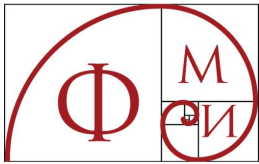
Several Clouds

Modern DevOps Practices

Prepared for

Faculty of Mathematics and Informatics (FMI)



Program overview

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1. Initial meeting
2. Software Development Life Cycle (SDLC)
3. Working with version control systems
4. Microservices and Docker
5. Pipelines
6. Continuous Integration
7. **DevSecOps**
8. **Continuous Delivery**
9. Code Assistants
10. Database versioning
11. Kubernetes
12. Cloud services in AWS
13. Infrastructure as Code with Terraform

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DevSecOps

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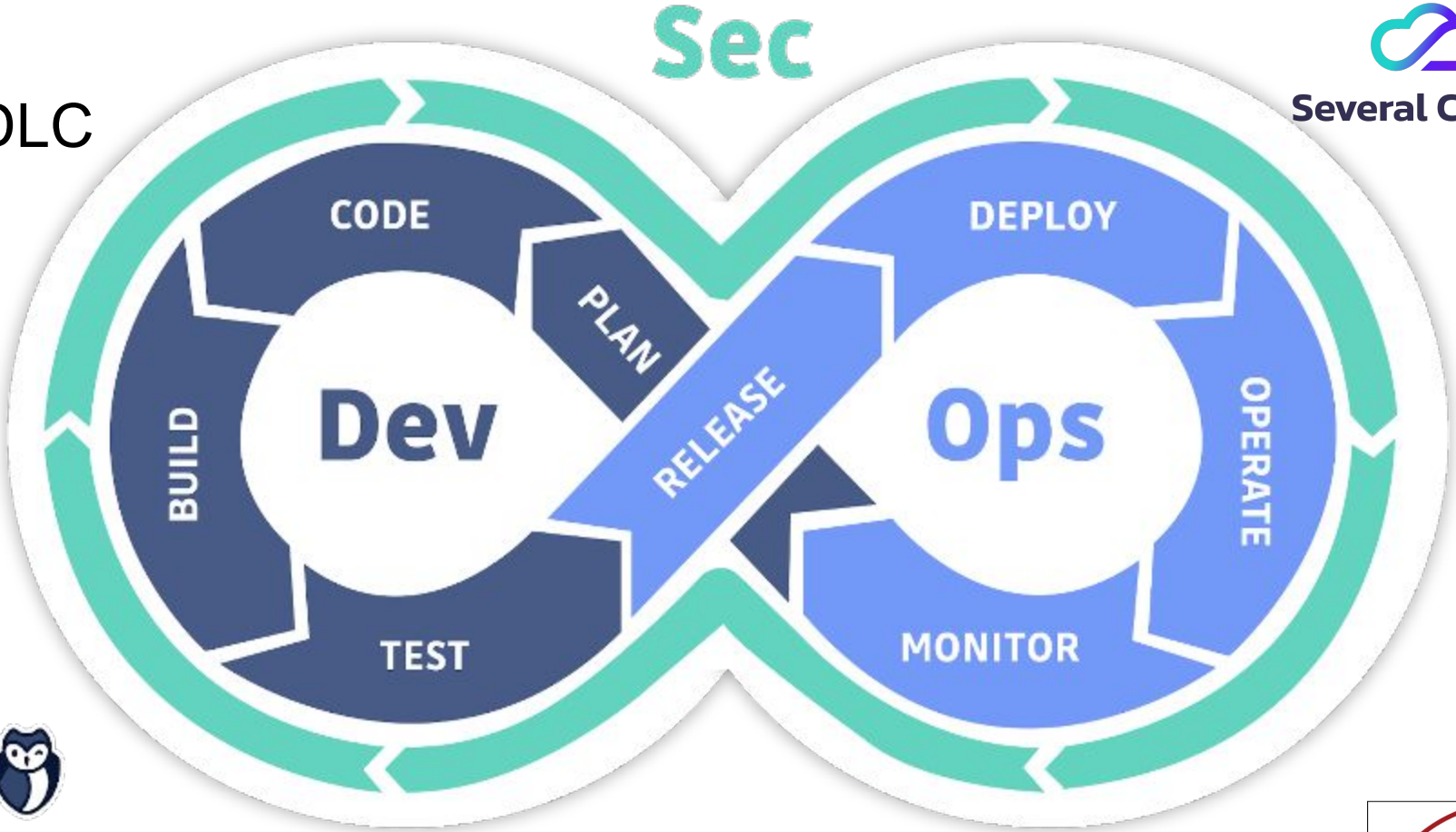
SDLC



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What is DevSecOps

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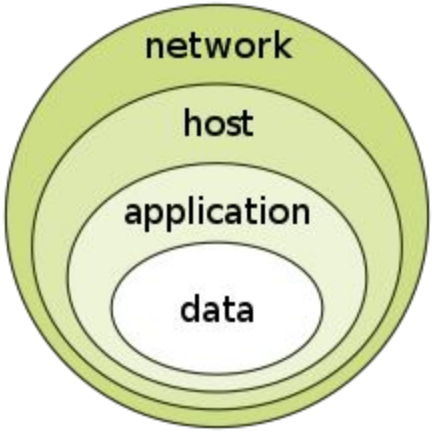
- Collaboration
- In the **past** Security teams were involved **last** in the SDLC

- Create fast feedback loops for Security
- “Shift security left”

What is DevSecOps

- Culture
- Tools

The “onion” information security model



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Multi-layered approach

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What are the components of your software solution?

Software composition analysis

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Configuration and Secrets

Software that you build

Dependencies - OSS and binaries

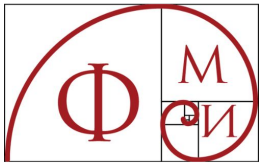
Application runtime

Operating System

Hypervisor Operating System

Hardware Security

Data Centers

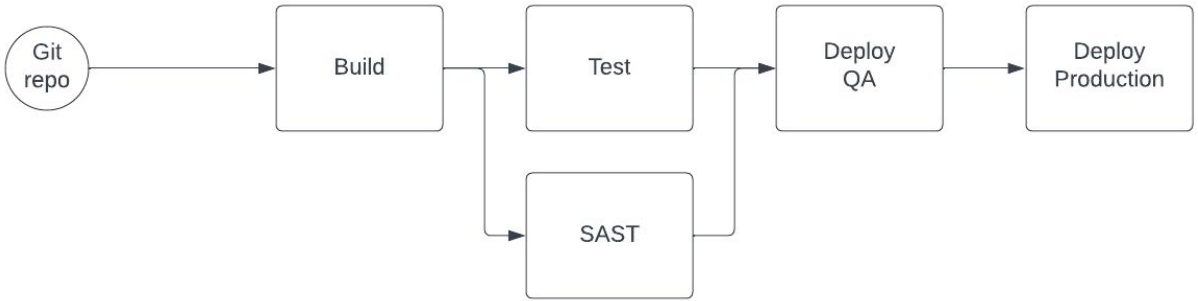


Application Security Testing

- SAST - Static Application Security Testing
- SCA - Software Composition Analysis
- DAST - Dynamic Application Security Testing
- IAST - Interactive application security testing
- RASP - Run-time Application Security Protection

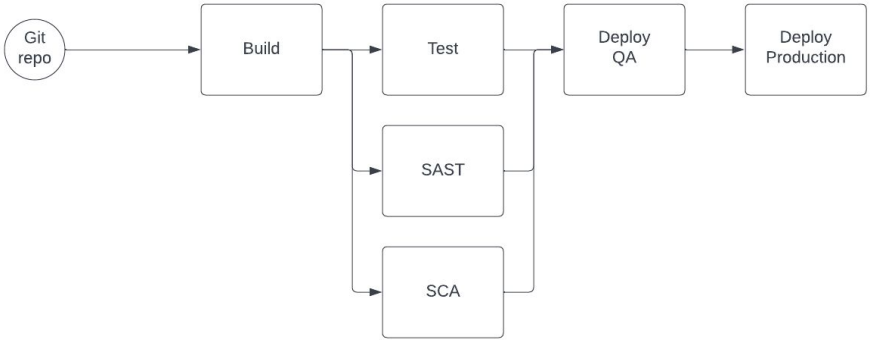
SAST

- White box
- Operates at the same level as the source code in order to detect vulnerabilities
- Static Code Analysis or SAST analysis is conducted before code compilation and without executing it
- Integrates with IDE



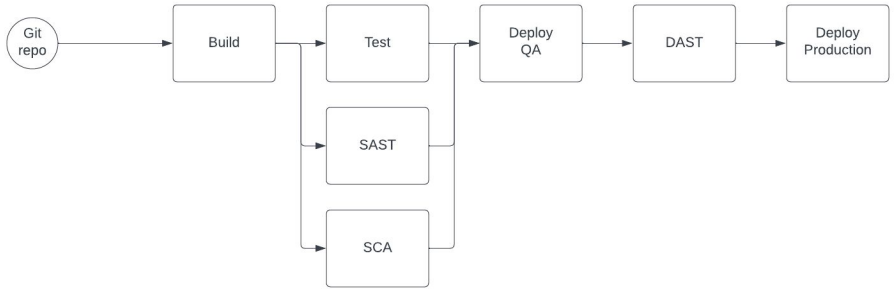
SCA

- Software Composition Analysis
- Quickly track and analyze any open-source and third-party components
- related components and supporting libraries
- direct and indirect dependencies
- detect software licenses, deprecated dependencies, as well as vulnerabilities and potential exploits



DAST

- Dynamic Application Security Testing
- Black box, performed from the outside in
- Security vulnerabilities and weaknesses in a running application
- Penetration testing
- Simulates attacks against an application



IAST

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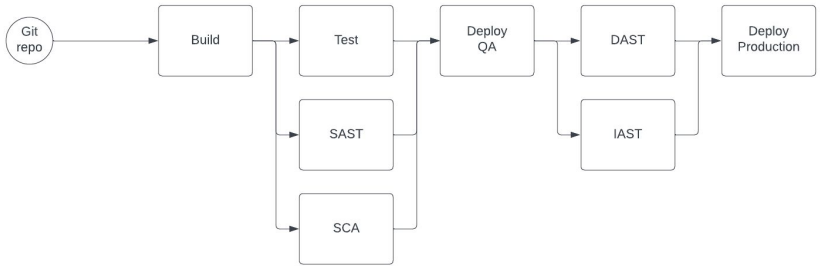
- Interactive application security testing
- Grey Box approach
- Operates inside the application
- IAST agent is working inside the app
- apply its analysis to the entire app
- Observes operation or attacks and identifies vulnerabilities
- Ability to identify third-party and open source components, known vulnerabilities, license types, and other potential risk issues



RASP

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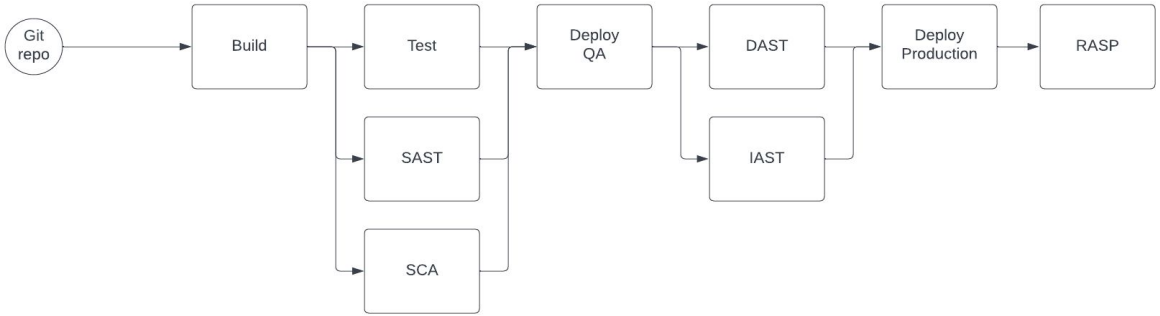
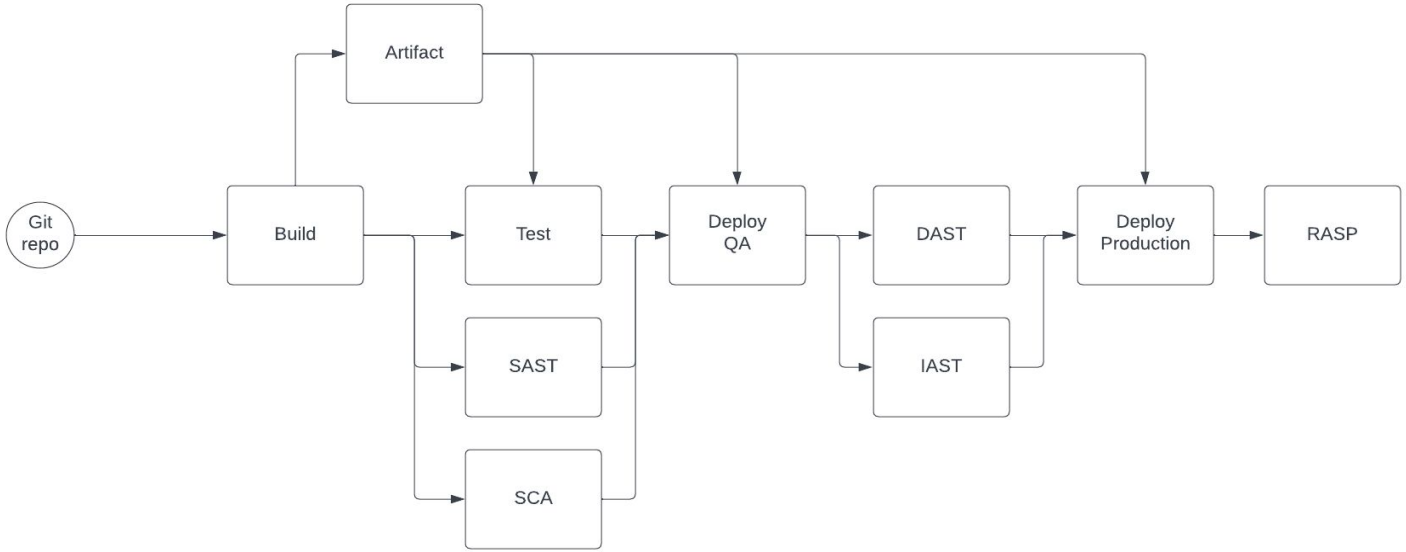
- Run-time Application Security Protection
- Works inside the application
- Less a testing tool and more a security tool compared to IAST
- Can control application execution
- Run continuous security checks on itself and respond to live attacks by terminating an attacker’s session and alerting defenders to the attack



Scan the artifacts

- Periodic scans on the artifacts



Fast feedback loop

SAST tools integrate with IDE

- Install SonarLint in your IDE

Check for hard coded secrets

- gitleaks; git-secrets; Trivy

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OWASP

The Open Web Application Security Project® (OWASP) is a nonprofit foundation that works to improve the security of software.

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Continuous Delivery

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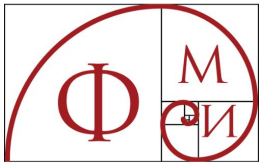

Continuous Deployment

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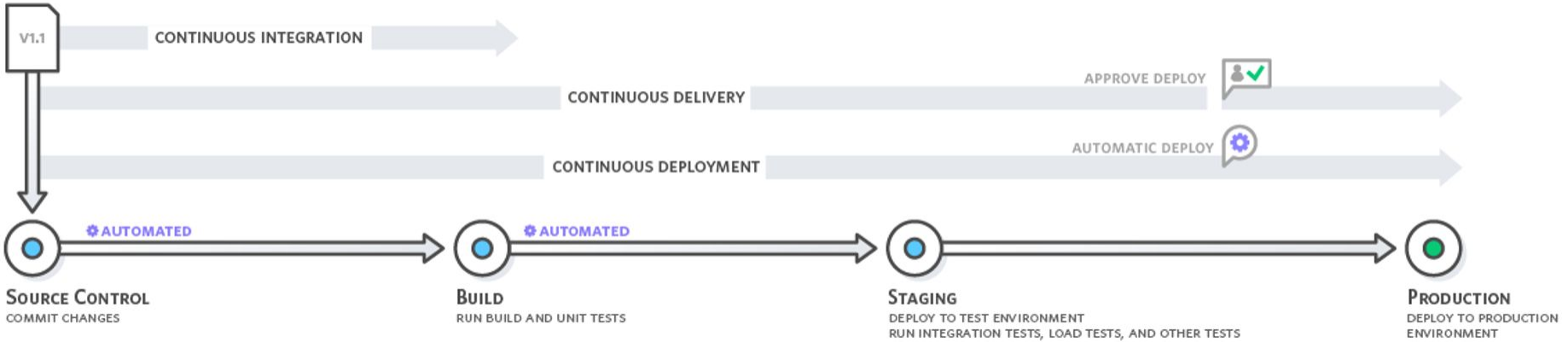
“Between the time a developer commits code to the repository and the time it runs in production, code is a pure liability.”



Continuous Delivery practices

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- deployment automation
- continuous integration
- use of version control for all production artifacts
- monitoring and observability
- continuous testing
- integrating data and the database into the deployment pipeline
- integrating security into software delivery work

Releasing software should be easy

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- It should be easy because you have tested every single part of the release process hundreds of times before.
- It should be as simple as pressing a button.
- The repeatability and reliability derive from two principles:
  - automate almost everything
  - keep everything you need to build, deploy, test, and release your application in version control

Automate almost everything

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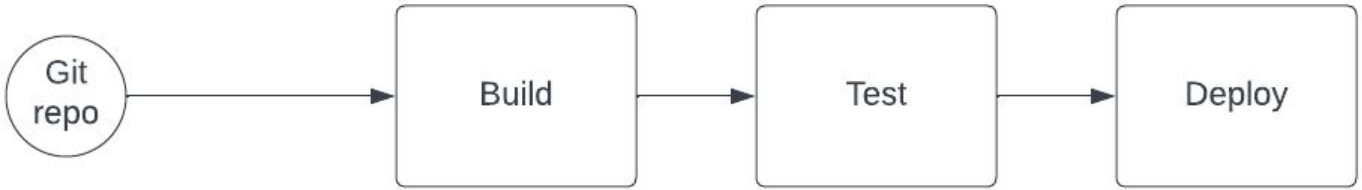
- Build and Deployment Automation
- Automate Data Migration
- Automate Monitoring and Reporting
- Infrastructure Automation

- Process to roll back to a previous version of production if the deployment goes wrong

The only route to Production

- Run every emergency fix through your standard deployment pipeline
- This is just one more reason to keep your cycle time low



Application deployment and testing strategies

https://cloud.google.com/architecture/application-deployment-and-testing-strategies

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Resources

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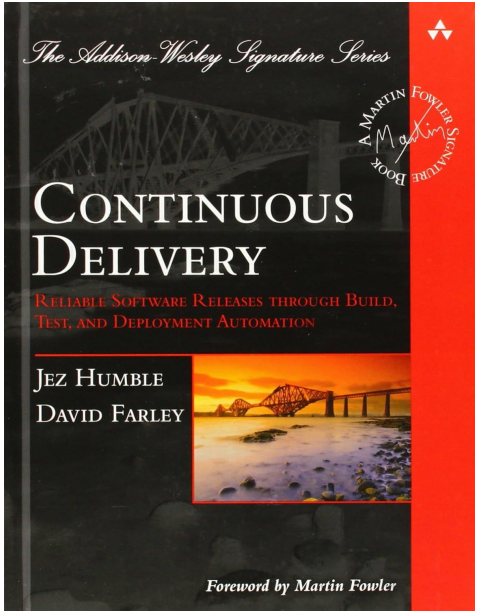
https://www.amazon.com/Continuous-Delivery-Deployment-Automation-Addison-Wesley/dp/0321601912

https://www.youtube.com/@ContinuousDelivery



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Thank you!

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