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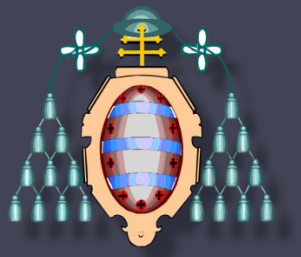

University of Oviedo

School of Computer Science

SOFTWARE ARCHITECTURE

Software Architecture

Lab. 08
TDD: Test-driven development
Code coverage(Codecov)
Continuous integration (GitHub Actions)
Tools to static analyze the code (SonarCloud)

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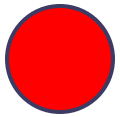
TDD

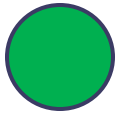
- Software development process where requirements are converted to specific test cases
- The opposite to software development that allows not tested software to be deployed
- Technique proposed by Kent Beck

TDD

Phases:

1. Add a test case
2. Execute test cases -> new one fails
3. Write the code
4. Execute all test cases
5. Code refactor





TDD

- Simple code created to satisfy the test case
- We get clean code as a result
- And a test-suite
- Helps focus to know what we want to implement

Codecov

- Coverage code tool
- Code coverage: Measure to show what code lines has been executed by a test suite
- Some terminology about CodeCov:
  - Hit: Line was executed
  - Partial: Line was not tested fully. Example: an if sentence with only one path tested.
  - Miss: Line was not executed

Codecov

- Coverage ratio is calculated with the following formula

  hits / (hits + misses + partials)

- After the tests, it generates a file that allows to do the analysis

  https://codecov.io/gh/arquisoft/dede_???

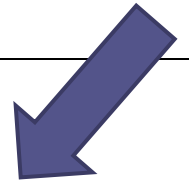
TDD – Example test

- Checking that the UserList component works well:
  - We create a list of users
  - We pass it to the UserList component
  - We check that both name and email are rendered

```
1   import React from 'react'
2   import { render } from "@testing-library/react";
3   import UserList from "./UserList";
4   import {User} from "../shared/shareddtypes";
5
6   test('check that the list of users renders propertly', async () => {
7       const userList:User[] = [{name: 'Pablo', email: 'gonzalezgpablo@uniovi.es' }];
8       const {getByText} = render(<UserList users={userList}/>);
9       expect(getByText(userList[0].name)).toBeInTheDocument();
10      expect(getByText(userList[0].email)).toBeInTheDocument();
11    });
```

TDD - Example test

- Checking that the EmailForm component works well:
  - Sometimes we need to mock some part of the application
  - If we didn't mock the api, our test would depend on the restapi
  - As these are unitary tests, we simulate that part of the app



```
6   jest.mock('../api/api');
7
8   test('check register fail', async () => {
9     jest.spyOn(api,'addUser').mockImplementation((user:User):Promise<boolean> => Promise.resolve(false))
10    await act(async () => {
11      const {container, getByText} = render(<EmailForm OnUserListChange={()=>{}}/>)
12      const inputName = container.querySelector('input[name="username"]')!;
13      const inputEmail = container.querySelector('input[name="email"]')!;
14      fireEvent.change(inputName, { target: { value: "Pablo" } });
15      fireEvent.change(inputEmail, { target: { value: "gonzalezgpablo@uniovi.es" } });
16      const button = getByText("Accept");
17      fireEvent.click(button);
18    });
19  })
```

Continuous Integration (CI)

- Development practice that requires developers to **integrate** code into a shared repository several times a day
- Every task to build the software is executed when some condition is met (for instance, a push a pull request, or the creation of a new release)

Continuous Integration (CI)

- Detect and solve problems continuously
- Always available
- Immediate execution of unit test cases and E2E tests.
- Automatic deployment
- Project quality monitorization.

Continuous Integration (CI)

- Examples:
  - Jenkins
  - Pipeline
  - Hudson
  - Apache Continuun
  - Travis
  - GitHub Actions

Continuous Integration (CI)

- Common usages:
  - Maintenance of the code in a repository
  - Building automation
  - Quick building
  - Execute test cases in a cloned production environment
  - Show results of last build.

GitHub Actions

- Continuous integration service for projects stored in GitHub
- Free for free software projects
- Configuration is in one or multiple YAML files inside the .github/workflows directory that is localized in the root directory of the project

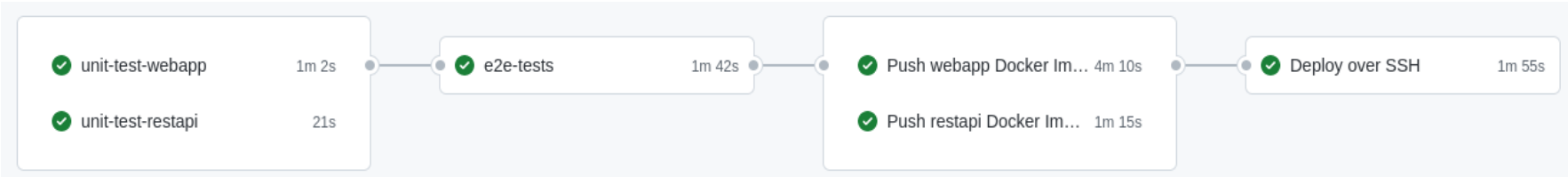
GitHub Actions

- .yml specifies:
  - Conditions for firing the process
  - List of jobs
    - Each executed in a specific environment
  - Steps to carry out the job (checkout, install dependencies, build and test)

```yaml
name: CI for ASW2122

on:
  release:
    types: [published]

jobs:
  unit-test-webapp:
    runs-on: ubuntu-latest
    defaults:
      run:
        working-directory: webapp
    steps:
    - uses: actions/checkout@v2
    - uses: actions/setup-node@v2
      with:
        node-version: 16
    - run: npm ci
    - run: npm test
    - uses: codecov/codecov-action@v2
```



GitHub Actions

- Each job can have a specific purpose (test a part of the app, deploy, etc.)
- GitHub actions can be used to automate other parts of the repository. Example: autoreply to new issues created in the repository

GitHub Actions

- *- uses: actions/checkout@v2.*
  - Uses an action created by the community.
  - In this case, it checks out the project to the runner
- *- uses: actions/setup-node@v2*
  with:
  node-version: 16
  - Installs node in the runner
- *- run: npm ci*
  - Runs a command (install the dependencies)
- *- run: npm test*
  - Executes the unitary tests. If some fail, the CI will fail

GitHub Actions

- We have jobs also to build the docker images and publish them to github
- Check the full documentation for the CI configuration

```
docker-push-webapp:
  name: Push webapp Docker Image to GitHub Packages
  runs-on: ubuntu-latest
  needs: [e2e-tests]
  steps:
  - uses: actions/checkout@v2
  - name: Publish to Registry
    uses: elgohr/Publish-Docker-Github-Action@3.04
    env:
      API_URI: http://${{ secrets.DEPLOY_HOST }}:5000/api
    with:
        name: pglez82/asw2122_0/webapp
        username: ${{ github.actor }}
        password: ${{ secrets.DOCKER_PUSH_TOKEN }}
        registry: ghcr.io
        workdir: webapp
        buildargs: API_URI
```

Static analysis of the code

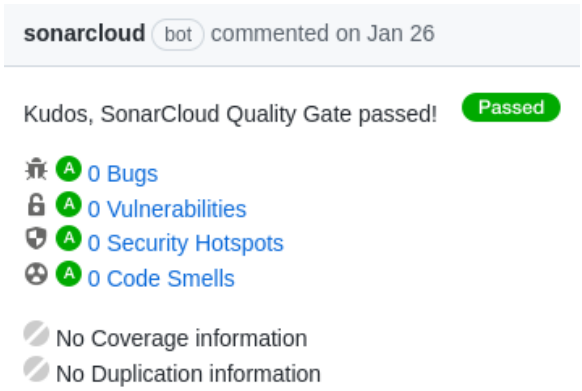
- Analyze the code without compiling it based in rules
- Detects bugs, code smells, system vulnerabilities, etc.
- Useful to control the code quality.
- If the code does not meet the quality requirements, then the commit can be blocked

SonarCloud

- Static code analysis tool
- It needs:
  - Git server like GitHub
  - Repository access
  - An accepted language
- Two types of analysis configuration:
  - **Automated Analysis** (Default). Code coverage not available. Scanner running in SonarCloud servers
  - **CI-based analysis**. Sonar scanner running at the project server and sending reports to SonarCloud.

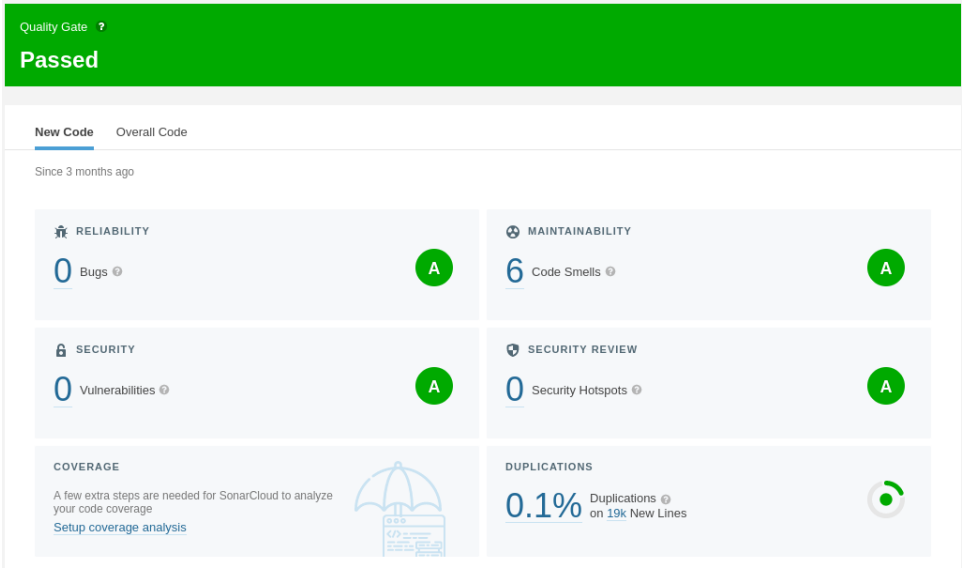
SonarCloud - dede_0 configuration

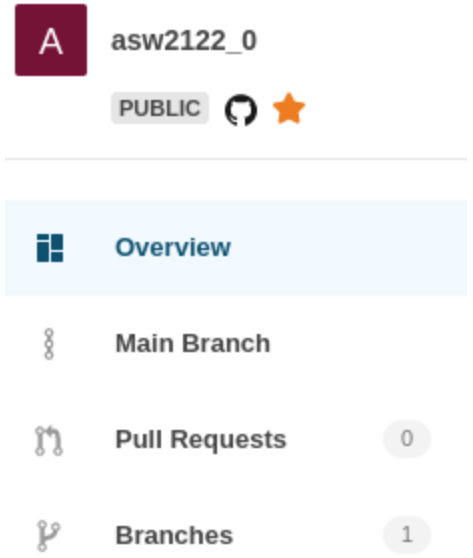
- After changes are pushed to the repository (example, a new pull request)
- We have information about the code quality of the pull request that we are merging to our project



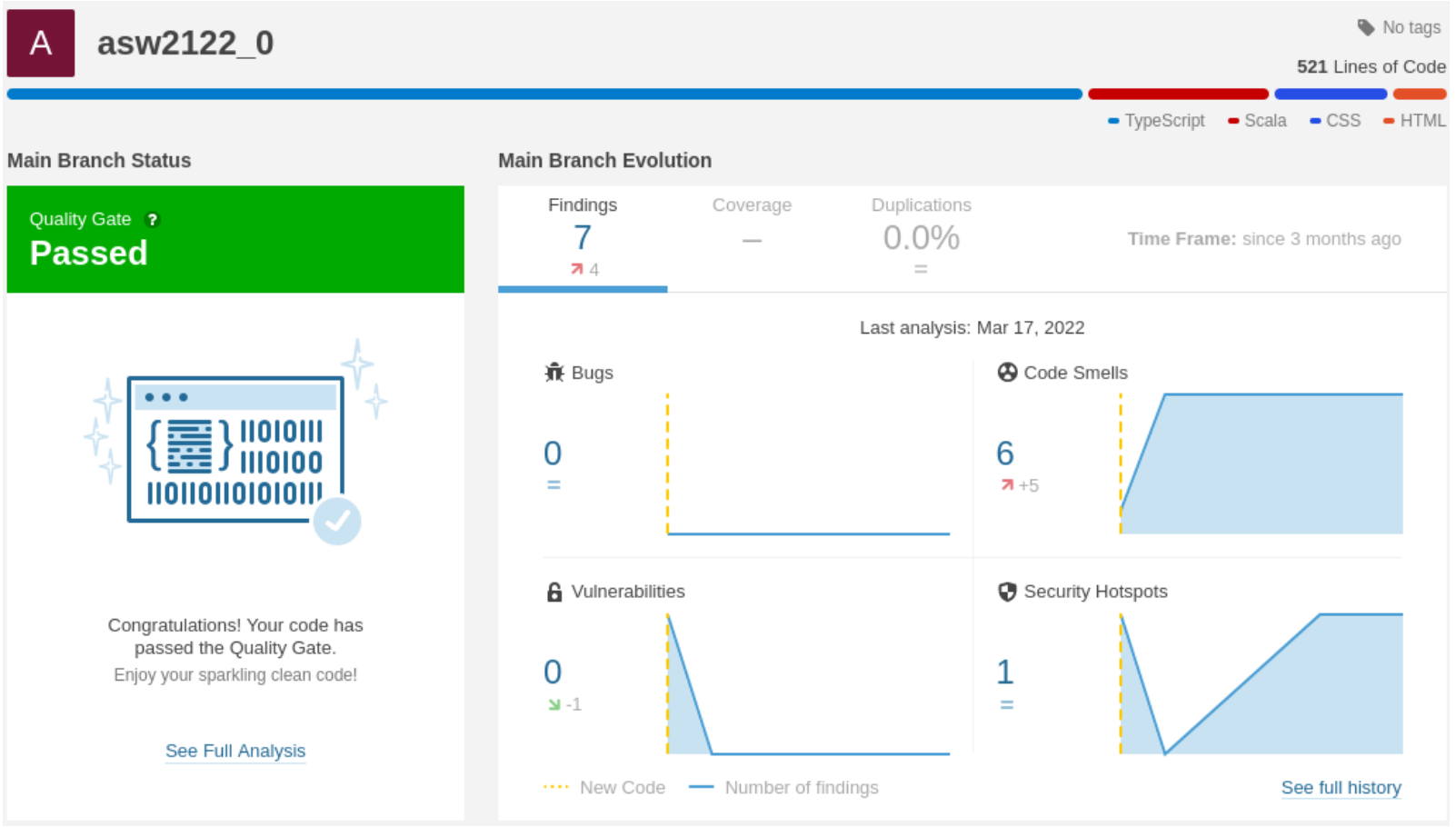
SonarCloud

- Sonarqube tool as a Service in the Cloud.
- In the Project Dashboard we can check project last analysis in the main branch, pull request and specific branches



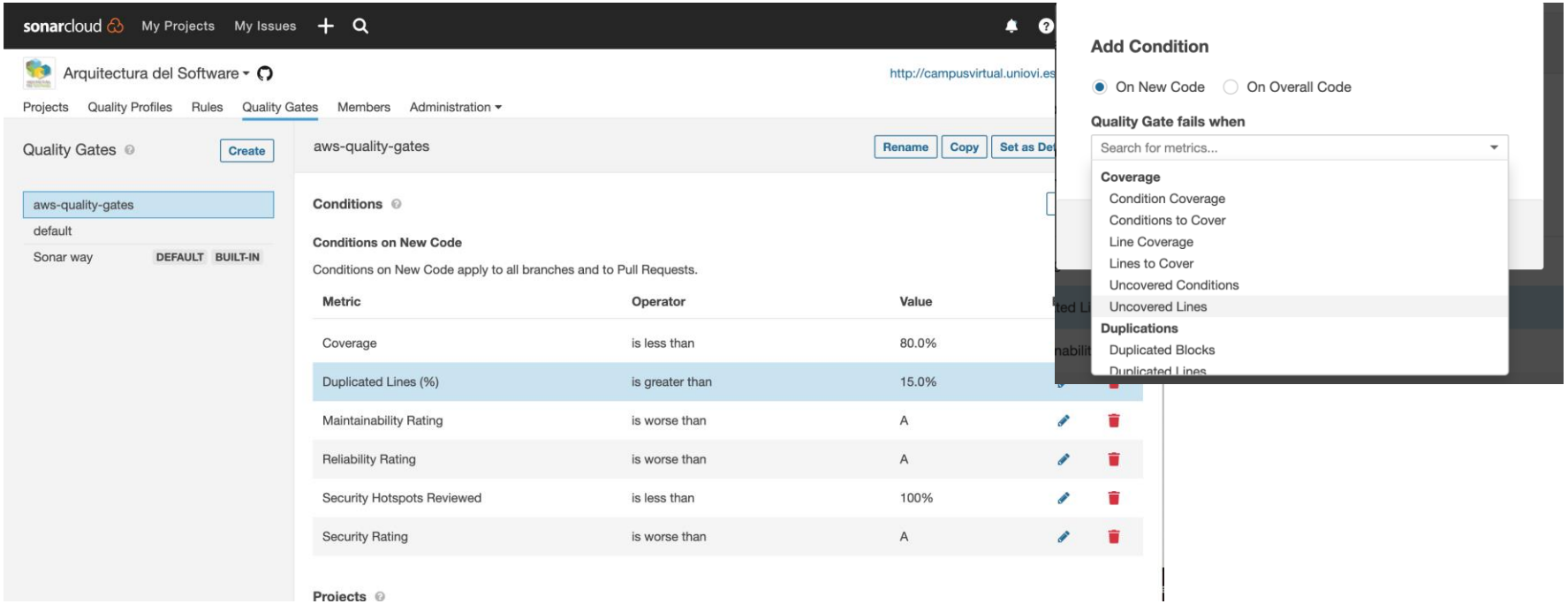


SonarCloud: Project certification and Quality evolution



SonarCloud: Quality Gates

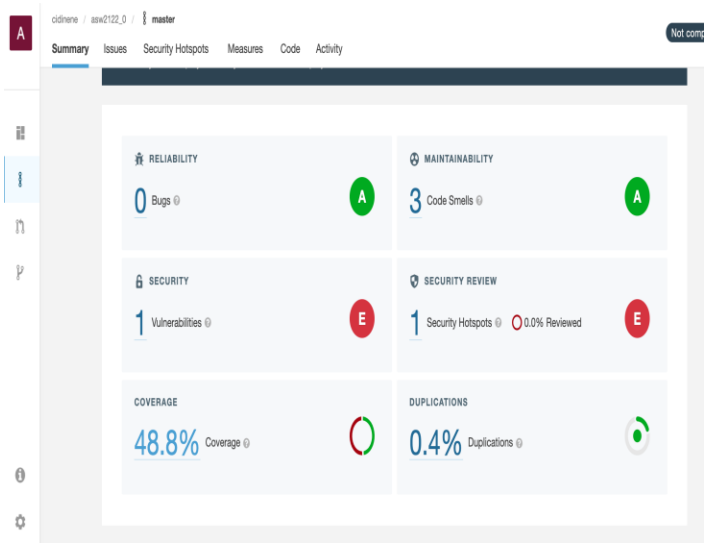
- At organization level, we can define the Quality Gates that our project must pass.



Example AWS-Quality-Gates , we increase the procentage of duplicate lines that can be found before launch exception

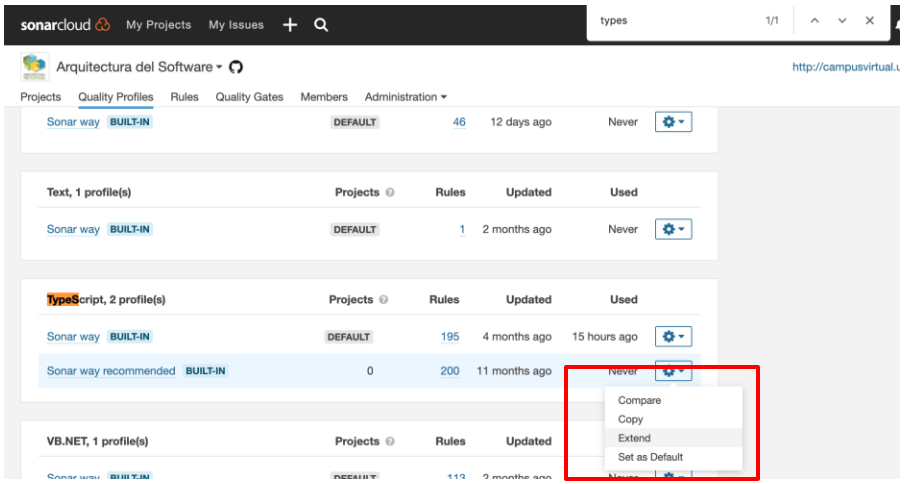
SonarCloud: Quality gates

- A **Quality Gate** is a set of conditions that our project should meet. That conditions include different aspect: code coverage, static code analyse based in rules, code duplicated, ..
- **Dede_o** default project uses code coverage with codecov. We can include SonarCloud code coverage to be computed in our quality gate. Manual: SONAR_COVERAGE_SETUP.md

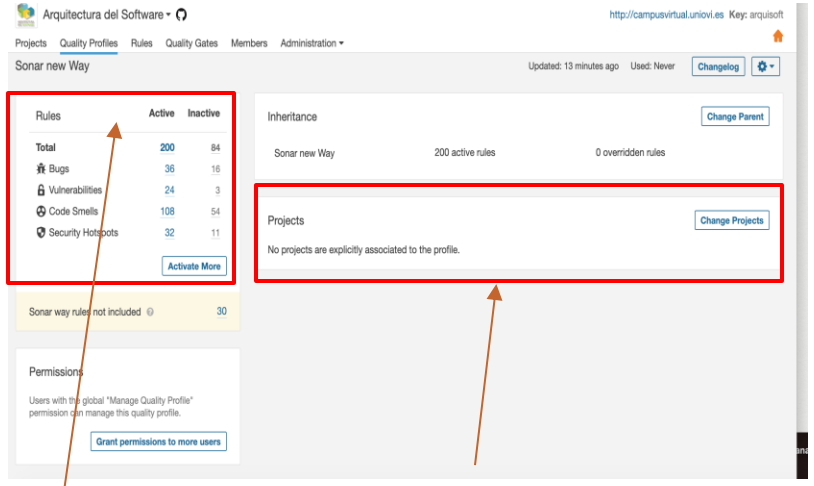


SonarCloud: Profiles and Rules

- Rules are defined at profile level
- We can add, desactivate, update rules creating a new profile : Copy a parent profile - change it - associate it to the project



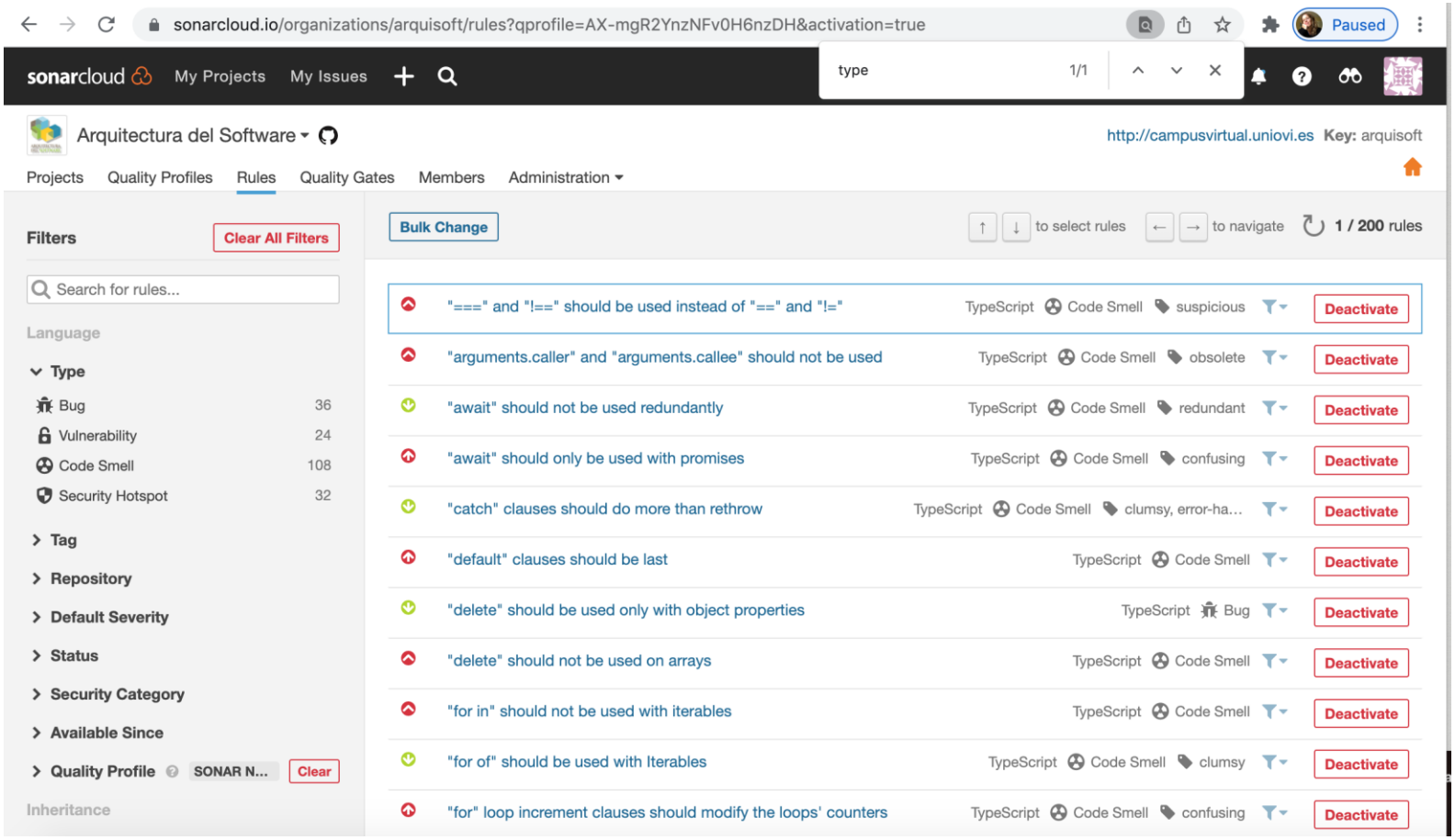
Create a new profile



Set the profile rules

Associate the profile to the project

Rules configuration



View alerts when coding

- https://marketplace.visualstudio.com/items?itemName=SonarSource.sonarlint-vscode