



**IT314 — Software Engineering**

## **Mutation Testing**

**Project Title: Next Chapter**

Online Book Reading Platform

**Group — 10**

**Extension Used:**

StrykerJS (Stryker Mutation Testing Framework)

# Mutation Testing Report

## 0.1 0.1 Content Moderation Testing

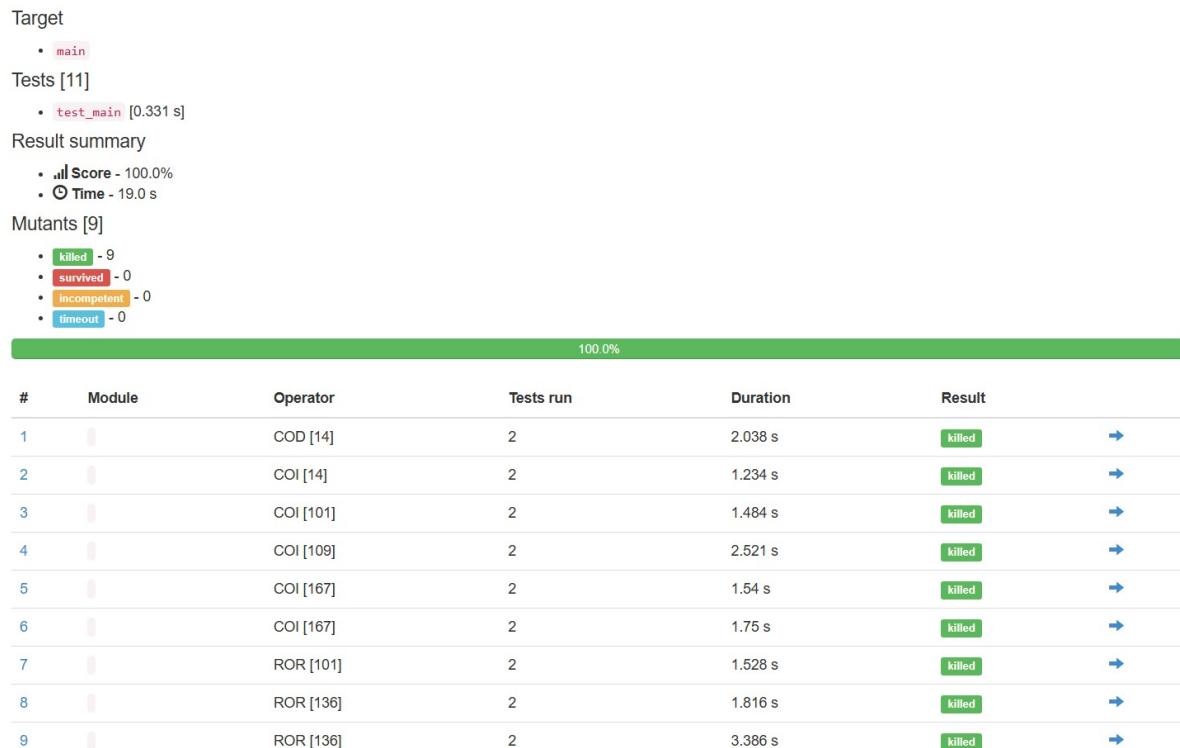
For the content moderation module of our project (implemented in Python), **MutPy** — a mutation testing tool for Python — was used.

MutPy was applied to validate and strengthen:

- Detection of inappropriate or harmful words
- Filtering user comments on books

The mutation testing using MutPy helped expose weaknesses such as:

- Filters failing on mixed-case offensive patterns
- Missing edge cases involving punctuation
- Logic that passed even when parts of filters were mutated



## 0.2 Website Testing (Mutation Analysis)

The main Next Chapter web application is built using React (Vite) and Supabase as the backend.

Mutation testing for the website was performed using **StrykerJS**, which evaluates:

- Component rendering logic
- Hook-based state management
- API and database interactions
- Error handling and fallback UI

StrykerJS helped identify untested flows such as unexpected null states, API failures, and incorrect assumptions in UI rendering.

### ● Mutants Screenshot

#### All files

The screenshot shows the StrykerJS interface with the 'Mutants' tab selected. It displays a table of mutation scores for different files and directories. The columns include File / Directory, Mutation Score (Of total, Of covered), Killed, Survived, Timeout, No coverage, Ignored, Runtime errors, Compile errors, Detected, Undetected, and Total. The 'All files' row has a total of 249 mutants, with 68 detected and 27 undetected. The 'components' directory has a total of 122 mutants, with 122 detected and 37 undetected. The 'lib' directory has a total of 115 mutants, with 127 detected and 58 undetected. The overall mutation score is 72.38% for total mutants and 78.55% for covered mutants.

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
All files	72.38	78.55	237	68	12	27	109	0	0	249	95	453
components	76.73	76.73	122	37	0	0	31	0	0	122	37	190
lib	68.65	80.38	115	31	12	27	78	0	0	127	58	263



## components

[Mutants](#) [Tests](#)

All files / components

249

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
components		76.73	122	37	0	0	31	0	0	122	37	190
CountUp.jsx		75.41	46	15	0	0	20	0	0	46	15	81
ProtectedRoute.jsx		65.52	38	20	0	0	1	0	0	38	20	59
TrendingBooks.jsx		95.00	38	2	0	0	10	0	0	38	2	50



## lib

[Mutants](#) [Tests](#)

All files / lib

249

File / Directory	Mutation Score		Killed	Survived	Timeout	No coverage	Ignored	Runtime errors	Compile errors	Detected	Undetected	Total
	Of total	Of covered										
lib		68.65	115	31	12	27	78	0	0	127	58	263
bookUtils.js		94.12	13	1	3	0	5	0	0	16	1	22
personalizationUtils.js		96.23	51	2	0	0	18	0	0	51	2	71
trendingUtils.js		52.17	51	28	9	27	55	0	0	60	55	170



- Tests Screenshot

## All tests

Tests



All tests

249

File / Directory	I	Killing	Covering	Not Covering	Total tests
All tests		60	162	63	285
components		33	84	40	157
lib		27	78	0	105
App.test.jsx		0	0	23	23



## components

Tests



All tests / components

249

File / Directory	I	Killing	Covering	Not Covering	Total tests
components		33	84	40	157
Admin.test.jsx		0	1	0	1
CountUp.test.jsx		13	29	0	42
Header.test.jsx		0	0	37	37
ProtectedRoute.test.jsx		9	15	3	27
TrendingBooks.test.jsx		11	39	0	50



## lib

Tests



All tests / lib

249

File / Directory	I	Killing	Covering	Not Covering	Total tests
lib		27	78	0	105
js/bookUtils.test.js		4	27	0	31
js/personalizationUtils.test.js		15	23	0	38
js/trendingUtils.test.js		8	28	0	36



## Overall Mutation Score

Mutation score is calculated using the standard formula:

$$\text{MutationScore} = \frac{\text{KilledMutants}}{\text{Killed} + \text{Survived} + \text{Timeout}} \times 100$$

From the mutation testing results (StrykerJS):

- **Killed Mutants:** 237
- **Survived Mutants:** 68
- **Timeout Mutants:** 12

Thus,

$$\text{MutationScore} = \frac{237}{237 + 68 + 12} \times 100 = \frac{237}{317} \times 100 = 74.76\%$$

**Final Mutation Score: 74.76%**