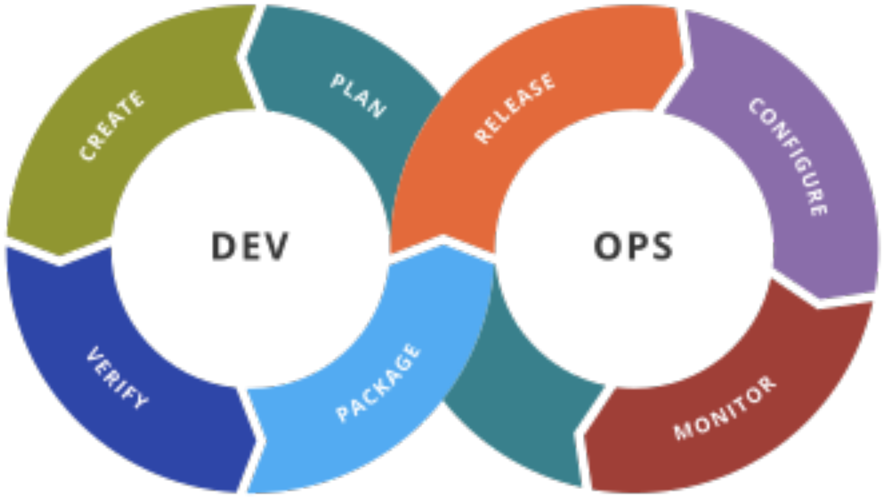
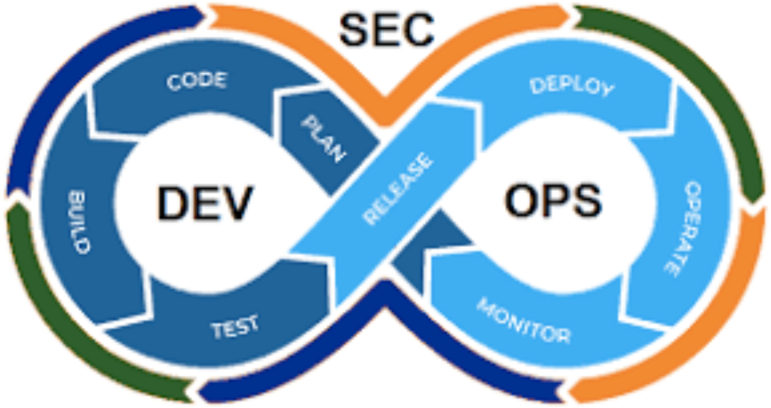
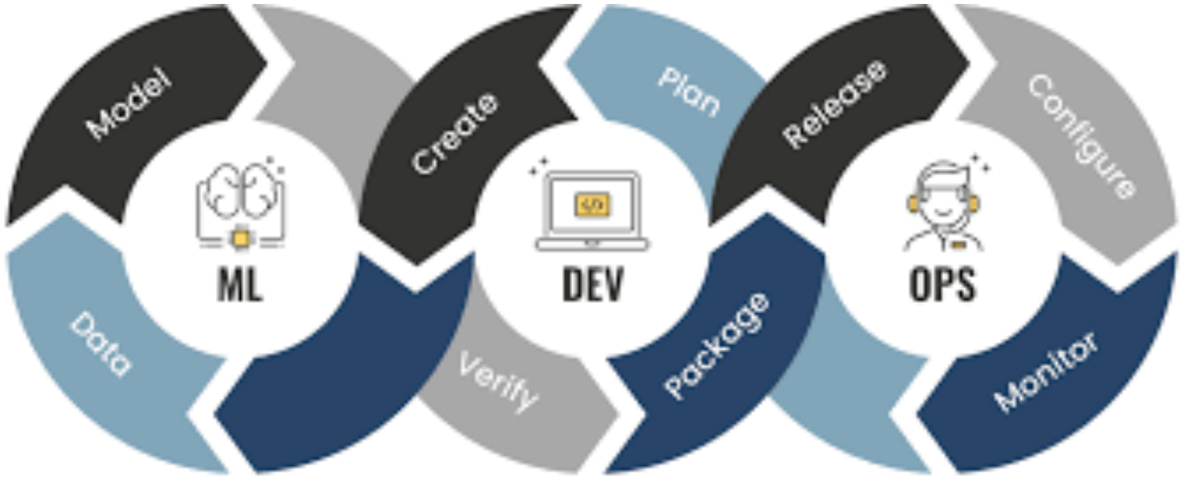
UNIVERSITAT DE BARCELONA







DevOps pipelines

by Eloi Puertas

Devops & QA principles

- Combines software development (**Dev**) and IT operations (**Ops**)

- **Shorten the systems development life cycle** and provide **continuous delivery** with **high software quality**

DevOps Toolchain

- **Microservices**: Small-size services
- **Code Repository and workflow**: controlled and managed central place
- **Automatization**: during CI/CD build, test, coverage…
- **Containerization**: Create containers for each environament.

Basic tools on cloud

- Repositories, VCS and workflows: Github, Gitfow, Bitbucket
- Project Management: Github, Jira
- Serverless Developing Containers: Github **Codespaces**
- Serverless Computing (Functions as a Server) for running CI/CD: **Github Actions**,Azure Functions, AWS lambda, Google Cloud Functions
- Test Utilities: **Lint**, **Testing** and **Coverage**: flake8, pytest, pytest-cov…
- Deployment: Docker, **Azure**, **AWS**, **Google Cloud**

Github Codespace

- https://docs.github.com/en/codespaces

Github Actions

- https://docs.github.com/en/actions
- CI/CD, build, unit tests, integration test, UX test, deployment
- Integration test using containers and actions:

https://docs.github.com/en/actions/using-containerized-services/about-service-containers

Serverless Development
Azure Functions

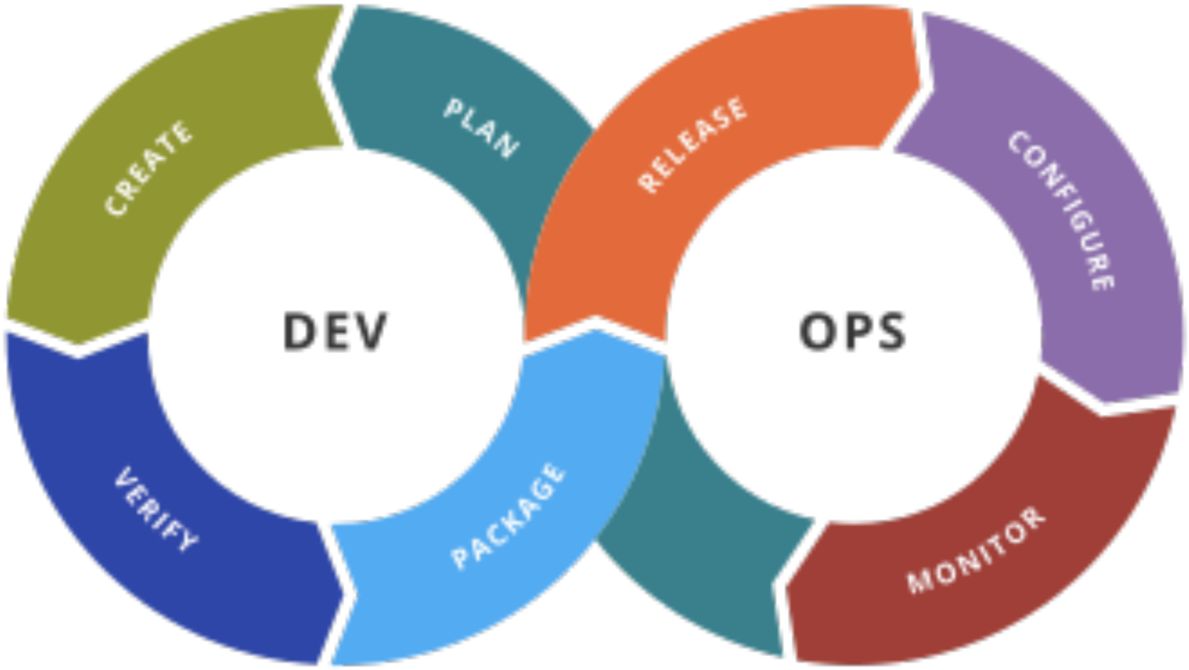
- Functions / Lamda (Functions as a Service) for end-to-end testing automatization.
- Docker + Functions + Selenium (cypress in JS)

Devops Stages

Agile Development + CI/CD: TDD + workflow

+ IAAS: Azure/AWS/Google Cloud

+ Monitor: Test Coverage, Burndown chart, Lead Time



Model
Data
ML
Create
Plan
Verify
DEV
Package
Release
Configure
OPS
Monitor

ML-DEVOPS

by Eloi Puertas

What is **ML-Devops**

- Apply CI/CD principles to Machine Learning applications
- CI: Testing and Validating:
- Code, components, **data** and **models**
- CD: Deploy a ML pipeline (Train and Testing)

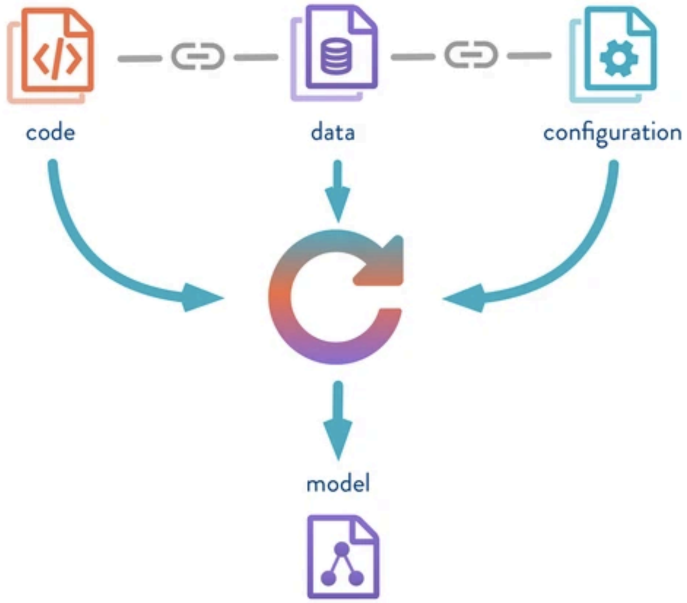
MLDevops-Stages

- **Development**: Github Codespaces, Google Colab notebooks, Azure Machine Learning.

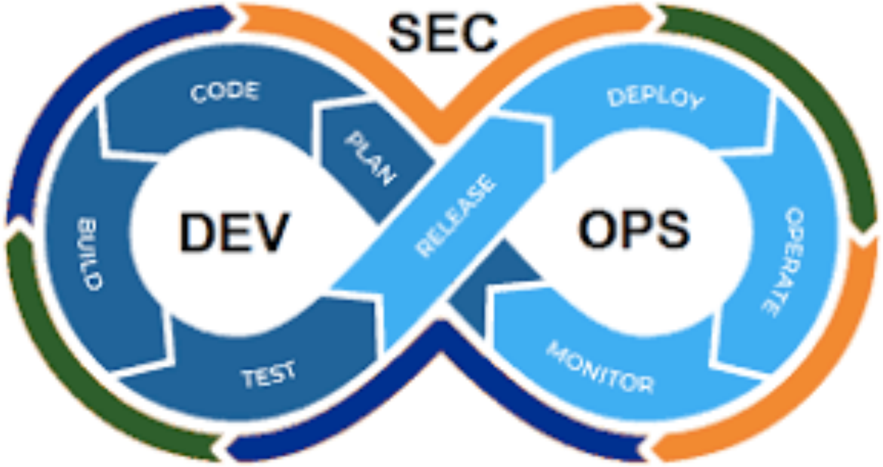
- **Data, workflow and experiment management:**

    - **DVC + DVC Studio**

    - **DVC + MLFlow**



UNIVERSITAT DE BARCELONA



Sec-DEVOPS

by Eloi Puertas

Sec-Devops

- Prioritize security on all phases.
- Add security testing along with quality assurance
- Automate security updates for known vulnerabilities
- Secure API gateways
- Encrypt data between services
- Each service should have the least privilege possible to minimize unauthorized connections and access.
- Isolate containers running microservices from each other and the network:
- Tight access control and centralized authentication mechanisms for securing microservices,