TQS: Quality Assurance manual

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1 Project management

1.1 Assigned roles

The team consists of a team coordinator, a product owner, a QA engineer, a DevOps master, and developers.

The assigned person and the responsibilities of each role are as follows:

Team Coordinator (Filipe Sousa): Ensure a fair distribution of tasks and that members adhere to the plan. Promote optimal collaboration within the team and proactively address any arising issues. Ensure timely delivery of the requested project outcomes.

Product owner (Daniel Simbe): Represents the interests of stakeholders and possesses a deep understanding of the product and the application domain, the team will turn to the Product Owner to clarify any questions about expected product features. Should be involved in accepting incremental solutions.

QA Engineer (Gonçalo Calvo): Responsible, in articulation with other roles, to promote the quality assurance practices and put in practice instruments to measure the quality of the deployment. Monitors that team follows agreed QA practices.

DevOps master (Filipe Sousa): Responsible for the (development and production) infrastructure and required configurations. Ensures that the development framework works properly. Leads the preparation of the deployment machine(s)/containers, git repository, cloud infrastructure, databases operations, etc.

Developer (All members of the team): Development tasks which can be tracked by monitoring the pull requests/commits in the team repository.

1.2 Backlog Grooming and Progress Monitoring

Backlog Structure:

Our project backlog is organized into iterations and categorized by statuses on the board:

IN DOING: Tasks prioritized for the current iteration.
I**N PROCESS:** Tasks currently in progress.
DONE: Completed tasks.

Git and CI/CD Integration:

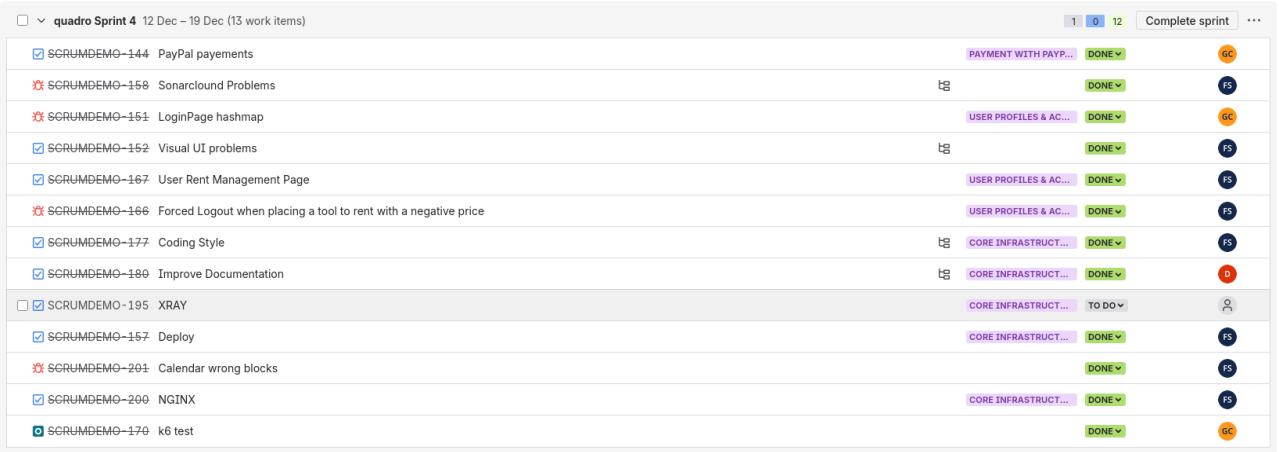
Branches: Created in Jira/GitHub and linked to the corresponding issue.

Pull Requests: Associated with tasks on the board.

Merge Criteria:

Mandatory review by another team member.

Passing automated tests (CI Pipeline Action).



2 Code quality management

2.1 Team policy for the use of generative AI

Regarding AI, we as a team decided to use it only for bug fixes when it took us too much time in our hands to deal with, and for generating boilerplate code examples, ensuring the code is always reviewed by a team member.

2.2 Guidelines for contributors

Coding style

The code style adopted for this project is prioritized by uniformity and the consistency rule in order to keep a more readable and consistent code.

For this project, we rely on the official Google Checkstyle and complement it with a custom Checkstyle file tailored to our codebase. Together, these configurations enforce Google's style rules while allowing a small set of project-specific adjustments.

Tools to use:

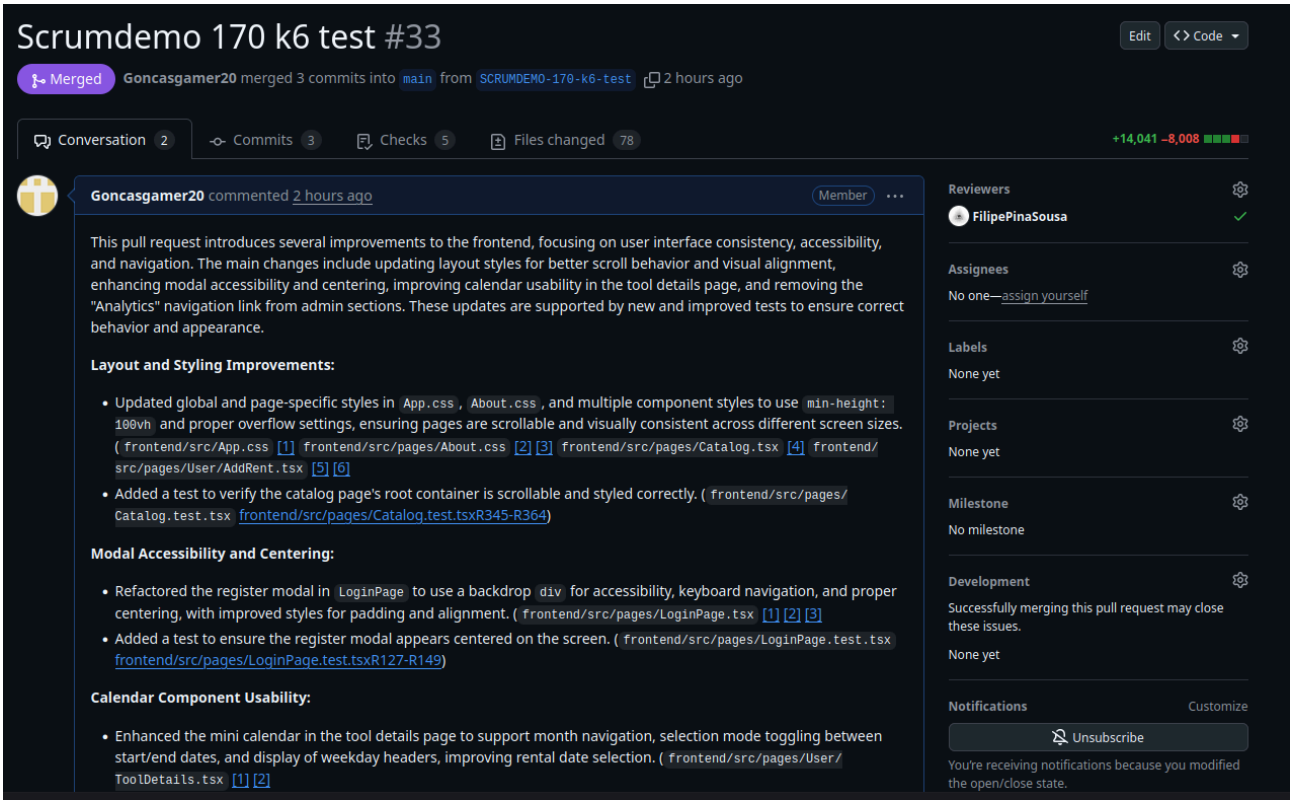
Java - Checkstyle

React + TypeScript - ESLint + @typescript-eslint

Code reviewing

Using GitHub Copilot as a reviewer on push and pull requests on the main branch as a helper on code review.

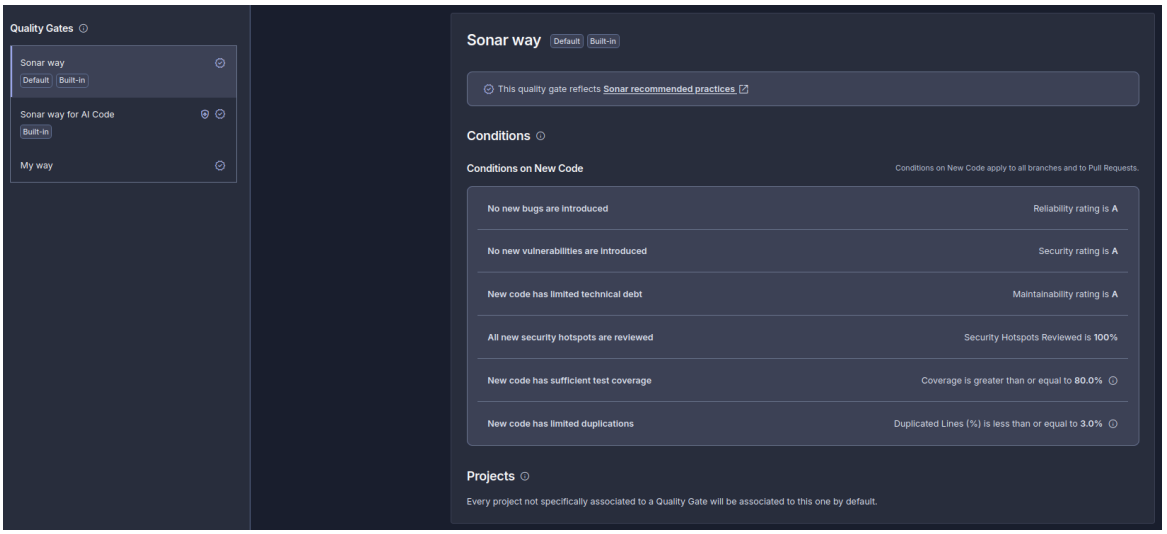
Also, have at least one team member to review pushes and PR to main branch of the project.



2.3 Code quality metrics and dashboards

For static code analysis, we opted to have a workflow with GitHub Actions which runs every time a push or a pull request is executed. It runs all tests, sends the code to be analyzed with SonarQube Cloud Service integrated on Github repository.

This creates issues in case the quality gate doesn't pass, and the developer must check and fix those issues. The default quality gate provided by the SonarQube is the used one with the duplicated code at 0.3% or greater and code coverage equal or greater than 80%.



3 Continuous delivery pipeline (CI/CD)

3.1 Development workflow

Coding workflow

Our project is organized in a single repository with the following modules:

```
├── backend
├── frontend
├── performance
├── docs
├── proxy
└── scripts
```

Regarding the division of branches, we do it as follows:

Main Branch: master (protected, merge only via Pull Request);

Secondary Branches: Created from backlog tasks.

Therefore, the work is done on different branches and commits are given to them. When the feature is completely implemented, it is given PR, with reviews and tests passed to the master branch.

Definition of done

A user story is only considered ready when it meets all of these points:

Functionality Implemented:

It does exactly what was requested in the task acceptance criteria.

Code Cleaned and Reviewed:

Another team member approved the code in the Pull Request.

It passed SonarQube analysis.

Testing Done and Approved:

Tests passed.

System Integration:

The code was merged into the main branch (master).

GitHub Actions, SonarCloud and CodeQL executed everything without errors (build, tests, deploy).

3.2 CI/CD pipeline and tools

Several CI/CD pipelines were implemented on GitHub Actions with the backup of SonarCloud quality tests.

For this project on GitHub it was created on a single repository it was created the following workflows:

Backend

Unit and integration backend tests, using JUnit and Cucumber

Upload of results to Sonar Cloud

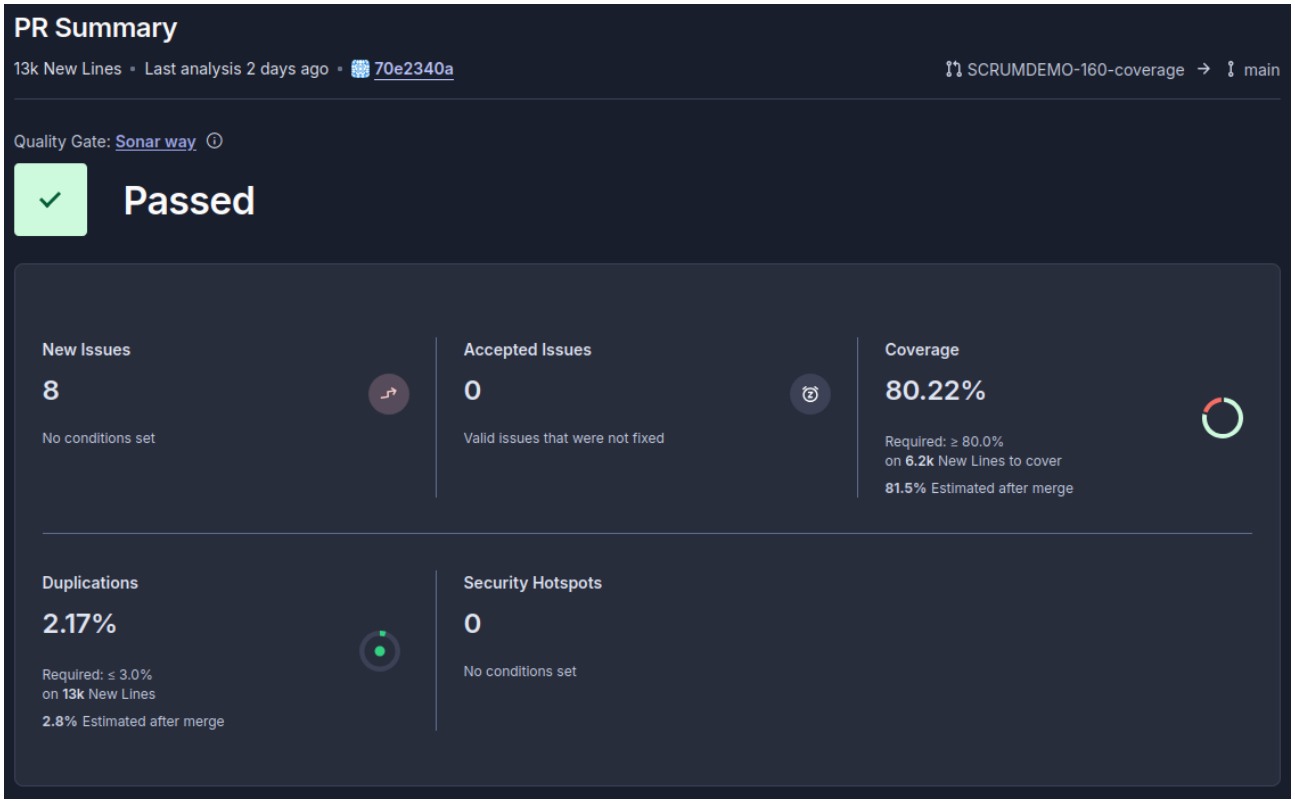
Frontend

Unit/E2E tests with Vitest and Cypress

SonarCloud analysis

K6 performance and metrics evaluation

After tests are run, SonarCloud comment on the Pull Request with the output of those tests.



4 Software testing

4.1 Overall testing strategy

To ensure coverage and efficiency, we use a mix of TDD (Test-Driven Development) and functional tests, automation for regression and CI enforcement:

- Test suites run locally and in CI (GitHub Actions); merges are gated on passing CI tests.
- Unit tests and small fast tests are used for API and domain logic.
- Integration and functional tests verify end-to-end flows and external integrations.
- BDD (Cucumber): Used for backend functional scenarios where acceptance criteria are expressed as Gherkin.
- SonarCloud is used for static code analysis and coverage reporting.

4.2 Functional testing and ATDD

Focus: User-facing behaviors (black-box testing) and acceptance criteria described in user stories.
When: For each user story with clear acceptance criteria (automated where possible).
Tools:
Cucumber (backend functional/BDD tests).
Frontend E2E is performed with Cypress.

4.3 Developer facing tests (unit, integration)

Unit Tests:

- **Tools:** JUnit (and Spring test utilities).
- **Goal:** High coverage for business logic; coverage measured with JaCoCo.

Integration Tests:

- **Tools:** Spring Boot integration tests executed with Maven (Surefire/Failsafe).
- **Goal:** Validate communication between controllers, services and the database.

4.4 Exploratory testing

Manual Exploratory Testing:

- Complements automation and is performed by team members.
- **Focus on scenarios not covered by automated tests, such as:**
  - Usability;
  - Complex edge cases;
  - Compatibility checks.

4.5 Non-function and architecture attributes testing

Performance and Monitoring

k6 performance test scripts locally runned

Security:

SonarQube