Software Engineering Processes

Course Code: XB_0089

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Lecture: DevOps

Bachelor in Computer Science, 2023/2024

DevOps

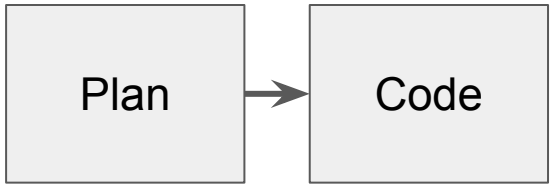
"*There is no simple definition of DevOps*"

– Ian Sommerville, 2020

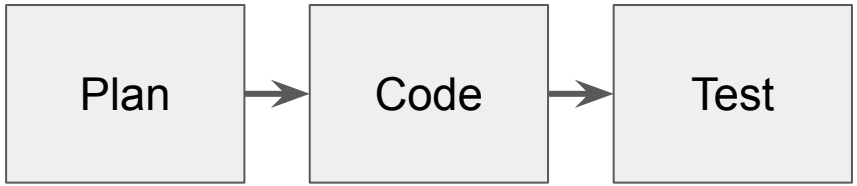
Long story short about our goals

Typical software release process

Typical software release process



Typical software release process



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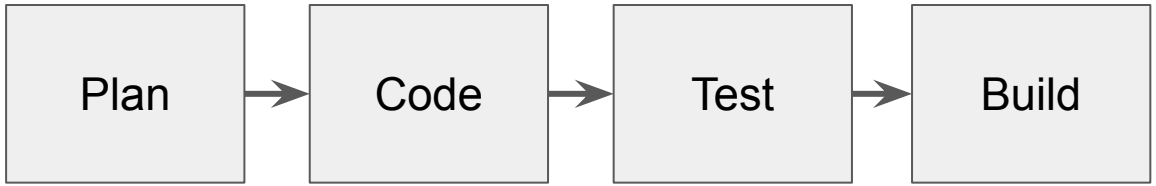

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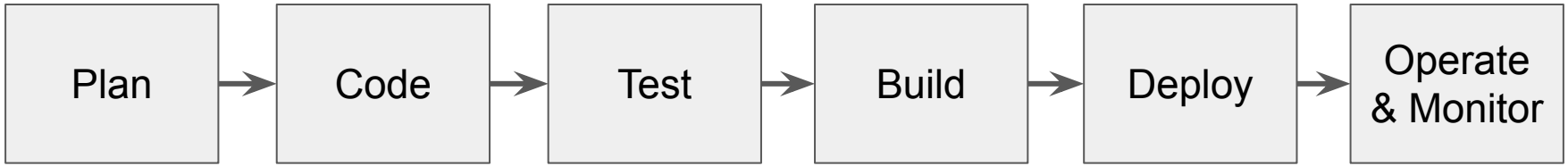

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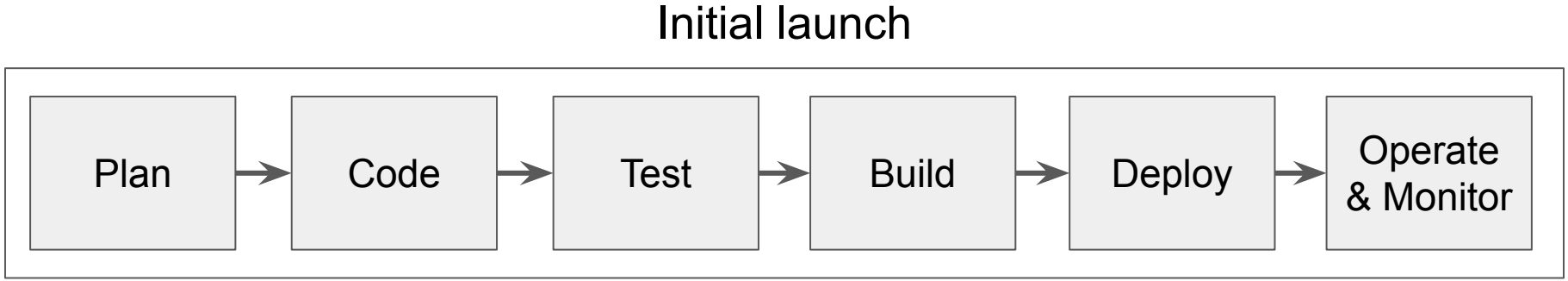

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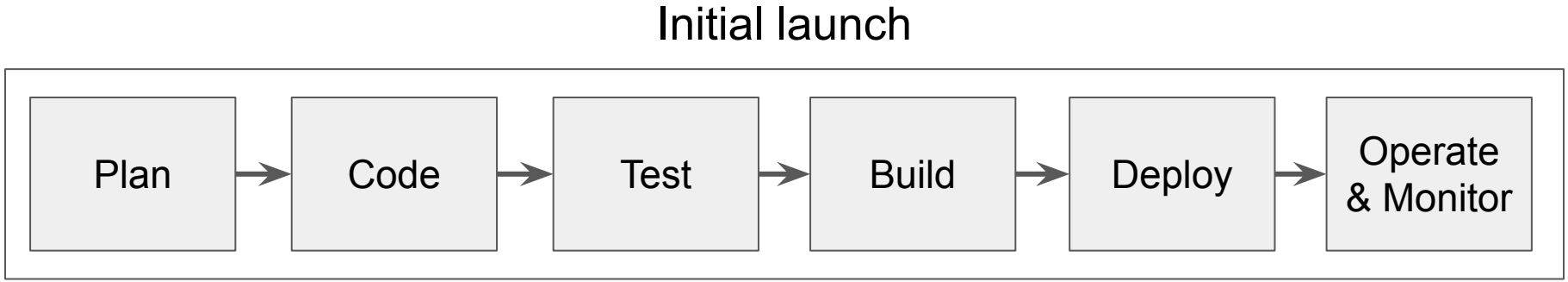
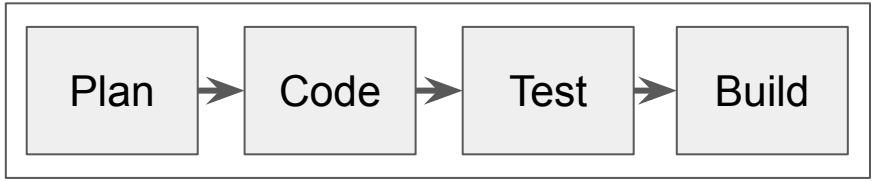


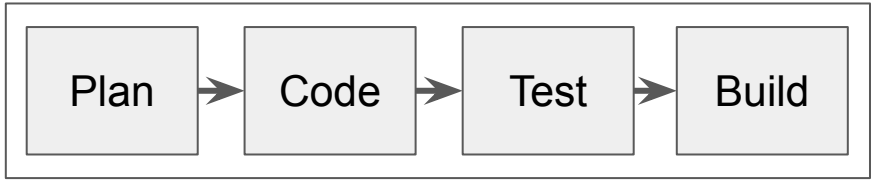
Improvements:
– Addition of features
– Bug fix
– Performance improvement

New versions

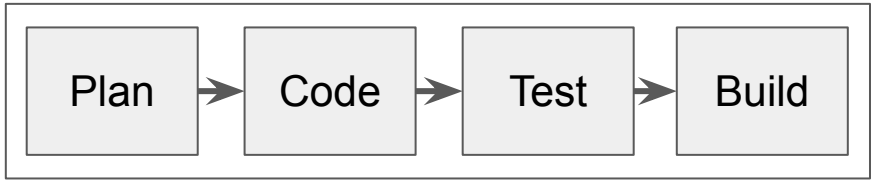
Version 1 (new feature)



Version 2 (bug fix)



Version 3 (performance improvement)



New versions

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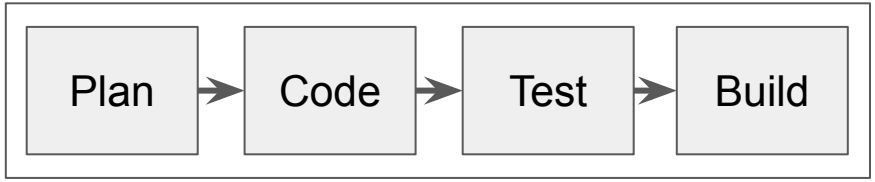

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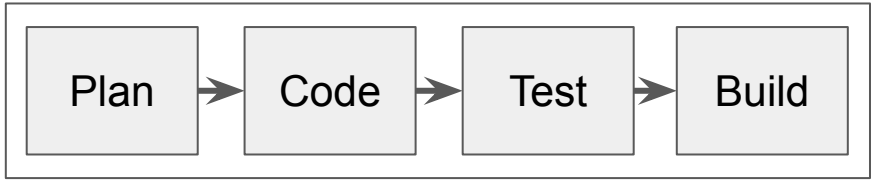

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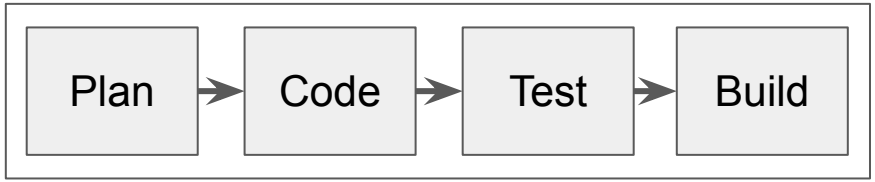


Goal: make it available to the users

Development

Code
repository

Development

Operations

Code repository

Servers

Development

Operations

Code repository

Servers

Continuously releasing software fast and with high quality

Challenges in the release process

1) Communication and collaboration between developers and operations

- Developers don’t consider the deployment environment
- Operations don’t know how the system works

Challenges in the release process

2) Conflict of interest

- Developers want to finish implementing fast
- Operations want to maintain stability

Challenges in the release process

3) Manual work

- Manual testing
- Manual release creation
- Manual deployment environment configuration
- …

Challenges in the release process

- Slow down the release process
- Require too much effort
- Error prone
- Difficult knowledge sharing

Development

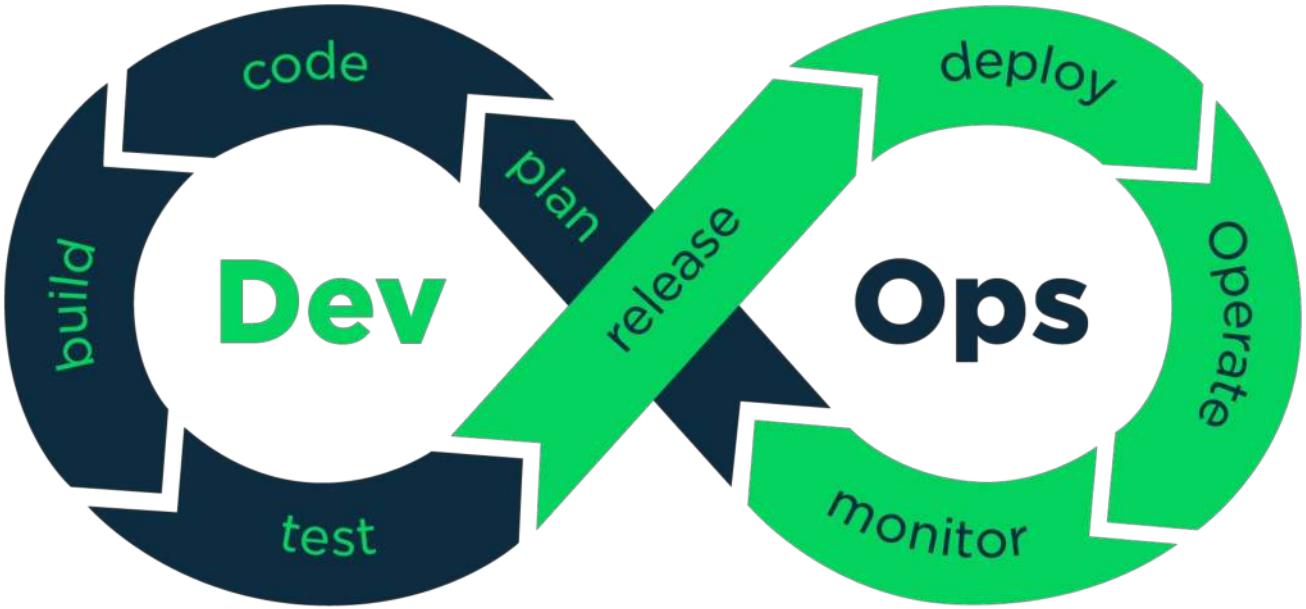
Operations

Code repository

Servers

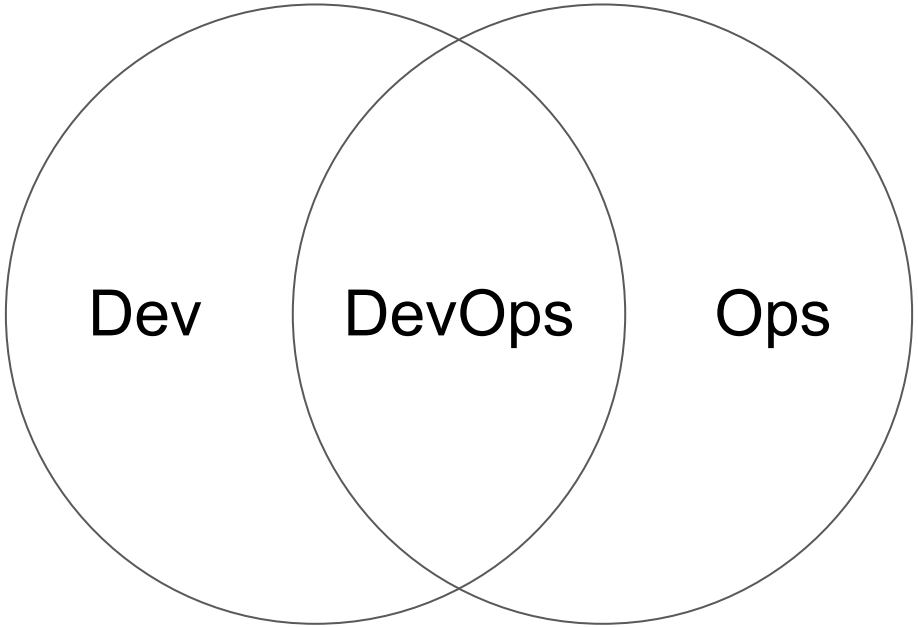
Continuously releasing software fast and with high quality

DevOps targets those challenges in the release process



Automated pipelines allow even multiple releases a day!

DevOps



DevOps

DevOps is a combination of cultural philosophies, practices, and tools

It is about anything that creates the process of **releasing software fast and with high quality**

Devs and Ops should work together more often

DevOps

Different companies implement DevOps in different ways

DevOps became a separate role: DevOps Engineer

There are many tools to help automating the processes

Benefits of DevOps

- Faster deployment
- Reduced risk
- Faster repair
- More productive teams

Aspects of DevOps automation

- Continuous integration
- Continuous delivery
- Continuous deployment
- Infrastructure as code

Continuous integration

Each time a developer performs a change to the project’s core repository main branch, an executable version of the system is built and tested

Benefits of continuous integration

- Faster to find and fix bugs
- Your changes are shared with the whole team
- Might create a “quality culture” in the development team

Continuous delivery and deployment

Continuous delivery: A simulation of the product’s operating environment is created and the executable software version is tested

Continuous delivery and deployment

Continuous delivery: A simulation of the product's operating environment is created and the executable software version is tested

Continuous deployment: A new release of the system is made available to users every time a change is made to the project's core repository main branch

Benefits of continuous deployment

- Reduced costs
- Faster problem solving
- Faster customer feedback

Business reasons against deploying every change

- Incomplete features, but the competitors shouldn’t know about it
- Customers may get irritated by many changes
- Synchronization of releases with known business cycles

Infrastructure as code

Infrastructure model written in a machine-processable language

Characteristics:

- Visibility
- Reproducibility
- Reliability
- Recovery

Aspects of DevOps automation

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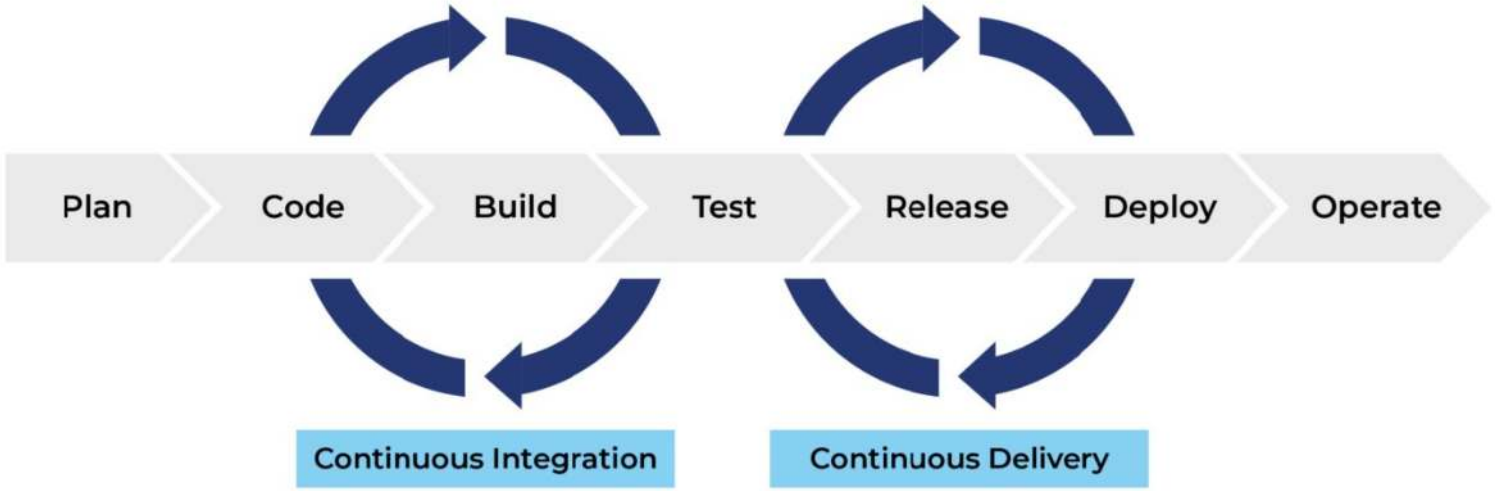
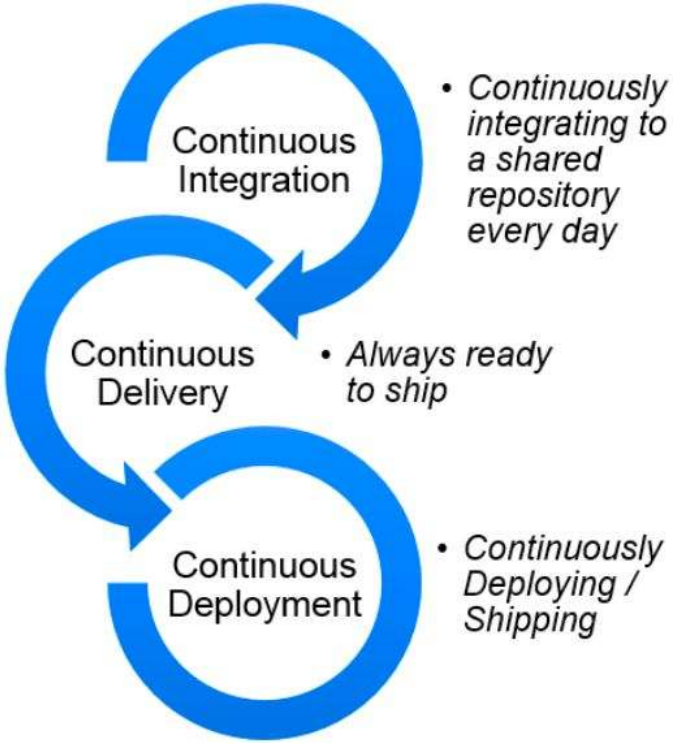
CI/CD


Plan
Code
Build
Test
Release
Deploy
Operate
Continuous Integration
Continuous Delivery

Continuous integration, delivery, and deployment



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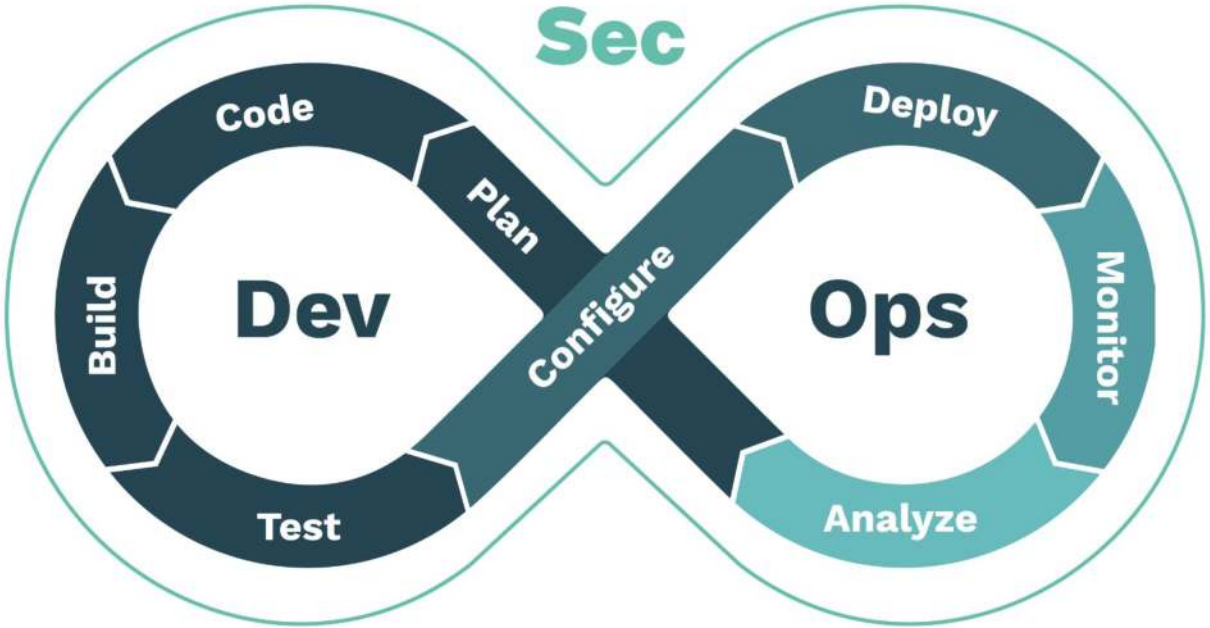
Agile and DevOps

Agile approaches target reducing the development time

DevOps targets the challenges in the release process

A variation: DevSecOps



TODO

Reading

Exam material:

- Ian Sommerville, “Engineering Software Products”, 2020: Chapter 10 - “DevOps and Code Management”, Sections 10.2 and 10.3

Recommended material:

- Ian Sommerville, “Engineering Software Products”, 2020: Chapter 9 - “Testing”

Takeaways?