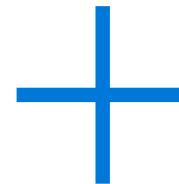
<https://azure.microsoft.com/fr-fr/services/machine-learning/>

# Building blocks for a Data Science Project



# Azure Machine Learning

Set of Azure Cloud  
Services



Python  
& R SDK, CLI, UX

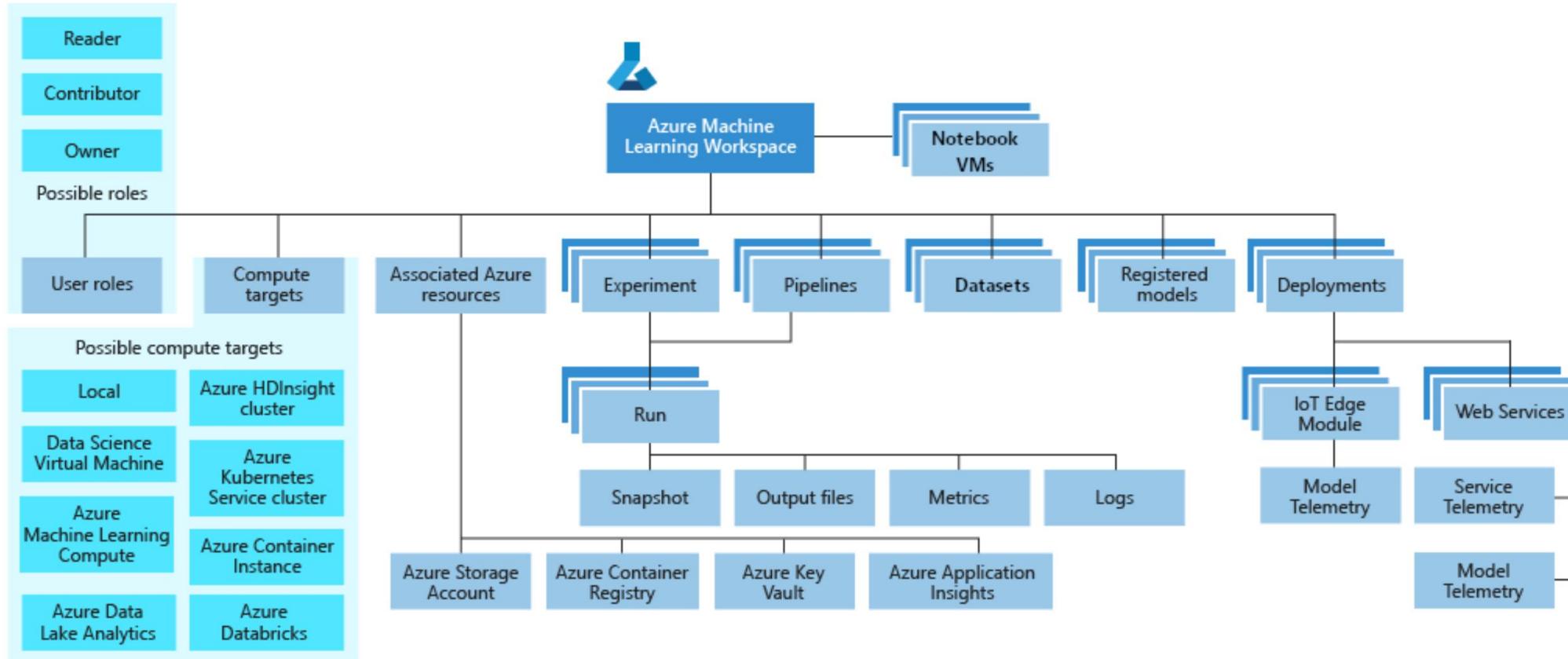
---

That enables you to:

- ✓ Prepare Data
- ✓ Build Models
- ✓ Train Models
- ✓ Manage Models
- ✓ Track Experiments
- ✓ Deploy Models

# Composants Azure ML

# Azure Machine Learning components



# Azure ML Studio

# Azure ML Studio

For all skill levels  
studio web experience

The screenshot shows the Azure ML Studio interface. On the left is a navigation sidebar with a 'New' button, 'Home' (which is selected), 'Author' (with 'Notebooks', 'Automated ML', 'Designer' sub-options), 'Assets' (with 'Datasets', 'Experiments', 'Pipelines', 'Models', 'Endpoints' sub-options), 'Manage' (with 'Compute', 'Datastores', 'Data Labeling' sub-options), and a 'Compute' section with 'Name' and 'AKSML' fields.

The main content area has a blue header 'workshop-aml-2020 > Home'. It features a 'Welcome to the studio!' message and four cards:

- Create new** (with a plus icon)
- Notebooks** (with a document icon): 'Code with Python SDK and run sample experiments.' Includes a 'Start now' button.
- Automated ML** (with a lightning bolt and gear icon): 'Automatically train and tune a model using a target metric.' Includes a 'Start now' button.
- Designer** (with a 3D cube icon): 'Drag-and-drop interface from prepping data to deploying models.' Includes a 'Start now' button.

Below these is a 'My recent resources' section with a 'Runs' table:

Run number	Experiment	Updated time	Status
2	workshop5-amlcompute	Feb 18, 2020 2:56 PM	Completed

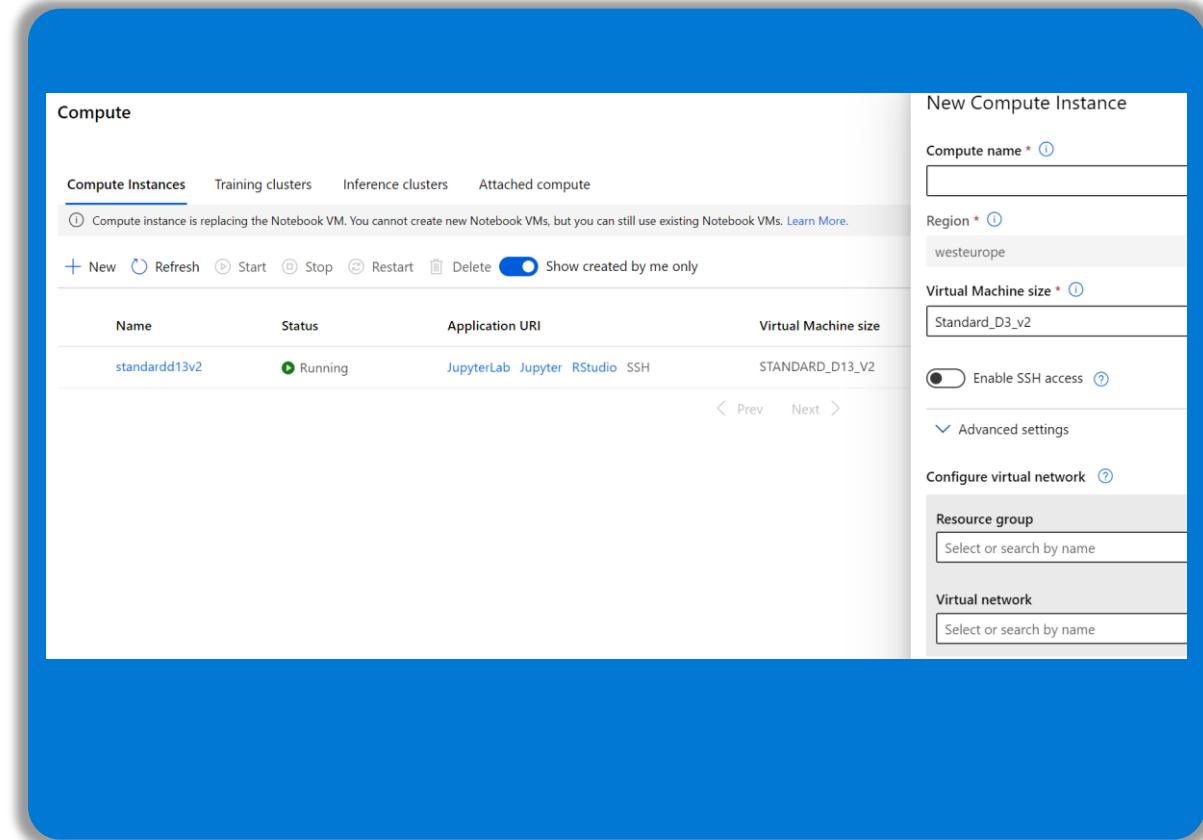
On the right side of the main content area, there is a 'Compute' section with a 'Name' field containing 'AKSML'.



# Notebooks

# 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.

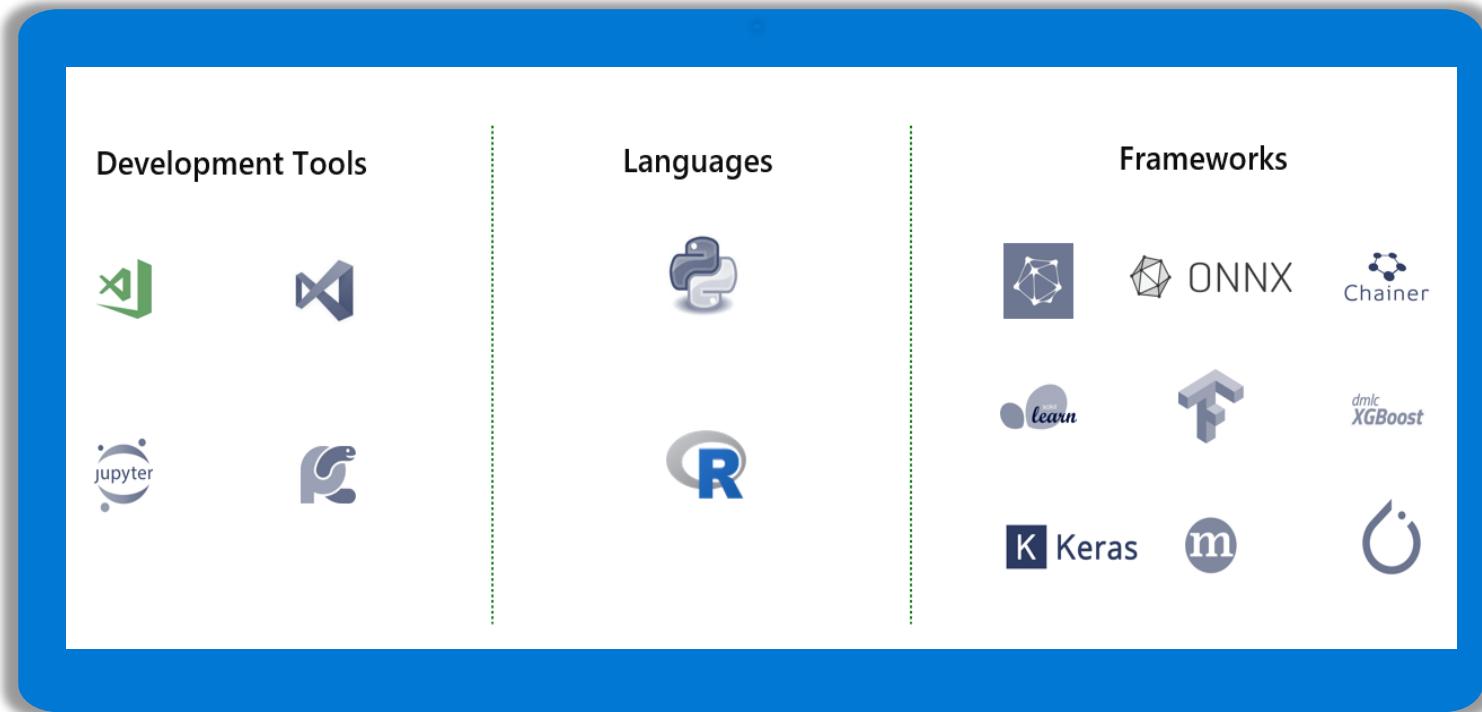


# Platform



# Azure Machine Learning

Open and interoperable platform



# Powerful infrastructure

Accelerate deep learning



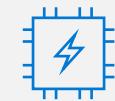
## CPUs

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)

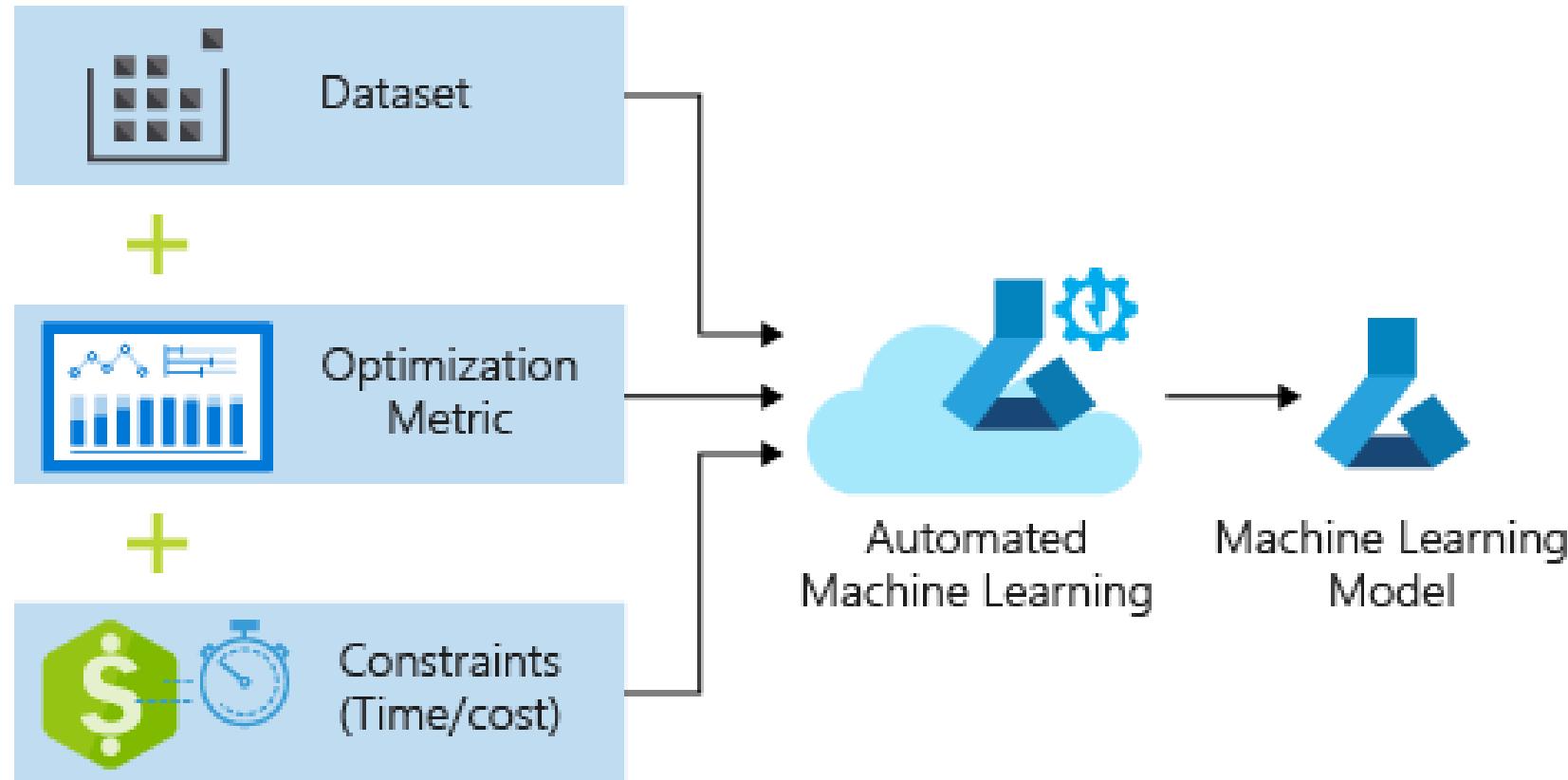


Optimized for flexibility

Optimized for performance

# AutoML

# Automated ML



# Azure Machine Learning accelerates model development

with automated machine learning

Input

Intelligently test multiple models in parallel

101010  
010101  
101010

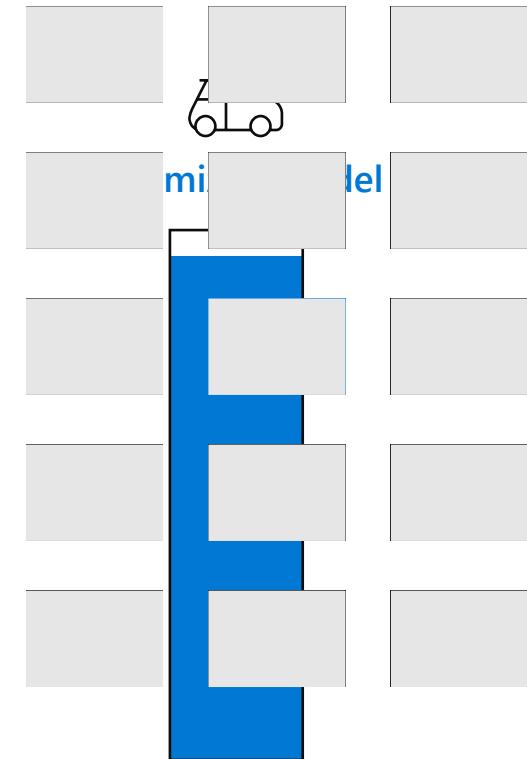
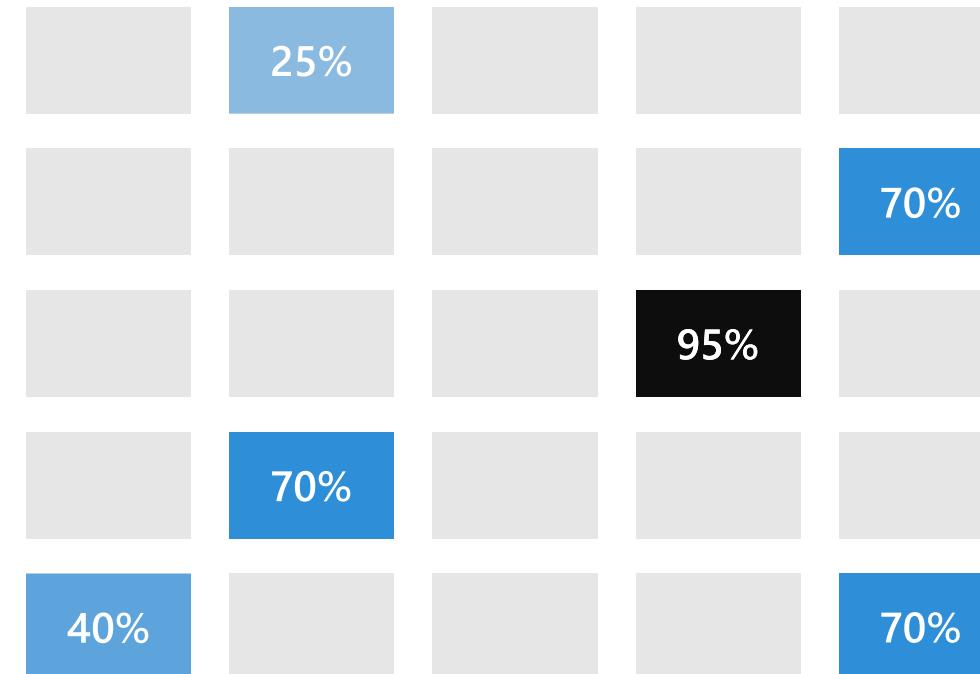
Enter data



Define goals



Apply constraints



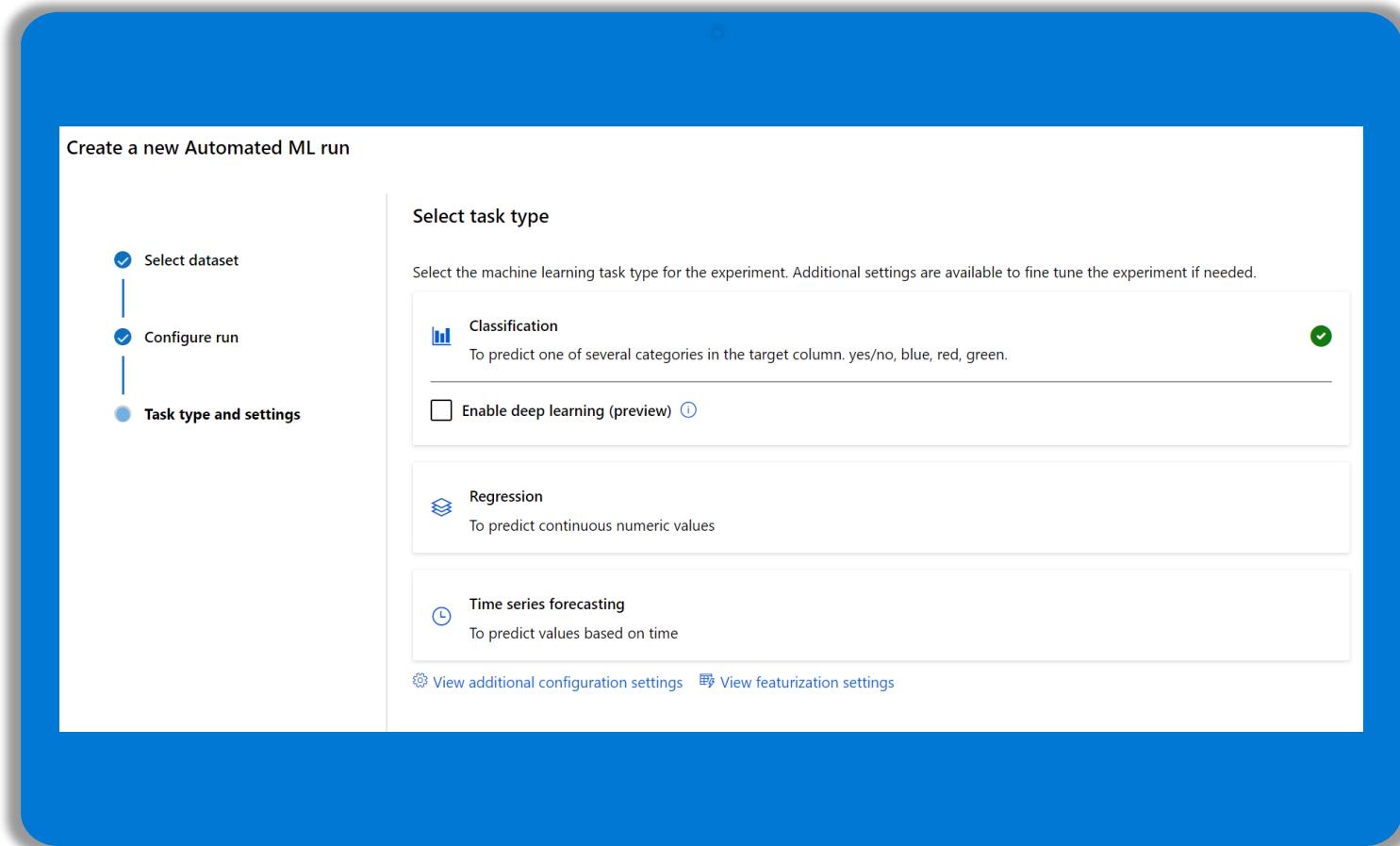
# Automated ML

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.

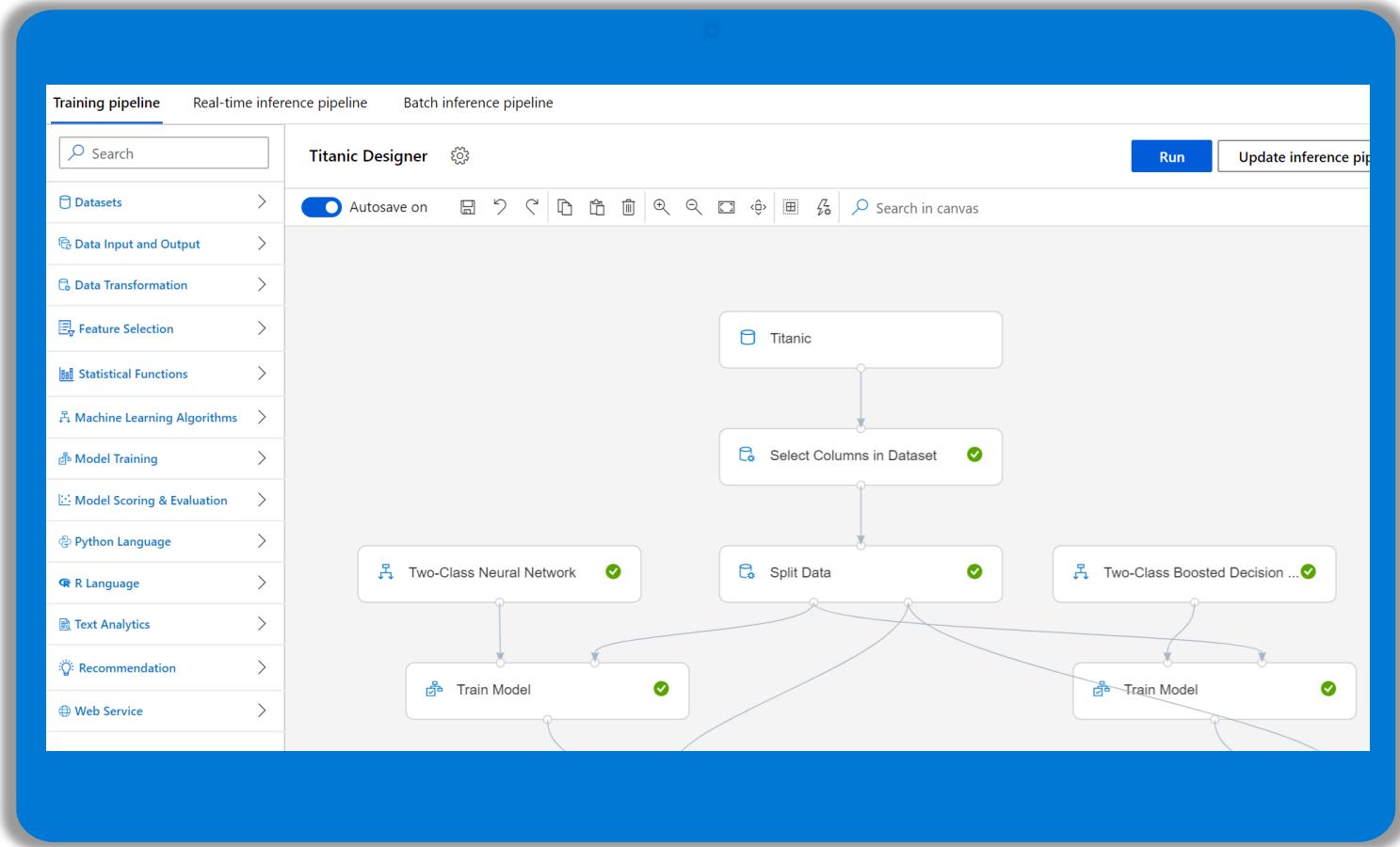
Build responsible AI solutions with model interpretability, and fine-tune your models to improve accuracy.



# Designer

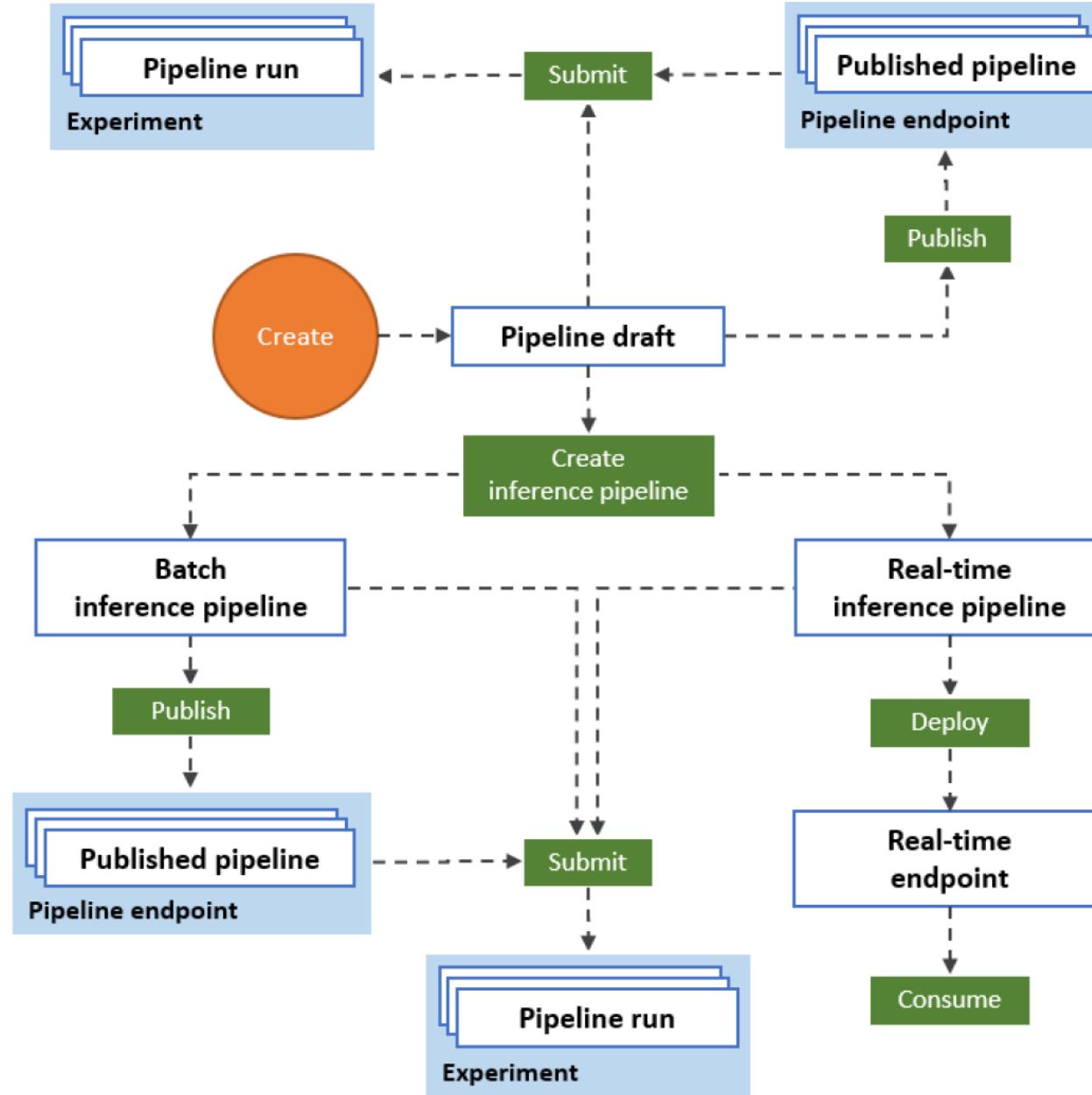
# Designer

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



# Pipelines

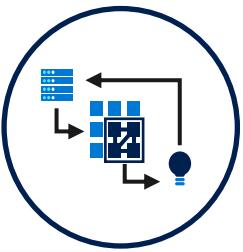
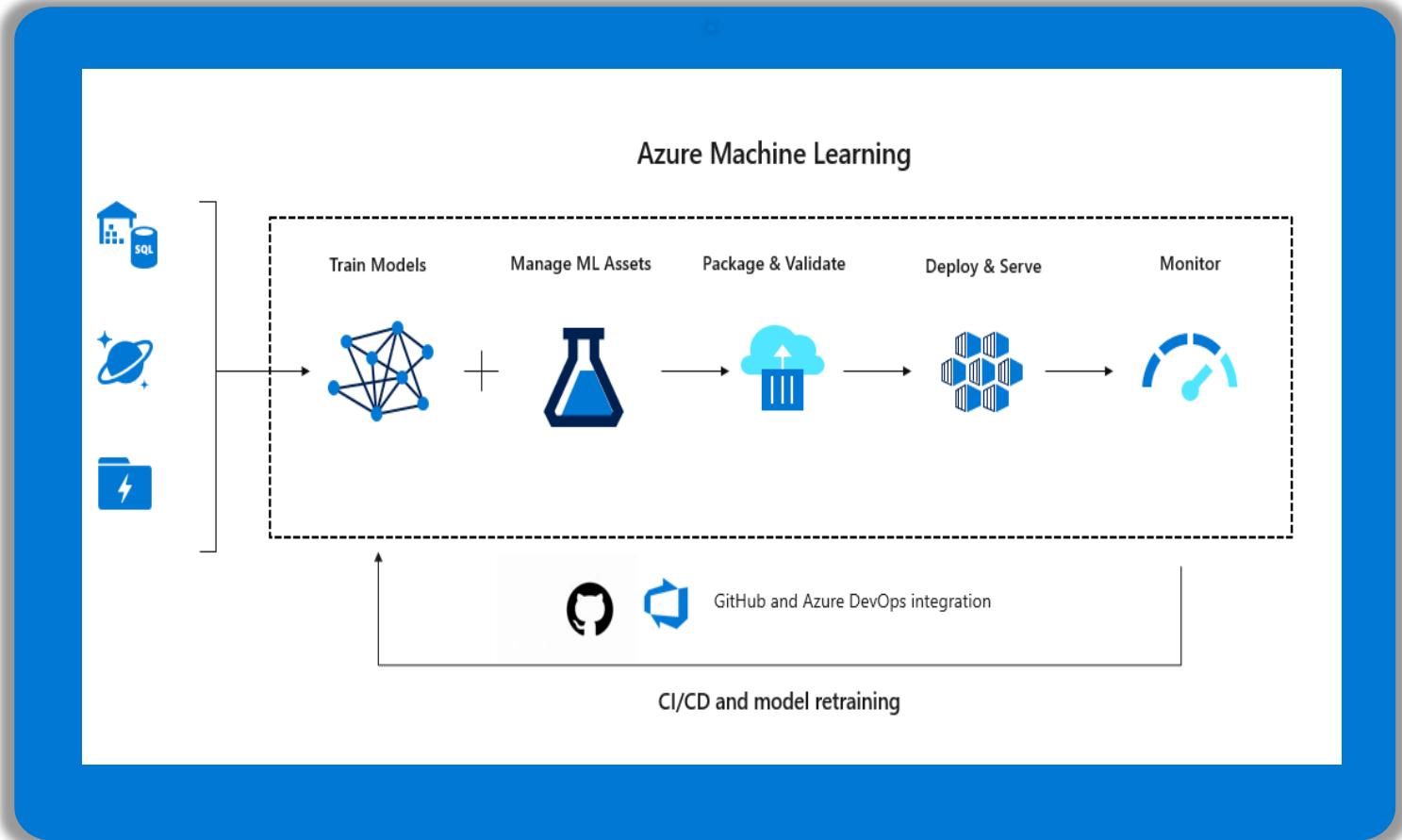
# Pipelines



# MLOps

# Azure Machine Learning

## Industry leading MLOps



# DevOps



Code reproducibility



Code testing



App deployment

# MLOps



Model reproducibility



Model validation



Model deployment

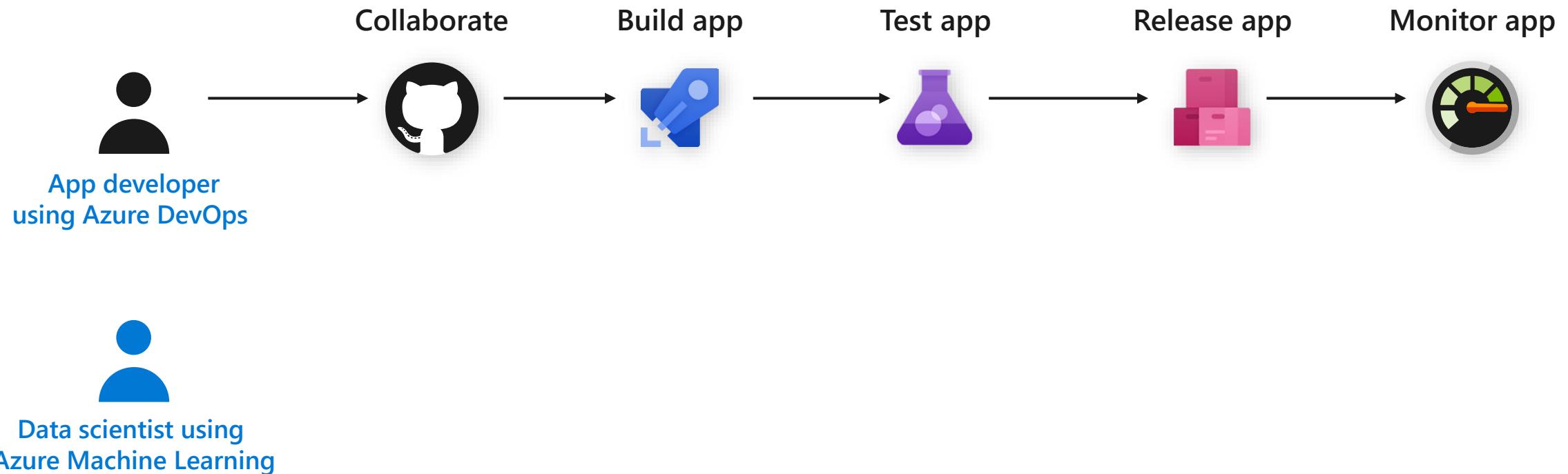


Model retraining

# MLOps

- **Create reproducible ML pipelines.**  
Pipelines allow you to define repeatable and reusable steps for your data preparation, training, and scoring processes.
- **Register, package, and deploy models** from anywhere and track associated metadata required to use the model.
- **Capture the governance** data required for capturing the end-to-end ML lifecycle, including who is publishing models, why changes are being made, and when models were deployed or used in production.
- **Notify and alert on events in the ML lifecycle** such as experiment completion, model registration, model deployment, and data drift detection.
- **Monitor ML applications** for operational and ML-related issues.  
Compare model inputs between training and inference, explore model-specific metrics, and provide monitoring and alerts on your ML infrastructure.
- **Automate the end-to-end ML lifecycle with Azure Machine Learning and Azure DevOps** to frequently update models, test new models, and continuously roll out new ML models alongside your other applications and services.

# MLOps with Azure Machine Learning



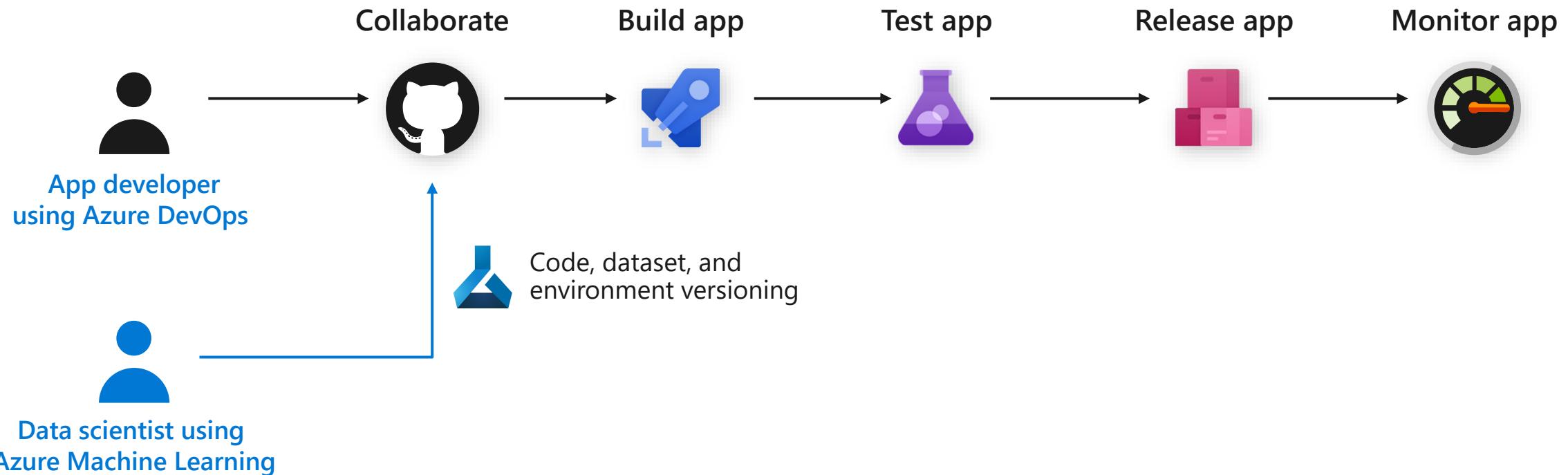
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning



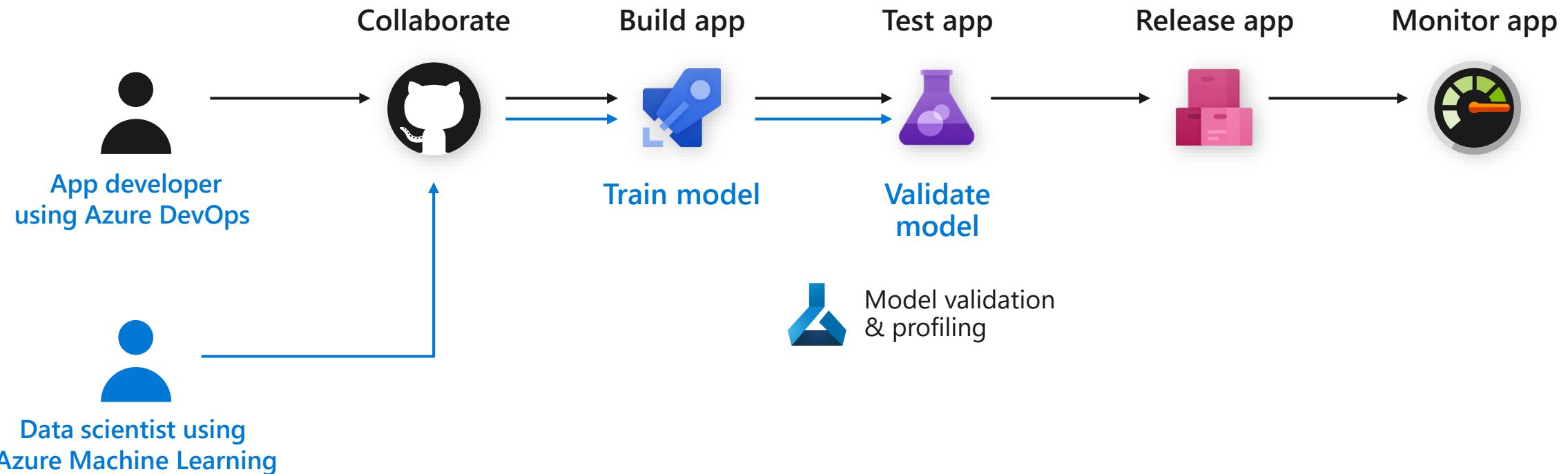
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning



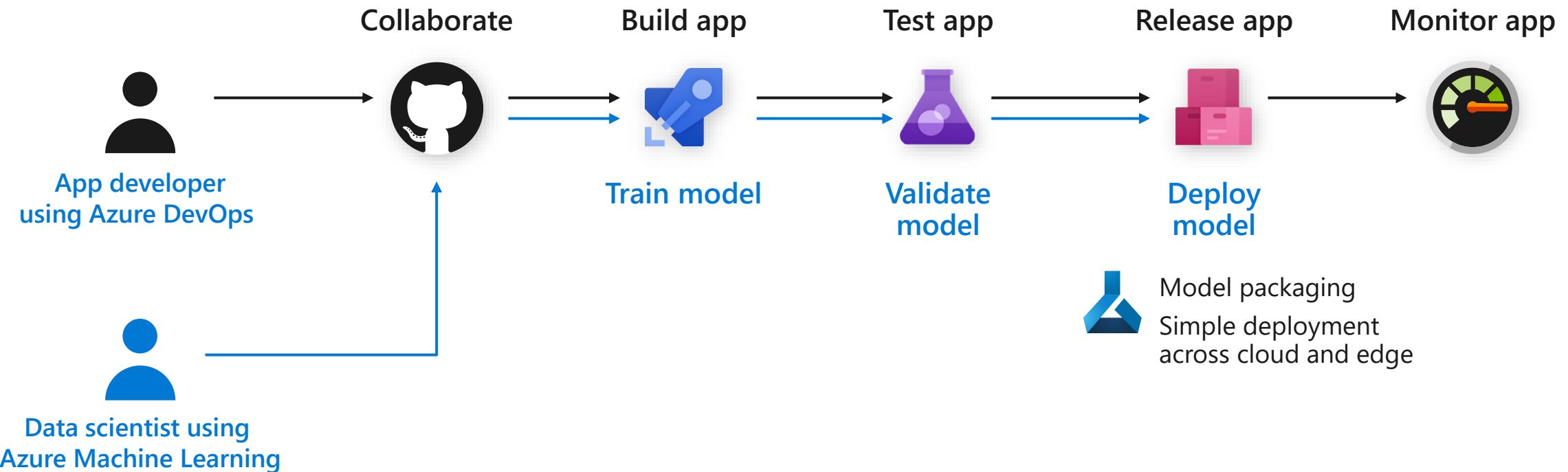
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning



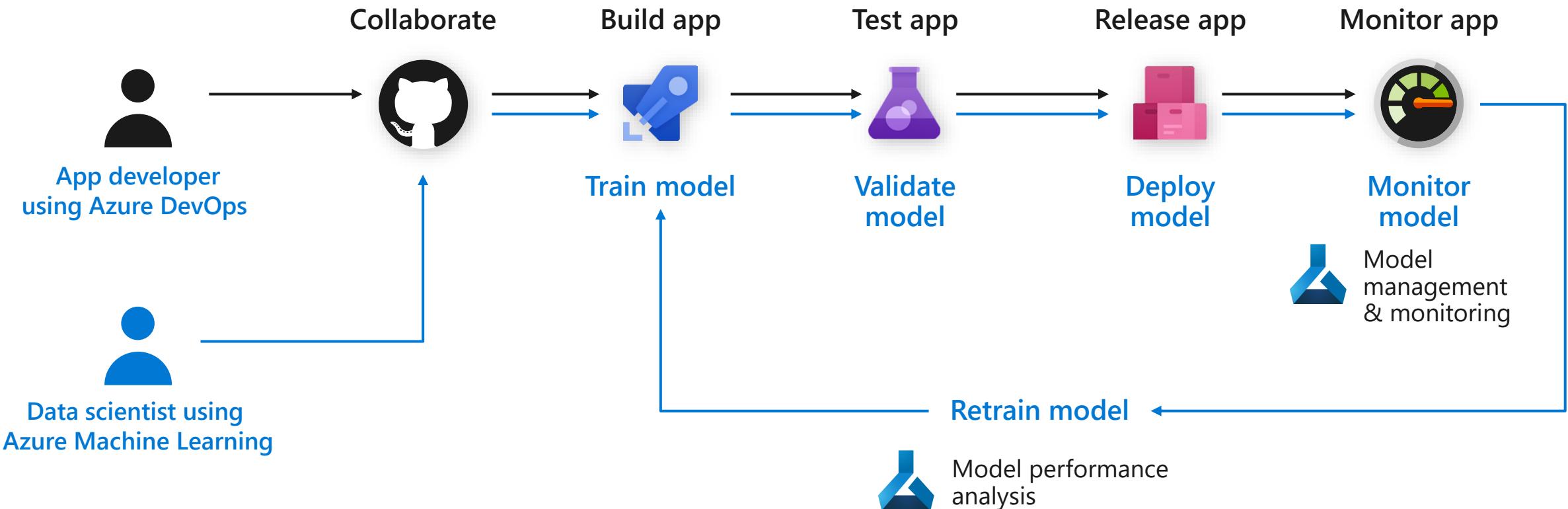
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning



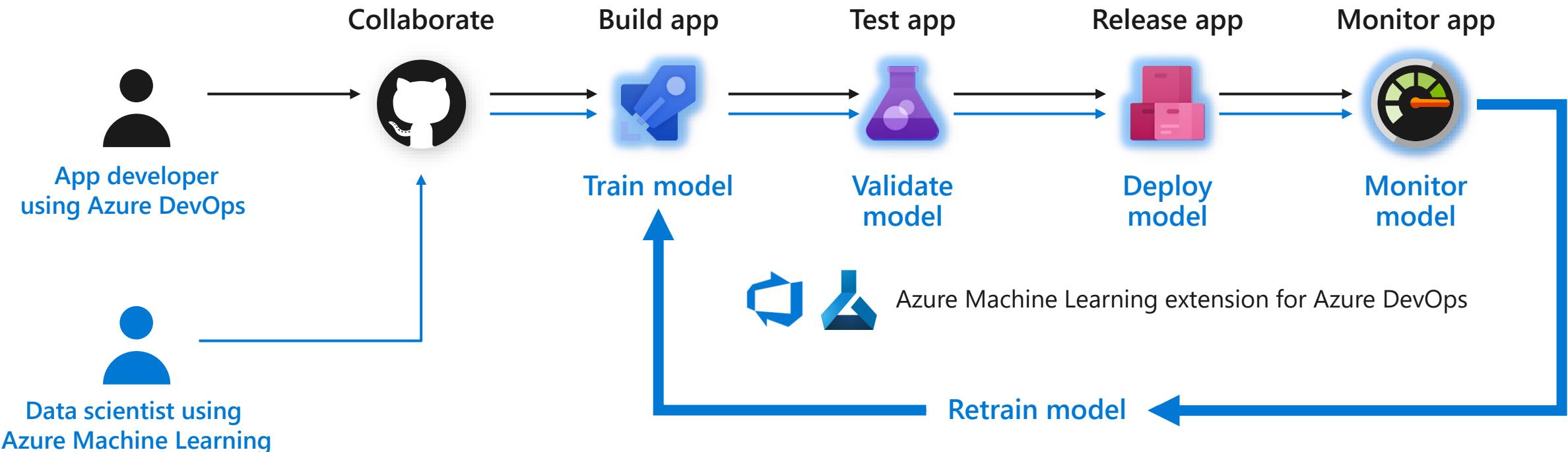
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning



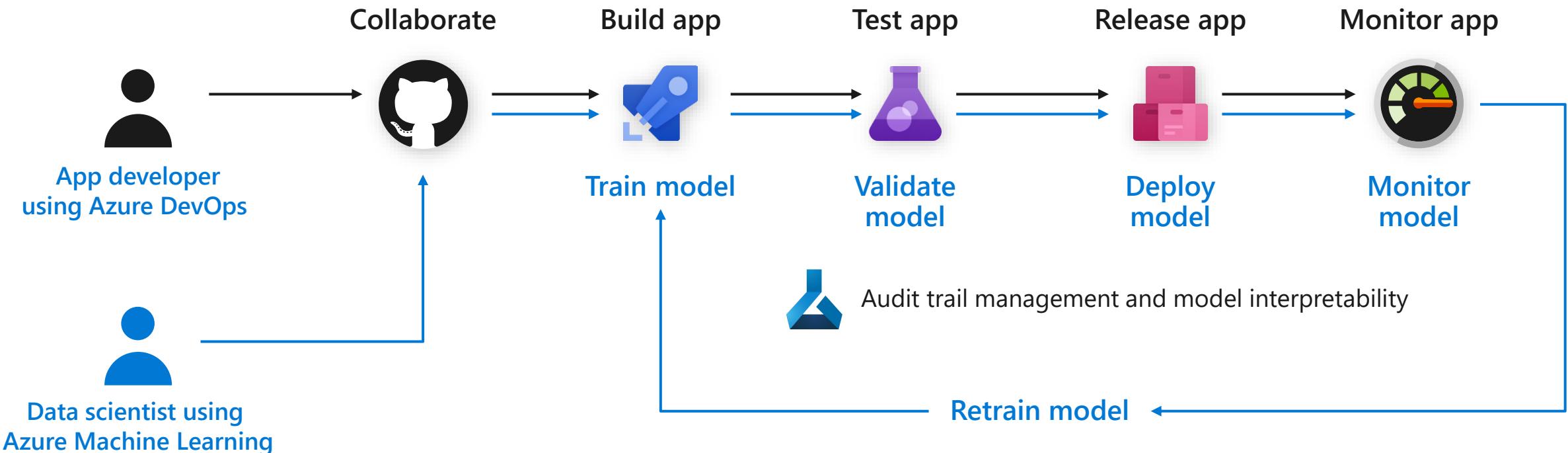
Model reproducibility

Model validation

Model deployment

Model retraining

# MLOps with Azure Machine Learning

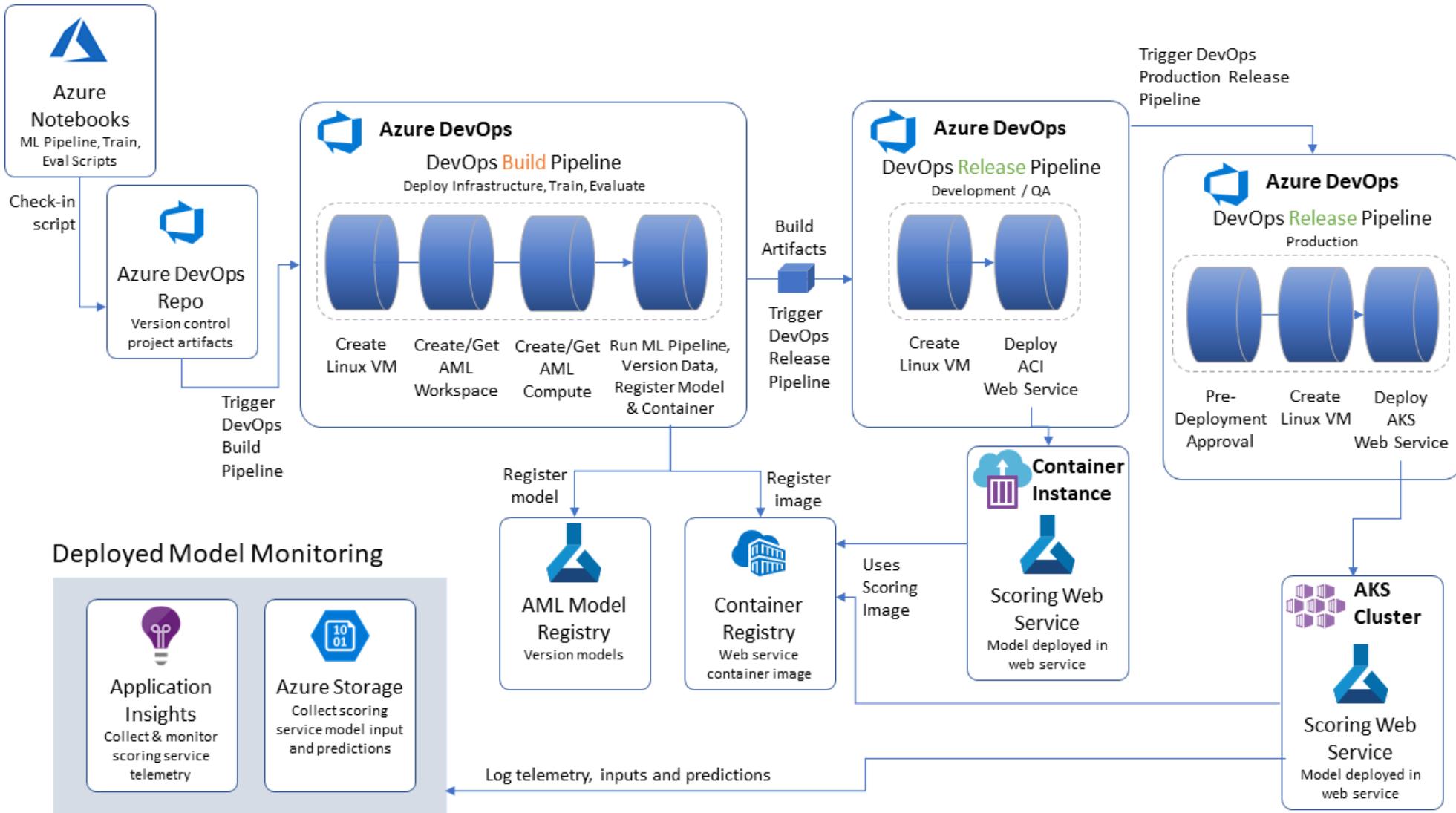


Model reproducibility

Model validation

Model deployment

Model retraining



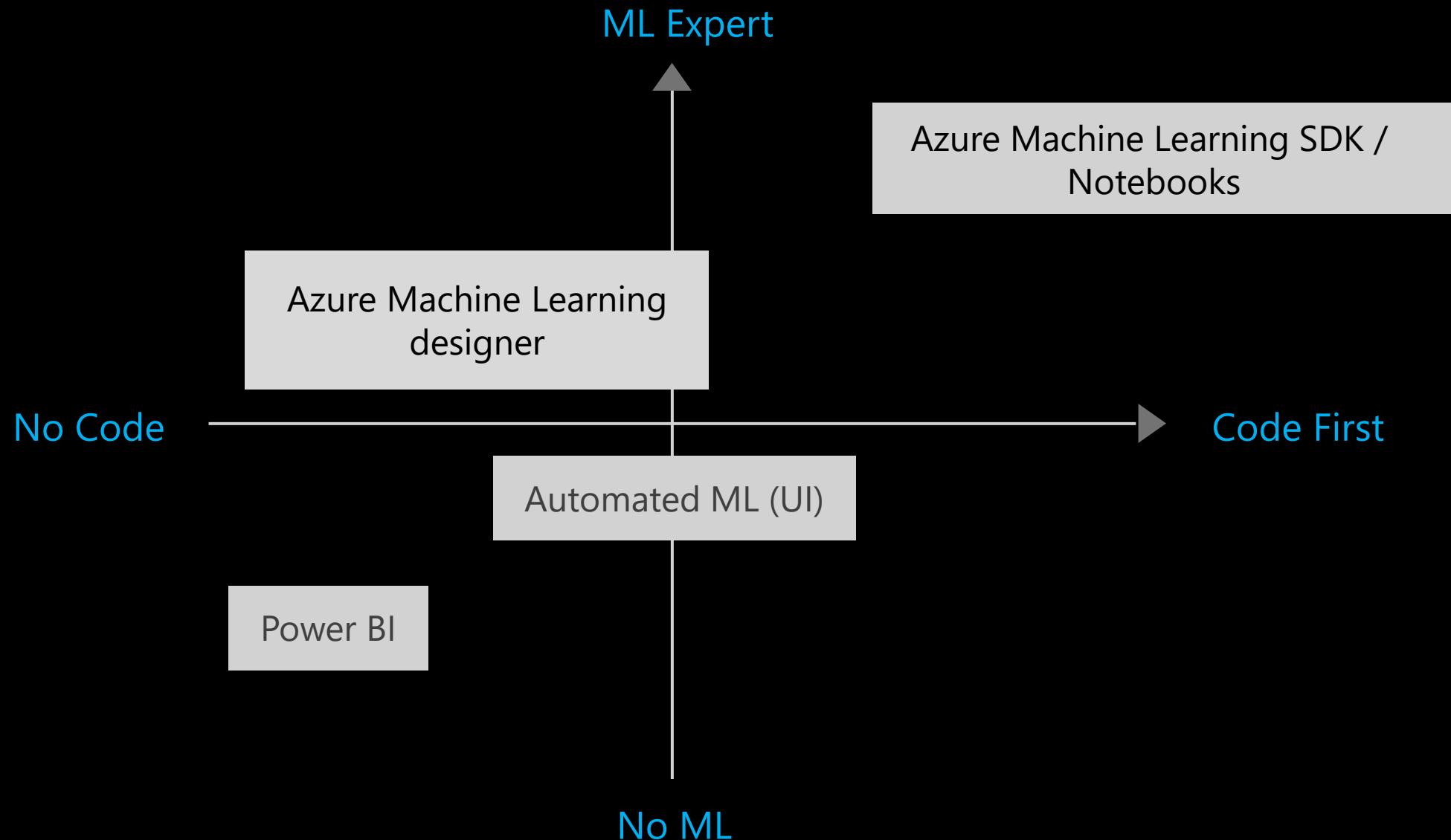
Model reproducibility

Model validation

Model deployment

Model retraining

# Build across skill levels with Azure Machine Learning



# Integration with VS Code

# Intégration Visual Studio

File Edit Selection View Go Debug Terminal Help

AZURE

- > API MANAGEMENT
- > DATAPIPELINES
- > EVENT GRID TOPICS
- > EVENT GRID SUBSCRIPTIONS
- > FUNCTIONS
- > STORAGE
- > APP SERVICE
- > LOGIC APPS
- > INTEGRATION ACCOUNTS
- > STREAM ANALYTICS
- ▽ MACHINE LEARNING
  - ▽ Microsoft Azure Internal Consumption
  - ▽ azuremlservice
    - > Experiments
    - > Pipelines
    - > Compute
    - ▽ Notebook VMs
      - ▽ vmds3v2
      - ▽ vmds15v2
    - > Models
    - > Images
    - > Deployments
    - > MLServiceWorkspace

Release Notes: 1.39.2 - AzureMLService - Visual Studio Code

Welcome Release Notes: 1.39.2 X

## 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 them out. Follow us on Twitter [@code!](#)

# Roles

# Rôles

- Standard roles
- Custom roles

Azure Machine Learning operation	Owner	Contributor	Reader
Create workspace	✓	✓	
Share workspace	✓		
Upgrade workspace to Enterprise edition	✓		
Create compute target	✓	✓	
Attach compute target	✓	✓	
Attach data stores	✓	✓	
Run experiment	✓	✓	
View runs/metrics	✓	✓	✓
Register model	✓	✓	
Create image	✓	✓	
Deploy web service	✓	✓	
View models/images	✓	✓	✓
Call web service	✓	✓	✓

# Rôles

```
{  
  "Name": "Data Scientist Demo",  
  "Description": "Can create experiments, submit runs, deploy models to test environments; Cannot create compute or register datastores",  
  "Actions": [  
    "Microsoft.MachineLearningServices/workspaces/*/read",  
    "Microsoft.MachineLearningServices/workspaces/*/action"  
  ],  
  "NotActions": [  
    "Microsoft.MachineLearningServices/workspaces/computes/listKeys/action",  
    "Microsoft.MachineLearningServices/workspaces/listKeys/action"  
  ],  
  "DataActions": [  
    "Microsoft.MachineLearningServices/workspaces/*/read",  
    "Microsoft.MachineLearningServices/workspaces/*/write",  
    "Microsoft.MachineLearningServices/workspaces/*/delete",  
    "Microsoft.MachineLearningServices/workspaces/*/action"  
  ],  
  "NotDataActions": [  
    "Microsoft.MachineLearningServices/workspaces/services/aks/prod/write",  
    "Microsoft.MachineLearningServices/workspaces/services/aks/prod/delete",  
    "Microsoft.MachineLearningServices/workspaces/endpoints/pipelines/write",  
    "Microsoft.MachineLearningServices/workspaces/endpoints/pipelines/delete",  
    "Microsoft.MachineLearningServices/workspaces/datastores/write"  
  ],  
  "AssignableScopes": [  
    "/subscriptions/e9b2ec51-5c94-4fa8-809a-dc1e695e4896"  
  ]  
}
```

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

# Monitoring Azure ML

# Monitoring Azure ML avec Azure Monitor

workshopmlRG - Insights (preview)  
Resource group

X

Search (Ctrl+ /) Refresh Collapse all Feedback Help

Total resources Active alerts  
19 1 ! Application map

Deployments Policies Properties Locks Export template

Cost Management

- Cost analysis
- Cost alerts
- Budgets
- Advisor recommendations

Monitoring

- Insights (preview)
- Alerts
- Metrics
- Diagnostic settings
- Logs

Filter by name... Local : Last 24 hours Group by app layer and resource type Alerts Severity

NAME	TOTAL ALERTS	SEV 0 ALERTS	SEV 1 ALERTS	INSIGHTS	ACTIONS
workshopmlRG	1 (-)	—	—		
Compute	1 (-)	—	—		
Virtual machine	1 (-)	—	—		
standardd2v224d142833d	—	—	—		...
standardds13v244d198275	1 (-)	—	—		...
Container registry	—	—	—		
Application	—	—	—		
Networking	—	—	—		
Other	—	—	—		
Storage and Databases	—	—	—		

# Monitoring Azure ML avec Azure Monitor

Show data for last:

1 hour

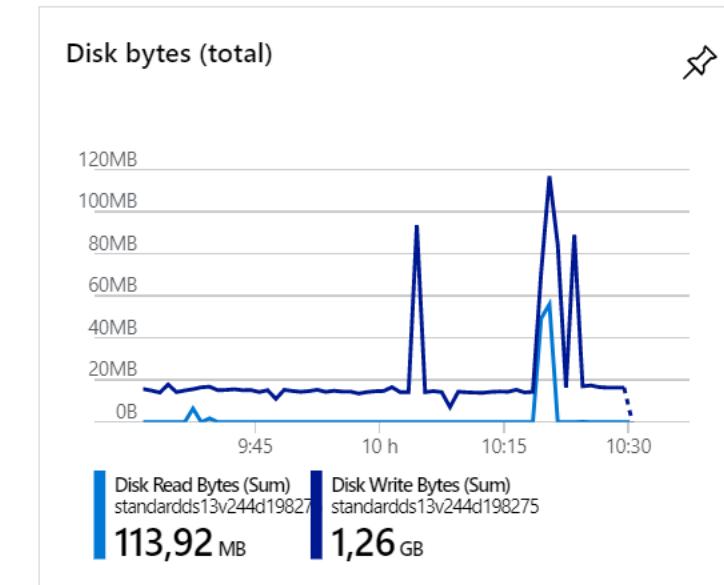
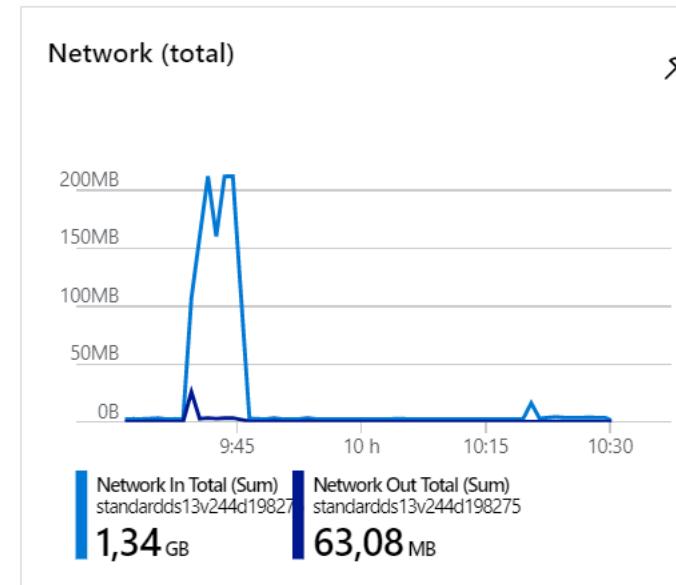
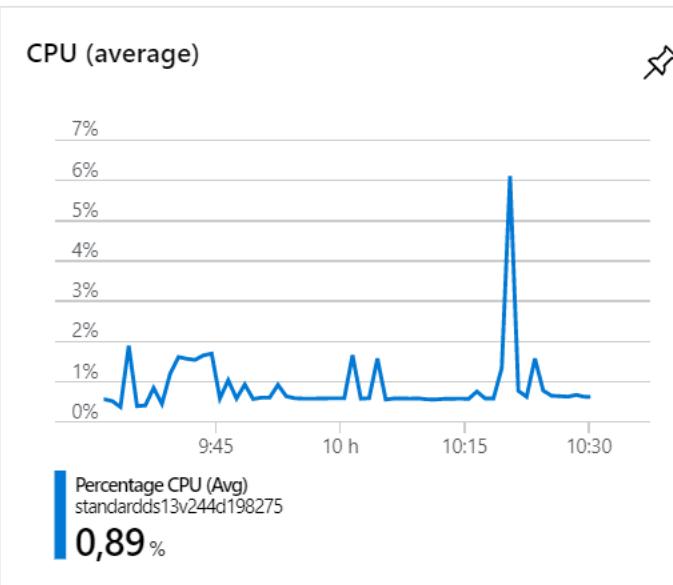
6 hours

12 hours

1 day

7 days

30 days



# Monitoring des modèles Azure ML

The screenshot shows the Azure Machine Learning Metrics interface for the service 'AMLSERVICEWS'. The left sidebar includes sections for Assets (Experiments, Pipelines, Compute, Models, Images, Deployments, Activities), Settings (Properties, Locks, Export template), and Monitoring (Alerts, Metrics, Diagnostic settings, Logs). The 'Metrics' section is highlighted with a red box.

The main area displays a chart title 'Chart Title' with options to 'Add metric', 'Add filter', and 'Apply splitting'. A 'Line chart' button is selected, and a 'New alert rule' button is highlighted with a red box.

The configuration pane shows the scope 'AMLSERVICEWS' and metric namespace 'Machine Learning S...'. A dropdown menu for 'METRIC' lists several options under 'MODEL' and 'QUOTA', with 'Model Deploy Failed' selected. A message at the bottom of the dropdown says: 'Select a metric above to see data appear on this chart or learn more below:' followed by three cards: 'Filter + Split', 'Plot multiple metrics', and 'Build custom dashboards'.

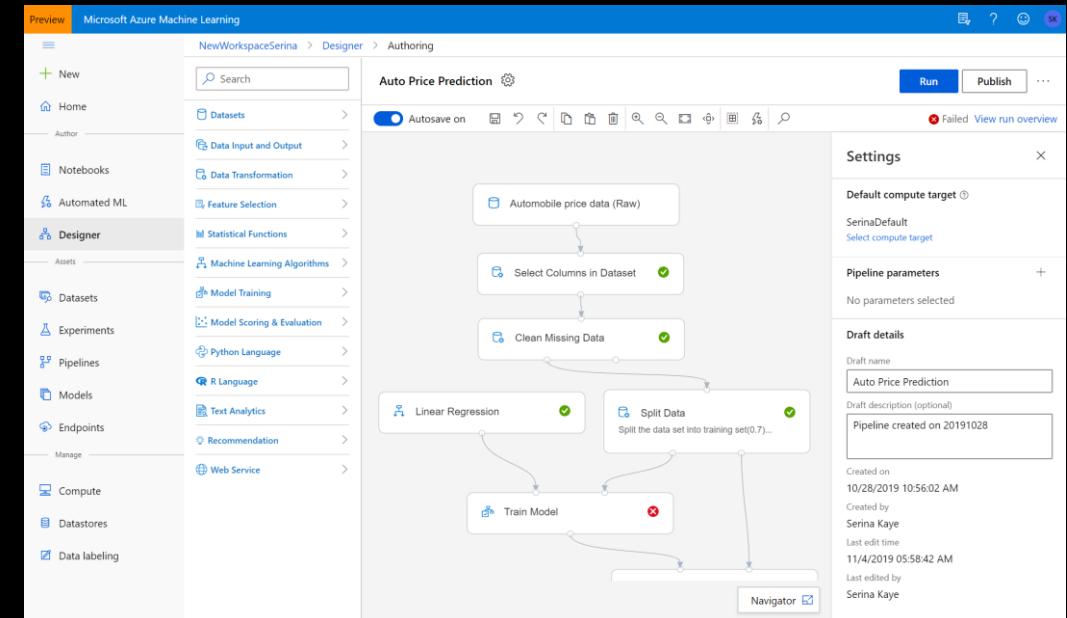
# Azure ML Editions

# Azure Machine Learning Enterprise Edition

- **Enterprise Edition**

At Ignite, we announced the new Azure Machine Learning Enterprise and Basic editions. The Enterprise edition contains our no-code ML capabilities (AutoML and designer) as well as cutting edge AutoML features such as DNNs, enterprise grade ML Ops capabilities such as data drift monitoring, and cross-workspace compute management

- The Enterprise edition is currently in preview. While in preview, customers with Enterprise workspaces will pay only for Azure resources consumed.
- All capabilities of AzureML that were in general availability before Ignite are now available in the "Basic" edition, now in GA. Basic workspaces will incur costs only for consumed Azure resources.



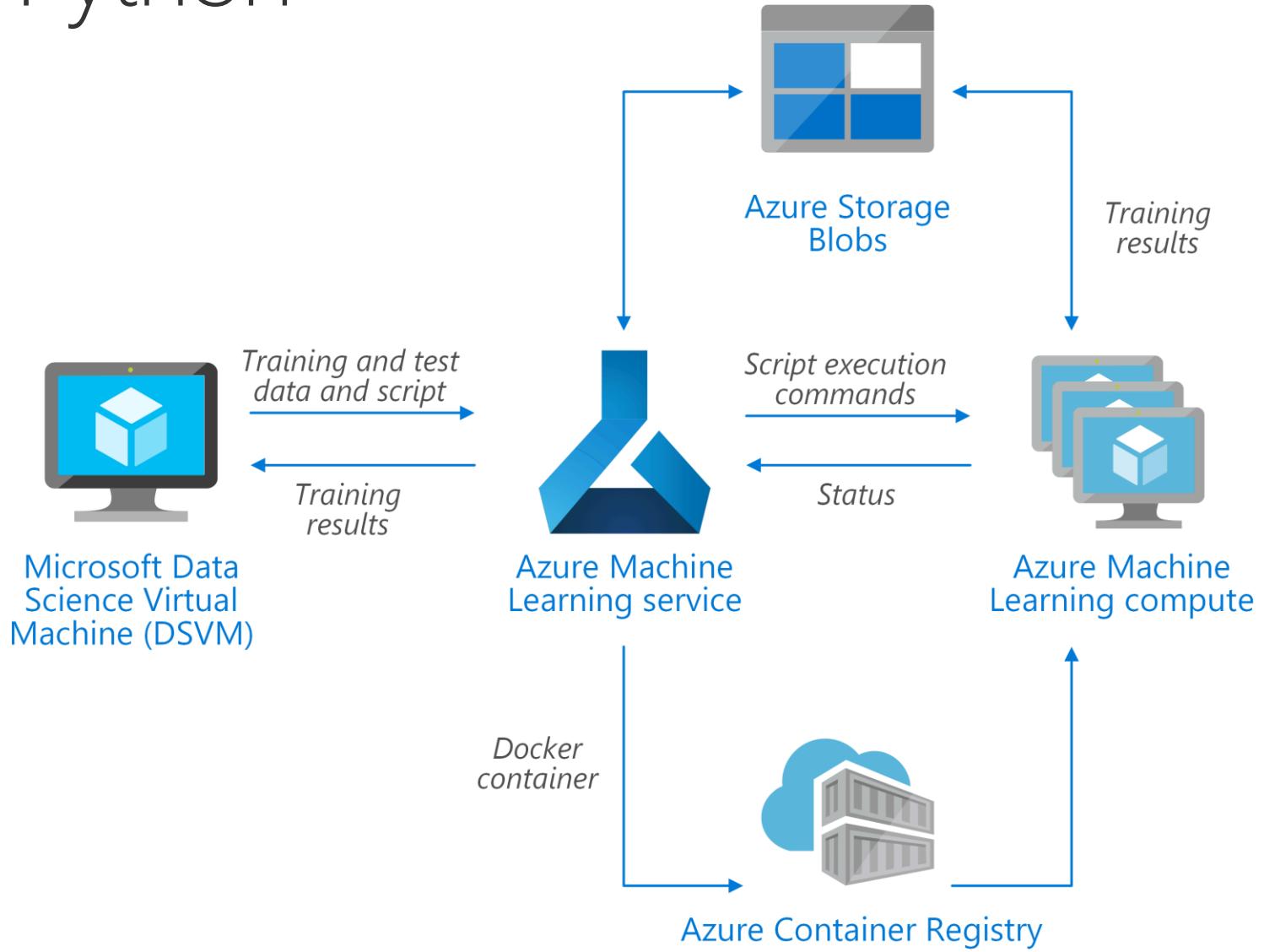
# Enterprise and Basic: Summary

- Azure Machine Learning offers two editions: Enterprise and Basic
- Basic edition is available in GA / Enterprise edition currently in preview
- More detail on our pricing page: <https://azure.microsoft.com/en-us/pricing/details/machine-learning/>

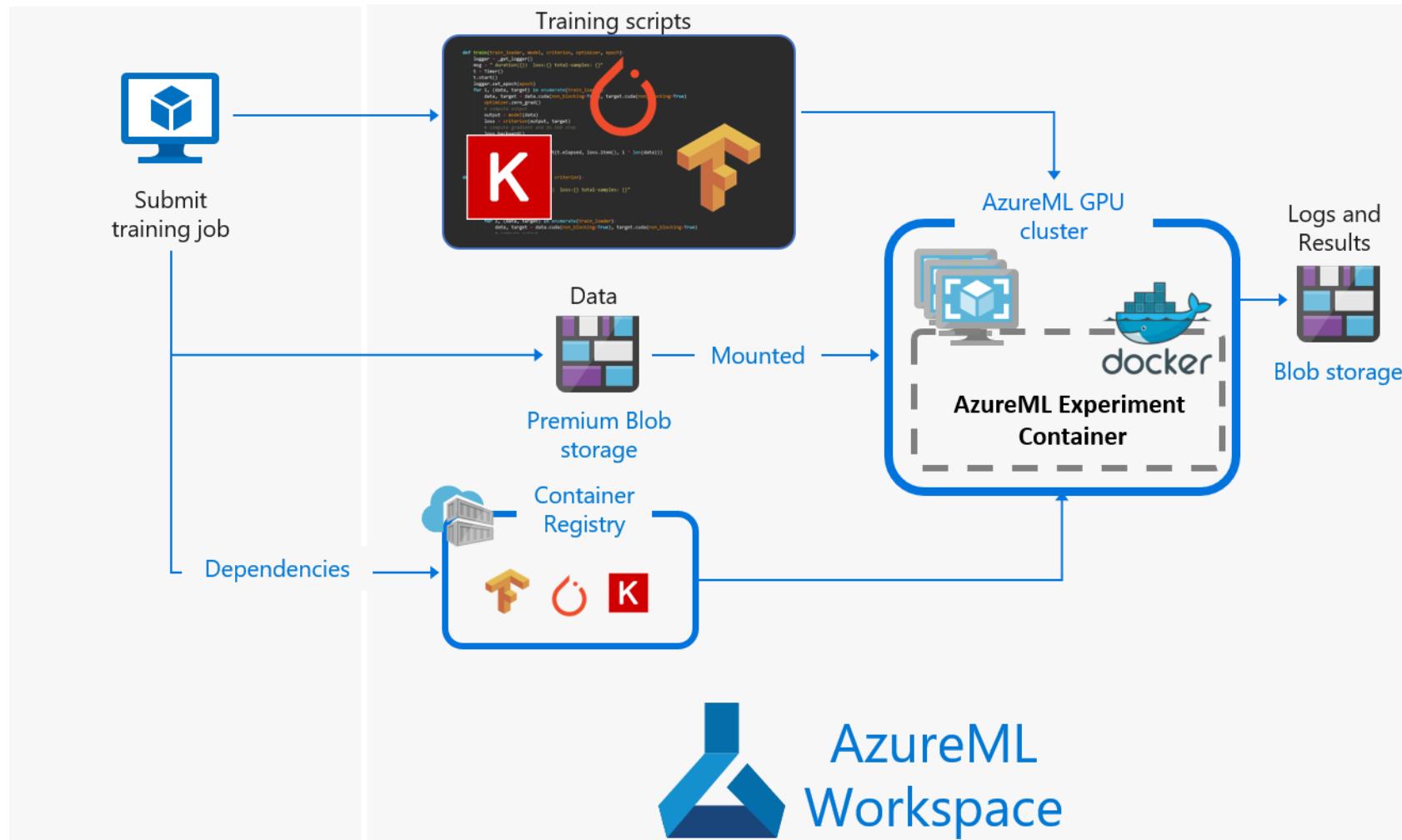
	<b>Basic</b>	<b>Enterprise</b>
<b>Pricing structure</b>	<ul style="list-style-type: none"><li>• Pay only for Azure resources consumed</li><li>• No charge for AzureML</li></ul>	<ul style="list-style-type: none"><li>• No up-front cost – scale as you need, pay for what you consume</li><li>• Compute surcharge for ML activities: data prep, training, inferencing</li></ul>
Audience	<ul style="list-style-type: none"><li>• Experienced data scientists who like a code-first environment</li><li>• Single data scientists or small data science teams who don't need enterprise price controls, or large-scale ML Ops</li></ul>	<ul style="list-style-type: none"><li>• Large enterprises with mixed data science, data engineering and analyst teams who would benefit from both code-forward and drag-and-drop ML</li><li>• Large data science teams that need to share compute across workspaces, or access other enterprise features</li></ul>
Messages	<ul style="list-style-type: none"><li>• The best place for open source ML</li><li>• Use your existing tools and IDE when scaling to the cloud</li><li>• Best in class code-first experience</li></ul>	Basic level + <ul style="list-style-type: none"><li>• Best in class ML for all skill levels including no-code ML</li><li>• Enterprise-grade security, governance and cost control</li><li>• Comprehensive ML lifecycle management</li></ul>
[Roadmap features]	<ul style="list-style-type: none"><li>• Responsible AI toolkit</li><li>• Reinforcement learning</li><li>• Batch inferencing</li><li>• Manual data labelling</li></ul>	<ul style="list-style-type: none"><li>• Data drift capabilities</li><li>• Automated ML ensemble models and deep learning</li><li>• Automated model retraining</li><li>• Managed inferencing</li><li>• ML assisted labelling</li></ul>

# Architectures

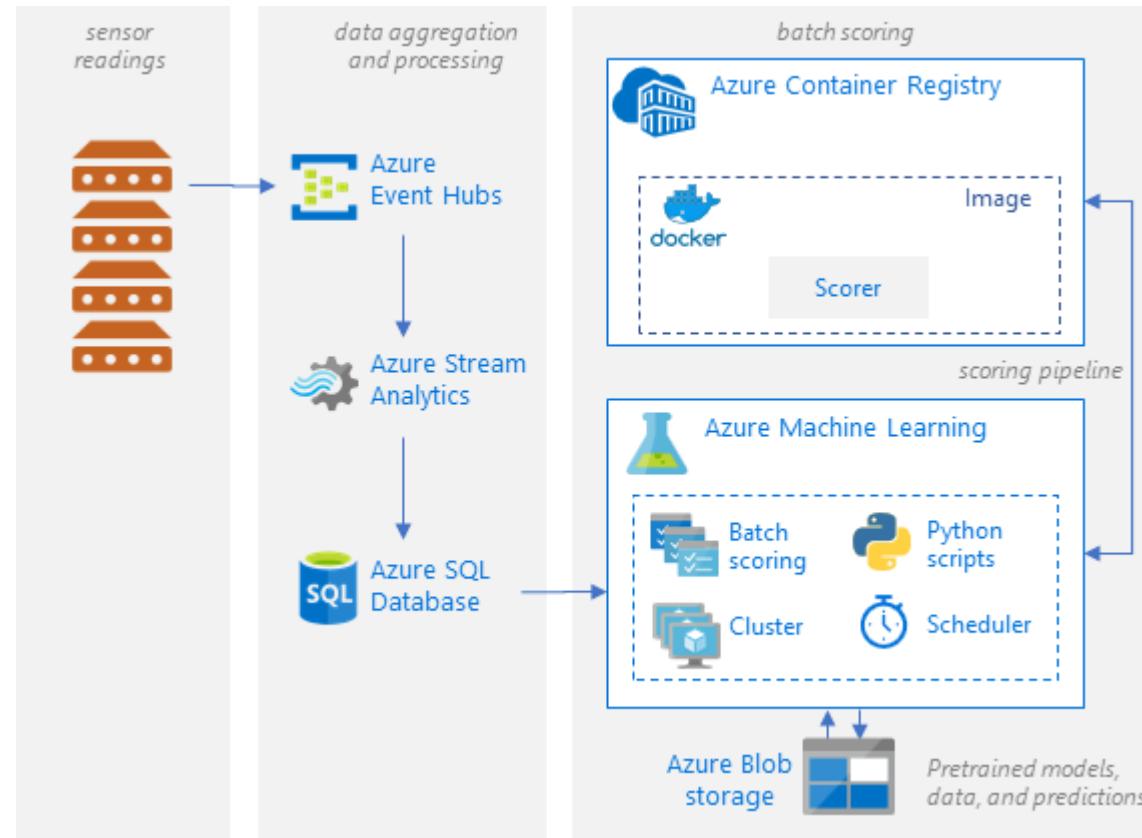
# Training Python



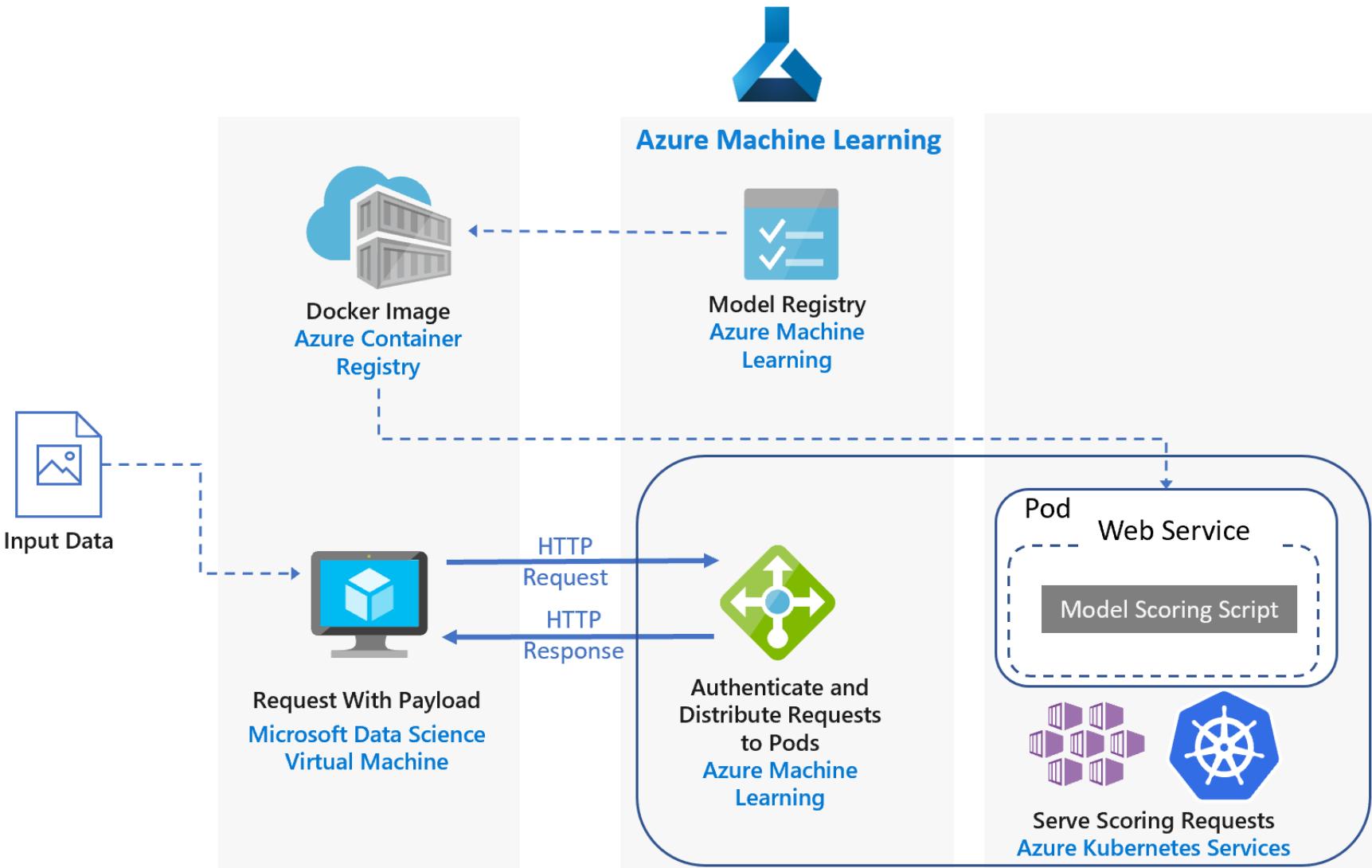
# Deep Learning



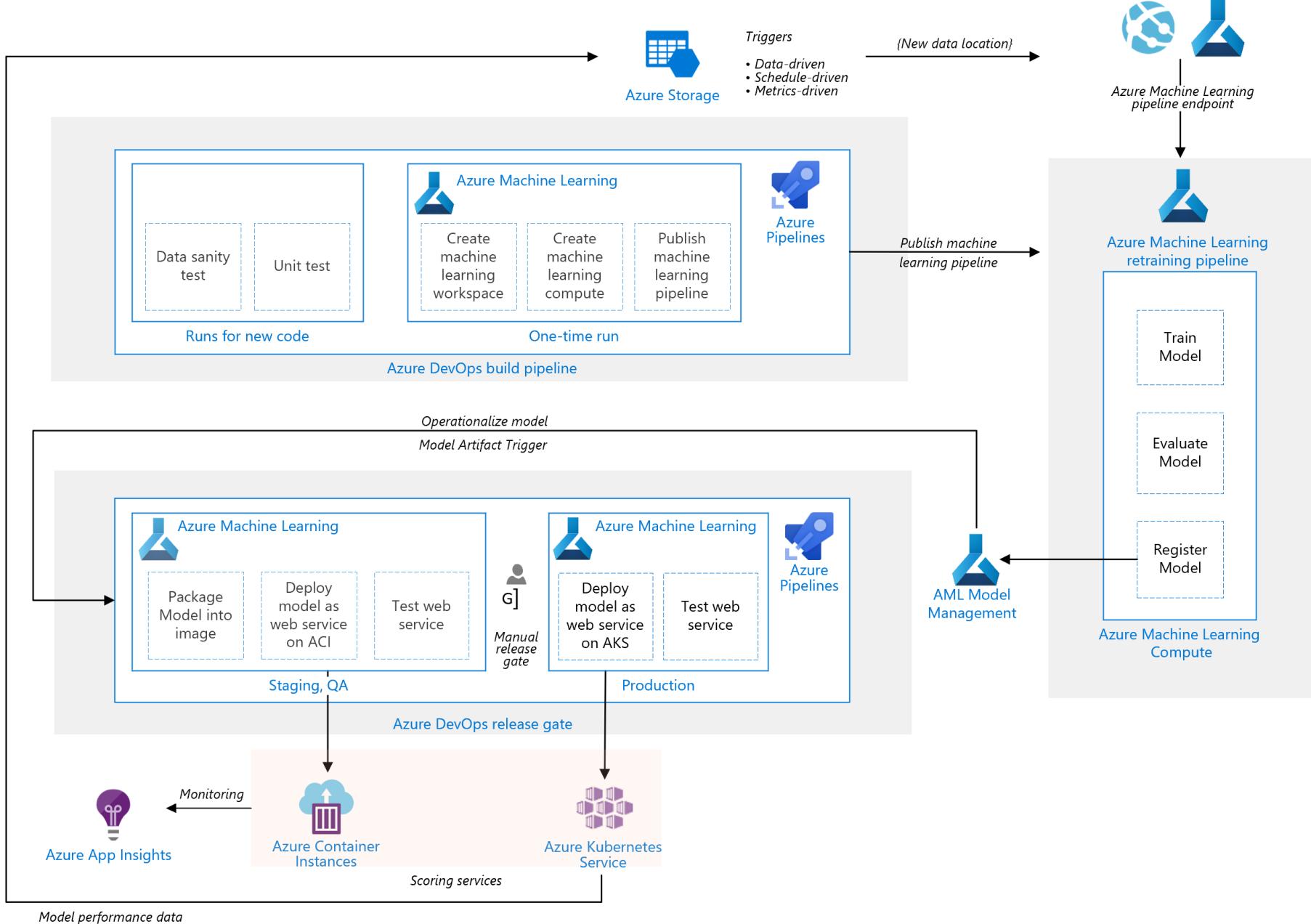
# Batch scoring of Python models



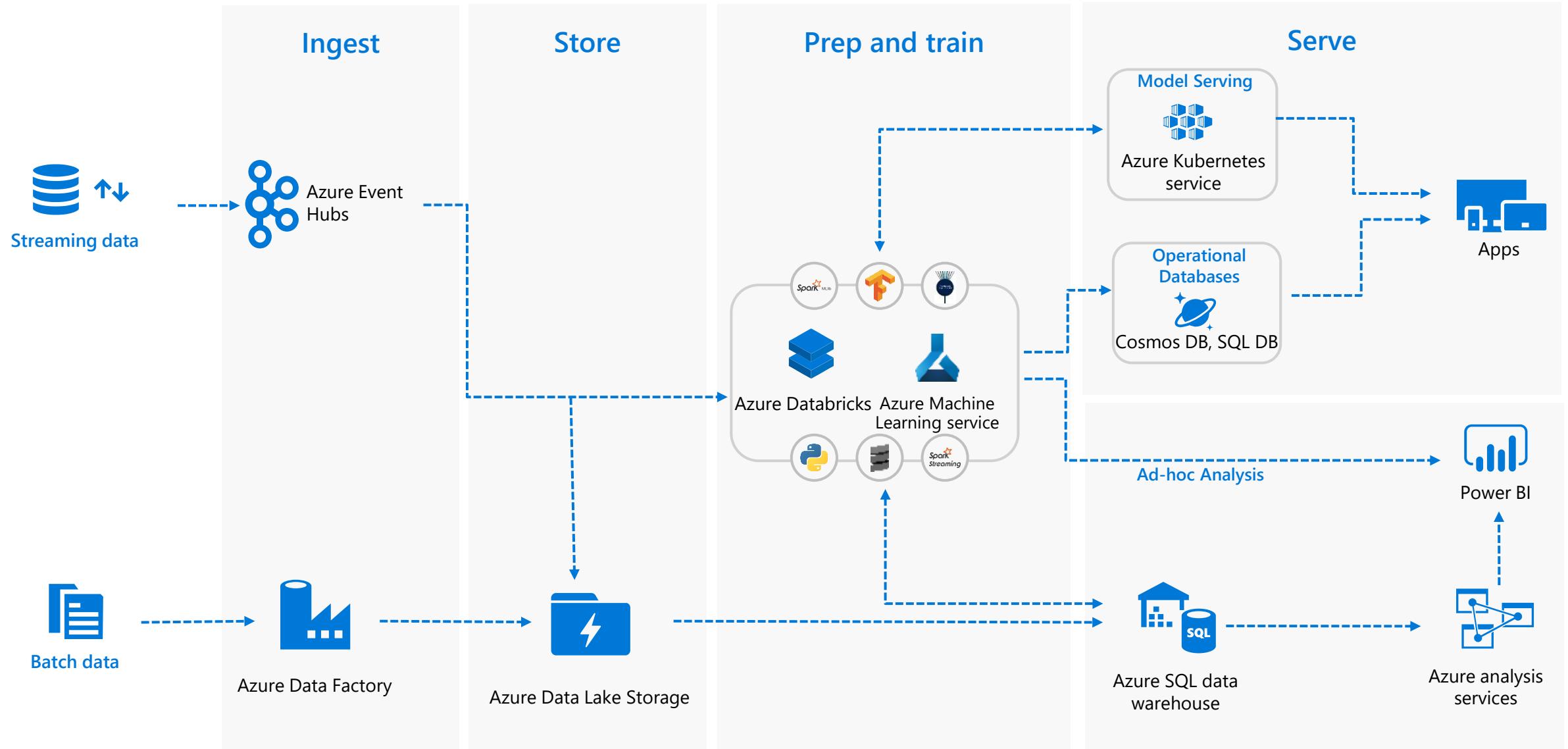
# Real time scoring



# MLOps

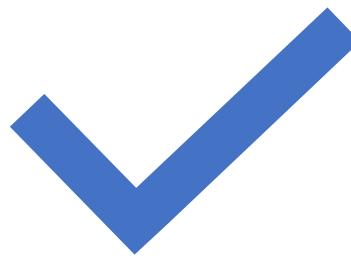


# Azure Databricks + Azure ML



# Documentation

# Documentation Azure ML



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>

Power BI Intégration

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

# AutoML with Azure ML 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:

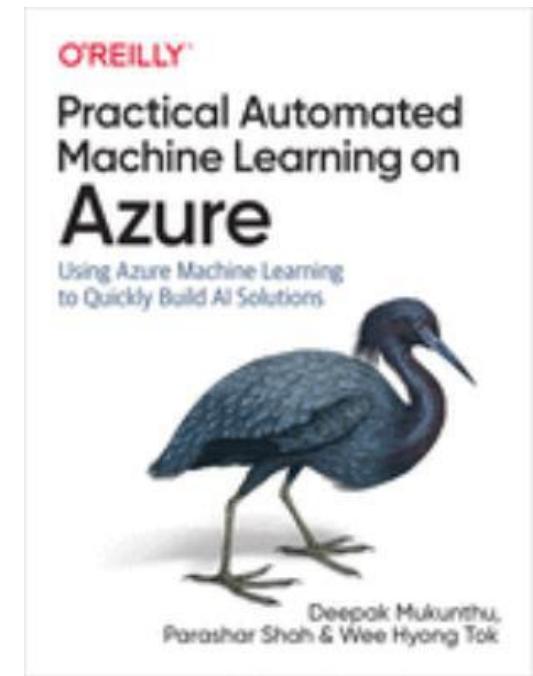
<https://customers.microsoft.com/en-us/story/733091-walgreens-boots-alliance-pharmaceuticals-azure>

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](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)

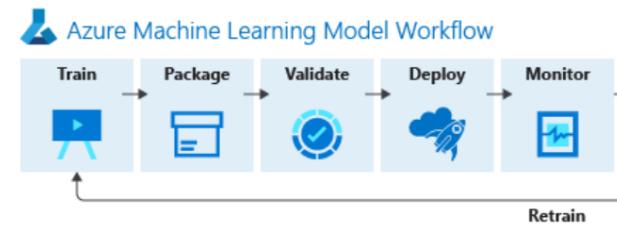


# Azure ML Git

[https://github.com/Azure/MachineLearnin  
gNotebooks/](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

Notification Hubs

Azure Search

Documentation Microsoft

<https://docs.microsoft.com/en-us/azure/#pivot=products>

Filter by title

- Azure Architecture Center
- > Cloud fundamentals
- > Example scenarios
- ✓ Reference architectures

#### Overview

- > AI
- > Big data
- > Enterprise integration
- > Hybrid networks
- > Identity management
- Internet of Things (IoT)
- > Microservices
- > Network DMZ

# 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.

Jump to: [AI](#) | [Big data](#) | [IoT](#) | [Microservices](#) | [Serverless](#) | [Virtual networks](#) | [VM workloads](#) | [SAP](#) | [Active Directory](#) | [Web apps](#)

## 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/>

WELCOME TO

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## Introduction to Azure

Module - 8 Units

Get started with Azure by creating and configuring your first virtual machine in the cloud.

[Start learning for free >](#)

Learning paths

Hands-on learning

Learn for free

### Start learning today

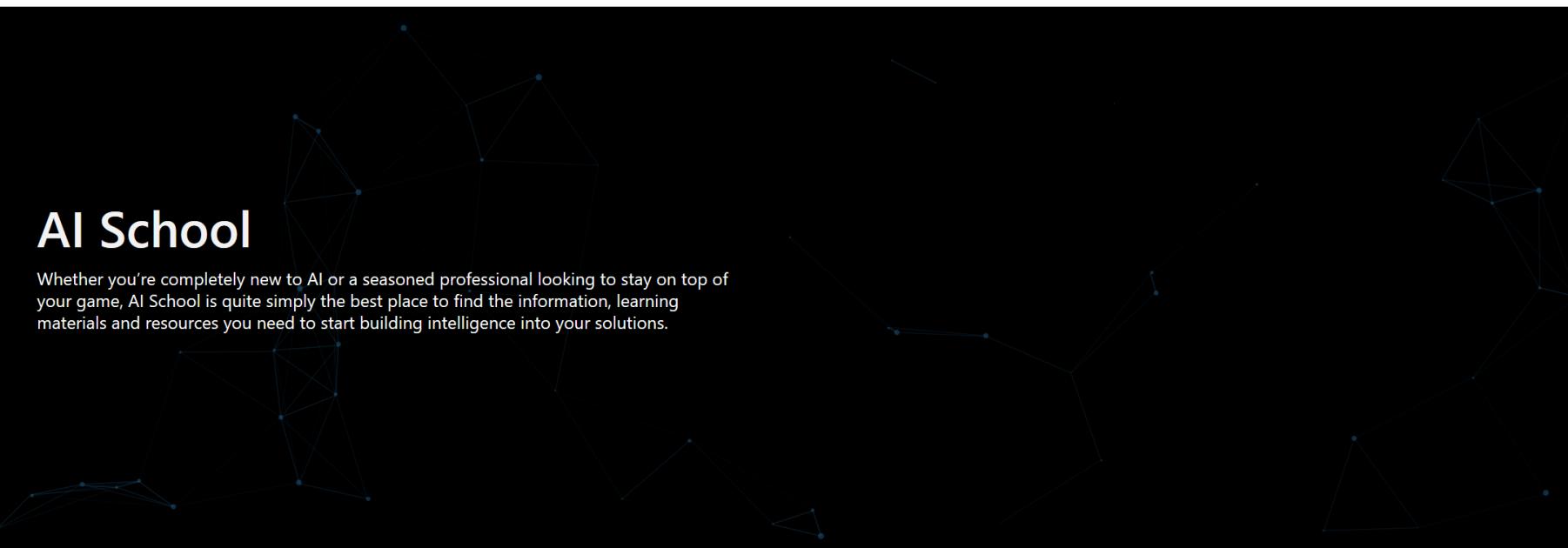
Up your game with a module or learning path tailored to today's developer and technology masterminds and designed to prepare you for industry-recognized Microsoft certifications.

[Select your role ▾](#)



Microsoft Learn

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



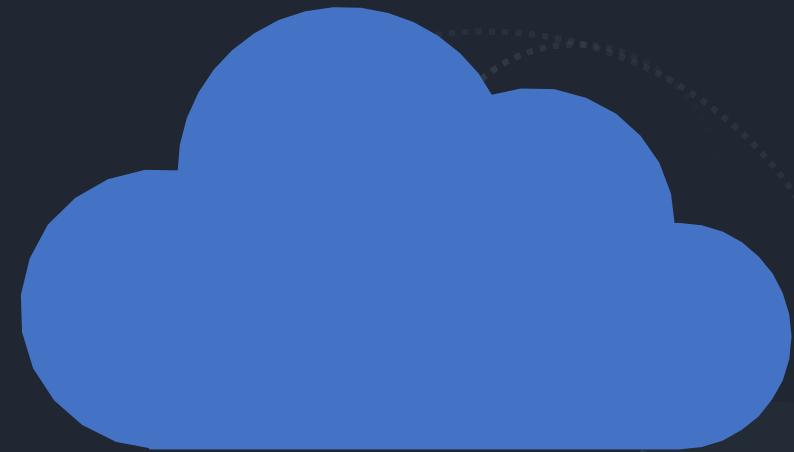
## AI School

Whether you're completely new to AI or a seasoned professional looking to stay on top of your game, AI School is quite simply the best place to find the information, learning materials and resources you need to start building intelligence into your solutions.

[AI Business School](#)[Conversational AI](#)[AI Services](#)[Machine Learning](#)[Autonomous Systems](#)[Responsible AI](#)

Microsoft AI School  
<https://aischool.microsoft.com/en-us/home>

# Présentation Azure ML Studio



# Provisionnement du service Azure ML

Home > Machine Learning > Machine Learning

## Machine Learning

Create

Main \* Tags Review \*

Workspace Name \*

 ✓

Subscription

 ▼

Resource group

 ▼

Create new

Location

 ▼

Workspace edition [View full pricing details](#) ⓘ

 ▼

ⓘ For your convenience, these resources are added automatically to the workspace, if regionally available: [Azure storage](#), [Azure Application Insights](#) and [Azure Key Vault](#).

# Création en cours...

Home > Microsoft.MachineLearningServices - Overview



## Microsoft.MachineLearningServices - Overview

Deployment

Delete Cancel Redeploy Refresh



### Your deployment is underway



Deployment name: Microsoft.MachineLearningServices  
Subscription: Microsoft Azure Internal Consumption (70b8f39e-88...  
Resource group: mlserviceRG

Start time: 07/11/2019 à 13:52:10

Correlation ID: [REDACTED]

#### Deployment details [\(Download\)](#)

Resource	Type	Status	Operation details
machinelearnin7815532...	Microsoft.Storage/stora...	Accepted	<a href="#">Operation details</a>
machinelearnin648760673	Microsoft.Insights/comp...	OK	<a href="#">Operation details</a>
machinelearnin9427122...	Microsoft.KeyVault/vaults	OK	<a href="#">Operation details</a>

#### Next steps

# Fin de la création

Home > Microsoft.MachineLearningServices - Overview

## Microsoft.MachineLearningServices - Overview

Deployment

Search (Ctrl+ /) <<

Delete Cancel Redeploy Refresh

✓ Your deployment is complete

Deployment name: Microsoft.MachineLearningServices  
Subscription: Microsoft Azure Internal Consumption (70b8f39e-88...)  
Resource group: mlserviceRG

Start time: 07/11/2019 à 13:52:10  
Correlation ID: [REDACTED]

Inputs

Outputs

Template

Deployment details (Download)

Next steps

Go to resource

# Ressources associées générées automatiquement

- [Azure Container Registry](#): Registers docker containers that you use during training and when you deploy a model. To minimize costs, ACR is **lazy-loaded** until deployment images are created.
- [Azure Storage account](#): Is used as the default datastore for the workspace. Jupyter notebooks that are used with your Azure Machine Learning Notebook VM are stored here as well.
- [Azure Application Insights](#): Stores monitoring information about your models.
- [Azure Key Vault](#): Stores secrets that are used by compute targets and other sensitive information that's needed by the workspace.

# Accès au service

Home > Microsoft.MachineLearningServices - Overview > MachineLearning

## MachineLearning

Machine Learning

Search (Ctrl+ /)

Download config.json Delete

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Events

Assets Experiments Pipelines Compute Models Images Deployments Activities

Properties Locks Export template Monitoring

Workspace edition : Enterprise Storage : machinelearnin7815532217  
Resource group : mlserviceRG Registry : ...  
Location : West Europe Key Vault : machinelearnin9427122382  
Subscription : Microsoft Azure Internal Consumption Application Insights : machinelearnin6487606737  
Subscription ID : 70b8f39e-8863-49f7-b6ba-34a80799550c

**Launch the new Azure Machine Learning studio**  
Introducing a new immersive experience (preview) for managing the end-to-end machine learning lifecycle.

**Getting Started**

 **View Documentation**  
Learn how to use Azure Machine Learning.

 **View more samples at GitHub**  
Get inspired by a large collection of machine learning examples.

 **View Forum**  
Join the discussion of Azure Machine Learning.

 **Learn about Enterprise Edition**  
Use the Enterprise edition to access UI-based tools for all skill levels, built-in MLOps and more

# Azure ML Studio

Preview Microsoft Azure Machine Learning

MachineLearning > Home

New

Home

Author

Notebooks

Automated ML

Designer

Assets

Datasets

Experiments

Pipelines

Models

Endpoints

Manage

Compute

Datastores

Data labeling

## Welcome to the studio!

Create new

Notebooks

Code with Python SDK and run sample experiments.

Start now

Automated ML

Automatically train and tune a model using a target metric.

Start now

Designer

Drag-and-drop interface from prepping data to deploying models.

Start now

### Tutorials

What is Azure Machine Learning?

Train your first ML model with Notebook

What is Automated Machine Learning?

What is Azure Machine Learning Designer?

Compute targets: where to train and deploy models

Deploy models with Azure Machine Learning

[View all tutorials →](#)

### Links

Blog

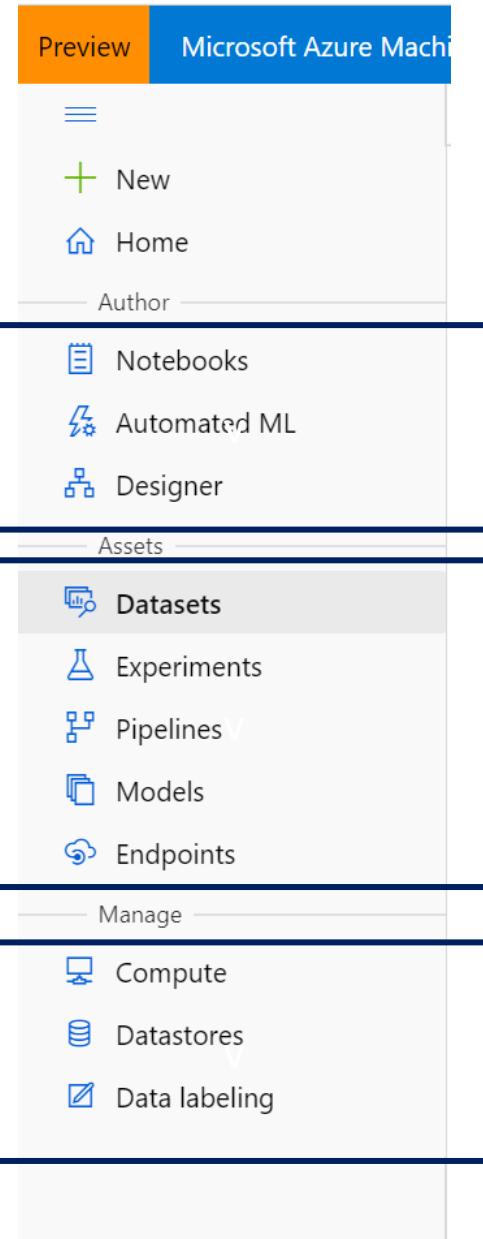
Follow us and find updates

Documentation

Find step-by-step tutorials, concepts, how-to guides, and more

# Menu Studio

---



Les interfaces graphiques

Les assets

Les ressources

# Création d'une VM pour les notebooks jupyter

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Notebook VMs

Compute

Notebook VMs Training Clusters Inference Clusters Attached Compute

+ New Refresh Start Stop Restart Delete Show created by me only

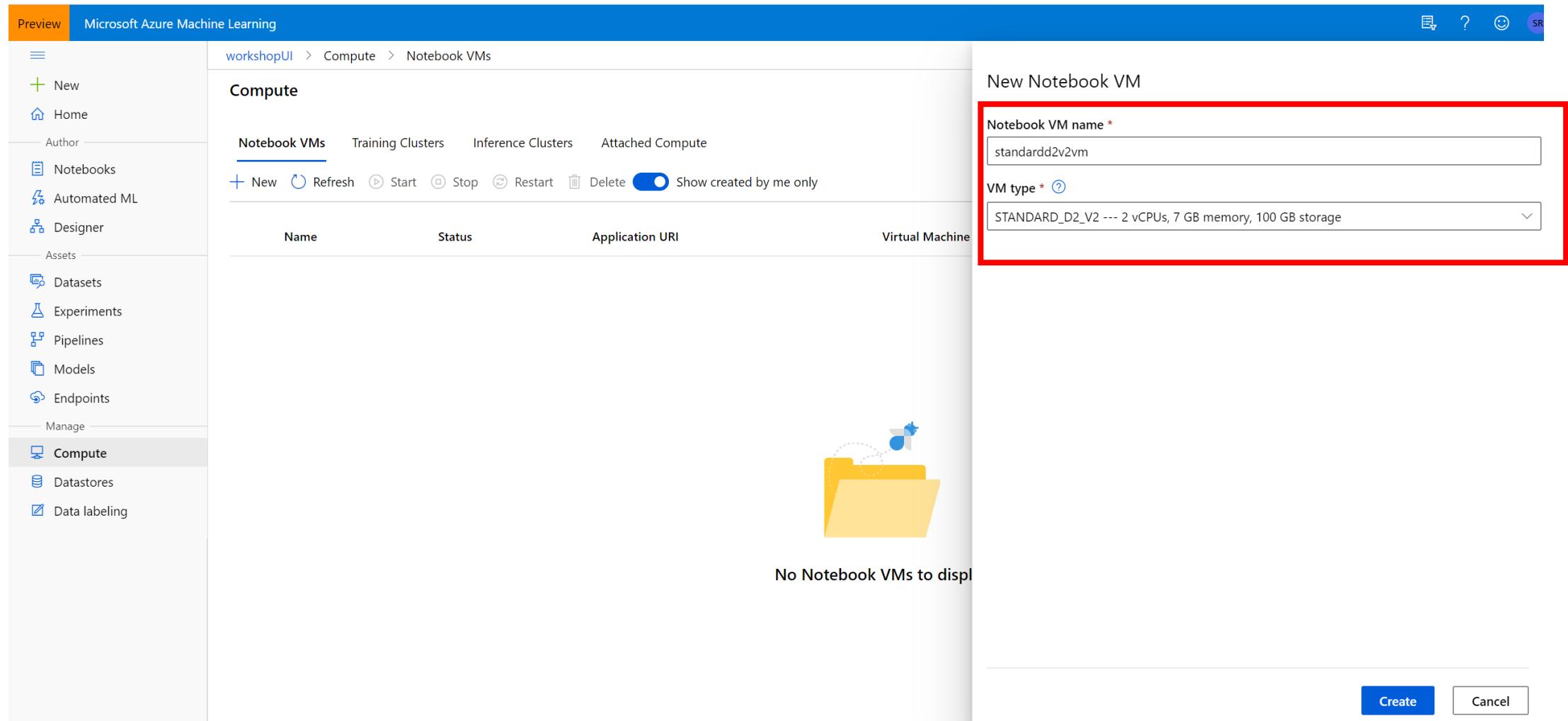
Name	Status	Application URI	Virtual Machine
No Notebook VMs to display			

New Notebook VM

Notebook VM name \* standardd2v2vm

VM type \* STANDARD\_D2\_V2 --- 2 vCPUs, 7 GB memory, 100 GB storage

Create Cancel



# Création d'une VM pour les notebooks jupyter

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Notebook VMs

Compute

Notebook VMs Training Clusters Inference Clusters Attached Compute

+ New Refresh Start Stop Restart Delete Show created by me only

Name	Status	Application URI	Virtual Machine size	Created on
standardd2v2vm	Legacy Running	JupyterLab Jupyter R-Studio	STANDARD_D2_V2	11/26/2019, 12:39:02 PM

< Prev Next >

Name	Status	Application URI	Virtual Machine size	Created on
standardd2v2vm	Legacy Running	JupyterLab Jupyter R-Studio	STANDARD_D2_V2	11/26/2019, 12:39:02 PM

# Création d'un serveur Azure ML Compute

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Training Clusters

**Compute**

Notebook VMs **Training Clusters** Inference Clusters Attached Compute

+ New Refresh Delete

Name	Type	Provisioning state	Created on ↓
No Compute to display			

New Training Cluster

Compute name \* ⓘ clusterCPU

Machine Learning Compute is a managed training environment consisting of one or more nodes. [Learn more.](#)

Region \* ⓘ westus

Virtual Machine size \* ⓘ Standard\_D2

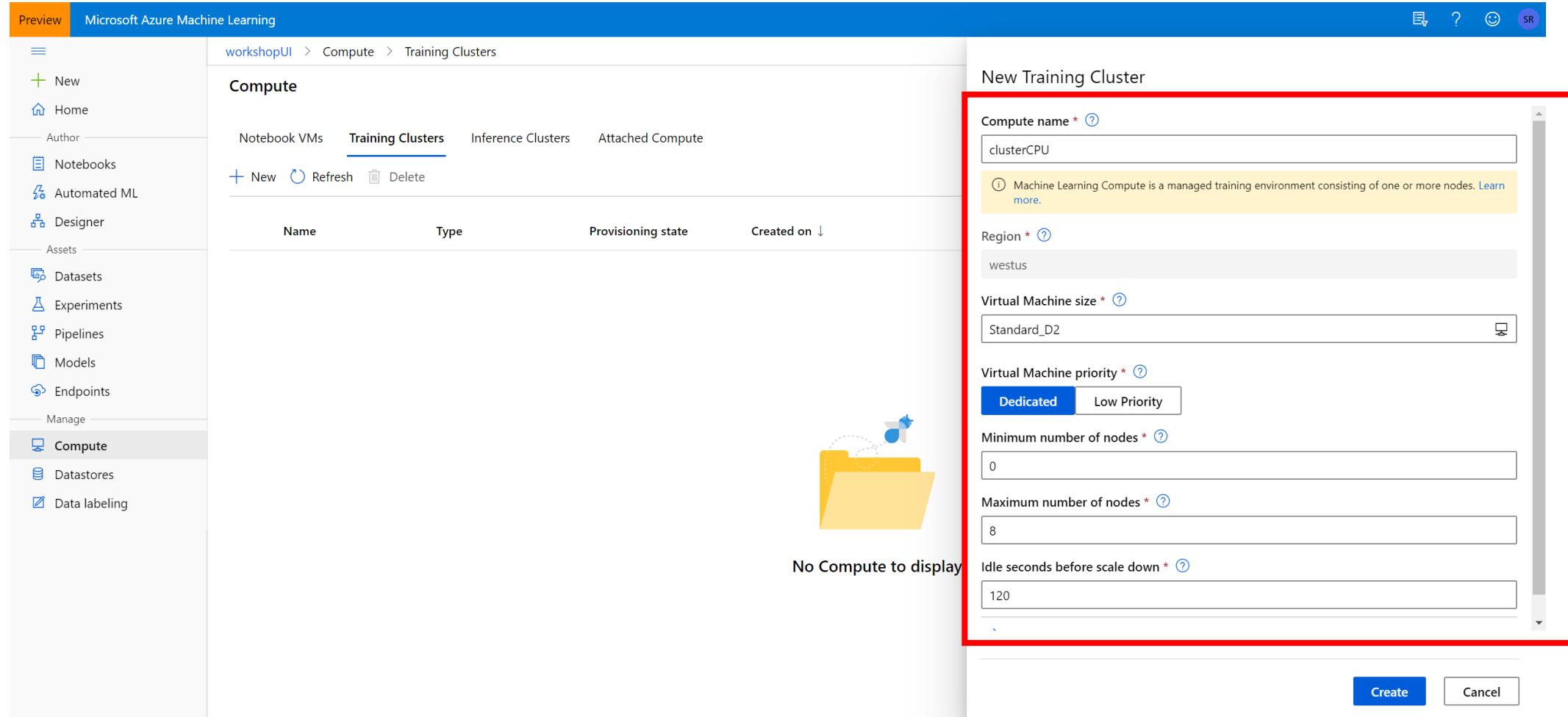
Virtual Machine priority \* ⓘ Dedicated

Minimum number of nodes \* ⓘ 0

Maximum number of nodes \* ⓘ 8

Idle seconds before scale down \* ⓘ 120

Create Cancel



# Création d'un serveur Azure ML Compute

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Training Clusters

**Compute**

Notebook VMs Training Clusters Inference Clusters Attached Compute

+ New Refresh Delete

Name	Type	Provisioning state	Created on
clusterCPU	Machine Learning Com...	Succeeded (0 nodes)	11/26/2019, 12:40:43 PM

< Prev Next >

The screenshot shows the Microsoft Azure Machine Learning Studio interface. On the left, there's a navigation sidebar with sections like 'Author' (Notebooks, Automated ML, Designer) and 'Assets' (Datasets, Experiments, Pipelines, Models, Endpoints). The main area is titled 'Compute' and shows four tabs: 'Notebook VMs', 'Training Clusters' (which is selected and highlighted in blue), 'Inference Clusters', and 'Attached Compute'. Below the tabs is a row of buttons: '+ New', 'Refresh', and 'Delete'. The main content area displays a table of existing clusters. The first cluster, 'clusterCPU', is highlighted with a red box. It has columns for 'Name' (clusterCPU), 'Type' (Machine Learning Com...), 'Provisioning state' (Succeeded (0 nodes)), and 'Created on' (11/26/2019, 12:40:43 PM). At the bottom right of the table area are navigation arrows labeled '< Prev' and 'Next >'.

# Création d'un serveur d'inférence

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Inference Clusters

**Compute**

Notebook VMs Training Clusters **Inference Clusters** Attached Compute

+ New ⏪ Refresh 🗑 Delete 🛡 Detach

Name	Type	Created/Attached	Provisioning state	Created on
No Compute to display				

New Inference Cluster

Compute name \* ⓘ  
InferenceCluster

Kubernetes Service

Region \* ⓘ  
North Europe

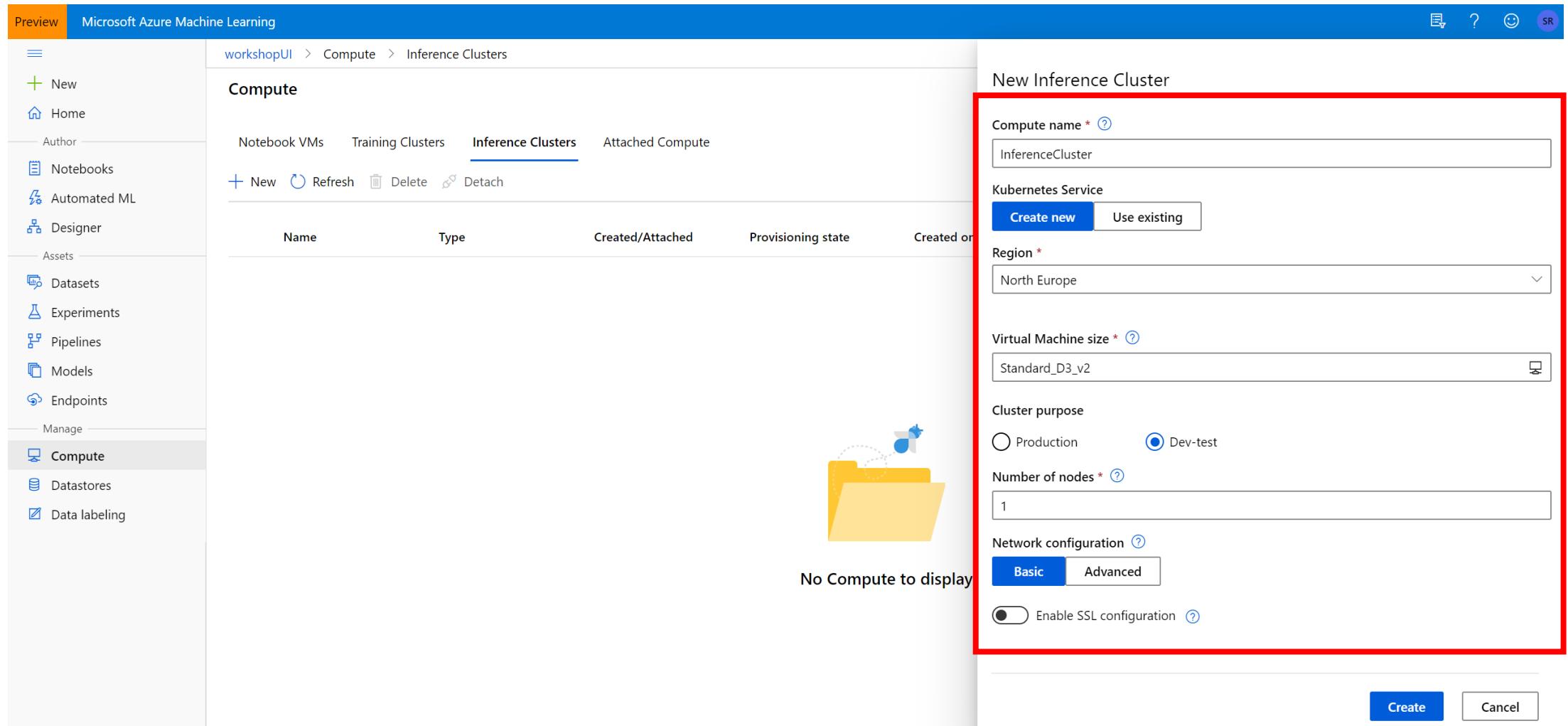
Virtual Machine size \* ⓘ  
Standard\_D3\_v2

Cluster purpose  
 Production  Dev-test

Number of nodes \* ⓘ  
1

Network configuration ⓘ

Enable SSL configuration ⓘ



# Création d'un serveur d'inférence

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Inference Clusters

Compute

Notebook VMs Training Clusters Inference Clusters Attached Compute

+ New Refresh Delete Detach

Name	Type	Created/Attached	Provisioning state	Created on
No Compute to display				

New Inference Cluster

Compute name \* ⓘ  
InferenceCluster

Kubernetes Service  
 Create new  Use existing

Region \*  
North Europe

Virtual Machine size \* ⓘ  
Standard\_D3\_v2

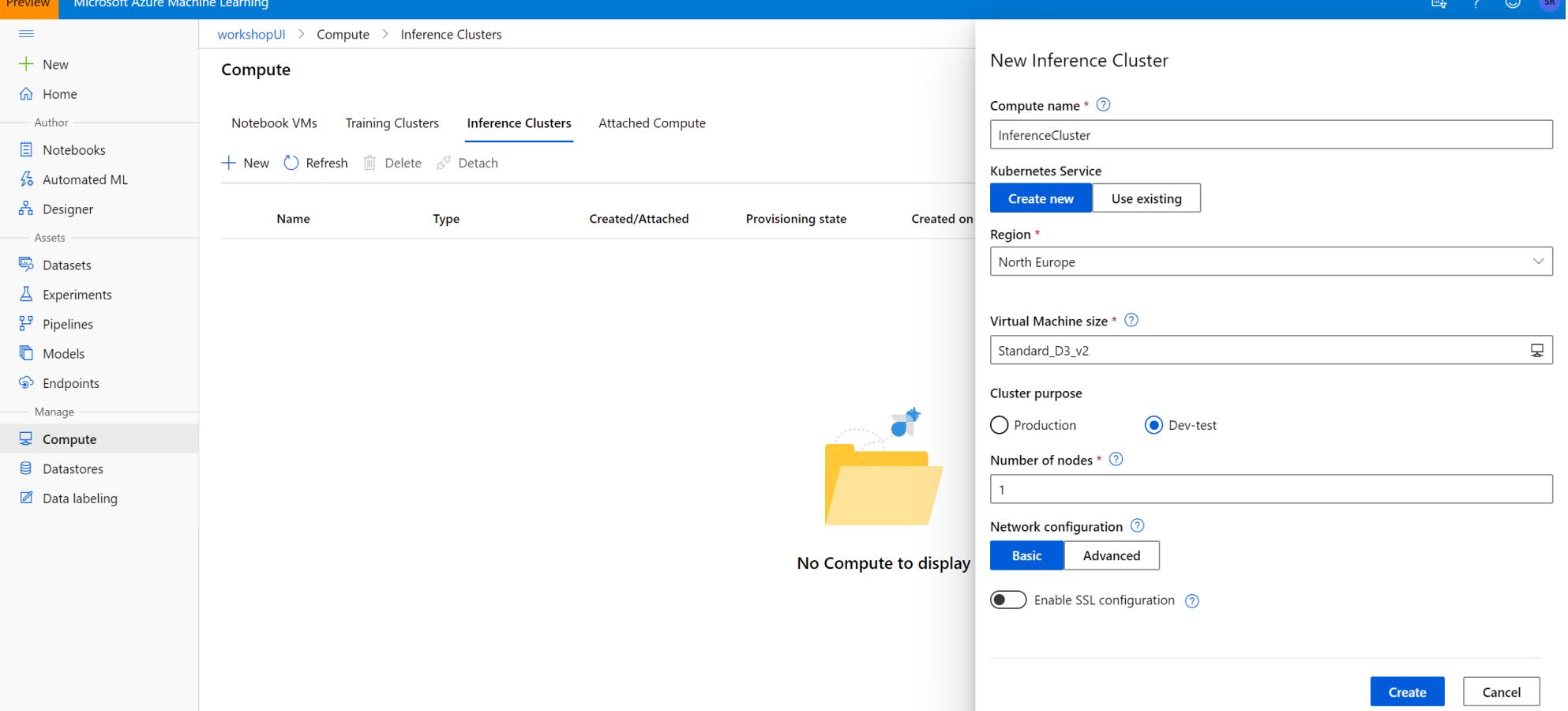
Cluster purpose  
 Production  Dev-test

Number of nodes \* ⓘ  
1

Network configuration ⓘ  
 Basic  Advanced

Enable SSL configuration ⓘ

Create Cancel



# Studio

Preview Microsoft Azure Machine Learning

workshopUI > Home

## Welcome to the studio!

**Create new** 

**Notebooks**  Code with Python SDK and run sample experiments. [Start now](#)

**Automated ML**  Automatically train and tune a model using a target metric. [Start now](#)

**Designer**  Drag-and-drop interface from prepping data to deploying models. [Start now](#)

### My recent resources

#### Compute

Name	Type	Provisioning state	Created on ↓
InferenceCluster	Kubernetes Service	 Succeeded	11/26/2019, 12:41:4...
clusterCPU	Machine Learning Com...	 Succeeded (0 nodes)	11/26/2019, 12:40:4...

[View all compute →](#)

# Présentation AutoML





# 1. Chargement des données

# Chargement de données

Preview Microsoft Azure Machine Learning

workshopUI > Datasets

## Datasets

Registered datasets    Dataset monitors

+ Create dataset    Refresh    Unregister

	Version	Created on	Modified on	Properties	Tags
From local files					
From datastore					
<b>From web files</b>					
From Open Datasets					

No datasets to display



# Chargement de données

The screenshot shows the 'Create dataset from web files' wizard in the Azure Data Studio interface. The left sidebar displays 'workshopUI > Datasets' and lists 'Registered datasets' and a 'Create dataset' button. The main area is titled 'Create dataset from web files' and shows the 'Basic info' step selected. The 'Basic info' section contains fields for 'Web URL \*' (set to 'https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv'), 'Name \*' (set to 'Titanic-l8r5gkgofl'), 'Dataset version' (set to '1'), 'Dataset type \*' (set to 'Tabular'), and a 'Description' box containing the URL. Other steps in the wizard include 'Settings and preview', 'Schema', and 'Confirm details'.

<https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv>

# Chargement des données

Create dataset from web files

Basic info

**Settings and preview**

Schema

Confirm details

Settings and preview

File format

Delimited

Delimiter

Comma

Example

Field1,Field2,Field3

Encoding

UTF-8

Column headers

All files have same headers

Skip rows

None

PassengerId

Survived

Pclass

Name

Sex

Age

SibSp

Parch

Ticket

Fare

Cabin

Embarked

PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
1	0	3	Bra...	m...	22...	1	0	A/5 21...	7.25		S
2	1	1	Cu...	fe...	38...	1	0	PC 175...	71.28	C85	C
3	1	3	Hei...	fe...	26...	0	0	STON/...	7.92		S
4	1	1	Futr...	fe...	35...	1	0	113803	53.10	C123	S
5	0	3	Alle...	m...	35...	0	0	373450	8.05		S
6	0	3	Mor...	m...	N	0	0	330877	8.46	O	

Back

Next

Cancel

# Chargement des données

Create dataset from web files

Basic info      Settings and preview      Schema      Confirm details

Include	Column name	Properties	Type	Format
<input checked="" type="checkbox"/>	Path	Not applicable to selecte...	String	
<input checked="" type="checkbox"/>	PassengerId	Not applicable to selecte...	Integer	1, 2, 3
<input checked="" type="checkbox"/>	Survived	Not applicable to selecte...	Integer	0, 1, 1
<input checked="" type="checkbox"/>	Pclass	Not applicable to selecte...	Integer	3, 1, 3
<input checked="" type="checkbox"/>	Name	Not applicable to selecte...	String	Braunc
<input checked="" type="checkbox"/>	Sex	Not applicable to selecte...	String	male, f
<input checked="" type="checkbox"/>	Age	Not applicable to selecte...	Decimal	22, 38,
<input checked="" type="checkbox"/>	SibSp	Not applicable to selecte...	Integer	1, 1, 0
<input checked="" type="checkbox"/>	Parch	Not applicable to selecte...	Integer	0, 0, 0
<input checked="" type="checkbox"/>	Ticket	Not applicable to selecte...	String	A/5 21
<input checked="" type="checkbox"/>	Fare	Not applicable to selecte...	Decimal	7.25, 7

Back      Next      Cancel

# Chargement des données

Create dataset from web files

Basic info

Settings and preview

Schema

Confirm details

Confirm details

Basic info	File settings
Name Titanic-l8r5gkgofl	File format Delimited
Dataset version 1	Delimiter Comma
Dataset type Tabular	Encoding UTF-8
Web URL <a href="https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv">https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv</a>	Column headers All files have same headers
Description Dataset is created from URL: <a href="https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv">https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv</a>	Skip rows None

Profile this dataset after creation

Select compute for profiling

clusterCPU

Refresh

Back Create Cancel

# Visualisation des sources de données

Preview Microsoft Azure Machine Learning

workshopUI > Datasets

Success : Titanic-l8r5gkgofl dataset created successfully

Datasets

Registered datasets    Dataset monitors

+ Create dataset    Refresh    ⚡ Unregister

Name	Version	Created on	Modified on	Properties	Tags
Titanic-l8r5gkgofl	1	Nov 26, 2019 3:29 PM	Nov 26, 2019 3:29 PM	Tabular	

< Prev    Next >

≡

+ New

Home

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Datastores

Data labeling

# Visualisation des données

Preview Microsoft Azure Machine Learning

workshopUI > Datasets > Titanic-l8r5gkgofl

## Titanic-l8r5gkgofl Version 1 (latest)

Details Explore Models

Refresh Generate profile Unregister New version

**Attributes**

**Properties**  
Tabular

**Description**  
Dataset is created from URL: [https://raw.githubusercontent.com/retkowsky/Titanic/master/...](https://raw.githubusercontent.com/retkowsky/Titanic/master/)

**Web Url**  
<https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv>

**Profile**  
Profile generation is running

**Current version**  
1

**Latest version**  
1

**Created time**  
Nov 26, 2019 3:29 PM

**Modified time**  
Nov 26, 2019 3:29 PM

**Tags**

No data

**Sample usage**

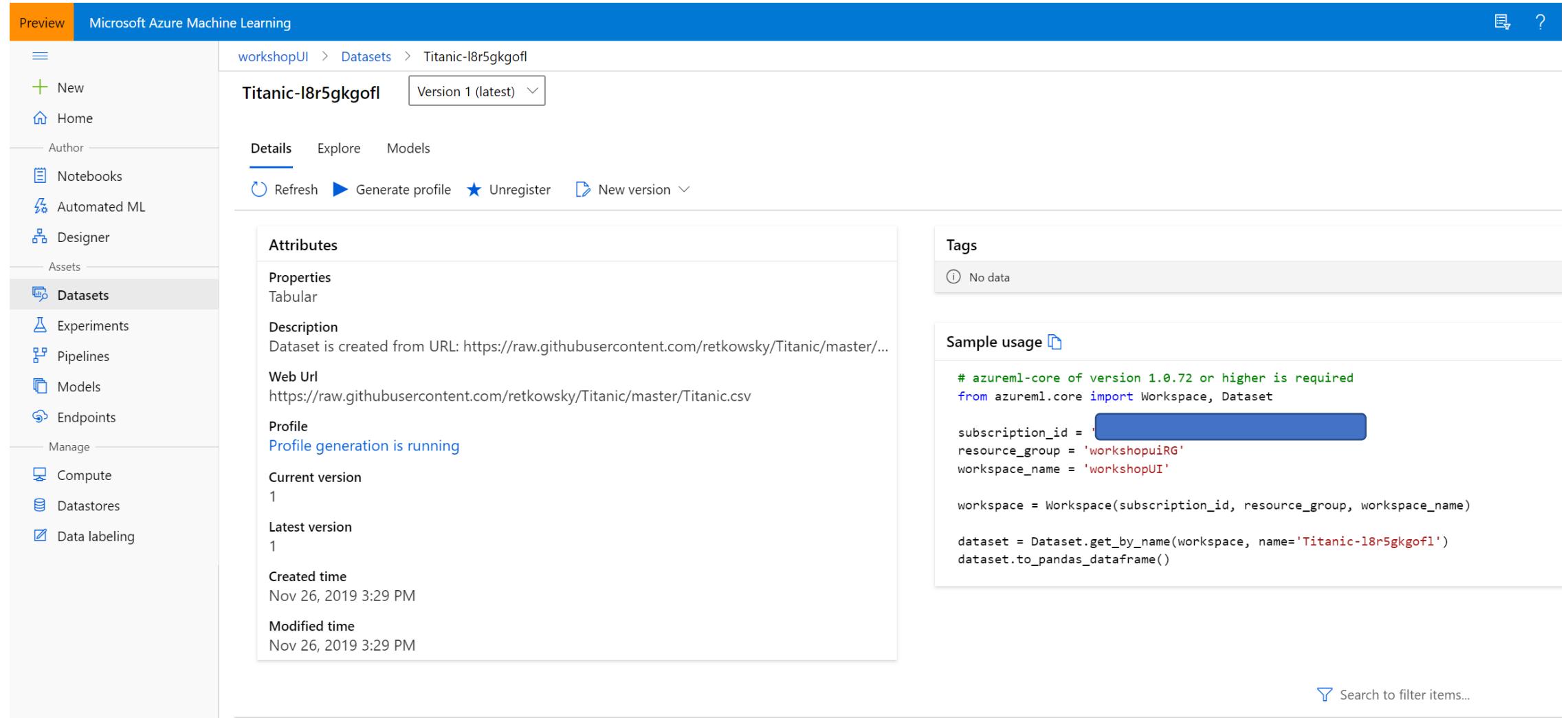
```
# azureml-core of version 1.0.72 or higher is required
from azureml.core import Workspace, Dataset

subscription_id = 'REDACTED'
resource_group = 'workshopuiRG'
workspace_name = 'workshopUI'

workspace = Workspace(subscription_id, resource_group, workspace_name)

dataset = Dataset.get_by_name(workspace, name='Titanic-l8r5gkgofl')
dataset.to_pandas_dataframe()
```

Search to filter items...



# Test accès à la source de données via Python

The screenshot shows the Microsoft Azure Machine Learning Studio interface. The left sidebar has a 'Datasets' section selected. The main content area displays the details for the 'Titanic-l8r5kgofl' dataset, version 1 (latest). The 'Attributes' section includes properties like 'Tabular', a 'Description' (dataset created from URL), a 'Web Url' (https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv), and a 'Profile' status 'Profile generation is running'. The 'Tags' section shows 'No data'. A red box highlights the 'Sample usage' section, which contains the following Python code:

```
# azureml-core of version 1.0.72 or higher is required
from azureml.core import Workspace, Dataset

subscription_id = 'REDACTED'
resource_group = 'workshopuiRG'
workspace_name = 'workshopUI'

workspace = Workspace(subscription_id, resource_group, workspace_name)

dataset = Dataset.get_by_name(workspace, name='Titanic-l8r5kgofl')
dataset.to_pandas_dataframe()
```

At the bottom right, there is a search bar with the placeholder 'Search to filter items...'.

# Accès à Jupyter Notebooks

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Notebook VMs

## Compute

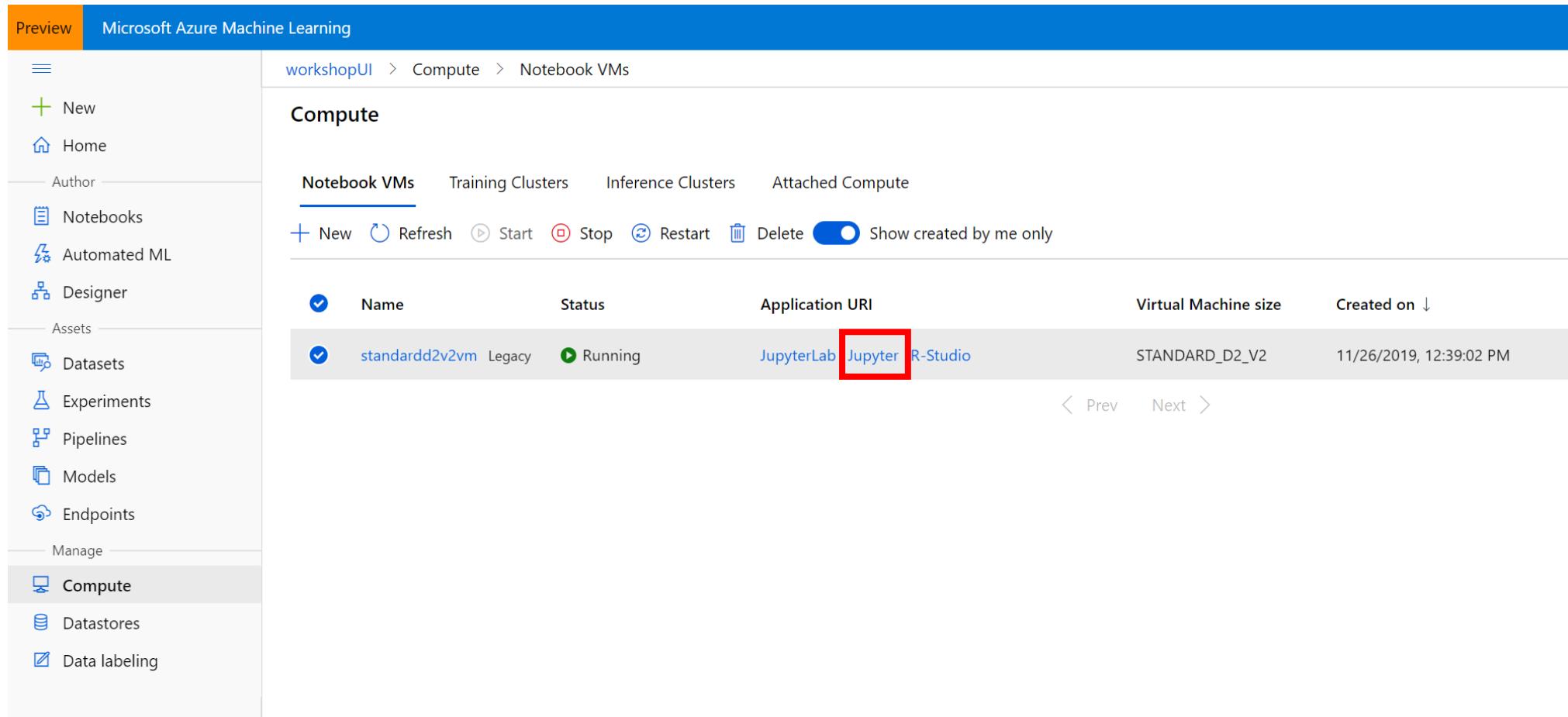
Notebook VMs Training Clusters Inference Clusters Attached Compute

+ New Refresh Start Stop Restart Delete Show created by me only

Name	Status	Application URI	Virtual Machine size	Created on
standardd2v2vm	Legacy Running	JupyterLab Jupyter R-Studio	STANDARD_D2_V2	11/26/2019, 12:39:02 PM

< Prev Next >

☰ New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling



# Test accès à la source de données via Python

jupyter Untitled Last Checkpoint: 2 minutes ago (unsaved changes) Trusted | Python 3.6 - AzureML

In [1]:

```
# azureml-core of version 1.0.72 or higher is required
from azureml.core import Workspace, Dataset

subscription_id = ''
resource_group = 'workshopuIRG'
workspace_name = 'workshopUI'

workspace = Workspace(subscription_id, resource_group, workspace_name)

dataset = Dataset.get_by_name(workspace, name='Titanic-18r5gkgoI')
dataset.to_pandas_dataframe()
```

Performing interactive authentication. Please follow the instructions on the terminal.  
To sign in, use a web browser to open the page <https://microsoft.com/devicelogin> and enter the code B39LYCQE6 to authenticate.  
Interactive authentication successfully completed.

Out[1]:

PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500		S
1	2	1	Cumings, Mrs. John Bradley (Florence Briggs Th... Heikkinen, Miss. Laina	female	38.0	1	0	PC 17599 STON/O2. 3101282	71.2833 7.9250	C85	C
2	3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	26.0	0	0				S
3	4	1	Allen, Mr. William Henry	male	35.0	1	0	113803	53.1000	C123	S
4	5	0	Moran, Mr. James	male	NaN	0	0	373450	8.0500		S
5	6	0	McCarthy, Mr. Timothy J.	male	54.0	0	0	330877 17463	8.4583 51.3625	F46	Q
6	7	0									S

In [2]:

```
df=dataset.to_pandas_dataframe()
```

In [3]:

```
df.describe()
```

Out[3]:

PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000

# Visualisation des données

Preview Microsoft Azure Machine Learning

workshopUI > Datasets > Titanic-l8r5gkgofl

Titanic-l8r5gkgofl Version 1 (latest)

Details Explore Models

Refresh Generate profile Unregister New version

Profile : This is the quick profile generated by sampled data. Profile is still generating, please wait till the profile has been generated to view the full profile.

Preview Profile

Number of columns: 12 Number of rows: 50 (of 891)

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket
1	1	0	3	Braund, Mr. Owen H...	male	22	1	0	A/5 21171
2	2	1	1	Cumings, Mrs. John ...	female	38	1	0	PC 17599
3	3	1	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2. 3101282
4	4	1	1	Futrelle, Mrs. Jacque...	female	35	1	0	113803
5	5	0	3	Allen, Mr. William He...	male	35	0	0	373450
6	6	0	3	Moran, Mr. James	male	null	0	0	330877
7	7	0	1	McCarthy, Mr. Timot...	male	54	0	0	17463
8	8	0	3	Palsson, Master. Gos...	male	2	3	1	349909
9	9	1	3	Johnson, Mrs. Oscar ...	female	27	0	2	347742
10	10	1	2	Nasser, Mrs. Nichola...	female	14	1	0	237736
11	11	1	3	Sandstrom, Miss. Ma...	female	4	1	1	PP 9549
12	12	1	1	Bonnell, Miss. Elizab...	female	58	0	0	113783
13	13	0	3	Saunderscock, Mr. Wil...	male	20	0	0	A/5. 2151
14	14	0	3	Andersson, Mr. Ande...	male	39	1	5	347082

# Visualisation des données

Preview Microsoft Azure Machine Learning

workshopUI > Datasets > Titanic-l8r5gkgofl

Titanic-l8r5gkgofl Version 1 (latest)

Details Explore Models

Refresh Generate profile Unregister New version

Preview Profile

Number of columns: 12 Number of rows: 891

Column	Profile	Type	Min	Max	Count	Missing count	Empty count	Error count	Mean	S
Survived		Integer	0	1	891	0	0	0	0.38	0
Pclass		Integer	1	3	891	0	0	0	2.31	0
Name		String	Abbing, Mr. ...	van Melkebe...	891	0	0	0	0.00	0
Sex		String	female	male	891	0	0	0	0.00	0



## 2. Paramétrage AutoML

# AutoML

Preview Microsoft Azure Machine Learning

workshopUI > 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

No recent automated ML runs to display.

Click "New automated ML run" to create your first run

[Learn more](#)

### Documentation

[View all documentation](#)

 Concept: What is automated machine learning?	06/19/2019
 Tutorial: Create your first classification model with automated machine learning	09/25/2019
 Blog: Build more accurate forecasts with new capabilities in automated machine learning	06/06/2019

# AutoML

workshopUI > Automated ML > Start run

## Create a new automated machine learning run

### Select dataset

Select a dataset from the list below, or create a new dataset.

+ Create dataset ▾

Search to filter items...

### Configure run

### Task type and settings

### Select dataset

Select a dataset from the list below, or create a new dataset.

+ Create dataset ▾

Search to filter items...

#### Dataset Name

#### Created on

#### Modified

Dataset Name	Created on	Modified
Titanic-l8r5gkgofl	11/26/2019, 3:29:36 PM	11/26/2019, 3:29:36 PM

< Prev Next >

# AutoML

workshopUI > Automated ML > Start run

## Create a new automated machine learning run

Select dataset

**Configure run**

Task type and settings

### Configure run

Configure the experiment. Select from existing experiments or define a new name, select the target column and the training compute to use. [Learn more](#)

#### Dataset

Titanic-l8r5gkgo! ([View dataset](#))

#### Experiment name \*

Titanic 

#### Target column \*

Survived 

#### Select training compute target \*

clusterCPU 

 Create a new compute  Refresh compute

# AutoML

workshopUI > Automated ML > Start run

## Create a new automated machine learning run

- Select dataset
- Configure run
- Task type and settings

### Select task type

Select the machine learning task type for the experiment. Additional settings are available to fine tune the experiment if needed.

#### Classification

To predict one of several categories in the target column. yes/no, blue, red, green.

Enable deep learning (preview) 



#### Regression

To predict continuous numeric values

#### Time series forecasting

To predict values based on time

 View additional configuration settings  View featurization settings

# AutoML

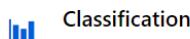
workshopUI > Automated ML > Start run

## Create a new automated machine learning run

- Select dataset
- Configure run
- Task type and settings

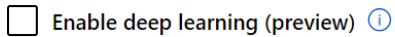
### Select task type

Select the machine learning task type for the experiment. Additional settings are



#### Classification

To predict one of several categories in the target column. yes/no, blue, r

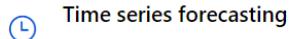


#### Enable deep learning (preview)



#### Regression

To predict continuous numeric values



#### Time series forecasting

To predict values based on time

[View additional configuration settings](#)

[View featurization settings](#)

### Additional configurations

#### Primary metric

Accuracy

Automatic featurization

Explain best model

#### Blocked algorithms

A list of algorithms that automated ML will not use during training.

> Exit criterion

> Validation

> Concurrency

# AutoML

workshopUI > Automated ML > Start run X

Create a new automated machine learning run

Task type and settings

- Select dataset
- Configure run
- Task type and settings**

Select task type

Select the machine learning task type for the experiment. Additional settings are available for each task type.

**Classification**  
To predict one of several categories in the target column. yes/no, blue, red, etc.  
 Enable deep learning (preview) (i)

**Regression**  
To predict continuous numeric values

**Time series forecasting**  
To predict values based on time

[View additional configuration settings](#) [View featurization settings](#)

Back Finish

Additional configurations

**Primary metric** (i)  
Accuracy

Automatic featurization (i)

Explain best model (i)

**Blocked algorithms** (i)  
LogisticRegression X SGD X MultinomialNaiveBayes X  
BernoulliNaiveBayes X SVM X LinearSVM X KNN X DecisionTree X  
RandomForest X ExtremeRandomTrees X GradientBoosting X  
A list of algorithms that automated ML will not use during training.

**Exit criterion**

Training job time (hours) (i)

Metric score threshold (i)

**Validation**

**Concurrency**

Save



### 3. Exécution AutoML

# AutoML

workshopUI > Automated ML > Start run

## Create a new automated machine learning run

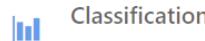
Select dataset

Configure run

Task type and settings

### Select task type

Select the machine learning task type for the experiment. Additional settings are available to fine tune the experiment if needed.



#### Classification

To predict one of several categories in the target column. yes/no, blue, red, green.



Enable deep learning (preview) (i)

### Creating a new automated machine learning run...

Validating data...



#### Time series forecasting

To predict values based on time



[View additional configuration settings](#)



[View featurization settings](#)

# AutoML

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 1 Preparing

Refresh Cancel

Details Models Data guardrails Properties Logs Outputs

**Run details**

Task type  
classification

Primary metric  
Accuracy

Run status  
Preparing

Experiment name  
Titanic

Run ID  
AutoML\_377c20bc-9e6d-45c3-97f5-80991011c378

The screenshot shows the Microsoft Azure Machine Learning Studio interface. The left sidebar has a 'Preview' tab selected, followed by 'Microsoft Azure Machine Learning'. The main menu includes 'New', 'Home', 'Author', 'Notebooks', 'Automated ML' (which is currently selected and highlighted in grey), 'Designer', 'Assets', 'Datasets', 'Experiments', 'Pipelines', 'Models', 'Endpoints', 'Manage', 'Compute', 'Datastores', and 'Data labeling'. The top navigation bar shows the path 'workshopUI > Automated ML > Run Detail'. Below this, it displays 'Run 1' with a status of 'Preparing'. There are 'Refresh' and 'Cancel' buttons. A tab bar at the bottom includes 'Details' (selected), 'Models', 'Data guardrails', 'Properties', 'Logs', and 'Outputs'. The 'Run details' section contains information about the task type (classification), primary metric (Accuracy), and current run status (Preparing). It also lists the experiment name (Titanic) and run ID (AutoML\_377c20bc-9e6d-45c3-97f5-80991011c378).

# AutoML

Preview Microsoft Azure Machine Learning

workshopUI > 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	Run ID	Status	Created on	Duration
Titanic	AutoML_377c20bc-9e6d-45c3-97f5-80991011c378	Running	11/26/2019, 3:34:13 PM	00:12:15

### Documentation

[View all documentation](#)

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

 Tutorial: Create your first classification model with automated machine learning  
09/25/2019

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Compute Datastores Data labeling

# AutoML – Child Runs

Preview Microsoft Azure Machine Learning

workshopUI > Experiments > Titanic

Titanic

Switch to old experience

Run status

Status	Count
Running	1
Completed	1
Failed	0
Other	0

Runs by compute

Duration (last 1)

Compute target

Add filter

Run	Created time	Duration	Status	Compute target	Run type	Tags
Run 2	11/26/2019, 3:34:22 PM	6m 34s	Completed	clusterCPU	azureml.scriptrun	
Run 1	11/26/2019, 3:34:13 PM	-	Running	clusterCPU	automl	model_explain_run: best_run experiment_status: ModelSelection experiment_status_desc: Beginning model ...

< Prev Next >

# Premiers résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 Running

Refresh Cancel  Auto refresh every 30 seconds

Author

Details Models Data guardrails Properties Logs Outputs

Search to filter items...

Algorithm name	Accuracy ↓	Created	Duration	Status	Model
MaxAbsScaler, LightGBM	0.7811111111111112	11/26/2019, 3:55:56 PM	00:01:16	Completed	<a href="#">Download</a>
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Running	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:57:30 PM		Queued	

< Prev Next >

# Premiers résultats

Details   **Models**   Data guardrails   Properties   Logs   Outputs

 Search to filter items...

Algorithm name	Accuracy ↓	Created	Duration	Status	Model
StandardScalerWrapper, LightGBM	0.8013108614232209	11/26/2019, 3:55:56 PM	00:01:18	Completed	 Download
MaxAbsScaler, LightGBM	0.7811111111111112	11/26/2019, 3:55:56 PM	00:01:16	Completed	 Download
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:55:56 PM		Queued	
<N/A>	NaN	11/26/2019, 3:57:30 PM		Queued	

 Prev   Next 



## 4. Résultats AutoML

# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 ✓ Completed

Refresh Cancel

Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

**Recommended model**

Model name  
MaxAbsScaler, LightGBM

Metric value  
0.8260424469413232

Created on  
Tue Nov 26 2019 15:55:56 GMT+0100 (Central European Standard Time)

Duration  
00:01:22

Sdk version  
1.0.74.1

Deploy status  
No deployment yet

**Run summary**

Task type  
classification

Primary metric  
Accuracy

Run status  
Completed

Experiment name  
Titanic

Run ID  
AutoML\_6aaf568a-287a-42d5-b882-1346a3517bb3

Deploy best model View model details Download best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 ✓ Completed

Refresh Cancel

Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

**Recommended model**

Model name  
MaxAbsScaler, LightGBM

Metric value  
0.8260424469413232

Created on  
Tue Nov 26 2019 15:55:56 GMT+0100 (Central European Standard Time)

Duration  
00:01:22

Sdk version  
1.0.74.1

Deploy status  
No deployment yet

**Run summary**

Task type  
classification

Primary metric  
Accuracy

Run status  
Completed

Experiment name  
Titanic

Run ID  
AutoML\_6aaf568a-287a-42d5-b882-1346a3517bb3

Deploy best model View model details Download best model

# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 ✓ Completed

↻ Refresh ✖ Cancel

Details Models Data guardrails Properties Logs Outputs

🔍 Search

Algorithm name	Accuracy ↓	Created	Duration	Status	Model
MaxAbsScaler, LightGBM	0.8260424469413232	11/26/2019, 3:55:56 PM	00:01:22	Completed	<span style="color: blue;">⬇️ Download</span>
StandardScalerWrapper, LightGBM	0.8013108614232209	11/26/2019, 3:55:56 PM	00:01:18	Completed	<span style="color: blue;">⬇️ Download</span>
SparseNormalizer, LightGBM	0.7957178526841447	11/26/2019, 3:55:56 PM	00:01:15	Completed	<span style="color: blue;">⬇️ Download</span>
TruncatedSVDWrapper, LightGBM	0.7889637952559301	11/26/2019, 3:55:56 PM	00:01:33	Completed	<span style="color: blue;">⬇️ Download</span>
MaxAbsScaler, LightGBM	0.7811111111111112	11/26/2019, 3:55:56 PM	00:01:16	Completed	<span style="color: blue;">⬇️ Download</span>

# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 ✓ Completed

Refresh Cancel  Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

**Data guardrails**

Type	Status	Description	
Cross validation	done	Each iteration of the trained model was validated through cross-validation.	<span style="color: green;">✓</span>
<a href="#">Additional details</a>			
Class balancing detection	passed	Classes are balanced in the training data.	<span style="color: green;">✓</span>
<a href="#">Additional details</a>			
Missing values imputation	fixed	The training data had the following missing values which were resolved. Please review your data source for data quality issues and possibly filter out the rows with these missing values. If the missing values are expected, you can either accept the above imputation, or implement your own custom imputation that may be more appropriate based on the data type and business process.	<span style="color: green;">✓</span>
<a href="#">Additional details</a>			
High cardinality feature detection	done	High cardinality inputs were detected in dataset and were featurized as text.	<span style="color: green;">✓</span>
<a href="#">Additional details</a>			

# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 Completed

Refresh Cancel  Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

**Properties**

Experiment name: Titanic

Run type: Automated ML

Run ID: AutoML\_6aaf568a-287a-42d5-b882-1346a3517bb3

Task type: classification

Compute target: clusterCPU

Primary metric: Accuracy

Deep learning: Disabled

**Additional run settings**

Dropped column(s): --

Validation type: Monte Carlo cross validation

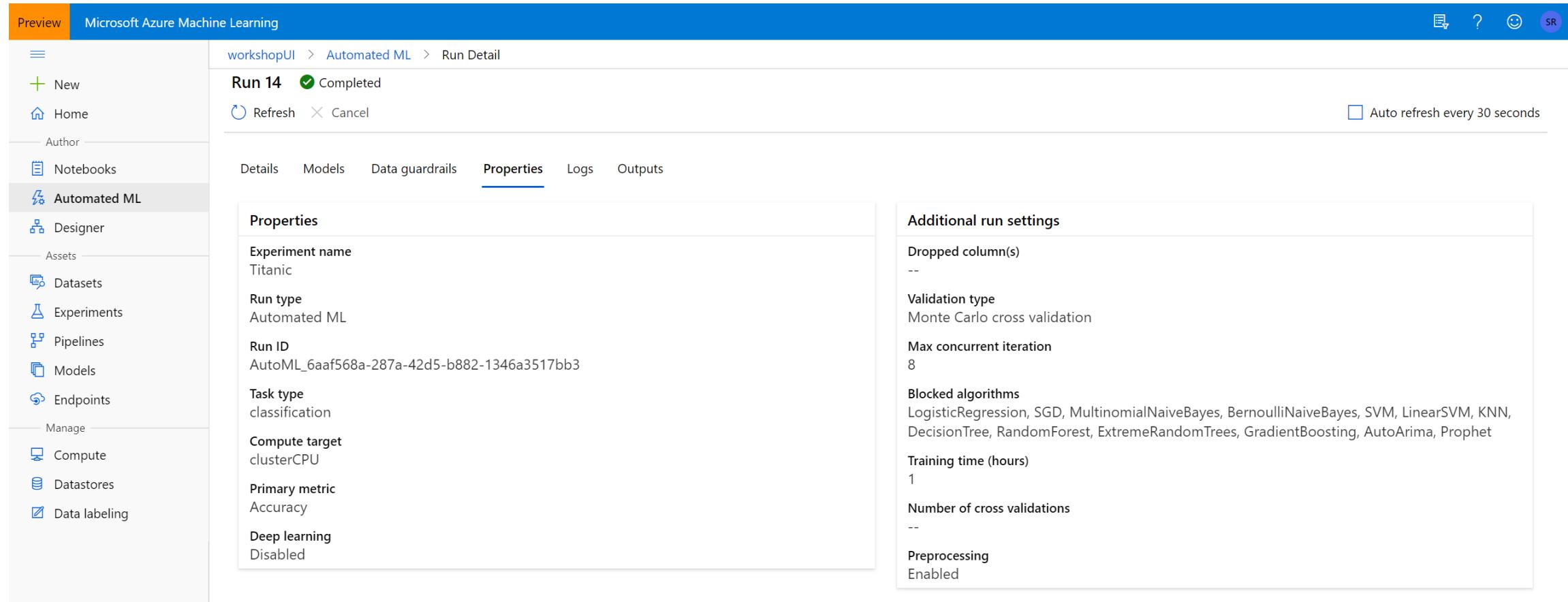
Max concurrent iteration: 8

Blocked algorithms: LogisticRegression, SGD, MultinomialNaiveBayes, BernoulliNaiveBayes, SVM, LinearSVM, KNN, DecisionTree, RandomForest, ExtremeRandomTrees, GradientBoosting, AutoArima, Prophet

Training time (hours): 1

Number of cross validations: --

Preprocessing: Enabled



# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 ✓ Completed

Refresh Cancel

Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

70\_driver\_log.txt

azureml-logs

55\_azureml-execution-tvmps\_89696805f24a0987b61

65\_job\_prep-tvmps\_89696805f24a0987b61f6b46a97

70\_driver\_log.txt

75\_job\_post-tvmps\_89696805f24a0987b61f6b46a971

{} process\_info.json

{} process\_status.json

logs

70\_driver\_log.txt

```
1 Starting the daemon thread to refresh tokens in background for process with pid = 138
2 Entering Run History Context Manager.
3 Starting the setup....
4 Set enable_streaming flag to False
5 ERROR - Importing matplotlib failed. Plotting will not work.
6 WARNING - Received unrecognized parameter: max_horizon auto
7 WARNING - Received unrecognized parameter: target_lags None
8 WARNING - Received unrecognized parameter: target_rolling_window_size None
9 WARNING - Received unrecognized parameter: time_column_name None
10 Turning diagnostics collection on.
11 Setup run completed successfully!
12
13
14 The experiment completed successfully. Finalizing run...
15 Cleaning up all outstanding Run operations, waiting 300.0 seconds
16 3 items cleaning up...
17 Cleanup took 0.004739999771118164 seconds
18
```

# Résultats

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail

Run 14 Completed

Refresh Cancel  Auto refresh every 30 seconds

Details Models Data guardrails Properties Logs Outputs

Outputs

verifier\_results.json

outputs

verifier\_results.json

automl\_driver.py

definition.json

Automated ML

New Home Author Notebooks Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

**Properties**

Algorithm name: MaxAbsScaler, LightGBM

Primary metric: Accuracy

Score: 0.8260424469413232

Sdk version: 1.0.74.1

Deploy status: No deployment yet

**Status**

Status: Completed

Run ID: AutoML\_6aaf568a-287a-42d5-b882-1346a3517bb3\_3

Input datasets: Input name: input\_data, ID: ac41a36d-f8a2-4531-901d-9bab50c89ed1

Time started: Tue Nov 26 2019 15:55:56 GMT+0100 (Central European Standard Time)

Duration: 00:01:22

**Run Metrics**

AUC macro: 0.86329

Recall score micro: 0.82604

Log loss: 0.44326

Precision score micro: 0.82604

**Deploy model** [Download model](#)

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 ✓ Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

Automated ML provides charts for better understanding of model performance. [Learn more](#)

Precision-Recall

The chart displays Precision on the Y-axis (0.0 to 1.0) against Recall on the X-axis (0% to 100%). Three curves represent the averages: Weighted Average (blue), Macro Average (red), and Micro Average (green). All curves start at (0%, 0) and end at (100%, 0). A purple dashed line represents the Ideal classifier.

ROC

The chart displays True Positive Rate on the Y-axis (0 to 1) against False Positive Rate on the X-axis (0% to 100%). Three curves represent the averages: Weighted Average (blue), Macro Average (red), and Micro Average (green). All curves start at (0%, 0) and end at (100%, 1). A purple dashed line represents the Ideal classifier. A cyan dashed diagonal line represents the Random classifier baseline.

Legend:

- Weighted Average
- Macro Average
- Micro Average
- Ideal
- 0
- 1

- Weighted Average
- Macro Average
- Micro Average
- Ideal
- Random classifier
- 0
- 1

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

Predicted Probability

Percentile

Gain Curve

True Label

Raw Confusion Matrix

Predicted Label

True Label \ Predicted Label	0	1
0	488	61
1	94	248

Gain

Percentile

Legend:

- Weighted Average
- Macro Average
- Micro Average
- Baseline
- 0
- 1

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

Select Explanation tabular | mimic | classification | 1717580e-9670-469e-bb91-6b830c20fba8 | 11/26/2019, 4:07:30 PM

Explainer: mimic

Global Importance

Summary Importance

Top K Features: 8

Feature Importance

Feature	Importance
Name_CharGramTfidf...	1.15
Pclass_CharGramCou...	0.45
Cabin_HashOneHotEn...	0.30
Sex_ModeCatImputer...	0.28
Fare_MeanImputer	0.25
Age_MeanImputer	0.20
PassengerId_MeanIm...	0.15
Name_CharGramTfidf...	0.12

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

Select Explanation tabular | mimic | classification | 1717580e-9670-469e-bb91-6b830c20fba8 | 11/26/2019, 4:07:30 PM

Explainer: mimic

Chart type: Top K Features: 8

Global Importance

Summary Importance

Feature Importance class : 0

Swarm

Name\_CharGramTfldf... Pclass\_CharGramCou... Cabin\_HashOneHotEn... Sex\_ModeCatImputer... Fare\_MeanImputer Age\_MeanImputer PassengerId\_MeanImpu... Name\_CharGramTfldf...

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

70\_driver\_log.txt

azureml-logs

55\_azureml-execution-tvmps\_89696805f24a0987b61

65\_job\_prep-tvmps\_89696805f24a0987b61f6b46a97

70\_driver\_log.txt

75\_job\_post-tvmps\_89696805f24a0987b61f6b46a971

{} process\_info.json

{} process\_status.json

logs

```
1 Starting the daemon thread to refresh tokens in background for process with pid = 141
2 Entering Run History Context Manager.
3 Starting the automl_driver setup...
4 Set enable_streaming flag to False
5 run_id in the real script: AutoML_6aaf568a-287a-42d5-b882-1346a3517bb3_3
6 ERROR - Importing matplotlib failed. Plotting will not work.
7 WARNING - Received unrecognized parameter: max_horizon auto
8 WARNING - Received unrecognized parameter: target_lags None
9 WARNING - Received unrecognized parameter: target_rolling_window_size None
10 WARNING - Received unrecognized parameter: time_column_name None
11 Turning diagnostics collection on.
12 WARNING - Received unrecognized parameter: max_horizon auto
13 WARNING - Received unrecognized parameter: target_lags None
14 WARNING - Received unrecognized parameter: target_rolling_window_size None
15 WARNING - Received unrecognized parameter: time_column_name None
16 Turning diagnostics collection on.
17 {'staticProperties': {}, 'score': 0.8260424469413232, 'run_properties': 'copy=True', 'pipeline_script': '{"objects": [{"class_r
18 | steps=[('datatransformer', DataTransformer(enable_dnn=None, enable_feature_sweeping=None,
19 | feature_sweeping_config=None, feature_sweeping_timeout=None,
20 | featurization_config=None, is_cross_validation=None,
21 | is_onnx_compatible=None, logger=None, observer=None, task=None)), ('MaxA... subsample=0.14894736842105263,
22 | subsample_for_bin=200000, subsample_freq=0, verbose=-10))], 'friendly_errors': '{}', 'pipeline_spec': '{"objects": [
23 |
24 |
25 The experiment completed successfully. Finalizing run...
26 Cleaning up all outstanding Run operations, waiting 300.0 seconds
27 3 items cleaning up...
28 Cleanup took 0.0038270950317382812 seconds
29
```

# Détails du best model

Preview Microsoft Azure Machine Learning

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel  Auto refresh every 30 seconds

Model details Visualizations Explanations Logs Outputs

azureml-logs explanation logs outputs conda\_env\_v\_1\_0\_0.yml

env\_dependencies.json  internal\_cross\_validated\_models.pkl  model.pkl  PY\_scoring\_file\_v\_1\_0\_0.py  accuracy\_table  PY\_automl\_driver.py  confusion\_matrix

{} env\_dependencies.json x internal\_cross\_validated\_models.pkl x

```
1 "zipp": "0.6.0",
2 "wrapt": "1.11.1",
3 "wheel": "0.30.0",
4 "werkzeug": "0.16.0",
5 "websocket-client": "0.56.0",
6 "wcwidth": "0.1.7",
7 "urllib3": "1.25.7",
8 "typing-extensions": "3.7.4.1",
9 "traitlets": "4.3.3",
10 "tqdm": "4.38.0",
11 "tornado": "6.0.3",
12 "termcolor": "1.1.0",
13 "statsmodels": "0.10.1",
14 "smart-open": "1.9.0",
15 "sklearn-pandas": "1.7.0",
16 "sk12onnx": "1.4.9",
17 "six": "1.13.0",
18 "shap": "0.29.3",
19 "setuptools": "41.6.0.post20191101",
20 "secretstorage": "3.1.1",
21 "scipy": "1.1.0",
22 "scikit-learn": "0.20.3",
23 "scikit-image": "0.16.2",
24 "s3transfer": "0.2.1",
25 "ruamel.yaml": "0.15.89",
26 "resource": "0.2.1",
27 "requests": "2.22.0",
28 "requests-oauthlib": "1.3.0",
```



## 5. Déploiement du meilleur modèle

# Déploiement du best modèle

workshopUI > Automated ML > Run Detail > MaxAbsScaler, LightGBM

Run 19 Completed

Refresh Explain model Cancel

A

Model details Visualizations Explanations Logs Outputs

## Properties

Algorithm name  
MaxAbsScaler, LightGBM

Primary metric  
Accuracy

Score  
0.8260424469413232

Sdk version  
1.0.74.1

Deploy status  
No deployment yet

Deploy model

Download model

## Status

Status  
Completed

Run ID  
AutoML\_6aaf568a-287a-42d5-b882-1346a3517bb3\_3

Input datasets  
Input name: input\_data, ID: [ac41a36d-f8a2-4531-901d-9bab50c89ed1](#)

Time started  
Tue Nov 26 2019 15:55:56 GMT+0100 (Central European Standard Time)

Duration  
00:01:22

## Run Metrics

AUC macro  
0.86329

Recall score micro  
0.82604

# Déploiement ACI ou AKS

## Deploy a model

Name \*

Description

Compute type \*

Models: AutoML6aaf568a23

Enable authentication



This model supports [no-code deployment](#). You may **optionally** override the default environment and driver file.

Use custom deployment assets

> Advanced

Deploy

Cancel

# Déploiement ACI en cours

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints

## Endpoints

Real-time endpoints Pipeline endpoints

Refresh Delete Search to filter items...

Name	Description	Created On	Updated On ↓	Updated By	Compute Target
titanicpredictionmodelaci	--	11/26/2019, 4:14:05 PM	11/26/2019, 4:14:05 PM	N/A	--

< Prev Next >

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

# Endpoint

Preview Microsoft Azure Machine Learning

workshopUI > RealtimeEndpoints > titanicpredictionmodelaci

## titanicpredictionmodelaci

[Details](#) [Consume](#)

Deployment state	Healthy	CPU	1
Compute type	ACI	Memory	2 GB
Service ID	titanicpredictionmodelaci	Autoscale enabled	false
Tags		App Insights enabled	true
Created on	11/26/2019 4:14:05 PM	Event Hubs enabled	false
Last updated on	11/26/2019 4:14:05 PM	Storage enabled	false
Compute target	N/A	Last edited by	N/A
REST endpoint	http://[REDACTED]/sc	Created by	N/A
Key-based authentication enabled	true		
Token-based authentication enabled	false		

New

Home

Author

Notebooks

Automated ML

Designer

Assets

Datasets

Experiments

Pipelines

Models

Endpoints

Manage

Compute

Datastores

Data labeling

# Endpoint

Preview Microsoft Azure Machine Learning

workshopUI > RealtimeEndpoints > titanicpredictionmodelaci

## titanicpredictionmodelaci

Details   **Consume**

**Basic consumption info**

REST endpoint  
http://[REDACTED].azur[REDACTED].econtainer.io/score

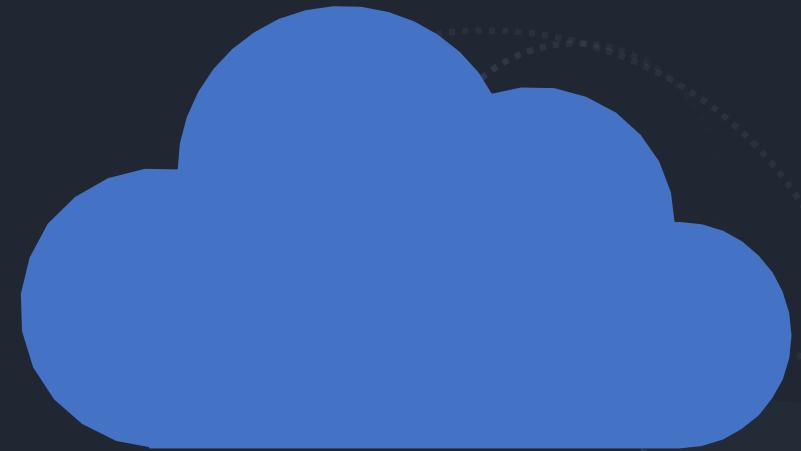
Using key    Using token

Primary key  
Z2[REDACTED]yq [REDACTED] Regenerate

Secondary key  
N[REDACTED]8 [REDACTED] Regenerate

The screenshot shows the Microsoft Azure Machine Learning Studio interface. On the left, there's a navigation sidebar with a 'Endpoints' section highlighted. The main area shows basic consumption info for a REST endpoint, including the URL and key/token options. The URL is partially redacted as 'http://[REDACTED].azur[REDACTED].econtainer.io/score'. Below this, there are two radio buttons: 'Using key' (selected) and 'Using token'. Under 'Using key', there are two fields: 'Primary key' with value 'Z2[REDACTED]yq' and a 'Regenerate' button, and 'Secondary key' with value 'N[REDACTED]8' and a 'Regenerate' button.

# Présentation Designer



# Menu Designer

The screenshot shows the Azure Machine Learning Studio (classic) interface. On the left, there is a vertical navigation menu with the following items:

- New
- Home
- Author
  - Notebooks
  - Automated ML
  - Designer
- Assets
  - Datasets
  - Experiments
  - Pipelines
  - Models
  - Endpoints
- Manage
  - Compute
  - Datastores
  - Data labeling

The "Designer" item under the "Author" section is highlighted with a gray background. To the right of the menu, the main workspace is visible. At the top of the workspace, the path "workshopUI > Designer > Aut" is displayed. Below the path is a search bar labeled "Search". The main content area contains a list of components or tools, each with an icon and a name followed by a right-pointing arrow:

- Datasets
- Data Input and Output
- Data Transformation
- Feature Selection
- Statistical Functions
- Machine Learning Algorithms
- Model Training
- Model Scoring & Evaluation
- Python Language
- R Language
- Text Analytics
- Recommendation
- Web Service



1. Réalisation d'un  
pipeline Designer

# Designer

workshopUI > Designer

## Designer

### New pipeline



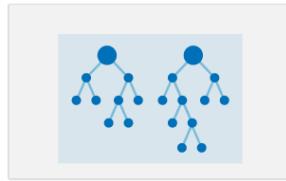
Easy-to-use prebuilt modules ⓘ



Sample 1: Regression -  
Automobile Price Prediction... ⓘ



Sample 2: Regression -  
Automobile Price Prediction... ⓘ



Sample 3: Binary Classification  
with Feature Selection - Inc... ⓘ



Sample 4: Binary Classification  
with custom Python script - ... ⓘ



Sample 5: Binary Classification -  
Customer Relationship Predi... ⓘ

Show more samples ▾

### Pipelines

Pipeline drafts Pipeline runs

⟳ Refresh 🗑 Delete

🔍 Search to filter items...

Name	Pipeline type	Updated on ↓	Created by
------	---------------	--------------	------------



No pipeline drafts to display

# Création d'un pipeline Designer

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Pipeline-Created-on-11-27-2019

Run Publish ...

Autosave on Search in canvas

Not started

New Home

Author

- Notebooks
- Automated ML
- Designer**

Assets

- Datasets
- Experiments
- Pipelines
- Models
- Endpoints

Manage

- Compute
- Datastores
- Data labeling

Search

Datasets Data Input and Output Data Transformation Feature Selection Statistical Functions Machine Learning Algorithms Model Training Model Scoring & Evaluation Python Language R Language Text Analytics Recommendation Web Service

**Settings**

**Default compute target** Select a compute target to run the pipeline.  
No compute target selected [Select compute target](#)

**Pipeline parameters** +  
No parameters selected

**Draft details**

Draft name: Pipeline-Created-on-11-2019  
Draft description (optional): Pipeline created on 20191127

Created on: 11/27/2019 04:22:42 PM  
Created by: Serge Retkowsky  
Last edit time: 11/27/2019 04:22:42 PM

Navigator

Navigator

# Sélection des données sources

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Draft Pipeline-Created-on-11-27-2019

Run Publish ...

Search

Datasets

Autosave on

Search in canvas

Titanic-l8r5gkgofl

My Datasets

Titanic-l8r5gkgofl

Samples

Adult Census Income Binary...

Automobile price data (Raw)

CRM Appetency Labels Shar...

CRM Churn Labels Shared

CRM Dataset Shared

CRM Upselling Labels Shared

Flight Delays Data

German Credit Card UCI dat...

IMDB Movie Titles

Movie Ratings

Weather Dataset

Wikipedia SP 500 Dataset

Data Input and Output

Titanic-l8r5gkgofl

Parameters Outputs

ID ac41a36d-f8a2-4531-901d-9bab50c89ed1

Dataset name Titanic-l8r5gkgofl

Datasource type AmlDataset

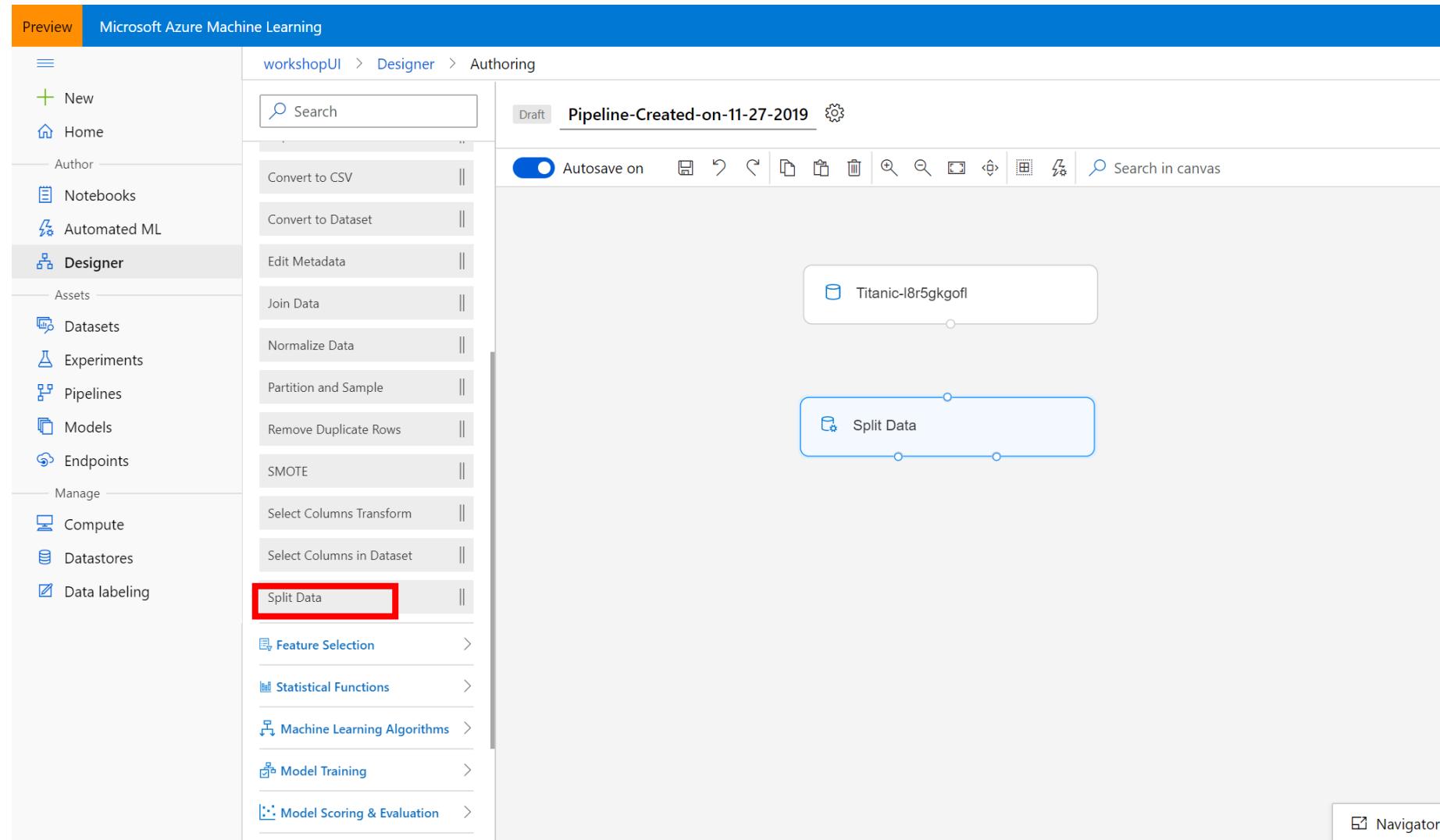
Description Dataset is created from URL: <https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv>

Data type DataFrameDirectory

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, there's a navigation sidebar with options like New, Home, Designer (which is selected), and various ML components. The main workspace is titled 'Pipeline-Created-on-11-27-2019'. In the center, a dataset named 'Titanic-l8r5gkgofl' is selected from a list of datasets. To the right, a detailed view of this dataset is shown, including its ID, name, source URL, and data type. The dataset is described as being created from a URL: 'https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv'. The data type is listed as 'DataFrameDirectory'.

## Partitionnement des données



# Régression logistique

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Draft Pipeline-Created-on-11-27-2019

Autosave on

Search in canvas

Titanic-l8r5kgofl

Split Data

Two-Class Logistic Regression

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, there's a navigation sidebar with sections like New, Home, Author, Designer (which is selected), Assets, Datasets, Experiments, Pipelines, Models, Endpoints, Manage, Compute, Datastores, and Data labeling. Under the Designer section, there are several machine learning models listed: Multiclass Decision Forest, Multiclass Logistic Regression (which is highlighted with a red box), Multiclass Neural Network, One-vs-All Multiclass, Two-Class Averaged Percep..., Two-Class Boosted Decision..., Two-Class Decision Forest, Two-Class Logistic Regression (which is also highlighted with a red box), Two-Class Neural Network, and Two-Class Support Vector ... Below these, there are sections for Model Training, Model Scoring & Evaluation, Python Language, R Language, Text Analytics, and Recommendation. The main workspace shows a pipeline titled "Pipeline-Created-on-11-27-2019". It starts with a "Titanic-l8r5kgofl" dataset, followed by a "Split Data" step, and ends with a "Two-Class Logistic Regression" step. The "Two-Class Logistic Regression" step is highlighted with a blue rounded rectangle.

# Decision Forest

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Search Pipeline-Created-on-11-27-2019 ⚙️

Autosave on

Search in canvas

Titanic-l8r5kgofl

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Multiclass Decision Forest

Multiclass Logistic Regression

Multiclass Neural Network

One-vs-All Multiclass

Two-Class Averaged Percep...

Two-Class Boosted Decision...

Two-Class Decision Forest

Two-Class Logistic Regression

Two-Class Neural Network

Two-Class Support Vector ...

Model Training

Model Scoring & Evaluation

Python Language

R Language

Text Analytics

Recommendation

Web Service

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. The left sidebar has 'Designer' selected. The main area displays a pipeline titled 'Pipeline-Created-on-11-27-2019'. The pipeline consists of several components connected by arrows: 'Titanic-l8r5kgofl' (dataset) feeds into 'Split Data', which then splits into 'Two-Class Logistic Regression' and 'Two-Class Decision Forest'. The 'Two-Class Decision Forest' component is highlighted with a red border. Other components visible include 'Multiclass Decision Forest', 'Multiclass Logistic Regression', 'Multiclass Neural Network', 'One-vs-All Multiclass', 'Two-Class Averaged Percep...', 'Two-Class Boosted Decision...', and 'Two-Class Support Vector ...'. The bottom navigation bar includes 'Model Training', 'Model Scoring & Evaluation', 'Python Language', 'R Language', 'Text Analytics', 'Recommendation', and 'Web Service'.

# Objet Train pour l'apprentissage

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Search: train

Draft Pipeline-Created-on-11-27-2019

Autosave on

Model Training

- Train Clustering Model
- Train Model**
- Tune Model Hyperparameters

Recommendation

- Train SVD Recommender

Canvas:

- Titanic-l8r5gkgofl
- Split Data
- Two-Class Logistic Regression
- Two-Class Decision Forest
- Train Model (with warning icon)
- Train Model (with warning icon)

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, there's a navigation sidebar with sections like 'Author', 'Assets', and 'Manage'. Under 'Author', 'Designer' is selected. A search bar at the top right is set to 'train'. The main area displays a pipeline titled 'Pipeline-Created-on-11-27-2019' in 'Draft' mode. The pipeline consists of several components connected by arrows: 'Titanic-l8r5gkgofl' (input) → 'Split Data' → 'Two-Class Logistic Regression' → 'Train Model' (with a warning icon) → 'Two-Class Decision Forest' → 'Train Model' (with a warning icon). There are also two additional 'Train Model' components shown without connections. The interface includes various toolbars and settings at the top.

# Objet Score pour le scoring des modèles

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Draft Pipeline-Created-on-11-27-2019

Score Model

Autosave on

Search in canvas

Titanic-l8r5kgkofl

Split Data

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Train Model

Score Model

Train Model

Score Model

Navigator

```
graph TD; A[Titanic-l8r5kgkofl] --> B[Split Data]; B --> C[Two-Class Logistic Regression]; C --> D[Train Model]; D --> E[Score Model]; B --> F[Two-Class Decision Forest]; F --> G[Train Model]; G --> H[Score Model];
```

# Objet Evaluate pour l'évaluation des modèles

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

evaluate

Model Scoring & Evaluation

Evaluate Model (highlighted with a red box)

Recommendation

Evaluate Recommender

Pipeline-Created-on-11-27-2019

Autosave on

Search in canvas

Titanic-l8r5kgkofl

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Train Model (with a yellow warning icon)

Score Model

Evaluate Model

Train Model (with a yellow warning icon)

Score Model

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, the navigation menu is visible with 'Designer' selected. In the center, a pipeline titled 'Pipeline-Created-on-11-27-2019' is displayed. The pipeline starts with a 'Split Data' component, which feeds into two parallel paths. Each path contains a 'Two-Class Logistic Regression' component followed by a 'Train Model' component (each with a yellow warning icon) and a 'Score Model' component. The outputs from the 'Score Model' components converge at the final 'Evaluate Model' component. A search bar at the top is set to 'evaluate'. The 'Evaluate Model' component is highlighted with a red box.

# Connexion des objets

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

evaluate

Pipeline-Created-on-11-27-2019

Run Publish ...

Autosave on | Search in canvas

Draft autosaved on 11/27/2019, 4:27:35 PM

Titanic-l8r5kgkofl

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Train Model

Score Model

Evaluate Model

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, the navigation bar includes 'Preview', 'workshopUI > Designer > Authoring', a search bar ('evaluate'), and buttons for 'Run', 'Publish', and more. The main workspace is titled 'Pipeline-Created-on-11-27-2019'. It displays a flowchart of data processing steps:

- A dataset node 'Titanic-l8r5kgkofl' connects to a 'Split Data' node.
- The 'Split Data' node branches into two paths, each leading to a 'Train Model' step (one for 'Two-Class Logistic Regression' and one for 'Two-Class Decision Forest').
- Both 'Train Model' steps connect to their respective 'Score Model' steps.
- The outputs of the 'Score Model' steps converge to a final 'Evaluate Model' step at the bottom.

Each step in the pipeline has a small orange warning icon next to it. The interface also features a toolbar with various icons for file operations and a 'Search in canvas' feature.

# Choix de la variable à modéliser

workshopUI > Designer > Authoring

Pipeline-Created-on-11-27-2019

Run Publish ...

Autosave on

Model Scoring & Evaluation

Evaluate Model

Recommendation

Evaluate Recommender

Titanic-l8r5kgofl

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Train Model

Score Model

Evaluate Model

Search in canvas

Draft autosaved on 11/27/2019, 4:27:35 PM

Train Model

Label column \* Edit column

Column names: Survived

Compute target

A compute target must be set before run a ...

Use default compute target

No compute target selected

Use other compute target

Comment

Type description for the module here, it will display on the graph.

Help documentation

Trains a classification or regression model in a supervised manner. [Learn more](#)

Navigator

```
graph TD; DS[Titanic-l8r5kgofl] --> SD[Split Data]; SD --> LR[Two-Class Logistic Regression]; SD --> DF[Two-Class Decision Forest]; LR --> TM1[Train Model]; DF --> TM2[Train Model]; TM1 --> SM1[Score Model]; TM2 --> SM2[Score Model]; SM1 --> EM[Evaluate Model]; SM2 --> EM;
```

# Choix du compute server

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Pipeline

evaluate

Model Scoring & Evaluation

Evaluate Model

Recommendation

Evaluate Recommender

New

Home

Author

Notebooks

Automated ML

Designer

Datasets

Experiments

Pipelines

Models

Endpoints

Manage

Compute

Datastores

Data labeling

Set up compute target

Select existing

Create new

Existing compute target(s)

Refresh

Compute target name	Number of avail...	Region	Status ↓
clusterCPU	0 / 8	westus	Succeeded
cpu-cluster	0 / 1	westus	Succeeded

< Prev Next >

Save Cancel

Train Model

Label column \* Edit column

Column names: Survived

Compute target

A compute target must be set before run a ...

Use default compute target

Use other compute target

No compute target selected  
Select compute target

Comment

Type description for the module here, it will display on the graph.

Help documentation

Trains a classification or regression model in a supervised manner. [Learn more](#)

Navigator

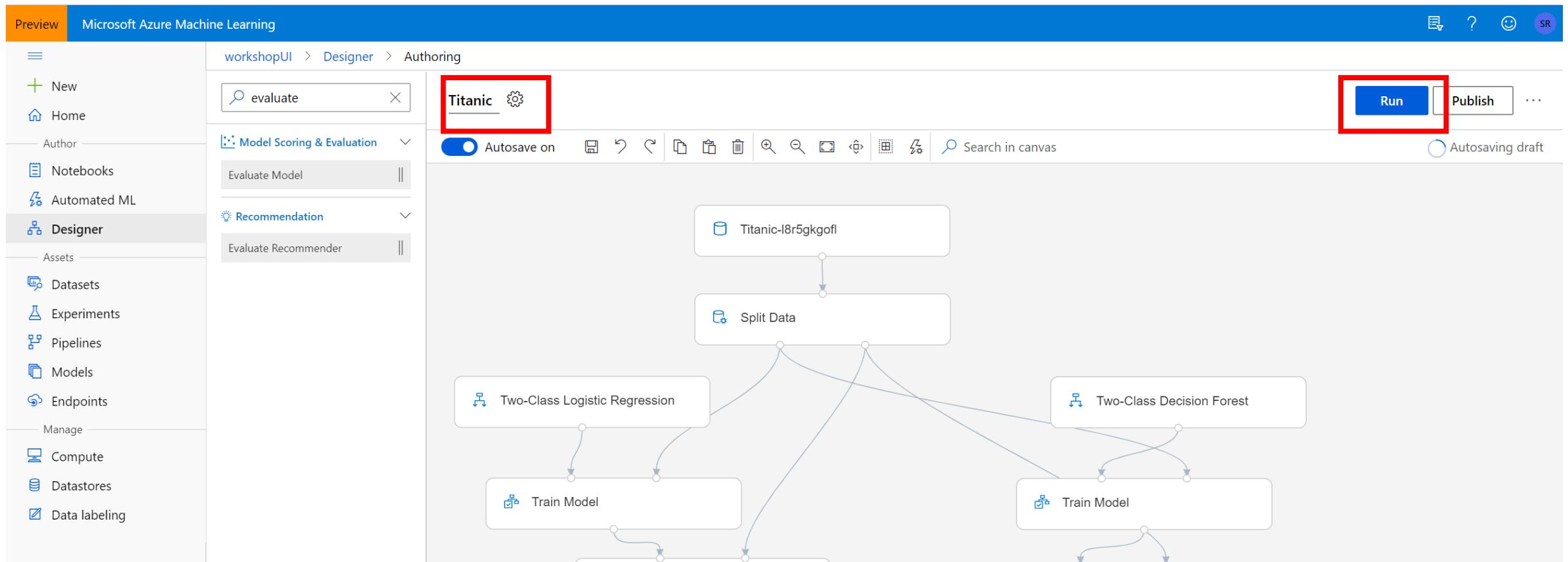
The screenshot displays the Microsoft Azure Machine Learning Studio interface. The left sidebar shows navigation categories like Assets, Compute, and Datastores. The main workspace is titled 'workshopUI > Designer > Authoring'. A central dialog box is open, titled 'Set up compute target', with the 'Select existing' radio button selected. It lists two existing compute targets: 'clusterCPU' and 'cpu-cluster', both in the 'westus' region and marked as 'Succeeded'. Below the table are 'Prev' and 'Next' navigation buttons. At the bottom of the dialog are 'Save' and 'Cancel' buttons. To the right of the dialog, a 'Train Model' module is visible in the pipeline, showing a 'Two-Class Decision Forest' structure. The overall interface is light blue and white, with orange highlights for active elements.

# On renomme le pipeline en « Titanic » et on clique sur Run

Screenshot of the Microsoft Azure Machine Learning Designer interface.

The pipeline titled "Titanic" is shown in the canvas. It starts with a "Titanic-l8r5gkgofl" dataset, which is split into two paths. The left path leads to a "Two-Class Logistic Regression" model, which then feeds into a "Train Model" step. The right path leads to a "Two-Class Decision Forest" model, which also feeds into a "Train Model" step. Both "Train Model" steps converge to a final output.

The pipeline has been renamed to "Titanic". The "Run" button in the top right corner is highlighted with a red box.



```
graph TD; A[Titanic-l8r5gkgofl] --> B[Split Data]; B --> C[Two-Class Logistic Regression]; C --> D[Train Model]; B --> E[Two-Class Decision Forest]; E --> F[Train Model]; D --> G[Final Output]; F --> G;
```

# Run du pipeline Titanic

workshopUI > Designer > Authoring

evaluate

Titanic

Model Scoring & Evaluation

Evaluate Model

Recommendation

Evaluate Recommender

Autosave on

Search in canvas

**Set up pipeline run**

Experiment \*

Run description \*

Compute target

Default clusterCPU

Train Model clusterCPU

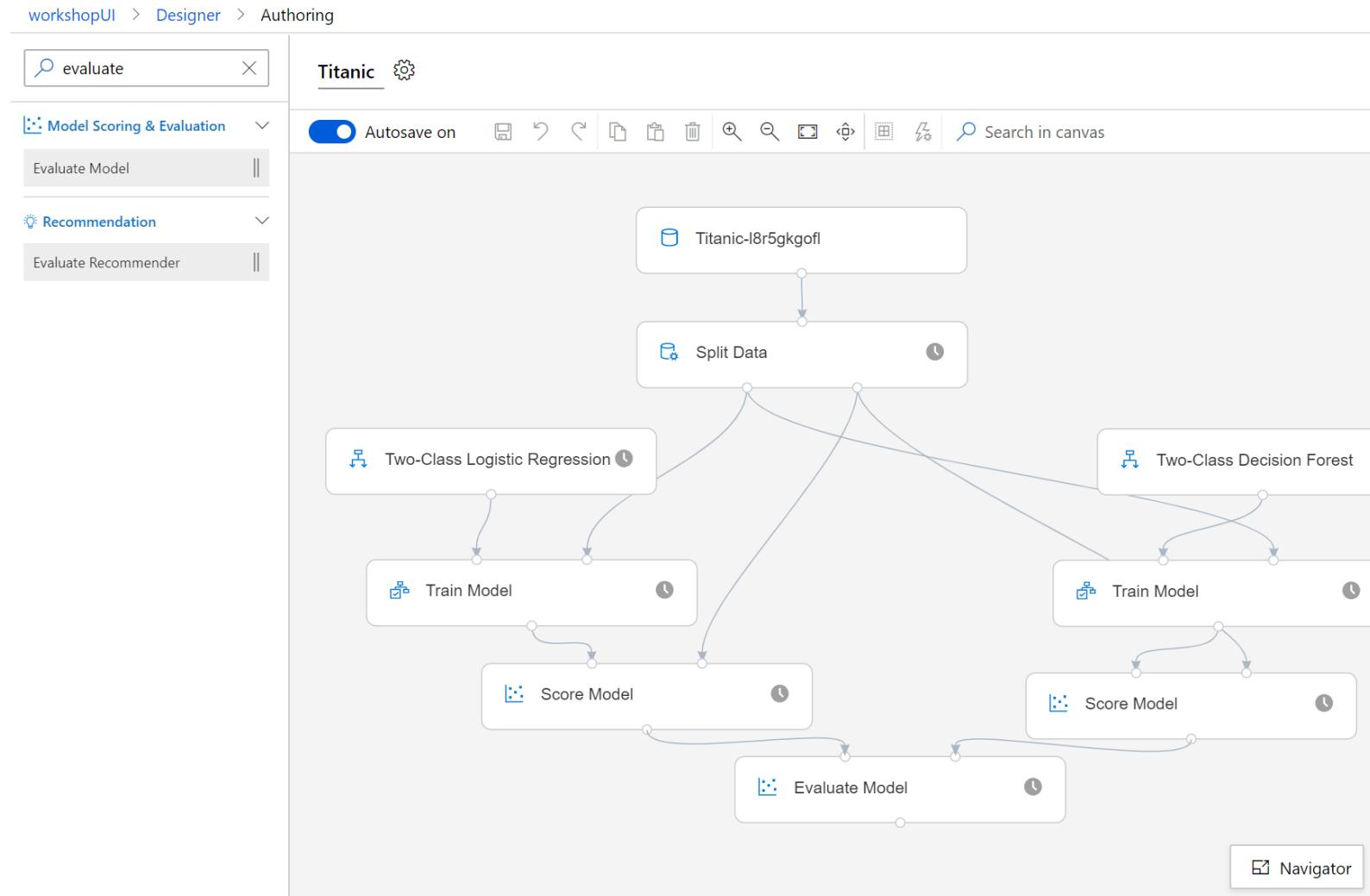
**Run** **Cancel**

Two-Class Logistic Regression → Train Model → Score Model → Evaluate Model

Two-Class Decision Forest → Train Model → Score Model → Evaluate Model

Navigator

# Run en cours



# Détails du Run

workshopUI > Designer > Authoring

X

**Titanic** ⚙️

Autosave on ⌚ Save Cancel Open Delete Search Find Copy Paste Search in canvas

Cancel run Publish ...

Running View run overview

**Run overview** X

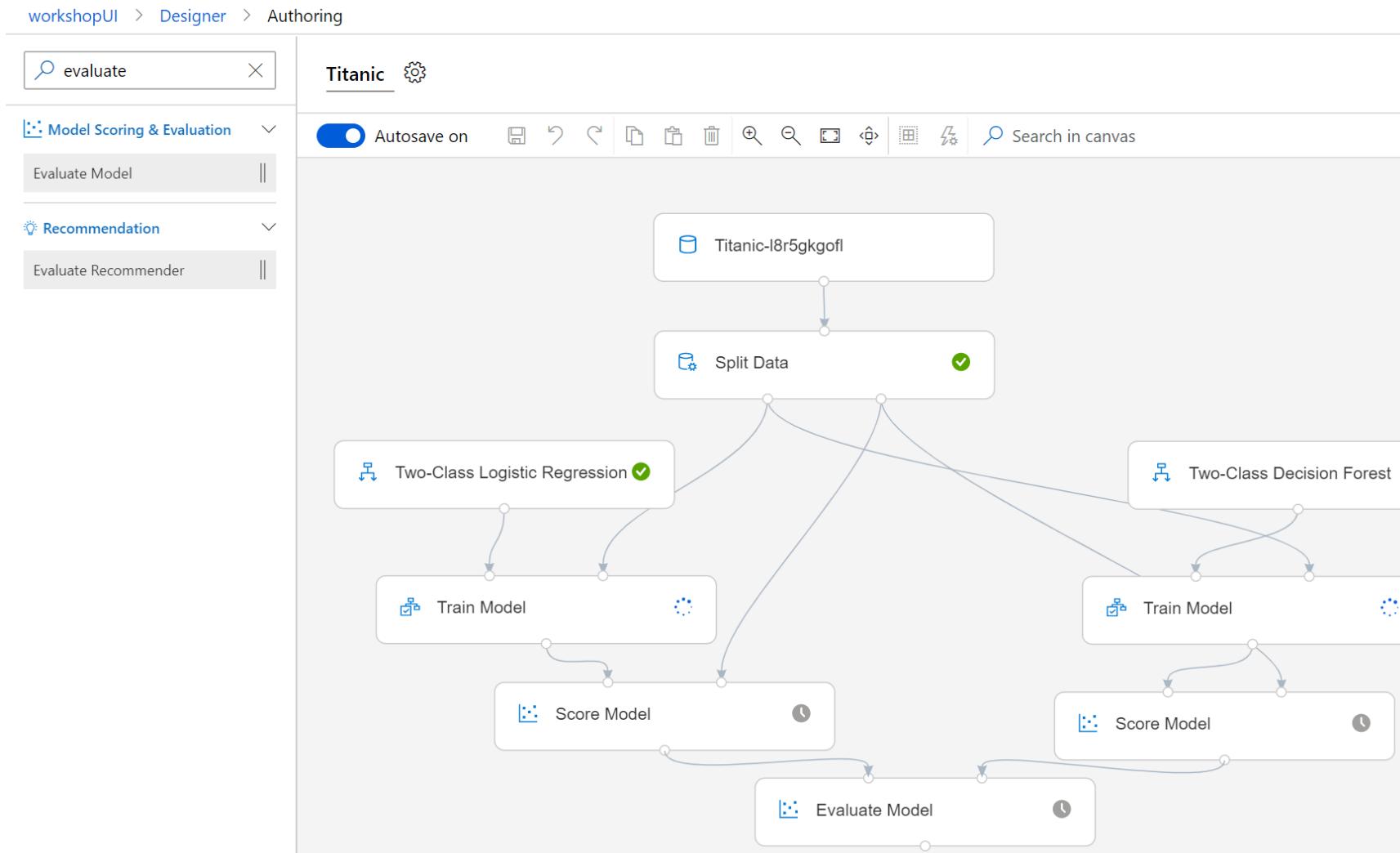
**Attributes** Pipeline parameters

Status: Running  
Submit time: -  
End time: -  
Duration: -  
Description: Analyse Titanic avec Azure ML Designer  
Run ID: 1c803ca9-cb21-4d8b-a5e0-e313d61f293  
Experiment: Titanic

```
graph TD; Input[Titanic-l8r5gkgofl] --> Split[Split Data]; Split --> LR[Two-Class Logistic Regression]; Split --> DF[Two-Class Decision Forest]; LR --> TrainLR[Train Model]; DF --> TrainDF[Train Model]; TrainLR --> ScoreLR[Score Model]; TrainDF --> ScoreDF[Score Model]; ScoreLR --> Evaluate[Evaluate Model]; ScoreDF --> Evaluate;
```

Navigator

# Avancement du Run



# Fin du Run

workshopUI > Designer > Authoring

Titanic

Search

Datasets >

Data Input and Output >

Data Transformation >

Feature Selection >

Statistical Functions >

Machine Learning Algorithms >

Model Training >

Model Scoring & Evaluation >

Python Language >

R Language >

Text Analytics >

Recommendation >

Web Service >

Run

Create inference pipeline

Publish

... Autosave on

Search in canvas

Run finished View run overview

Titanic-l8r5gkgoft

Split Data

Two-Class Logistic Regression

Two-Class Decision Forest

Train Model

Score Model

Evaluate Model

```
graph TD; A[Titanic-l8r5gkgoft] --> B[Split Data]; B --> C1[Two-Class Logistic Regression]; B --> C2[Two-Class Decision Forest]; C1 --> D1[Train Model]; C1 --> E1[Score Model]; C2 --> D2[Train Model]; C2 --> E2[Score Model]; D1 --> F[Evaluate Model]; D2 --> F; E1 --> F; E2 --> F;
```

Navigator

# Visualisation des résultats

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Titanic

Autosave on

Run Create inference pipeline Publish ...

Run finished View run overview

Split Data

Parameters Outputs Logs Details

Splitting mode \* Split Rows

Fraction of rows in the first output dataset... 0.5

Randomized split

Random seed \* 0

Stratified split \* False

Compute target

Use default compute target clusterCPU

Use other compute target

Comment

Navigator

The screenshot shows the Microsoft Azure Machine Learning Designer interface. On the left, the navigation pane is visible with sections like Author, Designer (selected), Assets, and Manage. The Designer section contains sub-options such as Datasets, Data Input and Output, Data Transformation, Feature Selection, Statistical Functions, Machine Learning Algorithms, Model Training, Model Scoring & Evaluation, Python Language, R Language, Text Analytics, Recommendation, and Web Service. The main workspace is titled "Titanic" and contains a flowchart of machine learning steps. A "Split Data" component is highlighted with a context menu open, showing options like "Copy" and "Delete". The pipeline includes components for "Two-Class Logistic Regression", "Two-Class Decision Forest", "Train Model", "Score Model", and "Evaluate Model". The "Evaluate Model" component has a green checkmark. The right side of the screen displays the "Split Data" configuration panel with settings for splitting mode (Split Rows, 0.5 fraction), randomized split, random seed (0), and stratified split (False). Compute target settings show "clusterCPU" selected. A "Comment" field is also present in the panel.

# Visualisation des résultats

## Split Data result visualization

X

Results dataset1 Results dataset2

Rows Columns (up to 100 columns/rows could be visualized)  
446 12

PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	...
236	0	3	Harknett, Miss. Alice Phoebe	female	30	0	0	W/C. 660	
610	1	1	Shutes, Miss. Elizabeth W	female	40	0	0	PC 17582	
461	1	1	Anderson, Mr. Harry Bengtsson,	male	48	0	0	19952	

### Age

#### Statistics

Mean	30.1949
Median	28.25
Min	0.42
Max	74
Standard deviation	14.8991
Unique values	74
Missing values	92
Feature type	Numeric Feature

#### Visualizations

Close

# Evaluation des modèles

Search Titanic Run Create inference

Evaluate Model result visualization

Left port Right port

● Scored dataset (left port) ● Scored dataset to compare (right port)

ROC curve

Precision-recall curve

Lift curve

Threshold  Predicted

Close

Evaluate Model

# Evaluation des modèles



# Publication du pipeline

Screenshot of the Azure Machine Learning Studio interface showing the publication process of a pipeline.

The main window displays a pipeline graph titled "Titanic". The graph consists of three main steps: "Two-Class Logistic Regression", "Train Model", and "Score Model". The "Train Model" step is highlighted with a green checkmark, indicating it has been successfully executed.

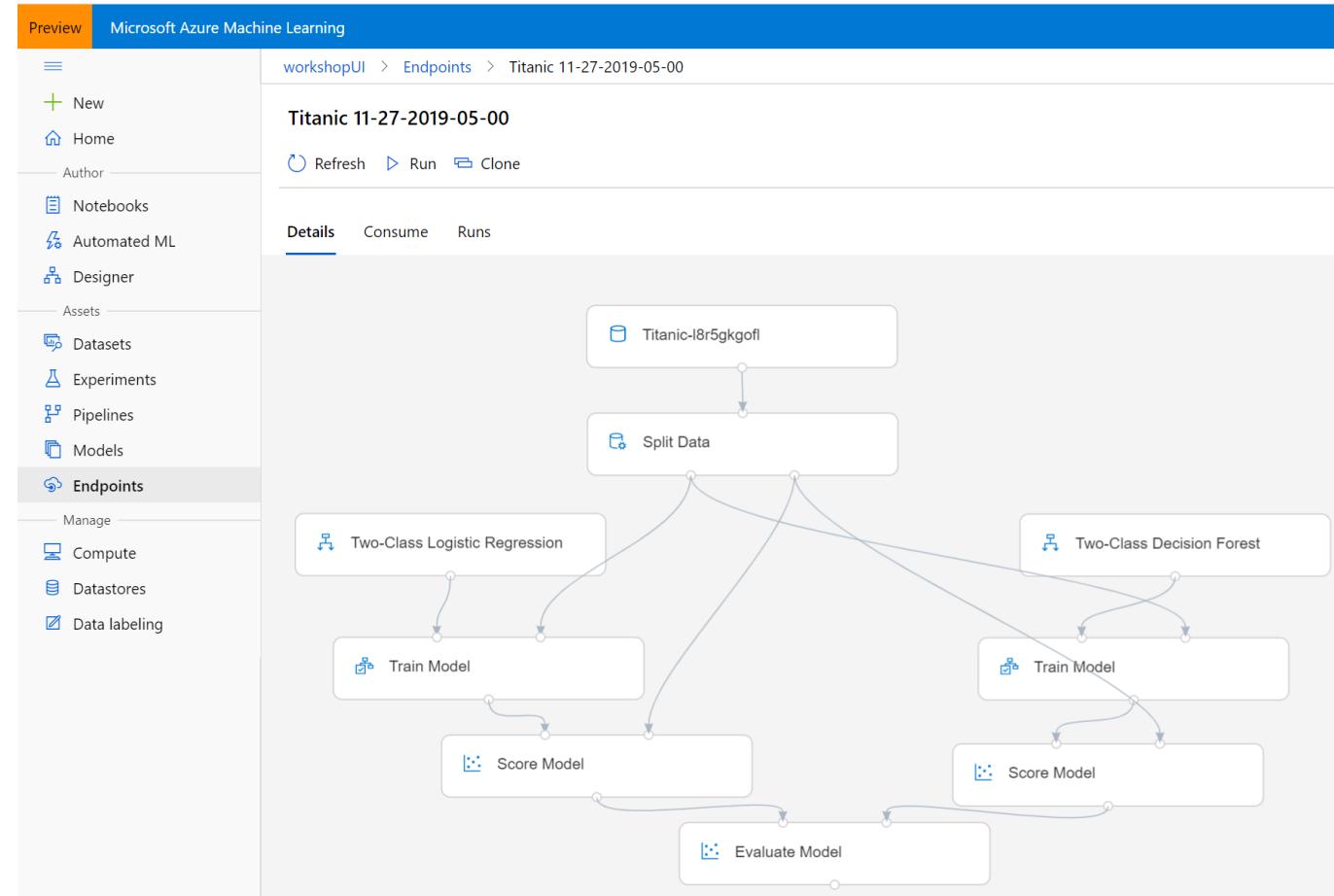
A modal dialog box titled "Set up published pipeline" is open in the center. It contains the following fields:

- PipelineEndpoint \***: A dropdown menu showing "+ New PipelineEndpoint".
- New PipelineEndpoint name \***: An input field containing "Titanic".
- PipelineEndpoint description (optional)**: A text area containing "Pipeline Titanic".
- Published pipeline**: A section showing "Titanic 11-27-2019-05-00".
- Checkboxes**:
  - Set as default pipeline for this endpoint.
  - Continue on failure step
- Pipeline parameters and default values**: A note stating "No pipeline parameters are specified. Set a data node as a pipeline parameter to use different data input when invoking this endpoint."

At the bottom of the modal are two buttons: "Publish" (highlighted in blue) and "Cancel".

At the top right of the main interface, there are buttons for "Run", "Create inference pipeline", "Publish" (disabled), and more options. To the right of the graph, there is a panel titled "Evaluate Model" with tabs for "Parameters", "Outputs", "Logs", and "Details". The "Parameters" tab shows "No parameter". The "Compute target" section includes a radio button for "Use default compute target" (selected) and "clusterCPU". There is also a link for "Use other compute target". The "Comment" section has a placeholder for "Type description for the module here, it will display on the graph." The "Help documentation" section describes the Evaluate Model module and provides a "Learn more" link.

# Visualisation du pipeline



# Visualisation du pipeline

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic 11-27-2019-05-00

Titanic 11-27-2019-05-00

Refresh Run Clone

Details Consume Runs

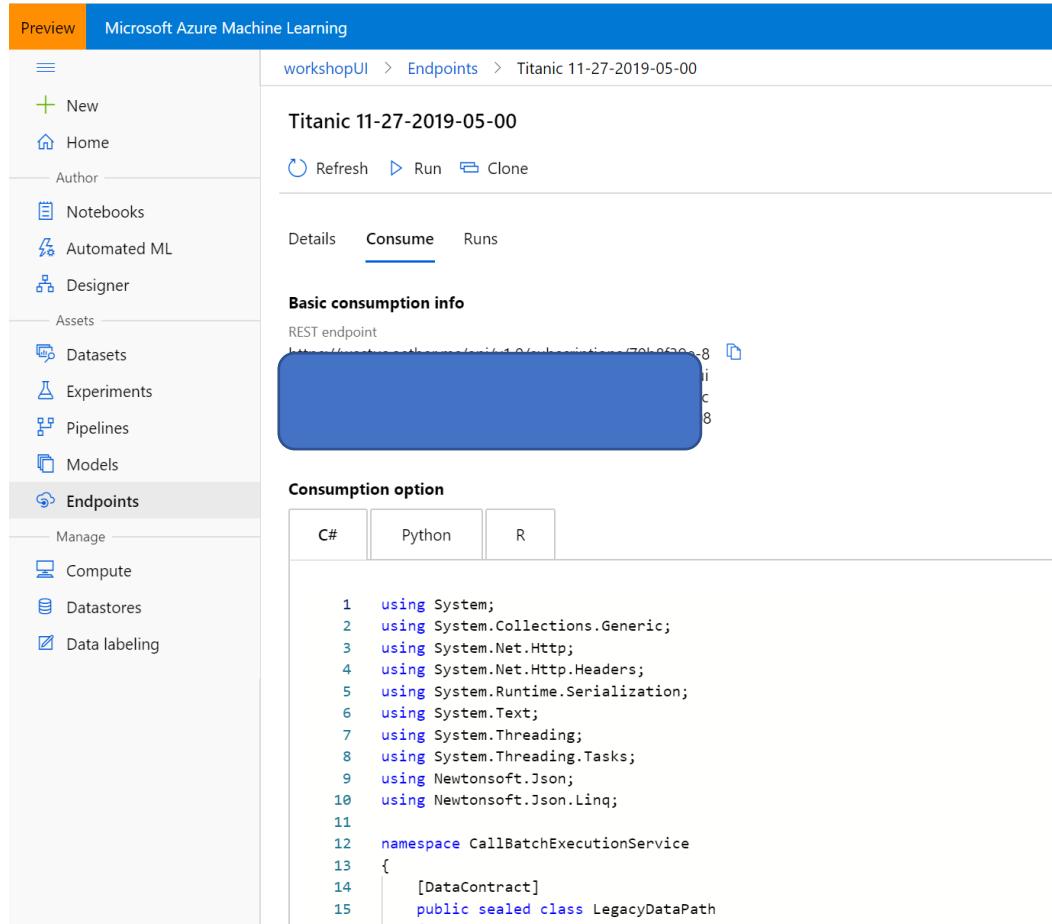
**Basic consumption info**

REST endpoint  
https://knn-endpoint.southcentralus.azurecontainer.io:443/predict?api-version=1.0

**Consumption option**

C# Python R

```
1  using System;
2  using System.Collections.Generic;
3  using System.Net.Http;
4  using System.Net.Http.Headers;
5  using System.Runtime.Serialization;
6  using System.Text;
7  using System.Threading;
8  using System.Threading.Tasks;
9  using Newtonsoft.Json;
10 using Newtonsoft.Json.Linq;
11
12 namespace CallBatchExecutionService
13 {
14     [DataContract]
15     public sealed class LegacyDataPath
16     {
17         [DataMember]
18         public string DataPath { get; set; }
19     }
20 }
```



# Visualisation du pipeline

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic 11-27-2019-05-00

### Titanic 11-27-2019-05-00

Refresh Run Clone

Runs

Run status	Count	Status
Running	0	Completed
Failed	0	Other

Duration (last 0) No Data

Run	Created time	Duration	Status	Description	Experiment	Submitted by
No pipeline runs to display						



# Nouvelle exécution du pipeline

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic 11-27-2019-05-00

Titanic 11-27-2019-05-00

Refresh Run Clone

Details Consume Runs

Run status

Running	Completed
0	0

Failed	Other
0	0

No pipeline runs to display

Set up pipeline run

Experiment \* Titanic

Run description \* Nouveau Runtime

Compute target

Default clusterCPU

Train Model clusterCPU

Parameters

No parameters defined

Run Cancel

# Nouveau run du pipeline

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic 11-27-2019-05-00

ⓘ Pipeline run has been submitted. [View Details](#)

Titanic 11-27-2019-05-00

⟳ Refresh ⏪ Run 🤖 Clone

Details Consume Runs

Run status Duration (last 0)

Running	Completed
0	0

Failed	Other
0	1

No Data

Search to filter items...

Run	Created time ↓	Duration	Status	Description	Experiment	Submitted by	Tags
Run 38	11/27/2019, 5:11:16 PM	-	Not started	Nouveau Runtime	Titanic	Serge Retkowsky	azureml.Designer: true

< Prev Next >

The screenshot shows the Microsoft Azure Machine Learning studio interface. The left sidebar is titled 'Preview' and contains navigation links: New, Home, Author (Notebooks, Automated ML, Designer), Assets (Datasets, Experiments, Pipelines, Models), and Endpoints (selected). Below these are Manage sections for Compute, Datastores, and Data labeling. The main content area shows an endpoint named 'Titanic 11-27-2019-05-00'. A message at the top says 'Pipeline run has been submitted.' with a link to 'View Details'. Below this is a summary card for 'Runs' with four categories: Running (0), Completed (0), Failed (0), and Other (1). A table below lists one run entry: 'Run 38' created on '11/27/2019, 5:11:16 PM' with a status of 'Not started', description 'Nouveau Runtime', experiment 'Titanic', submitted by 'Serge Retkowsky', and tag 'azureml.Designer: true'. Navigation arrows at the bottom allow for viewing previous or next runs.

# Fin du run du nouveau pipeline

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic 11-27-2019-05-00

Pipeline run has been submitted. [View Details](#)

Titanic 11-27-2019-05-00

Refresh Run Clone

Runs

Run status	Count
Running	0
Completed	1
Failed	0
Other	0

Duration (last 1)

Search to filter items...

Run	Created time	Duration	Status	Description	Experiment	Submitted by	Tags
Run 38	11/27/2019, 5:11:16 PM	7s	Completed	Nouveau Runtime	Titanic	Serge Retkowsky	azureml.Designer: true

< Prev Next >

# Visualisation depuis le studio des pipelines Designer

Preview Microsoft Azure Machine Learning

workshopUI > Designer

Designer

New pipeline

Show more samples ▾

Easy-to-use prebuilt modules ⓘ Sample 1: Regression - Automobile Price Prediction... ⓘ Sample 2: Regression - Automobile Price Prediction... ⓘ Sample 3: Binary Classification with Feature Selection - Inc... ⓘ Sample 4: Binary Classification with custom Python script - ... ⓘ Sample 5: Binary Classification - Customer Relationship Predi... ⓘ

Pipelines

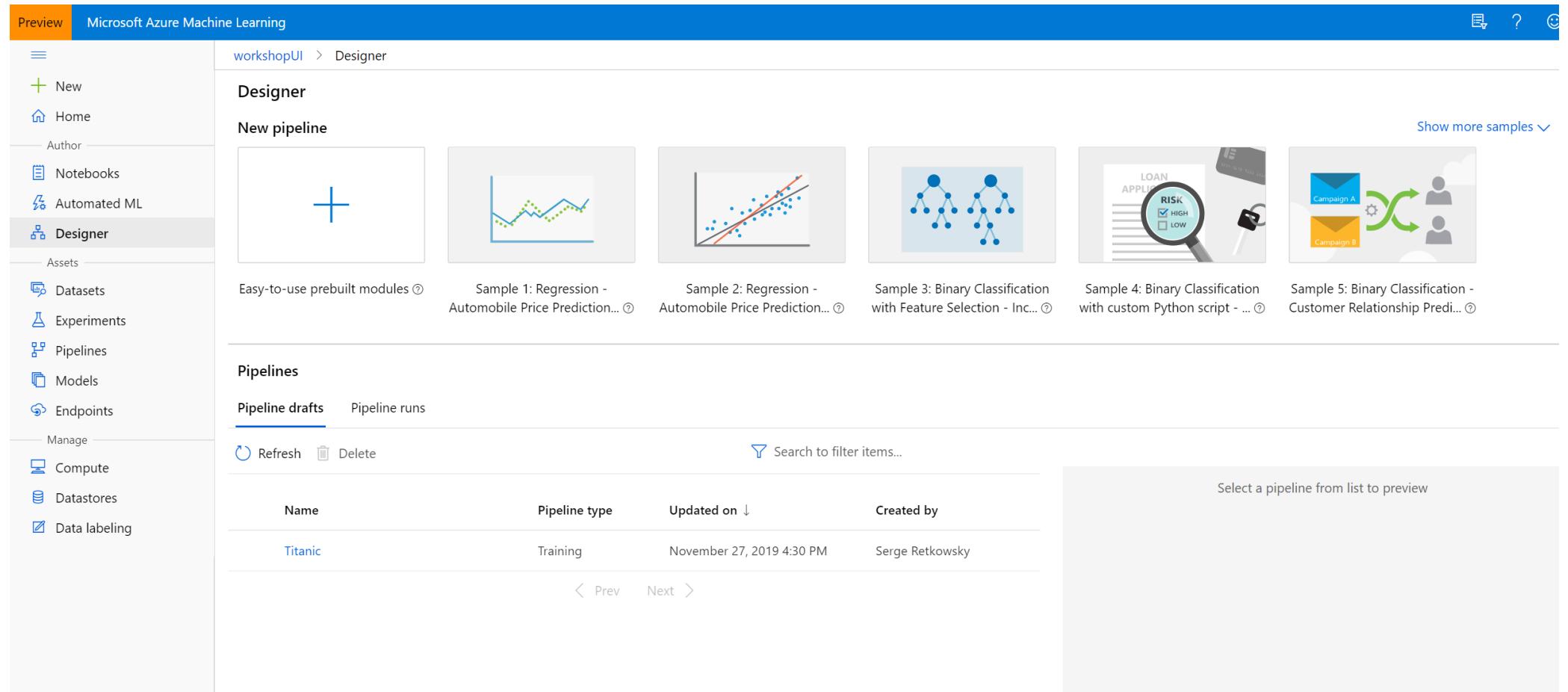
Pipeline drafts Pipeline runs

Refresh Delete Search to filter items...

Name	Pipeline type	Updated on ↓	Created by
Titanic	Training	November 27, 2019 4:30 PM	Serge Retkowsky

< Prev Next >

Select a pipeline from list to preview



# Visualisation depuis le studio des pipelines Designer

Preview Microsoft Azure Machine Learning

workshopUI > Designer

## Designer

### New pipeline

Show more samples ▾

Easy-to-use prebuilt modules	Sample 1: Regression - Automobile Price Prediction...	Sample 2: Regression - Automobile Price Prediction...	Sample 3: Binary Classification with Feature Selection - Inc...	Sample 4: Binary Classification with custom Python script - ...	Sample 5: Binary Classification - Customer Relationship Predi...

## Pipelines

Pipeline drafts Pipeline runs

Refresh Search to filter items

Run	Created time	Duration	Status	Description	Experiment	Submitted by	Tags
Run 38	11/27/2019, 5:11:16 PM	7s	Completed	Nouveau Runtime	Titanic	Serge Retkowsky	azureml.Designer: true azureml... +1
Run 29	11/27/2019, 4:30:29 PM	16m 55s	Completed	Analyse Titanic avec Azure ML ...	Titanic	Serge Retkowsky	azureml.Designer: true azureml.pipel...

< Prev Next >



2. Déploiement du  
modèle en AKS

# Création d'un pipeline Real Time

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Titanic

Autosave on

Run

Create inference pipeline

Real-time inference pipeline

Batch inference pipeline

Search in canvas

Dataset

Data Input and Output

Data Transformation

Feature Selection

Statistical Functions

Machine Learning Algorithms

Model Training

Model Scoring & Evaluation

Python Language

R Language

Text Analytics

Recommendation

Web Service

Split Data

Titanic-l8r5kgkofl

Two-Class Logistic Regression

Train Model

Score Model

Evaluate Model

Two-Class Decision Forest

Train Model

Score Model

Evaluate Model

Settings

Default compute target

clusterCPU

Select compute target

Pipeline parameters

No parameters selected

Draft details

Draft name

Titanic

Draft description (optional)

Pipeline created on 20191127

Created on

11/27/2019 04:22:42 PM

Created by

Serge Retkowsky

Last edit time

11/27/2019 04:30:27 PM

Last edited by

Navigator

```
graph TD; Split[Split Data] --> LR1[Two-Class Logistic Regression]; Split --> DF[Two-Class Decision Forest]; LR1 --> Train1[Train Model]; DF --> Train2[Train Model]; Train1 --> Score1[Score Model]; Train2 --> Score2[Score Model]; Score1 --> Eval1[Evaluate Model]; Score2 --> Eval2[Evaluate Model]; Eval1 --> Eval2
```

# Edition du pipeline Real Time

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline

Titanic-real time inference

Autosave on

Run Deploy ...

Not started

Search in canvas

Web Service Input

Titanic-l8r5gkgoI

Score Model

Web Service Output

Evaluate Model

Settings

Default compute target

clusterCPU

Select compute target

Pipeline parameters

No parameters selected

Draft details

Draft name

Titanic-real time inference

Draft description (optional)

Created on

11/27/2019 05:17:44 PM

Created by

Serge Retkowsky

Last edit time

Navigator

# Sauvegarde du pipeline Real Time

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline

Titanic-real time inference

Search

Datasets >

Autosave on

Data Input and Output >

Data Transformation >

Feature Selection >

Statistical Functions >

Machine Learning Algorithms >

Model Training >

Model Scoring & Evaluation >

Python Language >

R Language >

Text Analytics >

Recommendation >

Web Service >

Run Deploy ...

Draft saved on 11/27/2019, 5:18:46 PM

Set up pipeline run

Experiment \* Titanic

Run description \* Titanic-real time inference

Compute target Default clusterCPU

Run Cancel

MD-Titanic-Train\_Model-Trai...

```
graph LR; D[MD-Titanic-Train] --> Model[Model]; Model --> Scoring[Scoring]
```

# Exécution du pipeline Real Time

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline

Titanic-real time inference

Cancel run Deploy ...

Autosave on Search in canvas

Running View run overview

Search

Datasets >

Data Input and Output >

Data Transformation >

Feature Selection >

Statistical Functions >

Machine Learning Algorithms >

Model Training >

Model Scoring & Evaluation >

Python Language >

R Language >

Text Analytics >

Recommendation >

Web Service >

Web Service Input

Titanic-l8r5kgofl

MD-Titanic-Train\_Model-Trai...

Score Model

Web Service Output

```
graph LR; WSInput[Web Service Input] --> ScoreModel[Score Model]; TS[Titanic-l8r5kgofl] --> ScoreModel; MD[MD-Titanic-Train_Model-Trai...] --> ScoreModel; ScoreModel --> WSOutput[Web Service Output]
```

# Fin de l'exécution du pipeline

Sine Learning

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline

Titanic-real time inference

Run Deploy ...

Run finished View run overview

Search

Datasets >

Data Input and Output >

Data Transformation >

Feature Selection >

Statistical Functions >

Machine Learning Algorithms >

Model Training >

Model Scoring & Evaluation >

Python Language >

R Language >

Text Analytics >

Recommendation >

Autosave on

Search in canvas

```
graph LR; WebServiceInput[Web Service Input] --> ScoreModel[Score Model]; ScoreModel --> WebServiceOutput[Web Service Output];
```

# Création d'un cluster d'inférence (AKS)

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Inference Clusters

**Compute**

Notebook VMs Training Clusters **Inference Clusters** Attached Compute

+ New Refresh Delete Detach

Name	Type	Created/Attached	Provisioning state	Created on ↓
------	------	------------------	--------------------	--------------

The screenshot shows the Microsoft Azure Machine Learning interface. The top navigation bar has 'Preview' and 'Microsoft Azure Machine Learning'. Below it, the breadcrumb navigation shows 'workshopUI > Compute > Inference Clusters'. The main title is 'Compute'. Below the title, there are tabs: 'Notebook VMs', 'Training Clusters', 'Inference Clusters' (which is highlighted with a red box), and 'Attached Compute'. Underneath the tabs is a toolbar with icons for '+ New', 'Refresh', 'Delete', and 'Detach'. At the bottom is a table header with columns: Name, Type, Created/Attached, Provisioning state, and Created on (with a downward arrow). To the left of the main content is a sidebar with sections: 'New', 'Home', 'Author', 'Notebooks', 'Automated ML', 'Designer', 'Assets', 'Datasets', 'Experiments', 'Pipelines', and 'Models'. The 'Inference Clusters' tab is the active one.

# Définition AKS

New Inference Cluster

Compute name \* [?](#)

Kubernetes Service

[Create new](#) [Use existing](#)

Region \* [?](#)

West Europe

Virtual Machine size \* [?](#)

Standard\_D3\_v2

Cluster purpose

Production  Dev-test

Number of nodes \* [?](#)

Network configuration [?](#)

[Basic](#) [Advanced](#)

Enable SSL configuration [?](#)

---

[Create](#) [Cancel](#)

Création en cours (prévoir 10 minutes environ) pour créer l'instance AKS

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Inference Clusters

**Compute**

Notebook VMs Training Clusters **Inference Clusters** Attached Compute

+ New Refresh Delete Detach

Name	Type	Created/Attached	Provisioning state	Created on
ClusterAKS	Kubernetes Service	Created	Creating	November 27, 2019 5:34 PM

< Prev Next >

Compute Datastores Data labeling

The screenshot shows the Microsoft Azure Machine Learning interface. The left sidebar has sections for Author (Notebooks, Automated ML, Designer), Assets (Datasets, Experiments, Pipelines, Models, Endpoints), and Manage (Compute, Datastores, Data labeling). The Compute section is currently selected. The main content area is titled 'Compute' and shows four tabs: Notebook VMs, Training Clusters, Inference Clusters (which is selected and highlighted in blue), and Attached Compute. Below the tabs are buttons for '+ New', Refresh, Delete, and Detach. A table lists the existing inference clusters, showing one entry for 'ClusterAKS' which is a 'Kubernetes Service' and is currently in a 'Creating' state, having been created on November 27, 2019 at 5:34 PM. Navigation arrows for previous and next pages are at the bottom of the table.

# Fin de la création AKS

Preview Microsoft Azure Machine Learning

workshopUI > Compute > Inference Clusters

## Compute

Notebook VMs Training Clusters **Inference Clusters** Attached Compute

+ New Refresh Delete Detach Search to filter items...

Name	Type	Created/Attached	Provisioning state	Created on
ClusterAKS	Kubernetes Service	Created	Succeeded	November 27, 2019 5:34 PM

< Prev Next >

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

# Déploiement

---

Run

Deploy

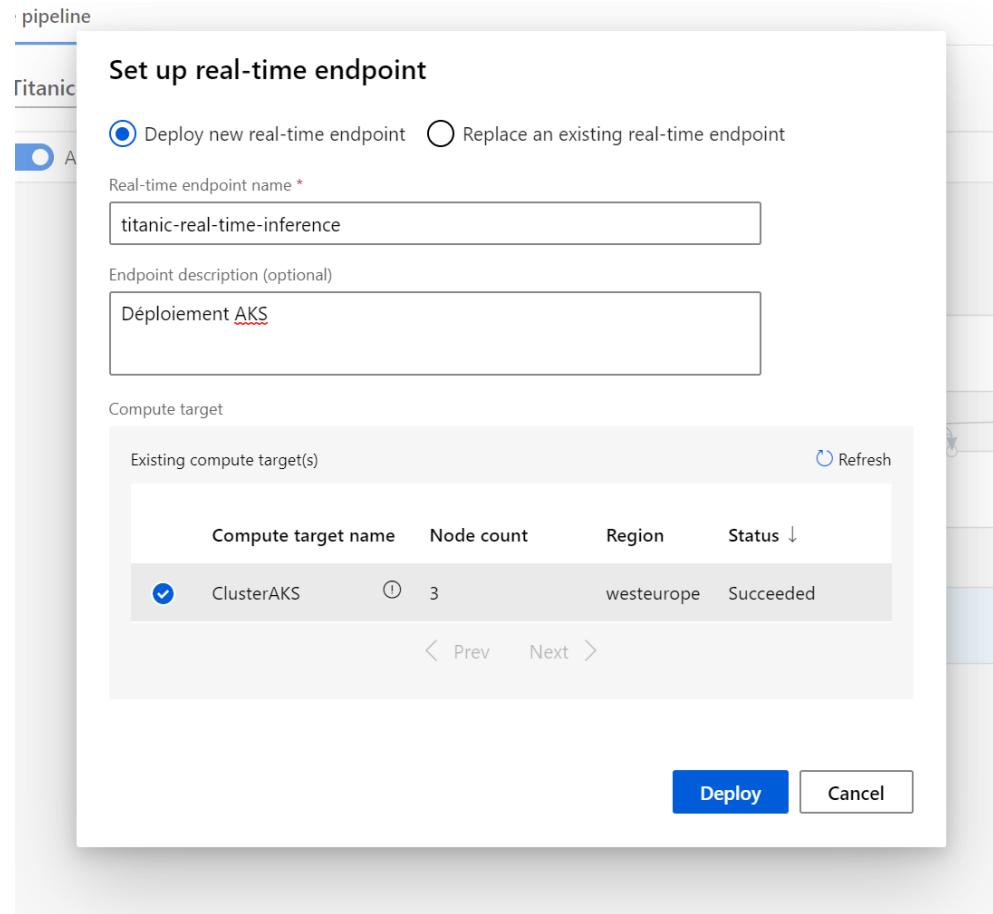
...

---

Run finished [View run overview](#)

---

# Déploiement du pipeline en AKS



# Déploiement AKS en cours

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Deploy: Preparing to deploy

Training pipeline Real-time inference pipeline

Notebooks

Automated ML

Designer

Datasets

Experiments

Pipelines

Models

Endpoints

Manage

Compute

Datastores

Data labeling

Search

Titanic-real time inference

Autosave on

Run Deploy ...

Web Service Input

Titanic-l8r5gkgofl

Score Model

Web Service Output

Settings

Default compute target

clusterCPU

Select compute target

Pipeline parameters

No parameters selected

Draft details

Draft name

Titanic-real time inference

Draft description (optional)

Created on

11/27/2019 05:17:44 PM

Created by

Serge Retkowsky

Last edit time

Navigator

```
graph TD; WebServiceInput[Web Service Input] --> ScoreModel[Score Model]; ScoreModel --> WebServiceOutput[Web Service Output]; Dataset[Titanic-l8r5gkgofl]
```

# Modèle déployé dans AKS

titanic-real-time-inference	true
Tags	Min replicas
CreatedByAMLStudio: true	1
Created on	Max replicas
3/6/2020 6:05:12 PM	10
Last updated on	Target utilization
3/6/2020 6:05:17 PM	70%
Compute target	Refresh period
aksTitanic	1 s
REST endpoint	App Insights enabled
http://40	true
Key-based authentication enabled	Event Hubs enabled
true	false
Token-based authentication enabled	Storage enabled
false	false
Swagger URI	Region
http://40	westeurope
Related inference draft	Last edited by
<a href="#">Related inference draft</a>	N/A
	Created by
	N/A

# Modèle déployé dans AKS

The screenshot shows the Azure Machine Learning Studio interface for testing a deployed model. The left sidebar navigation bar includes options like Home, Author, Notebooks, Automated ML, Designer, Assets, Datasets, Experiments, Pipelines, Models, and Endpoints. The 'Endpoints' option is currently selected.

The main area has three tabs: Details, Test (which is selected), and Consume. Below the tabs, there are sections for 'Input data to test real-time endpoint' and 'Test result'.

**Input data to test real-time endpoint:**

- WebServiceInput0:** A dropdown menu is open, showing 'WebServiceInput0'. To its right are icons for 'grid' and 'CSV'.
- Passenger:** Input field contains '1'.
- Survived:** Input field is empty.
- Class:** Input field contains 'Lower Class'.
- Name:** Input field contains 'Braund, Mr. Owen Harris'.
- Sex:** Input field contains 'male'.
- Age:** Input field contains '22'.

**Test result:**

- WebServiceOutput0:** A dropdown menu is open, showing 'WebServiceOutput0'.
- key** **value**
- Survived false
- Class Lower Clas
- Sex male
- Age 22
- Siblings or Spouses 1
- Parents or children 0
- Port S
- Scored Labels** false
- Scored Probabilities** 0.125

A red box highlights the last two items in the 'Test result' table: 'Scored Labels' and 'Scored Probabilities'.

# Modèle déployé dans AKS

The screenshot shows the Azure Machine Learning studio interface. On the left, a sidebar navigation menu is visible with the following items:

- Automated ML
- Designer
- Assets
  - Datasets
  - Experiments
  - Pipelines
  - Models
- Endpoints** (selected)
- Manage
  - Compute
  - Datastores
  - Data Labeling

The main content area is titled "Basic consumption info". It includes fields for "REST endpoint" (with a placeholder "Infer") and "Inference key" (with a placeholder "Using key"). Below these are sections for "Primary key" and "Secondary key", each with a "Regenerate" button. A "Consumption option" section at the bottom shows tabs for C#, Python, and R, with the C# tab selected. To the right of the tabs is a code snippet:

```
1 // This code requires the Nuget package Microsoft.AspNet.WebApi.Client to be installed.  
2 // Instructions for doing this in Visual Studio:  
3 // Tools -> Nuget Package Manager -> Package Manager Console  
4 // Install-Package Newtonsoft.Json  
5  
6 using System;  
7 using System.Collections.Generic;  
8 using System.IO;  
9 using System.Net.Http;  
10 using System.Net.Http.Headers;  
11 using System.Text;  
12 using System.Threading.Tasks;  
13 using Newtonsoft.Json;
```



### 3. Déploiement du pipeline en batch

# Déploiement pipeline Batch

Preview Microsoft Azure Machine Learning

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline Batch inference pipeline

Titanic-batch inference

Search

Autosave on

Run Publish ...

Not started

Search in canvas

Settings

Default compute target ⓘ clusterCPU Select compute target

Pipeline parameters + No parameters selected

Draft details

Draft name Titanic-batch inference

Draft description (optional)

Created on 11/27/2019 05:57:07 PM

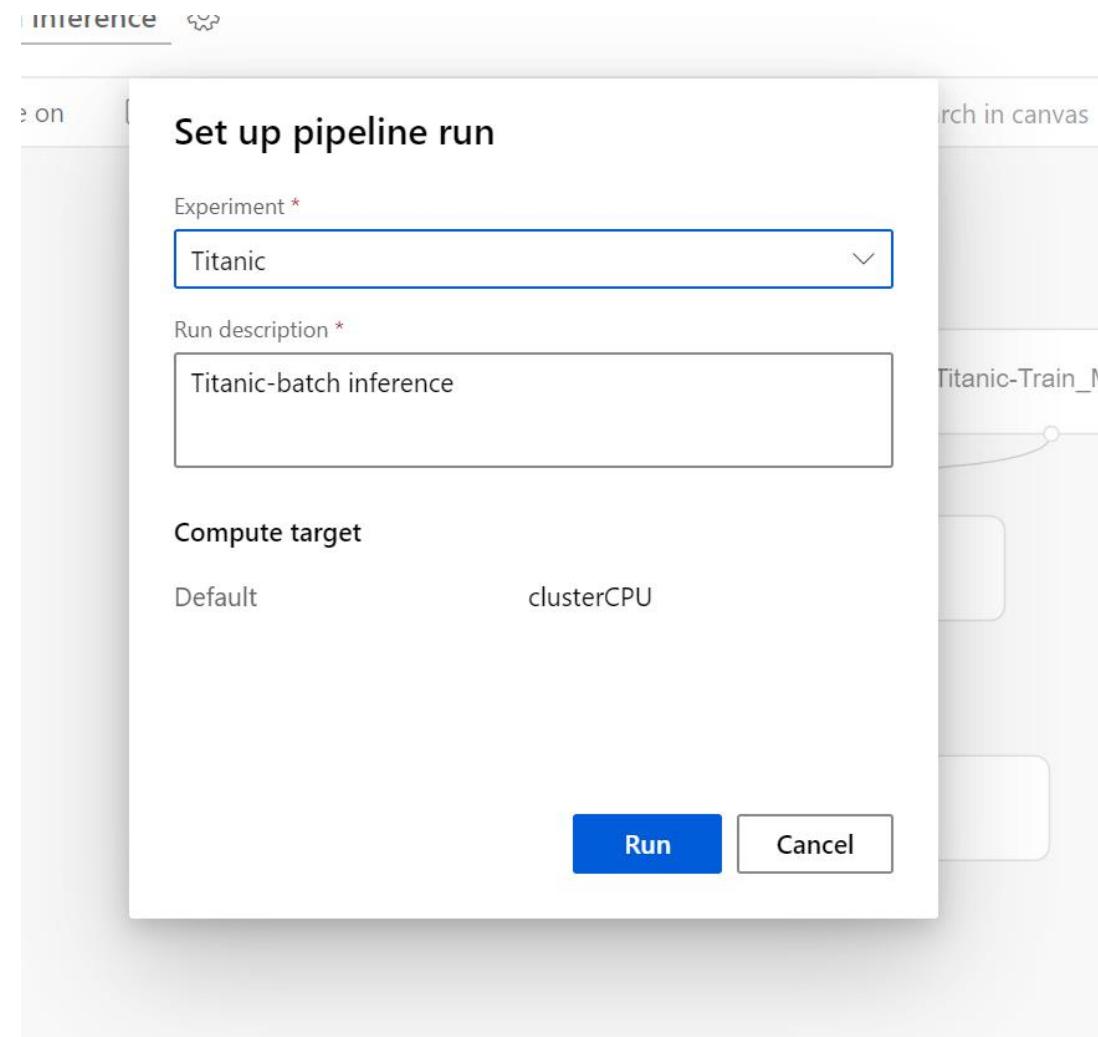
Created by Serge Retkowsky

Last edit time 11/27/2019 05:57:08 PM

Navigator

```
graph TD; A[Titanic-l8r5gkgofl] --> C[Score Model]; B[MD-Titanic-Train_Model-Trai...] --> C; C --> D[Evaluate Model]
```

# Déploiement Batch



# Création du pipeline batch

Preview Microsoft Azure Machine Learning

workshopUI > Designer > Authoring

Training pipeline Real-time inference pipeline Batch inference pipeline

Titanic-batch inference

Search ...

Autosave on Run finished View run overview

Datasets Data Input and Output Data Transformation Feature Selection Statistical Functions Machine Learning Algorithms Model Training Model Scoring & Evaluation Python Language R Language Text Analytics Recommendation Web Service

```
graph TD; A[Titanic-l8r5gkgofl] --> B[MD-Titanic-Train_Model-Trai...]; B --> C[Score Model]; C --> D[Evaluate Model];
```

The diagram illustrates a batch inference pipeline named "Titanic-batch inference". It starts with two input datasets: "Titanic-l8r5gkgofl" and "MD-Titanic-Train\_Model-Trai...". These datasets feed into a "Score Model" component. The output of the "Score Model" then feeds into an "Evaluate Model" component. Both the "Score Model" and "Evaluate Model" components have green checkmarks indicating they are successful.

# Publication du pipeline batch

Designer > Authoring

Real-time inference pipeline Batch inference pipeline

Titanic-batch inference

Autosave on

Output

ation

n

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ng Algorithms

& Evaluation

je

n

>

Set up published pipeline

PipelineEndpoint \*

+ New PipelineEndpoint

New PipelineEndpoint name \*

Titanic-batch inference

PipelineEndpoint description (optional)

Published pipeline

Titanic-batch inference 11-27-2019-06-06

Set as default pipeline for this endpoint.

Continue on failure step

Pipeline parameters and default values

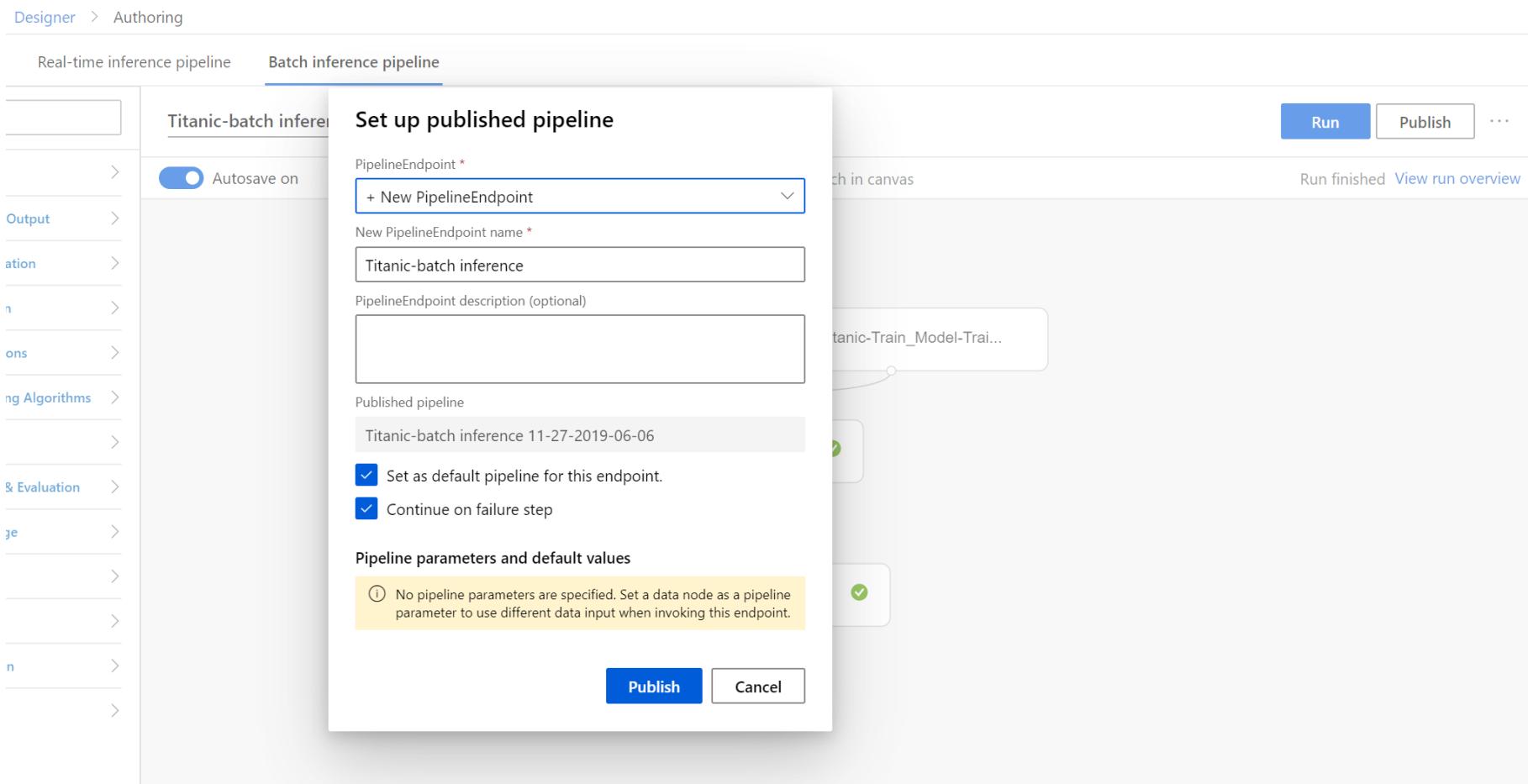
No pipeline parameters are specified. Set a data node as a pipeline parameter to use different data input when invoking this endpoint.

Run Publish ...

Search in canvas

Run finished View run overview

Titanic-Train\_Model-Trai...



# Visualisation des Pipeline Endpoints

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints

## Endpoints

Real-time endpoints Pipeline endpoints

Refresh Disable Enable View disabled Search to filter items...

Name ↓	Description	Modified on	Modified by	Last run submit time	Last run status	Status
Titanic-batch inference		-	Serge Retkowsky	-	-	Active
Titanic	Pipeline Titanic	-	Serge Retkowsky	-	-	Active

< Prev Next >

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

# Détails du pipeline endpoint batch

# Liste des pipelines publiés

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference

## Titanic-batch inference

Detail Published pipelines

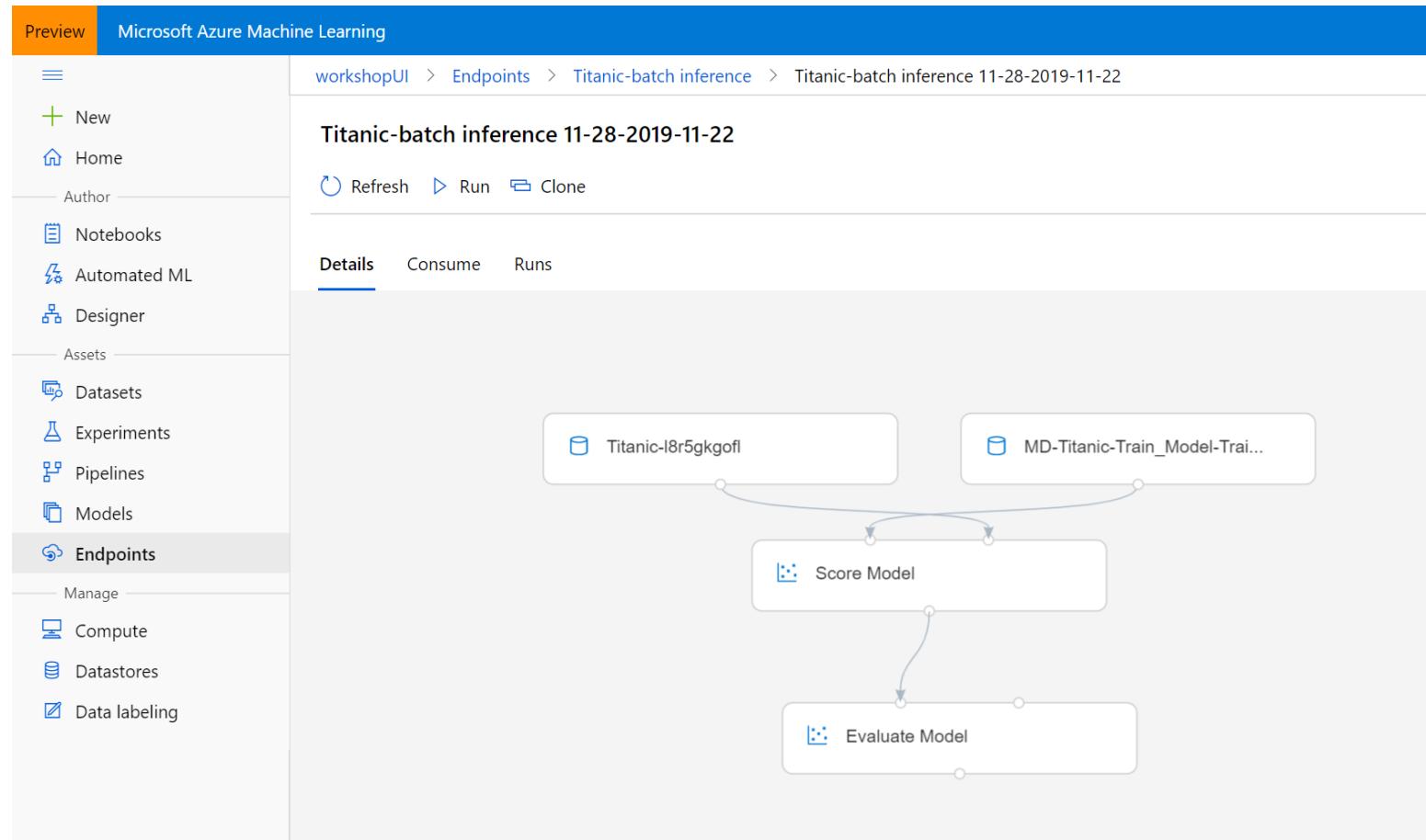
Refresh  Disable  Enable  View disabled  Search to filter items...

Name ↓	Description	Modified on	Modified by	Last run submit time	Last run status	Status
<a href="#">Titanic-batch inference 11-28-2019-11-22</a>	--	11/28/2019, 11:22:15 AM	Serge Retkowsky	11/28/2019, 11:25:44 AM	Finished	Active
<a href="#">Titanic-batch inference 11-27-2019-06-06</a>	--	11/27/2019, 6:07:16 PM	Serge Retkowsky	11/27/2019, 6:18:33 PM	Finished	Active

< Prev Next >

New Home Author Notebooks Automated ML Designer Assets Datasets Experiments Pipelines Models Endpoints Manage Compute Datastores Data labeling

# Visualisation du pipeline publié



# Visualisation des options de consommation du pipeline (C#, Python, R)

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference > Titanic-batch inference 11-28-2019-11-22

Titanic-batch inference 11-28-2019-11-22

Refresh Run Clone

Details Consume Runs

**Basic consumption info**

REST endpoint

http://86.148.86.148:8080/titanic-batch-inference/v1/predict?api-version=2019-11-22

**Consumption option**

C# Python R

```
1  using System;
2  using System.Collections.Generic;
3  using System.Net.Http;
4  using System.Net.Http.Headers;
5  using System.Runtime.Serialization;
6  using System.Text;
7  using System.Threading;
8  using System.Threading.Tasks;
9  using Newtonsoft.Json;
10 using Newtonsoft.Json.Linq;
11
12 namespace CallBatchExecutionService
13 {
14     [DataContract]
15     public sealed class LegacyDataPath
```

# Visualisation du code R

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference > Titanic-batch inference 11-28-2019-11-22

Titanic-batch inference 11-28-2019-11-22

Refresh Run Clone

Details Consume Runs

**Basic consumption info**

REST endpoint  
http://127.0.0.1:5000/predict?...  
8  
R  
e  
-402c-a004-92dd24db0241

**Consumption option**

C# Python R

```
1 library("RCurl")
2 library("rjson")
3 library("httr")
4
5 # Accept SSL certificates issued by public Certificate Authorities
6 options(RCurlOptions = list(cainfo = system.file("CurlSSL", "cacert.pem", package = "RCurl")))
7
8 printHttpError = function(status, headers, result) {
9   print(paste("The request failed with status code:", status, sep = " "))
10
11   # Print the headers - they include the request ID and the timestamp, which are useful for debugging the failure
12   print(headers)
13   print(result)
14 }
15
```

# Batch depuis l'interface graphique

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference 11-27-2019-06-06

Titanic-batch inference 11-27-2019-06-06

Refresh Run Clone

Details Consume Runs

Run status

Running	Completed
0	0

Failed	Other
0	0

No pipeline runs to display

Set up pipeline run

Experiment \* Titanic

Run description \* Run batch 1

Compute target Default clusterCPU

Parameters No parameters defined

Run Cancel

# Run du batch en cours

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference 11-27-2019-06-06

Pipeline run has been submitted. [View Details](#) X

### Titanic-batch inference 11-27-2019-06-06

Refresh Run Clone

Runs

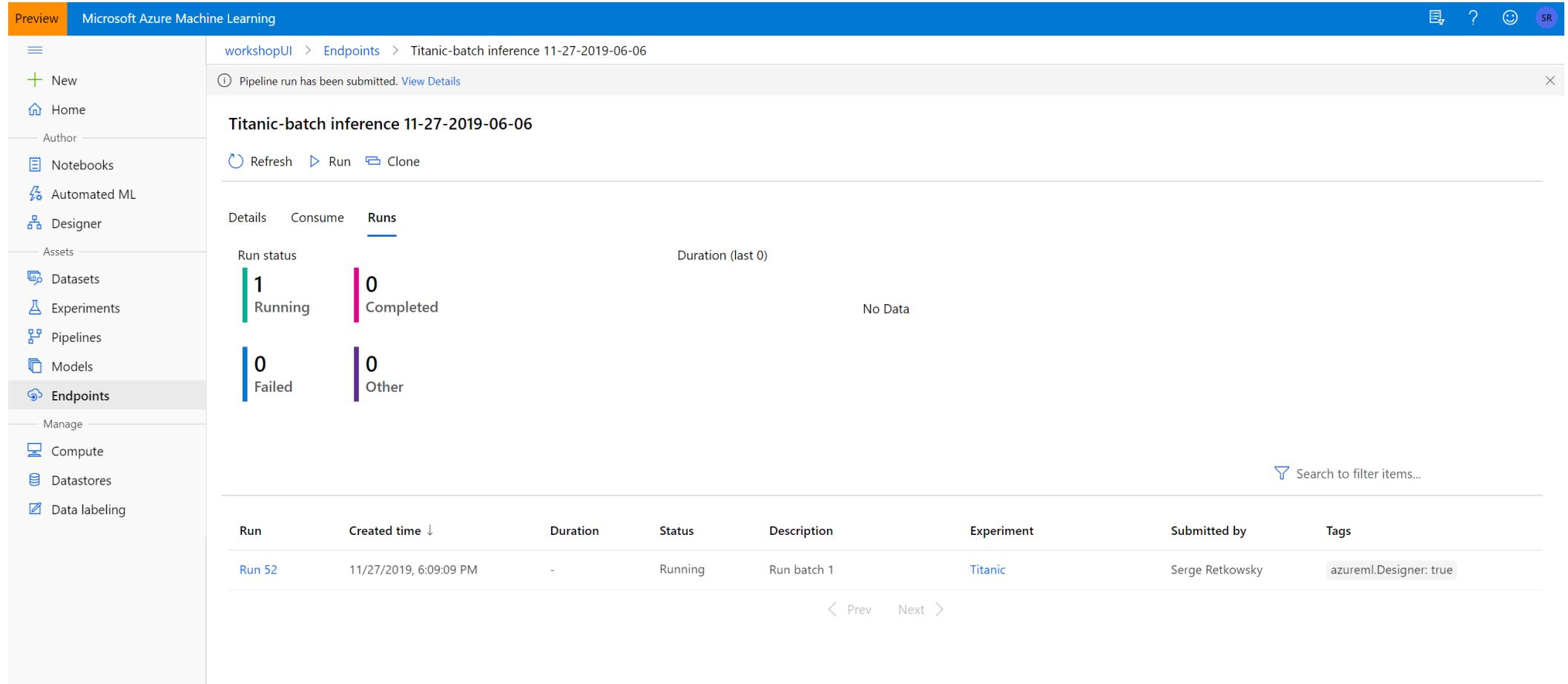
Run status	Count
Running	1
Completed	0
Failed	0
Other	0

Duration (last 0) No Data

Search to filter items...

Run	Created time	Duration	Status	Description	Experiment	Submitted by	Tags
Run 52	11/27/2019, 6:09:09 PM	-	Running	Run batch 1	Titanic	Serge Retkowsky	azureml.Designer: true

< Prev Next >



# Fin du run

Preview Microsoft Azure Machine Learning

workshopUI > Endpoints > Titanic-batch inference 11-27-2019-06-06

Pipeline run has been submitted. [View Details](#)

### Titanic-batch inference 11-27-2019-06-06

Refresh Run Clone

Runs

Run status	Count	Status
Running	0	
Completed	1	Completed
Failed	0	
Other	0	

Duration (last 1)

Nov 27, 2019

Search to filter items...

Run	Created time	Duration	Status	Description	Experiment	Submitted by	Tags
Run 52	11/27/2019, 6:09:09 PM	3s	Completed	Run batch 1	Titanic	Serge Retkowsky	azureml.Designer: true

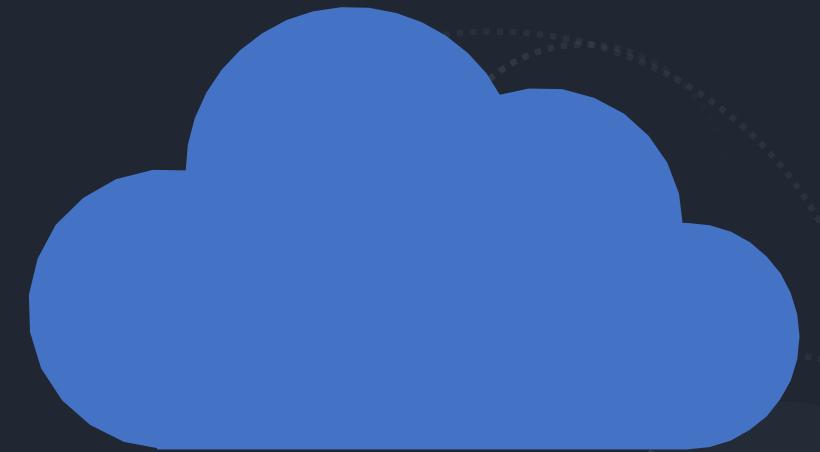
< Prev Next >

# Lancement du batch via le code Python

The screenshot shows the Microsoft Azure Machine Learning studio interface. The left sidebar has a 'Endpoints' section highlighted with a red box. Below it, a code editor displays a Python script for launching a batch inference job.

```
1  #!/usr/bin/env python
2  # coding: utf-8
3
4  import requests
5  import time
6  from azureml.core import Workspace
7  from azureml.core.authentication import InteractiveLoginAuthentication
8  from azureml.pipeline.core import PipelineRun
9
10 auth = InteractiveLoginAuthentication()
11 ad_token = auth.get_authentication_header()
12 ws = Workspace.from_config()
13
14 rest_endpoint = "restendpoint" # Replace this with the REST endpoint of the published pipeline
15 print("Rest endpoint: " + rest_endpoint)
16
```

# Intégration AutoML avec Power BI



# Deep insights with advanced analytics and AI

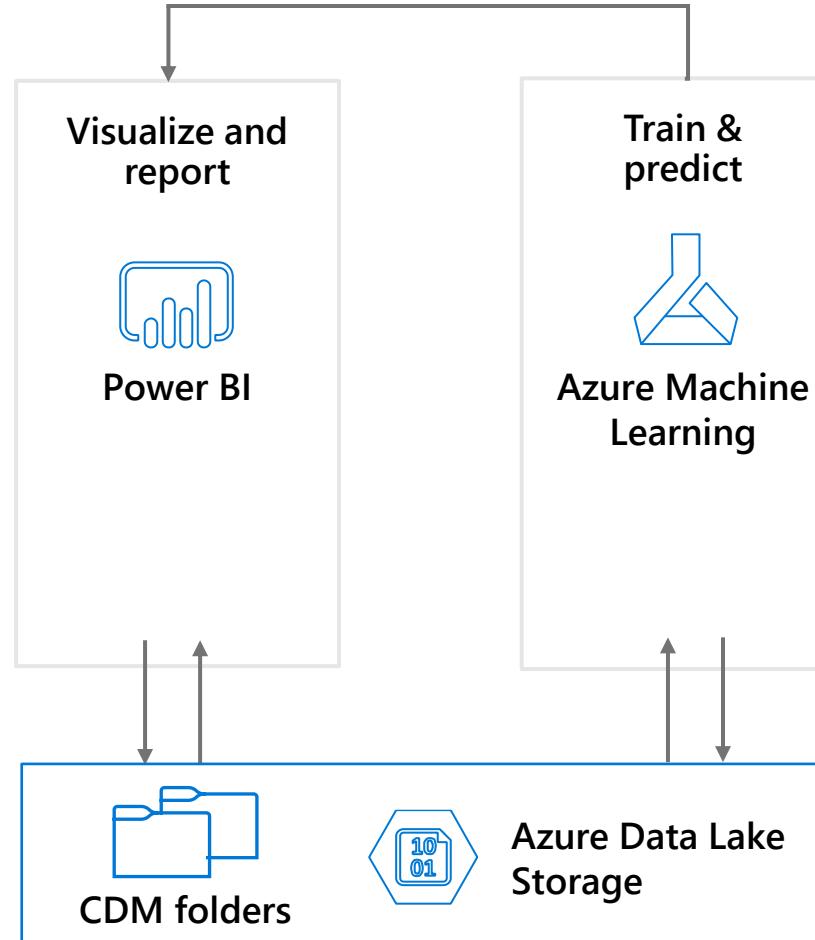
## Power BI + Azure Machine Learning

### Start with no-code ML

Business analysts can use automated machine learning within Power BI to solve for common use cases with zero coding.

### Extend with Azure Machine Learning

Seamless connection to Azure Machine Learning enables business analysts to consume the work of data scientists for more advanced problems.



### Solve complex challenges

Data scientists can leverage data in Azure Data Lake Storage to train models in Azure Machine Learning, giving your business a competitive edge.

### Reduce time-to-insight

Azure Machine Learning automates time-consuming tasks such as model tuning and deployment, reducing time-to-insight from weeks to hours.

# Improving sales negotiations to increase profits



Equipping sellers with machine learning insights with Power BI and Azure

## Challenge

Brazilian retailer began to lose money when sales stalled and they were unable to accurately discount products at the point of sale.

## Impact

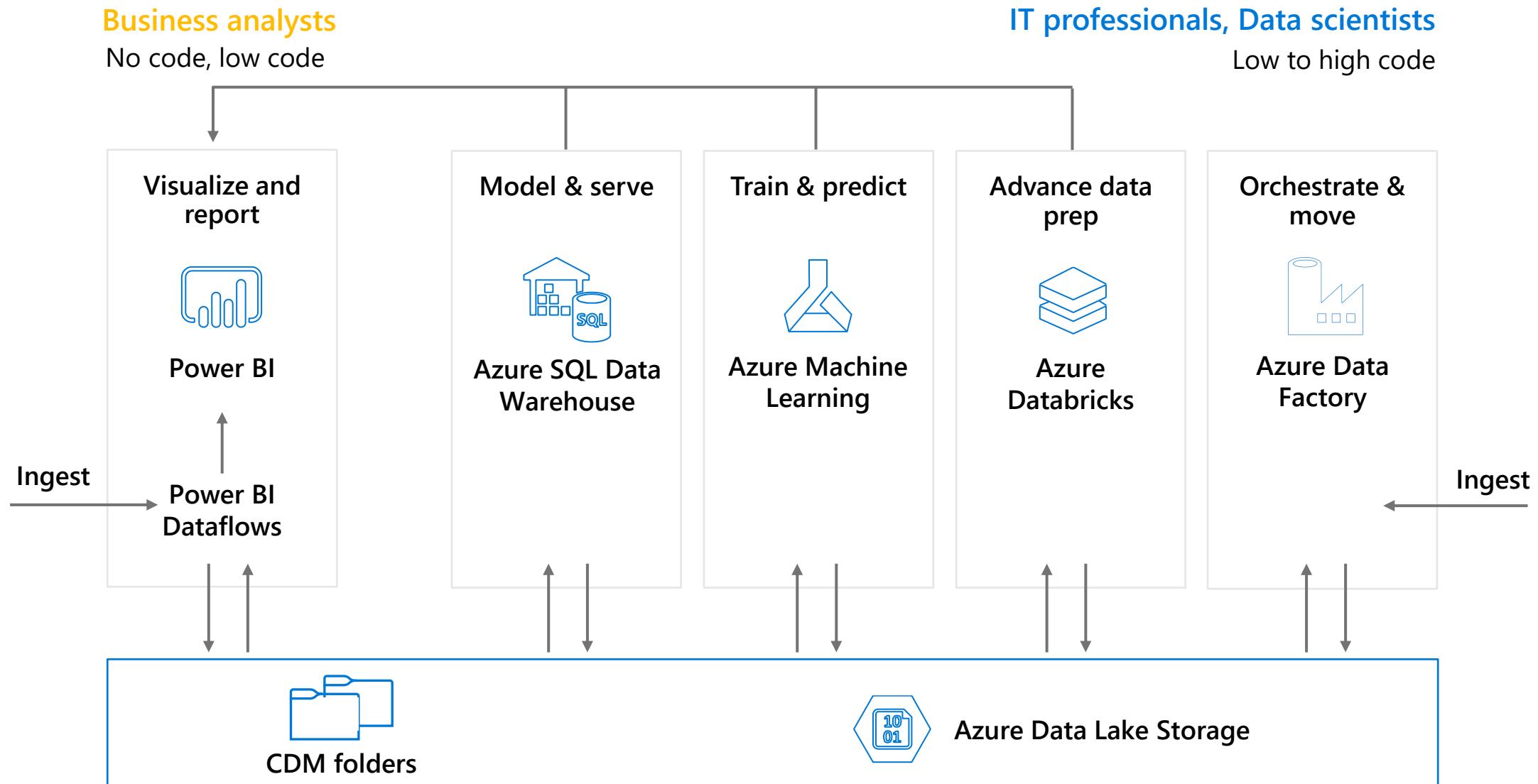
Improved product pricing by delivering insights from Azure Machine Learning to sellers in real time through Power BI.

Reduced costs by moving to the cloud with an advanced analytics solution using Power BI, Azure SQL Data Warehouse and Azure Machine Learning.

Implemented 90% of the solution with no IT help.

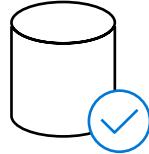


# Seamless integration, everywhere



# Power BI + Azure Data Services: Better together

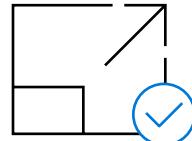
## One lake for all data



---

Game-changing data collaboration across your organization

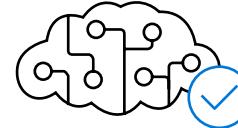
## Unlimited scale



---

Reason over petabytes of data in seconds

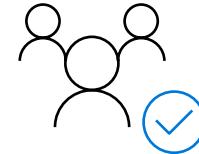
## Breakthrough insights



---

Unlock deeper insights with powerful AI models

## Easy consumption



---

Put actionable insights in the hands of everyone

**Unify your organization and unlock game-changing insights for all**

# Chargement des données dans Power BI

- Réalisation d'un modèle automatique de ML avec Power BI
- Données utilisées : Données du TITANIC  
<https://www.kaggle.com/c/titanic>
- Problématique : modélisation de la survie des passagers
- Variables explicatives :

Variables	Description	Notes sur les valeurs
PassengerID	Identifiant du passager	Entier compris entre 1 et 1309
Survived	Survivant ?	1 si le passager a survécu, 0 s'il est décédé
Pclass	Classe du passager	1 = 1 <sup>ère</sup> classe, 2 = 2 <sup>ème</sup> classe, 3 = 3 <sup>ème</sup> classe
Name	Nom et titre du passager	Style: Nom, titre. Prénoms
Sex	Sexe du passager	'male' ou 'female'
Age	Age du passager	Décimal si inférieur à 1, estimé si de la forme xx.5
SibSp	Nombre d'époux, de frères ou de soeurs présents à bord	
Parch	Nombre de parents ou d'enfants présents à bord	
Ticket	Numéro du ticket	
Fare	Prix des tickets	Le prix est indiqué en £ et pour un seul achat (peut correspondre à plusieurs tickets)
Cabin	Numéro de Cabine	Un ou plusieurs numéros de cabine, de la forme 'A123'
Embarked	Port d'embarcation	C = Cherbourg, Q = Queenstown, S = Southampton

# Ajout d'une source de données

Choose data source

All categories   File   Database   Azure   Online services   Other

Search

Data sources

Access File	Excel File	JSON File	Text/CSV File
XML File	Amazon Redshift Database	IBM Db2 database Database	MySQL database Database
Oracle database Database	PostgreSQL database Database	SQL Server database Database	Sybase database Database
Teradata database Database	Vertica Database	Azure Blobs Azure	Azure Data Explorer Azure
Azure SQL Data Warehouse Azure	Azure SQL database Azure	Azure Tables Azure	Common Data Service for Apps Online services
Microsoft Exchange Online Online services	Salesforce objects Online services	Salesforce reports Online services	SharePoint Online list Online services
Smartsheet Online services	Active Directory Other	OData Other	SharePoint list Other

Cancel

# Choix de la source de données

## Connect to data source



Text/CSV  
File

### Connection settings

#### File path or URL

`https://raw.githubusercontent.com/retkowsky/Titanic/master/train.csv`

### Connection credentials

#### On-premises data gateway

(none)



#### Authentication kind

Anonymous

<https://raw.githubusercontent.com/retkowsky/Titanic/master/Titanic.csv>

# Activation de l'option (Transform Table – Use 1st row as header)

Edit queries

Get data Refresh Options Manage columns Transform table Reduce rows Add column AI insights Map to standard Combine tables

Query

= Table.DemoteHeaders(Source)

	ABC 123 Column1	ABC 123 Column2	ABC 123 Column3	ABC 123 Column4	ABC 123 Column5	ABC 123 Column6
1	Column1	Column2	Column3	Column4	Column5	Column6
2	PassengerId	Survived	Pclass	Name	Sex	Age
3	1	0	3	Braund, Mr. Owen Harris	male	22
4	2	1	1	Cumings, Mrs. John Bradle...	female	38
5	3	1	3	Heikkinen, Miss. Laina	female	26
6	4	1	1	Futrelle, Mrs. Jacques Heat...	female	35
7	5	0	3	Allen, Mr. William Henry	male	35
8	6	0	3	Moran, Mr. James	male	
9	7	0	1	McCarthy, Mr. Timothy J	male	54
10	8	0	3	Palsson, Master. Gosta Leo...	male	2
11	9	1	3	Johnson, Mrs. Oscar W (Eli...	female	27
12	10	1	2	Nasser, Mrs. Nicholas (Ade...	female	14
13	11	1	3	Sandstrom, Miss. Margueri...	female	4
14	12	1	1	Bonnell, Miss. Elizabeth	female	58
15	13	0	3	Saunders, Mr. William ...	male	20
16	14	0	3	Andersson, Mr. Anders Joh...	male	39
17	15	0	3	Vestrom, Miss. Hulda Ama...	female	14
18	16	1	2	Hewlett, Mrs. (Mary D King...)	female	55
19	17	0	3	Rice, Master. Eugene	male	2
20						

Name: Query  
Entity type: Custom  
Applied steps: Source, Demoted headers

1 warning Save & close

# Edition des métadonnées

Edit queries

Power Query

Get data Refresh Options Manage columns Transform table Reduce rows Add column AI insights Map to standard Combine tables

Query

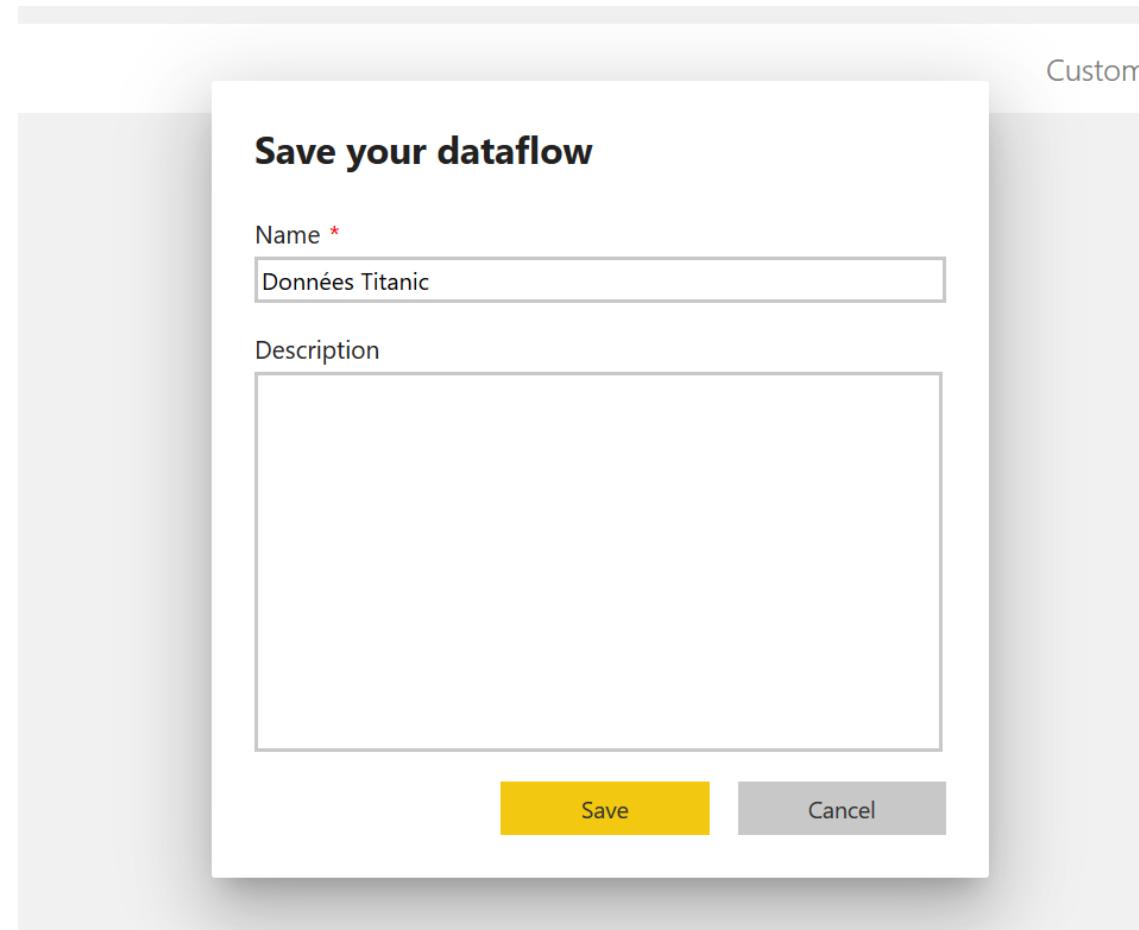
PassengerId Survived Pclass Name Sex Age

	PassengerId	Survived	Pclass	Name	Sex	Age
1	1	0		Braund, Mr. Owen Harris	male	
2	2	1		Cumings, Mrs. John Bradle...	female	
3	3	1		Heikkinen, Miss. Laina	female	
4	4	1		Futrelle, Mrs. Jacques Heat...	female	
5	5	0		Allen, Mr. William Henry	male	
6	6	0		Moran, Mr. James	male	(null)
7	7	0		McCarthy, Mr. Timothy J	male	
8	8	0		Palsson, Master. Gosta Leo...	male	
9	9	1		Johnson, Mrs. Oscar W (Eli...	female	
10	10	1		Nasser, Mrs. Nicholas (Ade...	female	
11	11	1		Sandstrom, Miss. Margueri...	female	
12	12	1		Bonnell, Miss. Elizabeth	female	
13	13	0		Saunderscock, Mr. William ...	male	
14	14	0		Andersson, Mr. Anders Joh...	male	
15	15	0		Vestrom, Miss. Hulda Ama...	female	
16	16	1		Hewlett, Mrs. (Mary D King...	female	
17	17	0		Rice, Master. Eugene	male	
18	18	1		Williams, Mr. Charles Euge...	male	(null)
19	19	0		Vander Planke, Mrs. Julius (...	female	
20	~					

Name: Query  
Entity type: Custom  
Applied steps:  
Source  
Promoted headers 1  
Changed column type

Cancel Save & close

# Sauvegarde du dataflow PowerBI



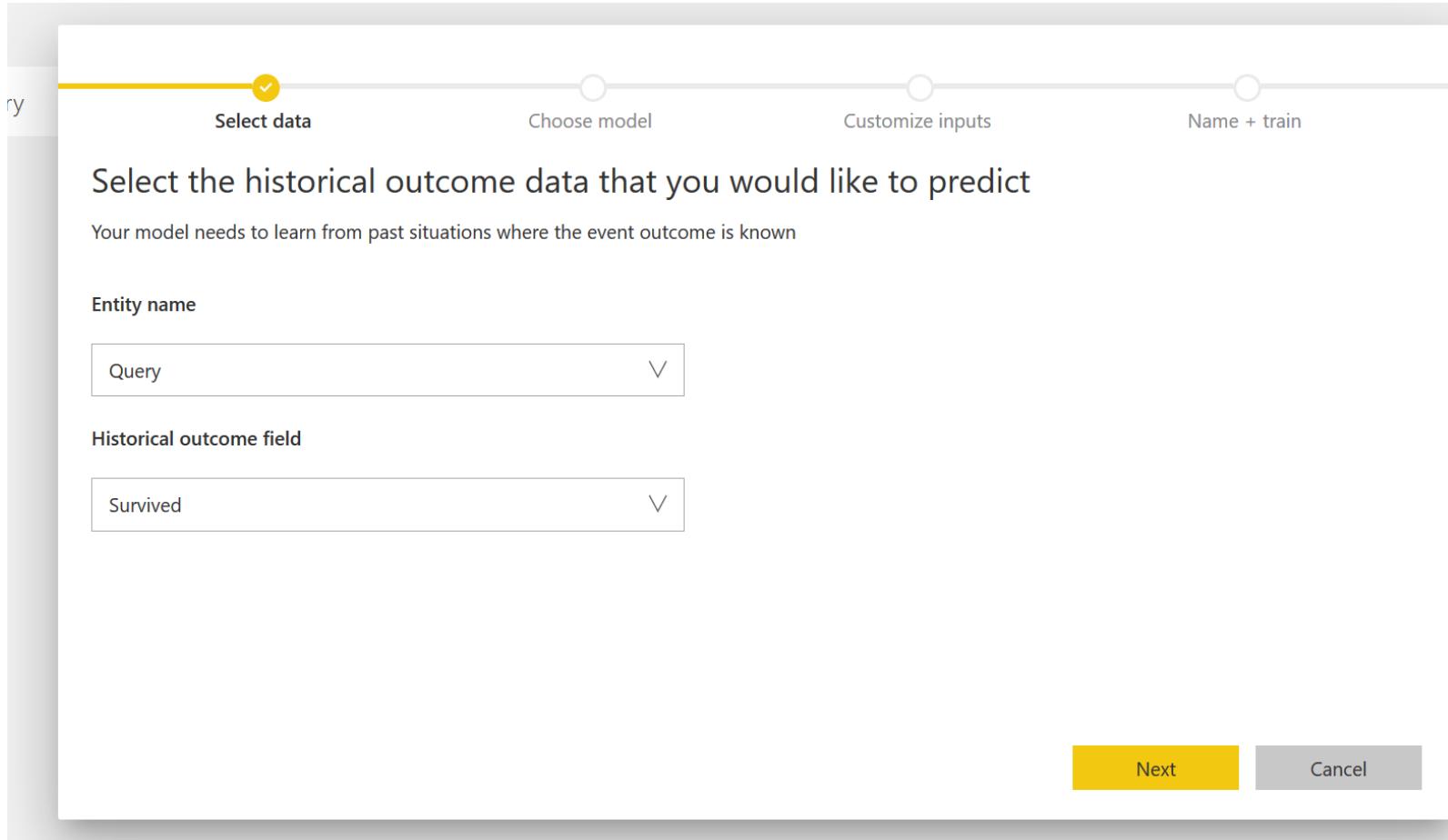
# Ajout d'un modèle de ML

The screenshot shows the Power BI AI Preview Support interface. The top navigation bar includes 'Power BI', 'Power BI AI Preview Support', 'Données Titanic', and a user profile icon. Below the navigation is a sidebar with links like 'Home (preview)', 'Favorites', 'Recent', 'Apps', 'Shared with me', 'Workspaces', and 'Power BI AI ...'. The main content area is titled 'Entities Machine learning models'. It displays a table with one row:

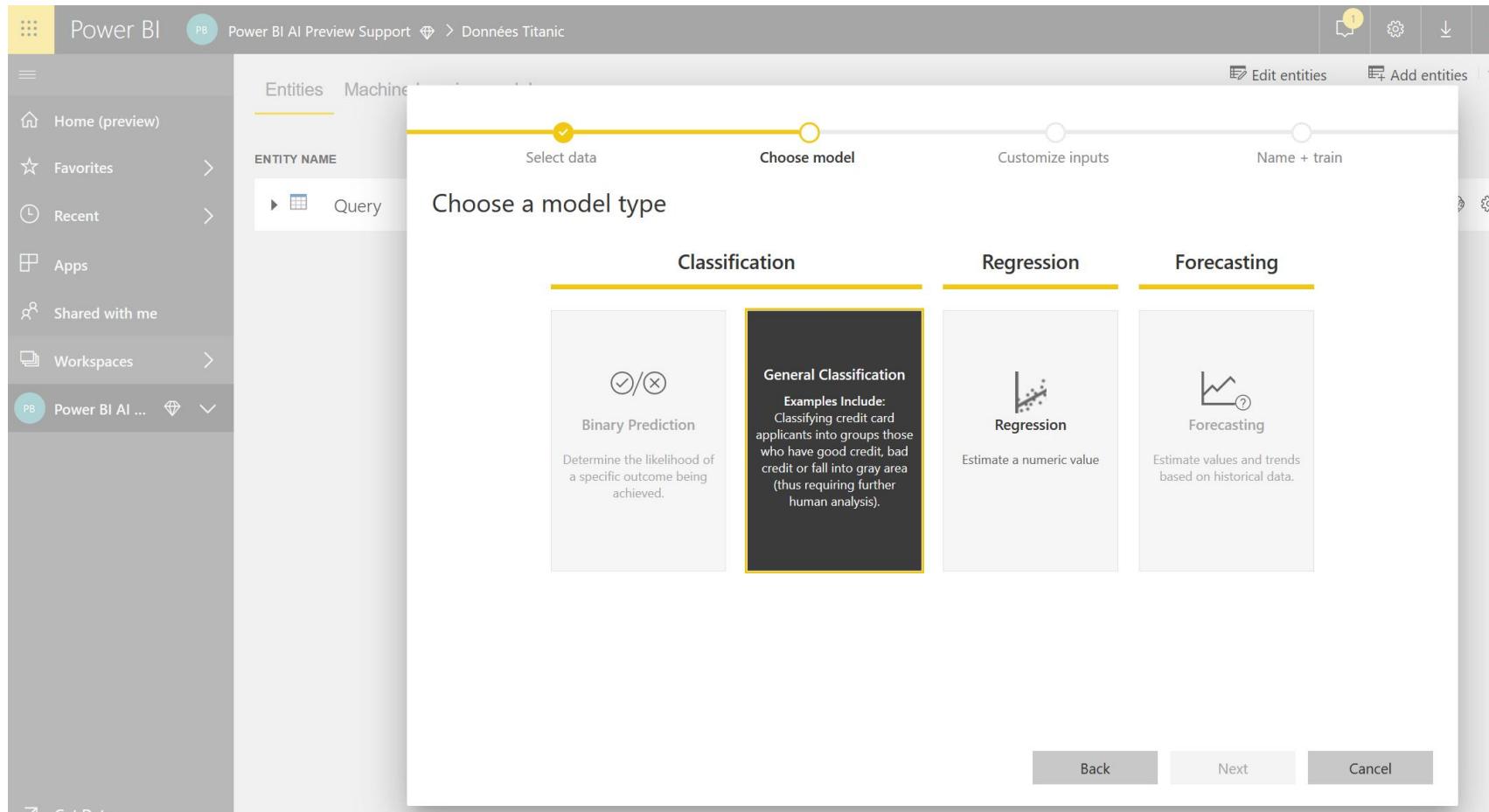
ENTITY NAME	ENTITY TYPE	ACTIONS
Query	Custom	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Settings</a> <a href="#">More</a>

A tooltip 'Add a machine learning model' points to a '+' button in the 'Actions' column. The bottom of the screen shows a taskbar with various icons and system status information.

# Utilisation de l'assistant AutoML – Choix de la variable cible



# Utilisation de l'assistant AutoML – Choix du type AutoML



# Spécification des variables exogènes

Progress bar:

Select data   Choose model   Customize inputs   Name + train

## Customize input fields

We've selected relevant inputs from your target and related entities. You can customize them below or proceed with the recommended inputs selected.

Advanced Configuration Reset Clear  
7 fields selected

^  
  
▼

**Base entity**

- ◀  **Query**
- PassengerId
- Survived *(Historical outcome field)*
- Pclass
- Name
- Sex
- Age
- SibSp
- Parch
- Ticket

Back Next Cancel

# Nom du modèle



## Name and review your model

### Model name

Modele TITANIC

### Description

(Optional)

### Training details

Model type: Classification

Base entity: Query

Historical outcome: Survived

Input fields: 7

**Training data:** The model will take a statistically significant sample from Query and train on approximately 80% of the sample data. It will then test its algorithm on the remaining sample data and report on its classification accuracy.

Back

Save

Cancel

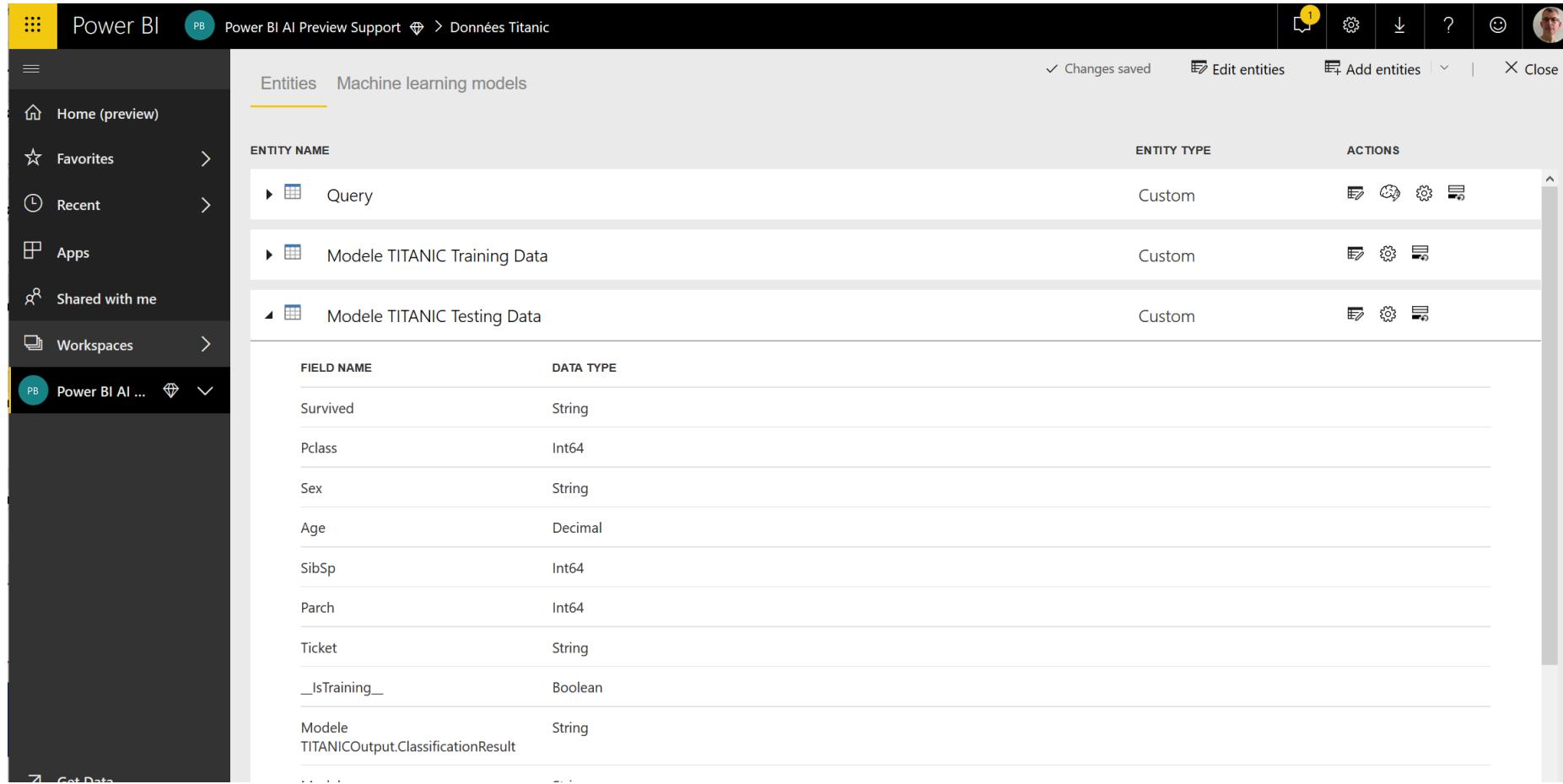
# Recherche du modèle

The screenshot shows the Power BI AI Preview Support interface. The left sidebar includes options like Home (preview), Favorites, Recent, Apps, Shared with me, Workspaces, and Power BI AI. The main area displays 'Entities' and 'Machine learning models'. A modal window is open, titled 'Your model is ready for training'. It contains the following text:

You can refresh your dataflow now to start training or refresh later.  
We'll notify you when your model is ready and show you how it performed.  
We estimate it may take up to 30 minutes for your model to train, based on the size of your dataset.

The modal also features a progress bar with three steps: 1. Create and train your model (completed), 2. Improve it, and 3. Apply it. Below the steps, there's a 'What's next:' section with instructions to evaluate, customize, and retrain the model until it's optimized. At the bottom, there are two buttons: 'Refresh now' (highlighted in yellow) and 'Refresh later'.

# Les données disponibles (Données Source, Train & Test)



The screenshot shows the Power BI AI Preview Support interface for the "Données Titanic" dataset. The left sidebar includes links for Home (preview), Favorites, Recent, Apps, Shared with me, Workspaces, and Power BI AI Preview Support. The main area displays three entities: "Query", "Modele TITANIC Training Data", and "Modele TITANIC Testing Data", all categorized as Custom. The "Modele TITANIC Training Data" entity is currently selected, showing its detailed schema:

FIELD NAME	DATA TYPE
Survived	String
Pclass	Int64
Sex	String
Age	Decimal
SibSp	Int64
Parch	Int64
Ticket	String
_IsTraining_	Boolean
Modele TITANICOutput.ClassificationResult	String

# Recherche automatique du meilleur modèle

The screenshot shows the Power BI AI Preview Support interface. The left sidebar includes options like Home (preview), Favorites, Recent, Apps, Shared with me, Workspaces, and Power BI AI Preview Support. The main area displays a table of machine learning models. The table has columns for NAME, TYPE, ACTIONS, LAST TRAINED, and STATUS. One model, "Modele TITANIC", is listed as a Classification type, last trained, and is in a Ready status.

NAME	TYPE	ACTIONS	LAST TRAINED	STATUS
Modele TITANIC	Classification	<a href="#">Info</a> <a href="#">Edit</a> <a href="#">Run</a> <a href="#">View</a>		Ready

# Résultats AutoML

The screenshot shows the Power BI AI Preview Support interface. The left sidebar has a yellow header bar with three dots, followed by 'Power BI' and a teal circular icon with 'PB'. Below this are navigation items: 'Home (preview)', 'Favorites', 'Recent', 'Apps', 'Shared with me', 'Workspaces', and 'Power BI AI ...'. The main content area has a dark grey header with a back arrow, the title 'Modele TITANIC model accuracy preview', a subtitle 'This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome.', and two buttons: 'Apply model' (yellow) and 'Edit model' (grey). The main body has a section titled 'MODEL PERFORMANCE' with a yellow vertical bar on the left. Below it is a dark grey box containing 'How the model was evaluate' and a text block about the model's evaluation process. To the right are four data tables:

Input row count	Sampled row count	Final model used
707	707	Pre-fitted Soft Voting Classif
Training row count	Validation row count	
530	177	

At the bottom right of the main content area is a small profile picture of a man.

# Résultats AutoML (suite)

Power BI Power BI AI Preview Support > Données Titanic

Home (preview) Favorites Recent Apps Shared with me Workspaces Power BI AI ...

## Modele TITANIC model accuracy preview

This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome.

Apply model Edit model

### Predicted classification results

● Correctly classified ● Incorrectly classified



Actual class	Correctly classified	Incorrectly classified
0	~80	~20
1	~60	~40

How to interpret these results.

The performance of a machine learning model reflects how well its predictions correspond to actual events. A ML model is trained using a "labeled" dataset, that includes the actual values you're trying to predict. A subset of the records is set aside for validation so that after the model is trained, the predictions for these records can be compared against the label data.

Classification is the problem of predicting which set of categories (also known as classes) a new data point belongs. This chart shows **correctly classified** and **incorrectly classified** records for each class of the input data.

# Résultats AutoML (suite)

Power BI Power BI AI Preview Support > Données Titanic

## Modele TITANIC model accuracy preview

This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome.

For analyzing a classification model, it is interesting to see the number of correct and incorrect predictions made by the classification model compared to the actual values in the data. This information can help in understanding what kind of results you will get from the model on unseen data.

Another important aspect to analyze is the impact of different columns in your data (features) to predictions. Certain features might have a high impact on predictions, whereas others might have very low. The **Top predictors** visual shows the relative impact of each feature on outcomes. Clicking on a predictor will show the breakdown in the test data.

Select a class to see how its prediction distribution and key influencers

Distribution of predictions for class 1

Predicted Class	Actual Class 1 (%)	Actual Class 0 (%)
0	20	80
1	60	40

**74%**  
Precision  
of records that are predicted as class 1 are actually of class 1

**75%**  
Recall  
of records that are actually class 1 are correctly predicted as class 1

# Résultats AutoML (suite)

Power BI PB Power BI AI Preview Support > Données Titanic

Home (preview) Favorites Recent Apps Shared with me Workspaces Power BI AI ...

## Modele TITANIC model accuracy preview

This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome.

Apply model Edit model

### Top influencers

[Click on a specific influencer to see its breakdown]

Influencer Type	Range
0	0 -- 16.336000
1	16.336000 -- 32.252500
male	32.252500 -- 48.168000
3	48.168000 -- 64.084000
2	64.084000 -- 80.000000

# Résultats AutoML (suite)

Power BI Power BI AI Preview Support > Données Titanic

Model TITANIC model accuracy preview

This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome.

Apply model Edit model

Automated ML was used to: find the best way to prepare your data; to determine the algorithms used; and iteratively select algorithm parameters likely to yield the best accuracy. These steps were used in the machine learning pipeline which generated your machine learning model.

Sampled rows 707 Final model quality 78%  
Training rows 530 Iterations run 32

Model quality over iterations

Maximum Model Quality : 0.87

Score 0.87  
Premier Estimator Name Pre-fitted Soft Voting Classifier  
Premier Estimator PreFittedSoftVotingClassifier(min\_models=1, max\_models=15, model\_seed\_threshold=0.05)

Your machine learning model

Get Data Model Performance Training Details

# Résultats AutoML (suite)

The screenshot shows a Power BI AI Preview Support report titled "Modele TITANIC model accuracy preview". The report summary states: "This report summarizes the accuracy of the Classification model and enables you to find an optimal threshold for defining your business outcome." A note below explains: "The tables below contain the list of features extracted from the inputs you provided, and the final set of parameters that were used to create your machine learning model. This information can be used to recreate the machine learning model outside Power BI."

**Data Featurization**

Feature	Feature Type	Imputation	Details
Parch	Categorical		🔗
Pclass	Categorical		🔗
SibSp	Categorical		🔗
Age	Numeric	Mean	🔗
Sex	Categorical	Mode	🔗

**Pre-fitted Soft Voting Classifierfinal parameters**

Parameter Name	Parameter Value
max_models	15
model_seed_threshold	0.05
min_models	1

# Documentation

- Azure ML :  
<https://azure.microsoft.com/en-us/services/machine-learning-service/>
- Documentation Azure ML :  
<https://docs.microsoft.com/en-us/azure/machine-learning/service/>
- Documentation AutoML Azure ML :  
<https://docs.microsoft.com/en-us/azure/machine-learning/service/concept-automated-ml>
- Intégration AutoML avec Power BI :  
<https://docs.microsoft.com/en-us/power-bi/service-tutorial-build-machine-learning-model>

