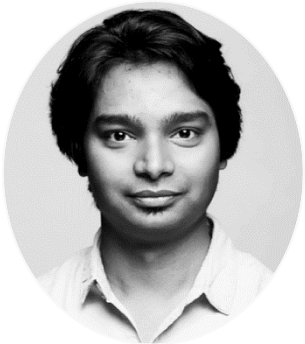


Building End-to-end Machine Learning Workflows with Kubeflow

INTRODUCTION



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Artificial intelligence: Software engine powering the industrial revolution 4.0.



Applications of Machine Learning



**Product
recommendation**



**Video
recommendation**



**Voice
assistants**



Risk prediction



**Personalized
medicine**



Fraud detection



\$3.9T

Business value created
by AI and ML in 2022
- Gartner

\$77.6B

Spending in AI system
in 2022
- IDC



Machine Learning Adoption in Enterprises

Exploring
(Just looking)



49%

Early Adopter
(Models in production for 2+ years)



36%

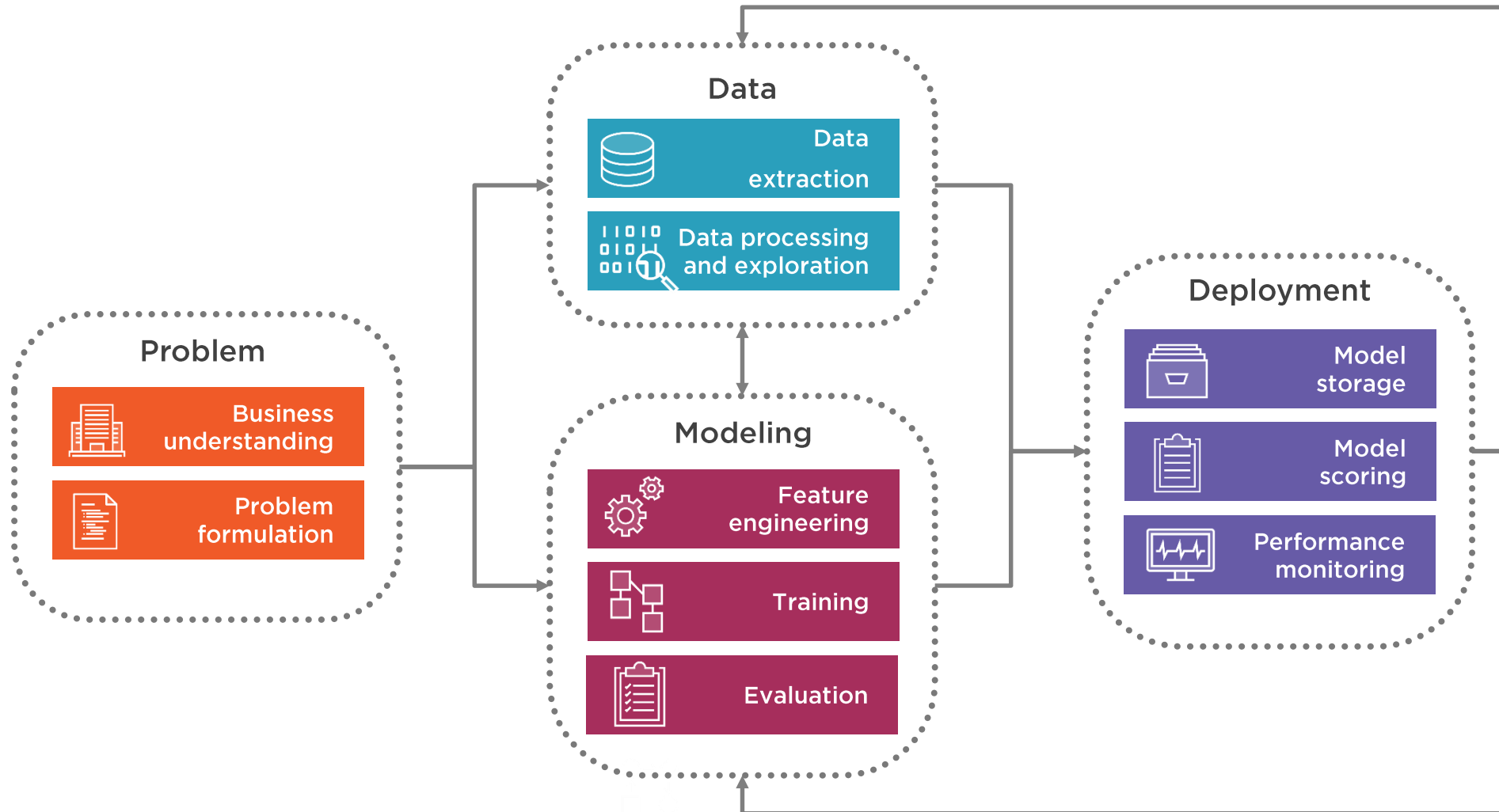
Sophisticated
(Models in production for 5+ years)



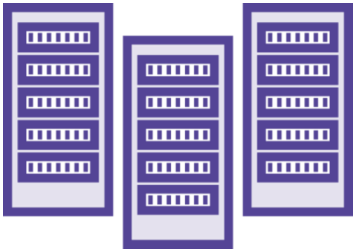
15%



Machine Learning Workflow



Machine Learning Workflow



Scale

Deal with scale



Logging

Generate, analyze, and act on monitoring logs



Collaboration

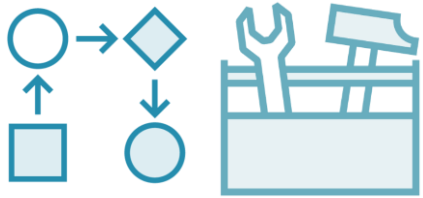
Work in team with different environments



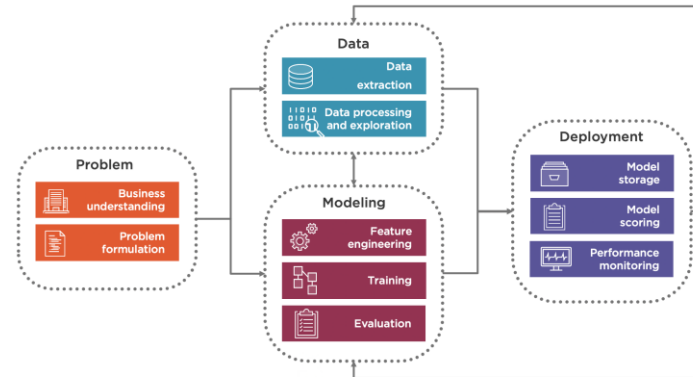
Track Experiments

Track and compare experiments





Typical software development workflow and toolkit



Machine learning workflow



Doesn't work seamlessly



Increased time to production



Low ROI



Kubeflow: Build and
manage simple, portable,
and scalable machine
learning workflows



Kubeflow

Open source machine learning toolkit for Kubernetes

Kubernetes

- Open source framework by Google
- Run production workload from anywhere
- Heavy lifting of orchestration and management

Kubeflow: Adapted Kubernetes for machine learning

Originated at Google



Kubeflow



Community contribution



Popular



Kubeflow



TensorFlow

Keras

PyTorch

scikit-learn



Kubeflow

Machine learning **toolkit** for Kubernetes
Simple, portable, and scalable workflow

Multi-user environment

Notebook
Server



Training at scale

TFJob
PyTorch Job
Chainer Job
MPI Job
MXNet Job
Fairing



Serving and scoring

KFServing
TFServing
NVIDIA
TensorRT
Fairing



Pipelines and experiments

Katib
Metadata
KF Pipelines
Argo



Logging and monitoring

Prometheus
Grafana



Overview



Setting up Kubeflow environment

Exploring Kubeflow components

Building machine learning model on
Kubeflow

Serving machine learning model on
Kubeflow

Building machine learning pipeline using
Kubeflow pipeline

What's next?



Targeted Audience



**Data scientists and
ML practitioners**



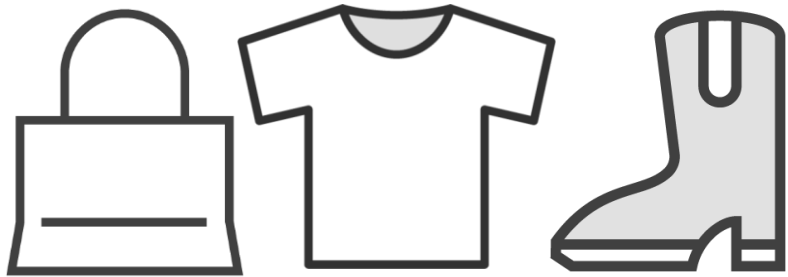
**ML project managers and
leaders**



Prerequisite :
Basics of machine learning
and deep learning

Building an end-to-end image classification system





Fashion-MNIST dataset

Open source

Similar to handwritten MNIST dataset

28x28 pixel images

Fashion items: Dresses, bags, and shoes

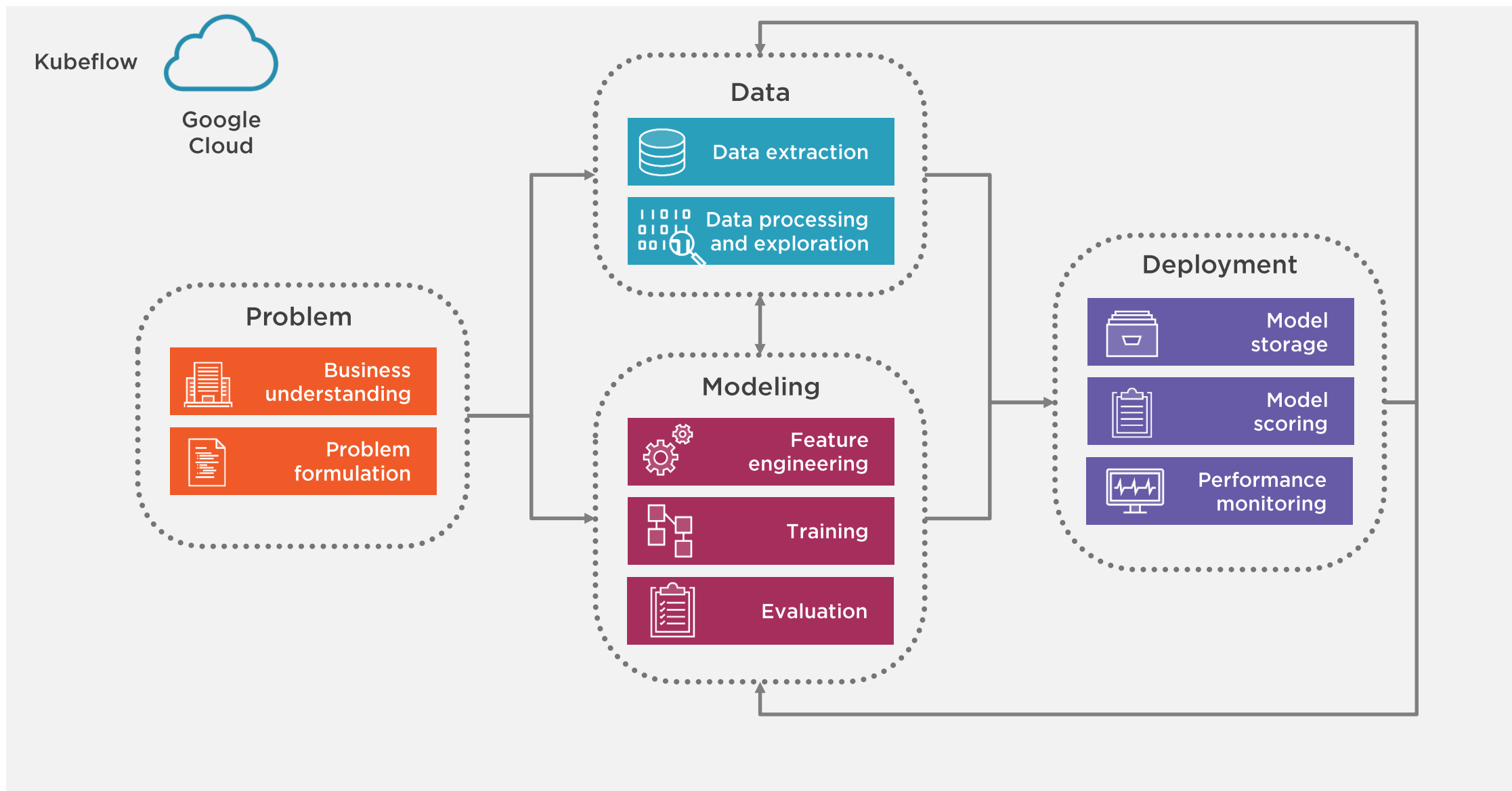
Neither too easy nor too hard

Focus on machine learning workflow

Use as a template



Building Machine Learning Workflow



Next up:
Setting up Kubeflow
Environment

