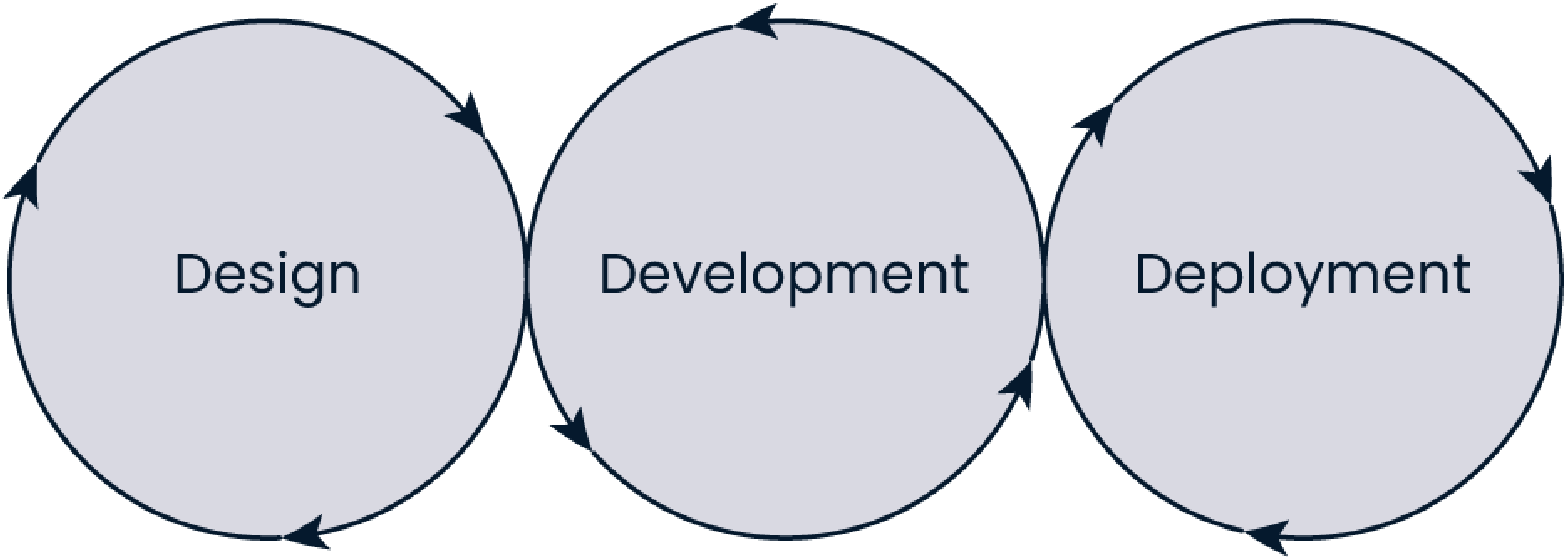
Preparing model for deployment

MLOPS CONCEPTS

Folkert Stijnman
ML Engineer

Runtime environment

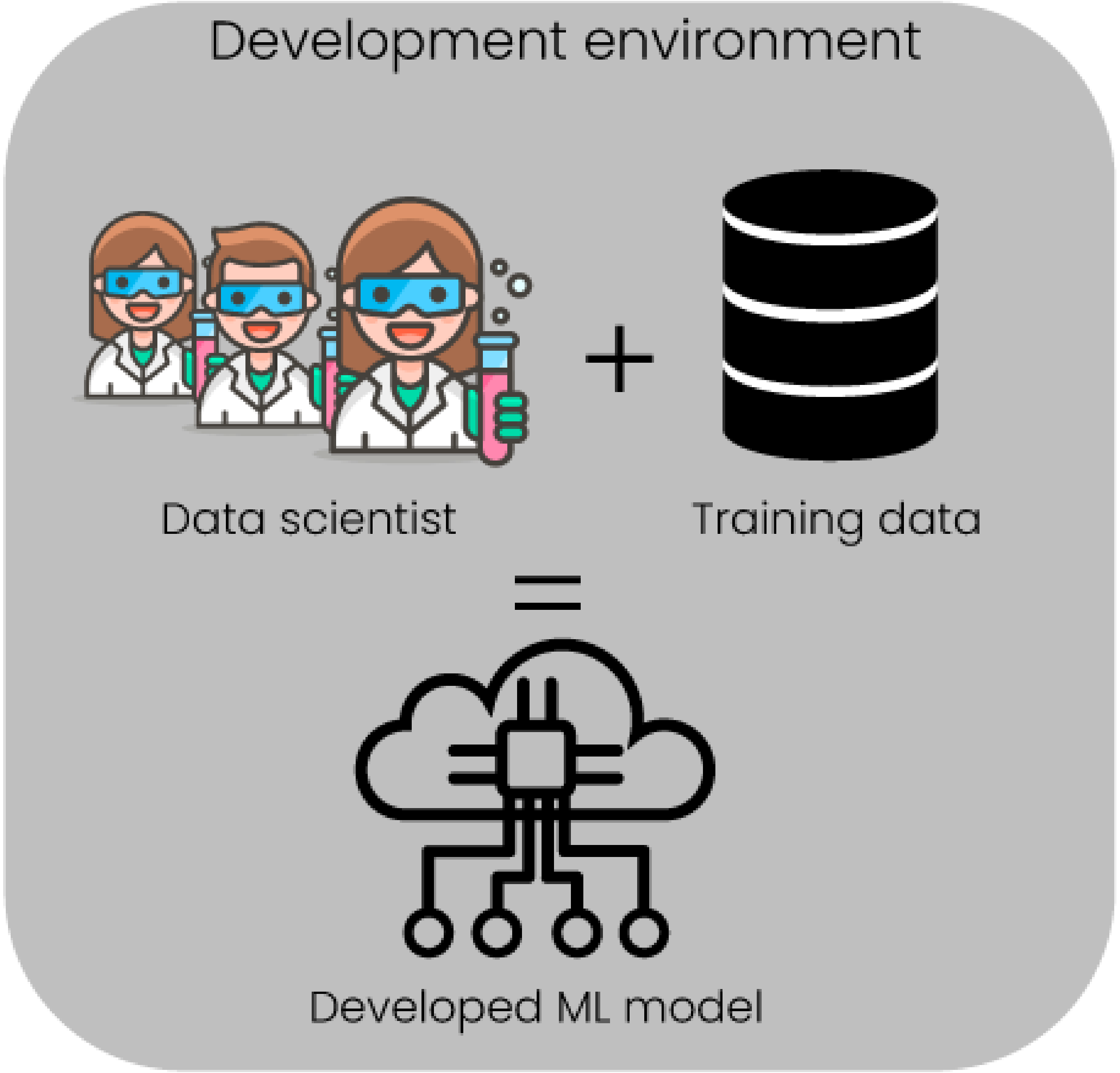


- Added value
- Business requirements
- Key metrics
- Data processing

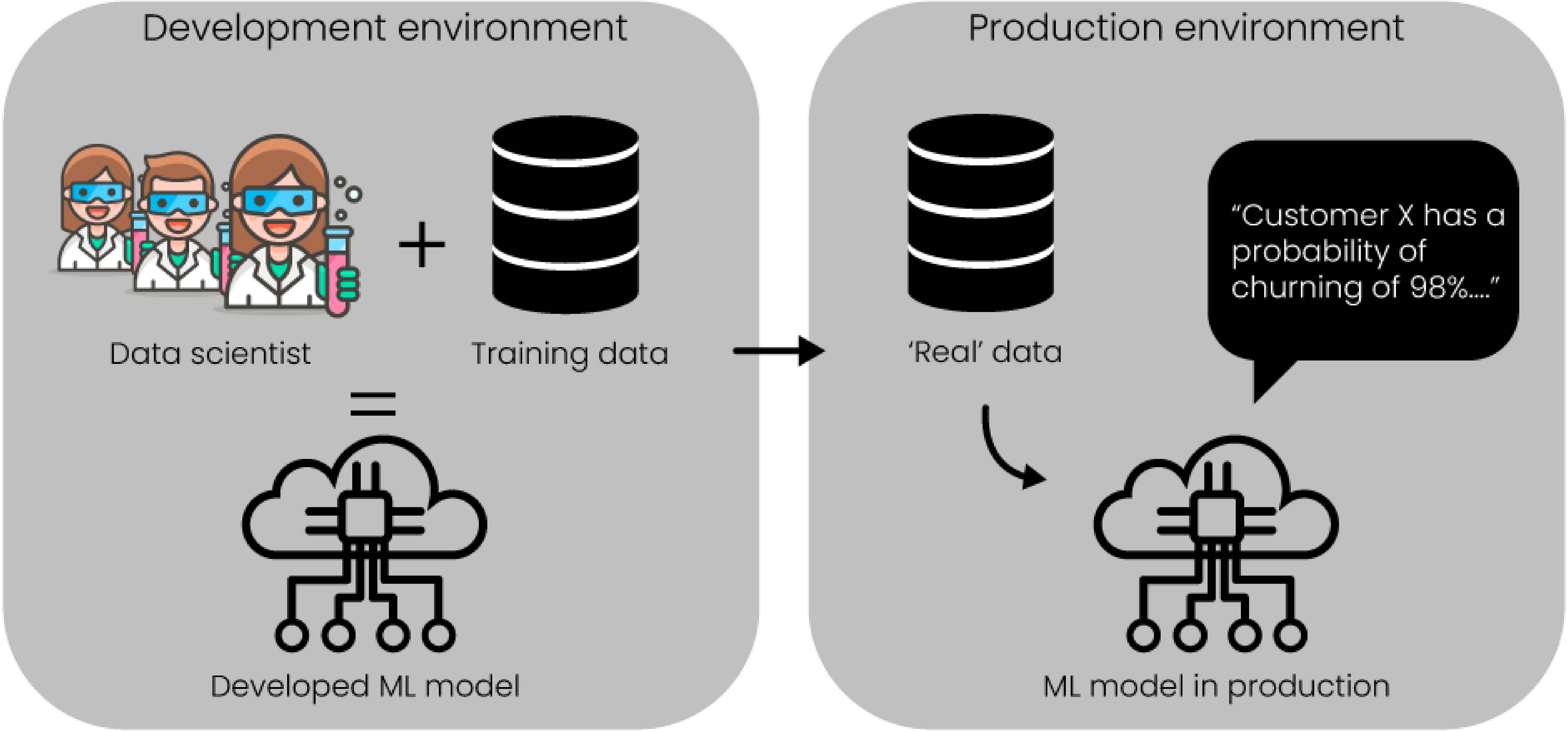
- Feature engineering
- Experiment tracking
- Model training & evaluation

- Runtime environments
- Microservices architecture
- CI/CD pipeline
- Monitoring & retraining

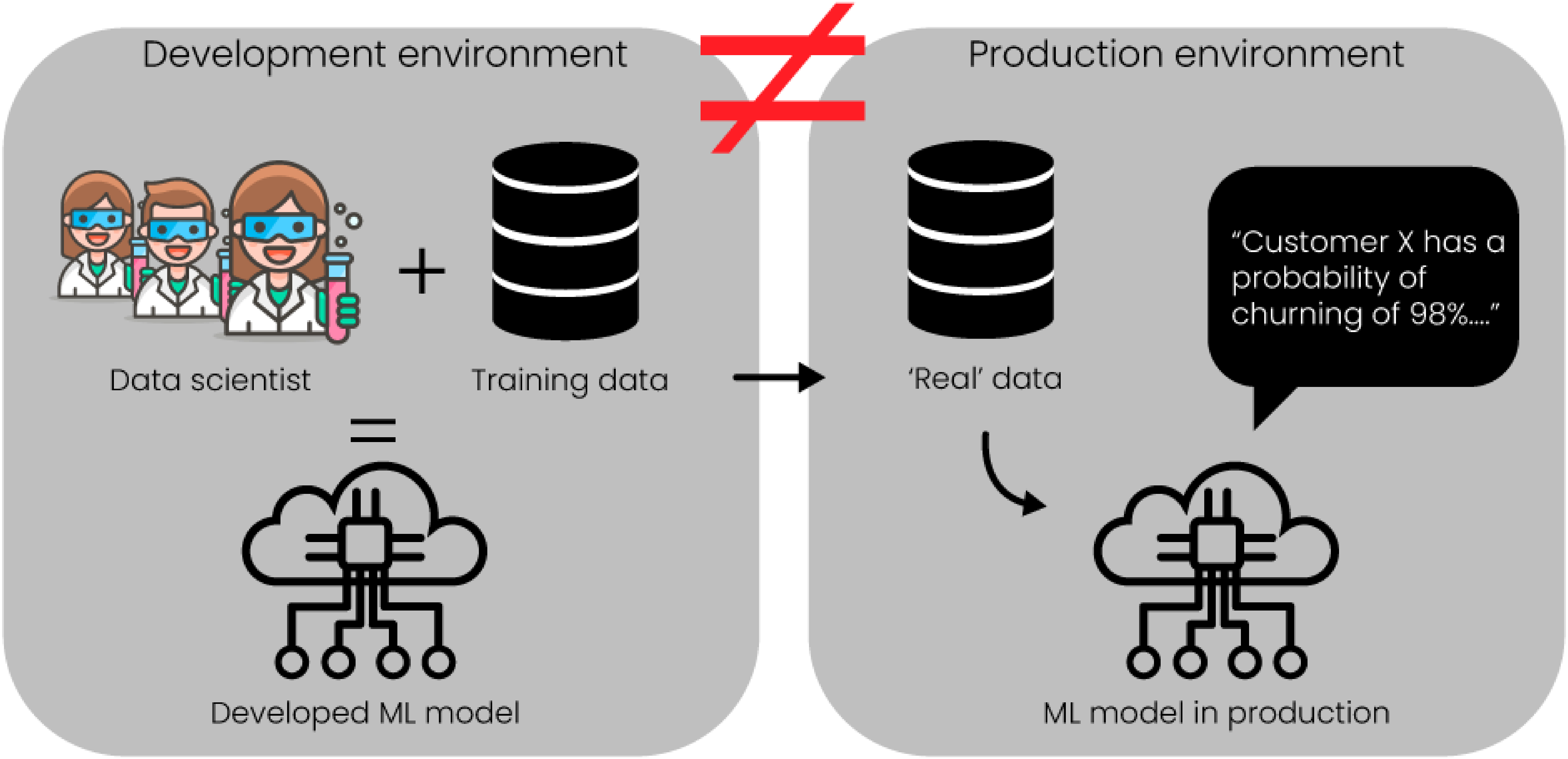
Development to deployment



Development to deployment

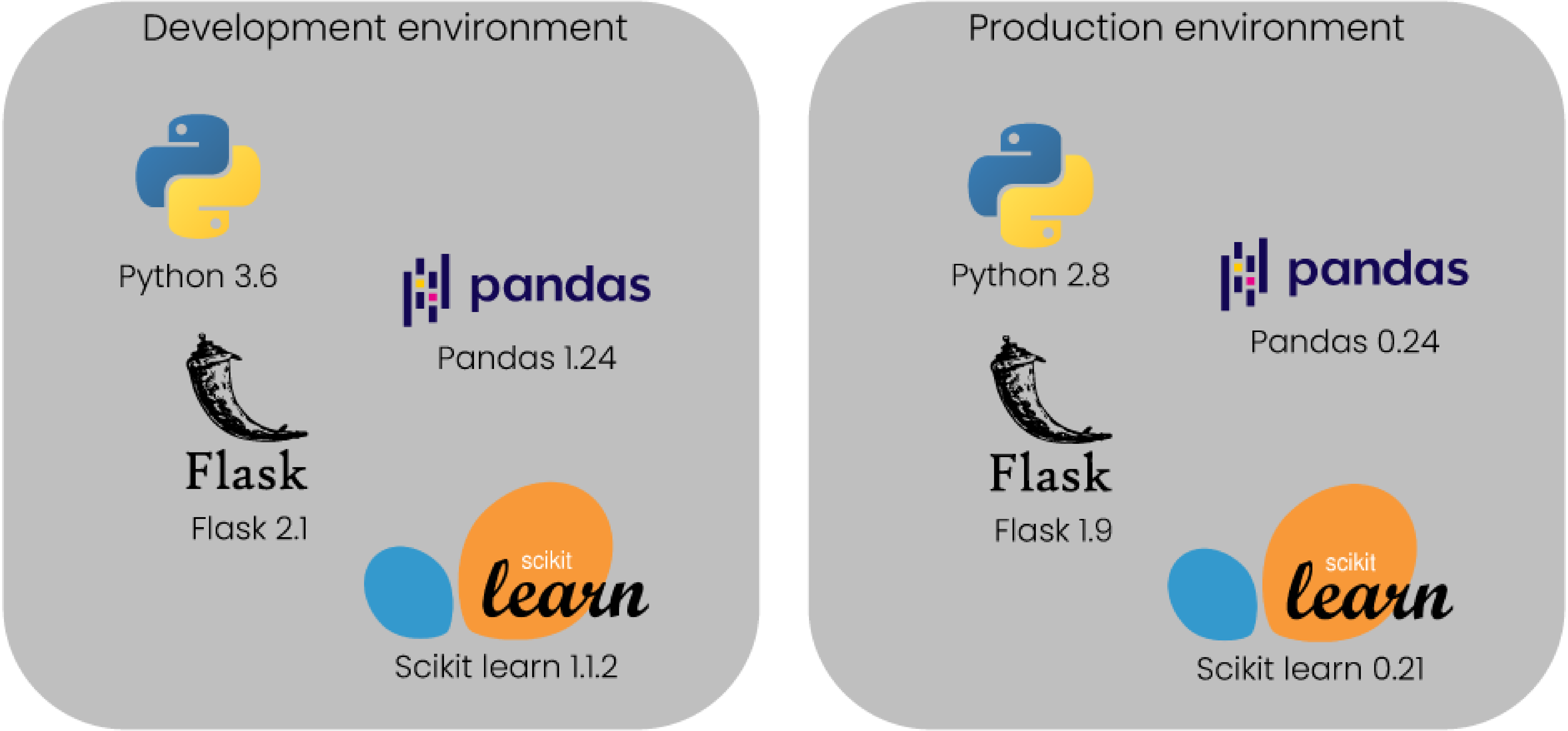


Development to deployment

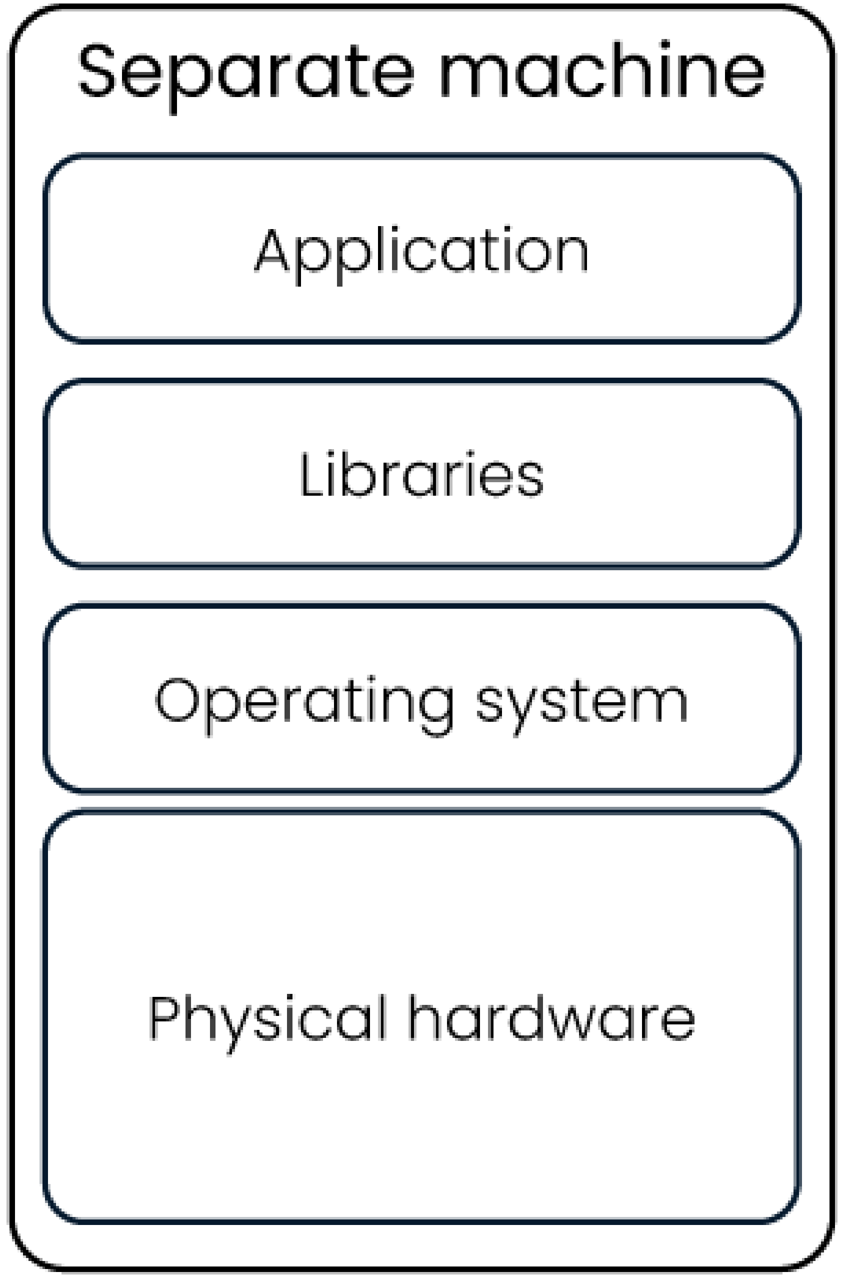


Runtime environments

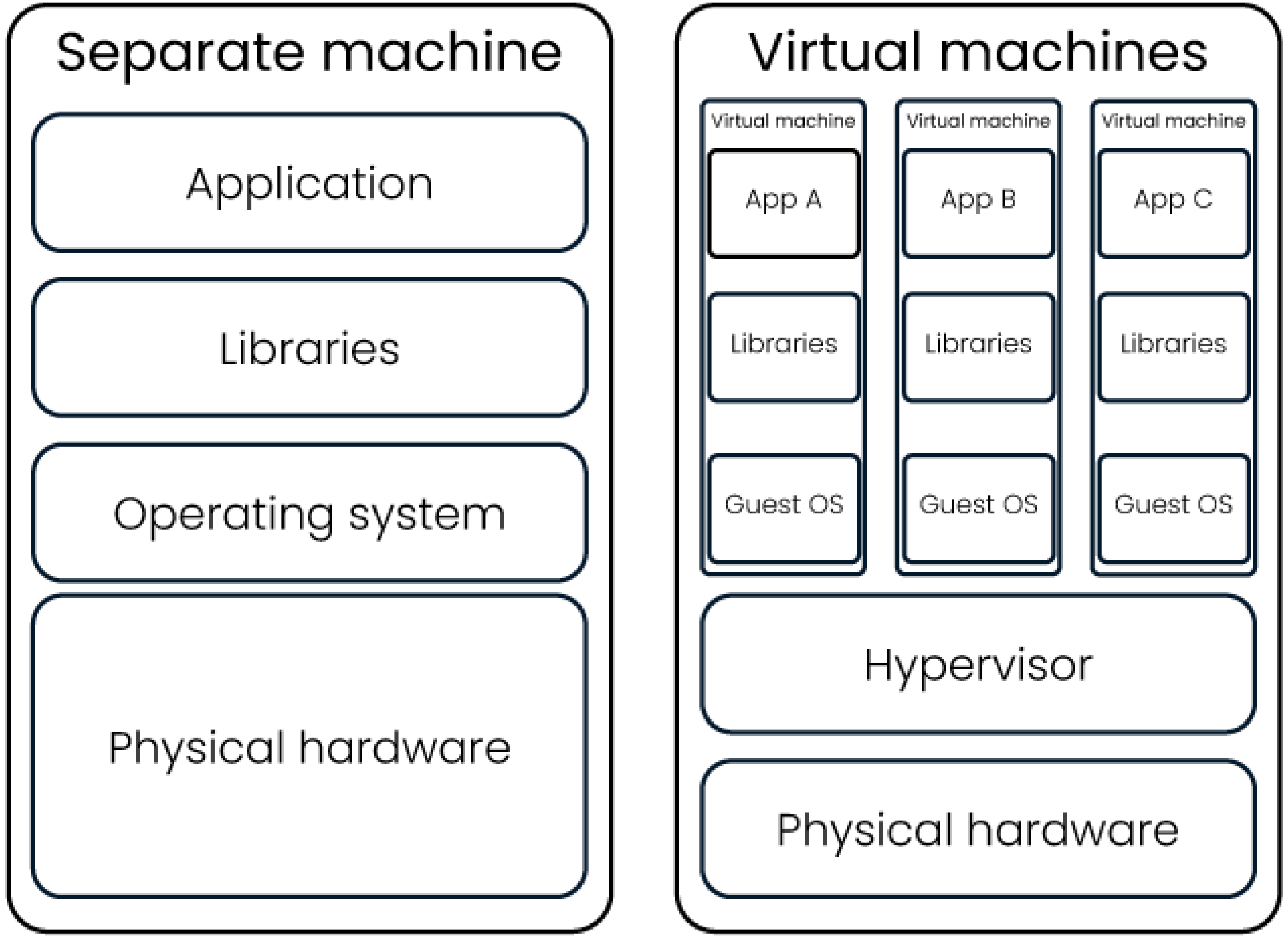
Runtime environments



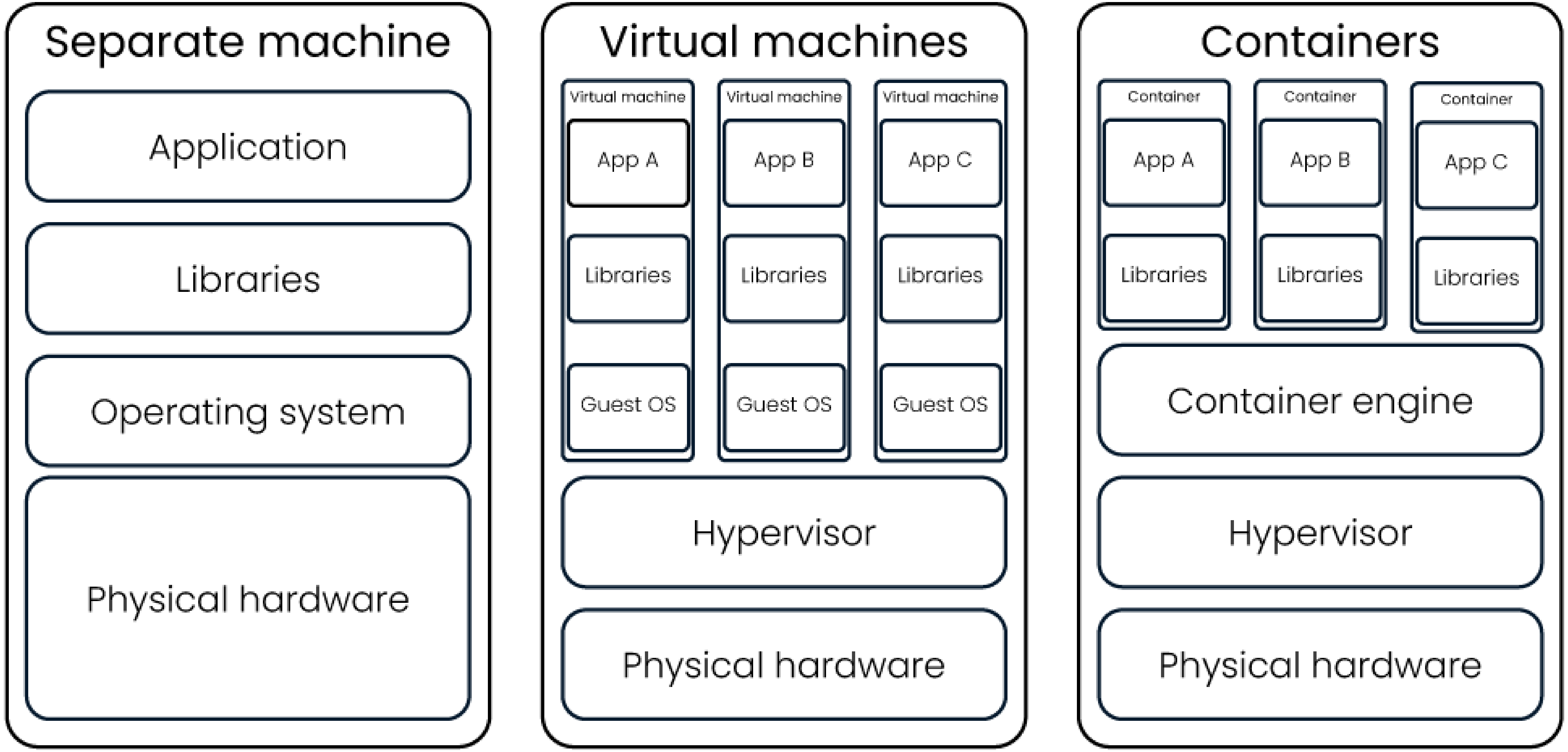
Mitigate different environments



Mitigate different environments



Mitigate different environments



Benefits containers

- Easier to maintain
- Portable
- Fast to start up

Let's practice!

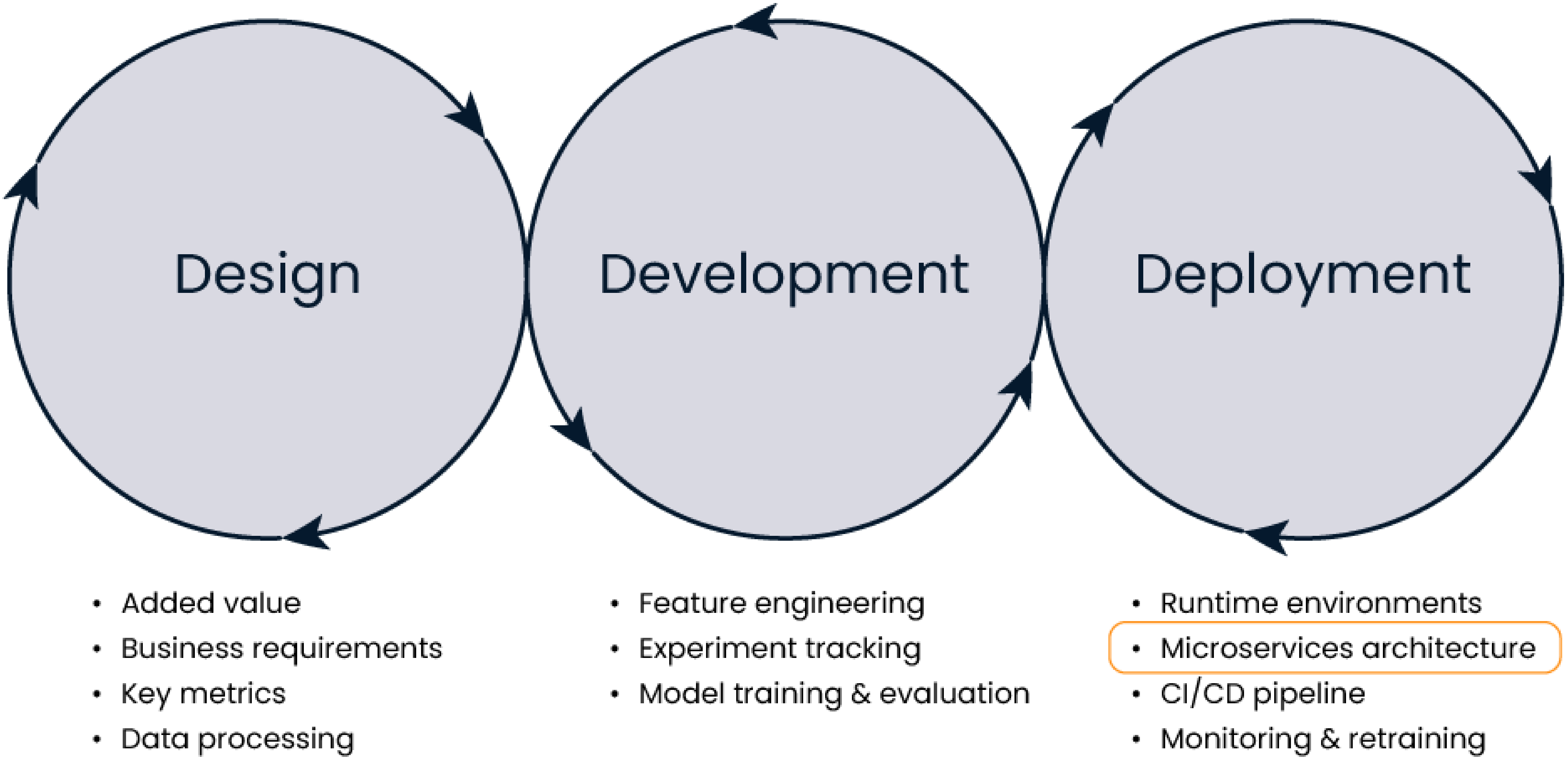
MLOPS CONCEPTS

Machine learning deployment architecture

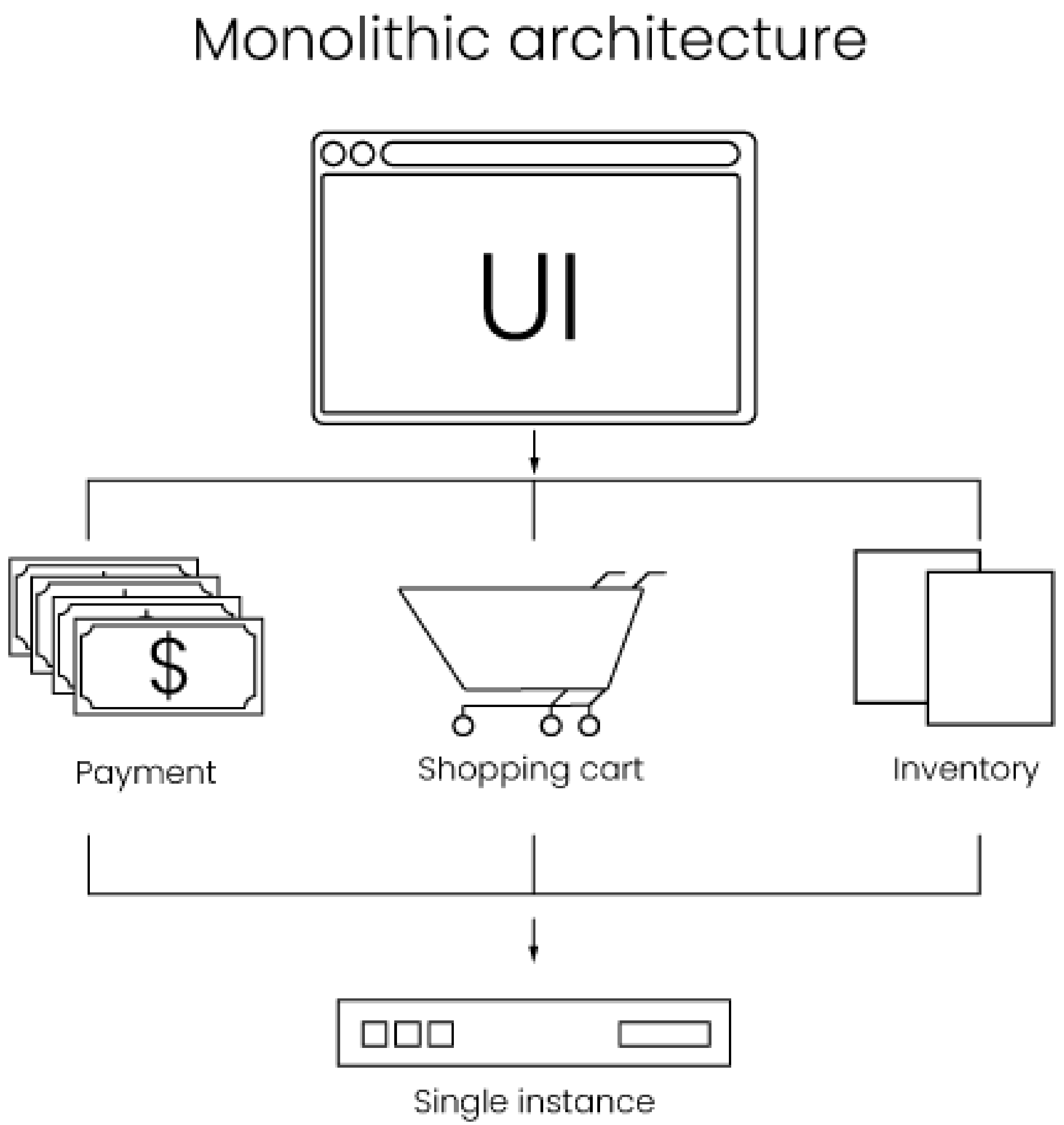
MLOPS CONCEPTS

Folkert Stijnman
ML Engineer

Microservices architecture



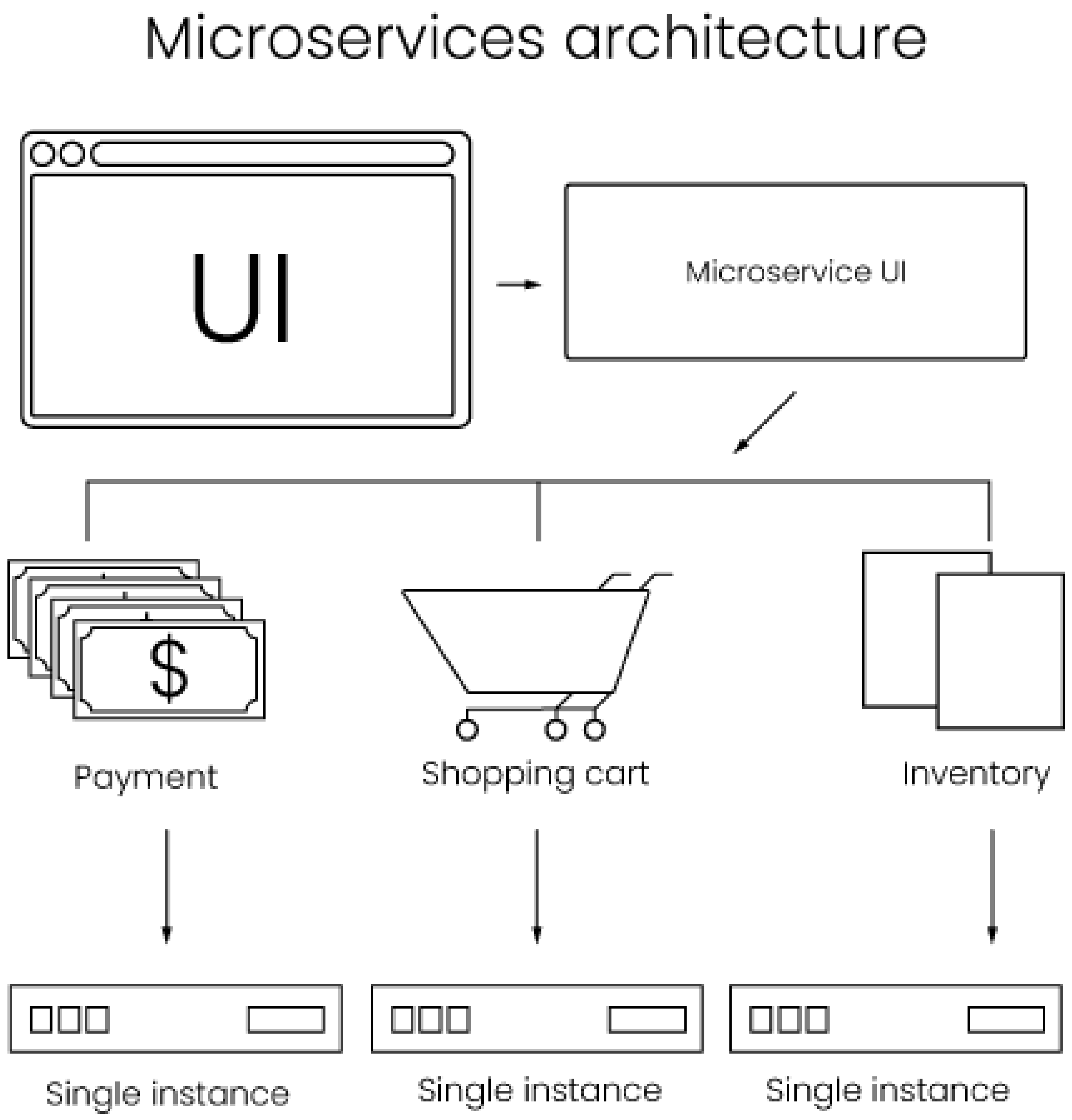
Monolith vs. microservice architecture



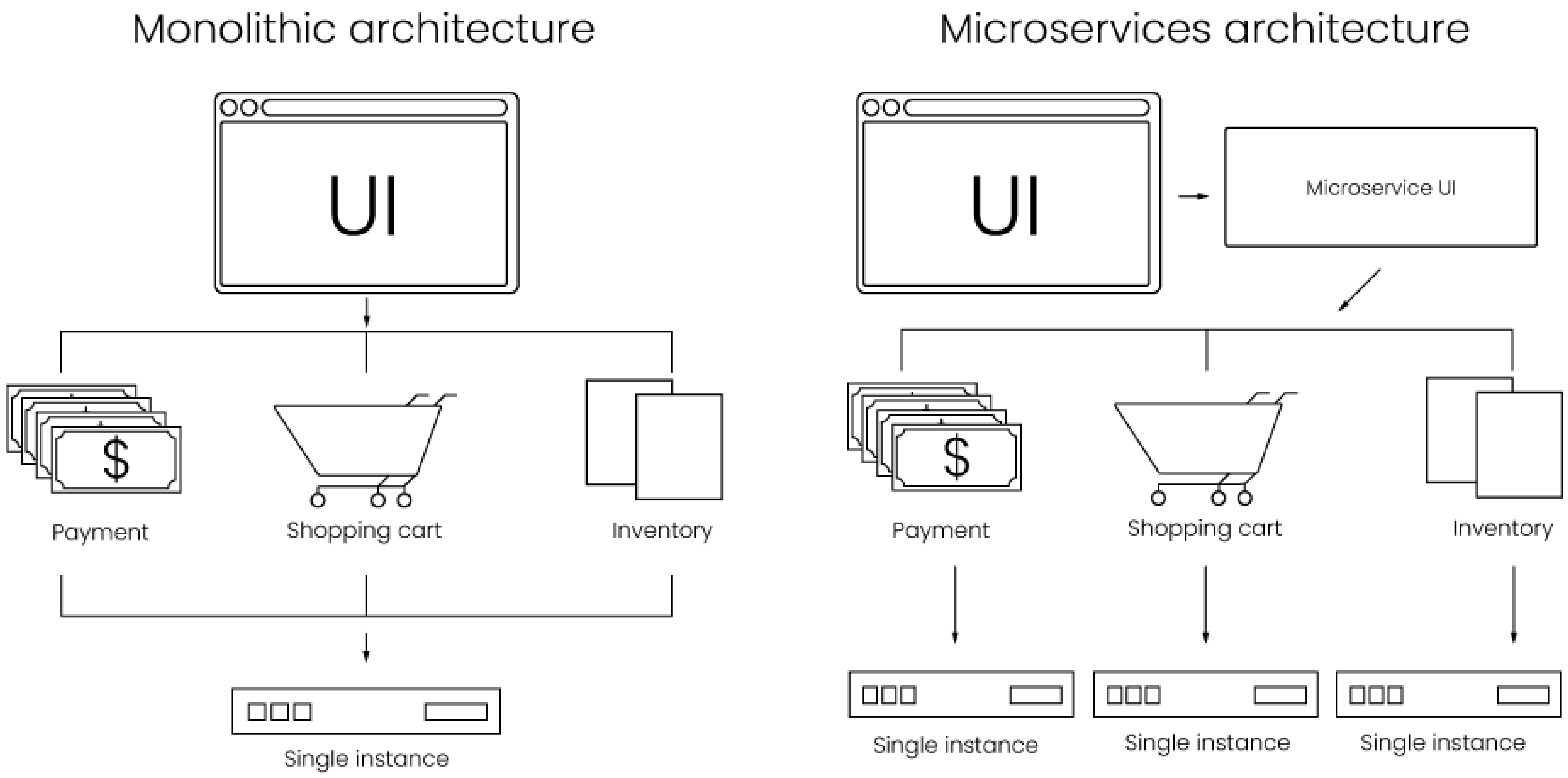
- One uniform application containing all services

Monolith vs. microservice architecture

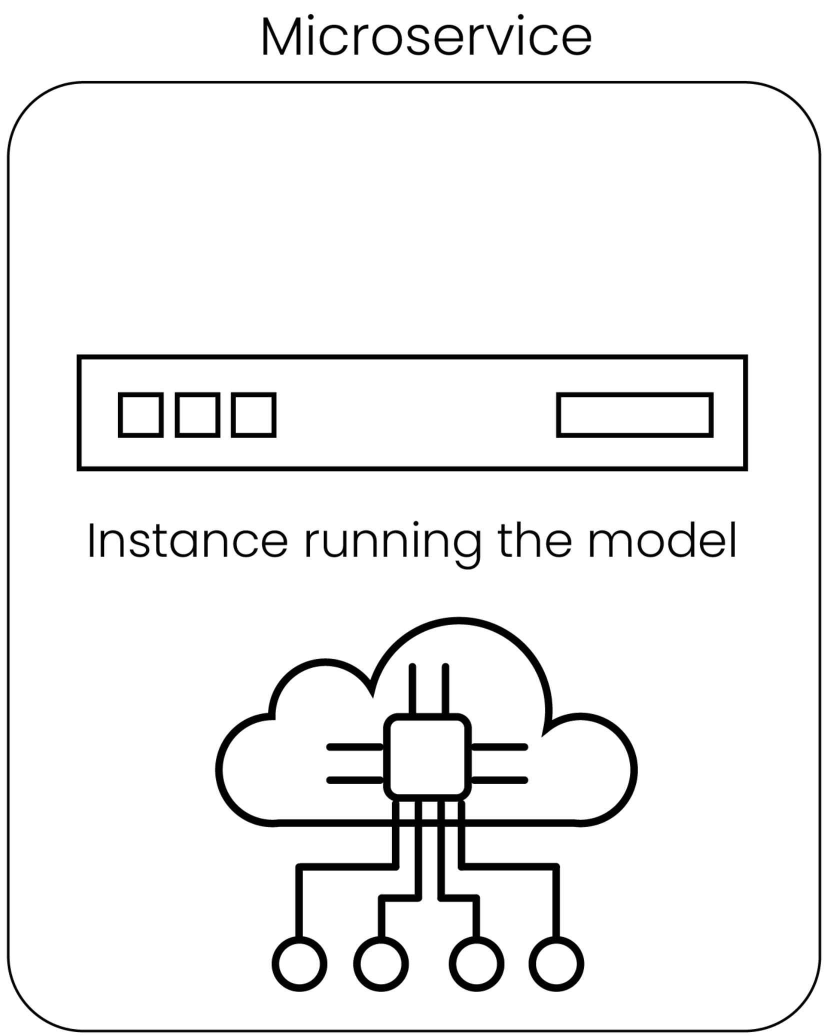
- Collection of smaller, independent services



Monolith vs. microservice architecture

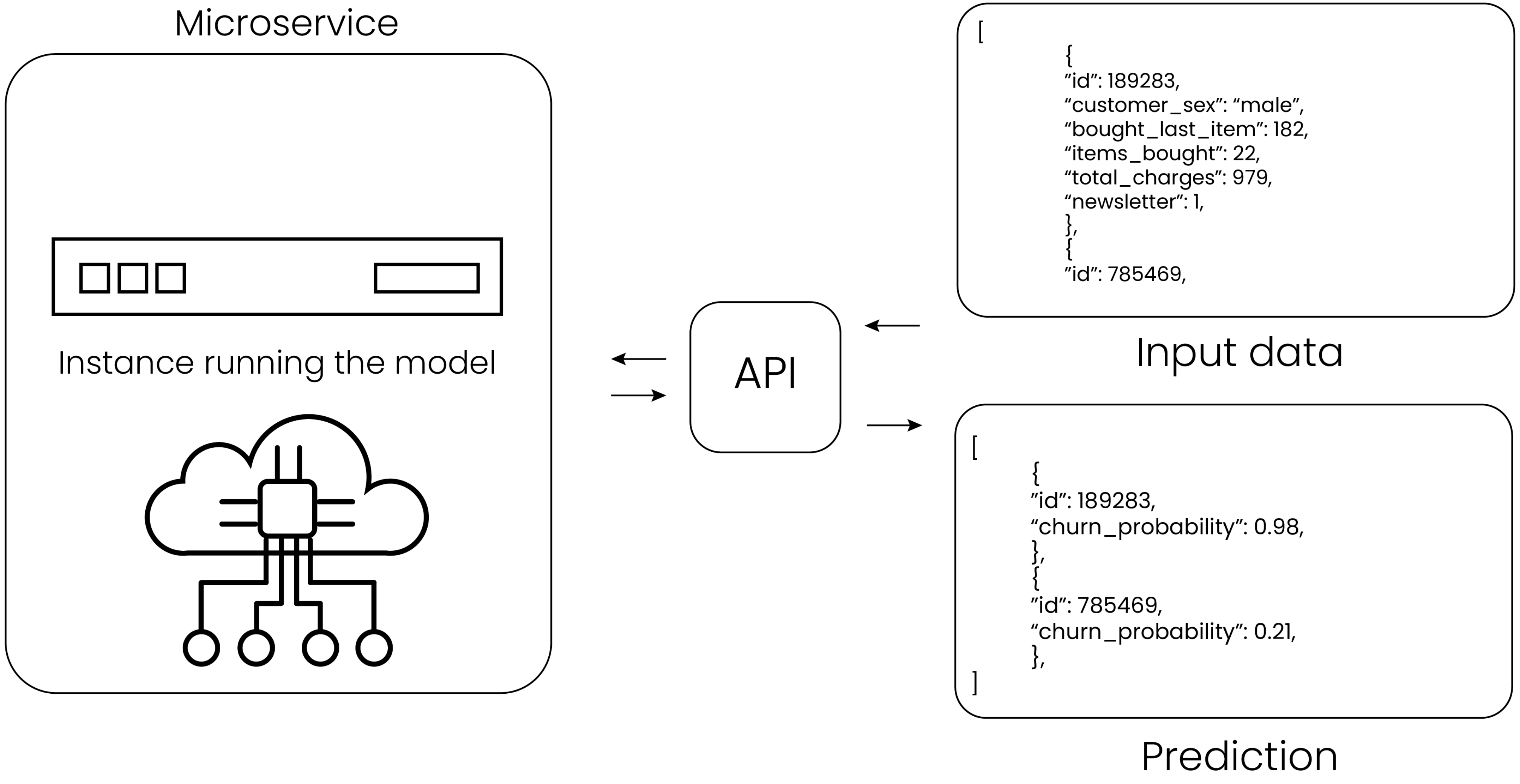


Inferencing

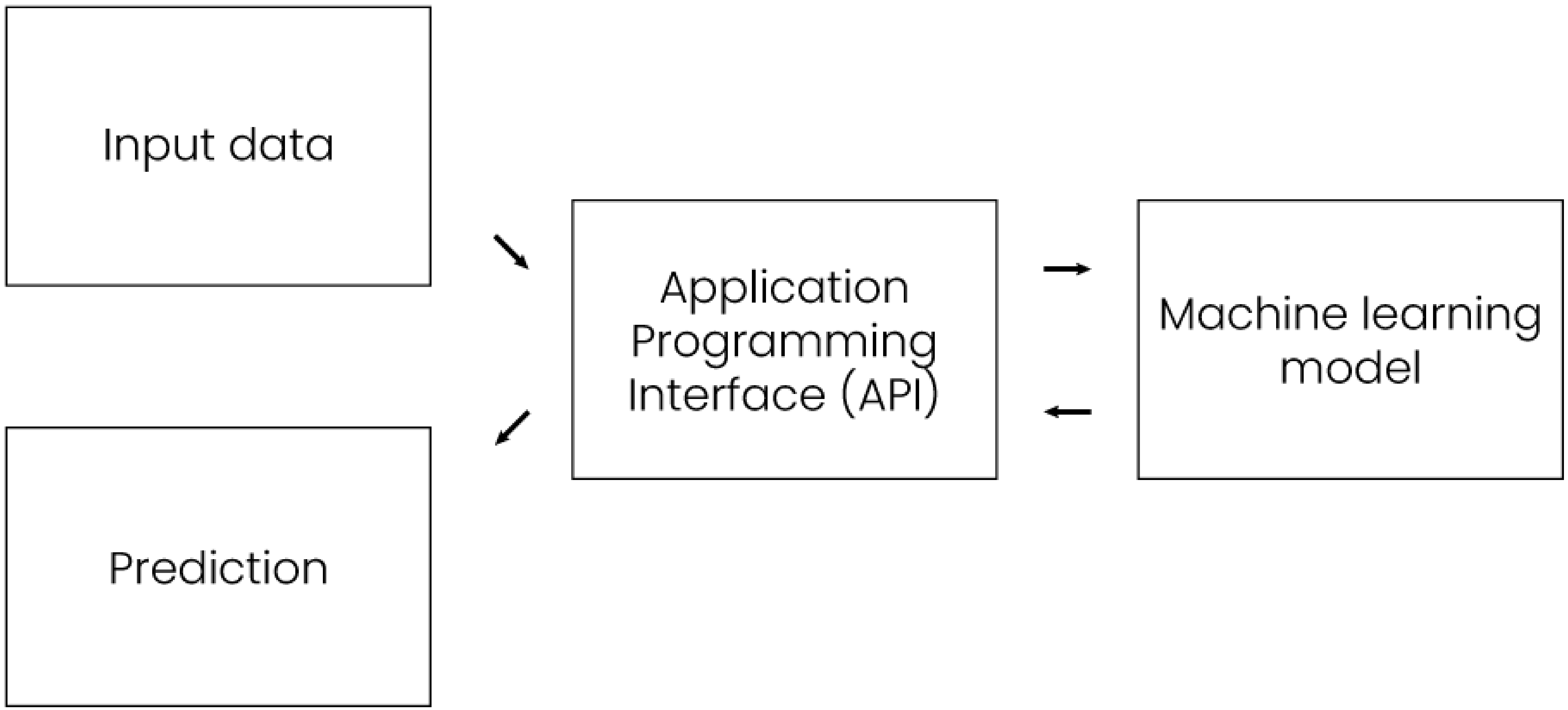


Inferencing

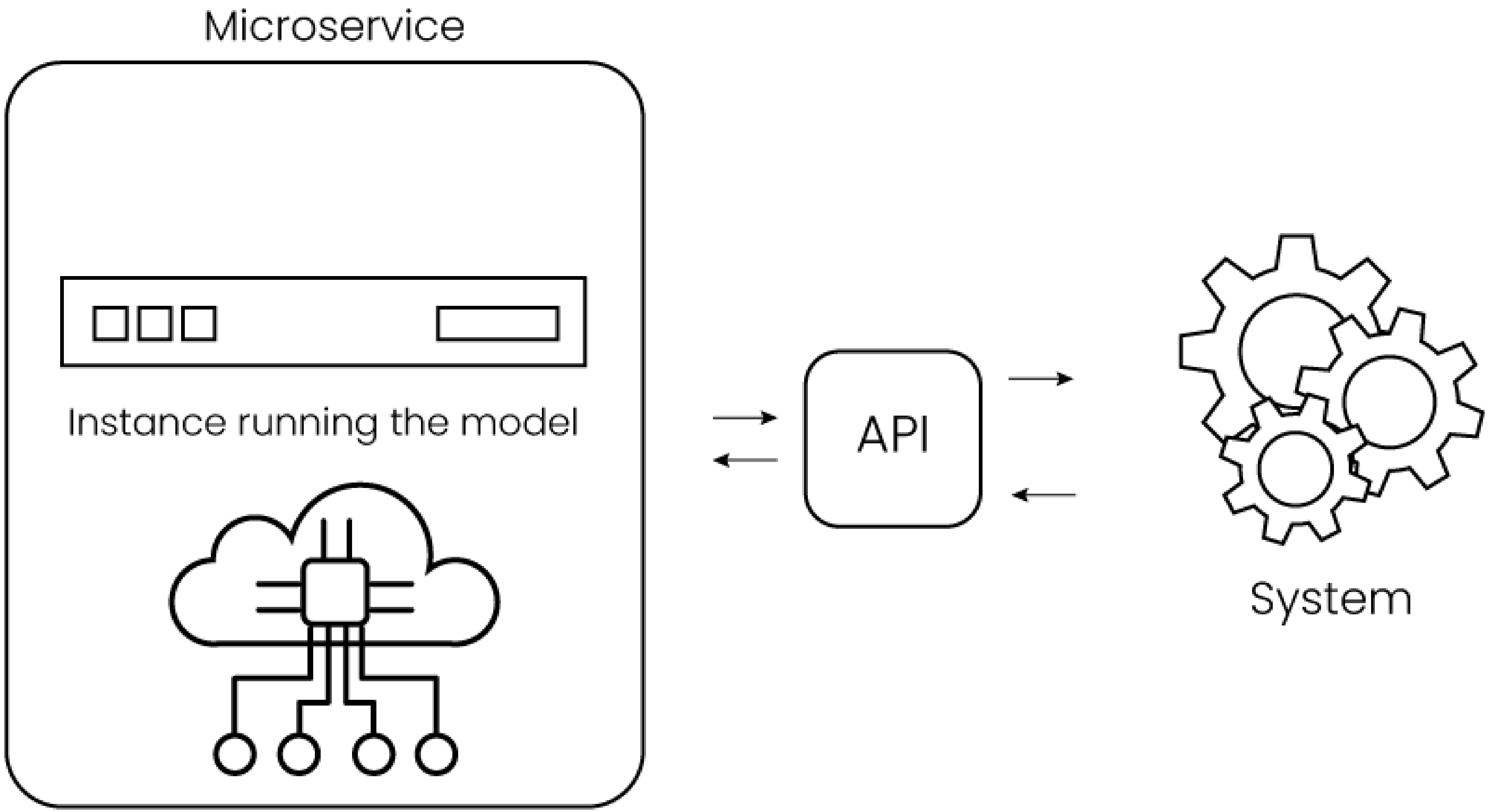
Inferencing is the process in which we send new input to the machine learning model and receive output from the model.



Application Programming Interface (API)



Integration



Let's practice!

MLOPS CONCEPTS

CI/CD and deployment strategy

MLOPS CONCEPTS

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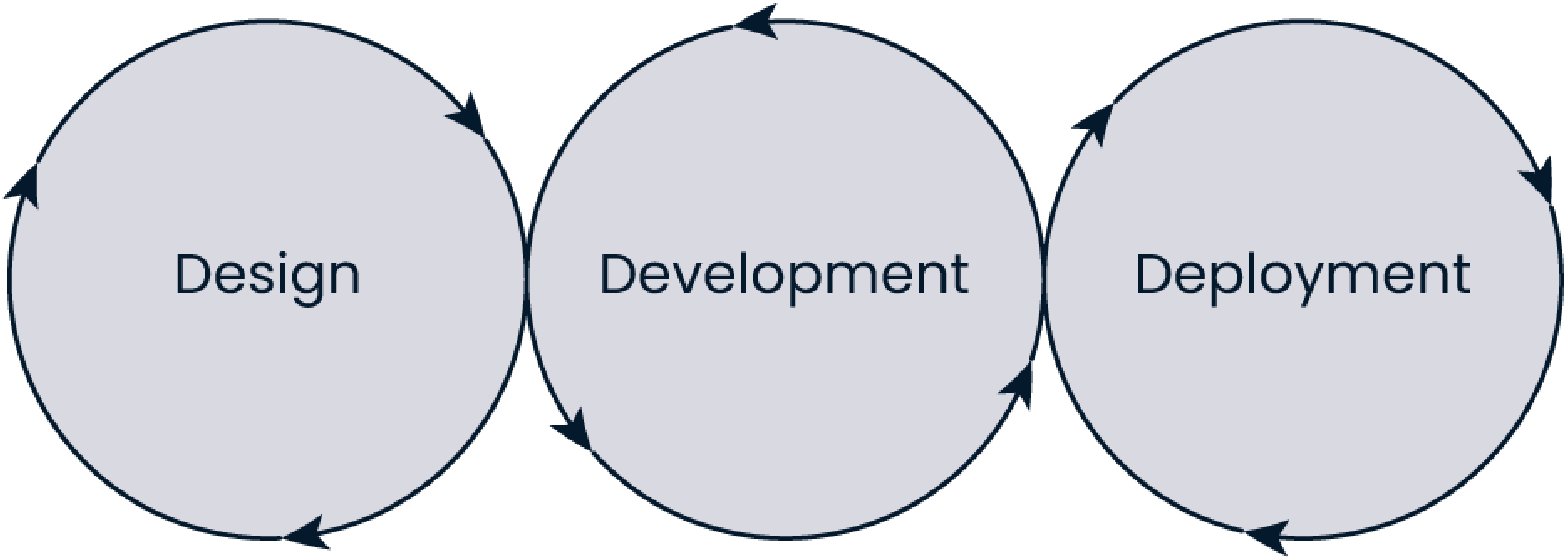
ML Engineer

CI/CD pipeline



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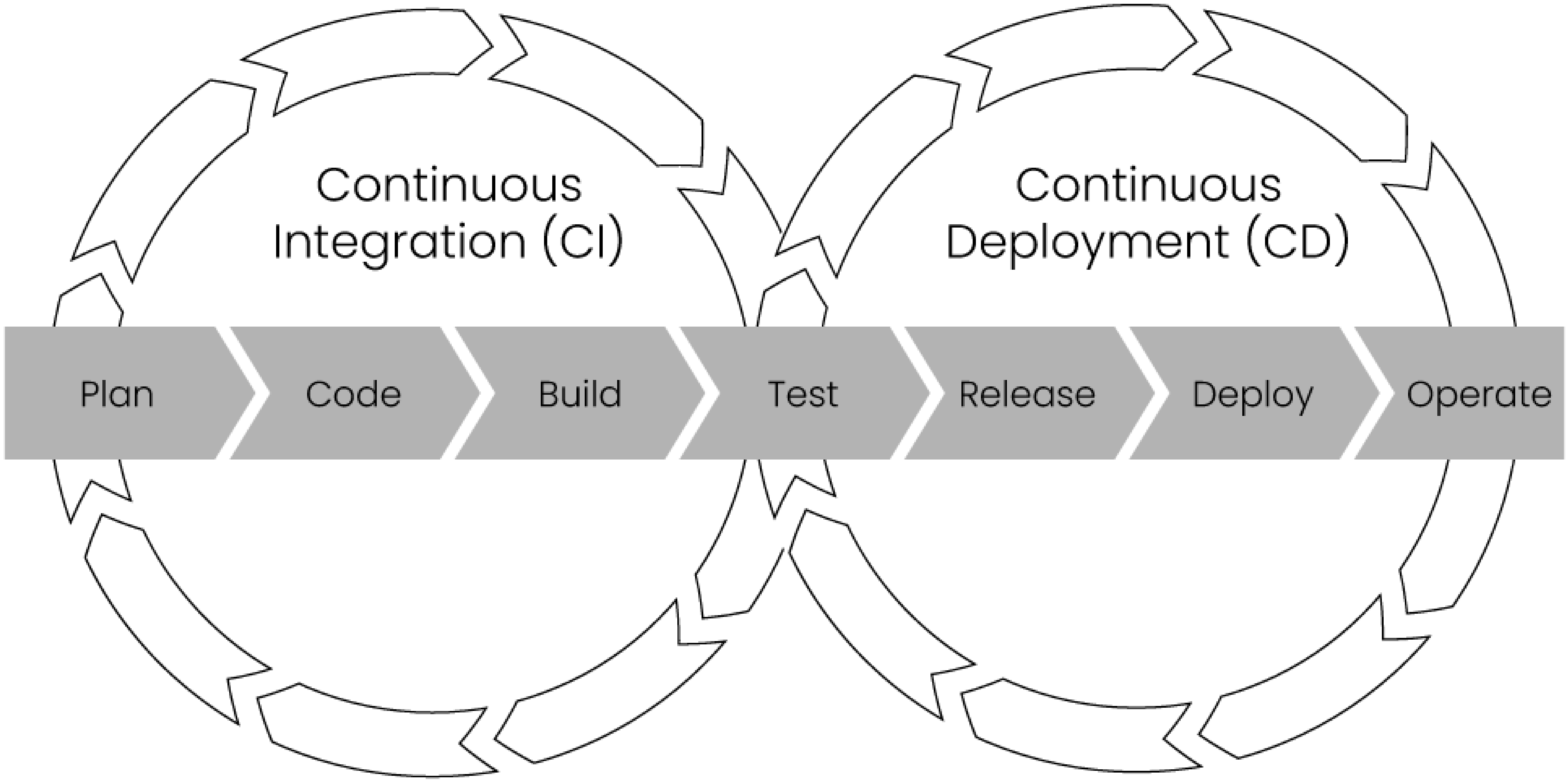
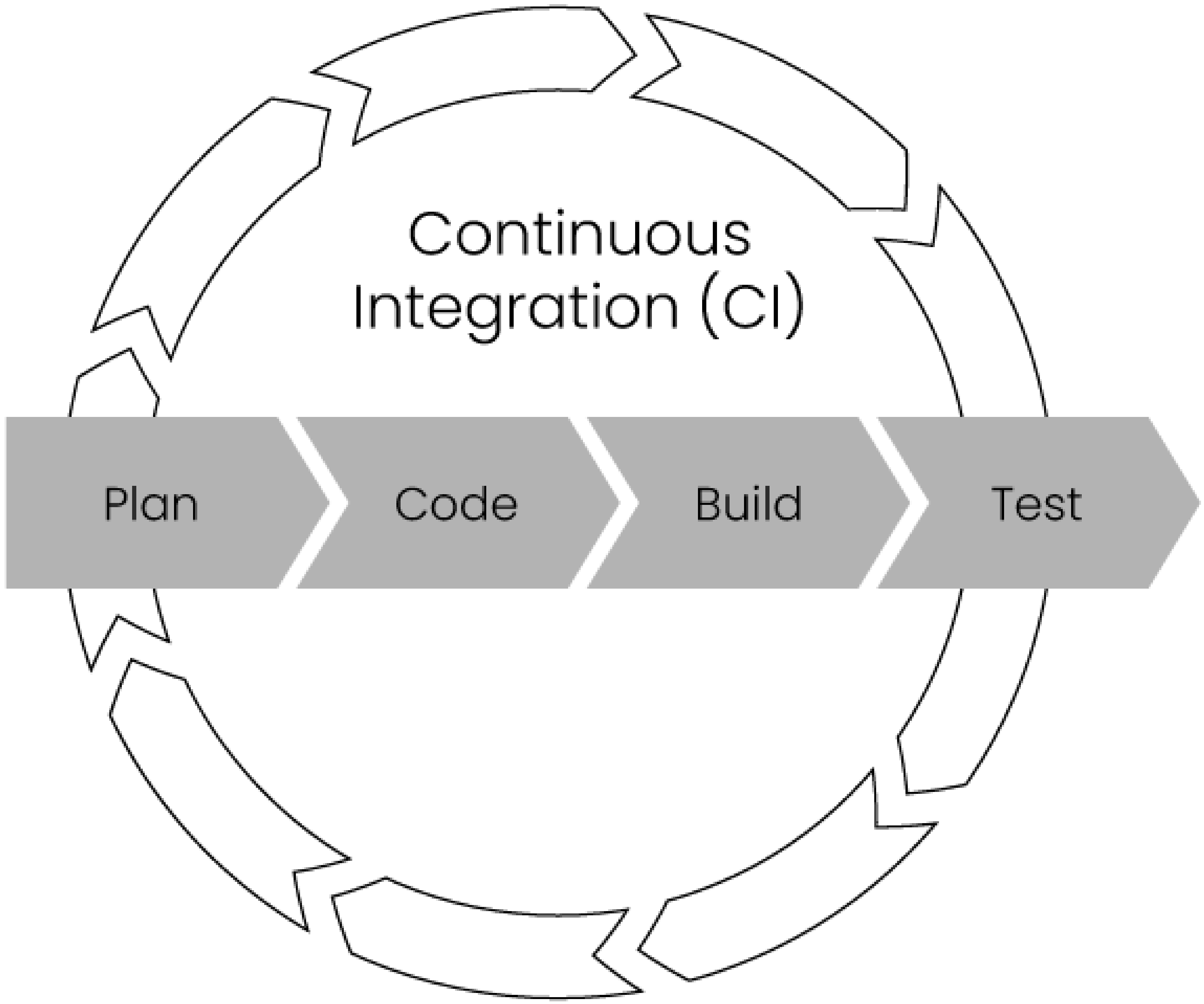
CI/CD

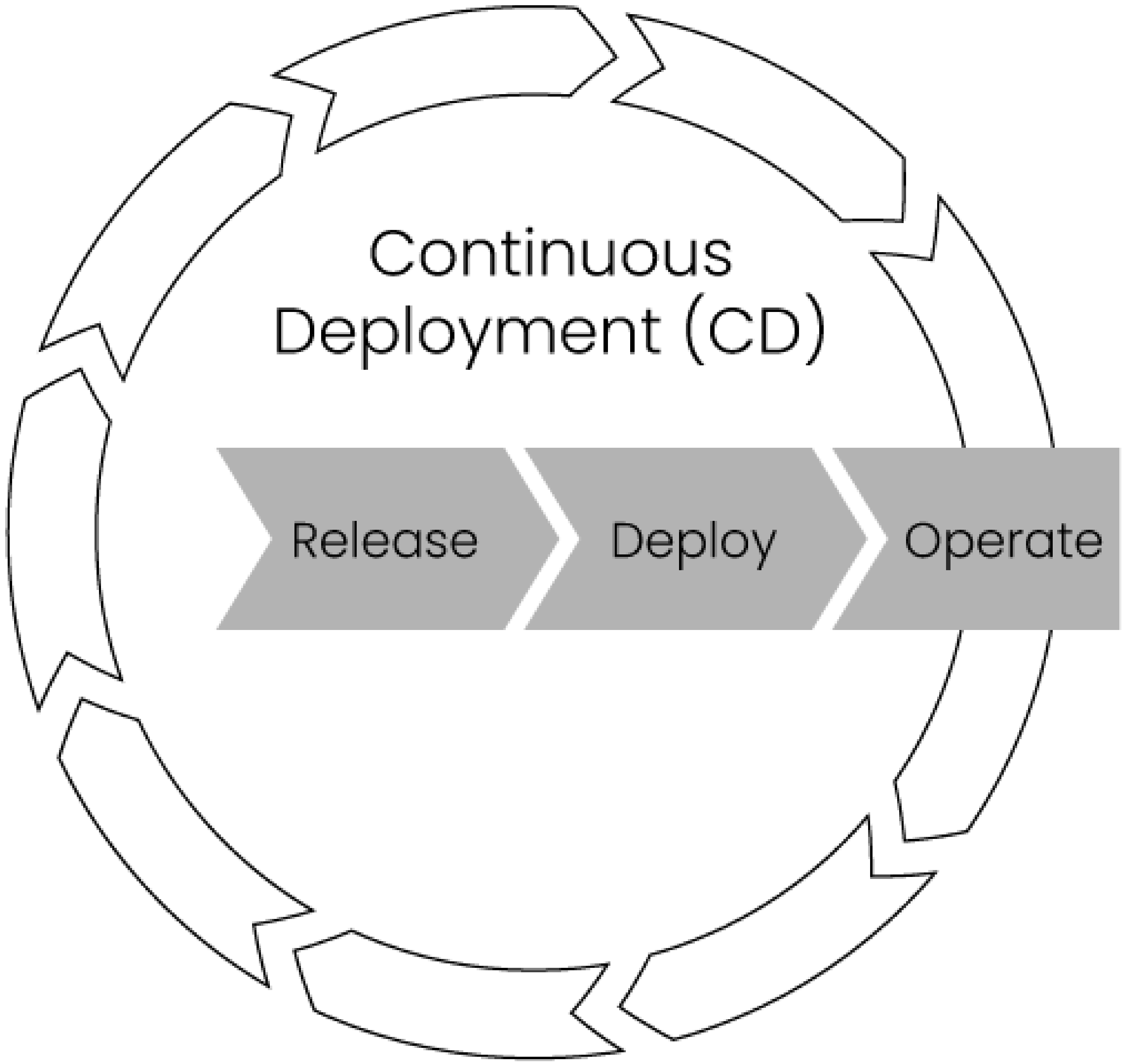


Continuous Integration (CI)
Continuous Deployment (CD)
Plan
Code
Build
Test
Release
Deploy
Operate

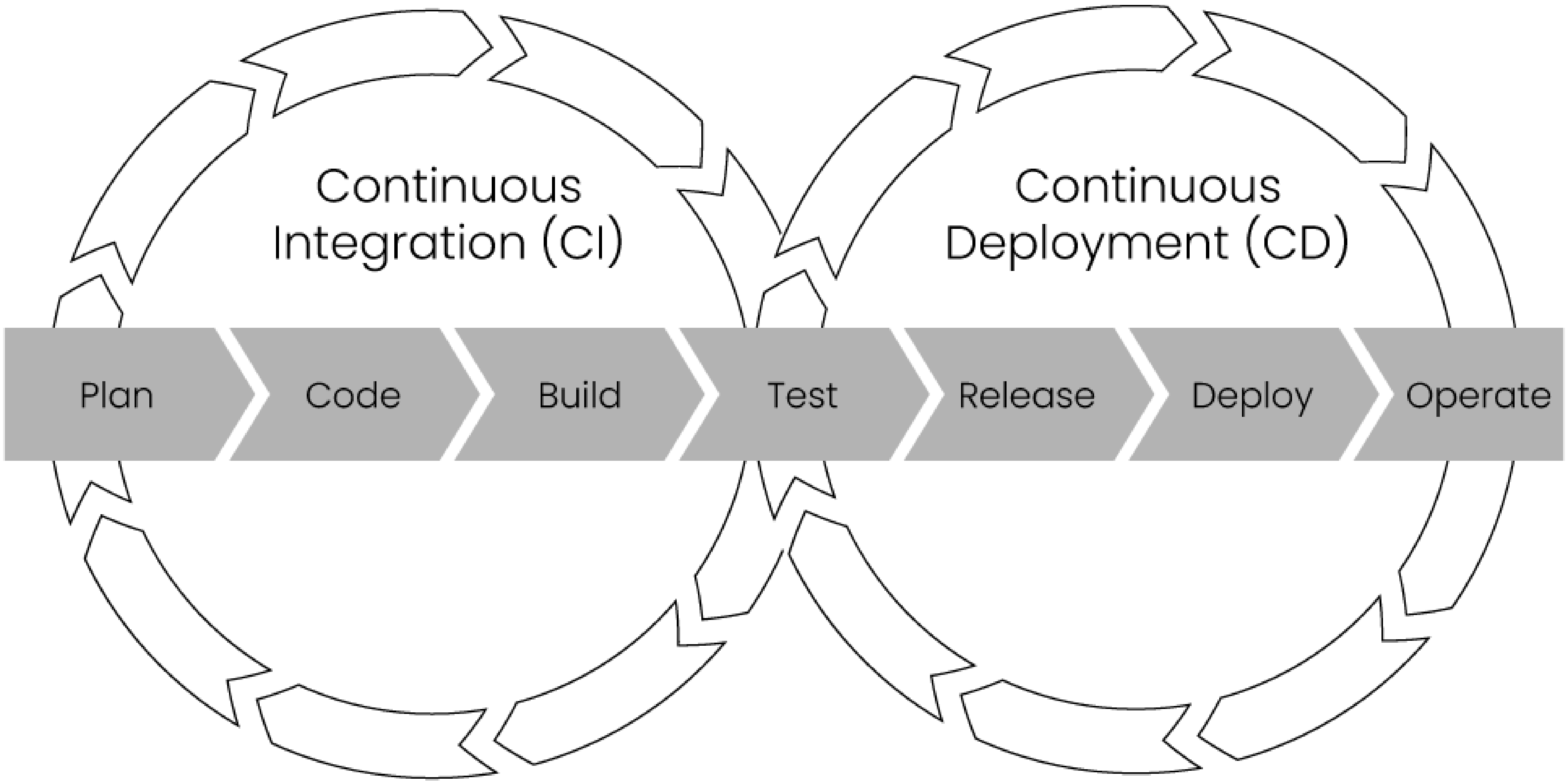
Continuous Integration



Continuous Deployment



CI/CD pipeline

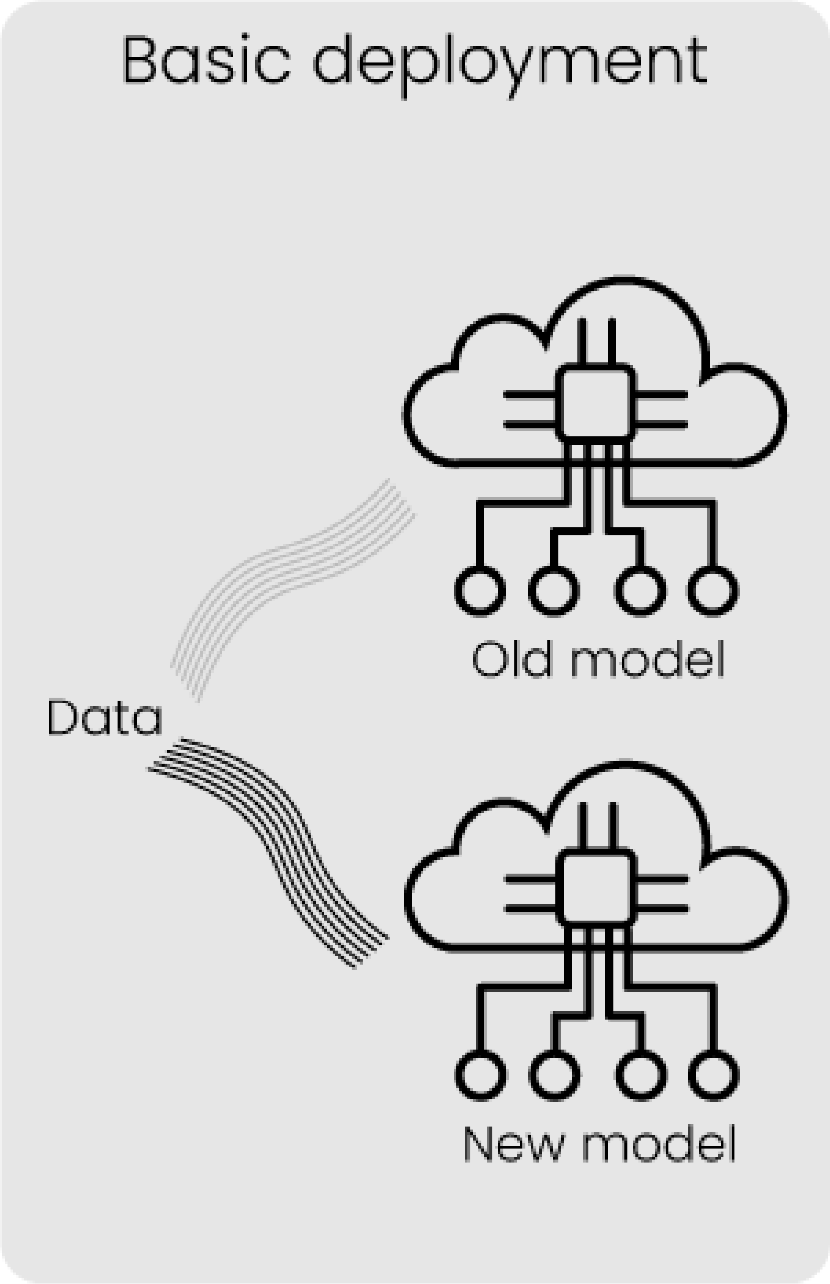


- Continuous integration: practices while code is being written
- Continuous deployment: practices after code is completed

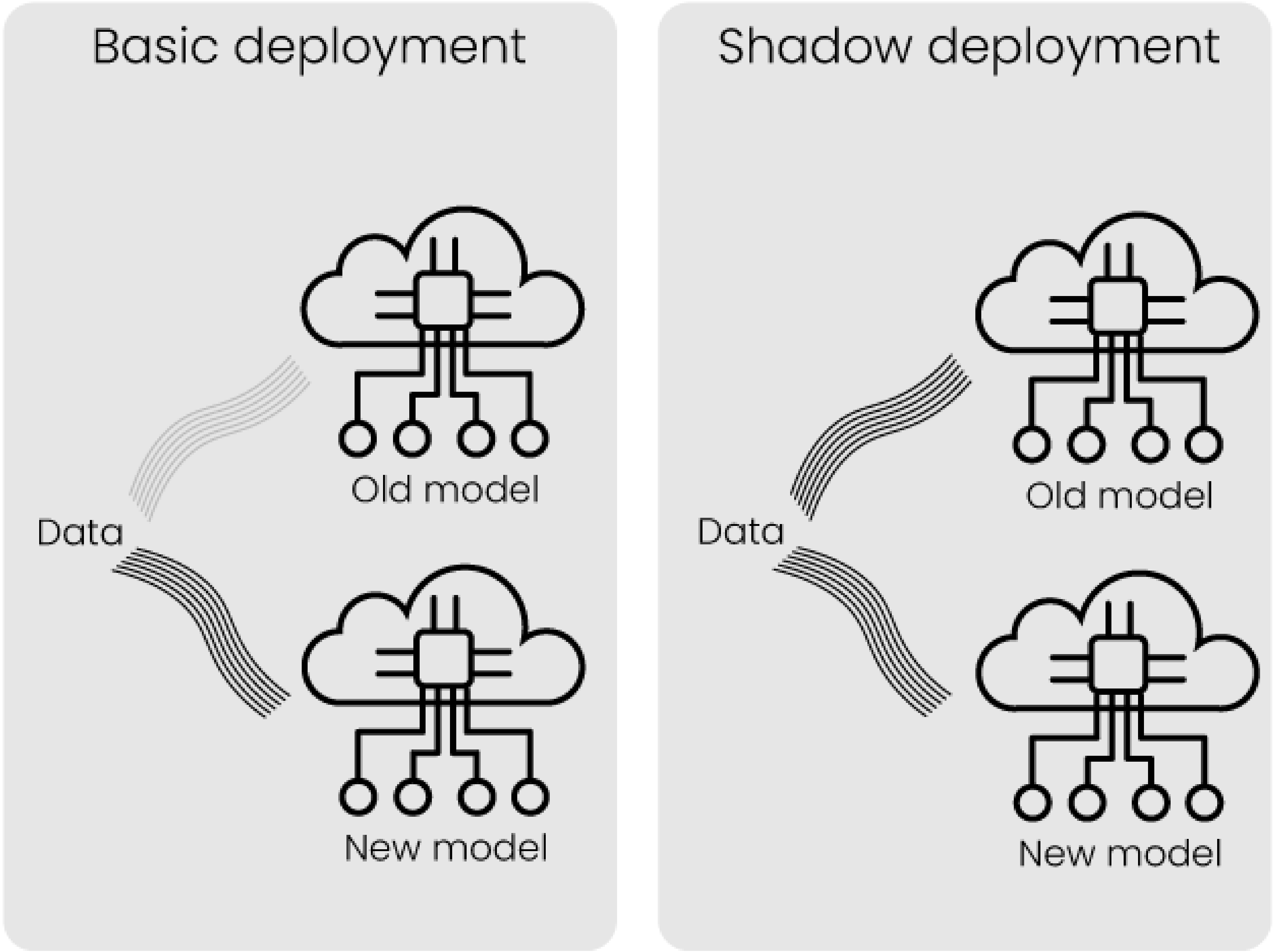
Deployment strategies

- Basic deployment
- Shadow deployment
- Canary deployment

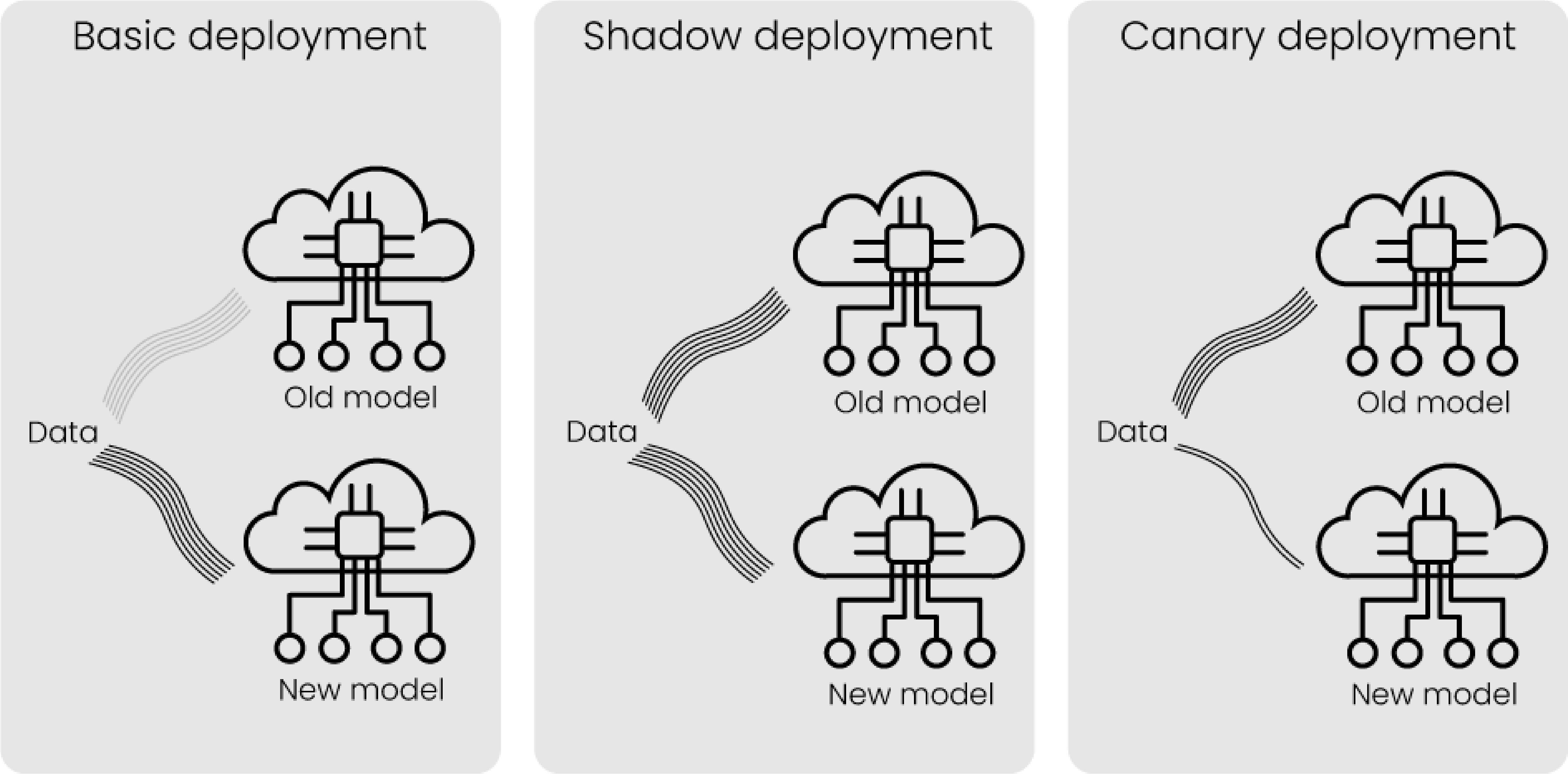
Deployment strategies



Deployment strategies



Deployment strategies



Deployment strategies

Strategy	Pros	Cons
Basic deployment	Straightforward, easy to implement, low resources	High risk if the model does not work as expected.
Shadow deployment	Easy to implement, no risk if model does not work as expected	Double resources.
Canary deployment	Slightly harder to implement, medium amount of resources	Small risk if model does not work as expected.

Let's practice!

MLOPS CONCEPTS

Automation and scaling

MLOPS CONCEPTS

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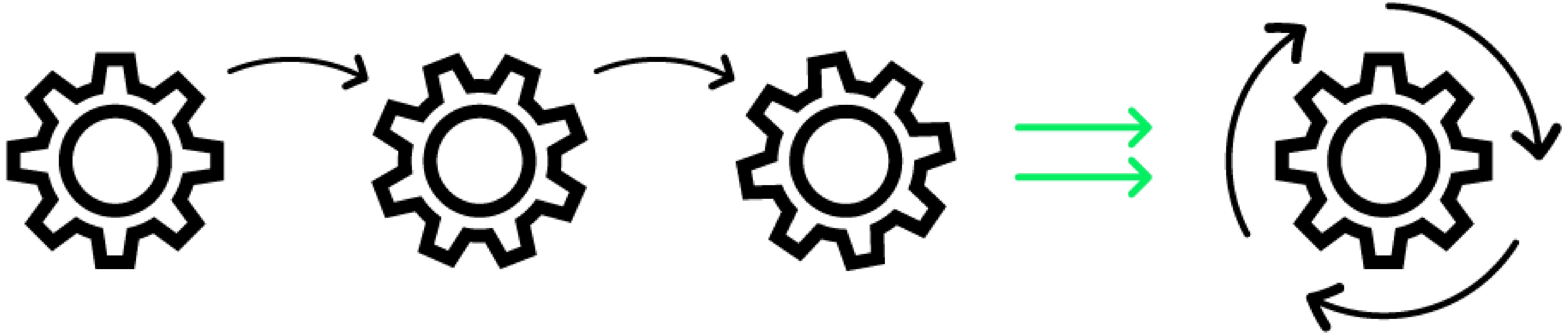
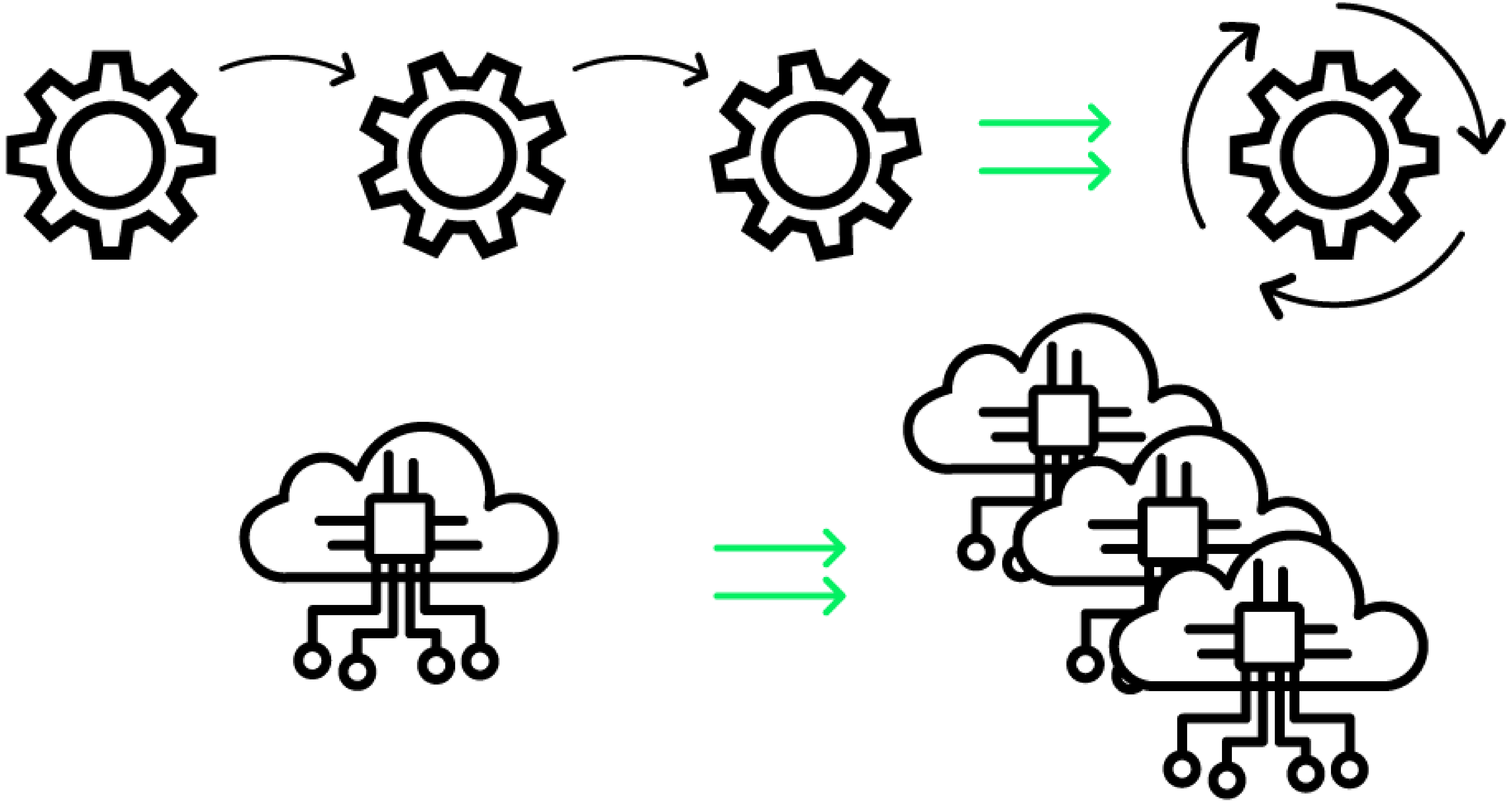
ML Engineer

Automation and scaling

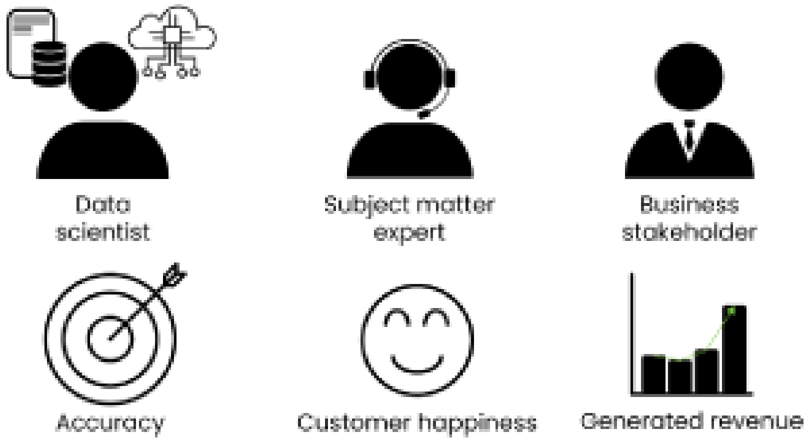


Automation and scaling



Design phase

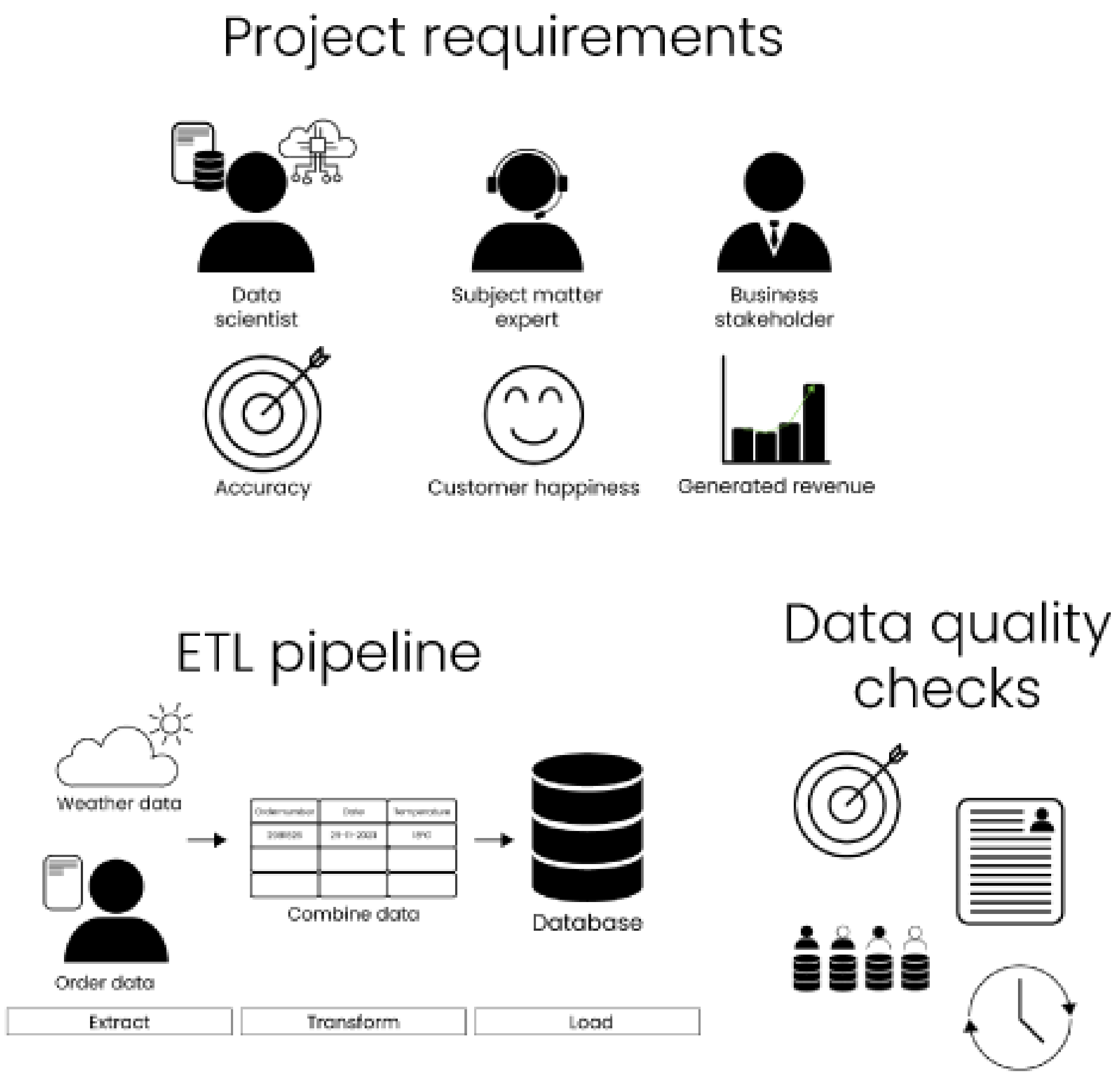
Project requirements



Project design

- Project design remains a manual process
- Use templates to automate and scale

Design phase



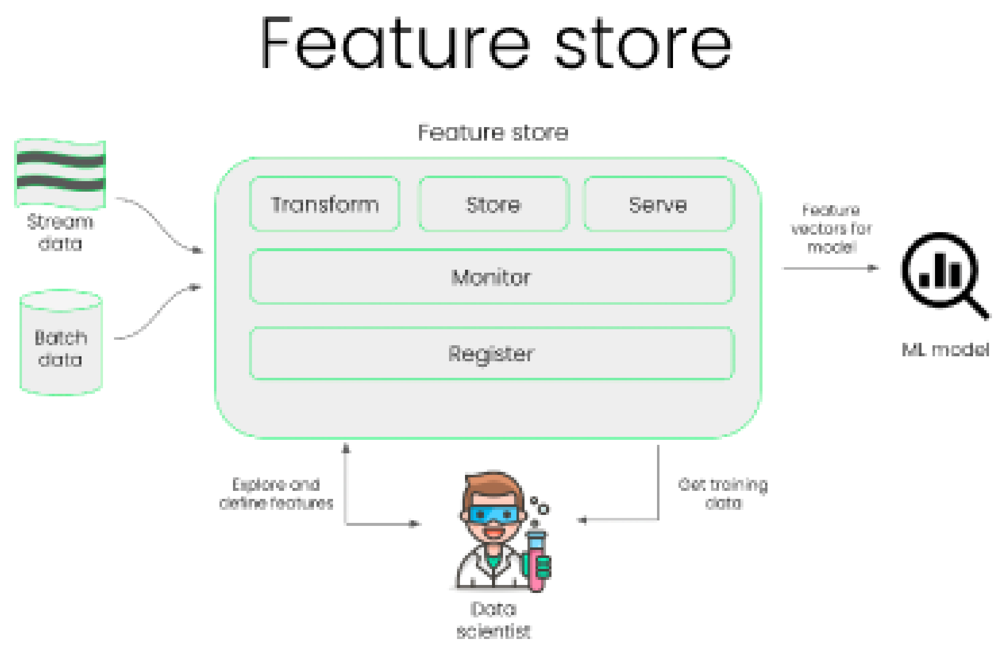
Project design

- Project design remains a manual process
- Use templates to automate and scale

Data acquisition

- Can be automated
- Enables high data quality

Development phase

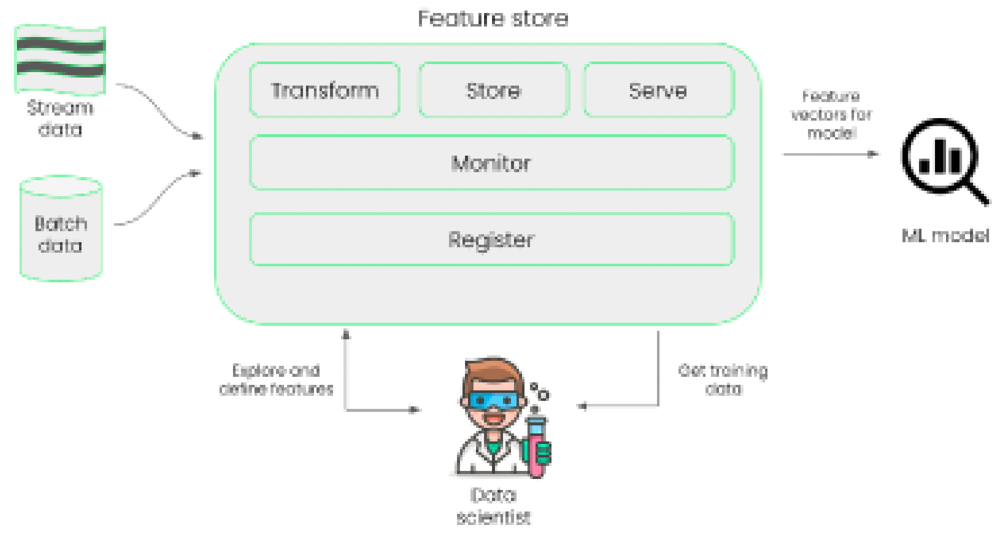


Feature store

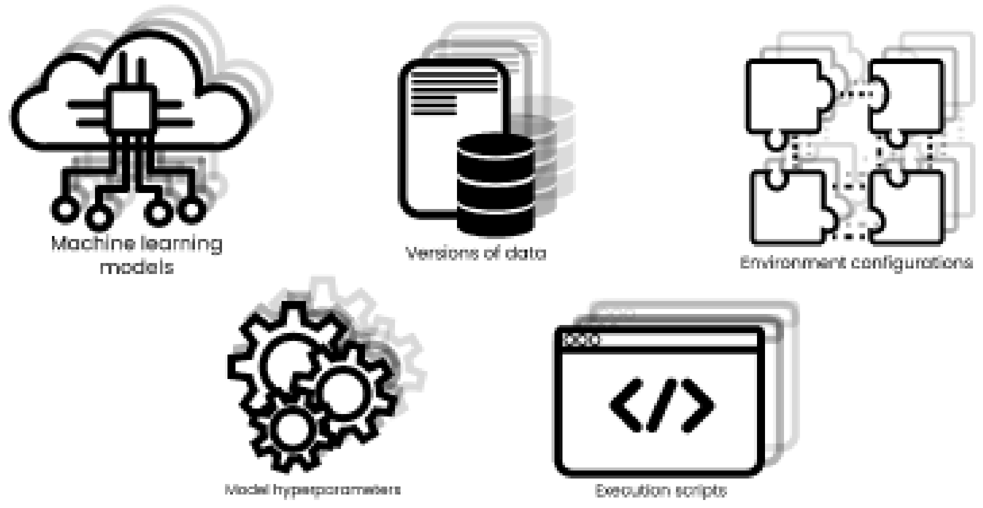
- Saves time building the same features
- Helps to scale

Development phase

Feature store



Experiment tracking



Feature store

- Saves time building the same features
- Helps to scale

Experiment tracking

- Automates tracking
- Ensures reproducibility

Deployment phase

Containerization

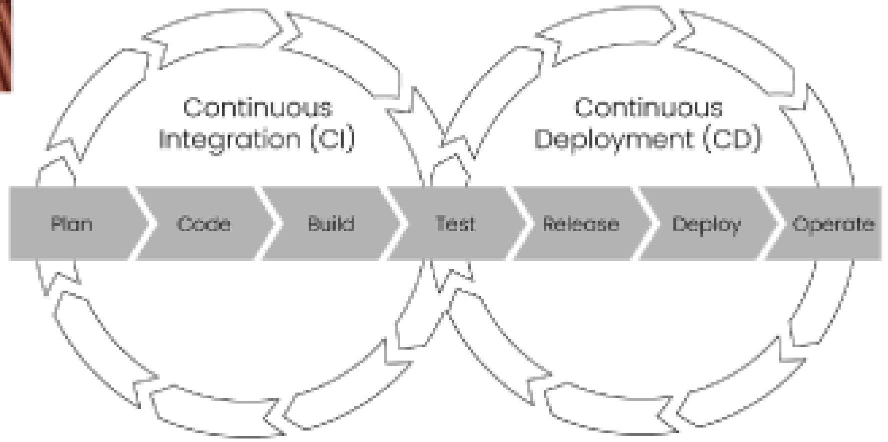
Containerization

- Easy to start up copies of same application
- Improves scalability

Deployment phase

Containerization

CI/CD pipeline



Containerization

- Easy to start up copies of same application
- Improves scalability

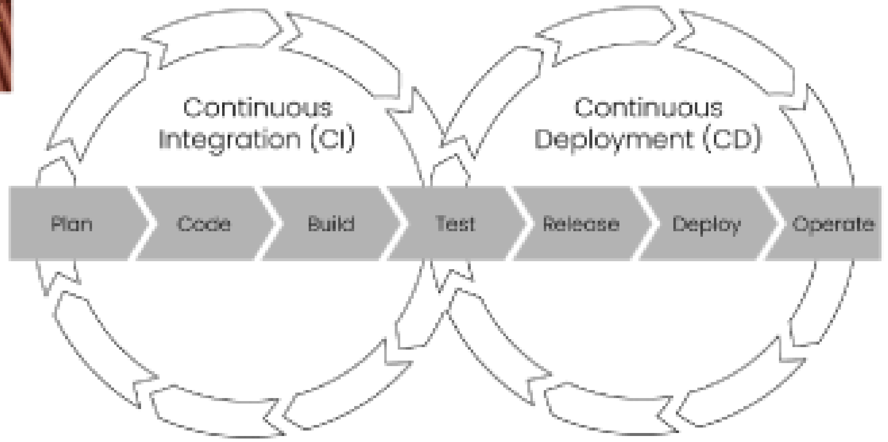
CI/CD pipeline

- Automates development and deployment
- Increases velocity of processes

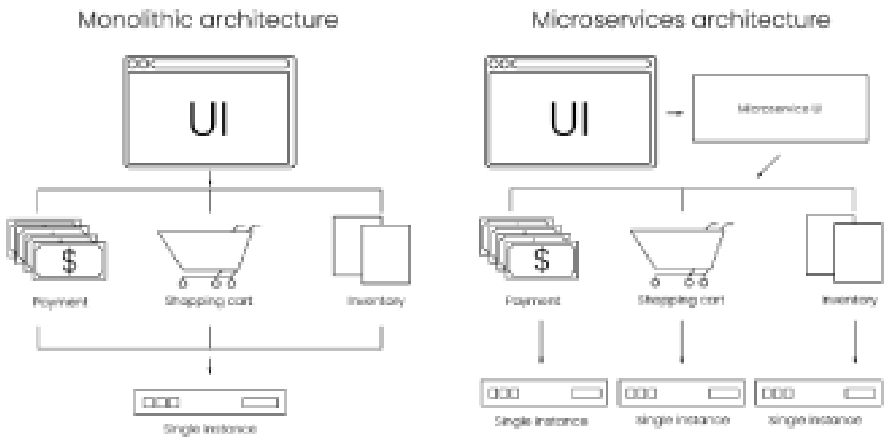
Deployment phase

Containerization

CI/CD pipeline



Microservice architecture



Containerization

- Easy to start up copies of same application
- Improves scalability

CI/CD pipeline

- Automates development and deployment
- Increases velocity of processes

Microservices architecture

- Improves scalability
- Independent development and deployment

Let's practice!

MLOPS CONCEPTS