MLOps

What is MLOps?

MLOps in simple term is DevOps for Machine Learning

End-to-End machine learning development process to design, build and manage reproducible, testable, and evolvable ML-powered software.

Why MLOps?

- MLOps aims to unify the release cycle for machine learning and software application release.
- MLOps enables automated testing of machine learning artifacts (e.g. data validation, ML model testing, and integration testing)
- MLOps enables the application of agile principles to machine learning projects.
- MLOps enables supporting machine learning models and datasets to build these models as first-class citizens within CI/CD systems.
- MLOps reduces technical debt across machine learning models.

"Practicing MLOps means that you advocate for automation and monitoring at all steps of ML system construction, including integration, testing, releasing, deployment and infrastructure management"

- **Google**

How MLOps is different from DevOps?

1. Data/Schema versioning apart from code versioning
2. Experiment tracking (Model hyperparameters, Data Distribution, Model performance, feature importance etc)
3. Model artifacts versioning
4. Monitor continuously for data and model drift
5. Continuous re-training of model
6. Capture sensitivity of key features to target

How MLOps is different from devOps?

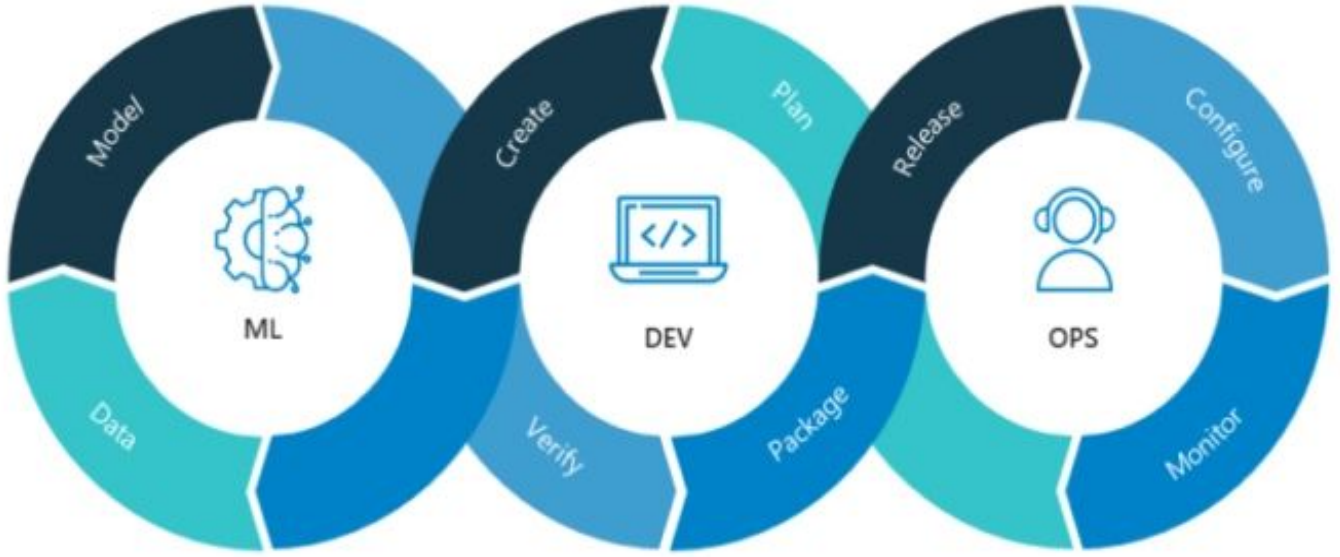


Image Source:
Nvidia

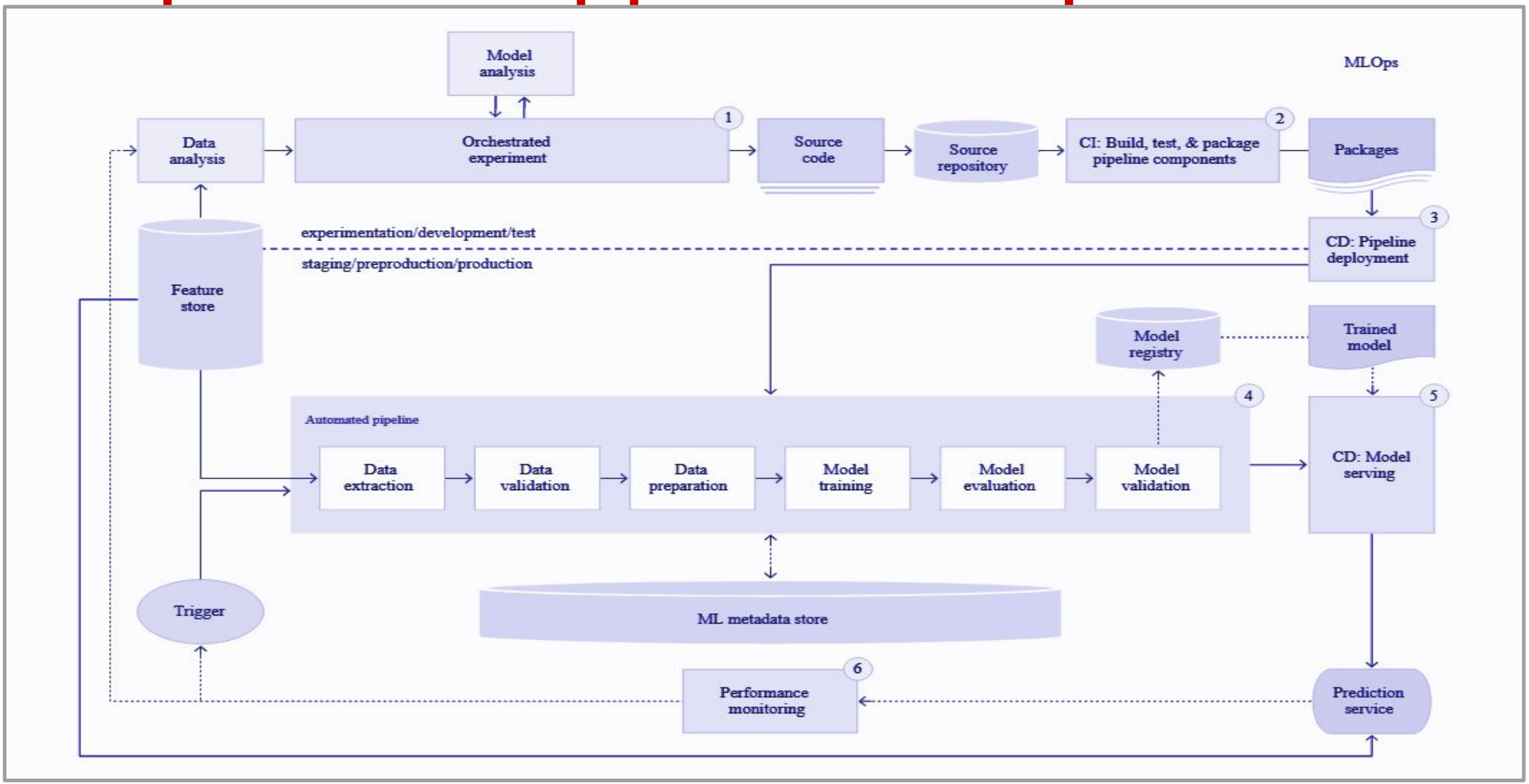
ML + DevOps = MLOps

CI - Build, Test and validate code + data + schema + models

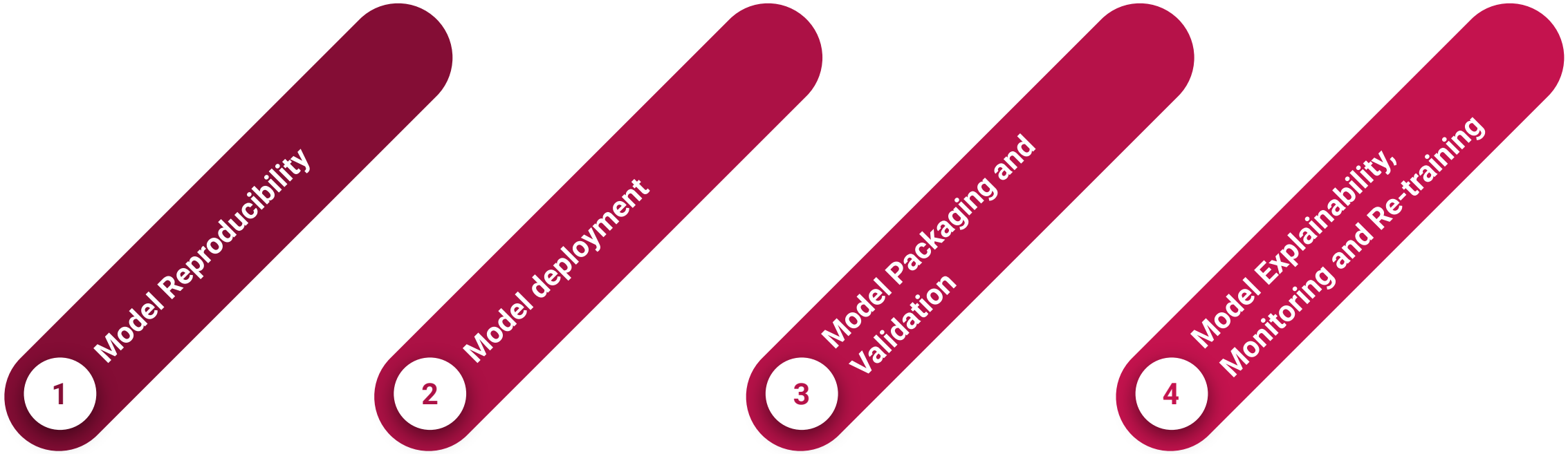
CD - ML Training Pipeline + (or) Serving Component

CT - Automatically re-train and serve the model

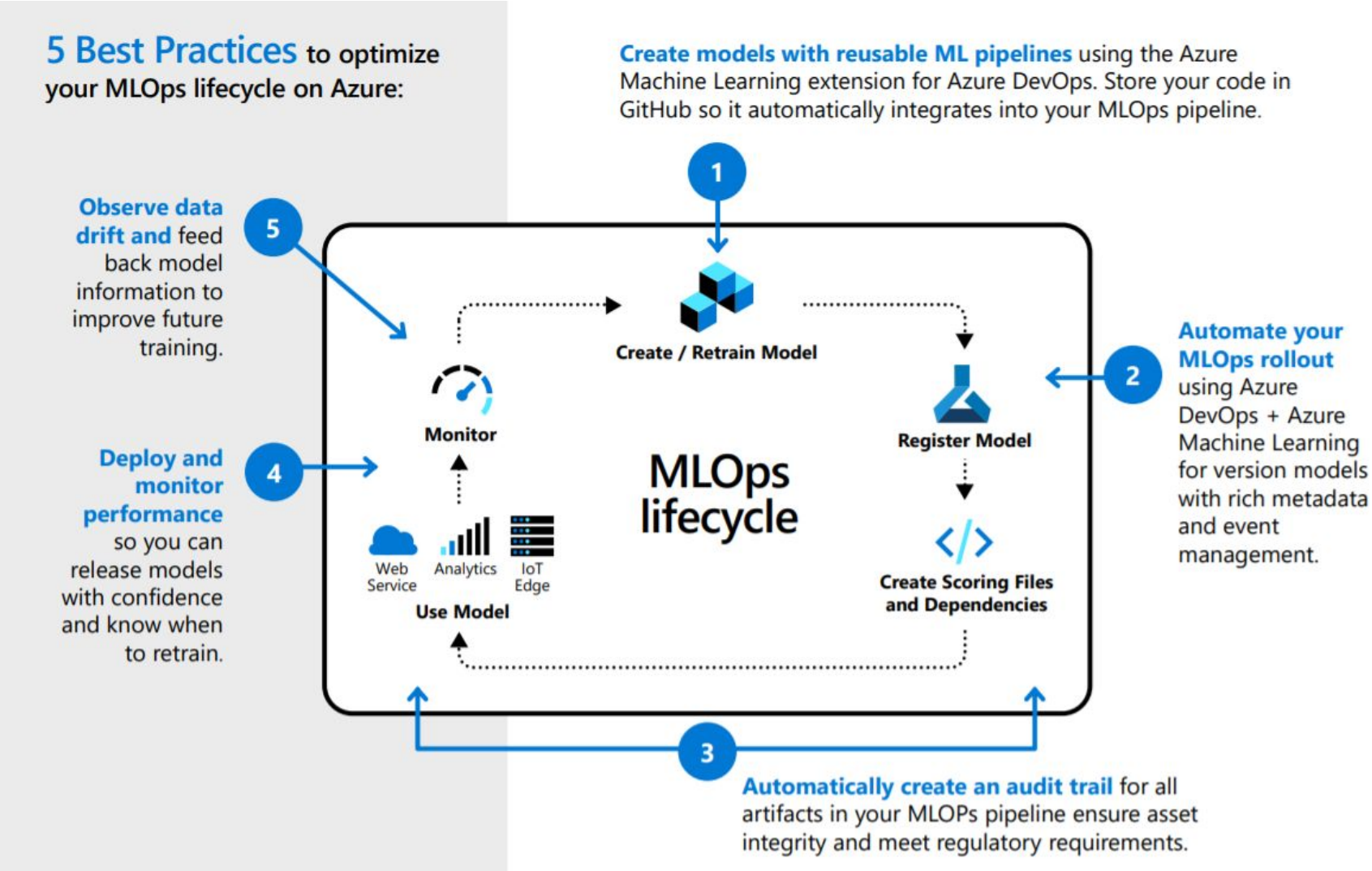
MLOps Automated pipeline and components



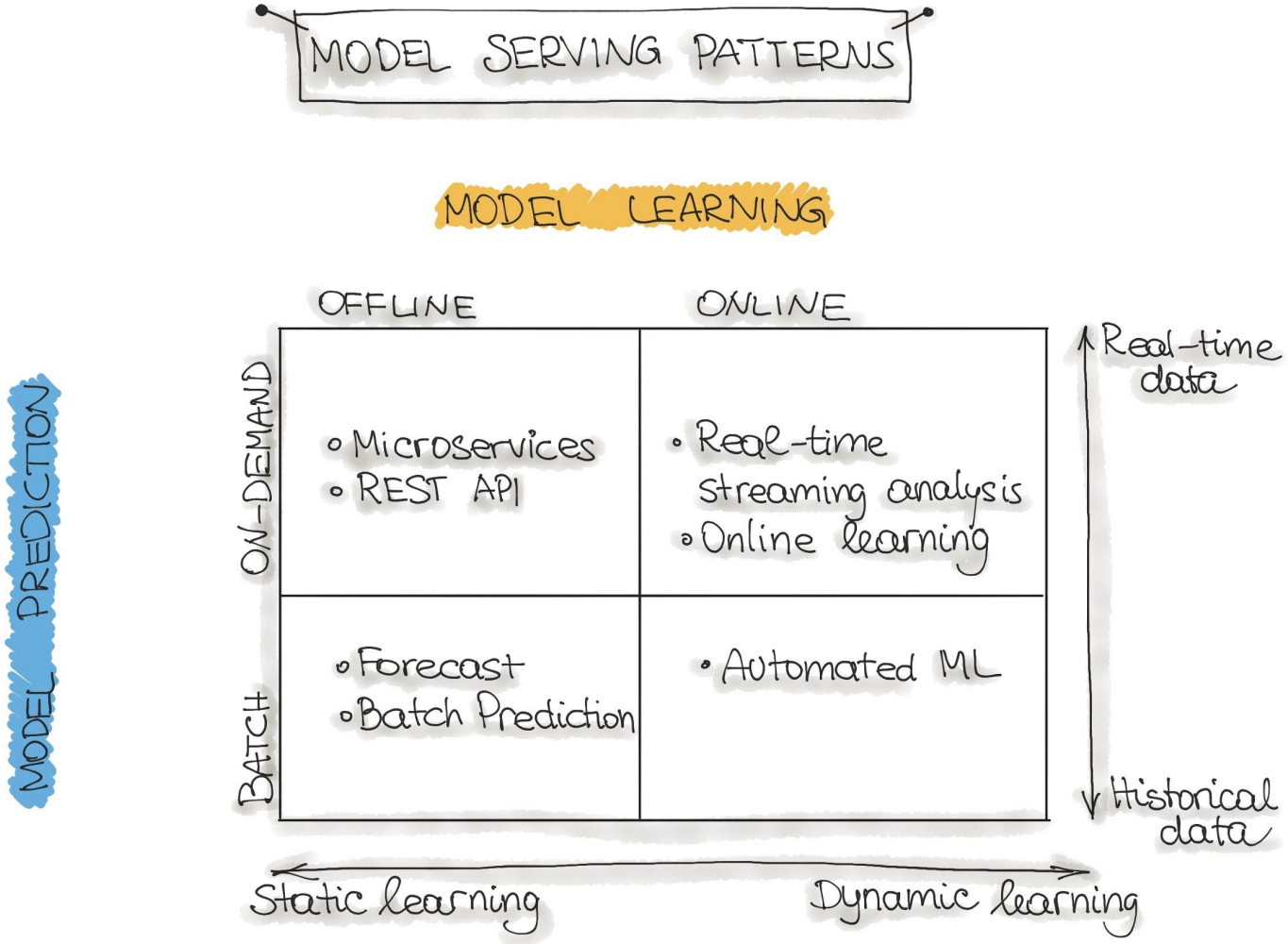
Key outcomes of MLOps



MLOps – Best Practices



Model Serving Patterns



References

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- https://blogs.nvidia.com/blog/2020/09/03/what-is-mlops/
- https://ml-ops.org/
    - https://ml-ops.org/content/mlops-principles
- https://landscape.lfai.foundation/?fullscreen=yes

ML FLow

MLflow is an open source platform to manage the ML lifecycle, including experimentation, reproducibility, deployment, and a central model registry. MLflow currently offers four components:

MLflow Tracking

Record and query experiments: code, data, config, and results

Read more

MLflow Projects

Package data science code in a format to reproduce runs on any platform

Read more

MLflow Models

Deploy machine learning models in diverse serving environments

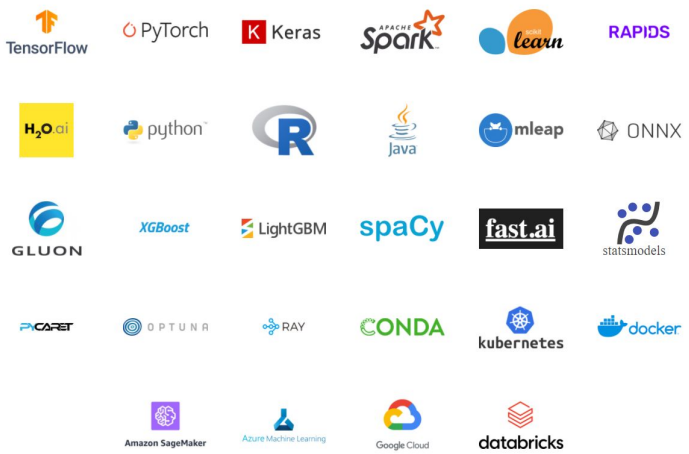
Read more

Model Registry

Store, annotate, discover, and manage models in a central repository

Read more

Integrations with:



MLFLow Hands on Steps

- MLFlow Quick Start
- MLFLow UI
- MLFlow Local Server
- MLFLow Serve Models as API
- MLFlow Integration