

Mutation Coverage

Contract Microservice: Controller

Before adjusting the tests, the ContractController had 0% coverage. The issue that we focused on was that the result was not validated, thus there were no assertions for the returning values. This resulted in the mutants producing a valid Contract, but we did not check whether the contract they produced were actually “correct”, meaning that the fields assigned were correct. After adjusting the tests, the ContractController had 36% coverage for mutation testing, as seen in the image below.

Before Refactoring Tests

Breakdown by Package

Name	Number of Classes	Line Coverage	Mutation Coverage
nl.tudelft.sem.contract.config	2	0% <div>0/13</div>	0% <div>0/6</div>
nl.tudelft.sem.contract.controller	2	100% <div>27/27</div>	0% <div>0/14</div>
nl.tudelft.sem.contract.service	2	100% <div>91/91</div>	89% <div>54/61</div>

After Refactoring Tests

Pit Test Coverage Report

Project Summary

Number of Classes	Line Coverage	Mutation Coverage
6	90% <div>118/131</div>	73% <div>59/81</div>

Breakdown by Package

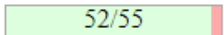
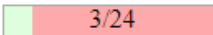
Name	Number of Classes	Line Coverage	Mutation Coverage
nl.tudelft.sem.contract.config	2	0% <div>0/13</div>	0% <div>0/6</div>
nl.tudelft.sem.contract.controller	2	100% <div>27/27</div>	36% <div>5/14</div>
nl.tudelft.sem.contract.service	2	100% <div>91/91</div>	89% <div>54/61</div>

Student Microservice: Controller

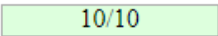
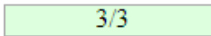
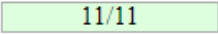
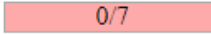
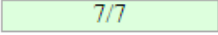
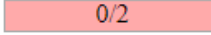
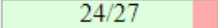
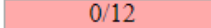
Before adjusting the tests, the Student Controller had 0% coverage. The issue was that the result was not validated, there were no assertions for the returning values.

After adjusting the tests, the Student Controller had 100% coverage for mutation testing, as seen in the image below.

nl.tudelft.sem.student.controller

Number of Classes	Line Coverage	Mutation Coverage
4	95%  52/55	13%  3/24

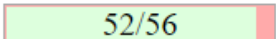
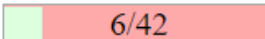
Breakdown by Class

Name	Line Coverage	Mutation Coverage
StudentController.java	100%  10/10	100%  3/3
StudentControllerContract.java	100%  11/11	0%  0/7
StudentControllerFeedback.java	100%  7/7	0%  0/2
StudentControllerRequest.java	89%  24/27	0%  0/12

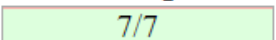
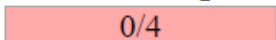
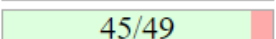
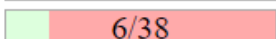
Request Microservice: RequestController

1. Before:

nl.tudelft.sem.request.controller

Number of Classes	Line Coverage	Mutation Coverage
2	93%  52/56	14%  6/42

Breakdown by Class

Name	Line Coverage	Mutation Coverage
ModificationController.java	100%  7/7	0%  0/4
RequestController.java	92%  45/49	16%  6/38

2. After:

nl.tudelft.sem.request.controller

Number of Classes	Line Coverage	Mutation Coverage
2	93% <div><div>52/56</div></div>	55% <div><div>23/42</div></div>

Breakdown by Class

Name	Line Coverage	Mutation Coverage
ModificationController.java	100% <div><div>7/7</div></div>	0% <div><div>0/4</div></div>
RequestController.java	92% <div><div>45/49</div></div>	61% <div><div>23/38</div></div>

3. Commit:

<https://gitlab.ewi.tudelft.nl/cse2115/2021-2022/sem-group-04b/sem-repo-04b/-/commit/f0f4e3c911989964b062dee7238601871a295952>

Request Microservice: ModificationController

1. Before:

nl.tudelft.sem.request.controller

Number of Classes	Line Coverage	Mutation Coverage
2	93% <div><div>52/56</div></div>	55% <div><div>23/42</div></div>

Breakdown by Class

Name	Line Coverage	Mutation Coverage
ModificationController.java	100% <div><div>7/7</div></div>	0% <div><div>0/4</div></div>
RequestController.java	92% <div><div>45/49</div></div>	61% <div><div>23/38</div></div>

2. After:

nl.tudelft.sem.request.controller

Number of Classes	Line Coverage	Mutation Coverage
2	93% <div><div>52/56</div></div>	64% <div><div>27/42</div></div>

Breakdown by Class

Name	Line Coverage	Mutation Coverage
ModificationController.java	100% <div><div>7/7</div></div>	100% <div><div>4/4</div></div>
RequestController.java	92% <div><div>45/49</div></div>	61% <div><div>23/38</div></div>

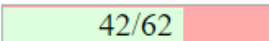
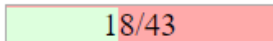
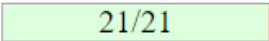
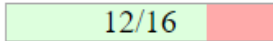
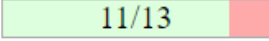
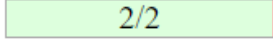
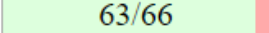
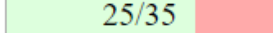
3. Commit:

<https://gitlab.ewi.tudelft.nl/cse2115/2021-2022/sem-group-04b/sem-repo-04b/-/commit/80dda73fe1a6cd83d5b97e427ff9c89c799f8676>

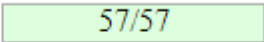
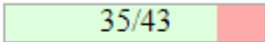
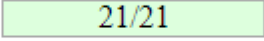
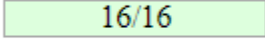
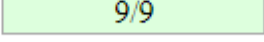
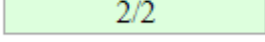
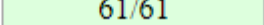
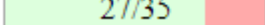
Request Microservice: Service

The main focus was to improve the mutation coverage for the CompanyRequestService class but I also ended up improving the one in the StudentRequest one (because the mutations were quite similar) and the mutations in the ModificationService just to increase it to 100%. The CompanyRequestService also had some methods that were not tested before so these additions also improved the line (and branch) coverage of the class(es).

1. Before:

Name	Line Coverage	Mutation Coverage
CompanyRequestService.java	68% 	42% 
ModificationService.java	100% 	75% 
RequestService.java	85% 	100% 
StudentRequestService.java	95% 	71% 

2. After:

Name	Line Coverage	Mutation Coverage
CompanyRequestService.java	100% 	81% 
ModificationService.java	100% 	100% 
RequestService.java	100% 	100% 
StudentRequestService.java	100% 	77% 

3. Commit:

<https://gitlab.ewi.tudelft.nl/cse2115/2021-2022/sem-group-04b/sem-repo-04b/-/commit/bb26cb699696a35f22e8d6476c10a97895754286>

Company Microservice: CompanyController

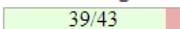
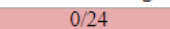
Before adjusting the tests, the Company Controller had 0% coverage. The issue here was the same as in the Student Controller. Namely, the result was not validated (there were no assertions for the returning values). After adjusting the tests, the Company Controller now has an improvement of 21% coverage for mutation testing. This can also be seen in the image below.

1. Before:

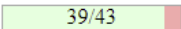
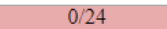
Pit Test Coverage Report

Package Summary

nl.tudelft.sem.company.controller

Number of Classes	Line Coverage	Mutation Coverage
1	91%  39/43	0%  0/24

Breakdown by Class

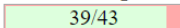
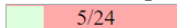
Name	Line Coverage	Mutation Coverage
CompanyController.java	91%  39/43	0%  0/24

2. After:

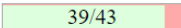
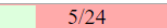
Pit Test Coverage Report

Package Summary

nl.tudelft.sem.company.controller

Number of Classes	Line Coverage	Mutation Coverage
1	91%  39/43	21%  5/24

Breakdown by Class

Name	Line Coverage	Mutation Coverage
CompanyController.java	91%  39/43	21%  5/24

3. Merge Request:

https://gitlab.ewi.tudelft.nl/cse2115/2021-2022/sem-group-04b/sem-repo-04b/-/merge_requests/62