Static Testing Tools and White-box test design

Static Testing

Rubocop

Linting and style enforcement. Rules are defined in `./server/.rubocop.yml`.

```
# analyze project
bundle exec rubocop

# Run analyzer and make rubocop automatically fix linting issues
bundle exec rubocop -a
```

Successful rubocop:

```
bundle exec rubocop
Inspecting 114 files
.............................................................................
..................................

114 files inspected, no offenses detected
.rubocop.yml: Style/SpaceInsideArrayLiteralBrackets has the wrong namespace -
replace it with Layout/SpaceInsideArrayLiteralBrackets
```

Linting errors highlighted by rubocop

```
bundle exec rubocop
Inspecting 114 files
.....C..............................................................
..................................

Offenses:

app/controllers/api/v1/auth_controller.rb:10:19: C: [Correctable]
Layout/SpaceInsideReferenceBrackets: Do not use space inside reference
brackets.
    code = params[ :code ]
                  ^
app/controllers/api/v1/auth_controller.rb:10:25: C:
Layout/SpaceInsideReferenceBrackets: Do not use space inside reference
brackets.
    code = params[ :code ]
                        ^
app/controllers/api/v1/auth_controller.rb:18:19: C: [Correctable]
Style/StringLiterals: Prefer single-quoted strings when you don't need string
interpolation or special symbols.
      redirect_to "https://munchora.pro/home"
                  ^^^^^^^^^^^^^^^^^^^^^^^^^^^


114 files inspected, 3 offenses detected, 2 offenses autocorrectable
.rubocop.yml: Style/SpaceInsideArrayLiteralBrackets has the wrong namespace -
replace it with Layout/SpaceInsideArrayLiteralBrackets
```

SonarQube

SonarQube (https://www.sonarsource.com/) a *static code analysis tool* that automatically inspects code for bugs, vulnerabilities, code smells, and test coverage without running the program.

SonarQube can be run through the use of Docker (https://medium.com/@index23/start-sonarqube-server-and-run-analyses-locally-with-docker-4550eb7112a3)

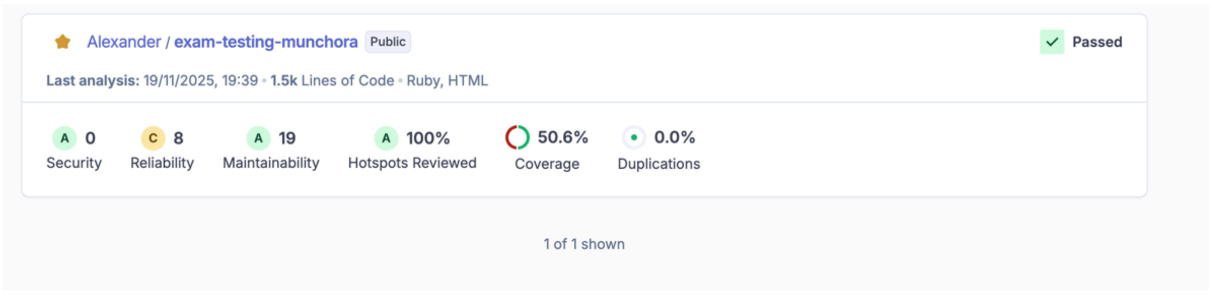
```
cd ./server
docker-compose -f docker-compose-sonar-qube.yml up
```

Go to **SonarQube dashboard** on `http://localhost:9000` - default credentials are login: `admin` password: `admin`

Use following command to scan project with *SonnarScanner*:

```
docker run \
    --rm \
    -v "$(pwd):/usr/src" \
    --network="host" \
    -e SONAR_HOST_URL="http://localhost:9000" \
    -e SONAR_SCANNER_OPTS="-Dsonar.projectKey=server -Dsonar.sources=./ -
Dsonar.test=test -Dsonar.javascript.lcov.reportPaths=test/coverage/lcov.info" \
    -e SONAR_TOKEN="${SONAR_TOKEN}" \
    sonarsource/sonar-scanner-cli
```

Sonarqube do also provide a cloud based solution which can be included in CI pipeline:



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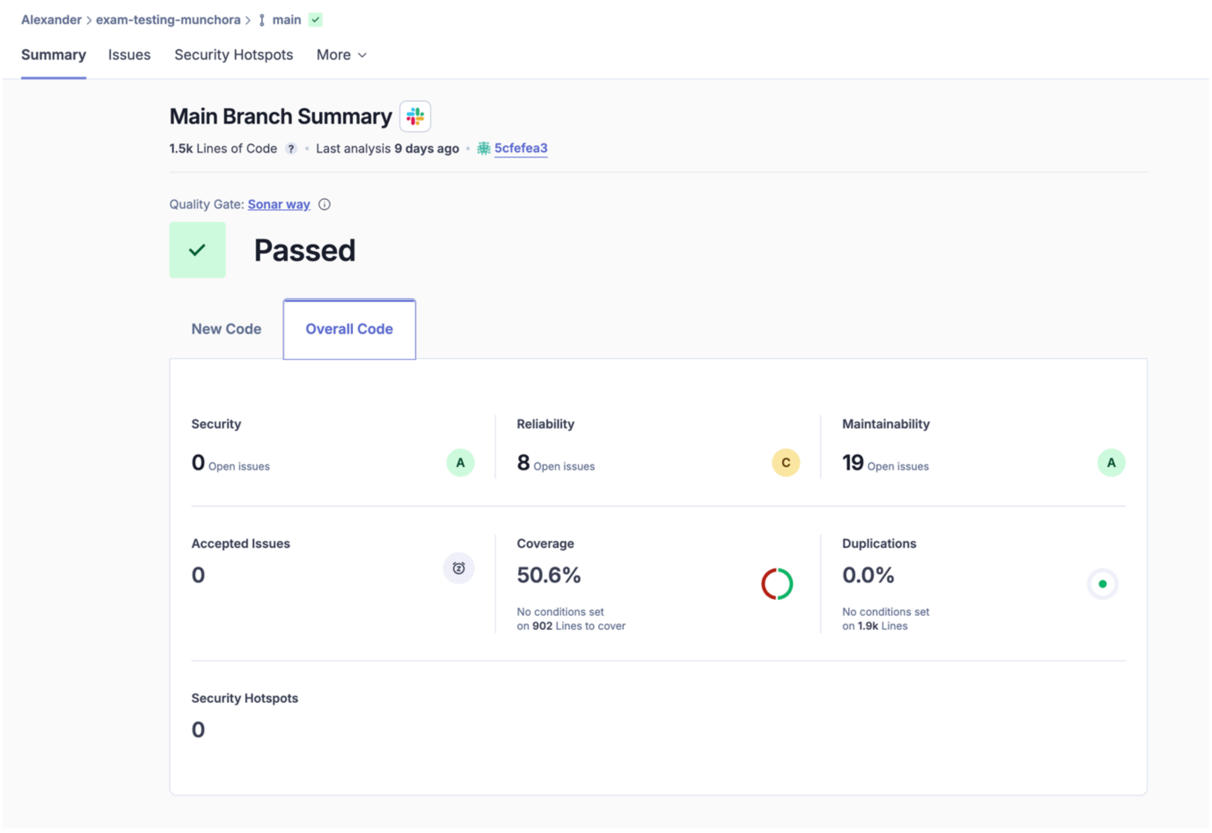
Passed

Last analysis: 19/11/2025, 19:39 • 1.5k Lines of Code • Ruby, HTML

A 0	C 8	A 19	A 100%	50.6%	0.0%
Security	Reliability	Maintainability	Hotspots Reviewed	Coverage	Duplications

1 of 1 shown



Alexander > exam-testing-munchora > main

Main Branch Summary

1.5k Lines of Code • Last analysis 9 days ago • 5cfefea3

Quality Gate: Sonar way

Passed

Security 0 Open issues A	Reliability 8 Open issues C	Maintainability 19 Open issues A
Accepted Issues 0	Coverage 50.6% No conditions set on 902 Lines to cover	Duplications 0.0% No conditions set on 1.9k Lines
Security Hotspots 0		

White Box Design Techniques

Focuses on the code and the structural elements.

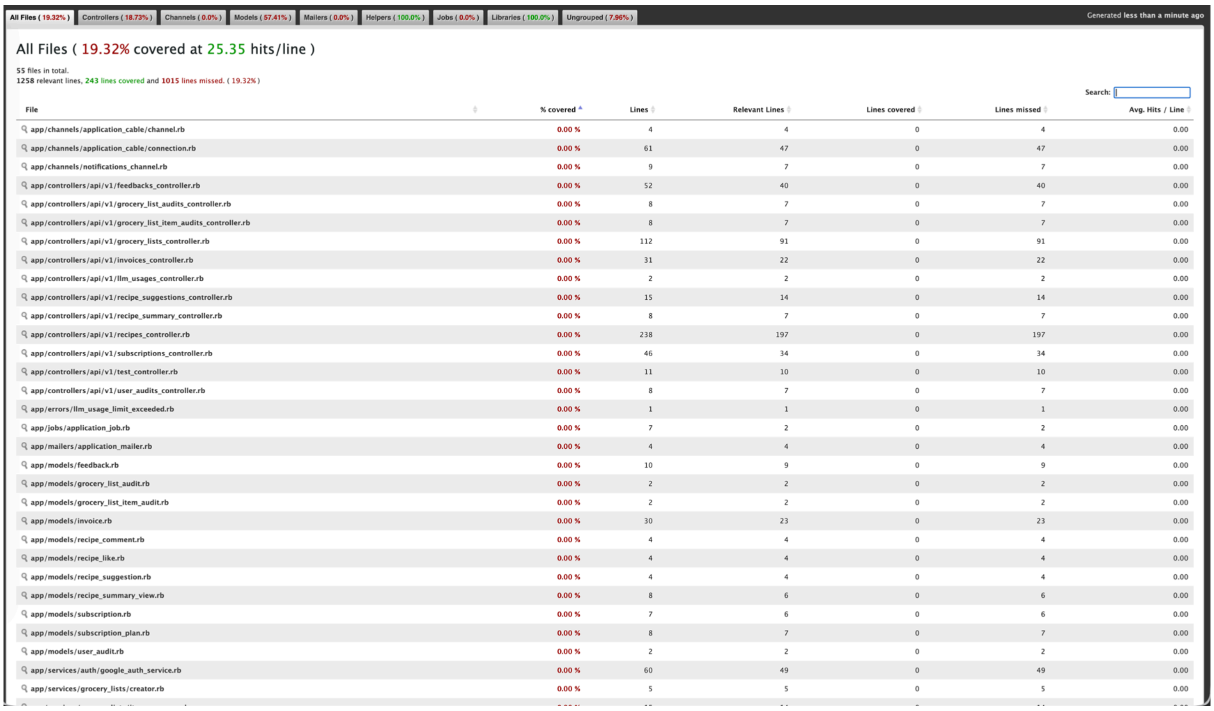
Statement Coverage: Measures whether each line of code has been executed by the test suite at least once. **decision coverage**: Measures whether **each decision (true/false outcome) of every conditional statement** has been exercised at least once.

The code coverage is collected by *rspec* and *simplecov*, so whenever test command `bundle exec rspec` is executed a coverage report is generated in JSON and HTML located at `./server/coverage/index.html` showing line-by-line coverage and totals.

Default *simplecov* measures coverage by line coverage which can be an issue with ternary operator/one line conditionals `number.odd? ? "odd" : "even"`

it can be set to use branch coverage instead:

```
SimpleCov.start do
  enable_coverage :branch
end
```



All Files (19.32% covered at 25.35 hits/line)

55 files in total.
1258 relevant lines, 243 lines covered and 1015 lines missed. (19.32%)

File	% covered	Lines	Relevant Lines	Lines covered	Lines missed	Avg. Hits / Line
app/channels/application_cable/channel.rb	0.00 %	4	4	0	4	0.00
app/channels/application_cable/connection.rb	0.00 %	61	47	0	47	0.00
app/channels/notifications_channel.rb	0.00 %	9	7	0	7	0.00
app/controllers/api/v1/feedbacks_controller.rb	0.00 %	52	40	0	40	0.00
app/controllers/api/v1/grocery_list_audits_controller.rb	0.00 %	8	7	0	7	0.00
app/controllers/api/v1/grocery_list_item_audits_controller.rb	0.00 %	8	7	0	7	0.00
app/controllers/api/v1/grocery_lists_controller.rb	0.00 %	112	91	0	91	0.00
app/controllers/api/v1/invoices_controller.rb	0.00 %	31	22	0	22	0.00
app/controllers/api/v1/llm_usages_controller.rb	0.00 %	2	2	0	2	0.00
app/controllers/api/v1/recipe_suggestions_controller.rb	0.00 %	15	14	0	14	0.00
app/controllers/api/v1/recipe_summary_controller.rb	0.00 %	8	7	0	7	0.00
app/controllers/api/v1/recipes_controller.rb	0.00 %	238	197	0	197	0.00
app/controllers/api/v1/subscriptions_controller.rb	0.00 %	46	34	0	34	0.00
app/controllers/api/v1/test_controller.rb	0.00 %	11	10	0	10	0.00
app/controllers/api/v1/user_audits_controller.rb	0.00 %	8	7	0	7	0.00
app/errors/llm_usage_limit_exceeded.rb	0.00 %	1	1	0	1	0.00
app/jobs/application_job.rb	0.00 %	7	2	0	2	0.00
app/mailers/application_mailer.rb	0.00 %	4	4	0	4	0.00
app/models/feedback.rb	0.00 %	10	9	0	9	0.00
app/models/grocery_list_audit.rb	0.00 %	2	2	0	2	0.00
app/models/grocery_list_item_audit.rb	0.00 %	2	2	0	2	0.00
app/models/invoice.rb	0.00 %	30	23	0	23	0.00
app/models/recipe_comment.rb	0.00 %	4	4	0	4	0.00
app/models/recipe_like.rb	0.00 %	4	4	0	4	0.00
app/models/recipe_suggestion.rb	0.00 %	4	4	0	4	0.00
app/models/recipe_summary_view.rb	0.00 %	8	6	0	6	0.00
app/models/subscription.rb	0.00 %	7	6	0	6	0.00
app/models/subscription_plan.rb	0.00 %	8	7	0	7	0.00
app/models/user_audit.rb	0.00 %	2	2	0	2	0.00
app/services/auth/google_auth_service.rb	0.00 %	60	49	0	49	0.00
app/services/grocery_lists/creator.rb	0.00 %	5	5	0	5	0.00

User creation | User #initialize

Test cases 100% statement coverage

```
#1. first_name="John", last_name="Doe", email="john@doe.com", provider=nil,
uid=nil, password="secret123"
    # TRUE path provider.blank? & TRUE :password is_a?(String)

#2. first_name="John", last_name="Doe", email="john@doe.com",
provider="google", uid="abc123", password=nil
    # TRUE branch of both provider.present? and uid.present?
```

Test cases 100% decision coverage

```
#1. first_name="John", last_name="Doe", email="john@doe.com", provider=nil,
uid=nil, password="secret123"
    # TRUE path for provider.blank? and TRUE for :password is_a?(String)

#2. first_name="John", last_name="Doe", email="john@doe.com", provider=nil,
uid=nil, password=1234
    # FALSE branch of :pasword is_a?(String)

#3. first_name="John", last_name="Doe", email="john@doe.com",
provider="google", uid=nil, password=nil
    # FALSE branch of uid.present? when provider.present?

#3. first_name="John", last_name="Doe", email="john@doe.com",
provider="google", uid="abc123", password=nil
    # TRUE branch of both provider.present? and uid.present?
```