Software Development Process and Tools

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What is a Software ?

Software is a collection of executable programming code, associated libraries and documentations.

What is Engineering ?

Developing products, using well-defined, scientific principles and methods.

Software Engineering is an engineering branch associated with development of software product using well-defined scientific principles, methods and procedures. The outcome of software engineering is an efficient and reliable software product.

Software Development Methodology

- Best practices or steps required to build Software Systems
- Activities involved in the software development process
  - Waterfall vs Agile

Waterfall
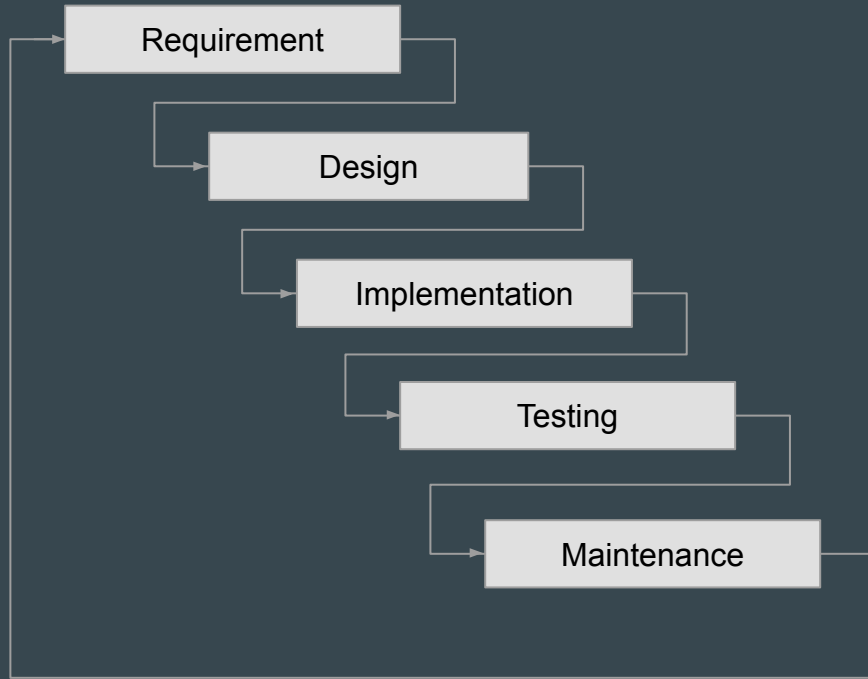
Pros:

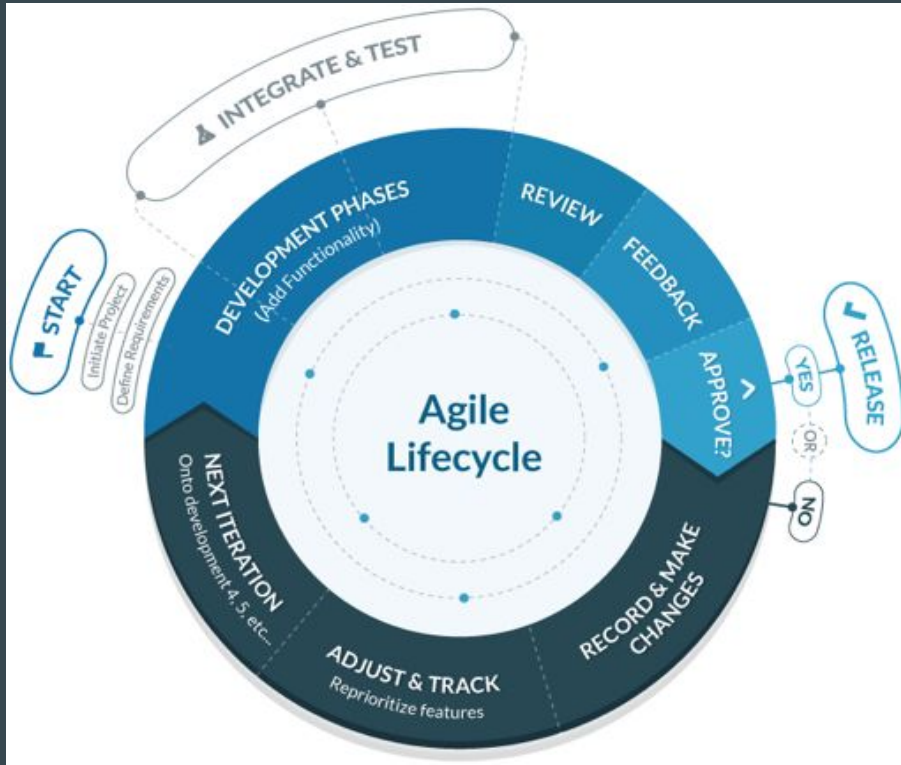- Well defined design
- Identifies problems early

Cons:

- Not suitable for requirements that change frequently
- Big cost for design

Suitable for:

- Critical systems like medical and military
- Mature legacy systems

Agile

Pros:

- Regular feedback from users
- Adapts easily to changes
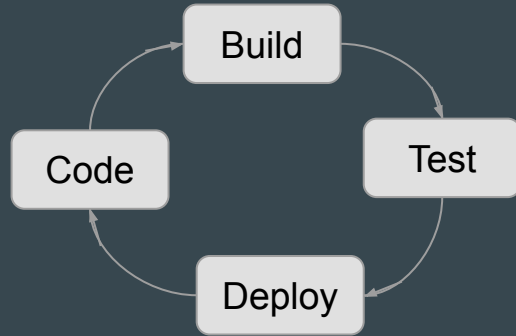- Emphasizes on team collaboration

Cons:

- Estimate of time and effort is not reliable
- Lack of documentation leads to unmanageable systems

Suitable for:

- Requirements that are vague
- Experimenting with technologies
- Fast incremental releases are ok

Automation and tools

Build

Test

Code

Deploy

- Make process repeatable
- Avoid time sinks
- Avoid human error
- Catch bug with automated tests
- Avoid configuration drift

Automation and tools

- Source Code Management
    - Git (Github/Gitlab/Bitbucket), SVN
        - https://www.youtube.com/watch?v=x0EYpi38Yp4
- Integrated Development Environment
    - Atom, Eclipse, IntelliJ, VSCode
- Build tools
    - Maven/Gradle, PyBuilder, Invoke, Fabric, Make
- Automated test tools
    - JUnit, PyTest
- Static Code Analysis Tools
    - SonarQube
- Continuous Integration/Deployment (CI/CD)
    - Travis, Jenkins, Gitlab CI

CI/CD
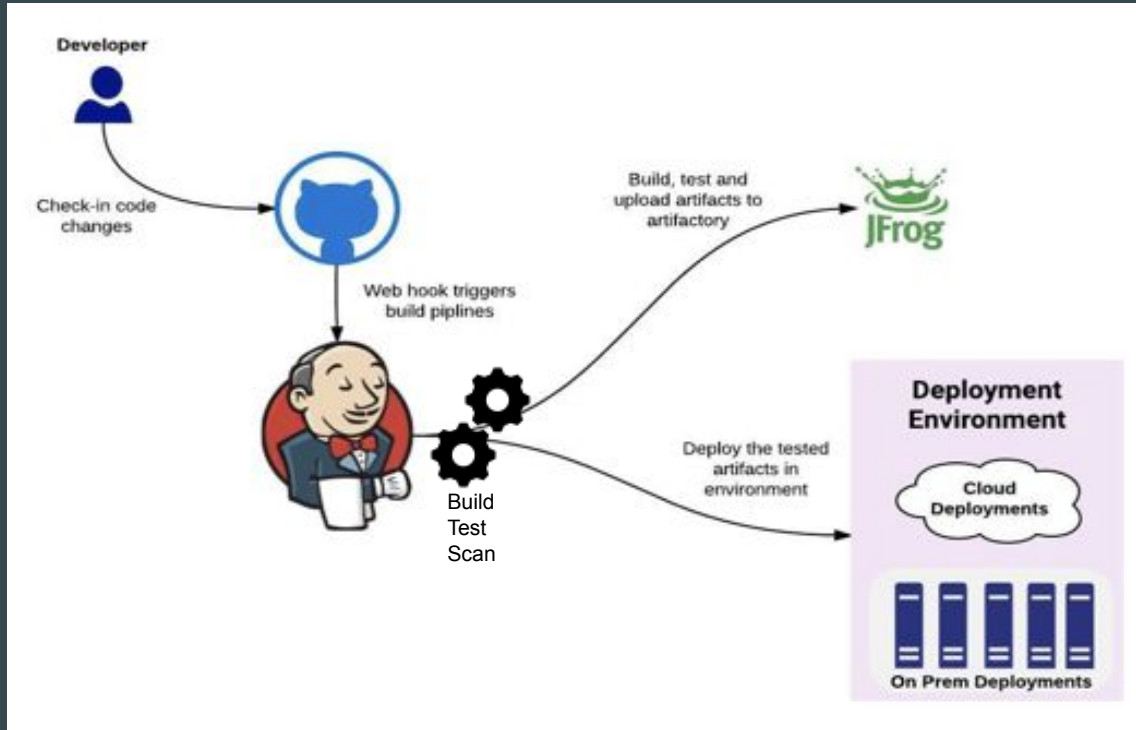
Development workflow - Github Flow
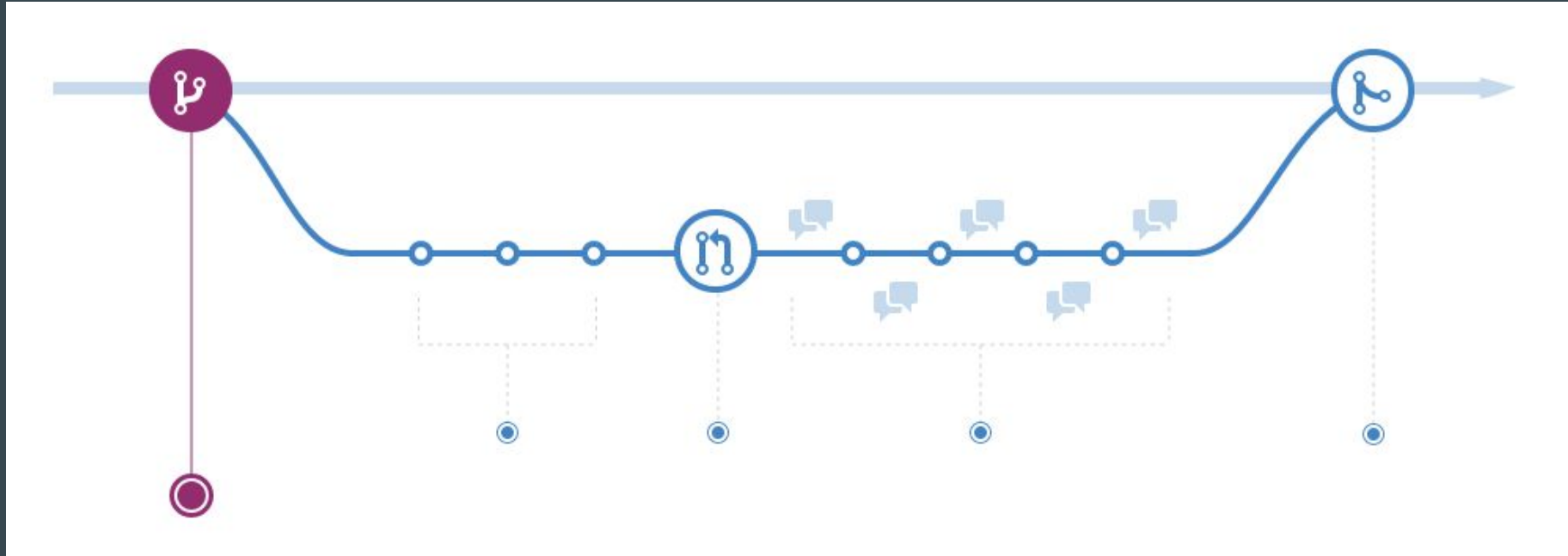
Other Management Tools

- Task Management
  - Zenhub, JIRA
- Content Management
  - Wiki, Confluence
- Project Management
  - Microsoft Project
- Visual design tools
  - Visio, UML tools

Demo

References & Resources

https://www.sei.cmu.edu

https://agilemanifesto.org/principles.html

https://guides.github.com/introduction/flow/

https://www.zenhub.com/

https://travis-ci.org/

https://sonarcloud.io

https://wiki.python.org/moin/ConfigurationAndBuildTools

Questions ?