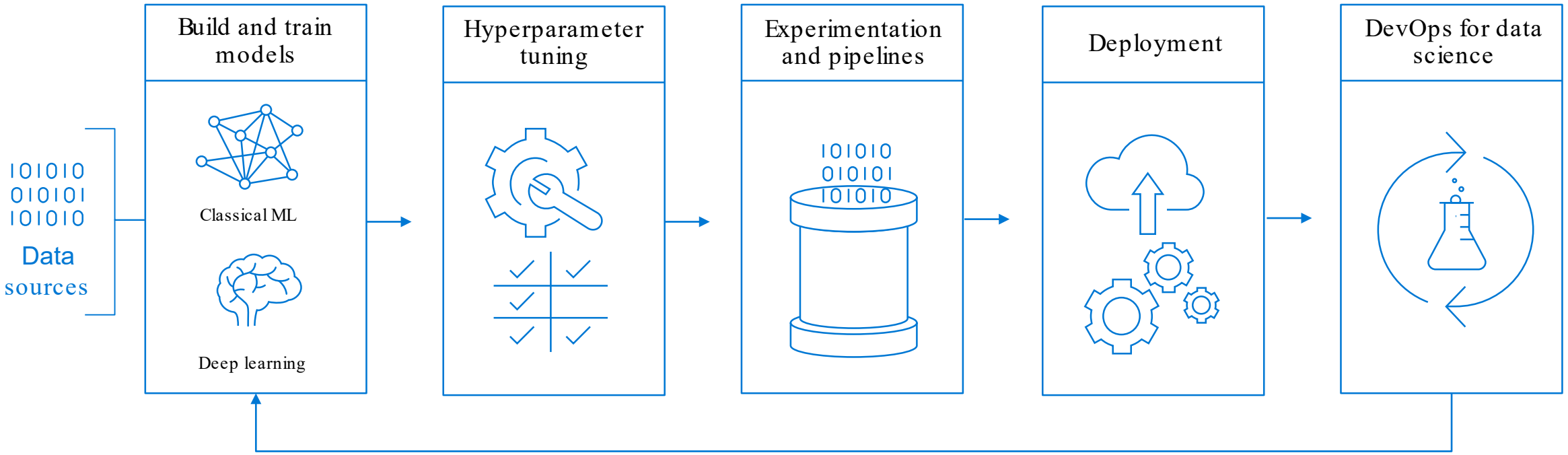
Machine Learning on Azure

Overview

- Machine Learning on Azure
- Custom AI
- Compute Targets (DSVMs and Managed Compute)
- DevOps for Machine Learning
- Azure Machine Learning Pipelines
- Flexible and Support for Open Source Frameworks
- Deployment
- Tool Agnostic Python SDK
- DataPrep SDK

Building blocks for a Data Science Project



Machine Learning on Azure

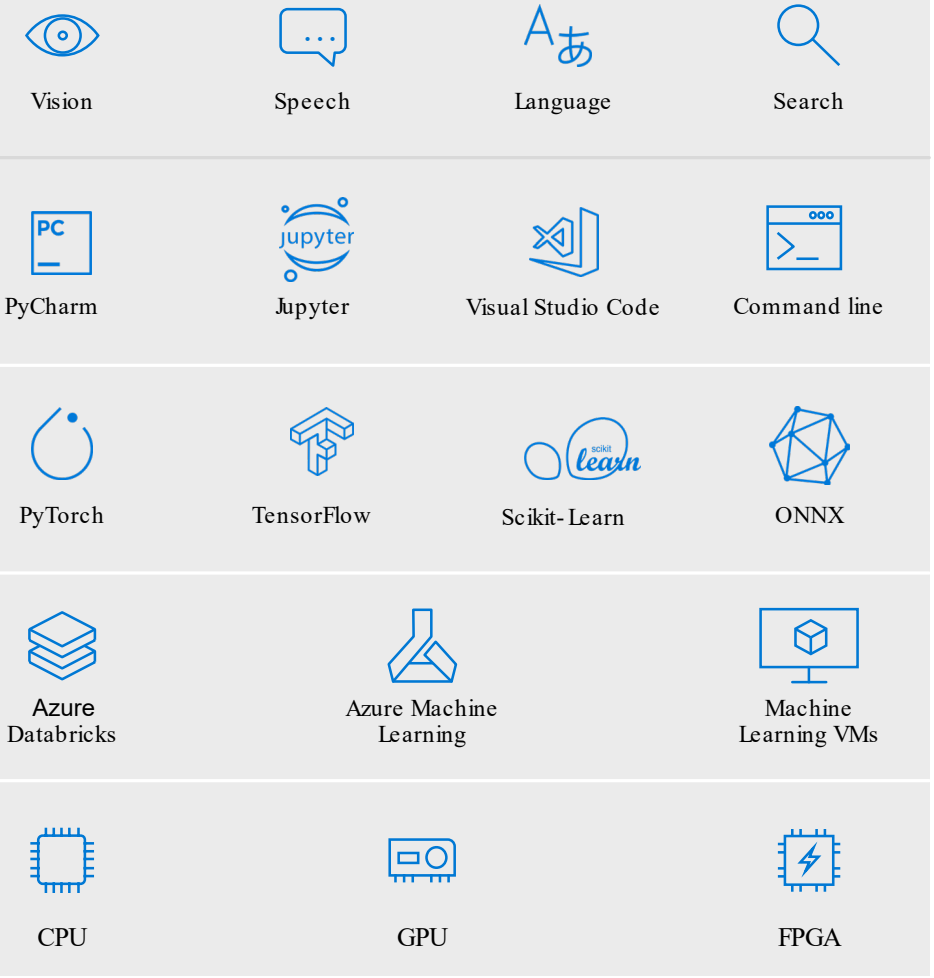
Domain Specific Pretrained Models
To reduce time to market

Familiar Data Science Tools
To simplify model development

Popular Frameworks
To build machine learning and deep learning solutions

Productive Services
To empower data science and development teams

Powerful Hardware
To accelerate deep learning



From the Intelligent Cloud to the Intelligent Edge

Azure Machine Learning Service

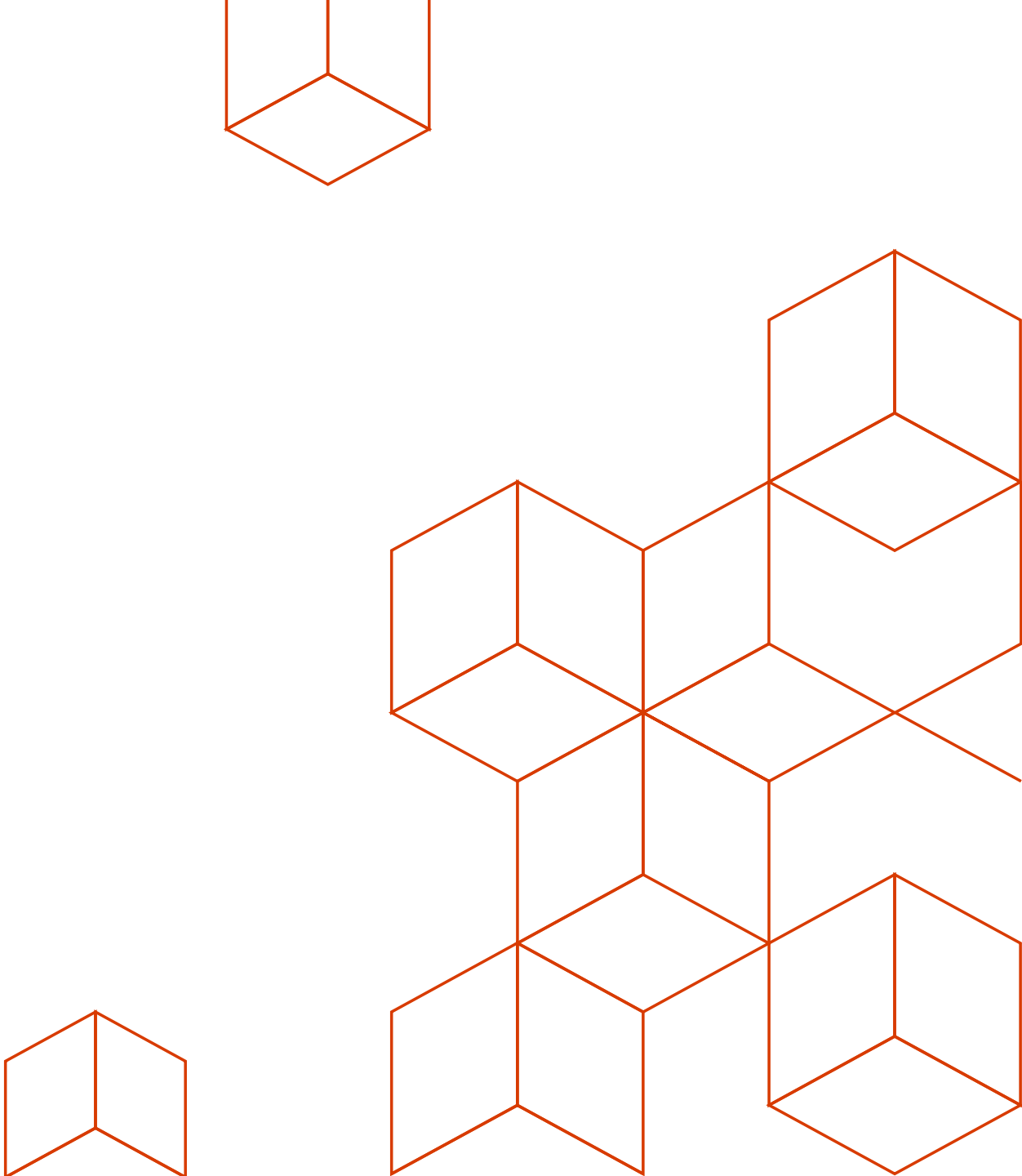
Set of Azure Cloud Services

Python SDK

That enables you to:

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

Custom AI



Productive Services

Empower data science and development teams

Integrated data science & data engineering teams

Desktop solutions not adequate

Need a unified big data & machine learning solution

Individual data scientists

Desktop solutions adequate

Need cloud for sporadic compute needs

Azure Databricks + Azure Machine Learning service

Machine Learning VMs

Azure Machine Learning Service

Bring AI to everyone with an end-to-end, scalable, trusted platform

Boost your data science productivity

Increase your rate of experimentation

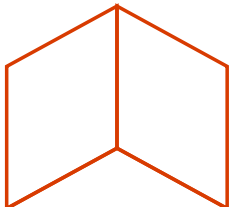
Deploy and manage your models everywhere

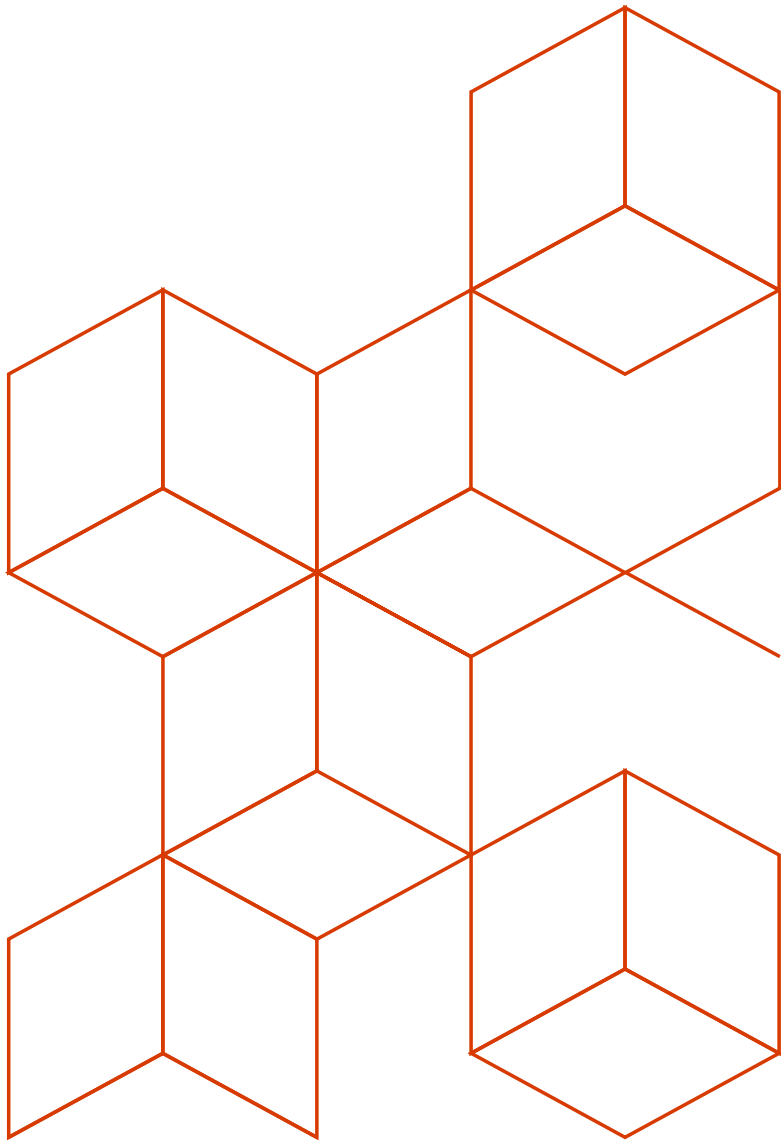
Built with your needs in mind

- Automated machine learning
- Managed compute
- DevOps for machine learning
- Simple deployment
- Tool agnostic Python SDK
- Support for open source frameworks

Seamlessly integrated with the Azure Portfolio

Data Science Virtual Machine

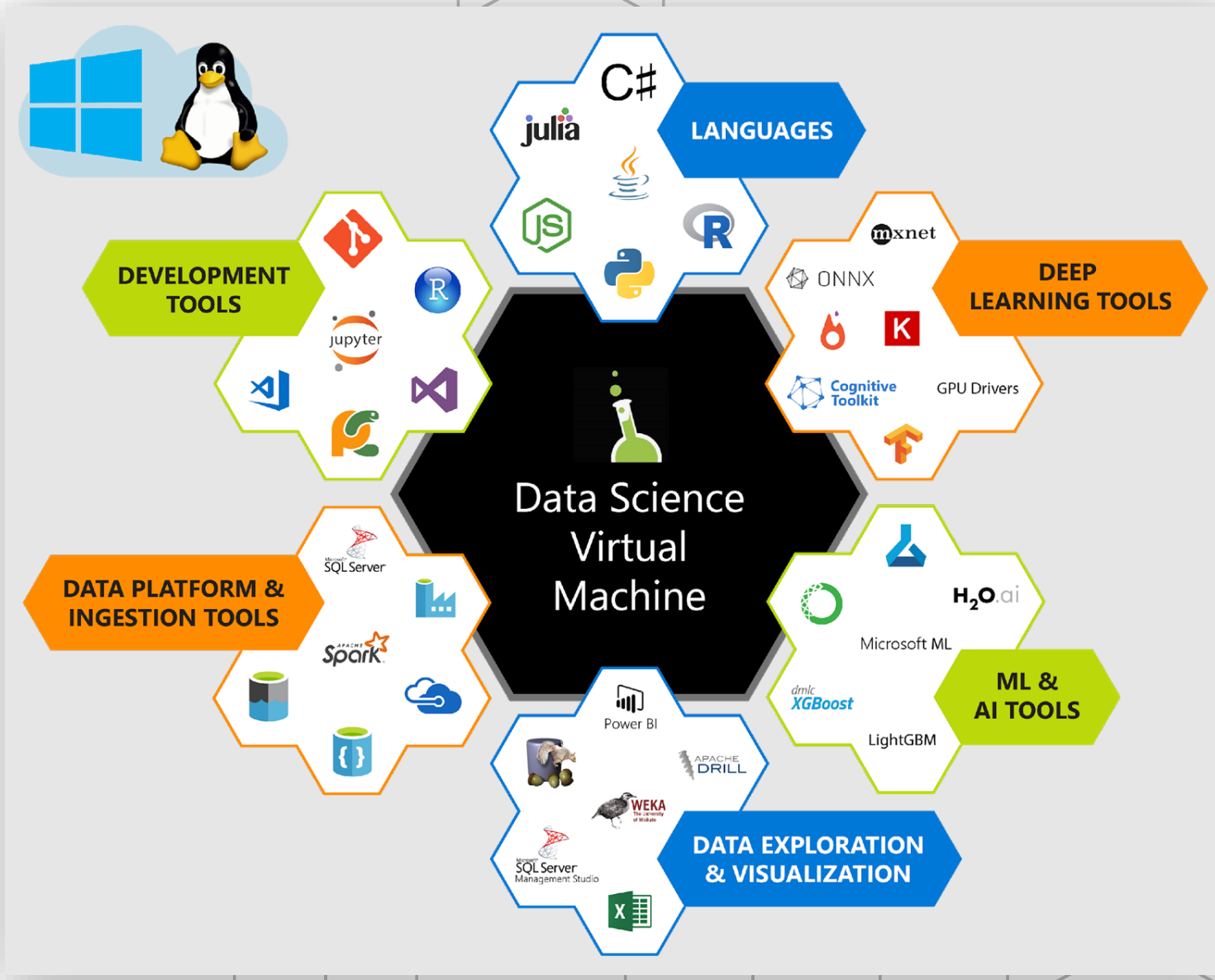




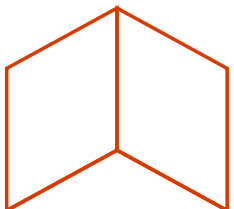
Data Science Virtual Machines (DSVM)

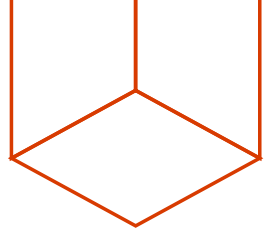
Pre-Configured environments in the cloud for
Data Science & AI Modeling,
Development & Deployment.

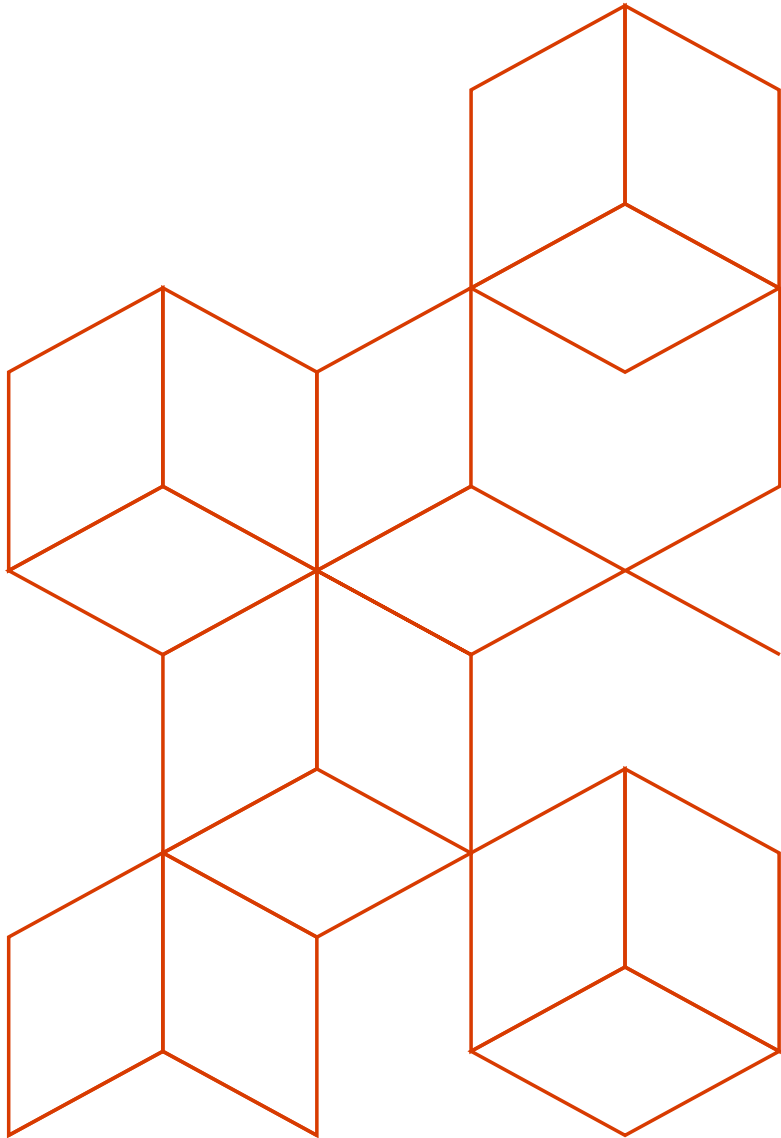
Samples to get started



Managed Compute



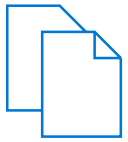




Training Infrastructure

Dependencies and Containers

Leverage system-managed AML compute or bring your own compute



Distribute data

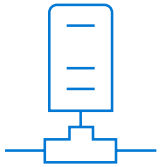
Manage and share resources across a workspace

Schedule jobs

Train at cloud scale using a framework of choice

Scale resources

Autoscale resources to only pay while running a job



Provision VM clusters

Use the latest NDv2 series VMs with the NVIDIA V100 GPUs

Powerful Infrastructure

Accelerate deep learning

CPUs

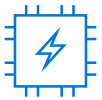
General purpose machine learning

D, F, L, M, H Series

GPUs

Deep learning

N Series



FPGAs

Specialized hardware accelerated deep learning

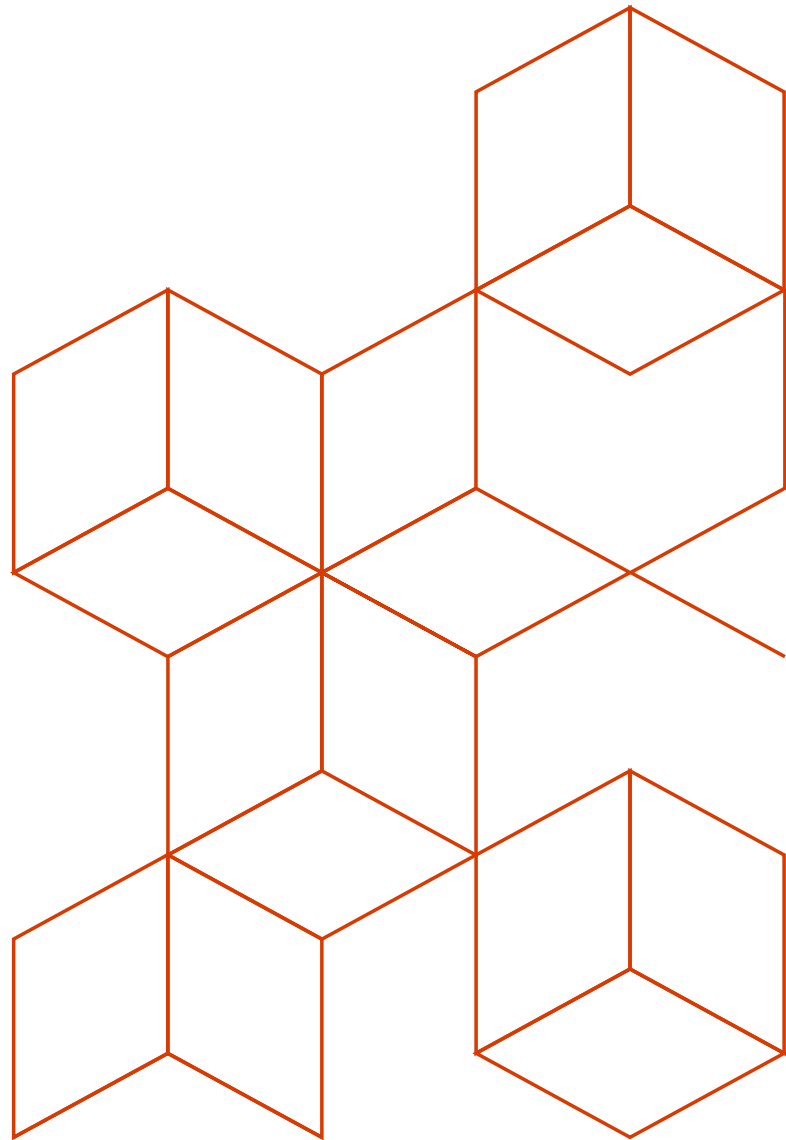
Project Brainwave

FPGA NEW UPDATES:

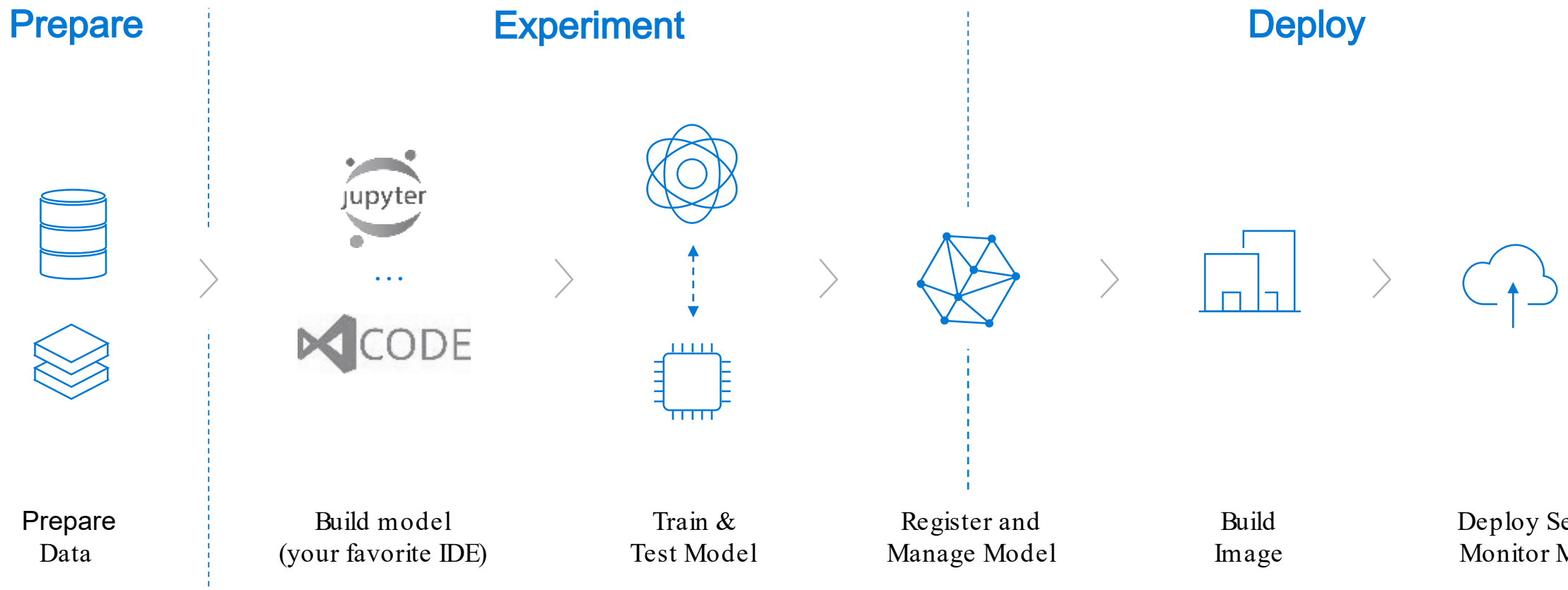
Support for image classification and recognition scenarios

ResNet 50, ResNet 152, VGG-16, SSD-VGG, DenseNet-121

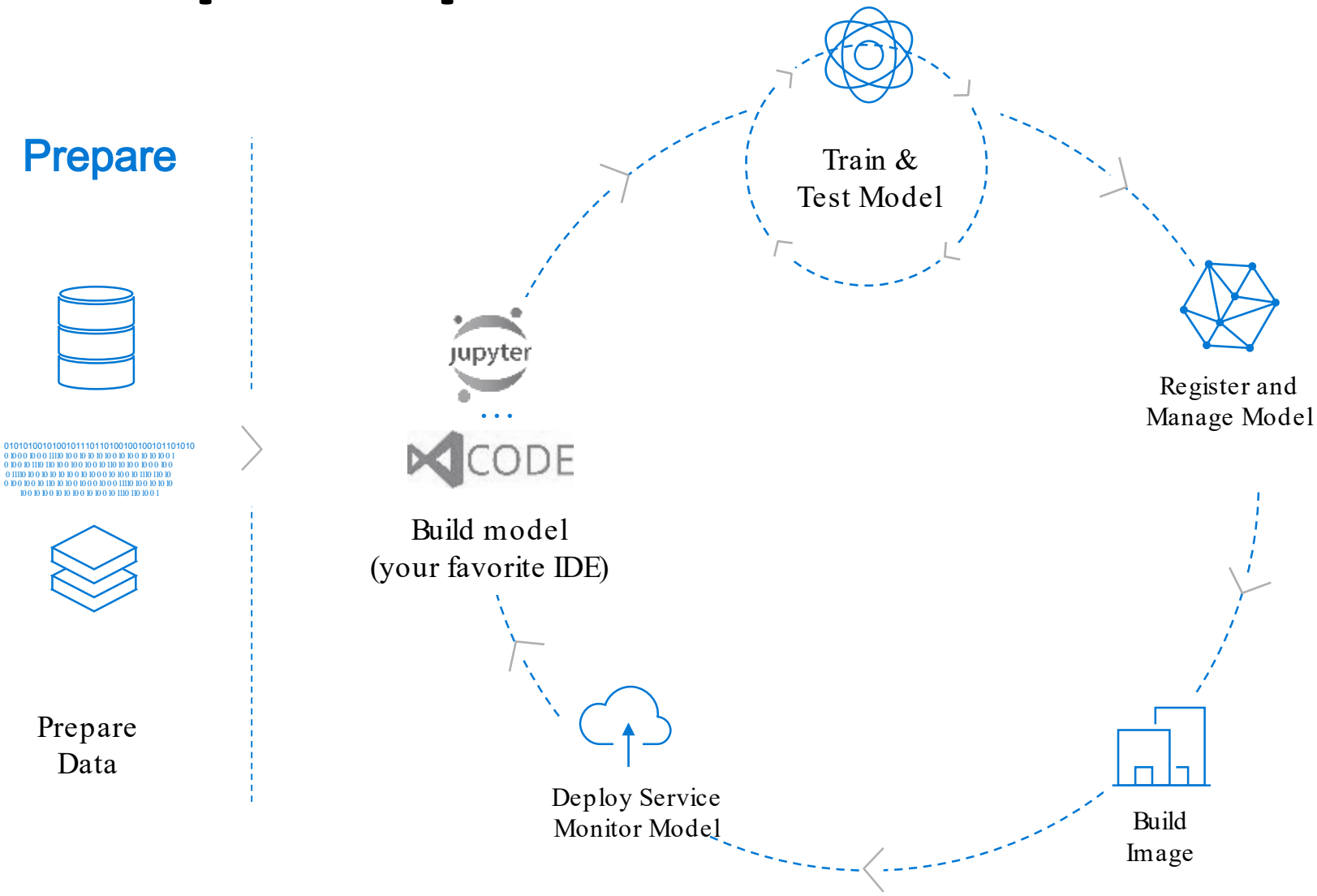
DevOps for Machine Learning



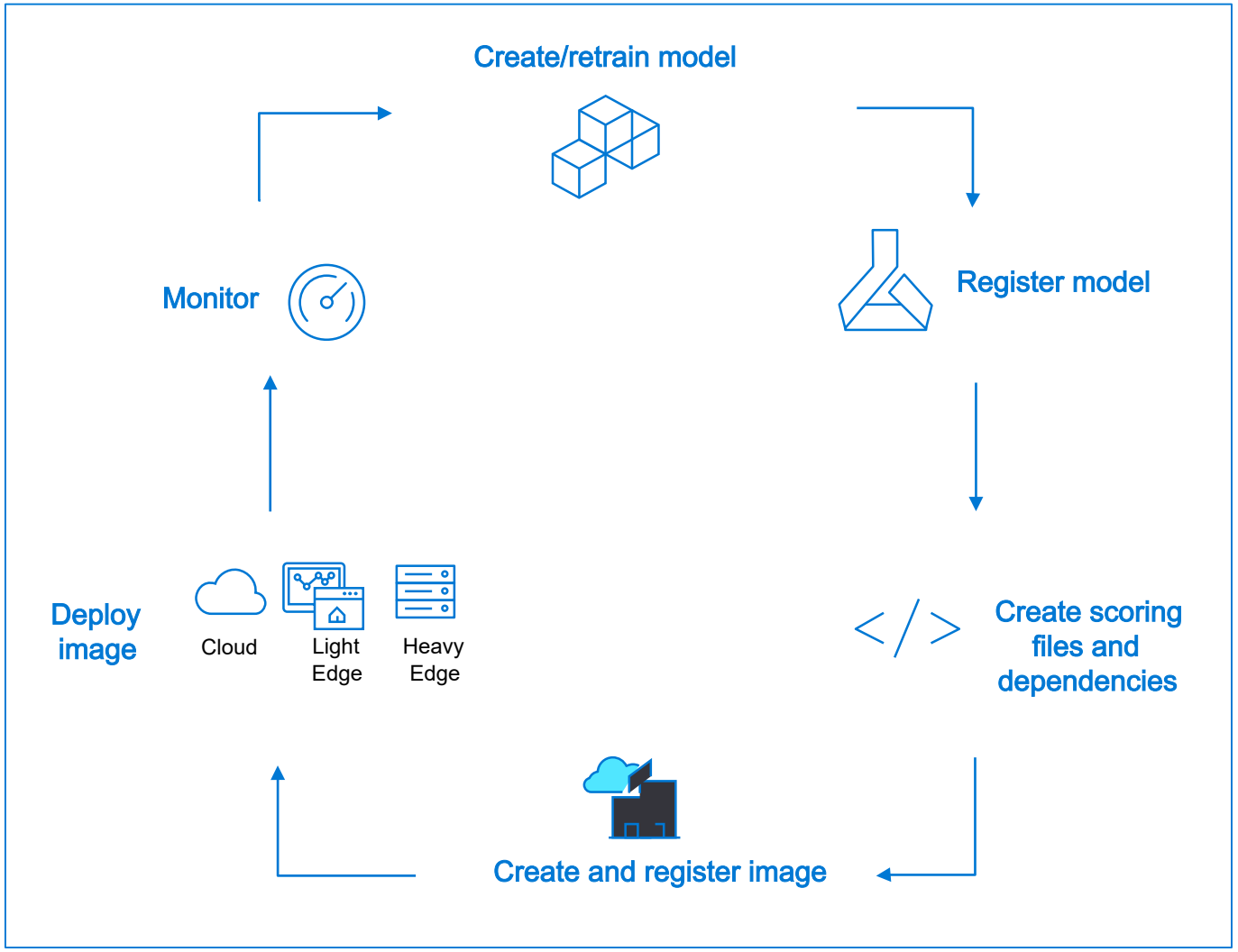
DevOps loop for data science



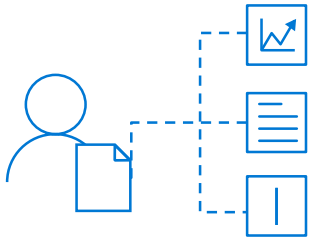
DevOps loop for data science



Model Management in Azure Machine Learning

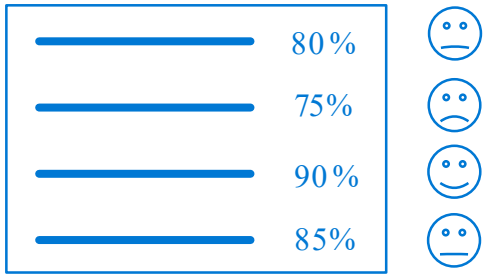


Experimentation

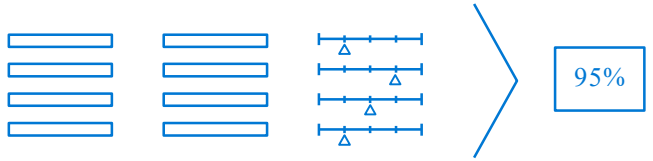


Leverage service-side capture of run metrics, output logs and models

Manage training jobs locally, scaled-up or scaled-out

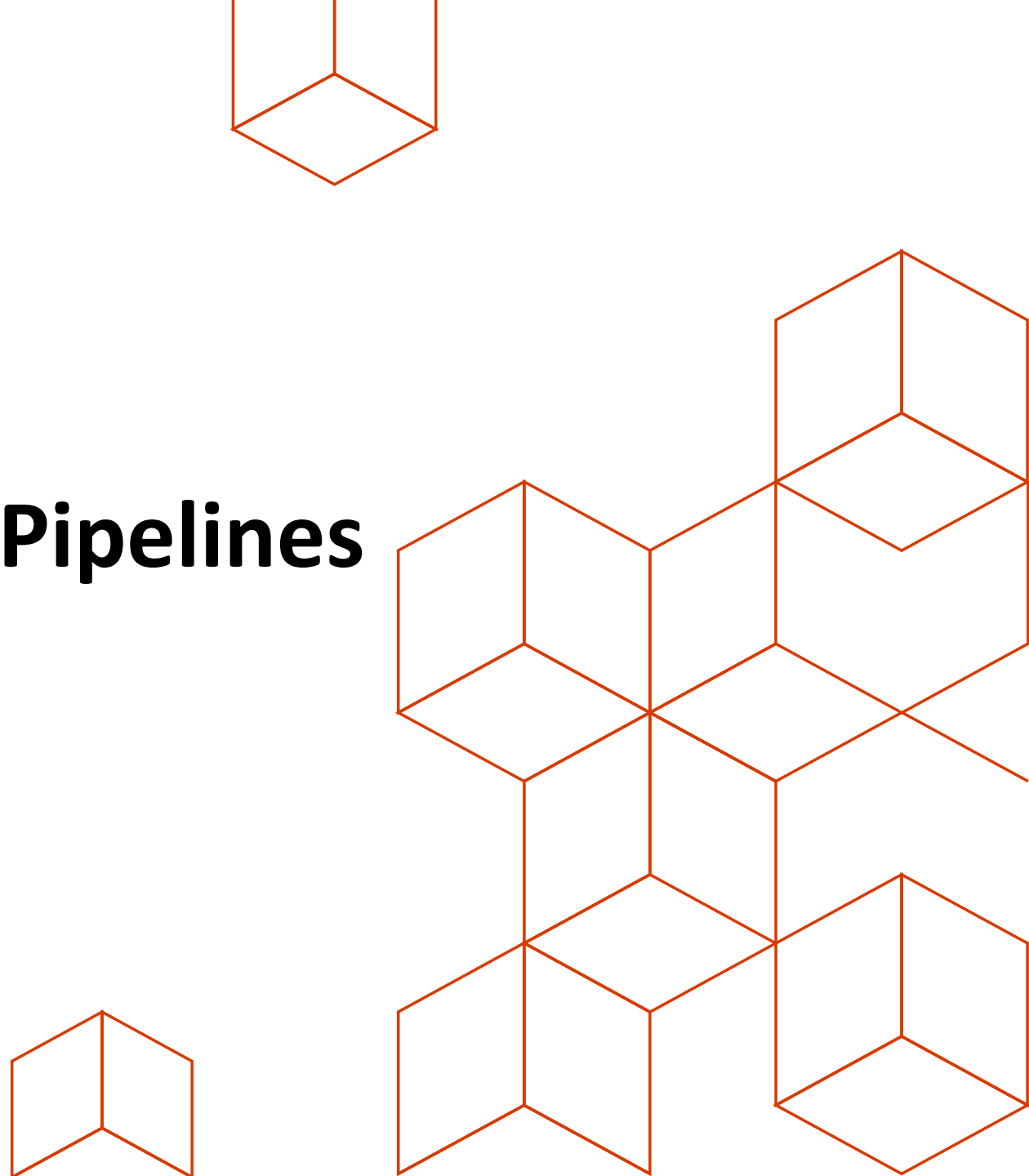


Use leaderboards, side by side run comparison and model selection

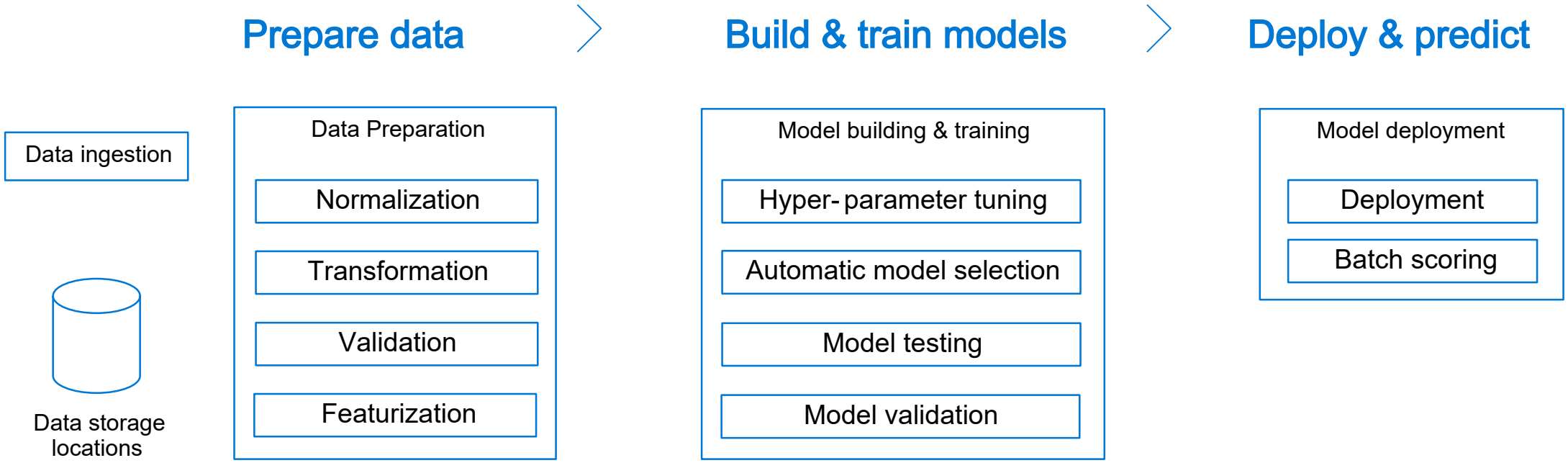


Conduct a hyperparameter search on traditional ML or DNN

Azure Machine Learning Pipelines



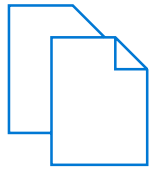
Azure Machine Learning Pipelines



Advantages of Azure ML Pipelines

Unattended runs

Schedule a few steps to run in parallel or in sequence to focus on other tasks while your pipeline runs

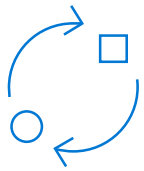


Tracking and versioning

Name and version your data sources, inputs and outputs with the pipelines SDK

Reusability

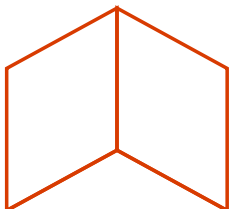
Create templates of pipelines for specific scenarios such as retraining and batch scoring

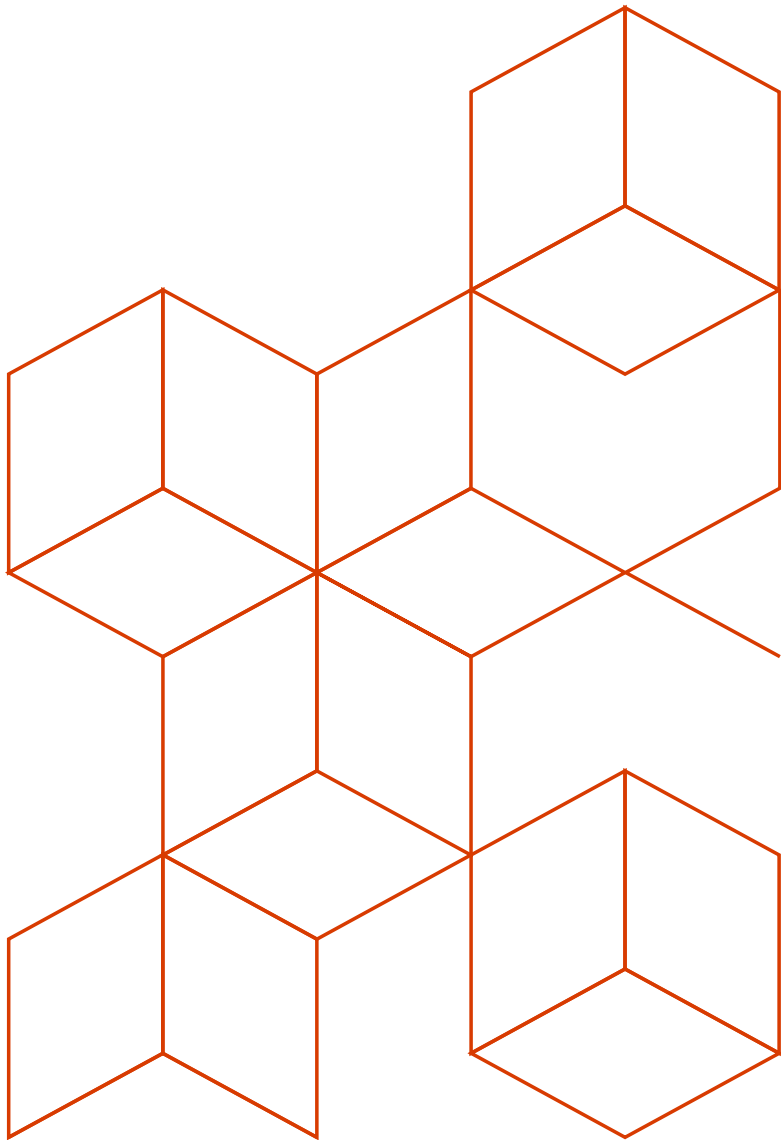


Mixed and diverse compute

Use multiple pipelines that are reliably coordinated across heterogeneous and scalable computes and storages

Support for
Open source frameworks





Popular Frameworks

Use your favorite machine learning frameworks


TensorFlow


PyTorch

Scikit-Learn


MXNet


Chainer

Keras

without getting locked into one framework


ONNX

Community project created by Facebook and Microsoft

Use the best tool for the job. Train in one framework and transfer to another for inference

Create

Frameworks

Services

Azure Custom Vision Service

Native support

Converters

Native support

ONNX Model

Native support

Converters

Deploy

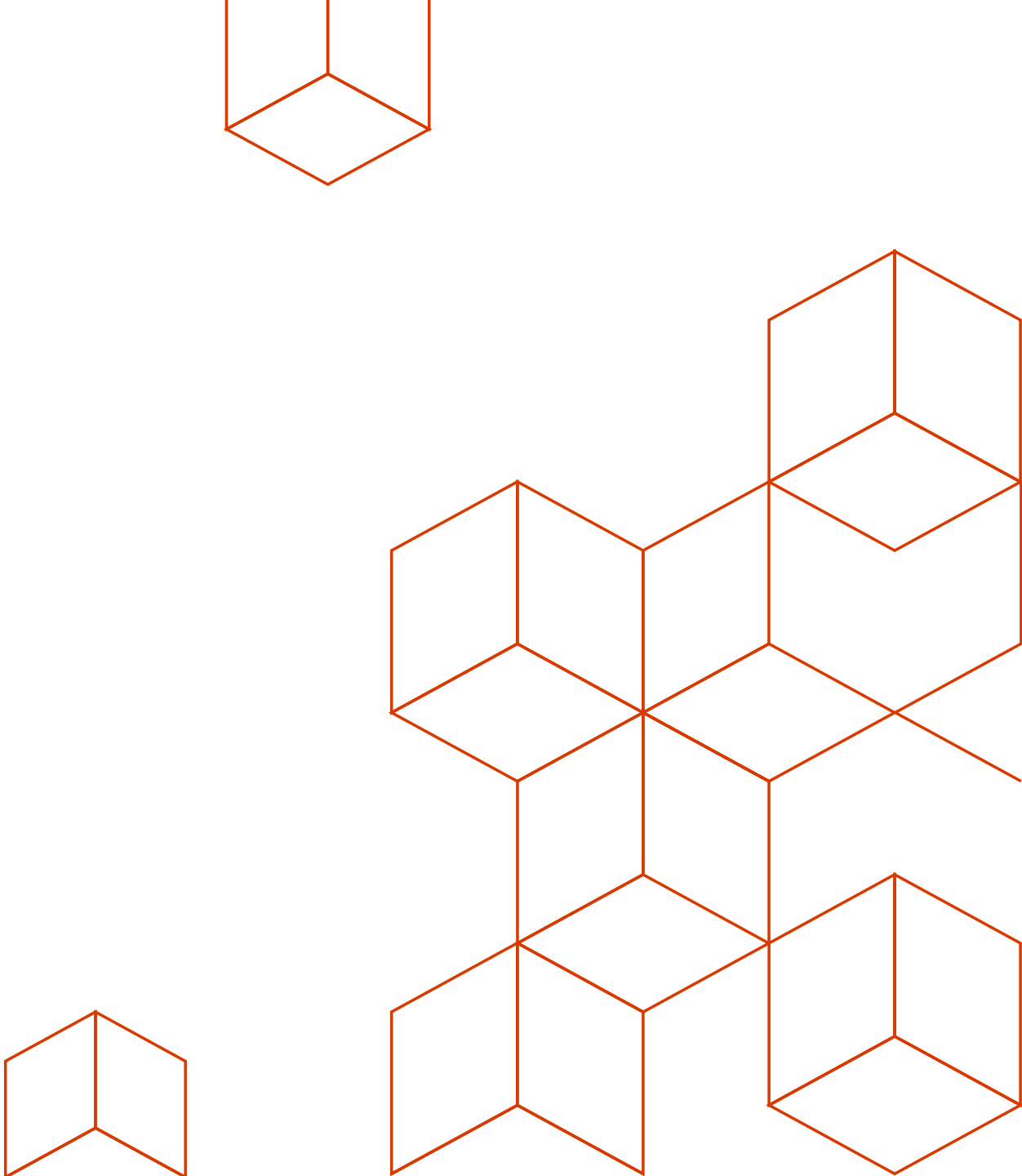
Azure

- Azure Machine Learning services
- Ubuntu VM
- Windows Server 2019 VM

Windows Devices

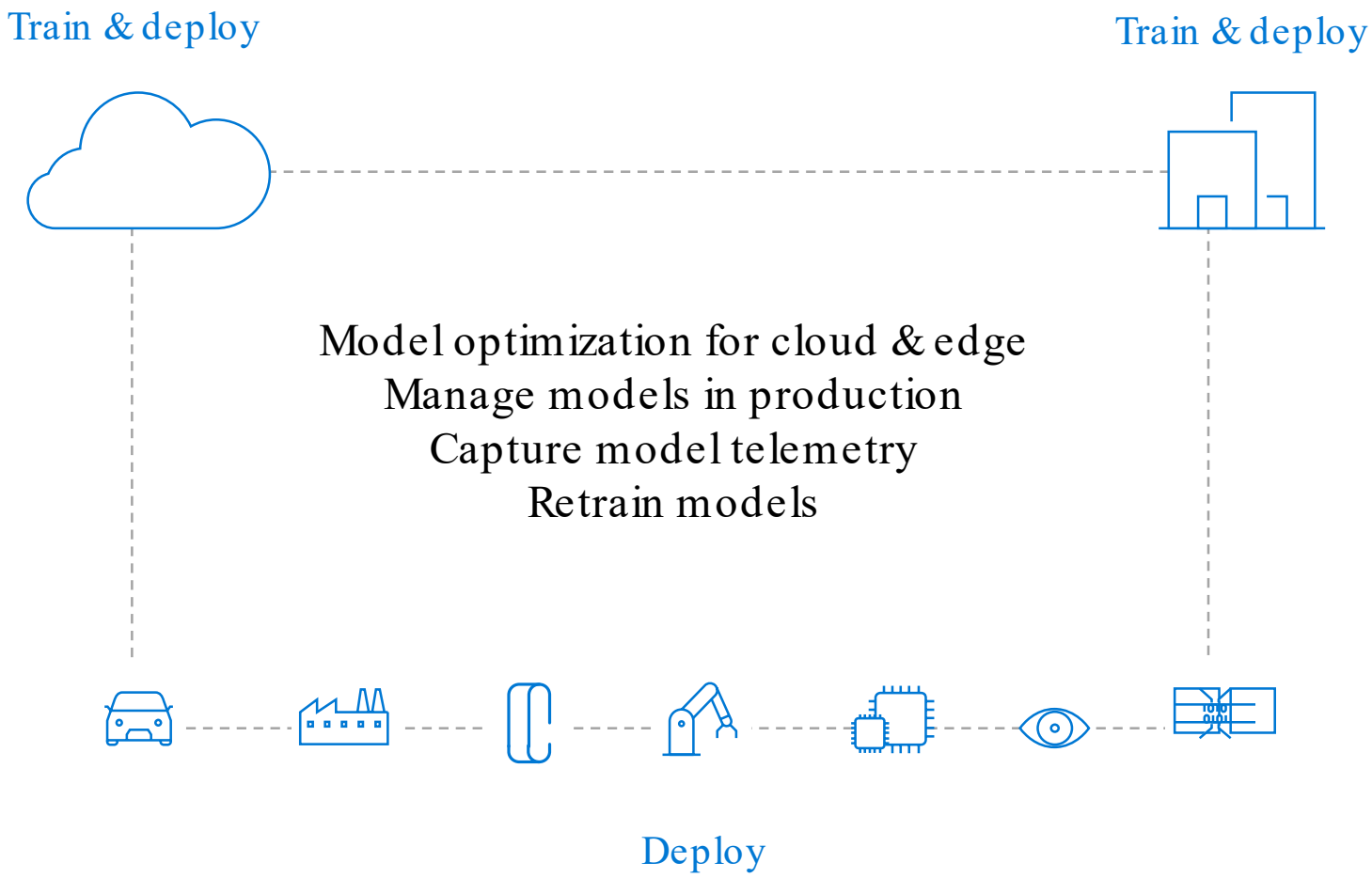
Other Devices
(iOS, etc)

Deployment

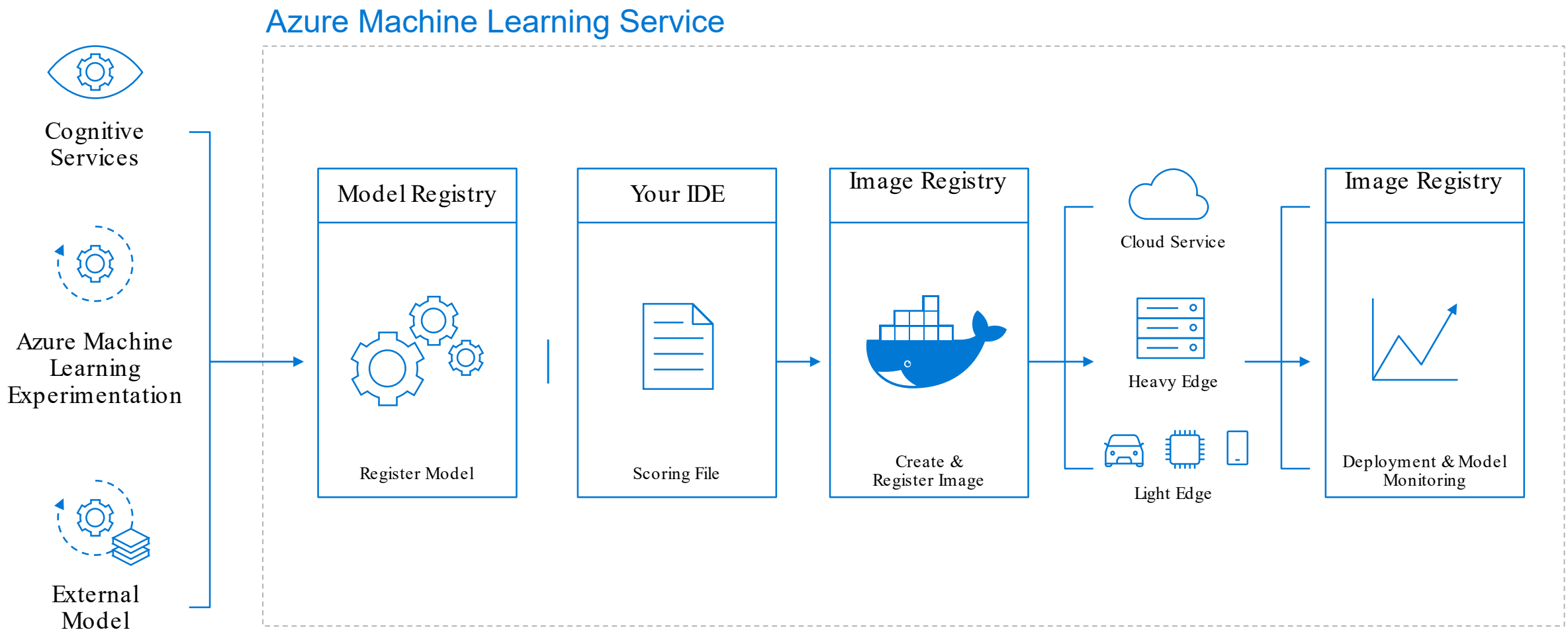


Flexible Deployment

Deploy and manage models on intelligent cloud and edge



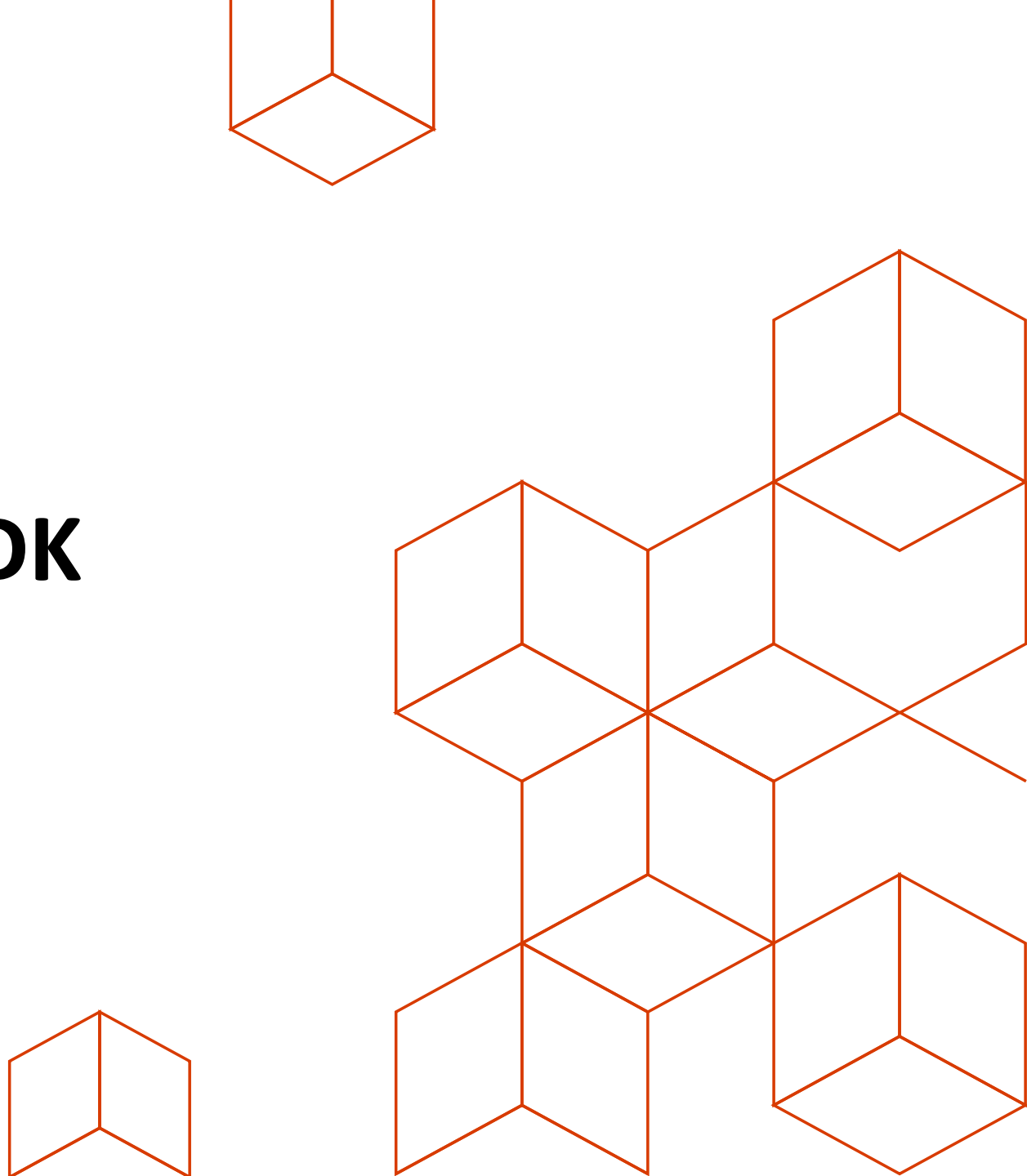
Deploy Azure ML models at scale



Deployments to Compute Targets

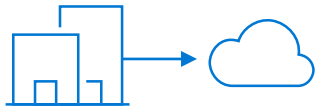
Compute target	Deployment type	Description
Azure Container Instances (ACI)	Web service	Fast deployment. Good for development or testing.
Azure Kubernetes Service (AKS)	Web service	Good for high-scale production deployments. Provides autoscaling, and fast response times.
Azure IoT Edge	IoT module	Deploy models on IoT devices. Inferencing happens on the device.
Field-programmable gate array (FPGA)	Web service	Ultra-low latency for real-time inferencing.

Tool Agnostic Python SDK



Tool Agnostic Python SDK

Use your favorite IDEs, editors, notebooks, and frameworks

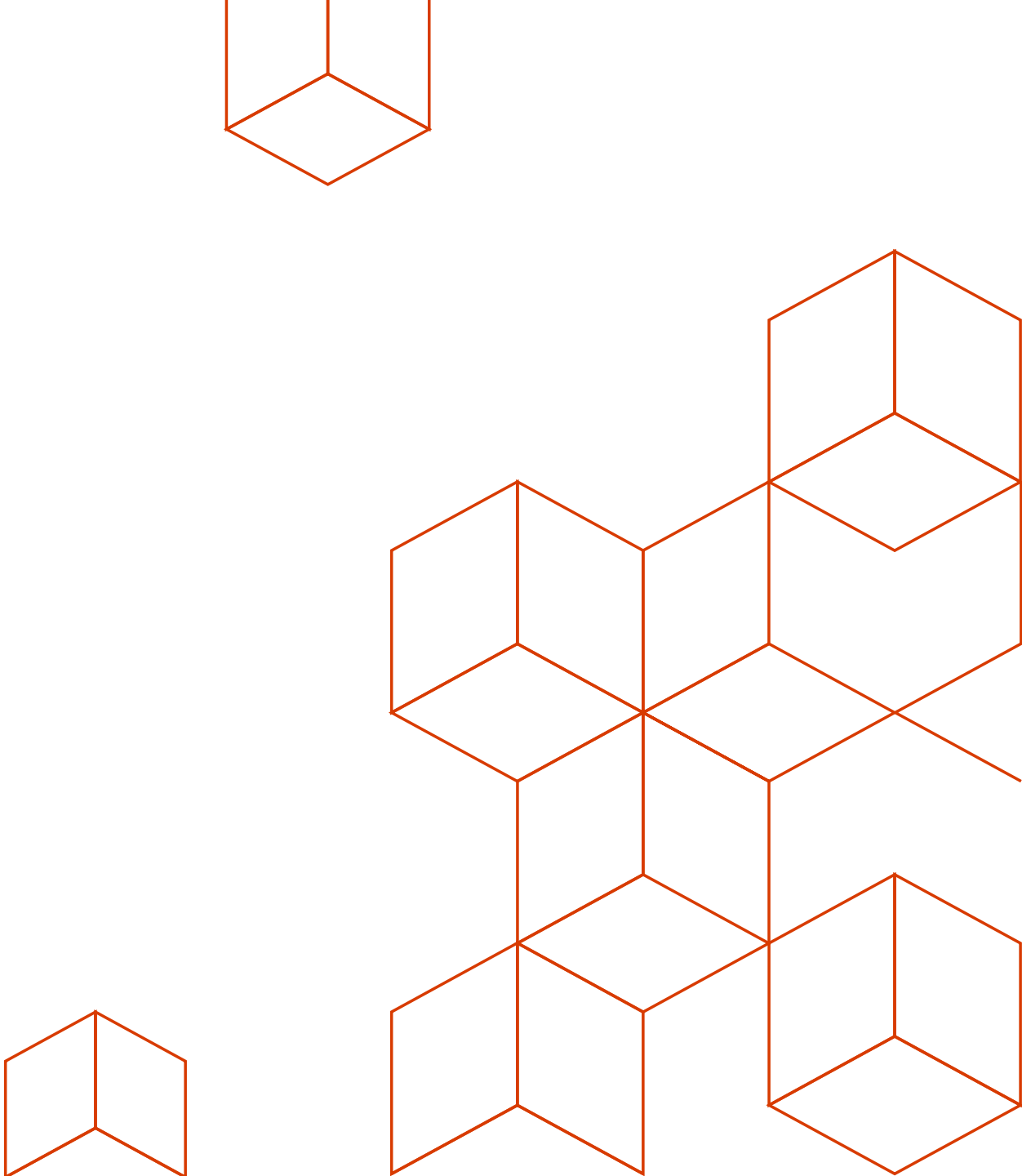


Flexibility of your local environment or curated cloud environment

Integrate with other services like Azure Databricks

Get started quickly without any complex pre-requisites

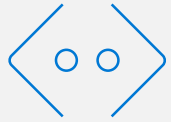
Azure ML Service includes DataPrep SDK



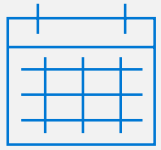
Customer Challenges and Pain Points

- Understanding the semantics of data is difficult and time-consuming
- Merging data from different sources is a manual process
- Detecting, troubleshooting and fixing errors is a high tax
- Custom code is always required
- Operationalization is challenging

Examples of manual, non-scalable work



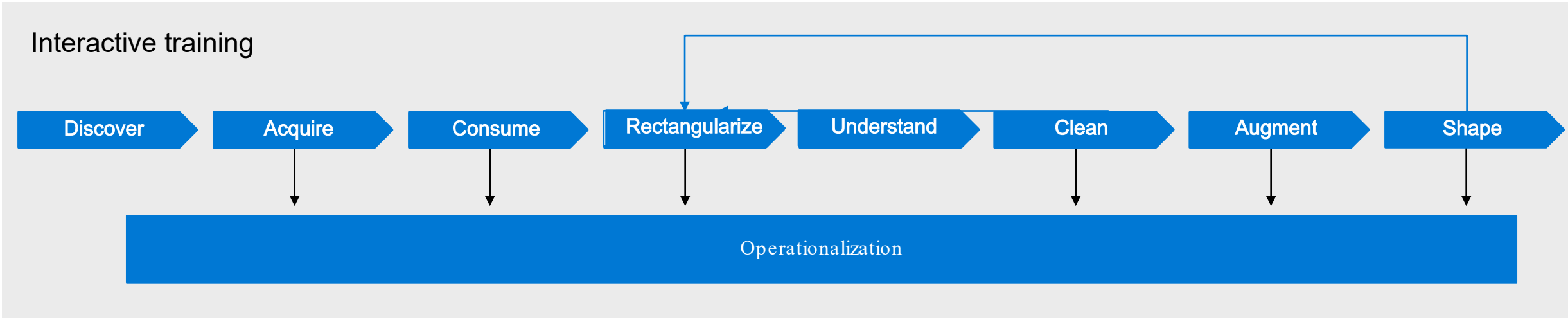
Data formatting

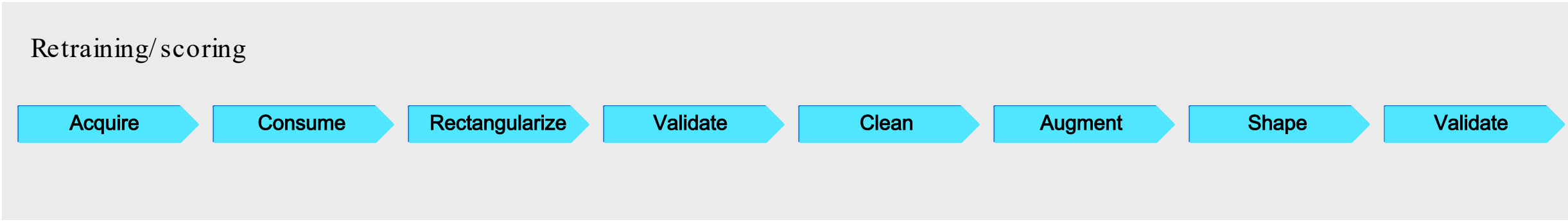


Dealing with dates

'Rectangularizing' data

Data Lifecycle





Data Prep SDK

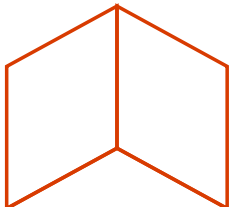
SDK

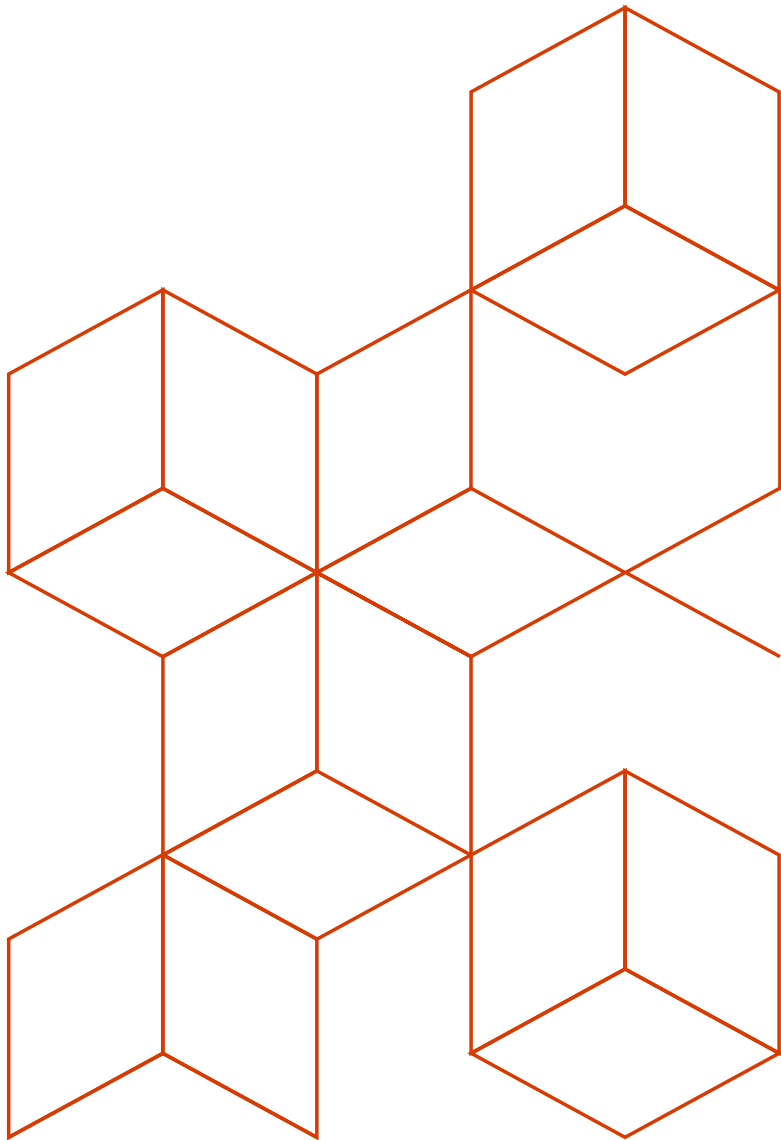
- Familiar pattern for complex transforms
- Responsive, lazy evaluations
- Share pipelines via serialization
- Support for execution

Core Engine

Scale through streaming
Multiple runtimes (Scale Up/Scale Out) single artifact
Intelligent transforms (by example, autoSplit, autojoin, fuzzy grouping, …)
Smart file reading

Summary





Azure Machine Learning service

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Questions