ANÁLISE DE SISTEMAS

Integração contínua & Entrega contínua (CI/CD)

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Objetivos de aprendizagem

Identificar os passos de um ciclo de CI

Distinguir entre *C. Integration*, *C. Deployment* e *C. Delivery*

Relacionar o CI/CD com a natureza iterative e incremental dos métodos ágeis de desenvolvimento

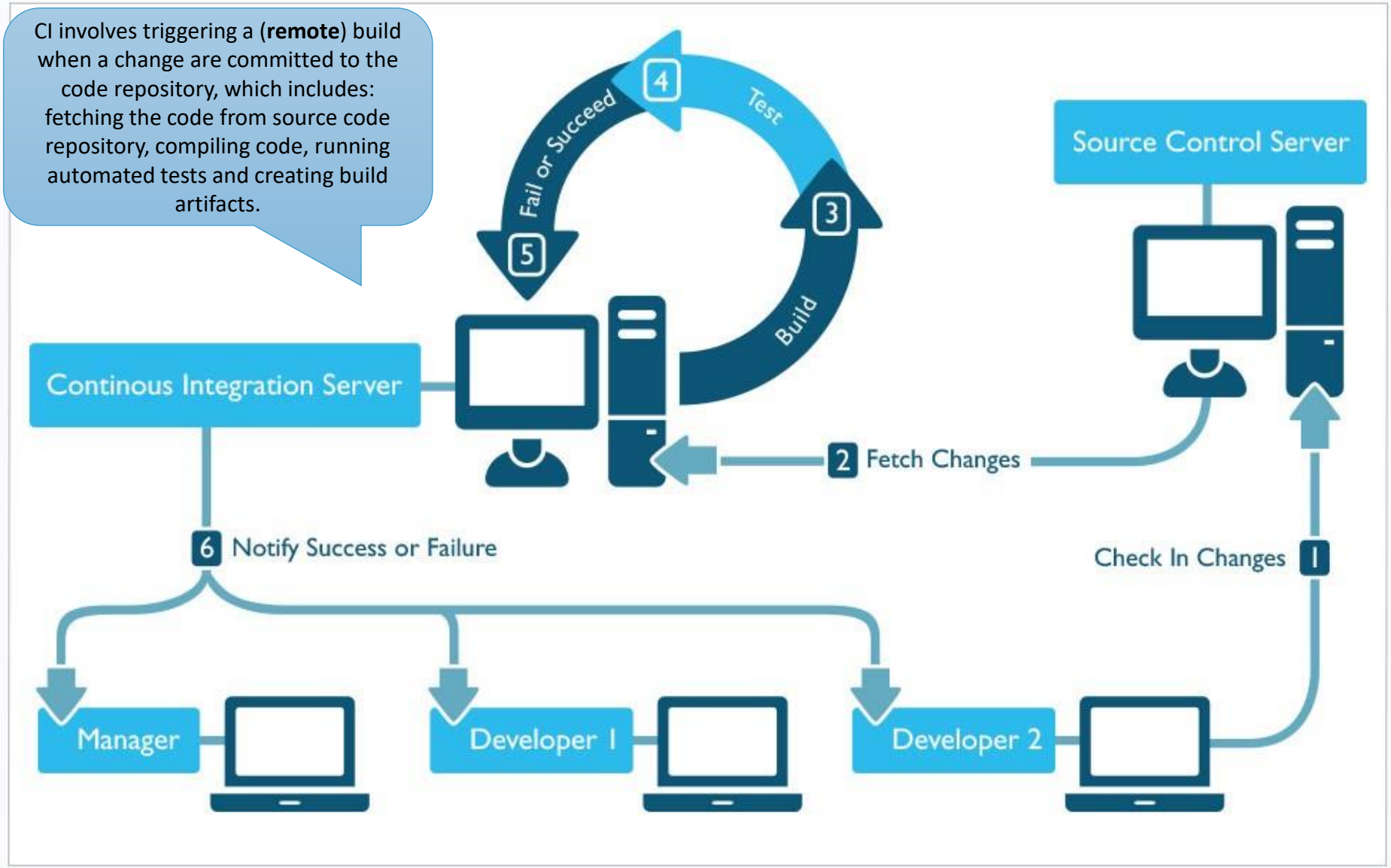
Explicar as tarefas englobadas numa “build”

Explicar as principais boas práticas na implementação de CI numa equipa

Relacionar o CI/CD e DevOps.


¯_(ツ)_/¯
IT WORKS
on my machine

CI involves triggering a (**remote**) build when a change are committed to the code repository, which includes: fetching the code from source code repository, compiling code, running automated tests and creating build artifacts.



https://insights.sei.cmu.edu/blog/continuous-integration-in-devops/

Continuously integrating the “units”

The essence of it lies in the simple practice of everyone on the team integrating frequently.

Feel comfortable and set up the tools to integrate at any time.

CI makes the development process smoother and less risky

↓ “it runs on my computer”

Early detection of failures (react quickly)

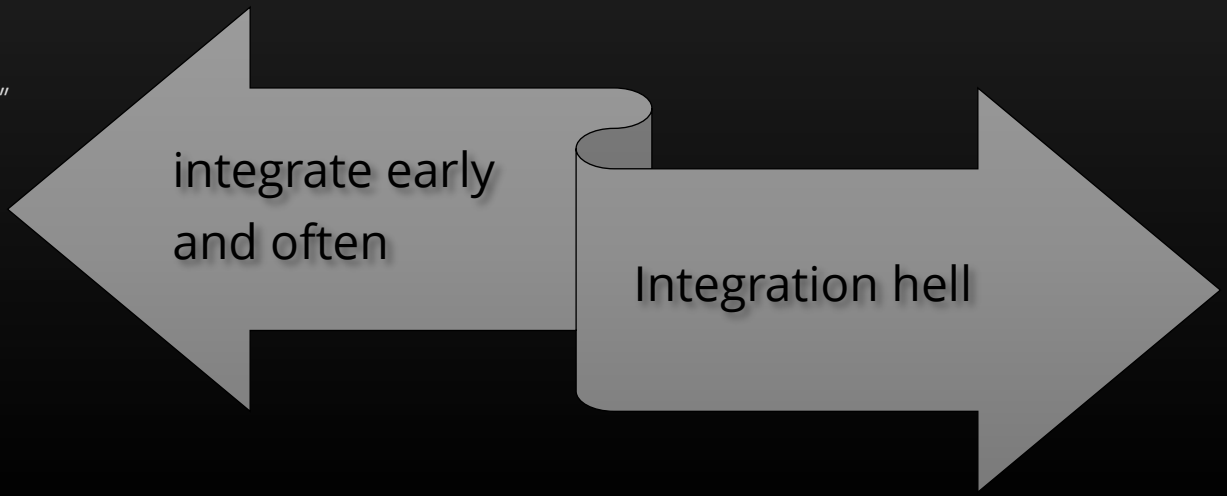
spot errors earlier

shared code ownership

everybody is co-responsible

big, unpredictable effort to integrate

app state is not executable most of the time



Suggested development workflow

1- Update from shared SCM

2- Code a new feature (tests + code) in a dedicate feature branch

3- Run automated build on local machine

Repeat #2 and #3 till tests pass

4- Commit (integrate with "central")

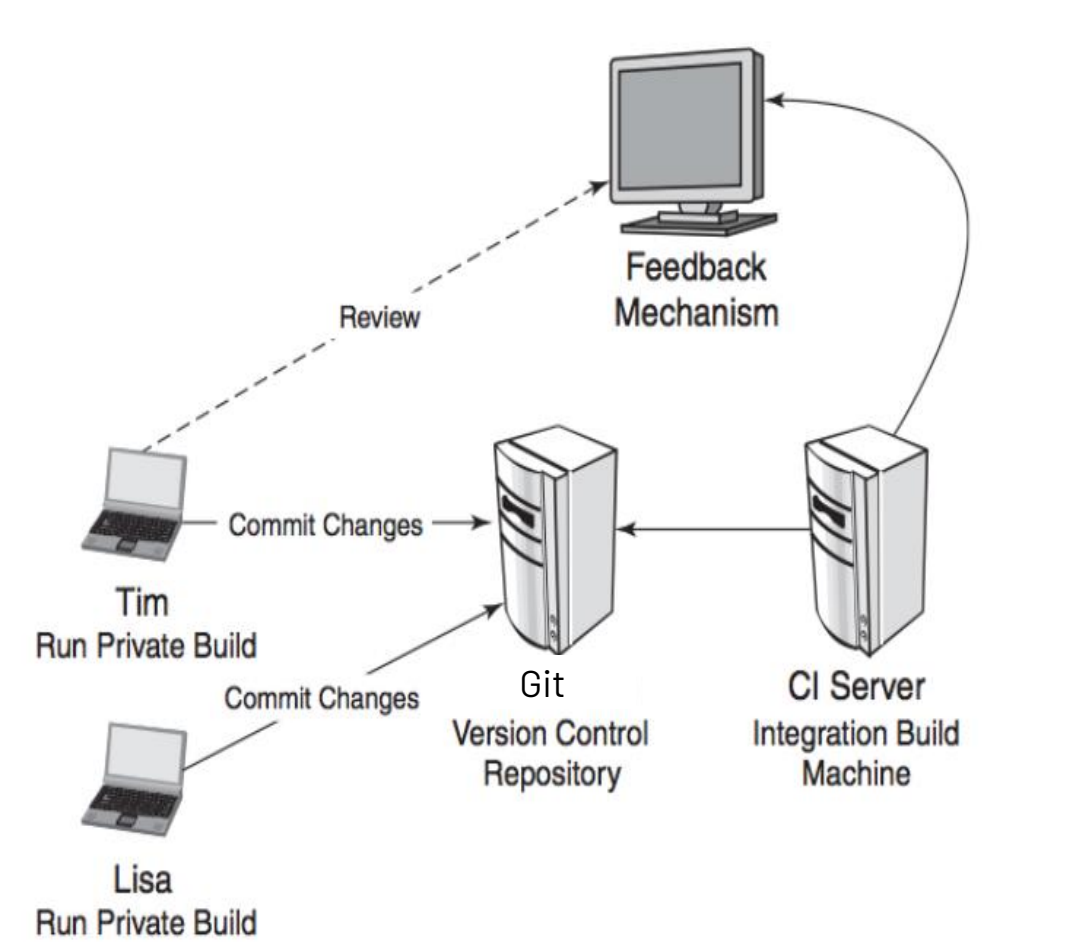
Pull requests advised (with peer code review)

5- Run a build on a clean machine

Update artifacts, update build status (feedback)

Immediately fix bugs and integration issues

Not only tools: CI culture required!



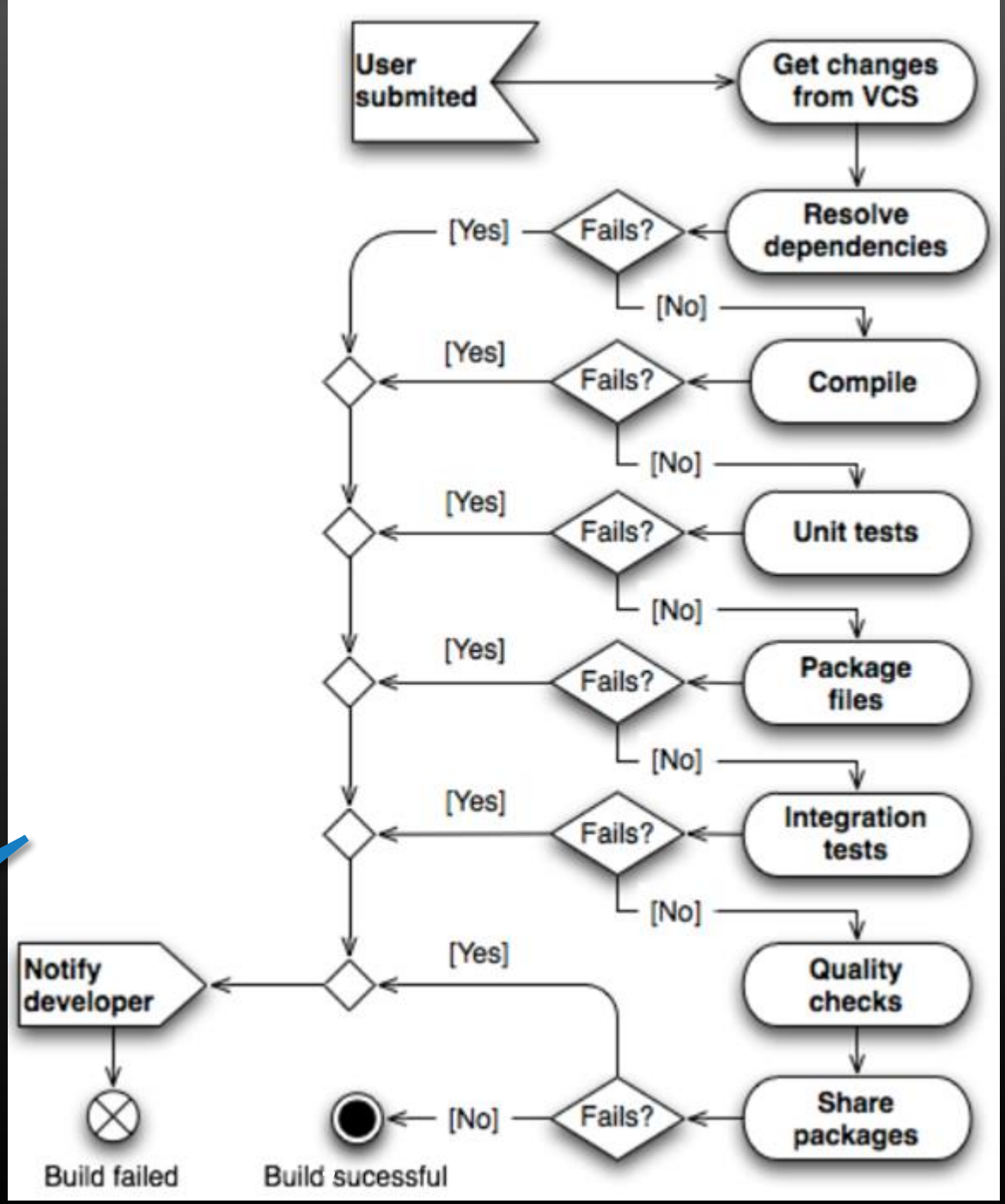
The build process

A build has several stages.

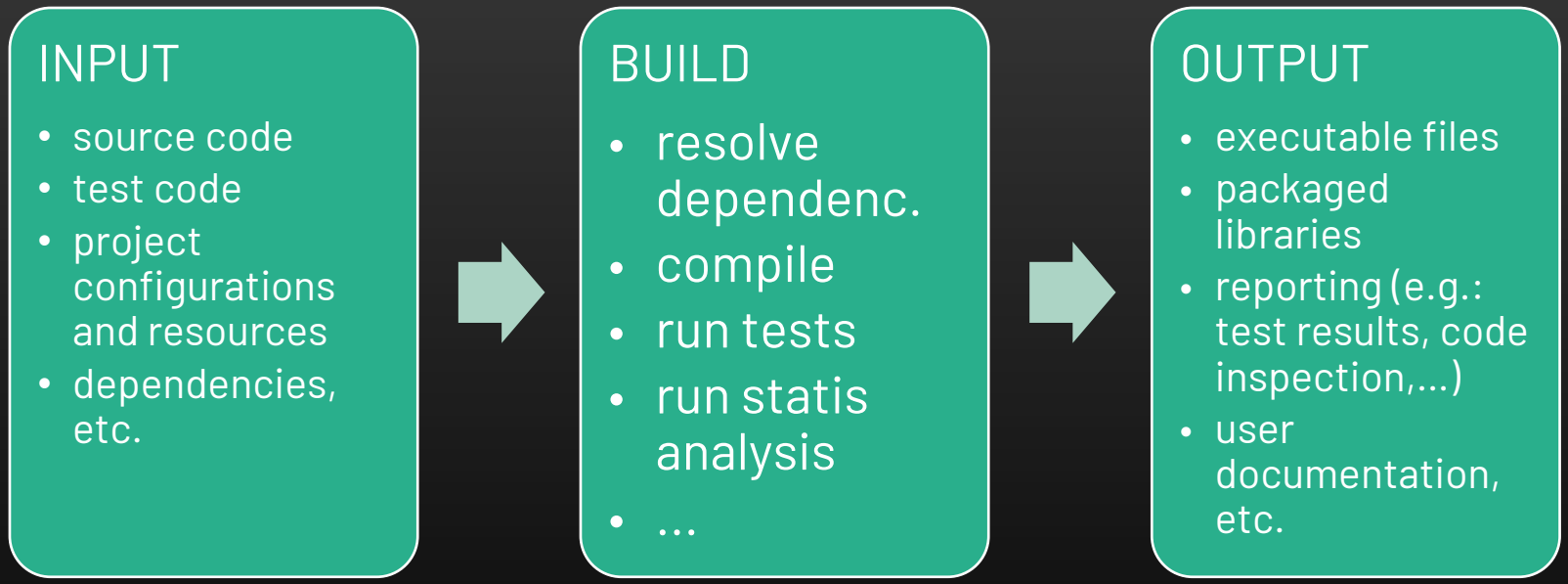
A successful build implies success in code correctness and quality checks.

Automatic build tools run quality checks (e.g.: unit testing, code inspections)

Not just compiling...



A *build* é mais que compilar...



Quality checks → análise estática do código

Analisar a qualidade do
Código sem o executar

- vulnerabilidades conhecidas
- potenciais erros (e.g.: *null pointers*,...)
- construções desaconselhadas

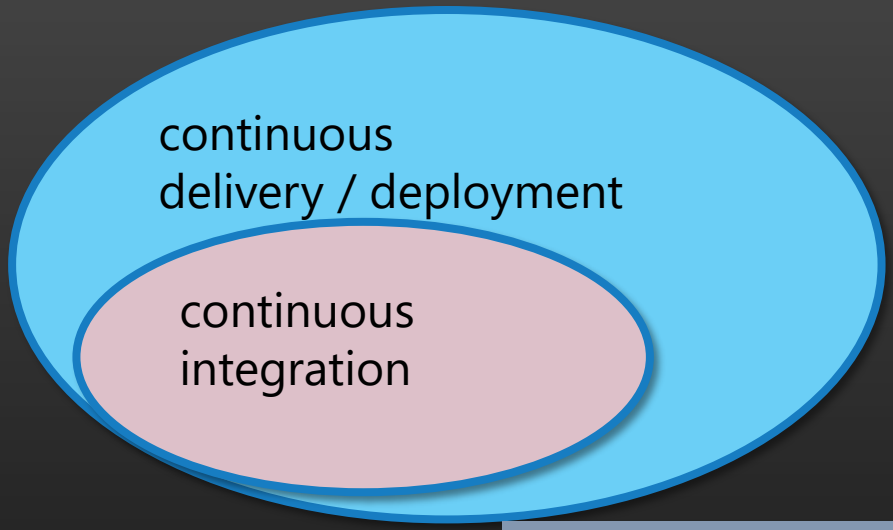
https://www.sonarqube.org/

Fowler's 10 CI practices

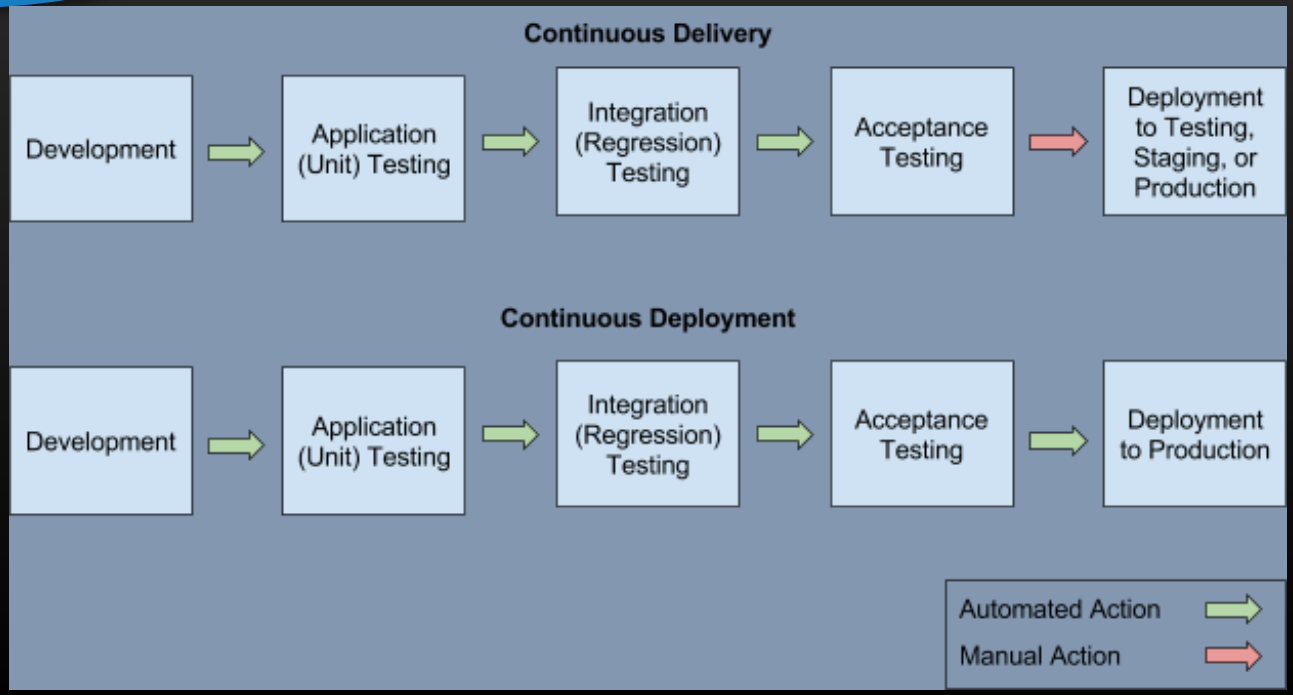
- Maintain a Single Source Repository.
- Automate the Build
- Make Your Build Self-Testing
- Everyone Commits To the Mainline Every Day
- Every Commit Should Build the Mainline on an Integration Machine
- Keep the Build Fast
- Test in a Clone of the Production Environment
- Make it Easy for Anyone to Get the Latest Executable
- Everyone can see what's happening
- Automate Deployment

http://martinfowler.com/articles/continuousIntegration.html

Termos relacionados



É possível fazer instalações frequentes, mas pode-se optar por não o fazer (geralmente relacionadas com a estratégia empresarial)



Continuous...

Continuous Delivery

sw development practice in which you build software in such a way that it **can be released** to production at any time.

You're doing continuous delivery when:

Focus on quality of working software

Your software is deployable throughout its lifecycle

Your **team prioritizes keeping the software deployable over working on new features**

Anybody can get fast, automated feedback on the production readiness

Continuous Deployment/release

every change goes through the pipeline and **automatically gets put** into production.

Focus on speed and agility to deploy to production

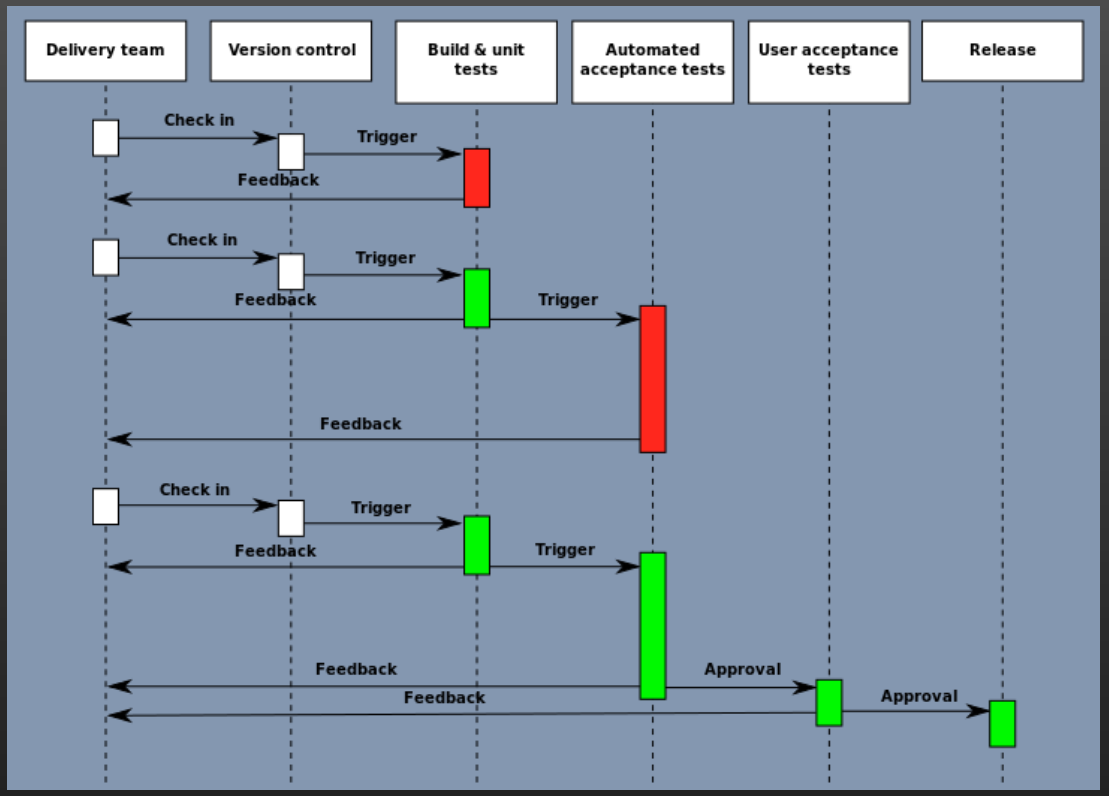
Continuous Integration

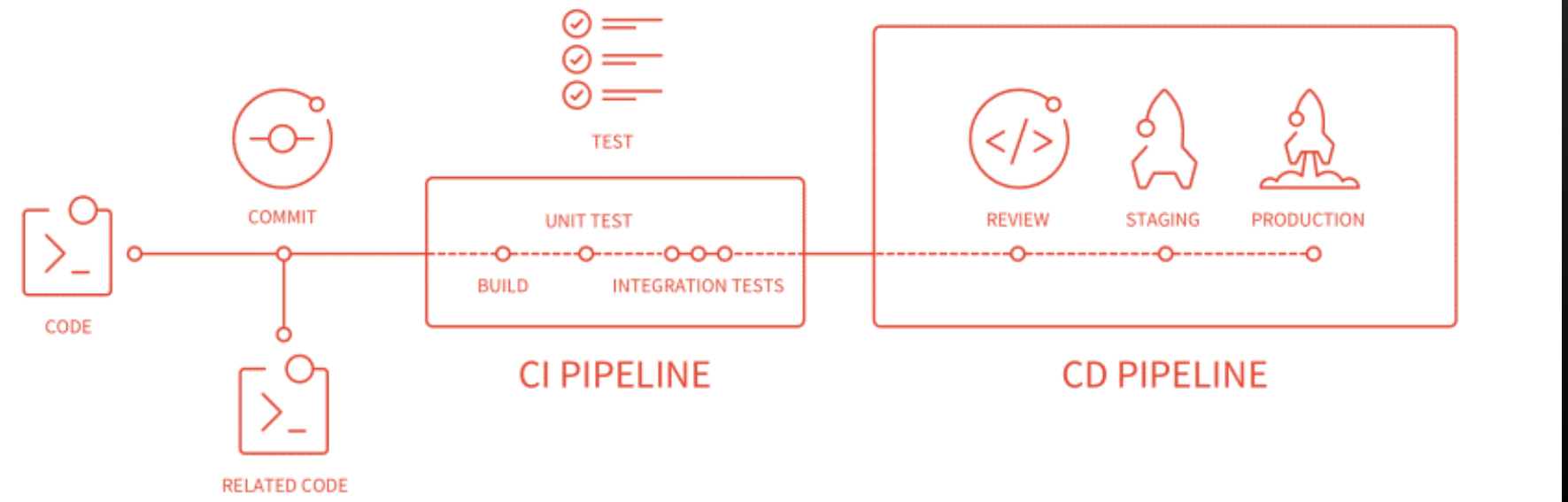
Automatically integrating, building, and testing code within the development environment.

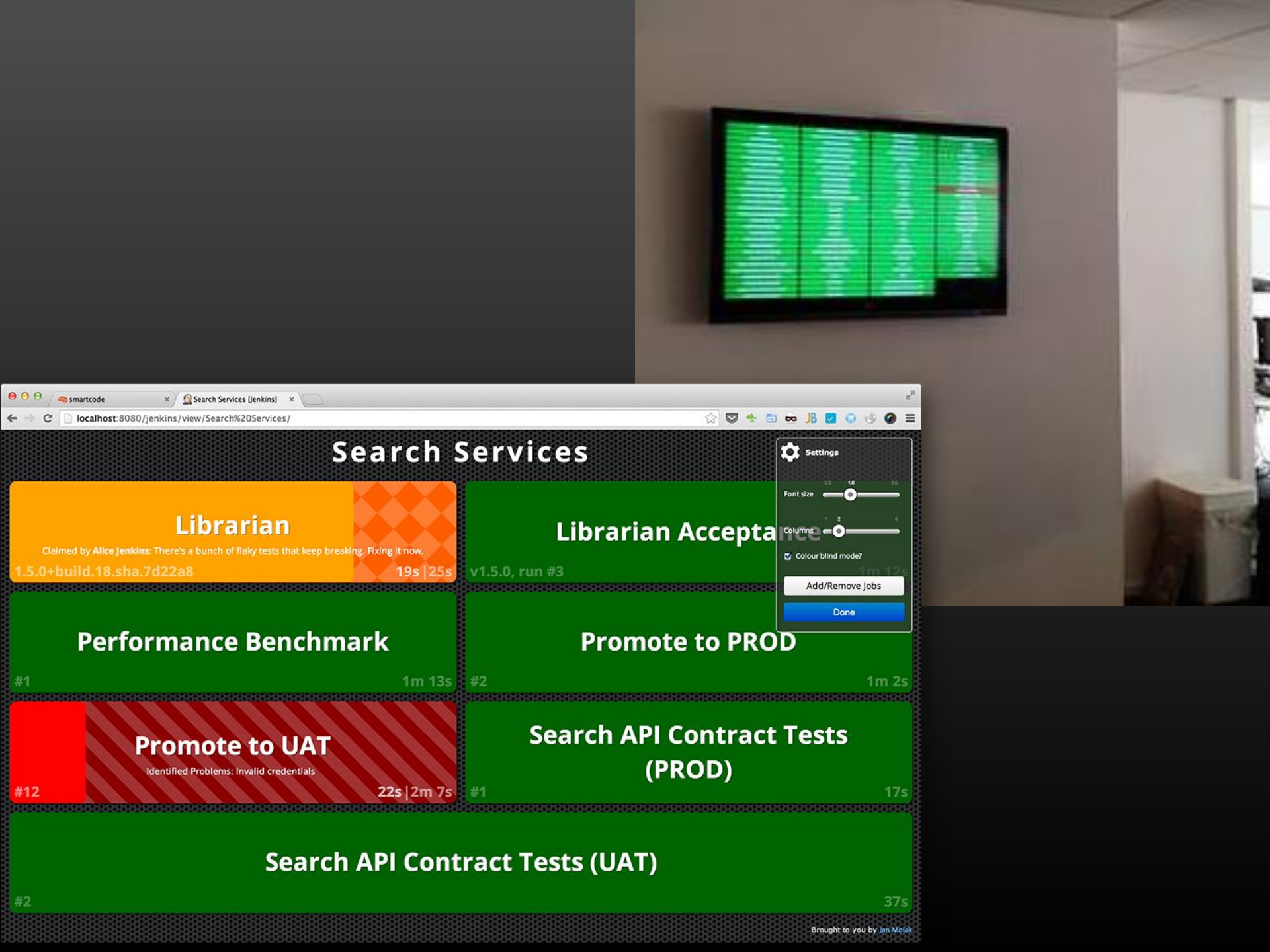
Pre-delivery steps.

Entrega continua

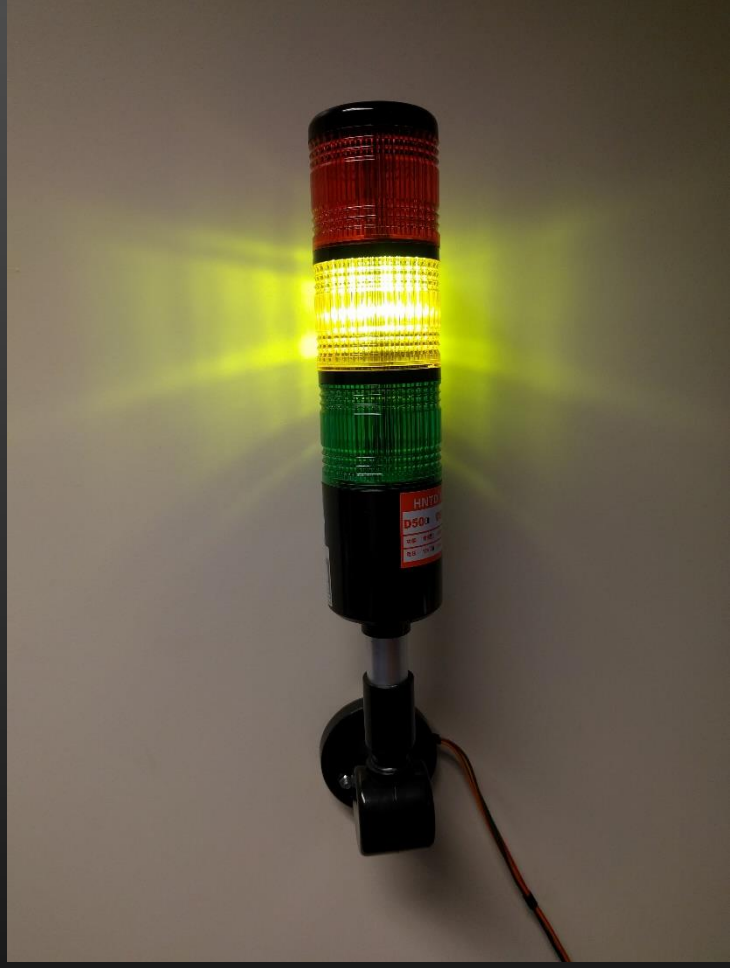
https://about.gitlab.com






smartcode
Search Services [Jenkins]
localhost:8080/jenkins/view/Search%20Services/
Search Services
Settings
Font size
Columns
Colour blind mode?
Add/Remove Jobs
Done
Librarian
Claimed by Alice Jenkins: There's a bunch of flaky tests that keep breaking. Fixing it now.
1.5.0+build.18.sha.7d22a8
19s | 25s
Librarian Acceptance
v1.5.0, run #3
1m 12s
Performance Benchmark
#1
1m 13s
Promote to PROD
#2
1m 2s
Promote to UAT
Identified Problems: Invalid credentials
#12
22s | 2m 7s
Search API Contract Tests (PROD)
#1
17s
Search API Contract Tests (UAT)
#2
37s
Brought to you by Jan Molak

Continuous feedback



Errors are easier to detect in an earlier stage, near the point where they have been introduced:

The detection mechanism of such bugs becomes simpler because the natural step in diagnosing the problem is to check what was the latest submitted change.

problems followed by atomic commits are easiest to correct than to fix several problems at once, after bulk commits

There must be an effective mechanism that automatically informs programmers, testers, database administrators and managers about the status of the build

Feedback → generate reaction in a more accurate and prompter way

Continuous testing

Quality checks at all system levels and involve all individuals, not just the elements of the QA team

Most of the tests can be automated and should be run in the CI pipeline to be carried out repeatedly:

unit testing, integration testing, regression testing, system testing, load and performance testing, etc.

Build tools can take a crucial role on automating tests

Pipeline as Code with Jenkins

The default interaction model with Jenkins, historically, has been very web UI driven, requiring users to manually create jobs, then manually fill in the details through a web browser. This requires additional effort to create and manage jobs to test and build multiple projects, it also keeps the configuration of a job to build/test/deploy separate from the actual code being built/tested /deployed. This prevents users from applying their existing CI/CD best practices to the job configurations themselves.

Pipeline

With the introduction of the Pipeline plugin, users now can implen
/deploy pipeline in a `Jenkinsfile` and store that alongside their co
another piece of code checked into source control.

Jenkins ♥ Continuous Delivery Articles

Multibranch Workflows in Jenkins
jenkins-ci.org

Continuous Delivery

fining
pipeline

A *continuous delivery (CD) pipeline* is an automated expression of your process for getting software from version control right through to your users and customers. Every change to your software (committed in source control) goes through a complex process on its way to being released. Pipeline provides an extensible set of tools for modeling simple-to-complex delivery pipelines "as code" via the Pipeline domain-specific language (DSL) syntax.

```
pipeline {
    agent {
        docker {
            image 'maven:3-alpine'
            args '-v /root/.m2:/root/.m2'
        }
    }
    options {
        skipStagesAfterUnstable()
    }
    stages {
        stage('Build') {
            steps {
                sh 'mvn -B -DskipTests clean package'
            }
        }
        stage('Test') {
            steps {
                sh 'mvn test'
            }
            post {
                always {
                    junit 'target/surefire-reports/*.xml'
                }
            }
        }
        stage('Deliver') { (1)
            steps {
                sh './jenkins/scripts/deliver.sh' (2)
            }
        }
    }
}
```

```
pipeline {
    agent any
    stages{
        stage('Build'){
            steps {
                sh 'mvn clean package'
            }
            post {
                success {
                    echo 'Now Archiving...'
                    archiveArtifacts artifacts: '**/target/*.war'
                }
            }
        }
        stage ('Deploy to Staging'){
            steps {
                build job: 'Deploy-to-staging'
            }
        }

        stage ('Deploy to Production'){
            steps{
                timeout(time:5, unit:'DAYS'){
                    input message:'Approve PRODUCTION Deployment?'
                }

                build job: 'Deploy-to-Prod'
            }
            post {
                success {
                    echo 'Code deployed to Production.'
                }

                failure {
                    echo ' Deployment failed.'
                }
            }
        }


    }
}
```

GitHub Actions

```yaml
steps:
  - uses: actions/checkout@v4
  - uses: actions/setup-java@v4
    with:
      java-version: '17'
      distribution: 'temurin'
  - name: Run the Maven verify phase
    run: mvn --batch-mode --update-snapshots verify
```

GitLab CI/CD

https://docs.gitlab.com/ee/ci/introduction/