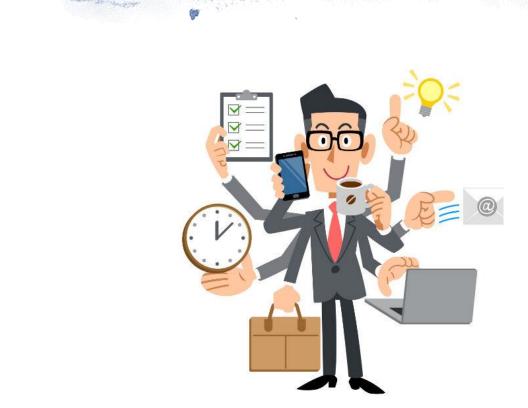


Présentation Azure ML

23 mars 2020



Vos interlocuteurs



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- AI&ML specialist
- serge.retkowsky@microsoft.com

Version du document

- V 1.1
- 23 mars 2020

Machine Learning on Azure

Domain specific pretrained models To simplify solution development Vision Language Speech Search **Familiar Data Science tools** To simplify model development **Visual Studio Code Command line** Azure Notebooks Popular frameworks To build advanced deep learning solutions TensorFlow ONNX PyTorch Scikit-Learn **Productive services** To empower data science and development teams **Azure Machine** Machine Azure **Databricks Learning VMs** Learning Powerful infrastructure To accelerate deep learning CPU **GPU FPGA**



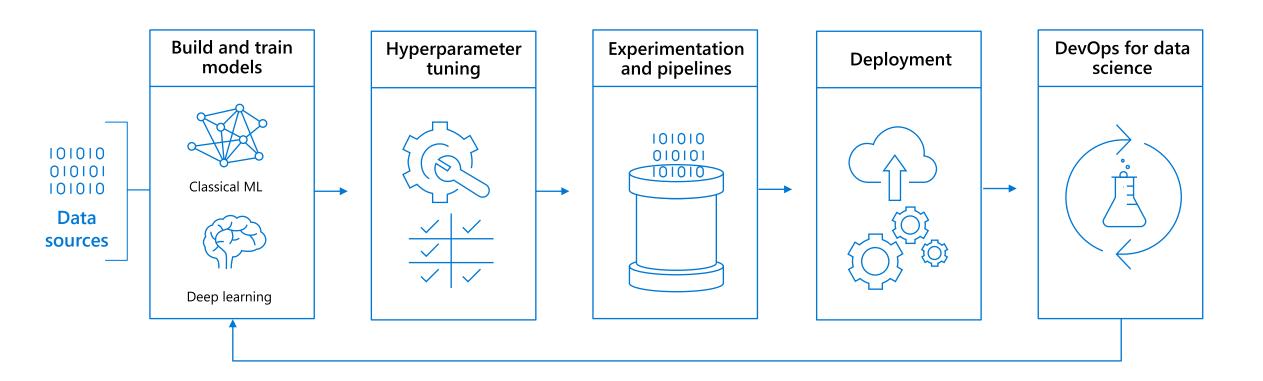




Azure Machine Learning

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

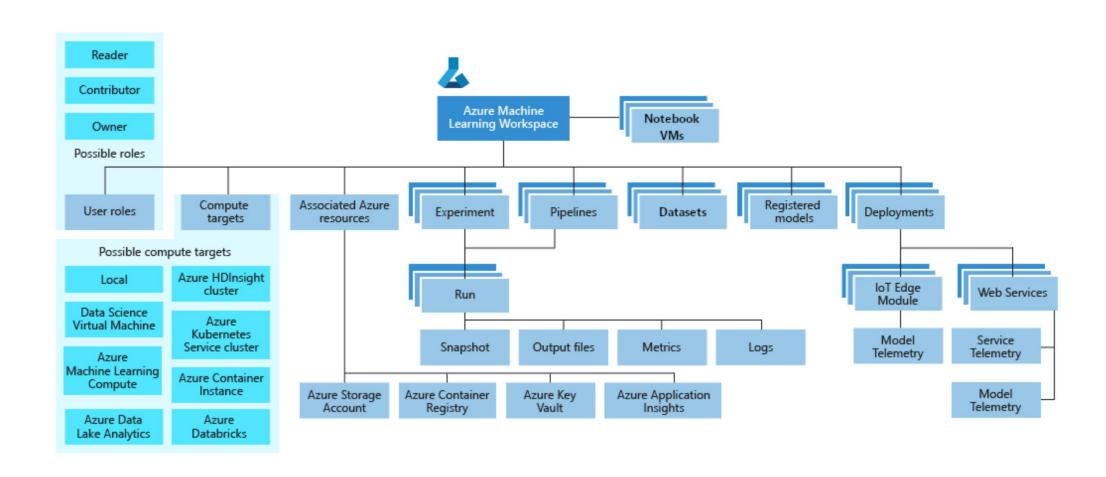
That enables you to:

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

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

Composants Azure ML

Azure Machine Learning components

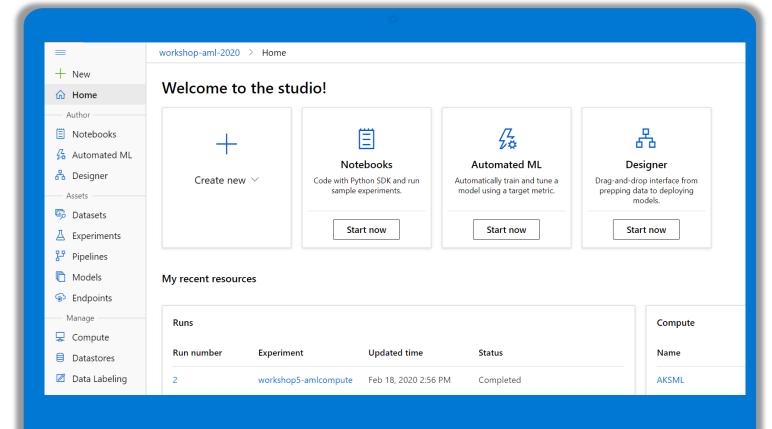


Azure ML Studio



Azure ML Studio

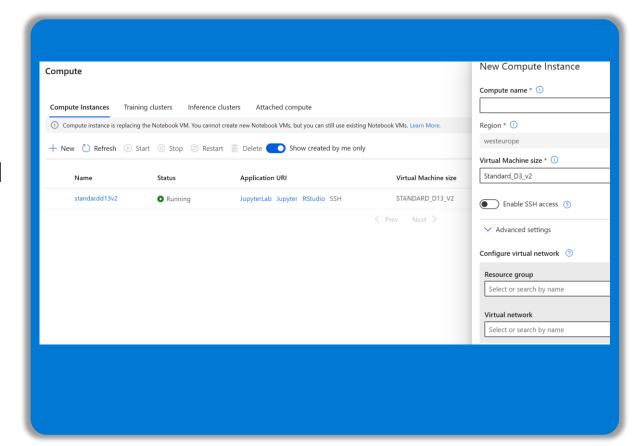
For all skill levels studio web experience



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.

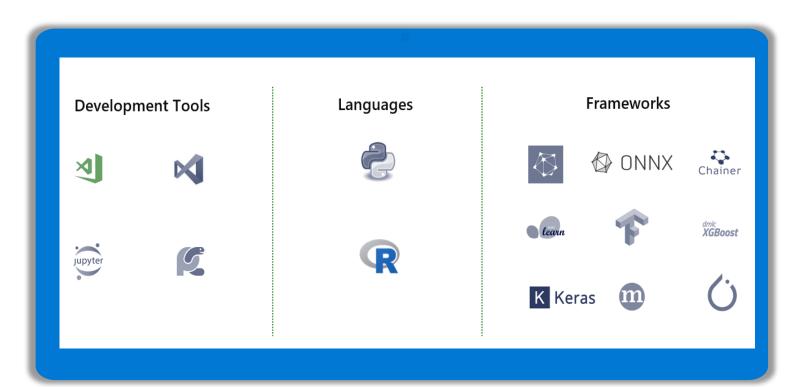


Platform



Azure Machine Learning

Open and interoperable platform



Powerful infrastructure

Accelerate deep learning



General purpose machine learning

D, F, L, M, H Series



GPUs

Deep learning N Series



FPGAs

Specialized hardware accelerated deep learning

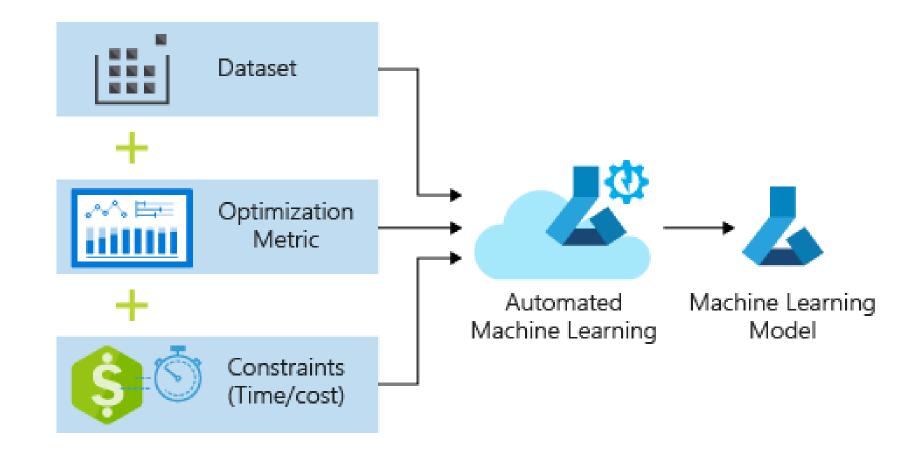
AML hardware accelerated models (Project Brainwave)

Optimized for flexibility

Optimized for performance

AutoML

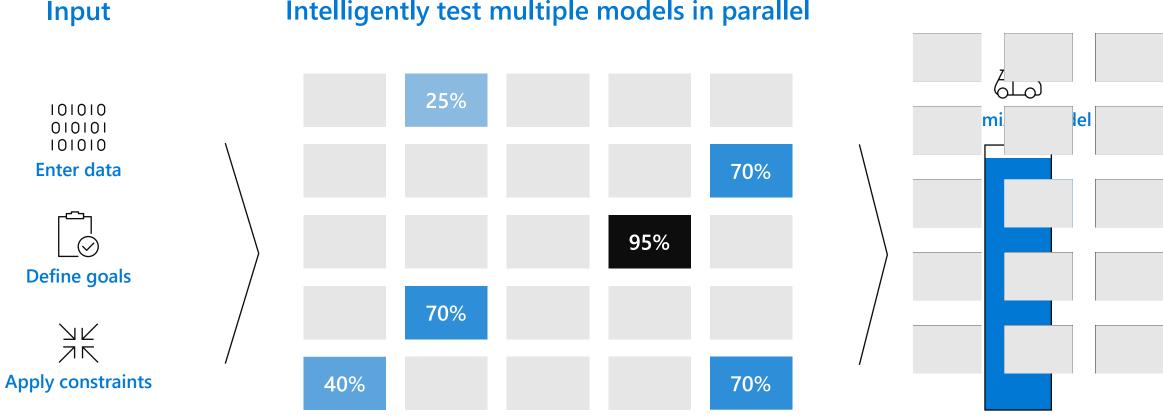
Automated ML



Azure Machine Learning accelerates model development

with automated machine learning

Intelligently test multiple models in parallel



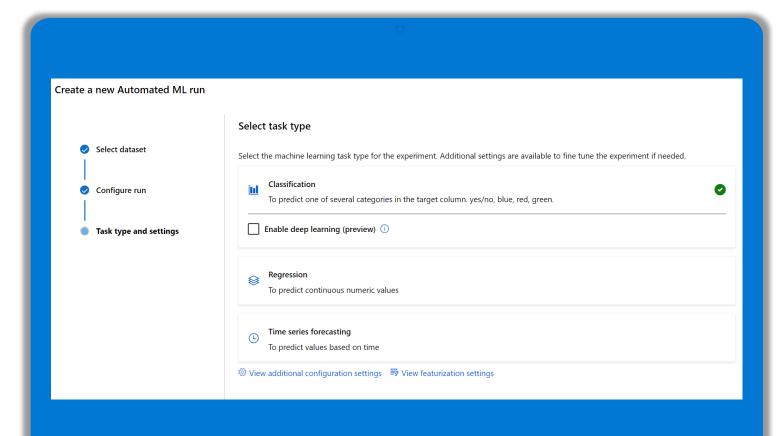
Automated ML

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.

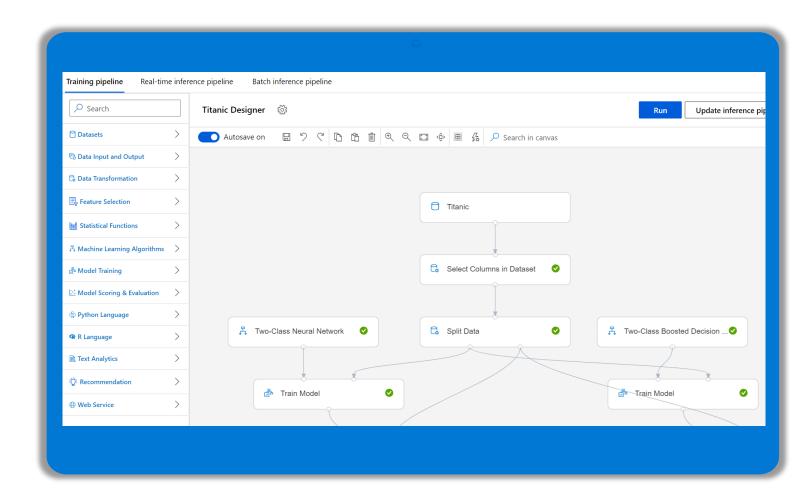
Build responsible AI solutions with model interpretability, and fine-tune your models to improve accuracy.



Designer

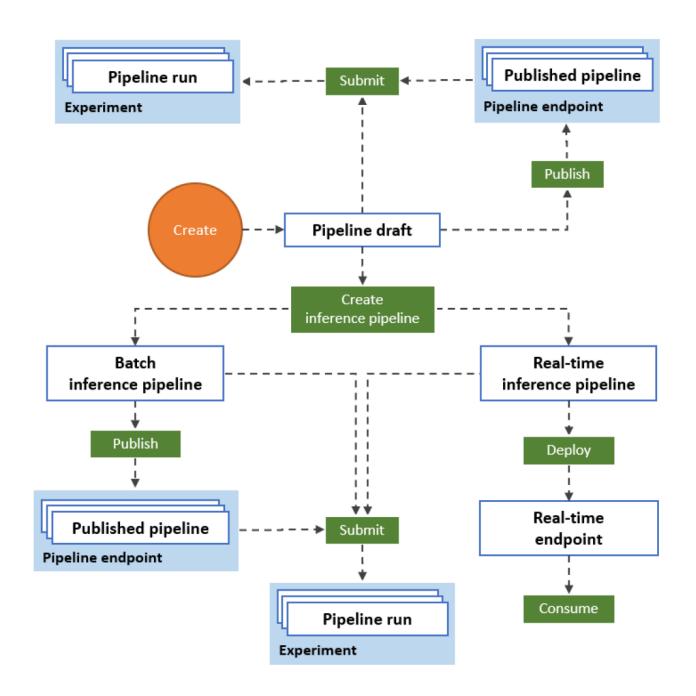
Designer

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



Pipelines

Pipelines

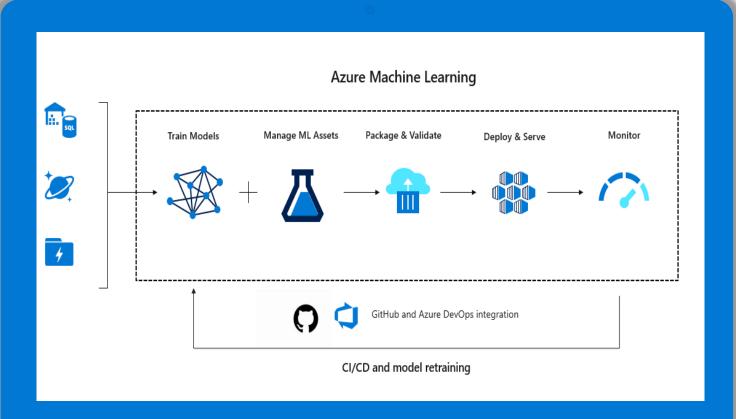


MLOps



Azure Machine Learning

Industry leading MLOps



DevOps



Code reproducibility



Code testing



App deployment

MLOps



Model reproducibility



Model validation



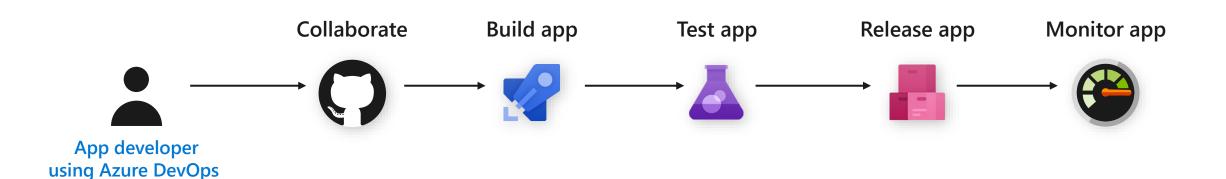
Model deployment



Model retraining

MLOps

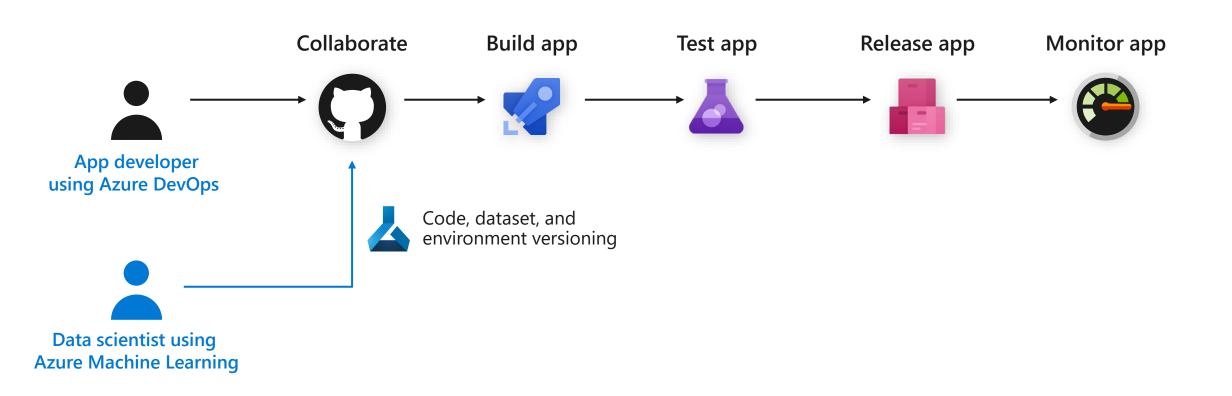
- Create reproducible ML pipelines.
 - Pipelines allow you to define repeatable and reusable steps for your data preparation, training, and scoring processes.
- Register, package, and deploy models from anywhere and track associated metadata required to use the model.
- **Capture the governance** data 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.





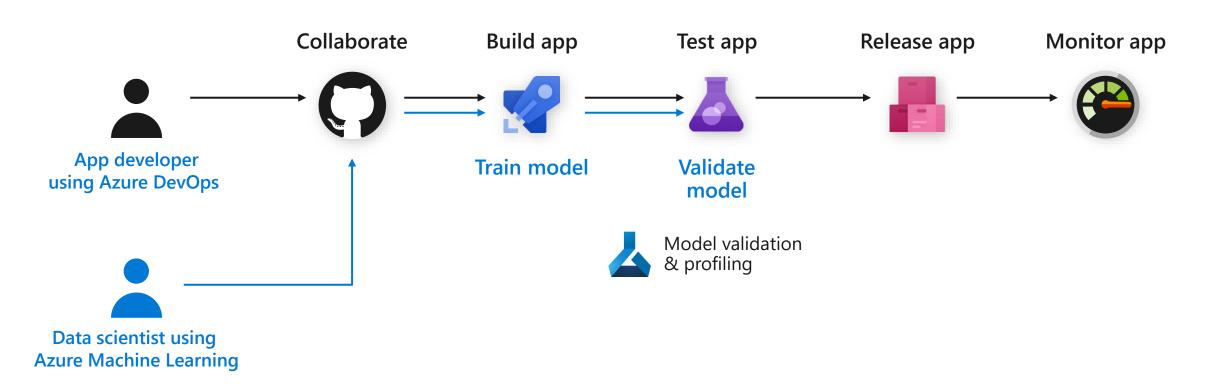








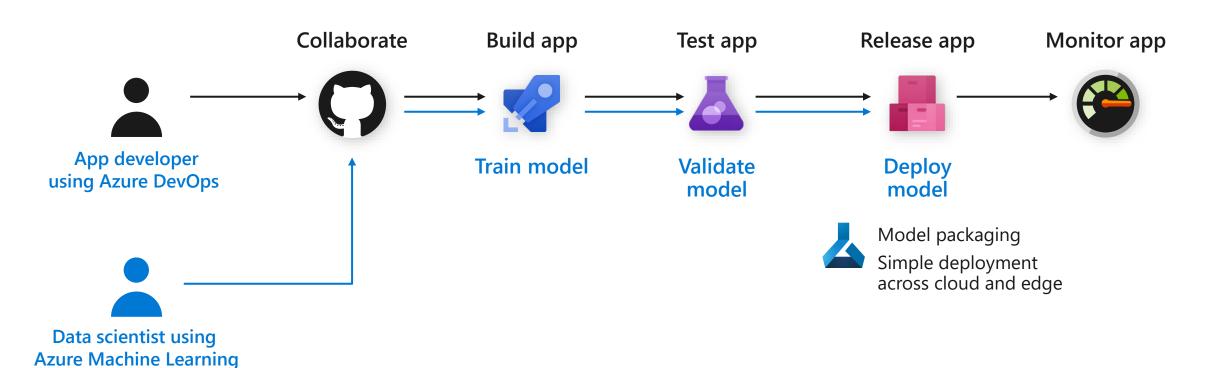






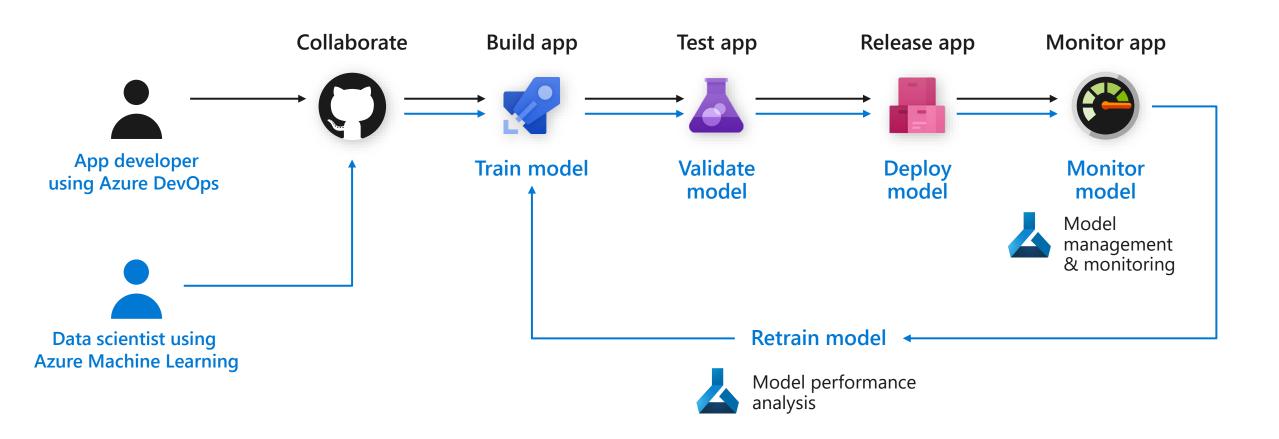










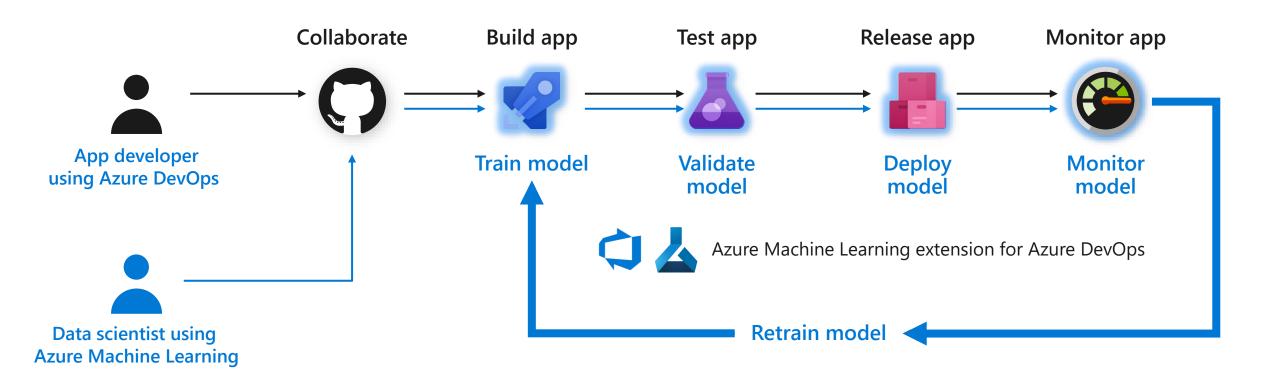










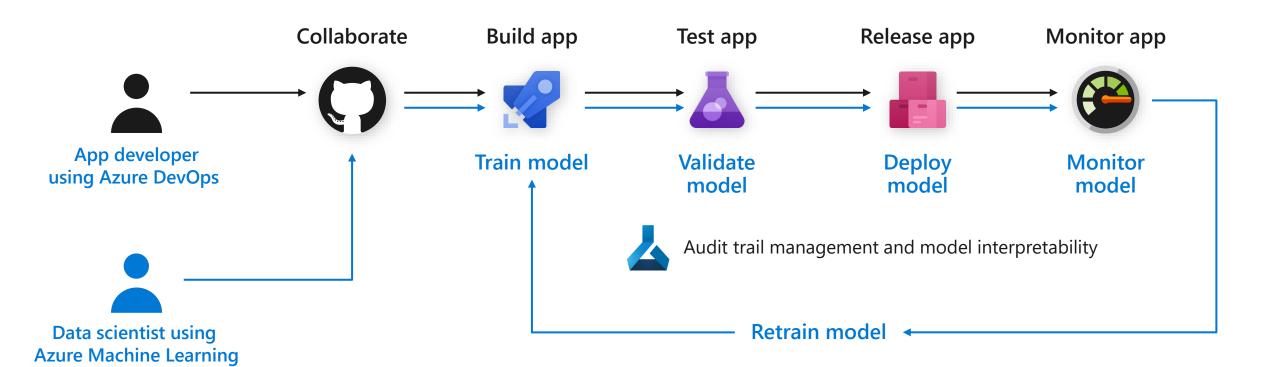








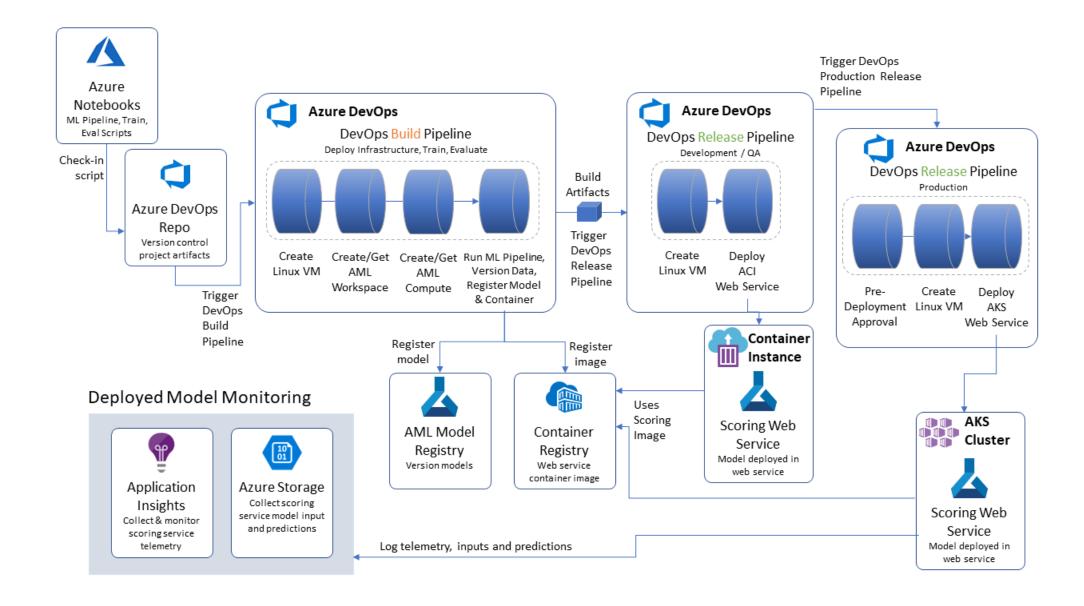












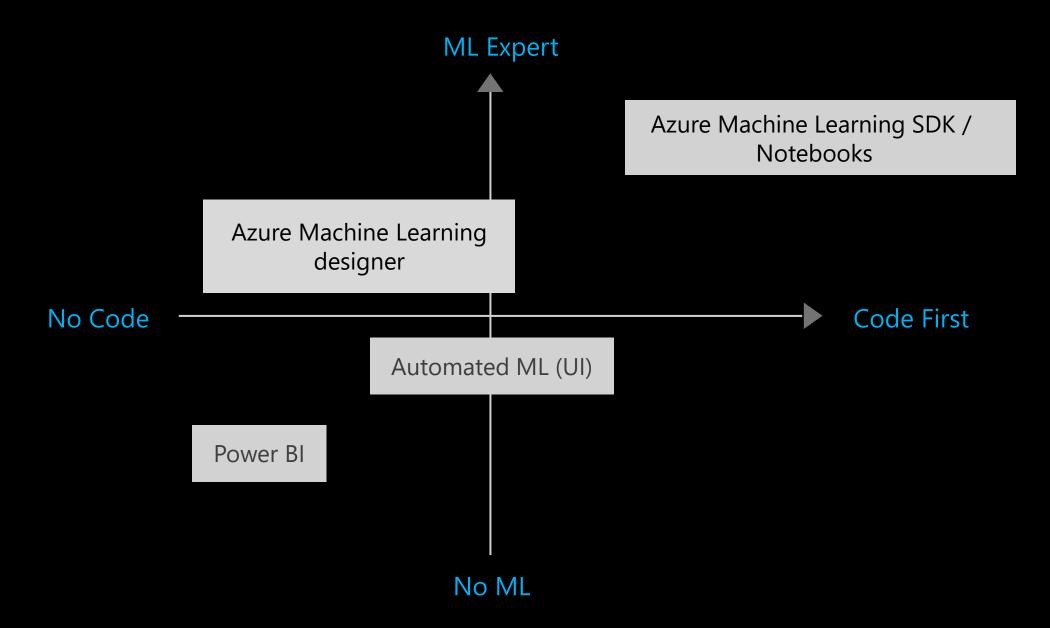






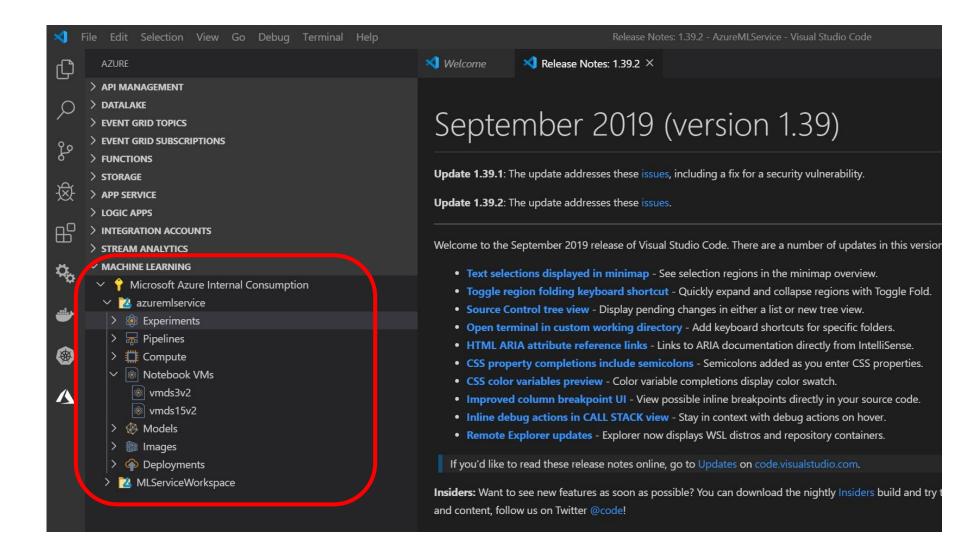


Build across skill levels with Azure Machine Learning



Integration with VS Code

Integration with Visual Studio



Roles

Roles

- 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	✓	✓	√

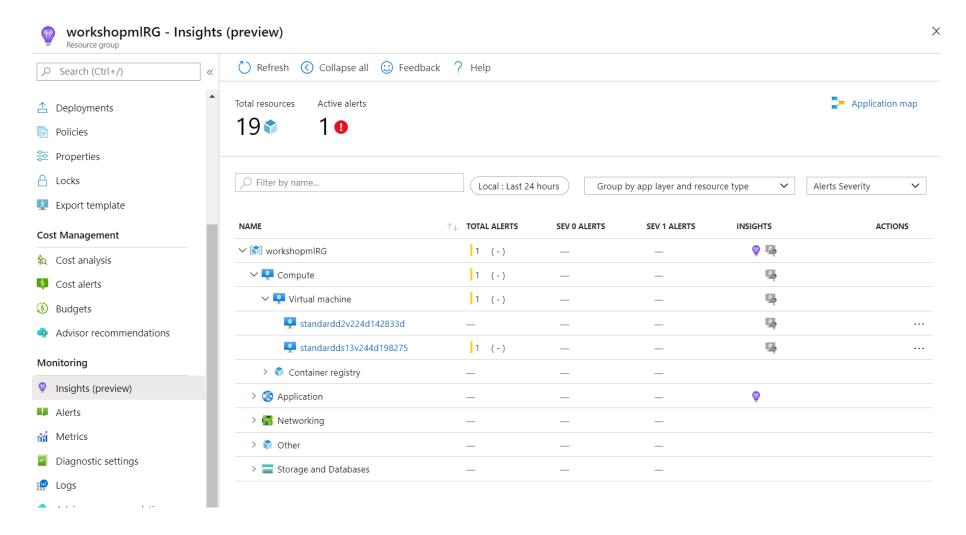
Roles

```
"Name": "Data Scientist Demo",
"Description": "Can create experiments, submit runs, deploy models to test envionments; 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

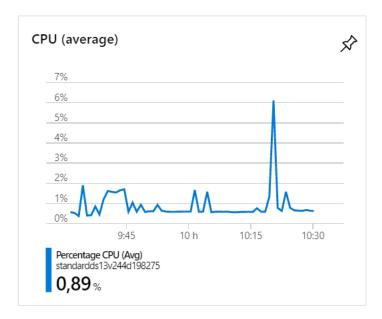
Monitoring Azure ML

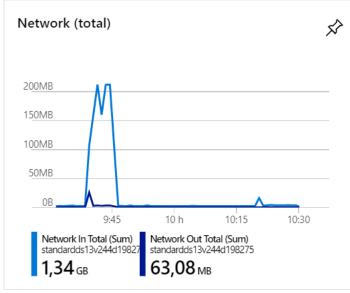
Monitoring Azure ML with Azure Monitor

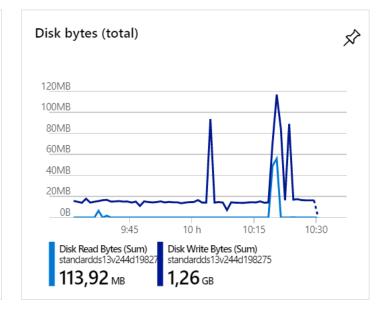


Monitoring Azure ML with Azure Monitor

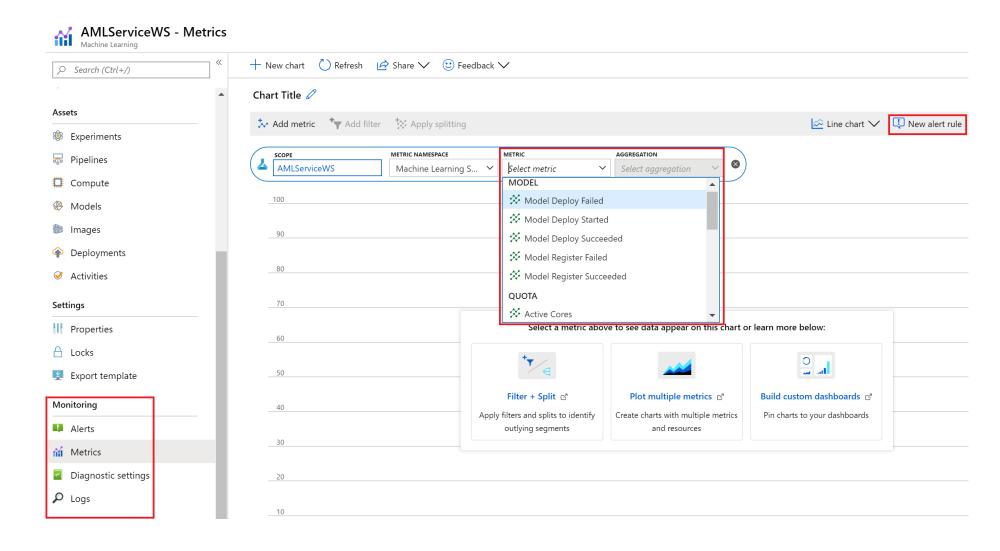








Monitoring Azure ML models



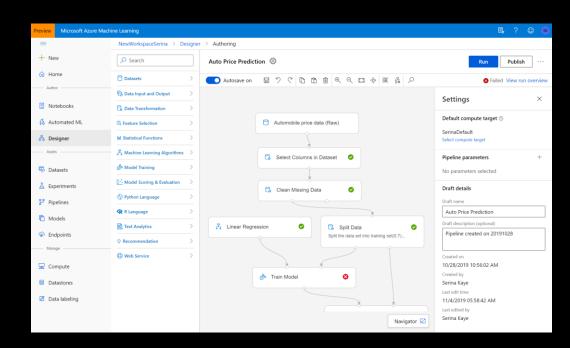
Azure ML Editions

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 crossworkspace 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.



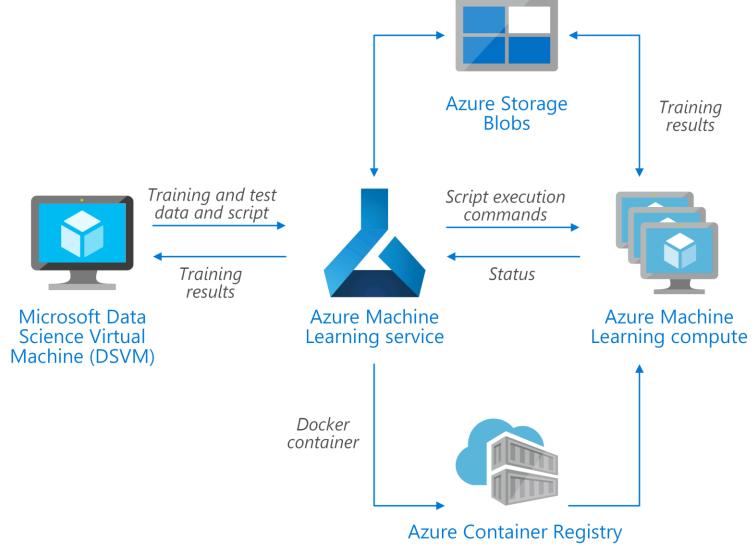
Enterprise and Basic: Summary

- 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/

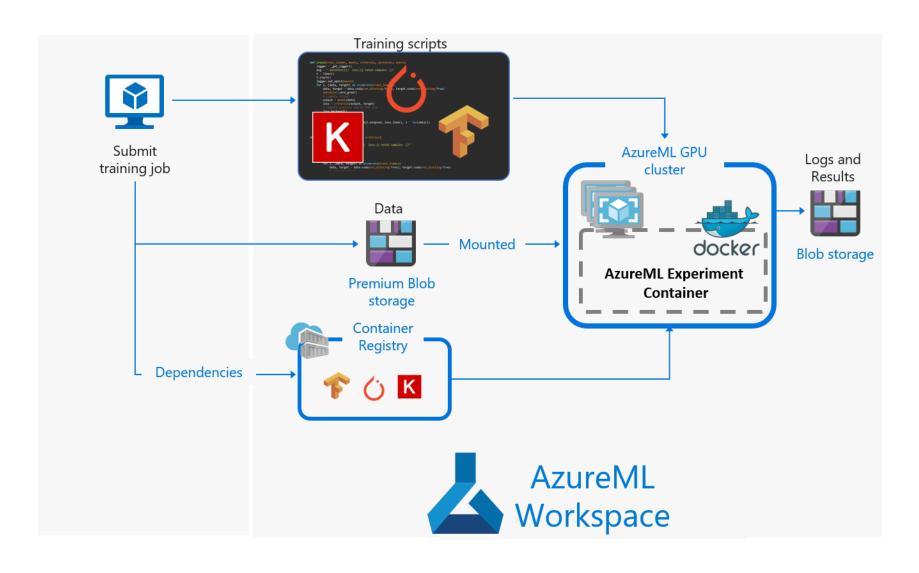
	Basic	Enterprise
Pricing structure	Pay only for Azure resources consumedNo charge for AzureML	 No up-front cost – scale as you need, pay for what you consume Compute surcharge for ML activities: data prep, training, inferencing
Audience	 Experienced data scientists who like a code- first environment Single data scientists or small data science teams who don't need enterprise price controls, or large-scale ML Ops 	 Large enterprises with mixed data science, data engineering and analyst teams who would benefit from both code-forward and drag-and-drop ML Large data science teams that need to share compute across workspaces, or access other enterprise features
Messages	 The best place for open source ML Use your existing tools and IDE when scaling to the cloud Best in class code-first experience 	 Basic level + Best in class ML for all skill levels including no-code ML Enterprise-grade security, governance and cost control Comprehensive ML lifecycle management
[Roadmap features]	Responsible AI toolkitReinforcement learningBatch inferencingManual data labelling	 Data drift capabilities Automated ML ensemble models and deep learning Automated model retraining Managed inferencing ML assisted labelling

Architectures

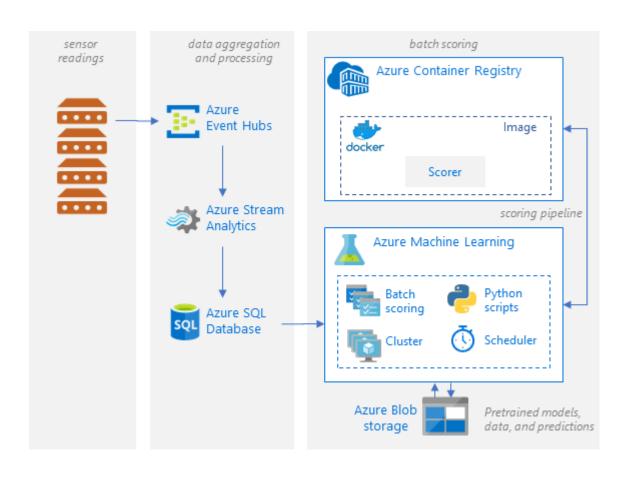
Training Python



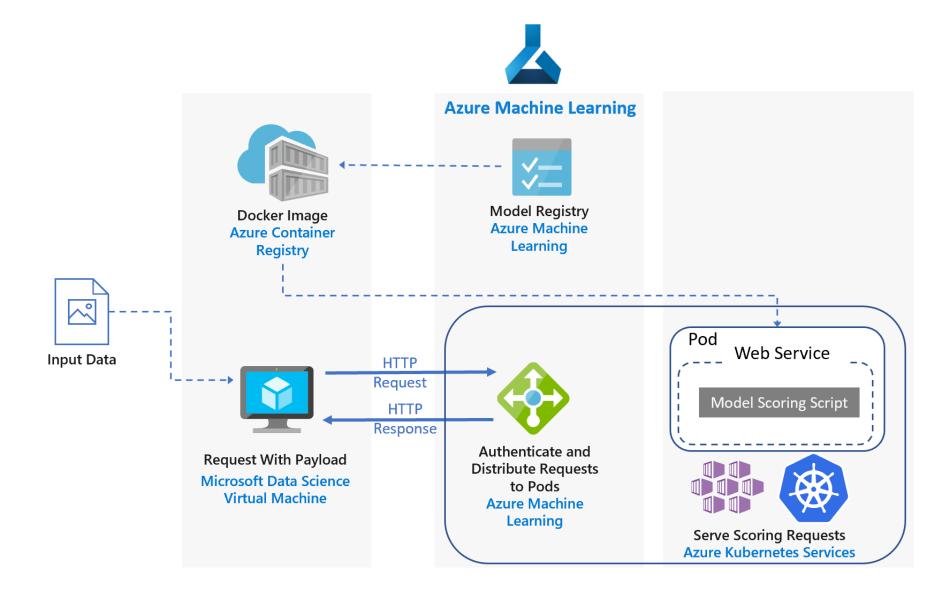
Deep Learning

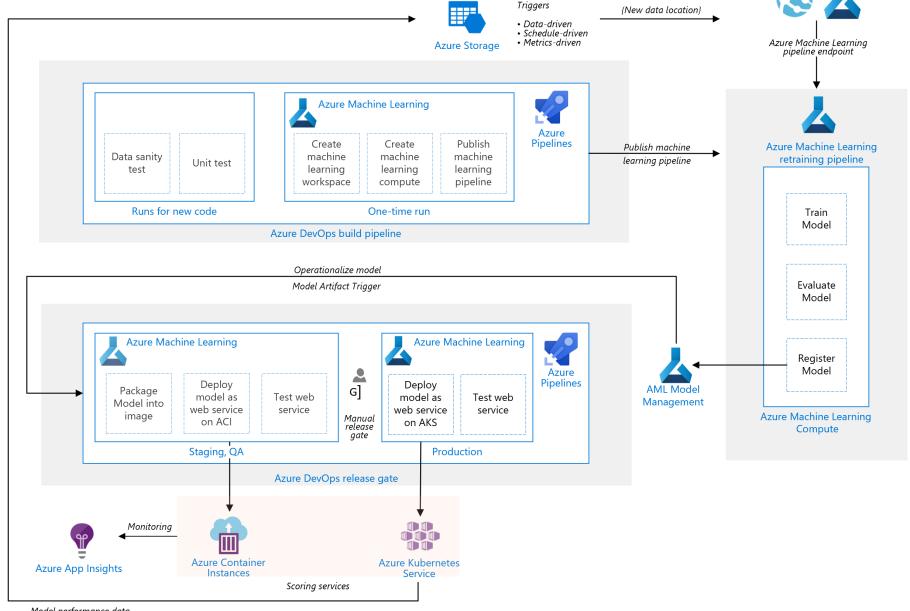


Batch scoring of Python models



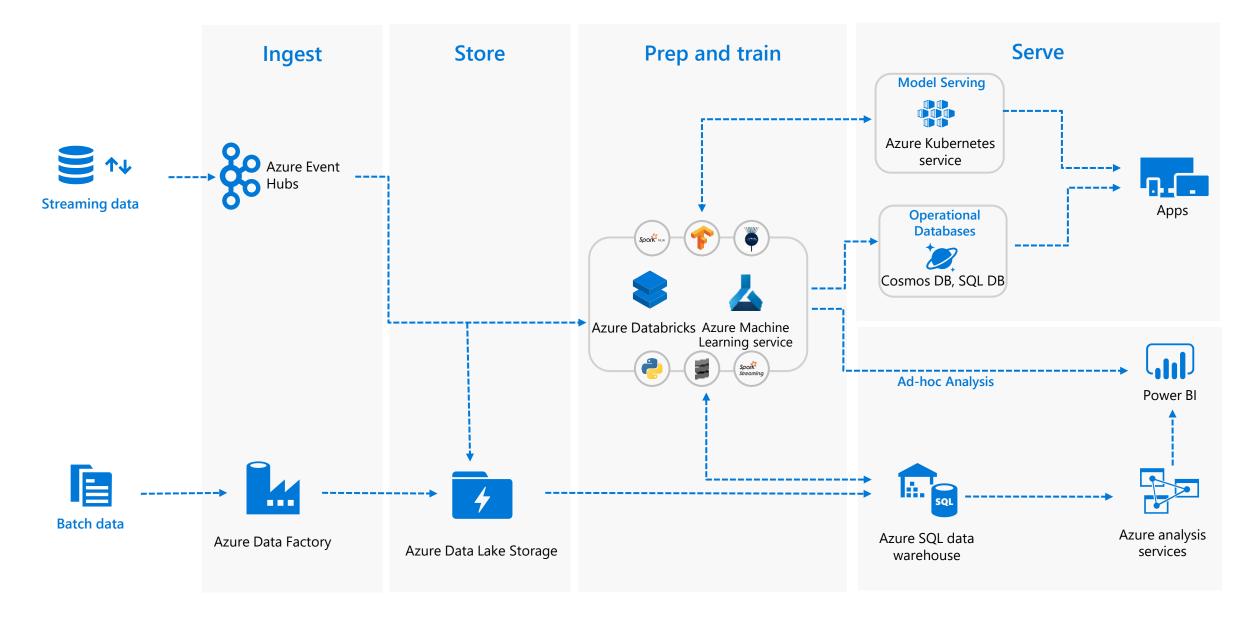
Real time scoring





Model performance data

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/enus/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:

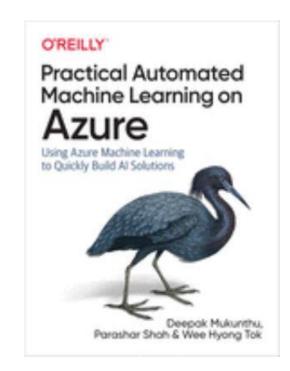
https://customers.microsoft.com/en-us/story/733091-walgreens-boots-alliance-pharmaceuticals-azure

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/807Y8X2HH4/ref=sr 1 1?keywords=automl+azure&qid=1573050215&s=digital-text&sr=1-1

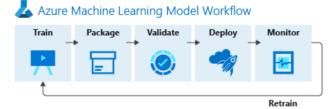


Azure ML Git

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

Azure Machine Learning service example notebooks

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



Quick installation

pip install azureml-sdk

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

How to navigate and use the example notebooks?

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





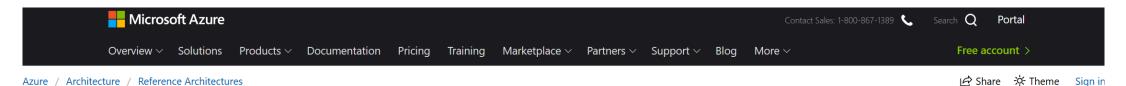


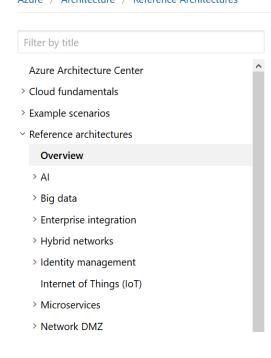
Get Started Products SDKs/Tools Architecture

All	Compute	Networking	Storage	Web
Compute	Linux Virtual Machines	Networking Overview	Storage	App Service - Web Apps
Networking	Windows Virtual Machines	Content Delivery Network	• StorSimple	API Management
•	App Service	♣ ExpressRoute	Data Lake Storage Gen2	Content Delivery Network
Storage	Functions	Azure DNS	Data Lake Storage Gen1	Notification Hubs
Web	Batch	··· Virtual Network	Blob Storage	Azure Search

Documentation Microsoft

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





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: Al | Big data | IoT | Microservices | Serverless | Virtual networks | VM workloads | SAP | Active Directory | Web apps

Al and machine learning

puthon 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



powered

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

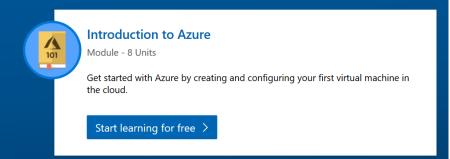
Architectures Microsoft

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Microsoft Learn

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

Microsoft Al School https://aischool.microsoft.com/en-us/home

