

MLOps

**Cómo poner tus sistemas
de machine learning en producción**

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Hello my name is



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¿Qué hice para conseguir estos resultados?

¿Cuál es la versión buena del modelo?

Olvidarte de que estás entrenando y apagar el ordenador

*Más habitual entrenar modelos
que hacer predicciones con ellos*

El modelo ejecuta en local pero no en producción

Tenemos el modelo en producción pero no sabemos cómo lo está haciendo

La precisión está bajando... ¿cómo reentrenamos?

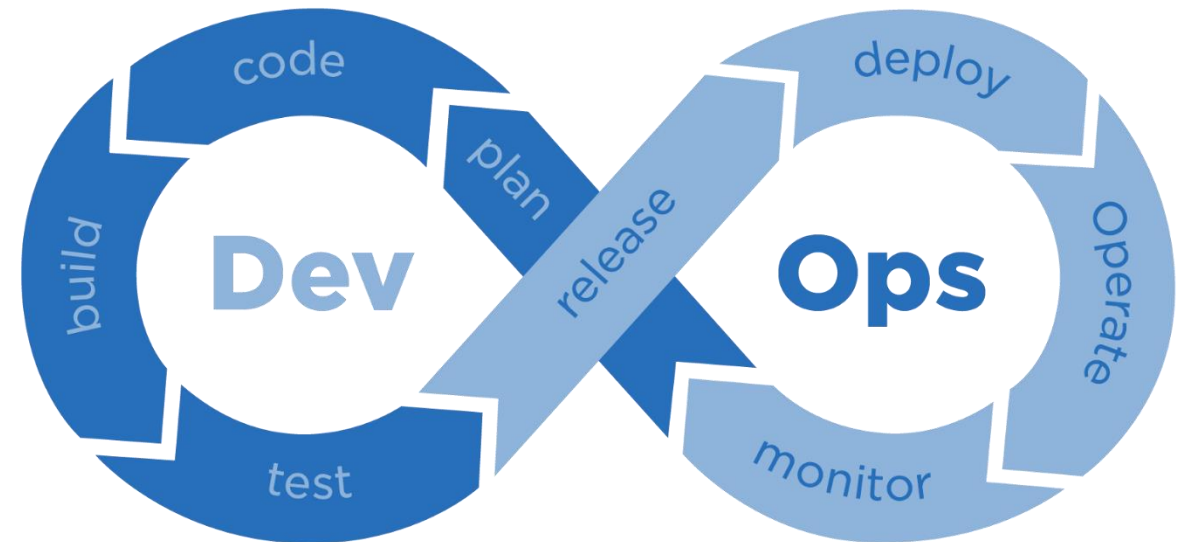
Tenemos un nuevo modelo... ¿cómo lo cambiamos?

What is DevOps?

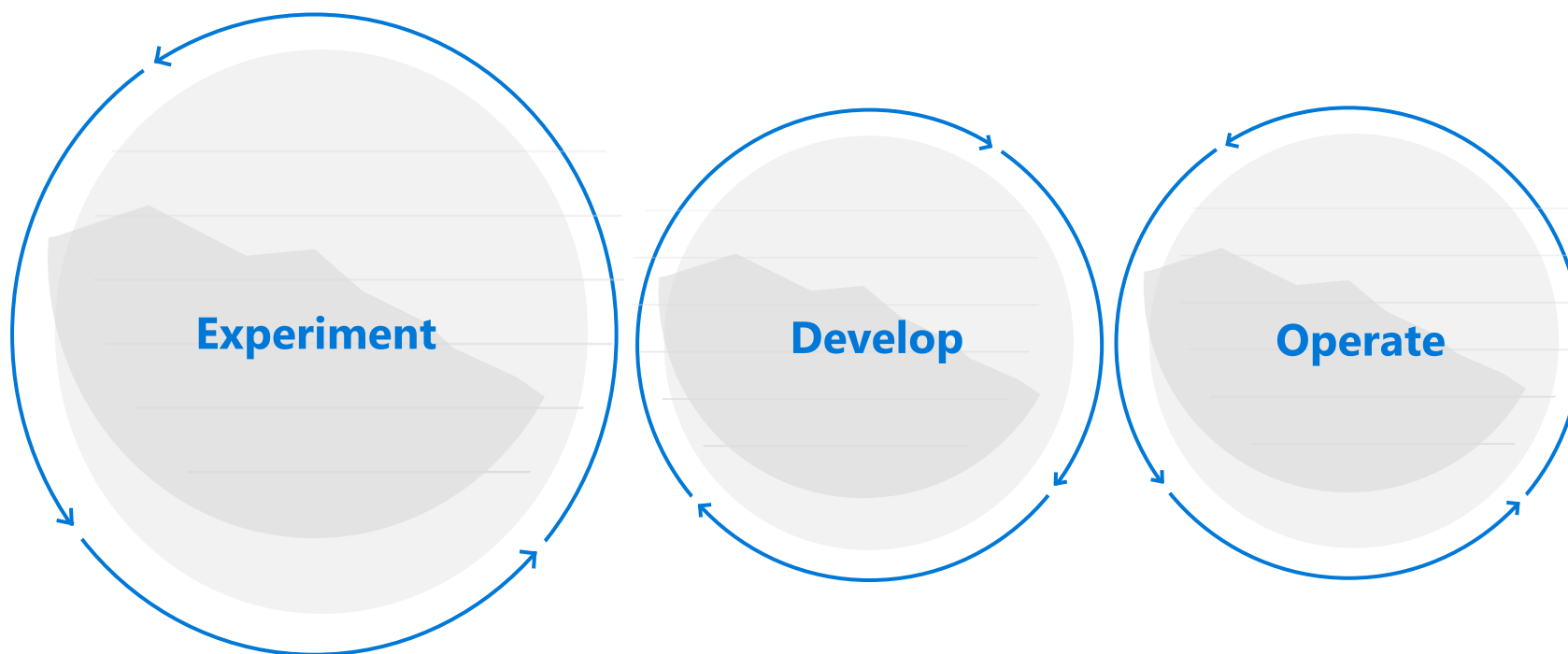


DevOps is the union of **people**, **process**, and **products** to enable continuous delivery of value to your end users. ”

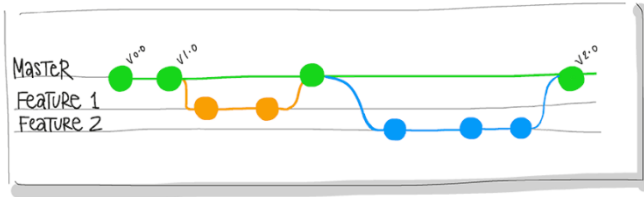
Donovan Brown



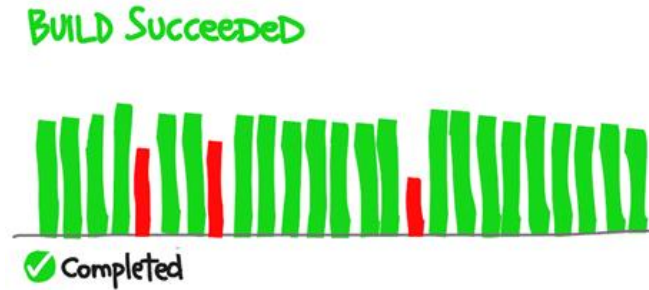
Data Science Lifecycle



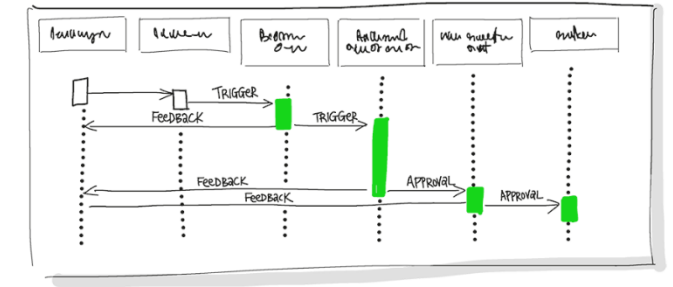
DevOps practices



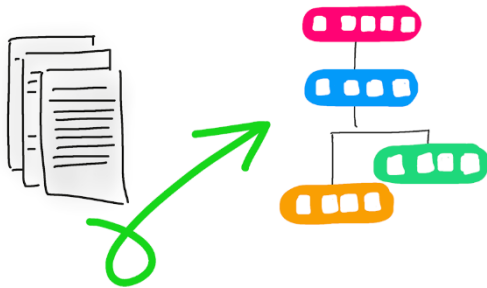
Version Control



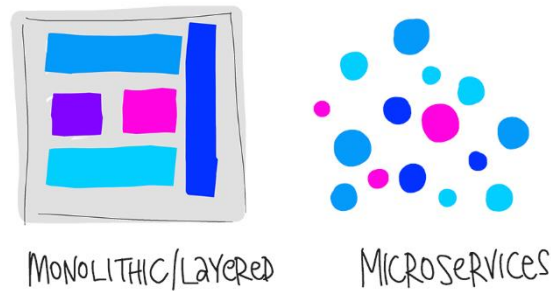
Continuous Integration



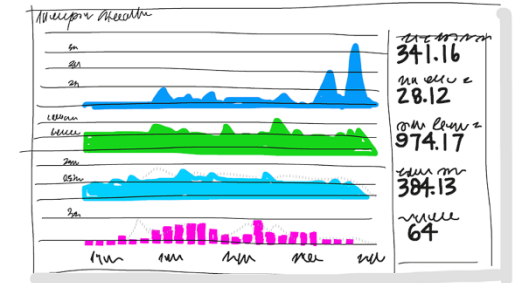
Continuous Delivery



Infrastructure as Code

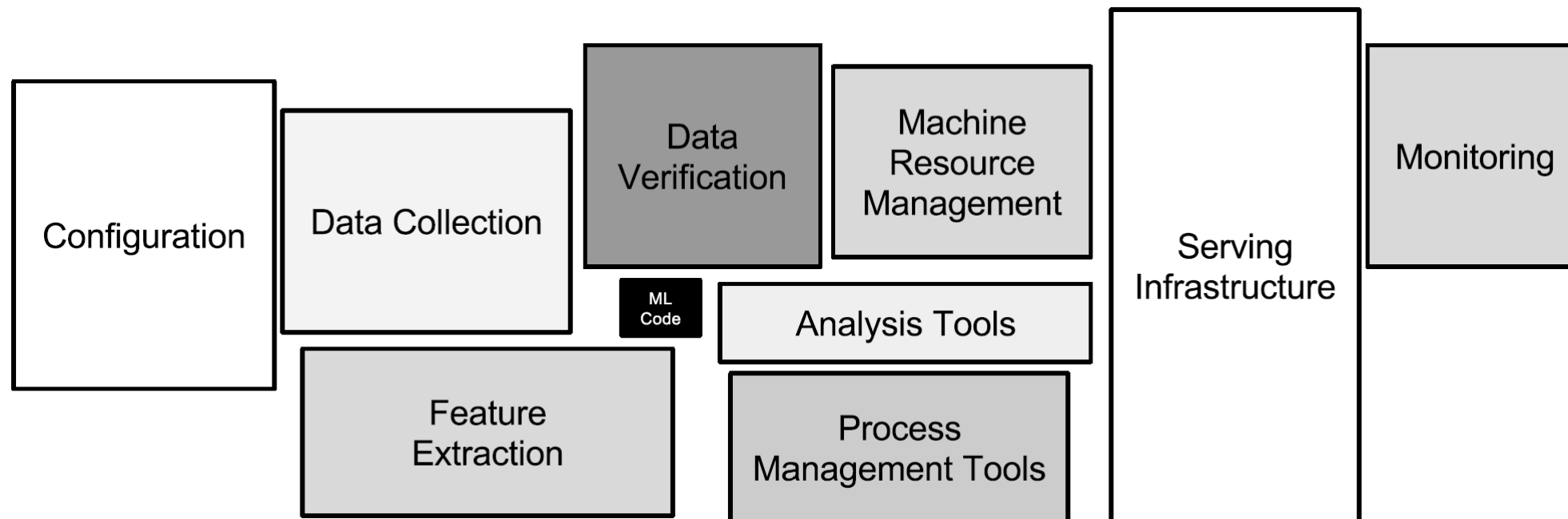


Microservices



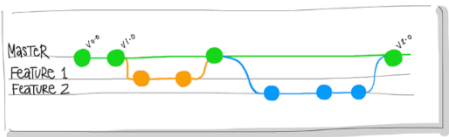
Monitoring and logging

Machine Learning Systems

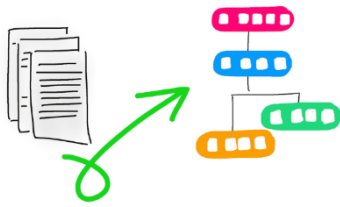


Sculley et al., "Hidden Technical Debt in Machine Learning Systems", 2015

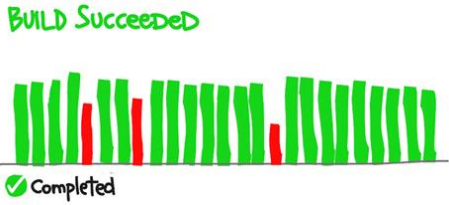
DevOps practices



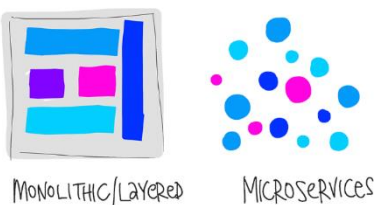
Version Control



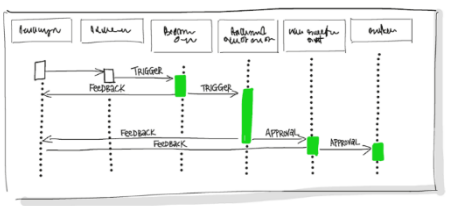
Infrastructure as Code



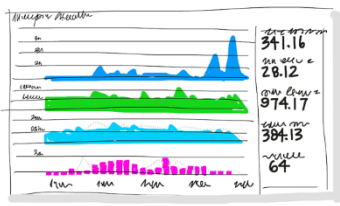
Continuous Integration



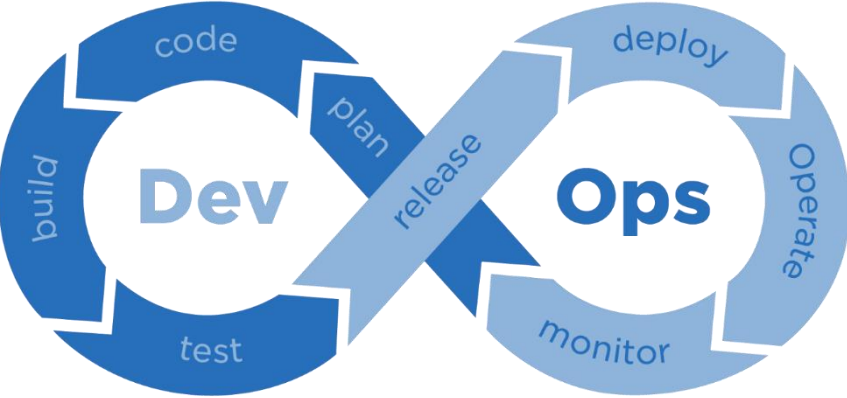
Microservices



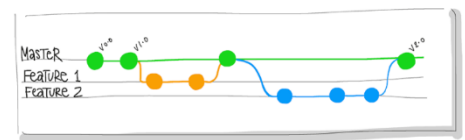
Continuous Delivery



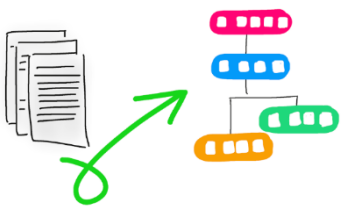
Monitoring and logging



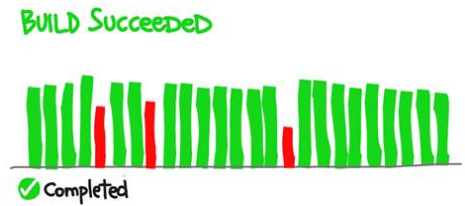
MLOps practices



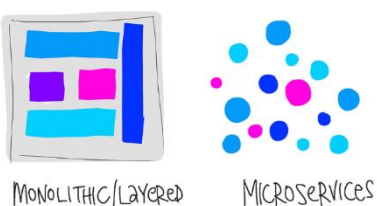
Version Control
code, data & models



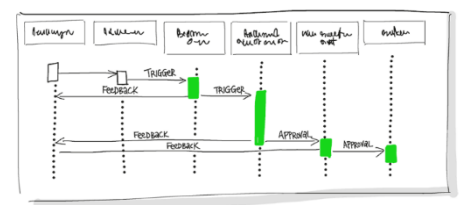
Infrastructure as Code



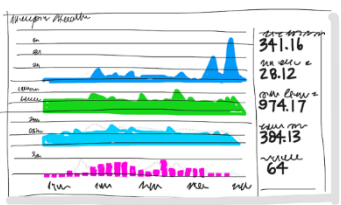
Continuous Integration
training



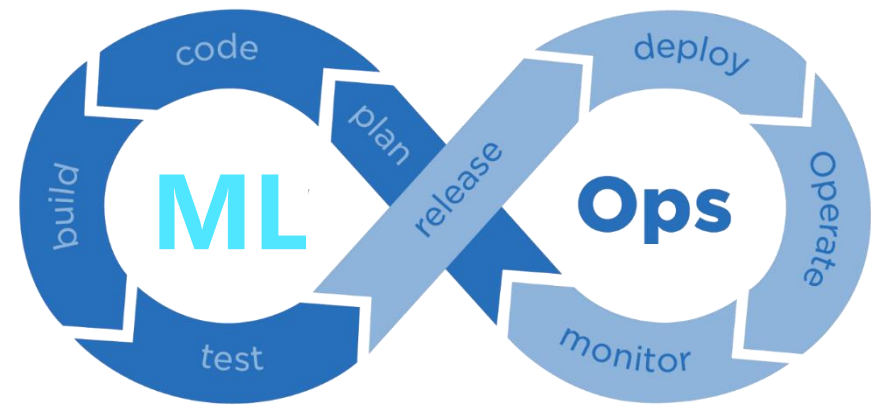
Microservices



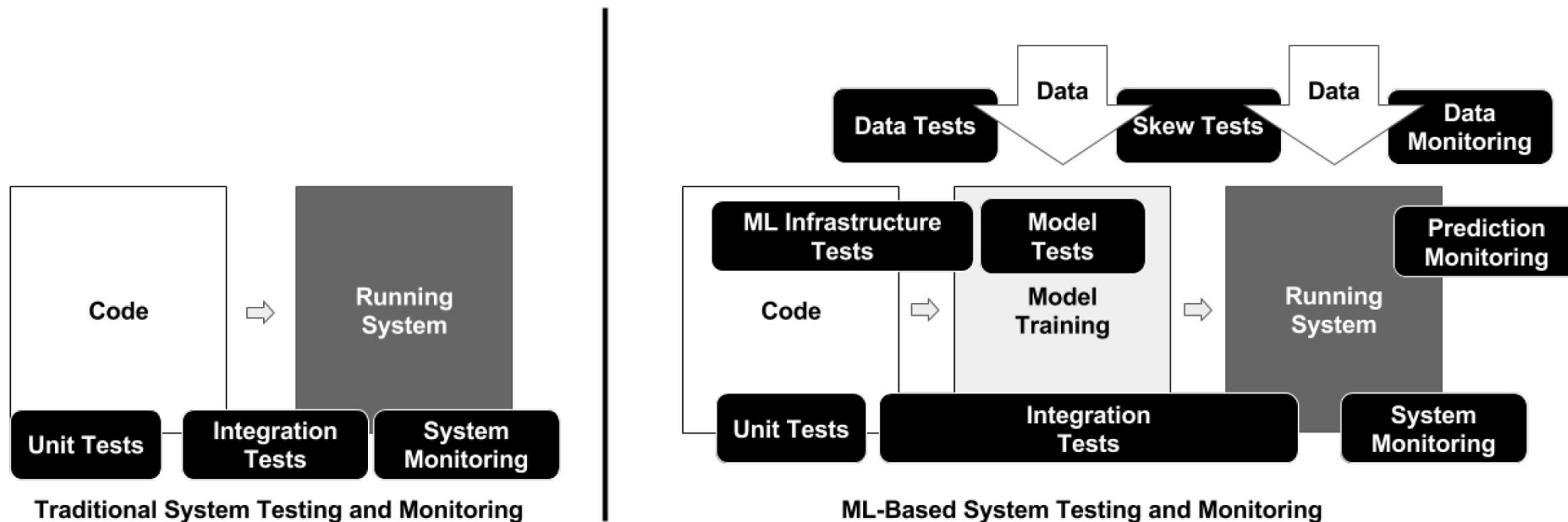
Continuous Delivery
model deployment



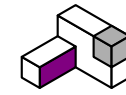
Monitoring and logging
data & model monitoring



Traditional Systems vs. Machine Learning Systems



Breck et al., "What's your ML Test Score? A rubric for ML production systems", 2017



¿Cómo
implementamos
esto?

ML Lifecycle Platforms

mlflow



Azure Machine Learning



Amazon SageMaker



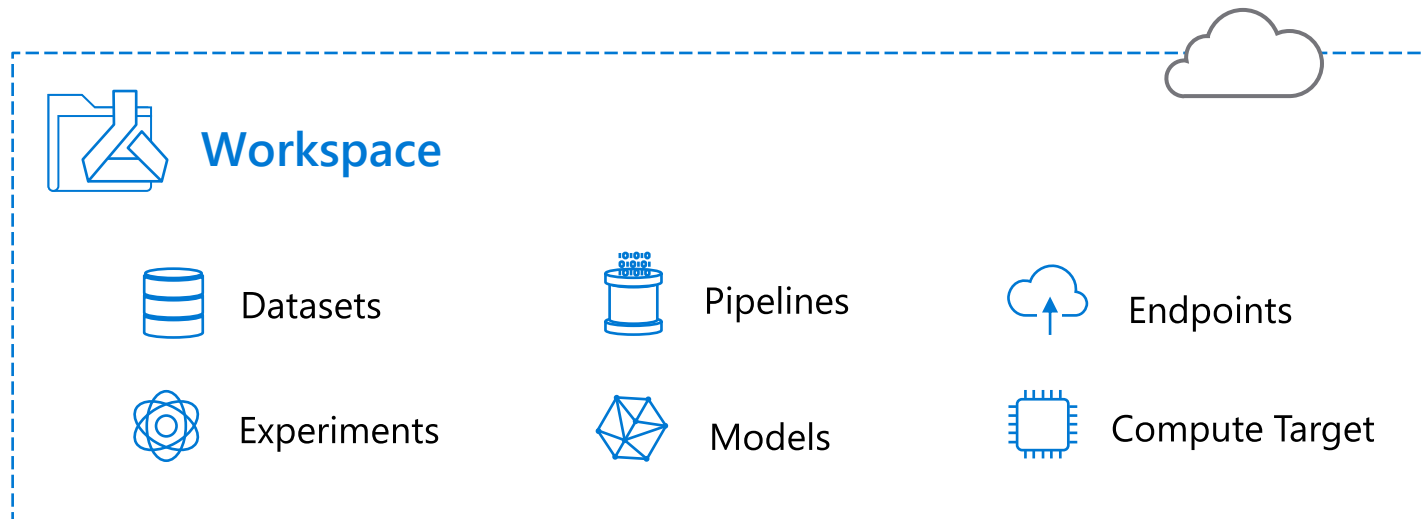
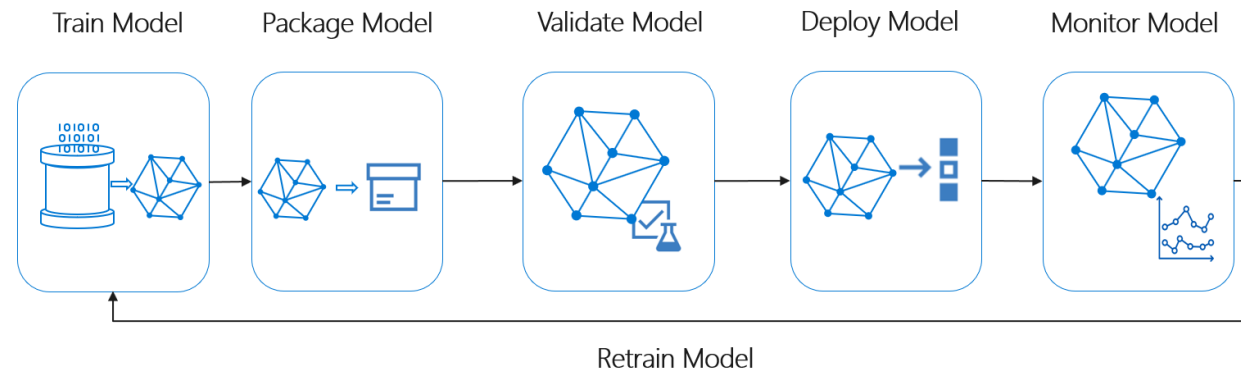
Google Cloud

H₂O.ai

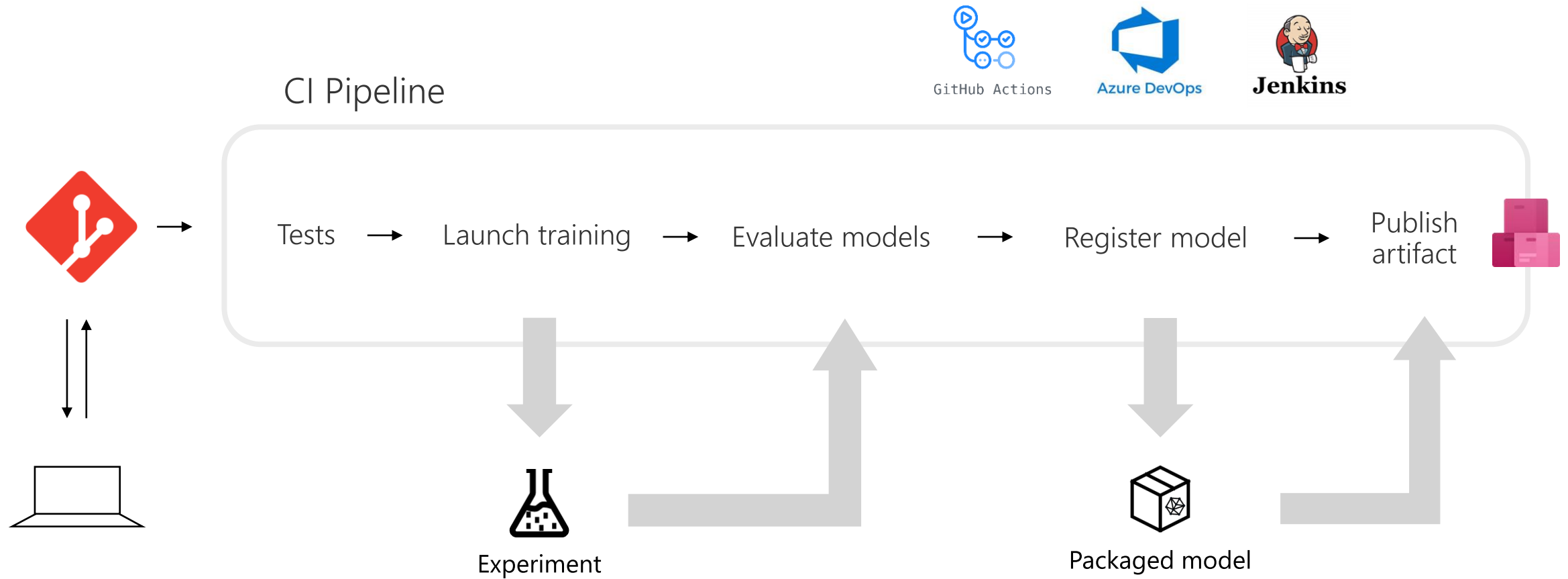


DataRobot

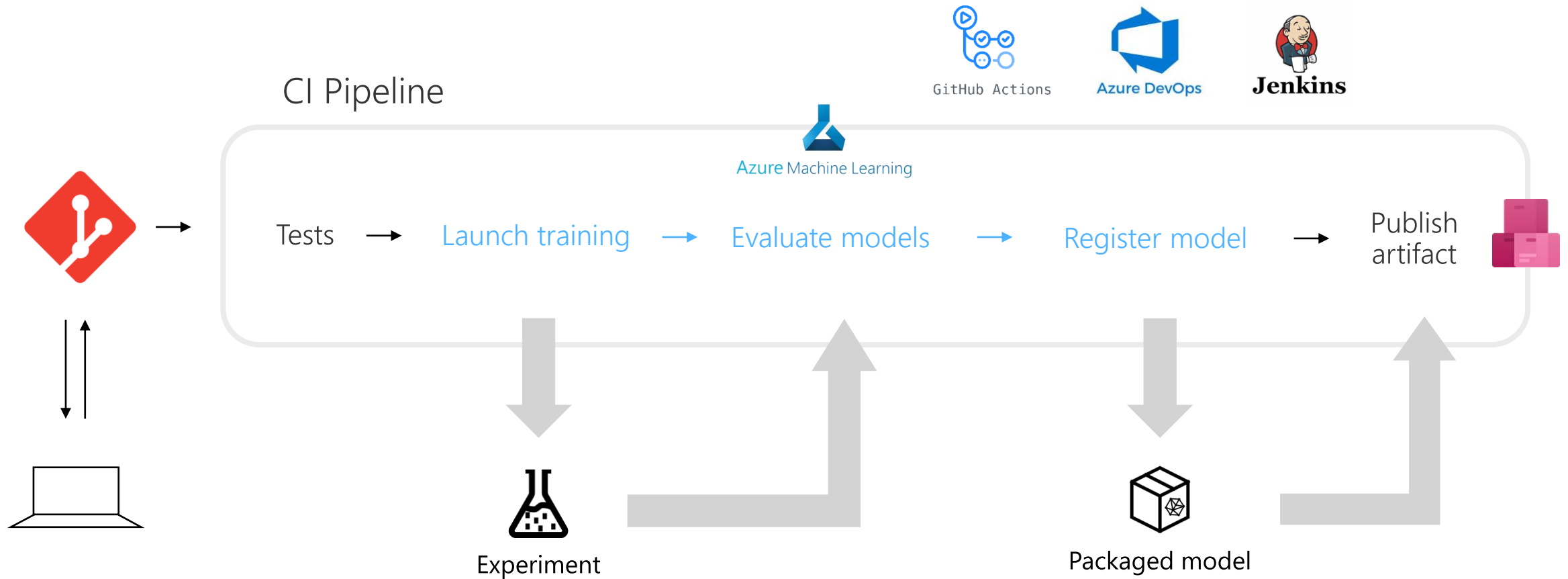
Azure Machine Learning (AML)

 **Python SDK** **R SDK**

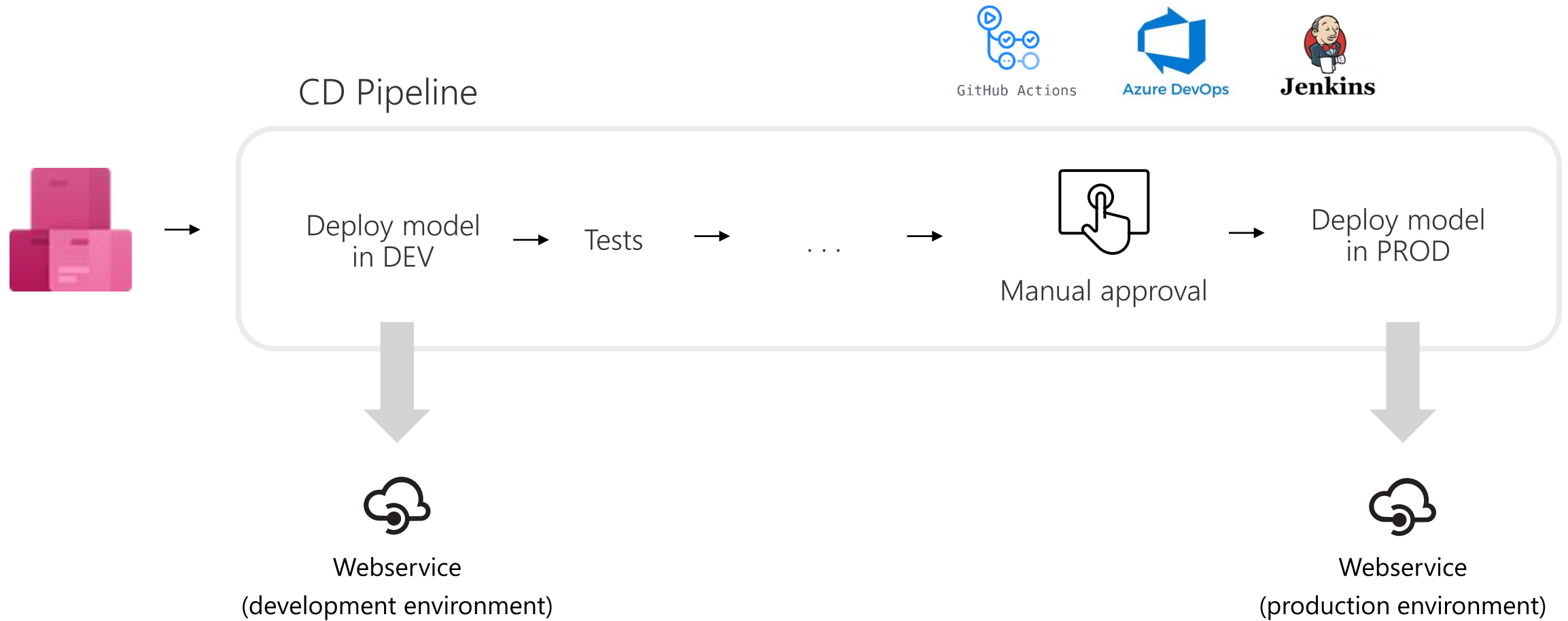
Continuous Integration in MLOps



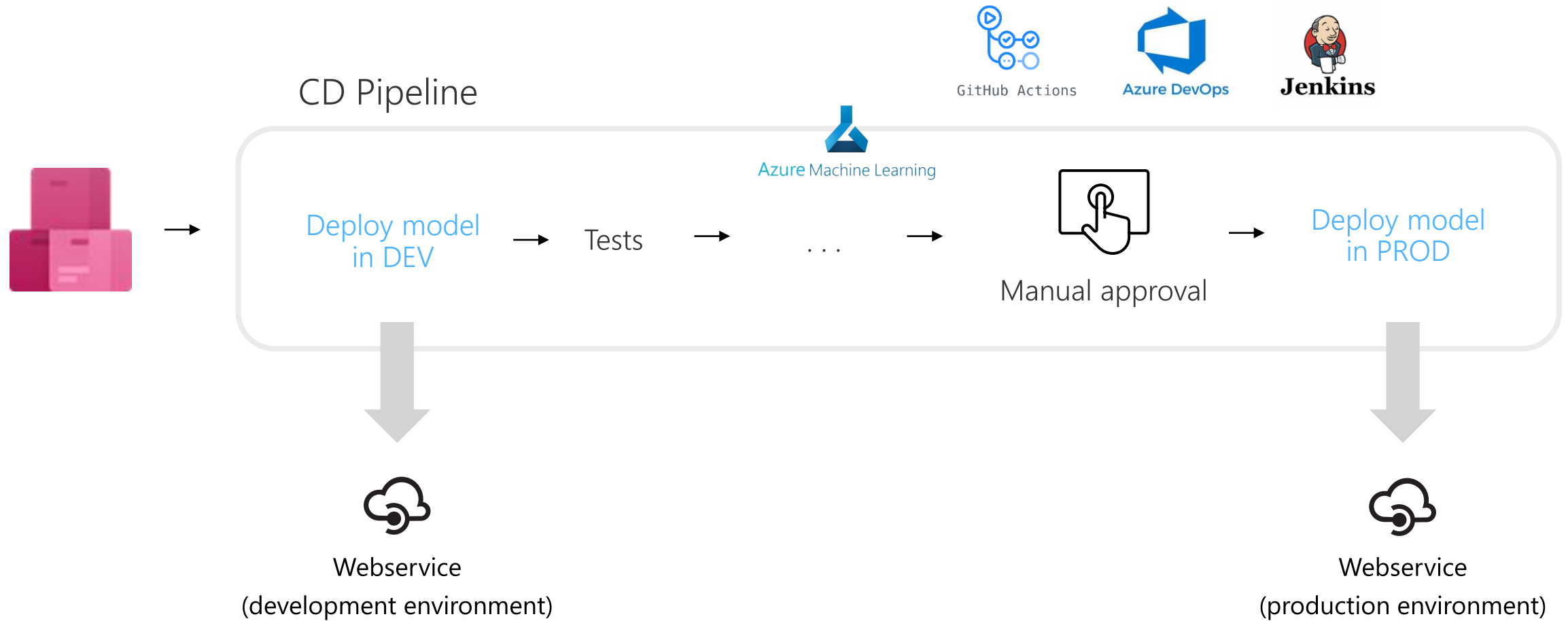
Continuous Integration in MLOps



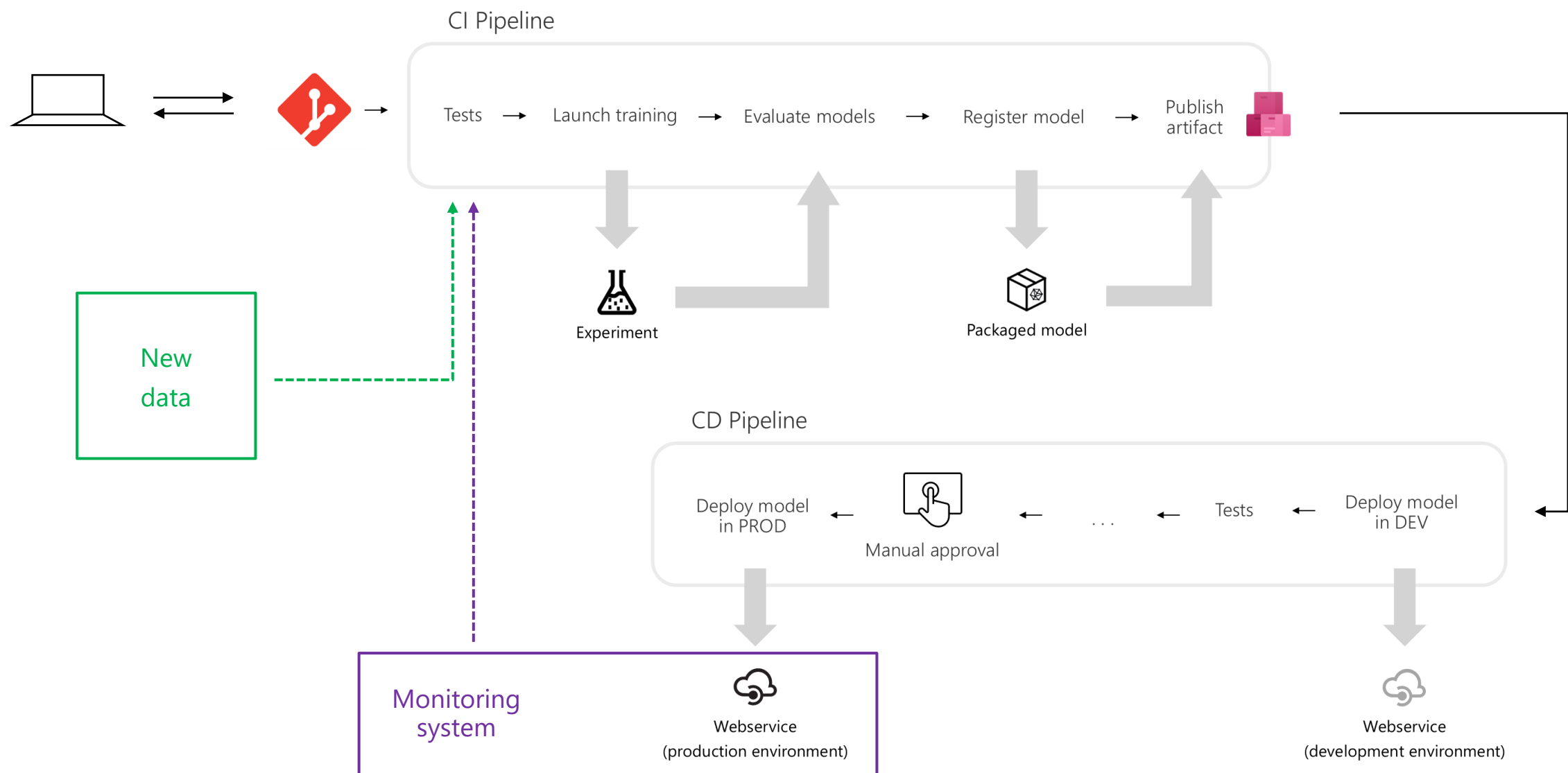
Continuous Deployment in MLOps

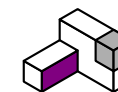


Continuous Deployment in MLOps



MLOps Architecture





¡Gracias!

Para leer más:

- ml-ops.org
- github.com/visenger/awesome-mlops

Ejemplo implementación:

- github.com/microsoft/MLOpsPython