

Orchestration in MLOps

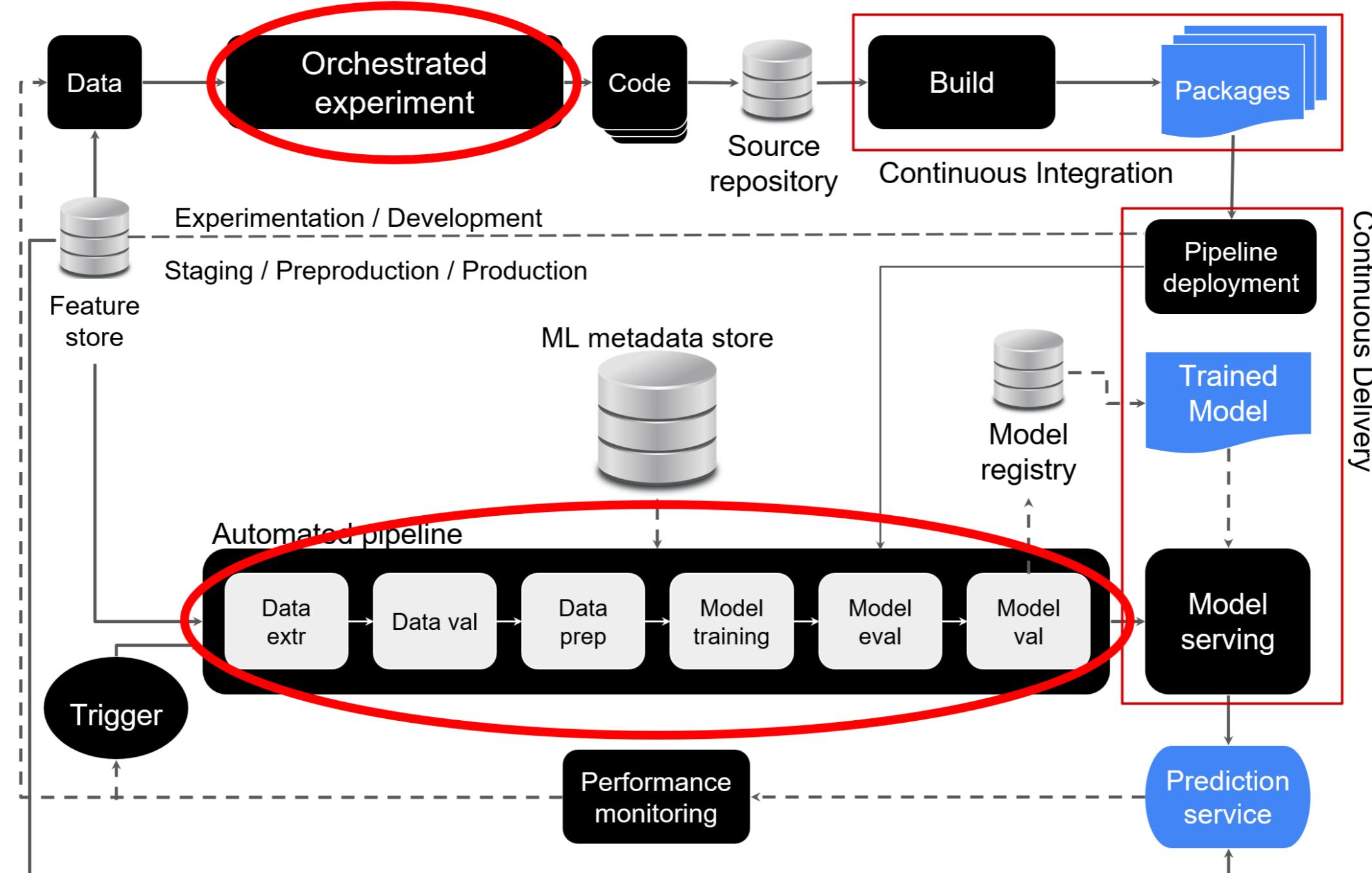
FULLY AUTOMATED MLOPS



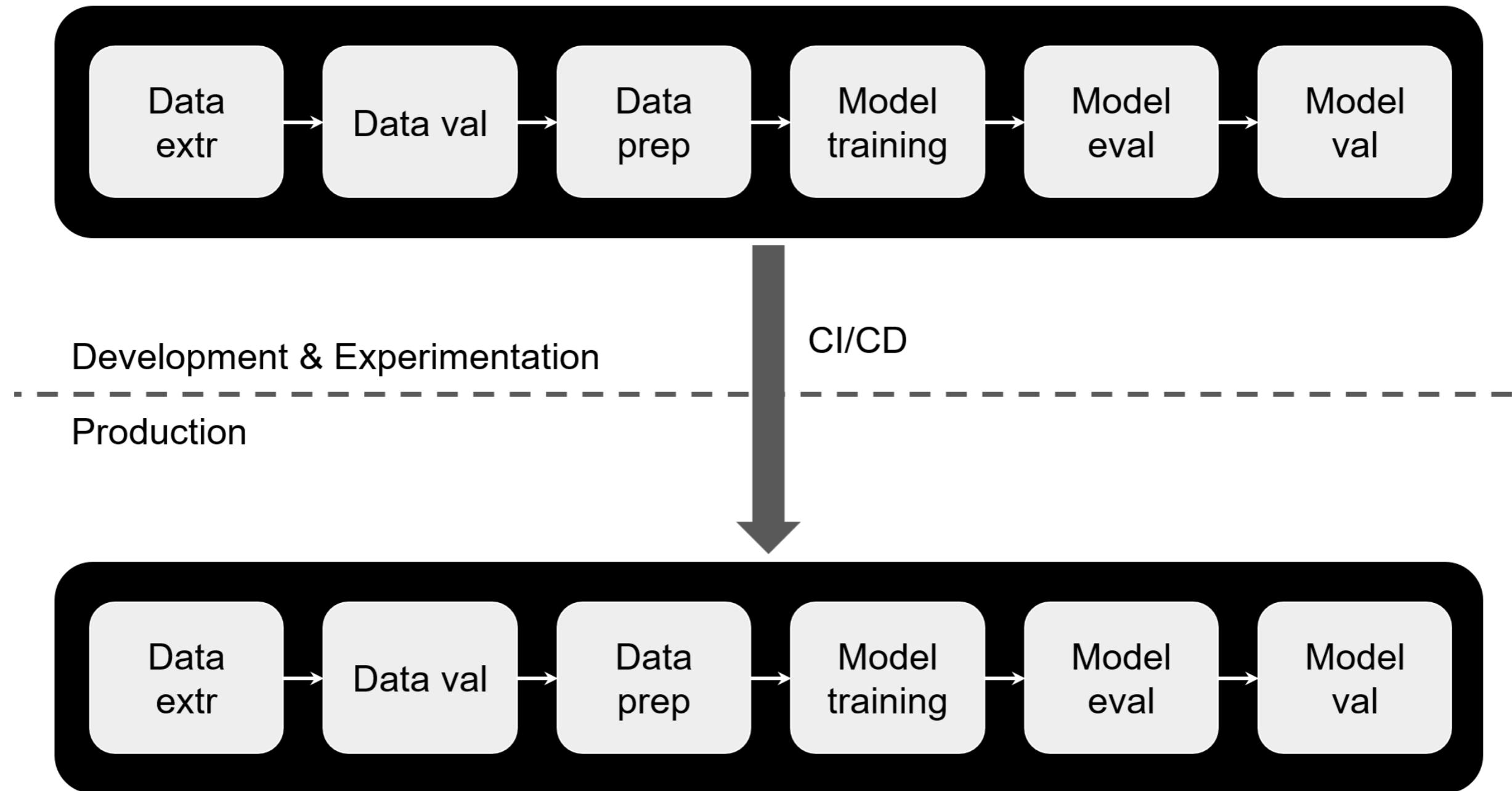
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A core component in MLOps systems



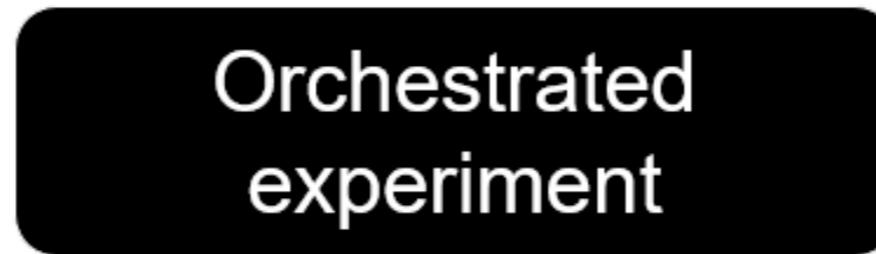
Modularity & reusability



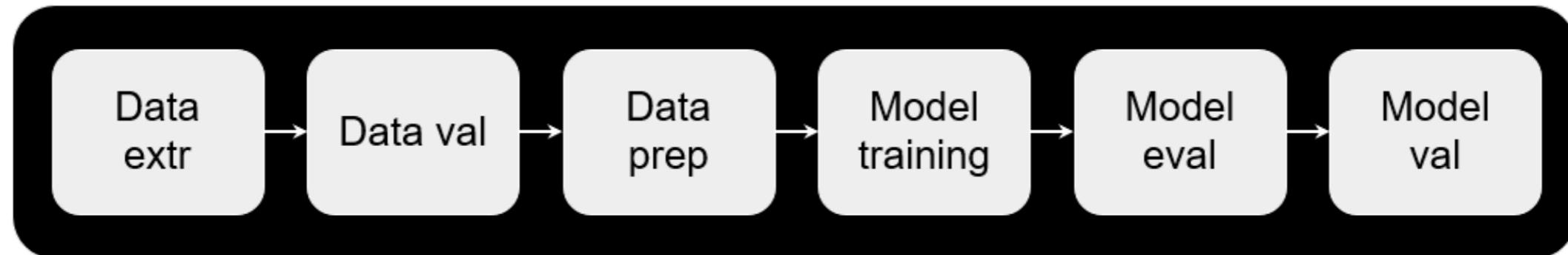
Orchestration & automation

ML pipelines are used in:

- Development & experimentation

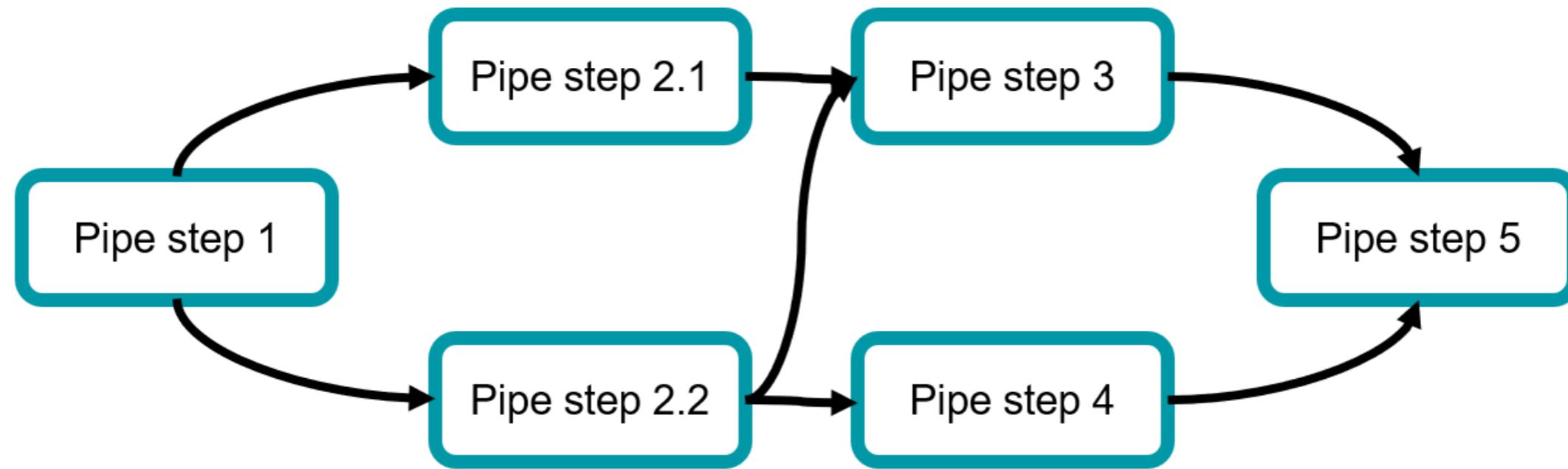


- Production



Direct Acyclic Graphs in MLOps

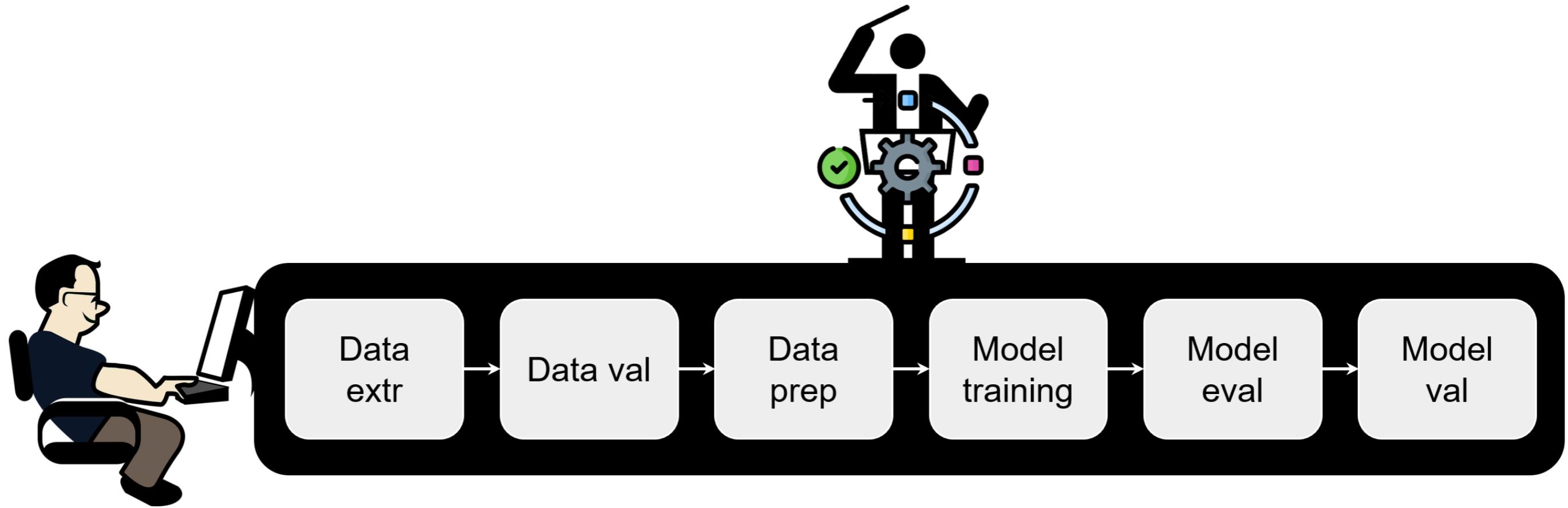
- Graphical pipeline representations
- Pipeline steps represented as nodes
- Steps dependencies are edges



What is orchestration in MLOps?

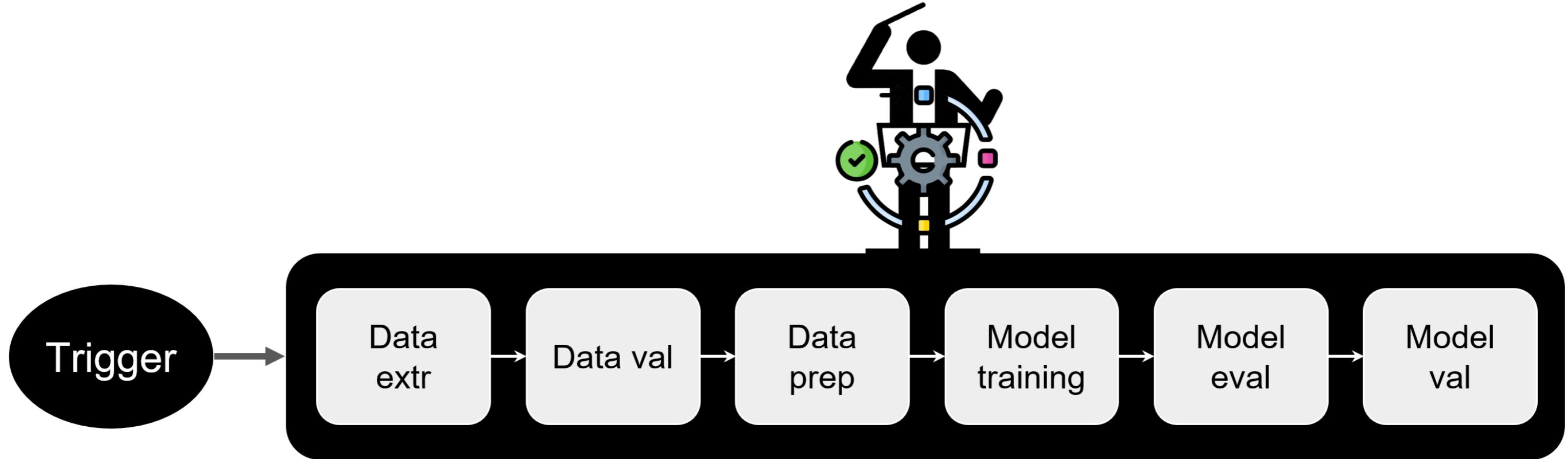
- Managing & automating task flows
- Scheduling, monitoring of tasks
- Managing data dependencies and flows

ML pipelines - development & experimentation



- Manage end-to-end tasks in model training
- Correct flow, record and logging
- Parallel experimentation

ML pipelines - production



- Helps automating model deployment
- Manages and execute pipeline steps
- Consistent and reliable deployments

Let's practice!

FULLY AUTOMATED MLOPS

Automation in MLOps deployment strategies

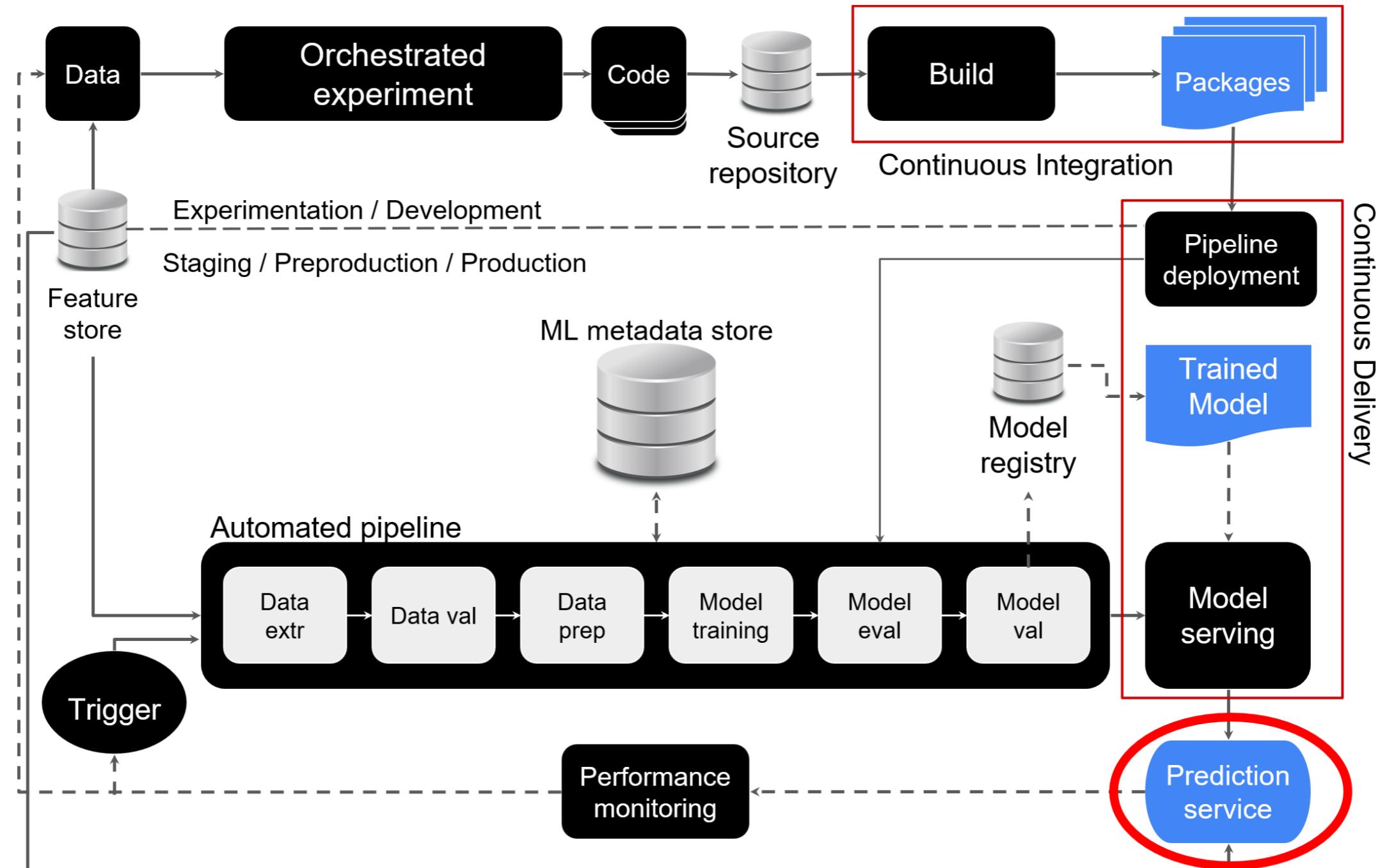
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Model deployment - prediction service



Prediction services - modes recap

Predictions can be served in:

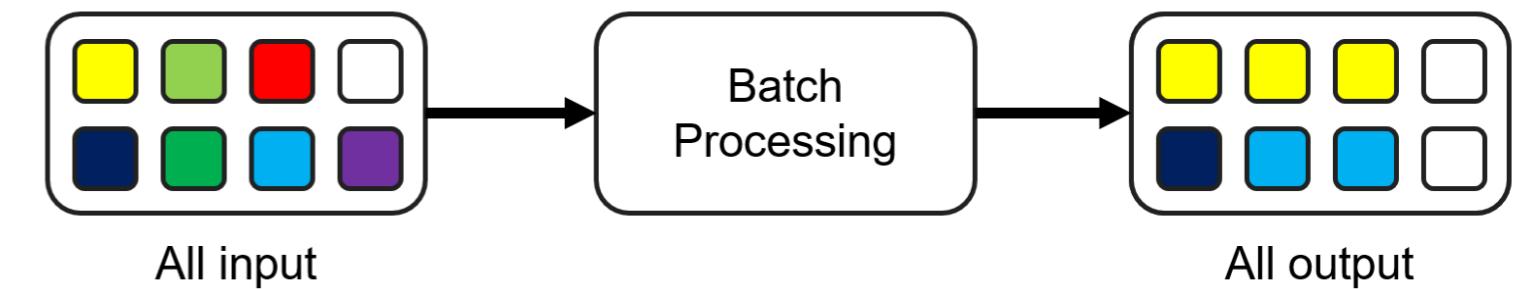
- Batch
- Streams
- Real-time
- On-the-edge

Prediction service - batch serving

- Large number of predictions

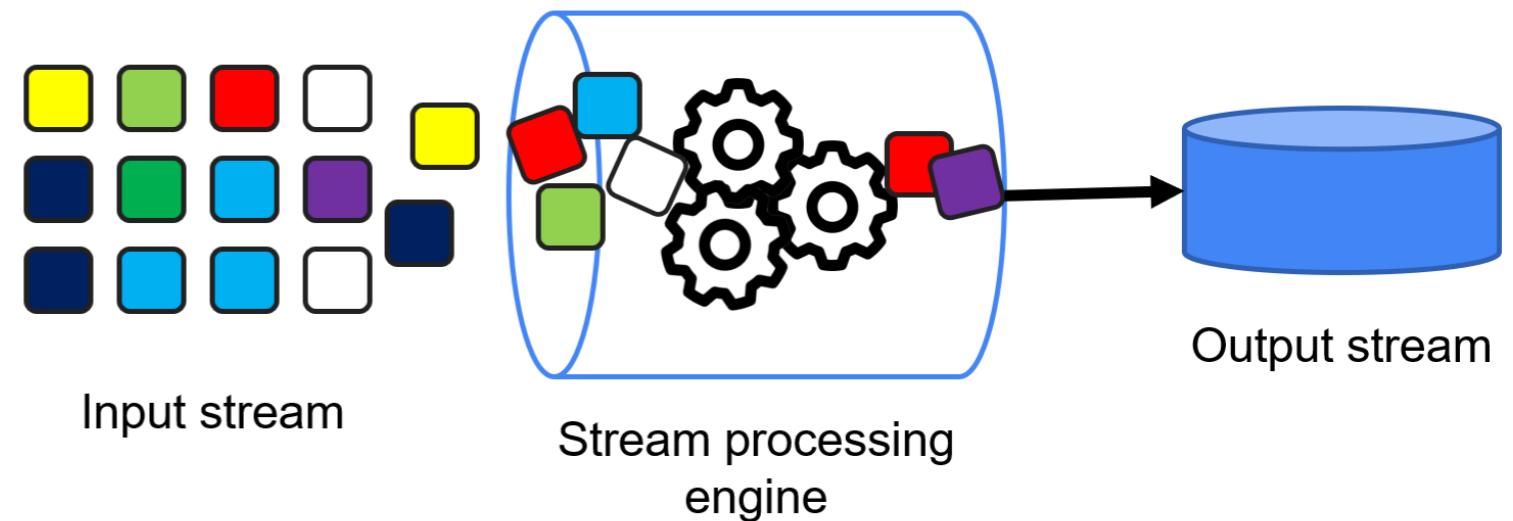
- Periodic schedules

- Event triggered



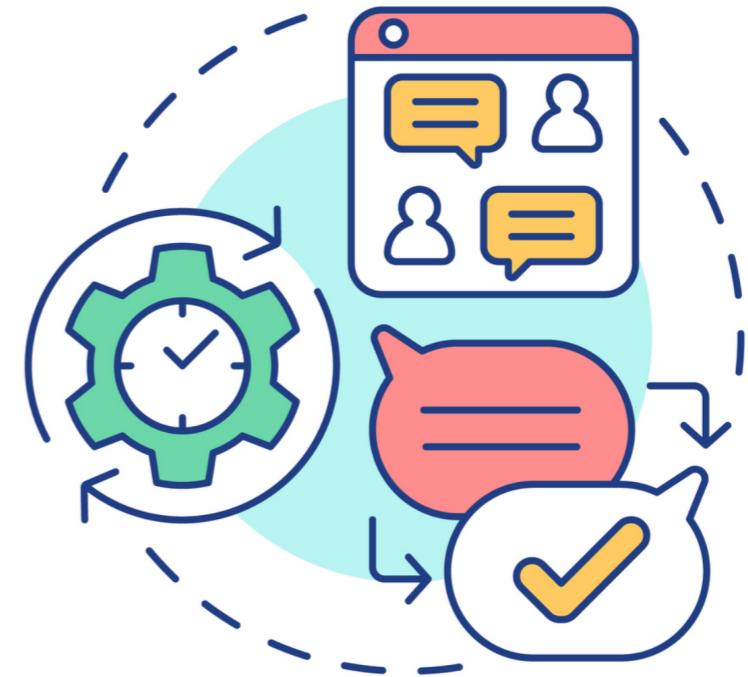
Prediction service - streaming serving

- Continuously incoming data
- Continuously delivered predictions



Prediction service - real time

- Single record
- Instant predictions



Prediction service - on the edge

- Mobile devices
- IoT devices
- Reduced latency



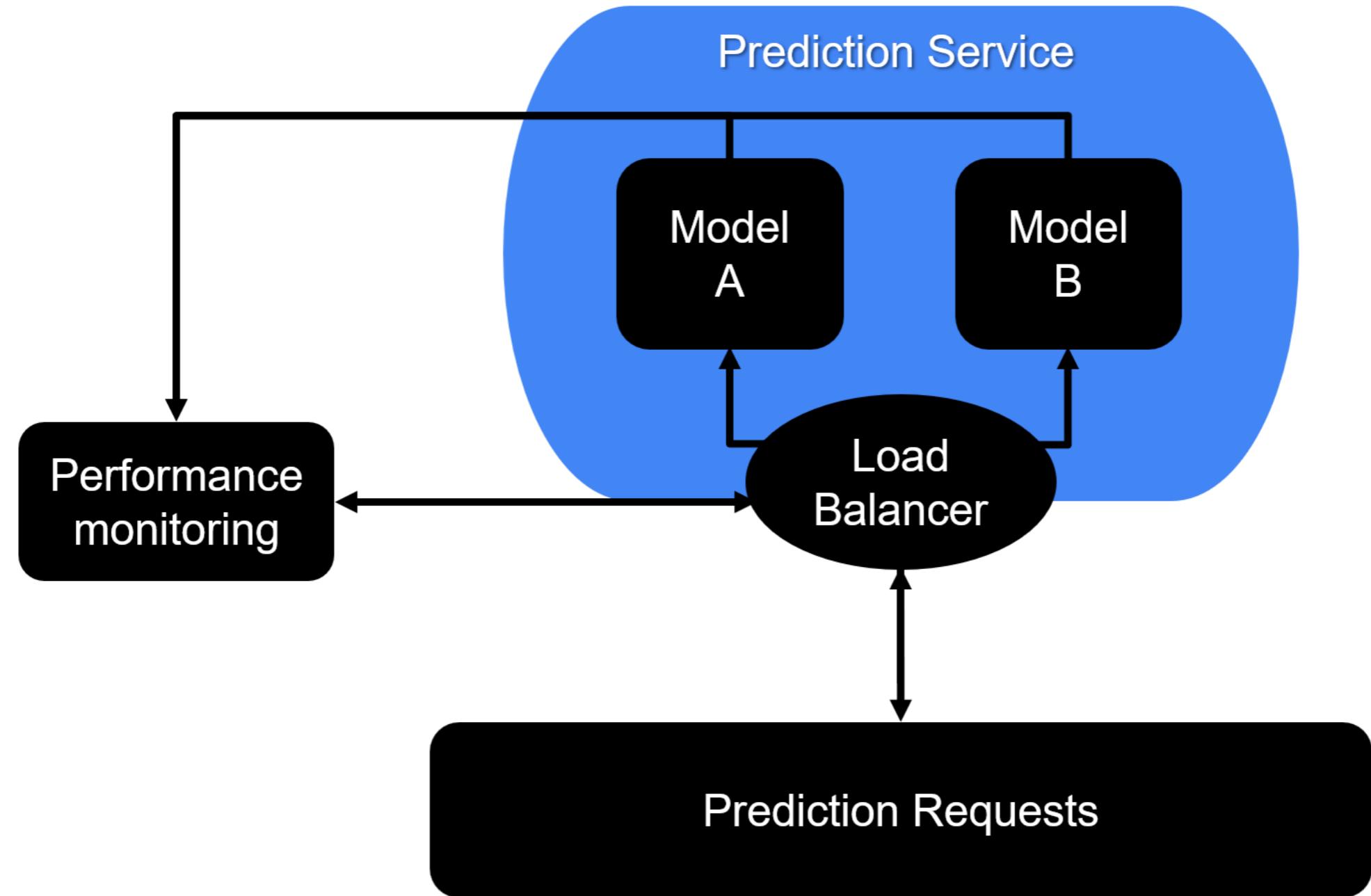
Deployment strategies

ML serving types determines how we should deploy and update our prediction services

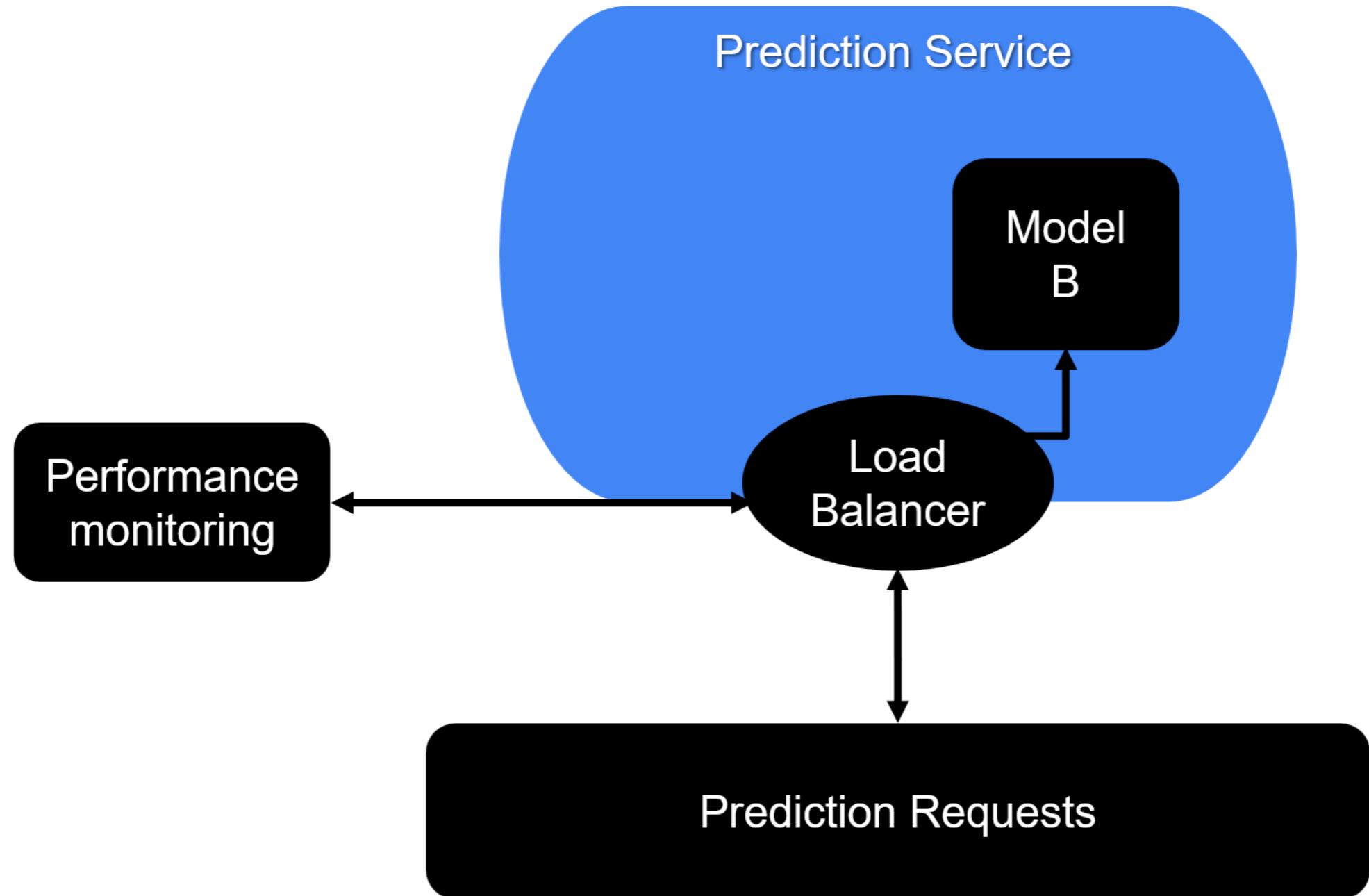
Model deployment strategies include:

- Shadow deployment
- Canary deployment
- A/B testing
- Blue/Green

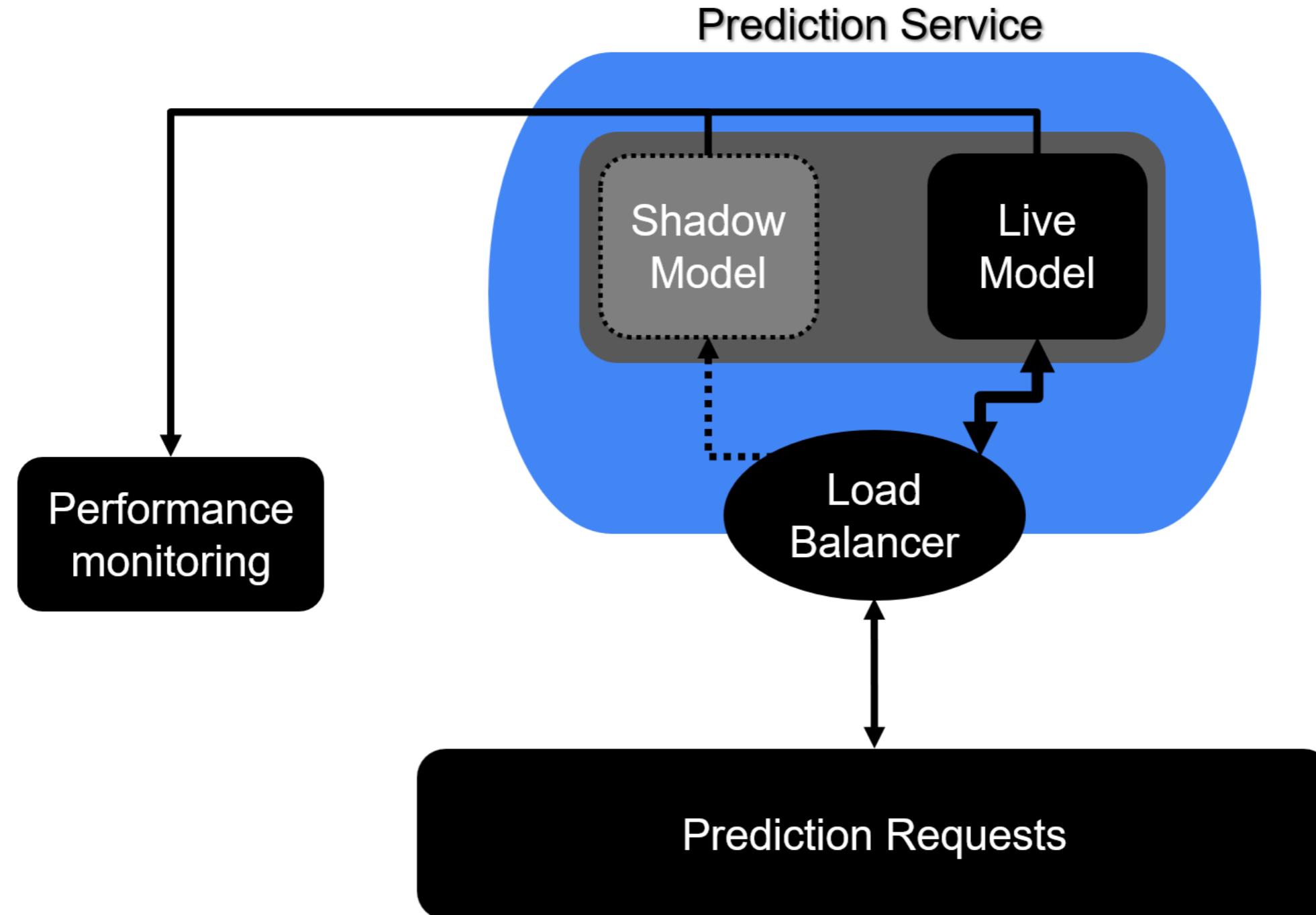
A/B testing



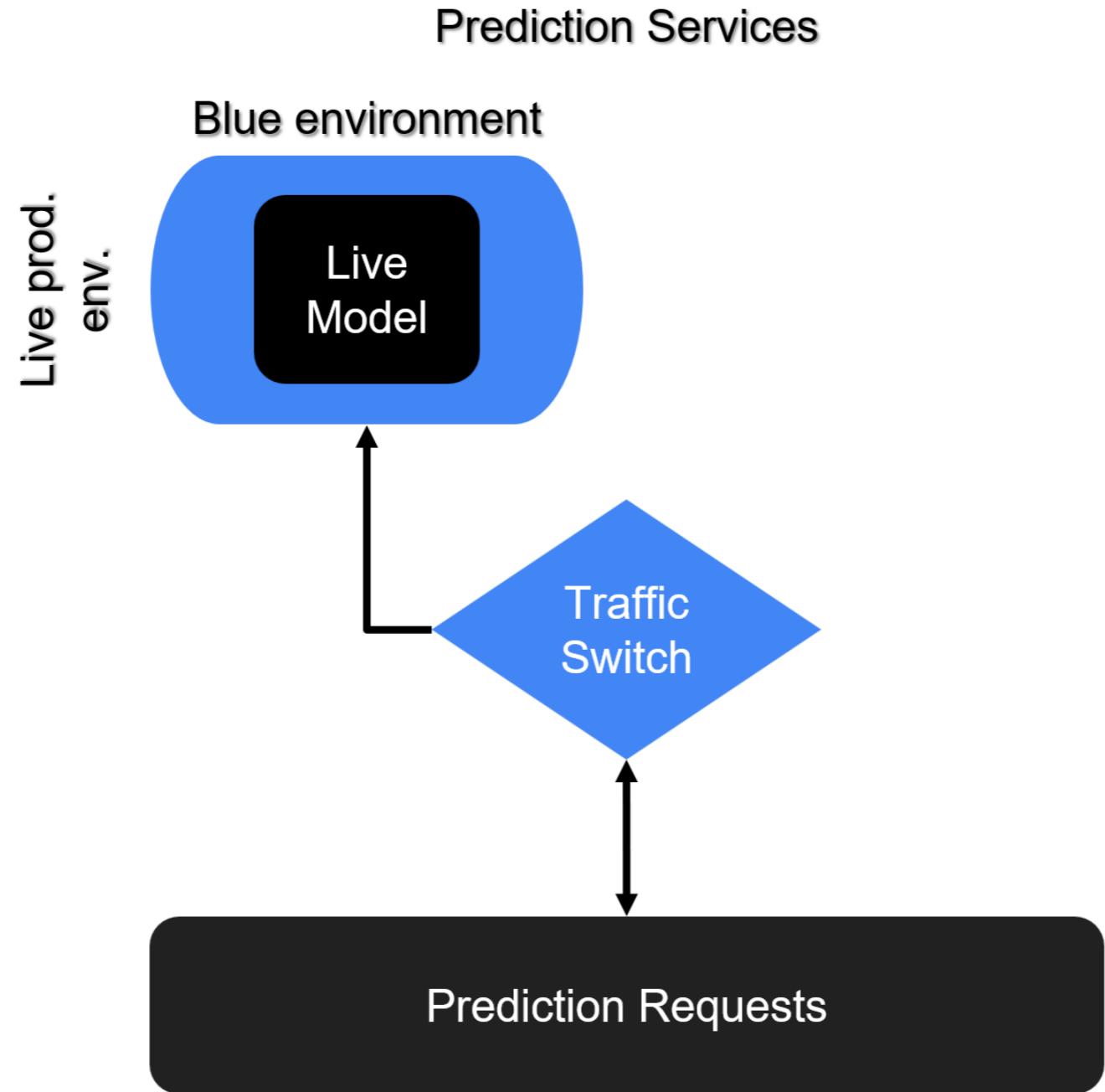
A/B testing



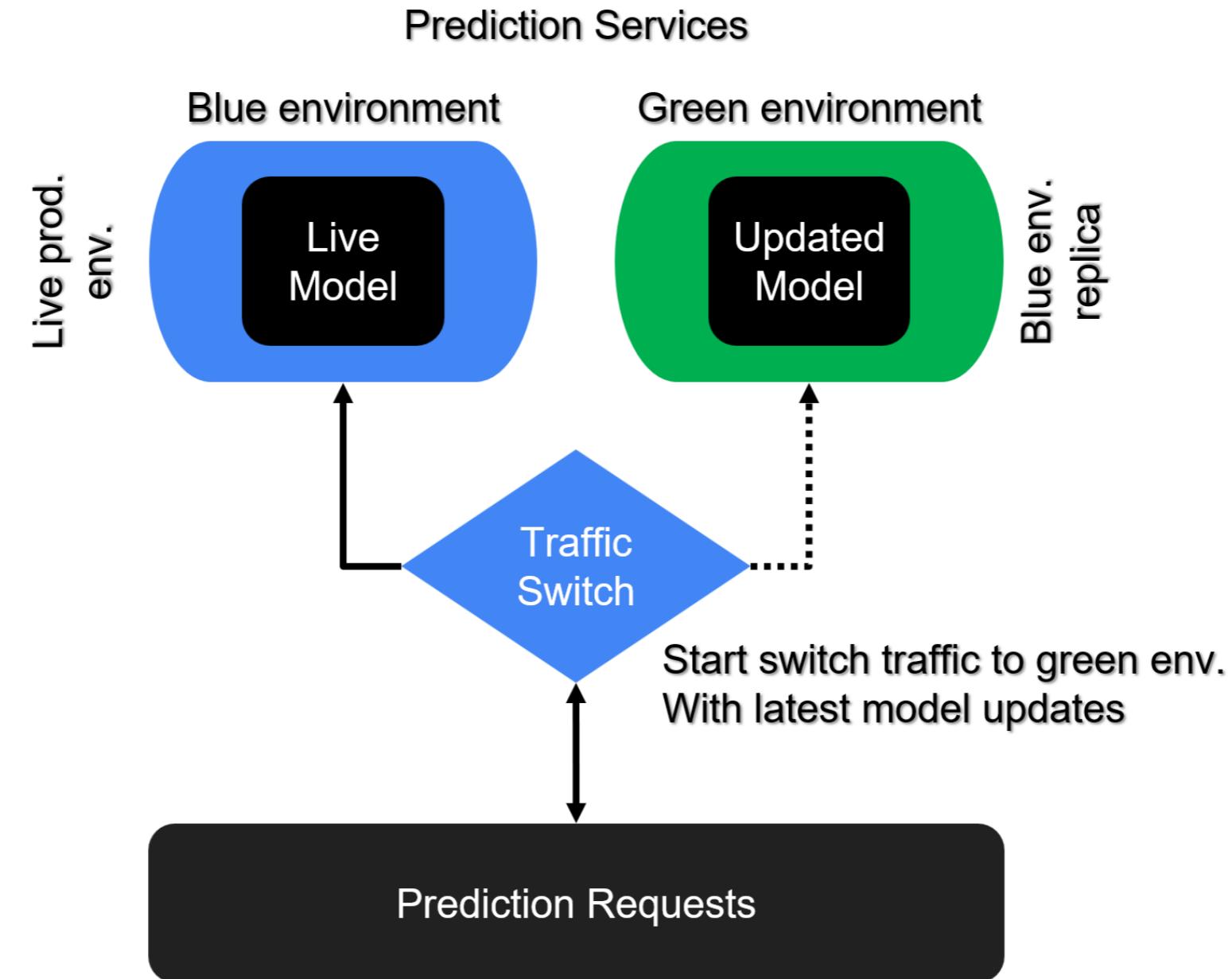
Shadow deployment



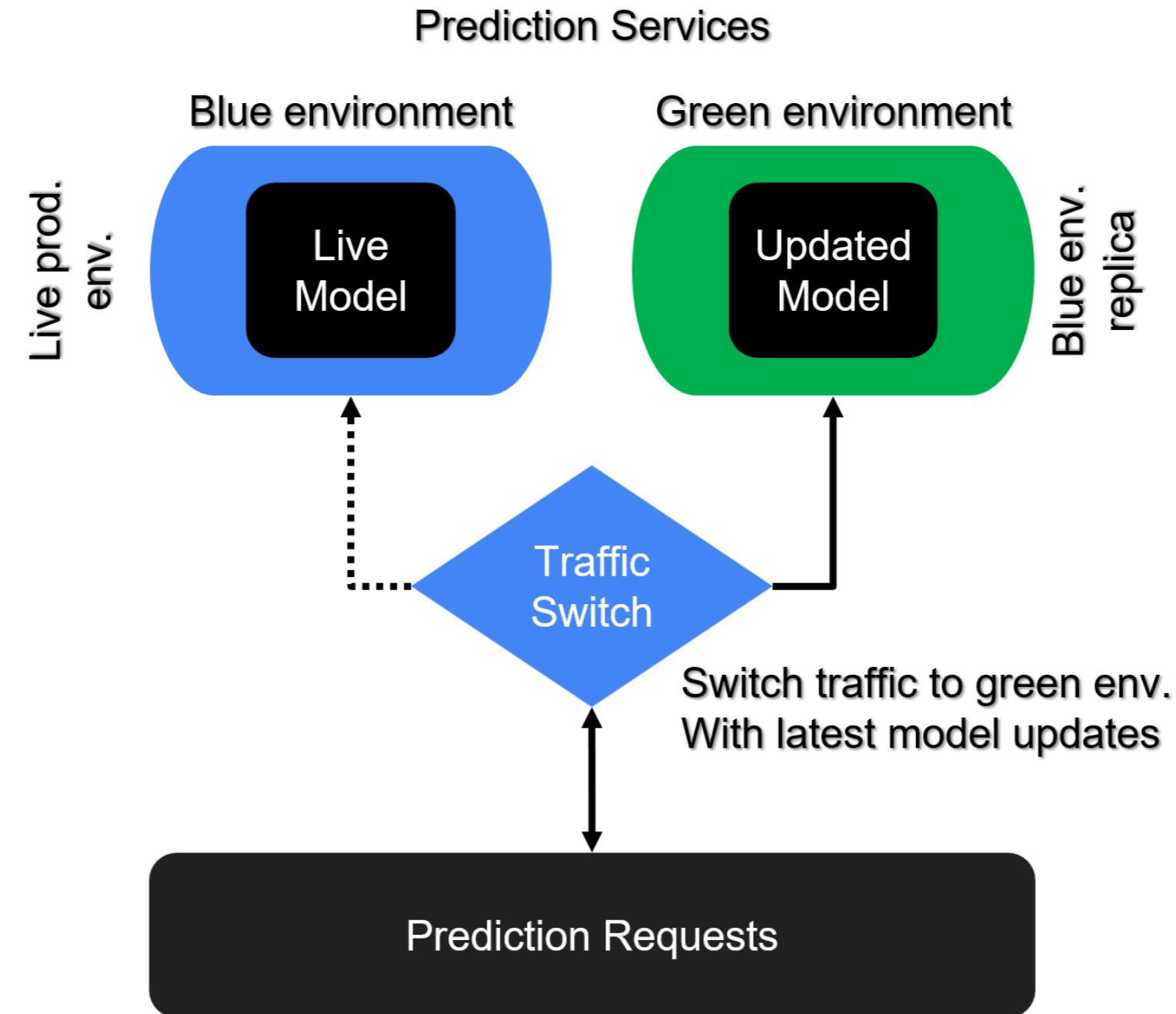
Blue/Green deployment



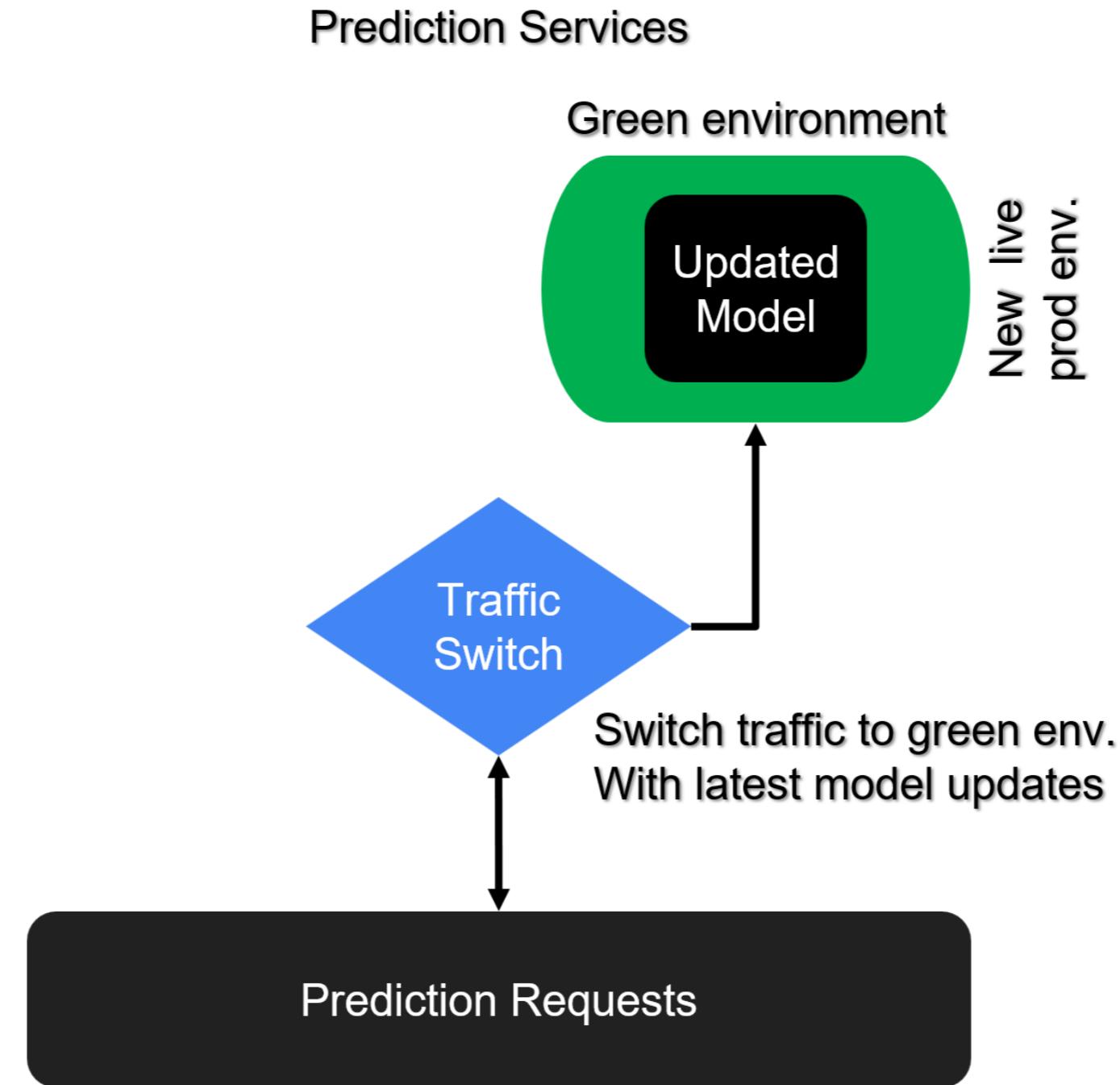
Blue/Green deployment



Blue/Green deployment



Blue/Green deployment



Deploying and updating prediction services

Model type determines deployment strategy

Deployment strategy	No downtime	Condition-based	Rollback time	Additional costs
Shadow	✓	✗	NA	Medium
Canary	✓	✗	Fast	Low
A/B testing	✓	✓	Fast	Low
Blue/Green	✓	✗	Instant	High

Let's practice!

FULLY AUTOMATED MLOPS

CI/CD/CT/CM in Fully Automated MLOps

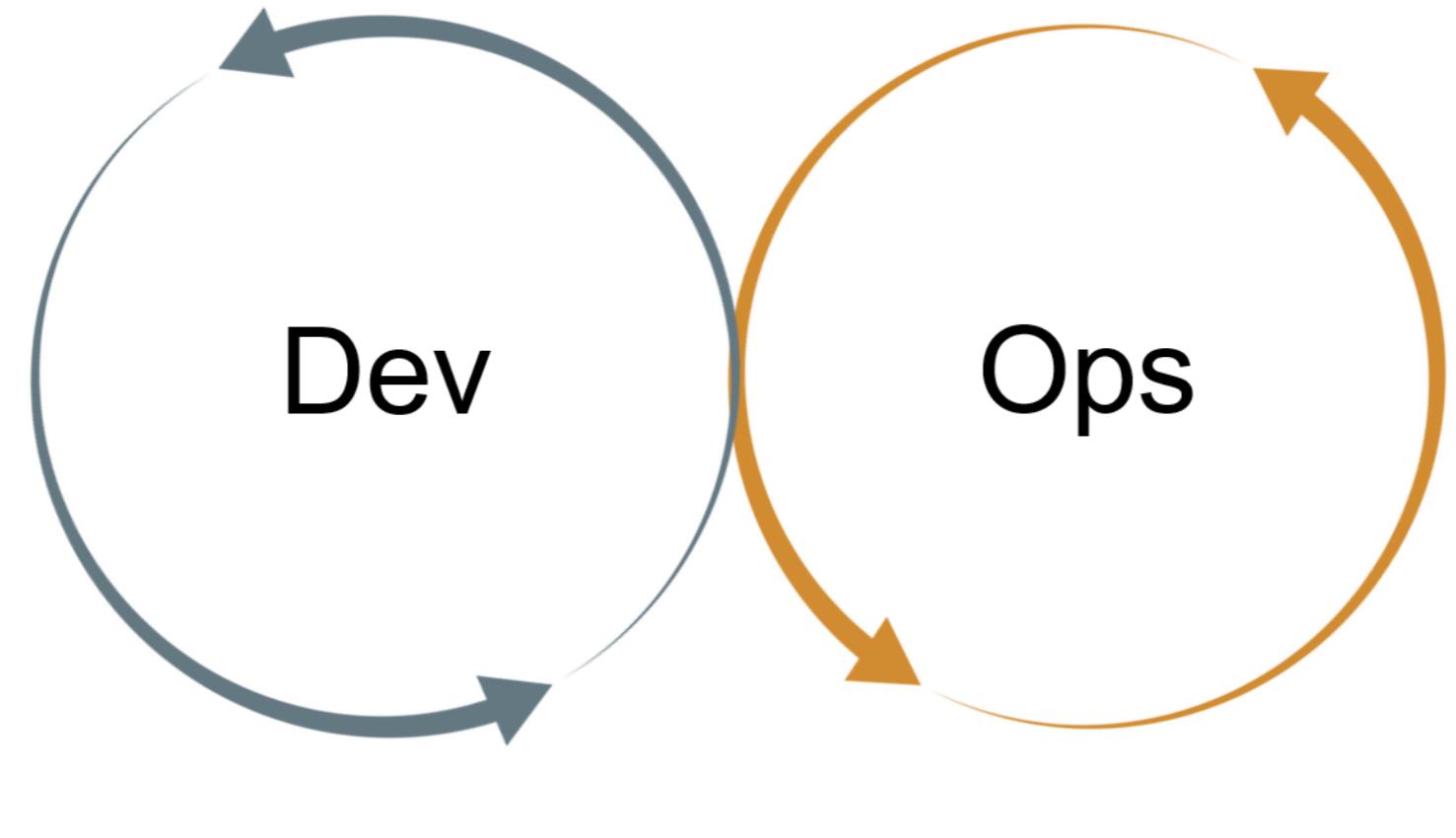
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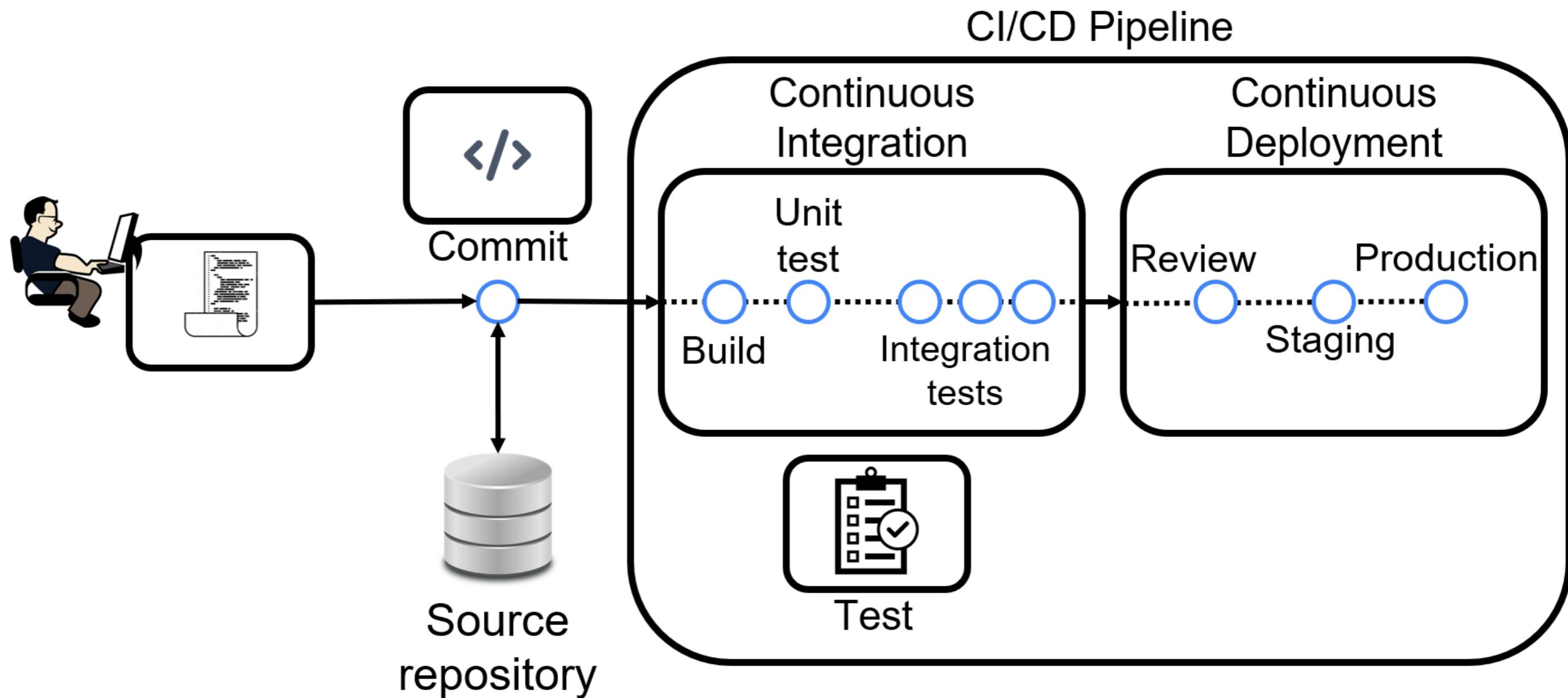
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DevOps

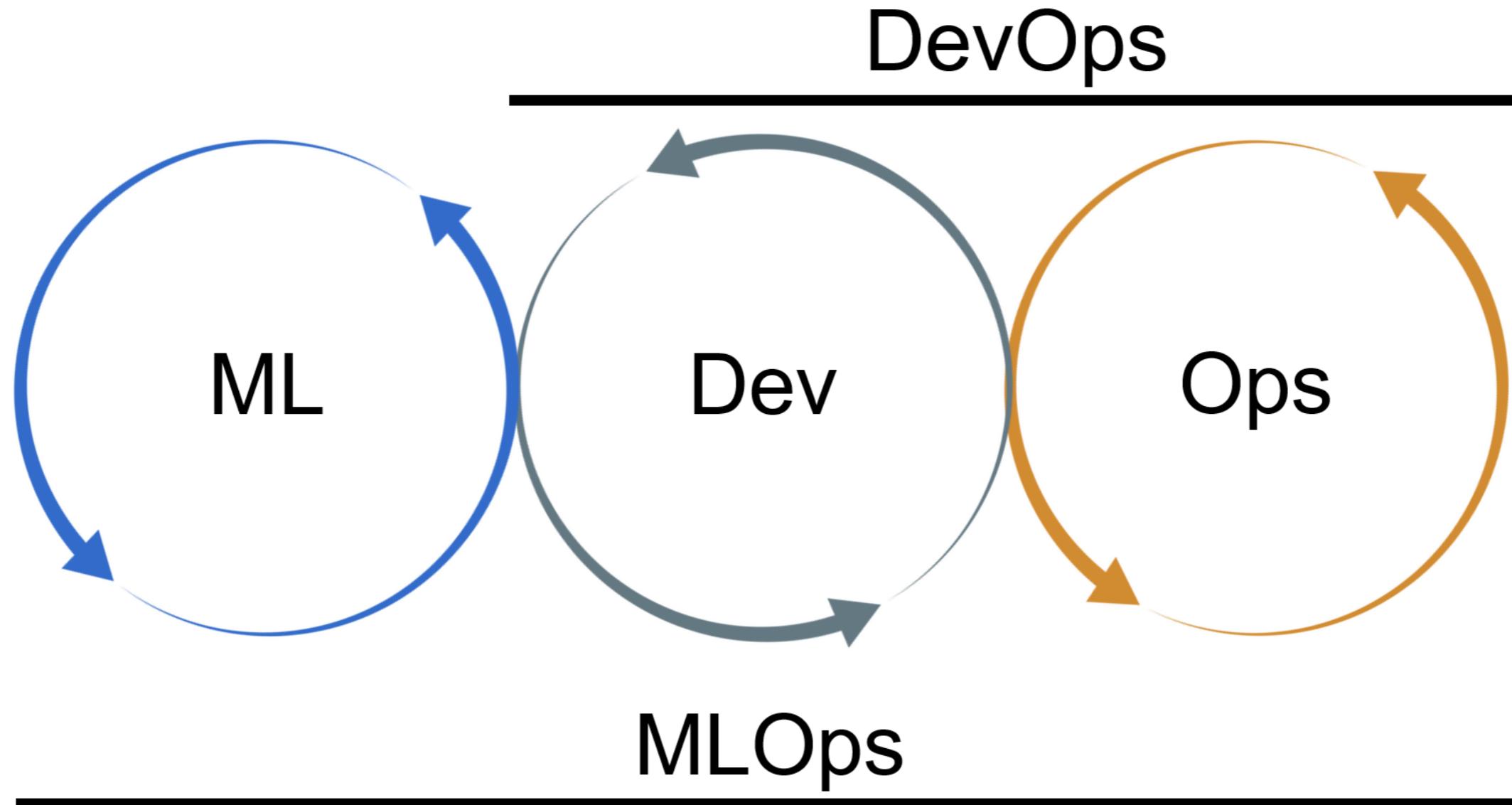


DevOps

CI/CD in DevOps

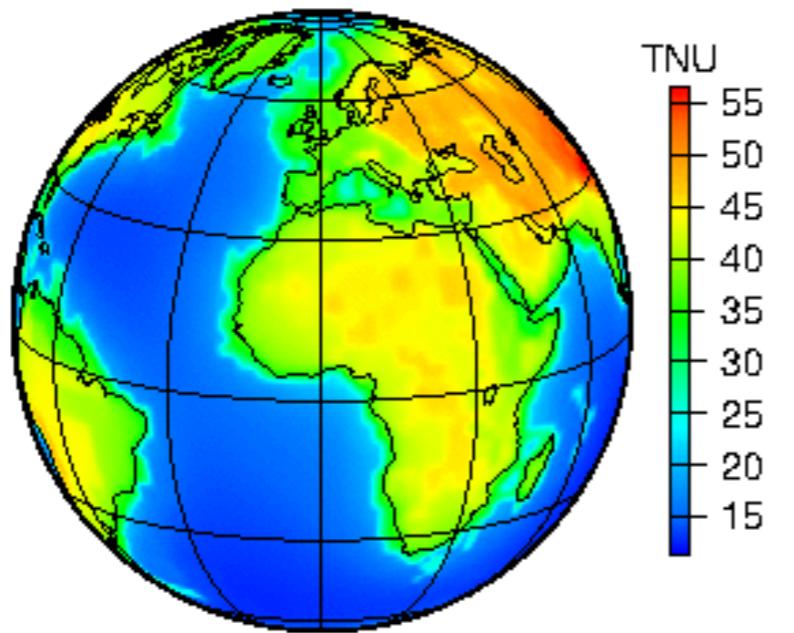


Fully automated MLOps

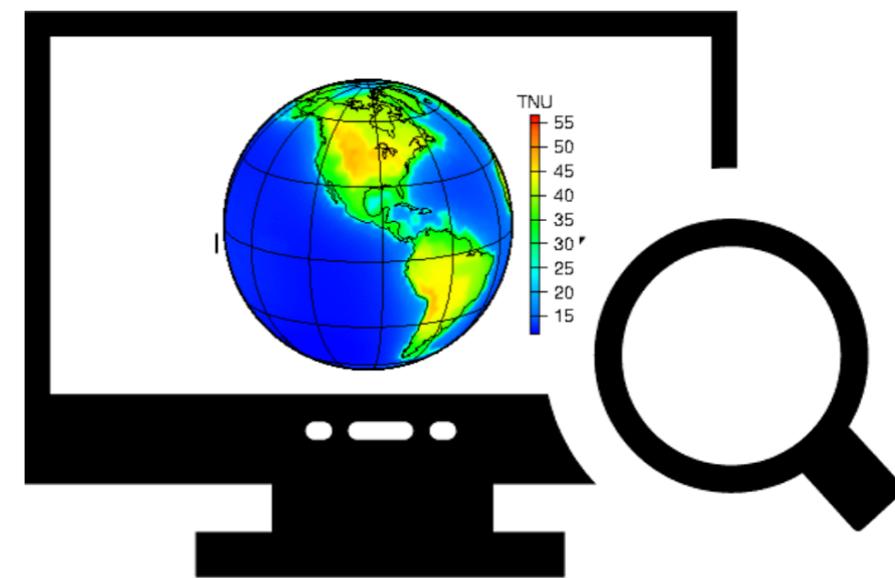


Considerations about ML - Changing world

Continuously changing world

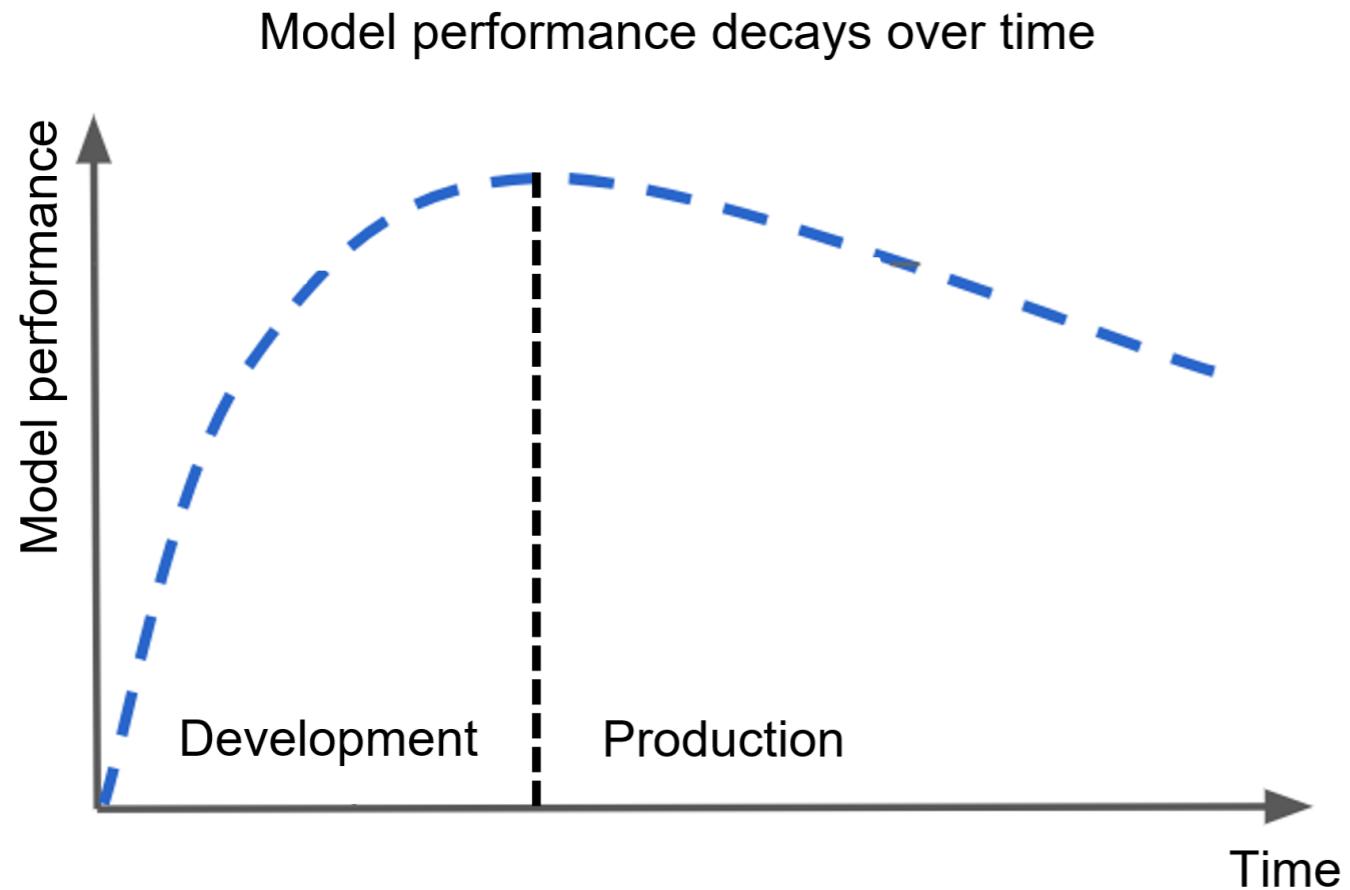


Continuous monitoring (CM)

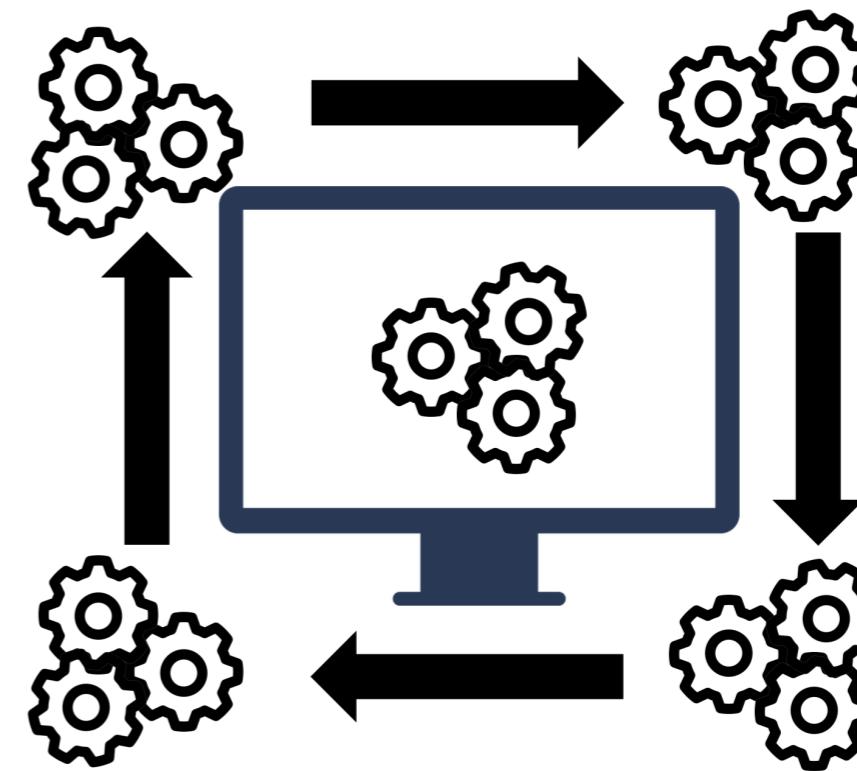


Considerations about ML - Decaying performance

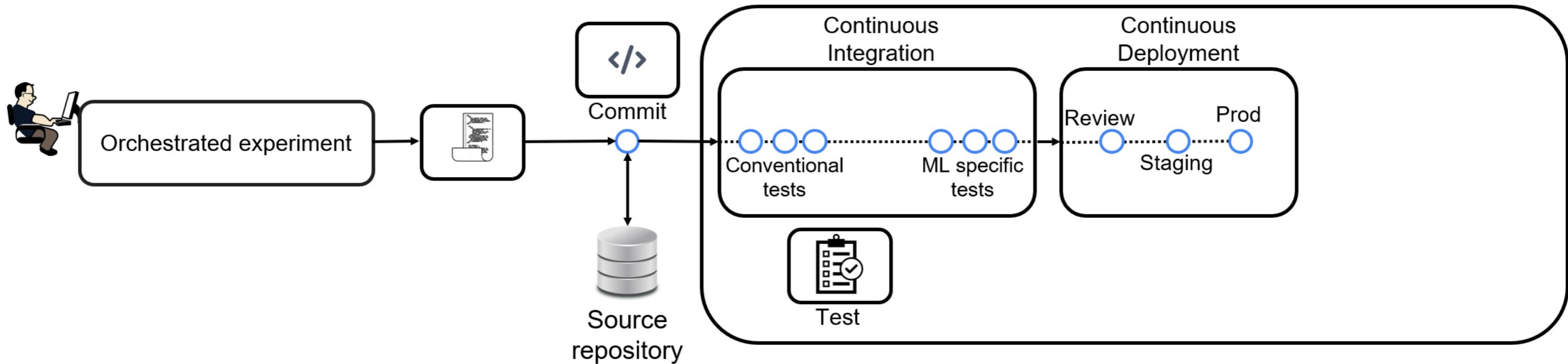
Continuously decaying models



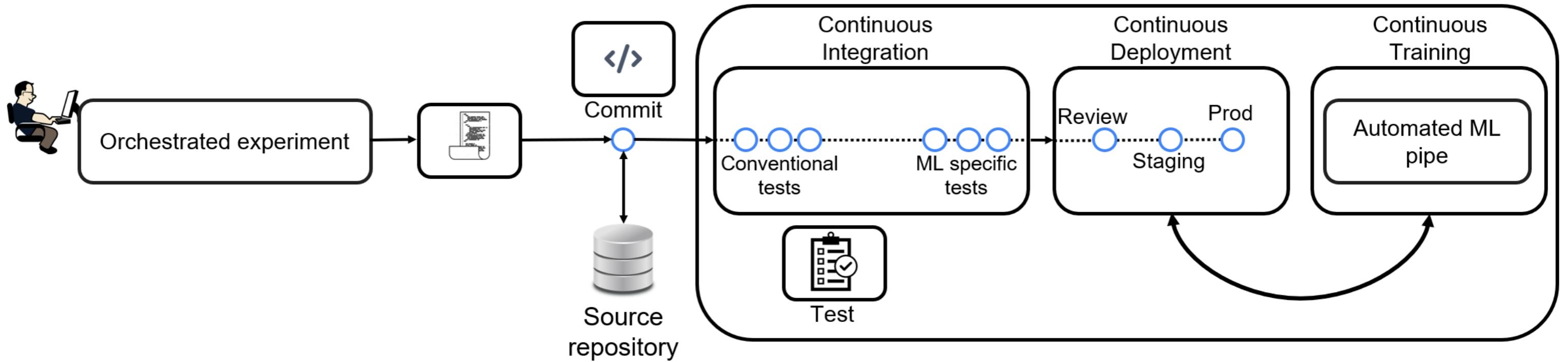
Continuous training (CT)



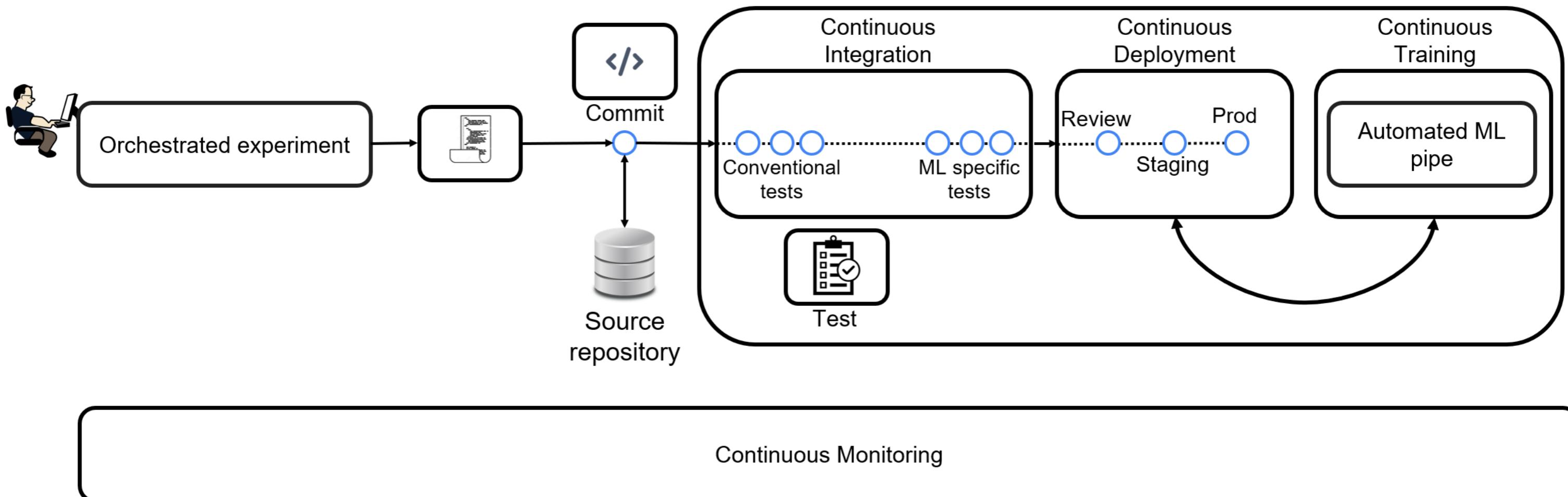
CI/CD/CT/CM in MLOps



CI/CD/CT/CM in MLOps



CI/CD/CT/CM in MLOps



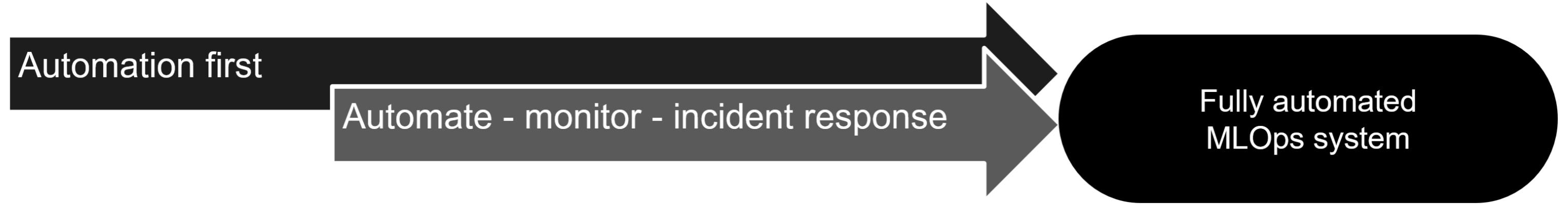
Fully automated MLOps

Fully automated
MLOps system

Fully automated MLOps - Automation first



Fully automated MLOps - Automated response pattern



Fully automated MLOps - CI/CD/CT/CM



Fully automated MLOps



Let's practice!

FULLY AUTOMATED MLOPS

Summary

FULLY AUTOMATED MLOPS



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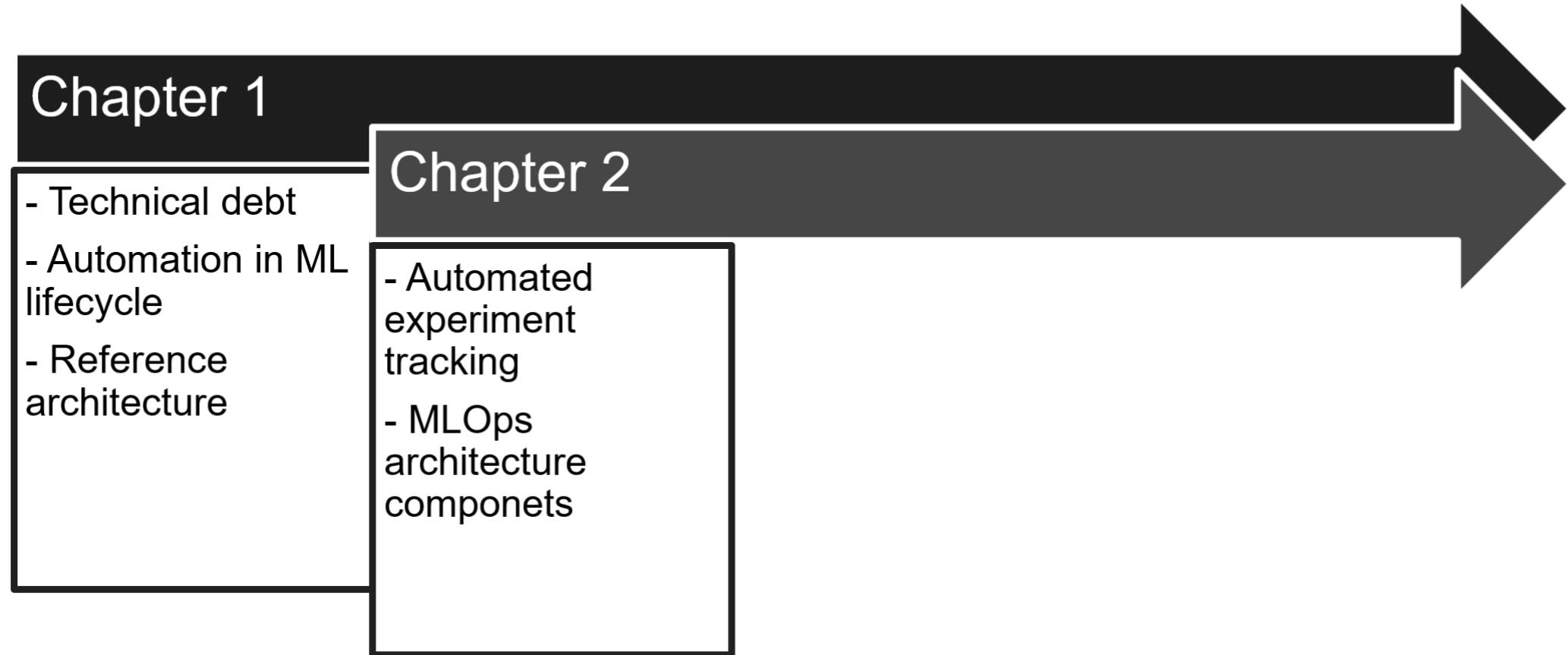
Congratulations!!!

Chapter 1 - Introduction to fully automated MLOps

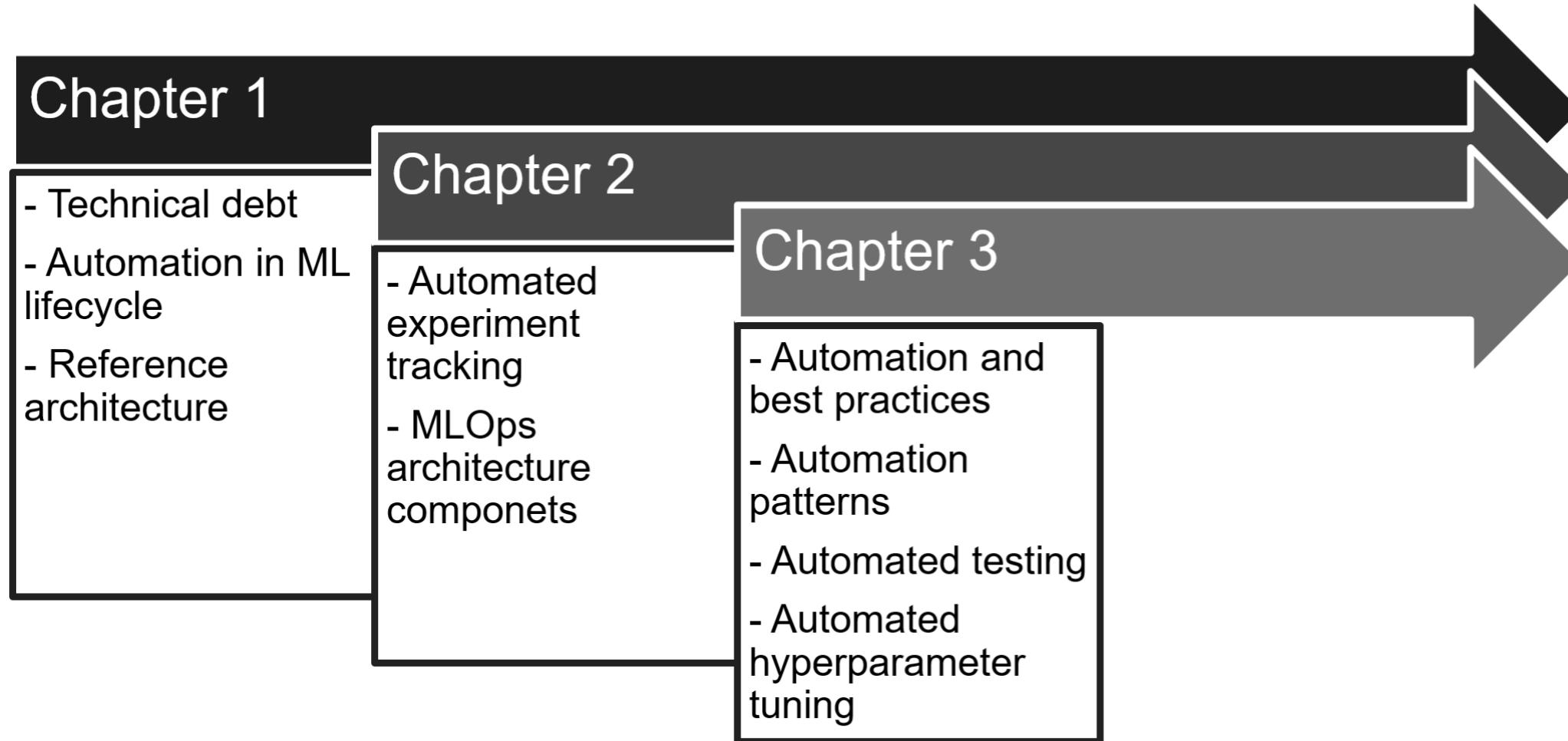
Chapter 1

- Technical debt
- Automation in ML lifecycle
- Reference architecture

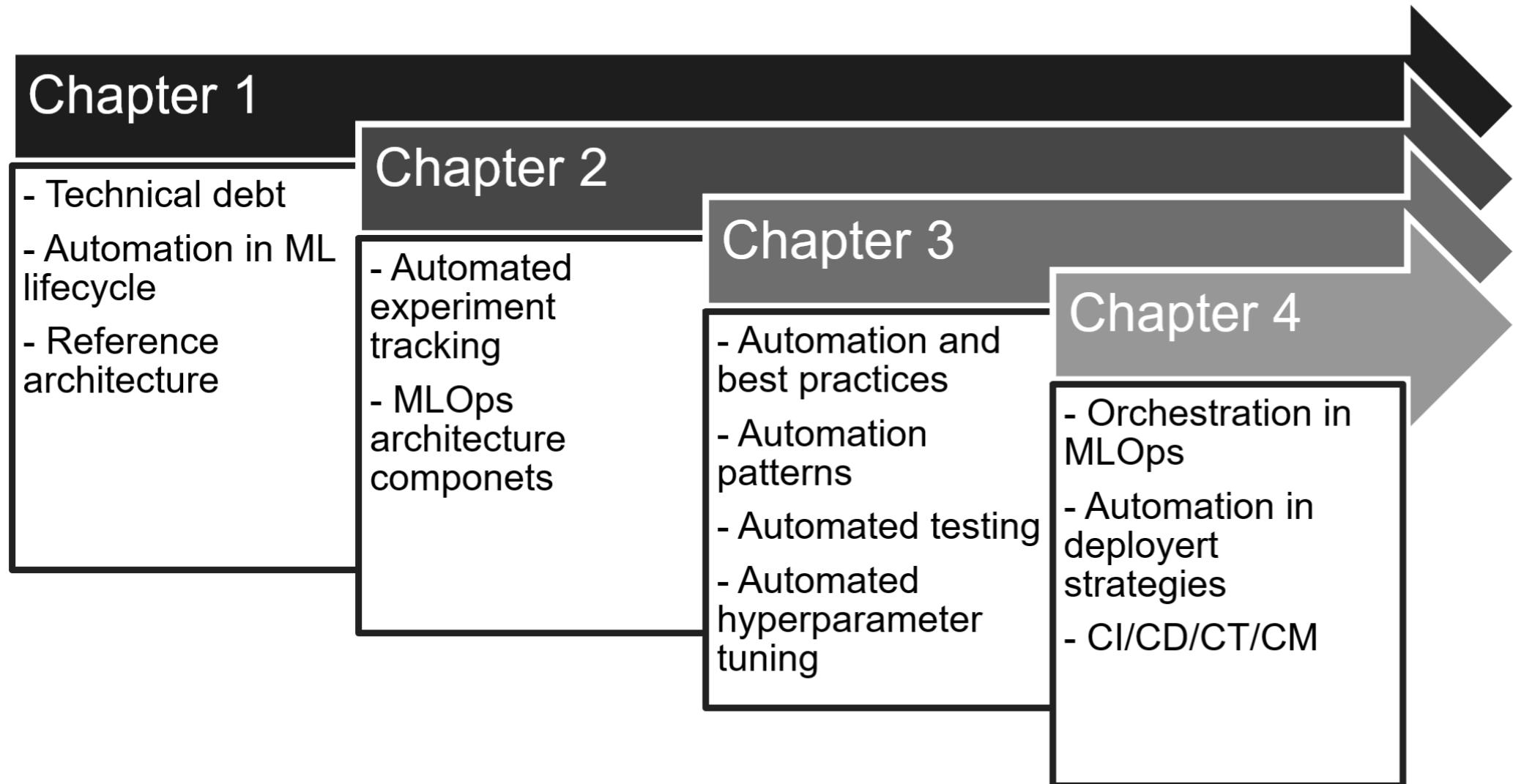
Chapter 2 - Fully automated MLOps architecture



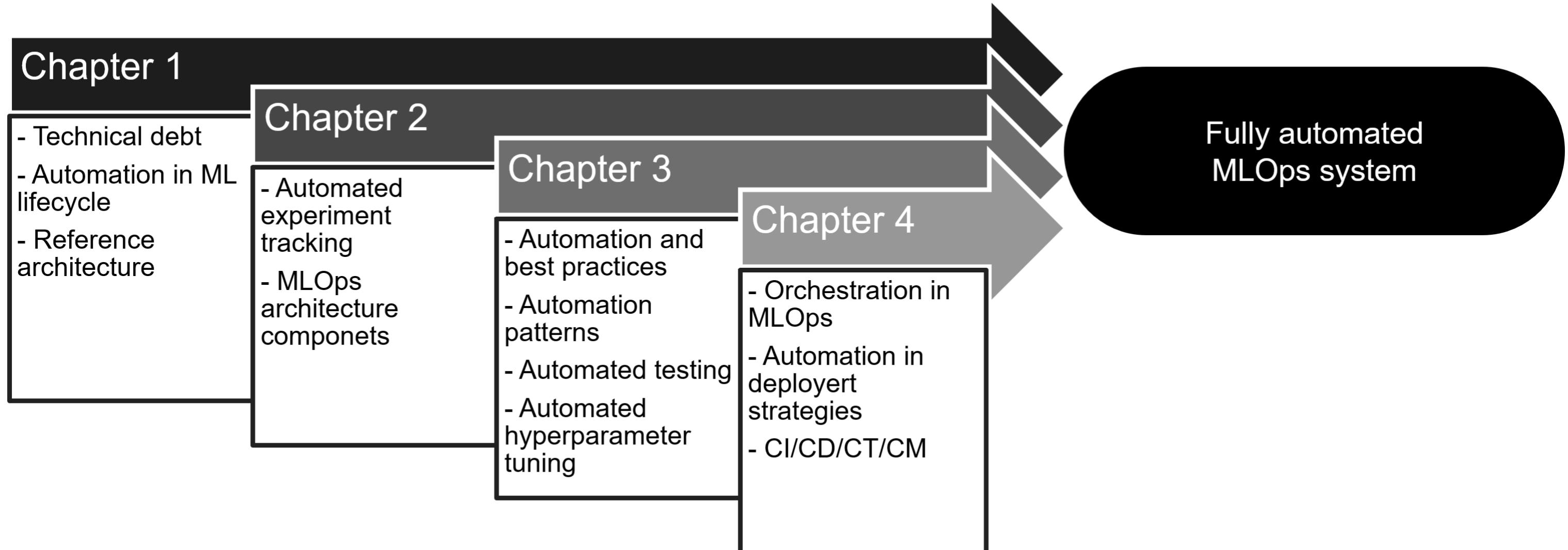
Chapter 3 - Automation patterns



Chapter 4 - Automation in MLOps deployments



Congratulations!



Let's practice!

FULLY AUTOMATED MLOPS