



An introduction to AI/MLOps

SUNNY BHAVEEN CHANDRA | INEURON.AI

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Part 1:

Introduction

Objectives

01

MLOps is an ML engineering culture and practice that aims at unifying

- **ML system development (Dev)** and
- **ML system operation (Ops)**

Objectives

02

Techniques for implementing and automating -

- **continuous integration (CI),**
- **continuous delivery (CD), and**
- **continuous training (CT)**

for machine learning (ML) systems.

Objectives

02

03

MLOps advocates for -

- **automation** and
 - **monitoring**
- at all stages of the ML system development process, including -
- **integration,**
 - **testing,**
 - **releasing,**
 - **deployment, and**
 - **infrastructure management.**

Challenges

01

Building an integrated ML system and continuously operate it in production with a vast array of the surrounding infrastructure.

Challenges

02

To automate the process from beginning to end while managing -

- **different teams**
- using **different technologies** and
- follow **different routines**.

And also make them -

- **auditable** and
- **reproducible**.

Challenges

03

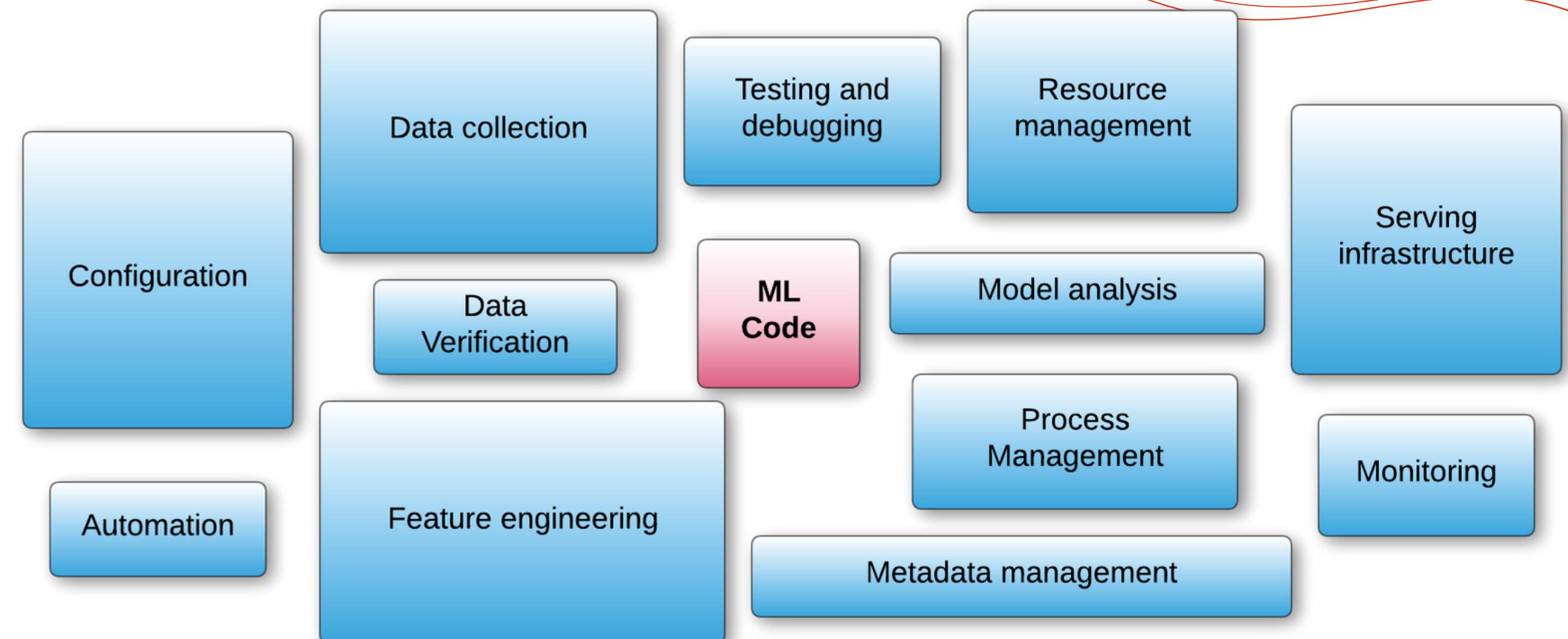
Various dependencies like -

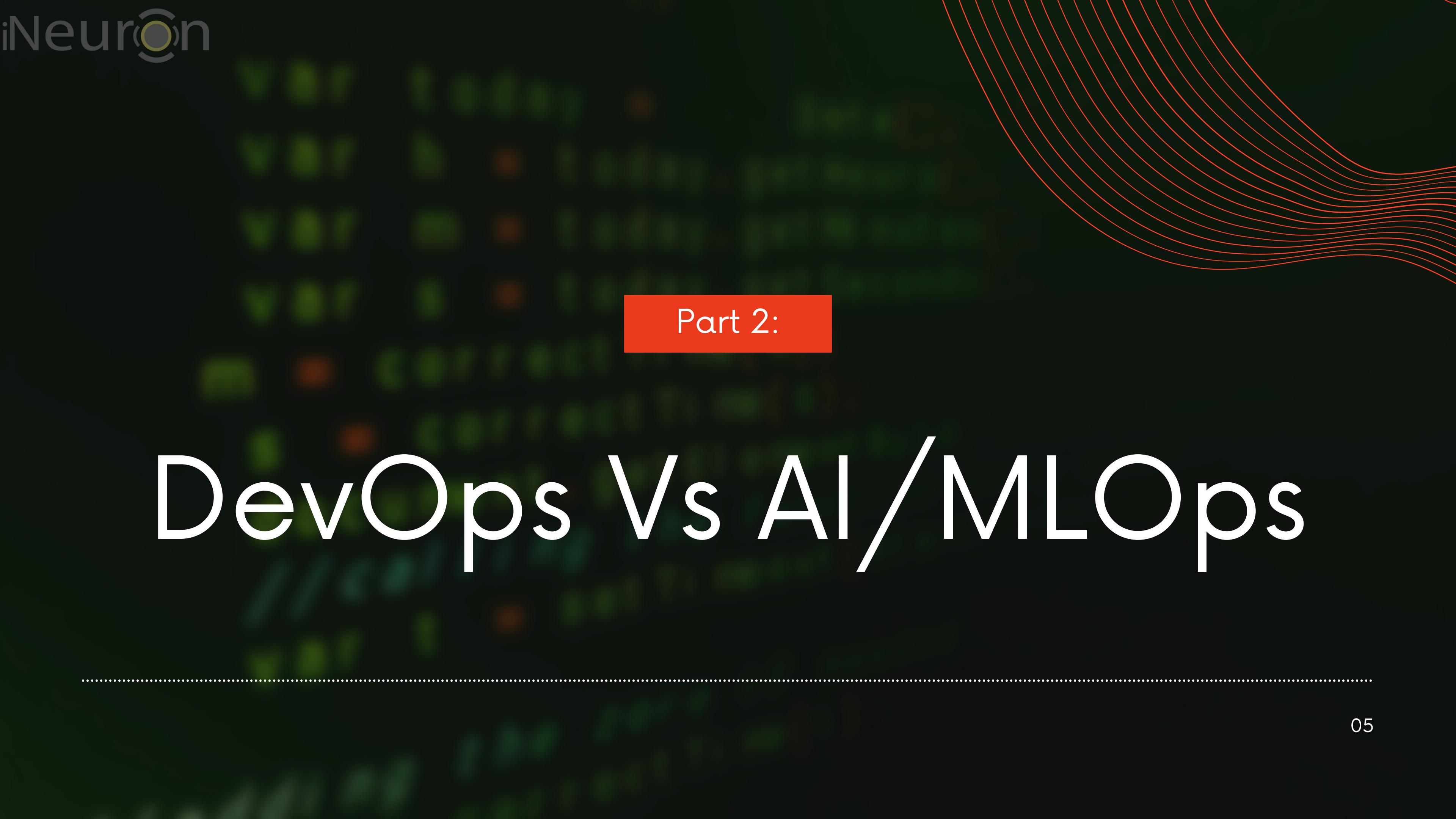
- **data dependency,**
- **model complexity,**
- **reproducibility,**
- **testing,**
- **monitoring** etc

These changes and dependencies in addition to code must be controlled and integrated into the software delivery process.

Hidden Technical **Debt** in Machine Learning Systems.

-Sculley et al. in 2015



The background of the slide features a dark green gradient with a subtle texture. In the upper right quadrant, there is a series of thin, orange, wavy lines that curve from the top right towards the center.

Part 2:

DevOps Vs AI/MLOps



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DevOps

In the development and operation of large-scale software systems, DevOps is a widespread approach. Shortening development cycles, boosting deployment velocity, and ensuring reliable releases are all advantages of this strategy.

It uses two concepts in software system development to get these benefits:

1. Continuous Integration (CI)
2. Continuous Delivery (CD)

ML systems differ from other software systems

Continuous Integration (CI)

It's no longer only about testing and validating code and components; data, data schemas, and models must also be tested and validated.

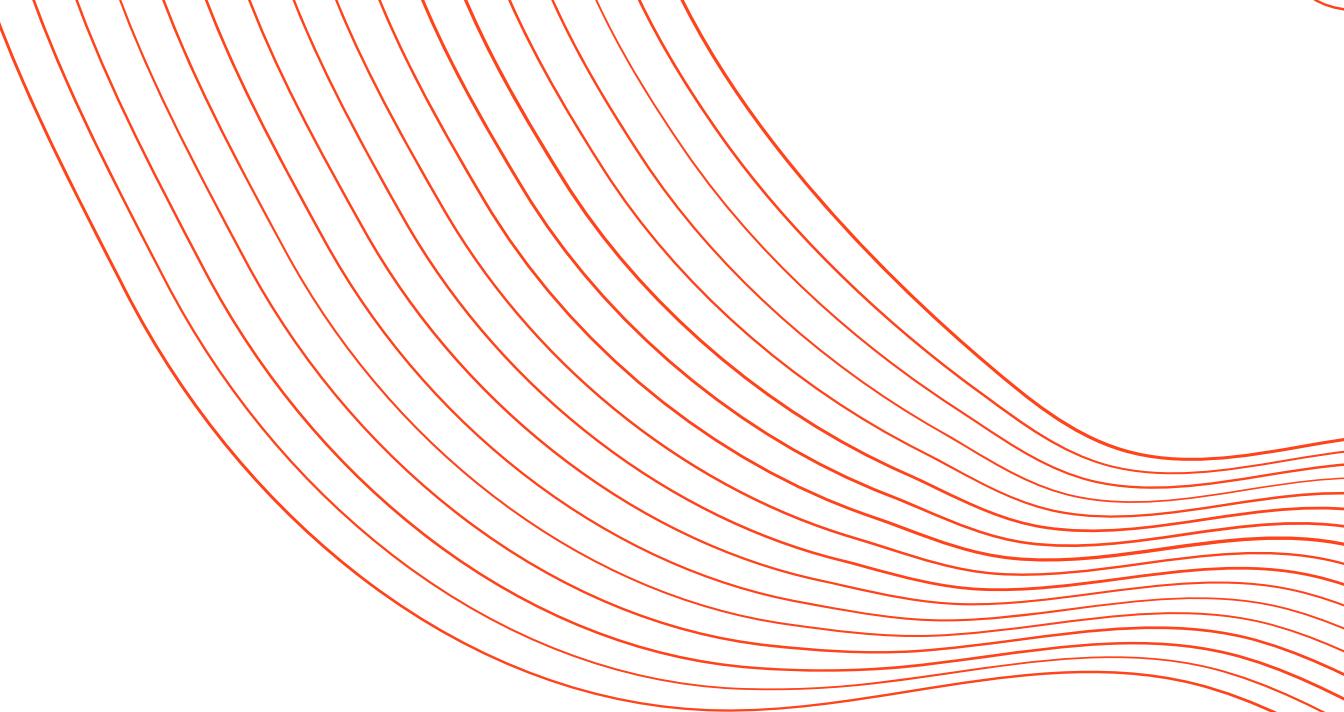
ML systems differ from other software systems

Continuous Delivery (CD)

It's no longer about a single software package or service, but about a system (an ML training pipeline) that automatically deploys another service (model prediction service).

ML systems differ from other software systems

Continuous training (CT)



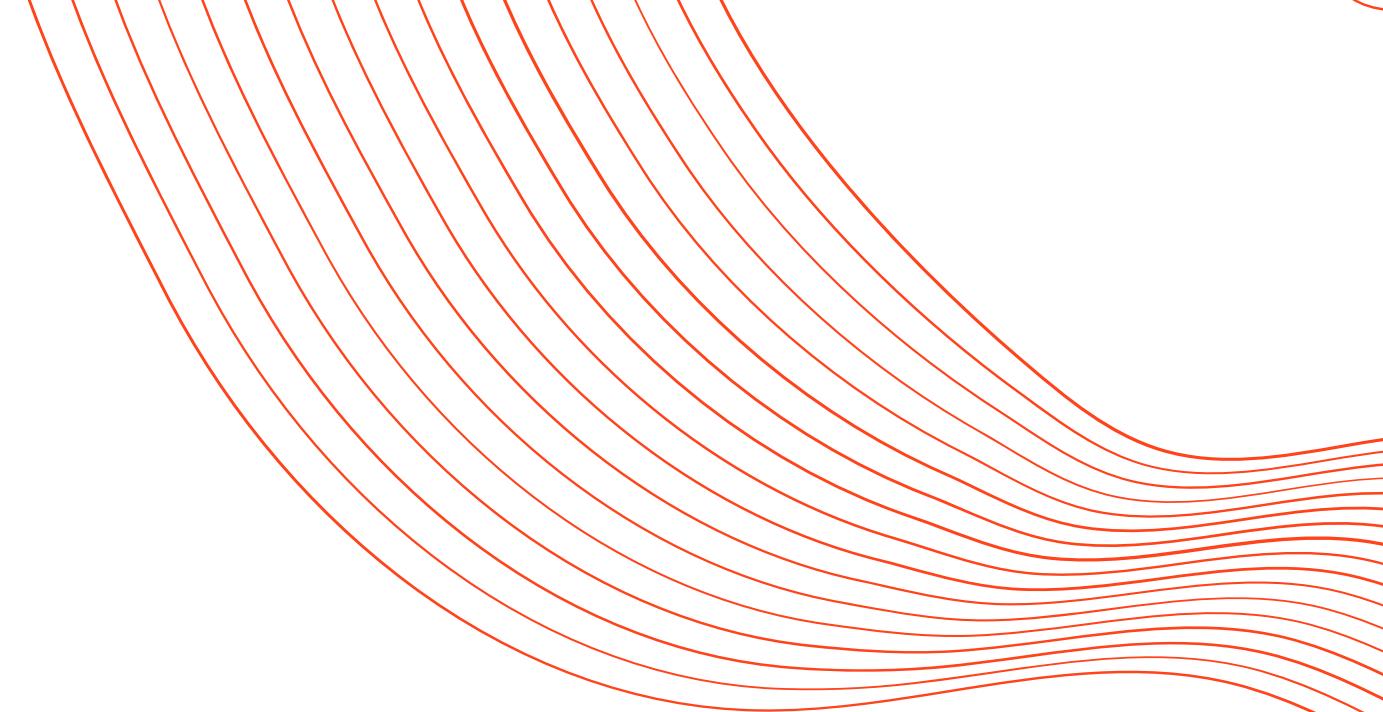
It's a novel attribute specific to machine learning systems that deals with automatically retraining and serving models.

Part 3:

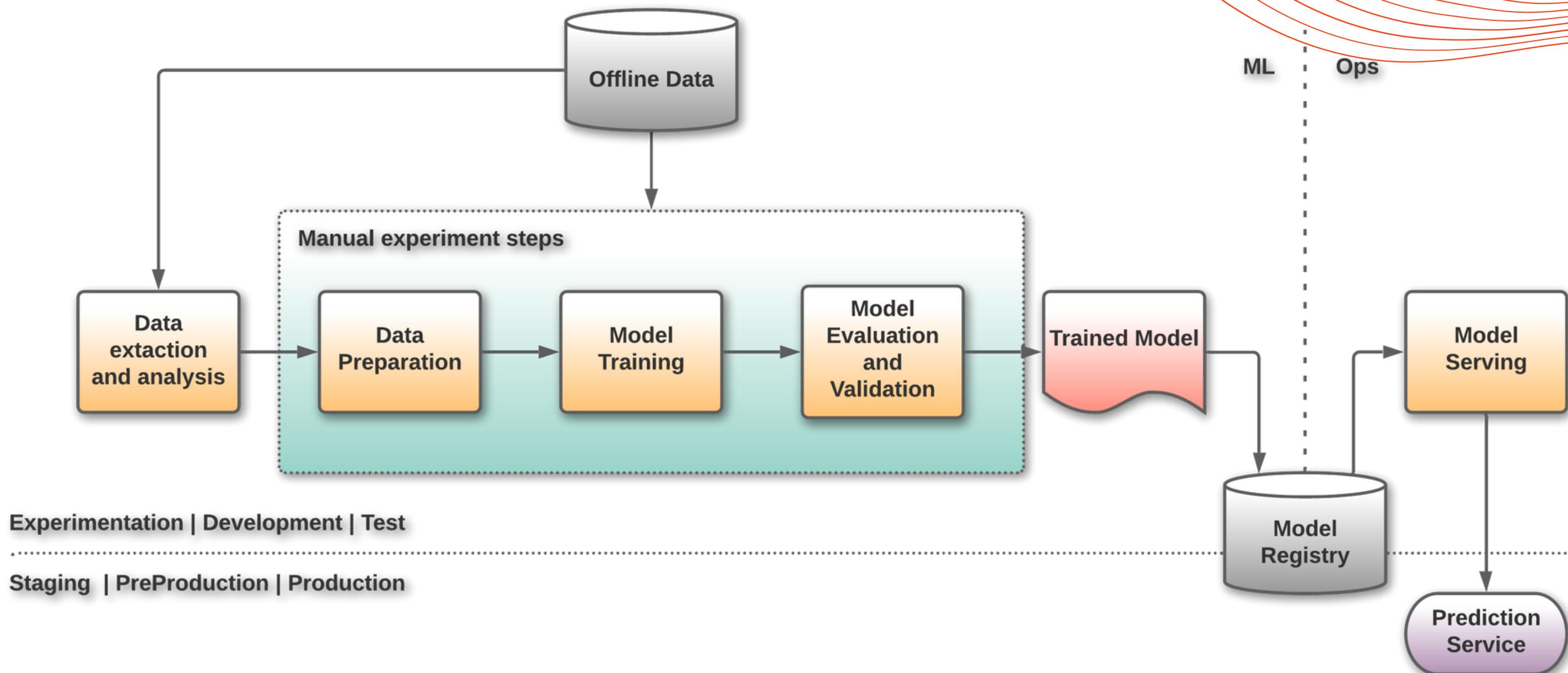
Steps in AI/MLOps



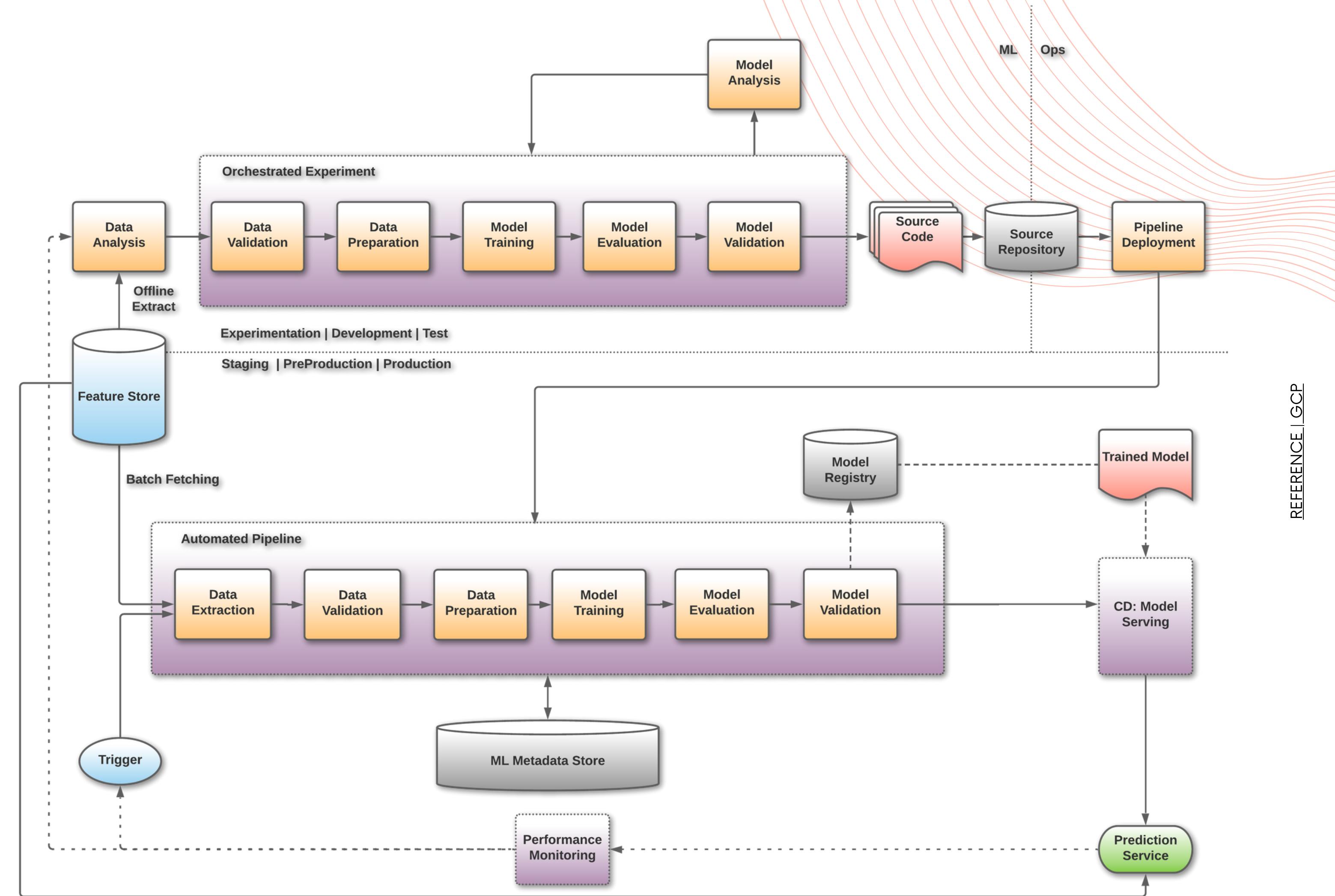
Generic steps in AI/ML systems

- 
- 1 Data extraction
 - 2 Data analysis
 - 3 Data preparation
 - 4 Model training
 - 5 Model evaluation
 - 6 Model validation
 - 7 Model serving
 - 8 Model monitoring

Level 0

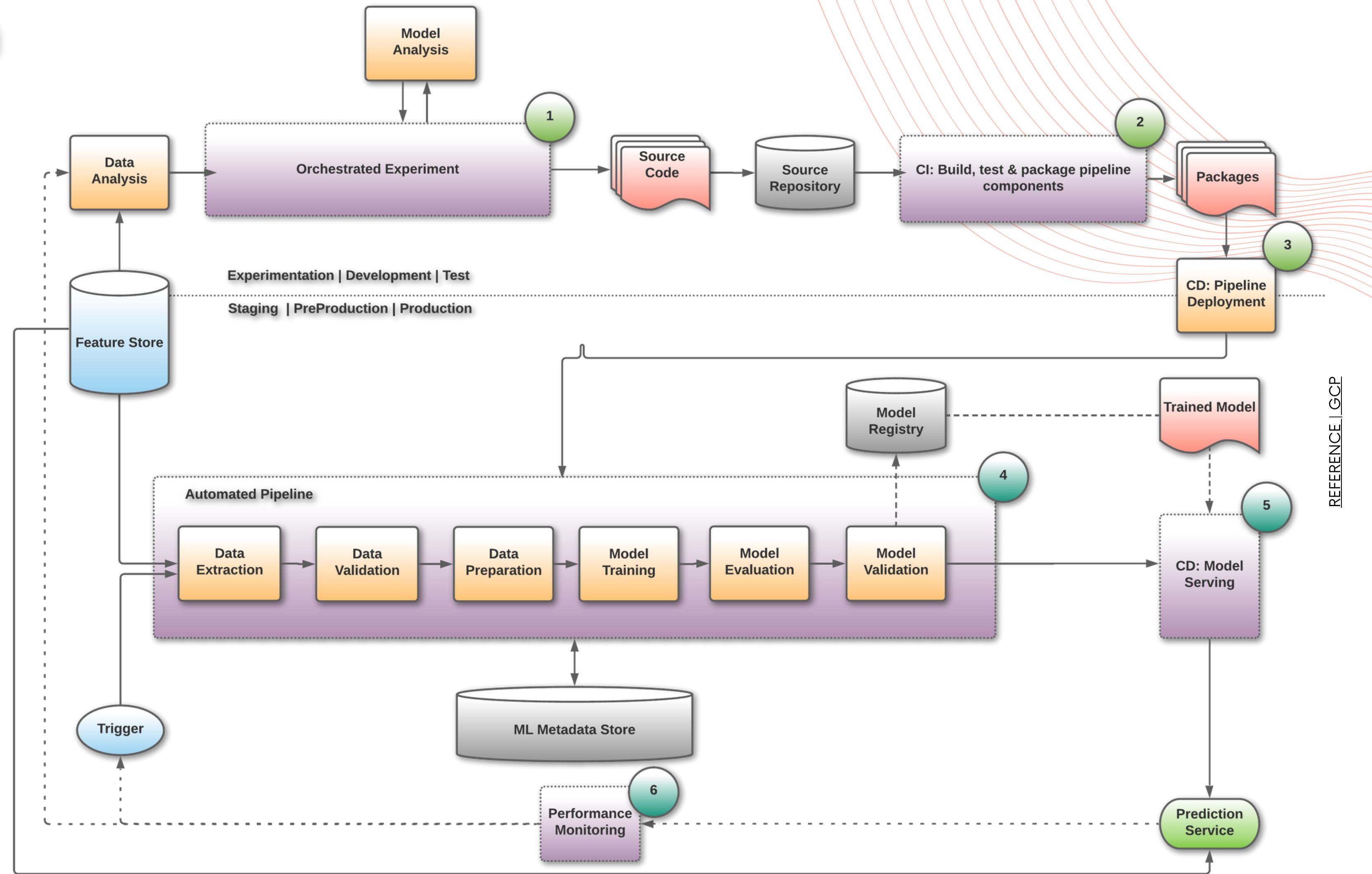


Level I

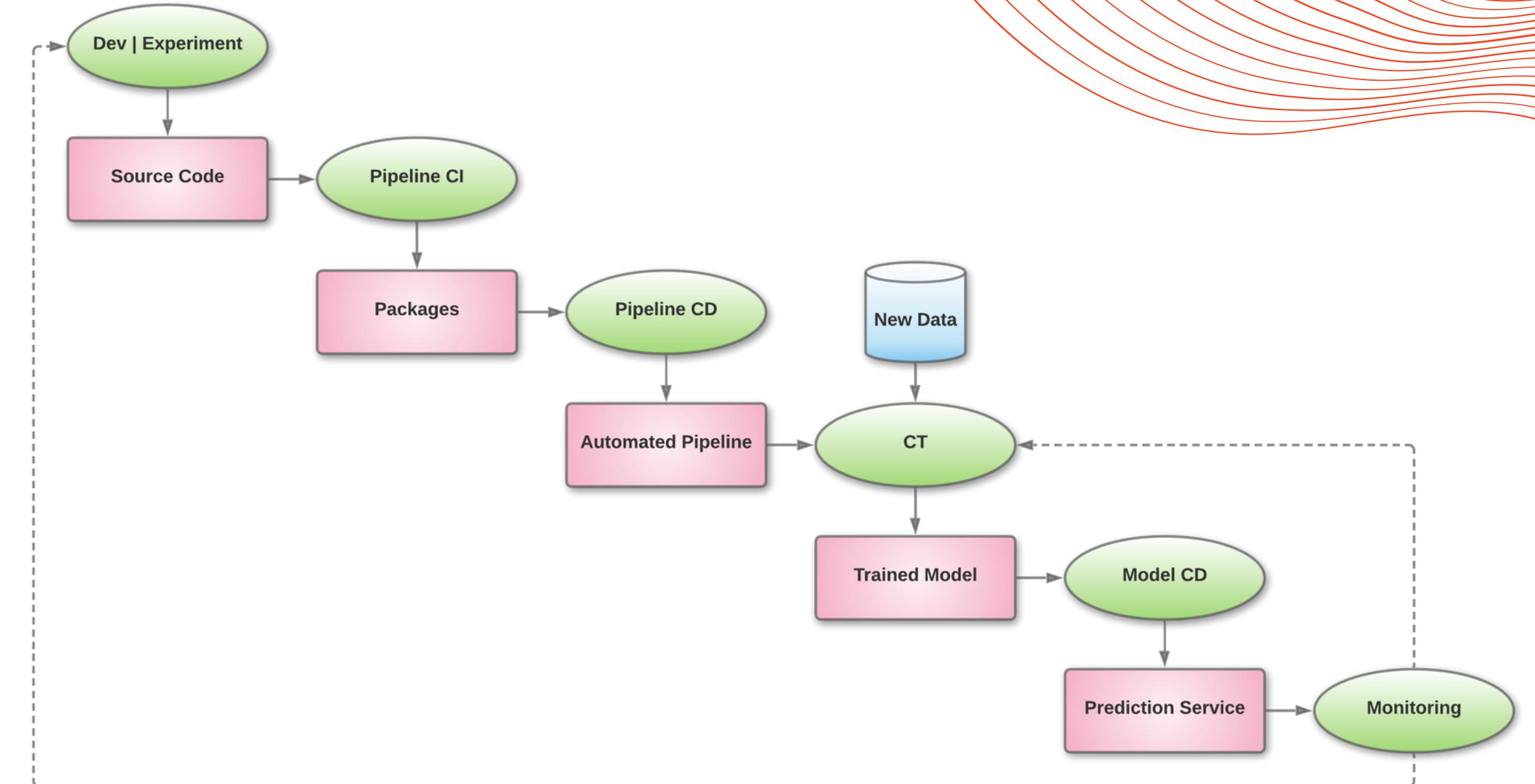


Level | 2

12



Stages of CI/CD



References

1

GCP

MLOps: Continuous delivery
and automation pipelines in
machine learning

2

martinFowler.com

Continuous Delivery for
Machine Learning

Thank you!

Contact us if there are any questions.



Website

..... www.iNeuron.ai

**Phone
Number**

..... +91 87885 03778 ,
+91 6260 726 925

**Email
Address**

..... contact@ineuron.ai