Test Report (Student #4)



**Group Number:** C3.040  
**Repository:** <https://github.com/DP2-C1-037/Acme-ANS-C3>

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# Executive Summary

This testing report presents the results of both functional and performance testing conducted on the system developed for the Assistance Agent module. It includes a compilation of the test cases implemented, grouped by feature (Claim Management and Tracking Logs), their effectiveness in detecting bugs, and the performance metrics obtained through testing on two different computers. The goal of this analysis is to evaluate the system’s stability, reliability, and efficiency under different execution environments.

# Revision Table

|  |  |  |
| --- | --- | --- |
| **Revision Number** | **Date** | **Description** |
| 1.0 | 12/10/2025 | Functional testing |
| 1.1 | 13/10/2025 | Performance testing |
| 2.0 | 13/10/2025 | Added missing Test Cases |

# Introduction

Introduction

This document outlines the testing process carried out to assess both the functional and non-functional aspects of the system. The primary objective is to verify that the system adheres to the client’s specified requirements and behaves reliably and efficiently across different execution environments.

Functional testing focuses on ensuring that each implemented feature performs as expected and detects any deviation from the intended behaviour. Performance testing, on the other hand, evaluates the responsiveness and stability of the system under varying workloads and hardware configurations.

The structure of this document is as follows:

* **Section 4** presents the functional test cases, organized by feature. Each test case includes a brief description, the observed outcome, and an assessment of how effective it was at uncovering defects. It also analyses the system’s performance by including execution time measurements, relevant statistical charts, 95% confidence intervals for the wall time, and hypothesis testing to compare performance across different machines.
* **Section 5** provides a comprehensive summary of the testing results and highlights the most important findings and conclusions drawn from the process.
* **Section 6** lists the references and resources used, if applicable.

# Contents

## Functional Testing

### 4.1.1. Claim

|  |  |  |  |
| --- | --- | --- | --- |
| Test Case ID | Description | Result | Bug Detection Effectiveness |
| List Completed |  |  |  |
| TC-01 | Access the list of completed (accepted/rejected) claims as an assistance agent. | The system shows only completed and published claims. | Low |
| TC-02 | Access the list with a different role (e.g., pilot). | Access is denied. | Low |
| TC-03 | Access the list while unauthenticated. | Access is denied. | Low |
| List Undergoing |  |  |  |
| TC-04 | Access the list of undergoing claims as an assistance agent. | The system shows only non-completed claims, including the associated leg. | Low |
| TC-05 | Access the list with a different role. | Access is denied. | Low |
| TC-06 | Access the list while unauthenticated. | Access is denied. | Low |
| Show |  |  |  |
| TC-07 | Access a published claim as the owner agent. | The system shows the claim correctly. | Low |
| TC-08 | Access a draft claim as the owner agent. | The system shows the claim correctly. | Low |
| TC-09 | Attempt to access a claim using a non-existing ID (e.g., -1). | Access is denied. | Low |
| TC-10 | Access a draft claim as an agent who is not the owner. | Access is denied. | Low |
| Create |  |  |  |
| TC-11 | Create a new claim as an agent with valid data and a leg that has already occurred. | The claim is created in draft mode. | Low |
| TC-12 | Attempt to create a claim linked to a leg that has not yet occurred. | The system blocks the creation and shows an error message. | Medium |
| TC-13 | Create a claim while unauthenticated or with an unauthorized role. | Access is denied. | Low |
| Update |  |  |  |
| TC-14 | Update a draft claim as the owner agent with valid data. | The claim is updated successfully. | Low |
| TC-15 | Attempt to update an already published claim. | Access is denied. | High\*¹ |
| TC-16 | Attempt to update a claim as an agent who is not the owner. | Access is denied. | Low |
| Publish |  |  |  |
| TC-17 | Publish a draft claim with all correct data. | The claim is published successfully. | Low |
| TC-18 | Attempt to publish a claim that has already been published. | Access is denied. | Low |
| TC-19 | Publish a claim as an agent who is not the owner. | Access is denied. | Low |
| Delete |  |  |  |
| TC-20 | Delete a draft claim as the owner agent. | The system deletes the claim correctly. | Low |
| TC-21 | Attempt to delete an already published claim. | Access is denied, as published claims cannot be deleted. | Medium |
| TC-22 | Delete a claim while unauthenticated or with an unauthorized role. | Access is denied. | Low |

A screenshot of a graph

AI-generated content may be incorrect.

### 4.1.2. Tracking Log

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case ID | Description | Result | Bug Detection Effectiveness |  |
| List and Show |  |  |  |  |
| TC-23 | Access the list of tracking logs for one's own claim. | The system shows all logs (draft and published). | Low |  |
| TC-24 | Access a published tracking log from one's own claim. | The system shows the log correctly. | Low |  |
| TC-25 | Access a draft log from one's own claim. | The system shows the log correctly. | Low |  |
| TC-26 | Access the logs of a claim with an unauthorized role. | Access is denied. | Low |  |
| Create |  |  |  |  |
| TC-27 | Create a new draft log for one's own claim. | The log is created in draft mode. | Low |  |
| TC-28 | Create a new log for a claim whose last log already had a 100% resolution (exceptional case). | The system allows the creation of the new log. | High\*² |  |
| TC-29 | Attempt to create a log for a claim that belongs to another agent. | Access is denied. | Low |  |
| Update |  |  |  |  |
| TC-30 | Update a draft log as the owner agent with valid data. | The log is updated successfully. | Low |  |
| TC-31 | Attempt to update an already published tracking log. | Access is denied. | Medium |  |
| Publish |  |  |  |  |
| TC-32 | Publish a draft log for a claim that is already published. | The log is published successfully. | Low |  |
| TC-33 | Attempt to publish a log for a claim that is still in draft mode. | The system blocks publication and shows an error message. | Medium |  |
| TC-34 | Attempt to publish an already published log. | Access is denied. | Low |  |
| Delete |  |  |  |  |
| TC-35 | Delete a draft tracking log. | The system deletes the log correctly. | Low |  |
| TC-36 | Attempt to delete an already published tracking log. | Access is denied. | Medium |  |

**A screenshot of a graph

AI-generated content may be incorrect.**

|  |  |
| --- | --- |
| |  | | --- | |  | |
|  |

## Performance Testing

### Performance charts

A performance evaluation was conducted to determine the influence of hardware configuration on system efficiency. For this purpose, execution time metrics were collected from two systems, designated as PC A and PC B. Analysis of the data, illustrated by performance charts, confirmed a consistent superiority in the performance of PC B over PC A.

Statistical summary:

|  |  |
| --- | --- |
| *PC A* | |
|  |  |
| Mean | 15,80111 |
| Standard Error | 0,837166 |
| Median | 7,88815 |
| Mode | 1,4378 |
| Standard Deviation | 18,71959 |
| Sample Variance | 350,4231 |
| Kurtosis | 4,838906 |
| Skewness | 2,046923 |
| Range | 122,4153 |
| Minimum | 1,1147 |
| Maximum | 123,53 |
| Sum | 7900,553 |
| Count | 500 |
| Confidence Level(95,0%) | 1,644804 |

|  |  |  |
| --- | --- | --- |
| interval (ms) | 14,1563 | 17,44591 |
| Interval (s) | 0,01415630183 | 0,01744590922 |

Statistical summary:

|  |  |
| --- | --- |
| *Column1* | |
|  |  |
| Mean | 51,2364 |
| Standard Error | 2,700963 |
| Median | 18,8462 |
| Mode | 3,3079 |
| Standard Deviation | 80,75834 |
| Sample Variance | 6521,909 |
| Kurtosis | 5,707504 |
| Skewness | 2,419145 |
| Range | 492,1824 |
| Minimum | 1,3655 |
| Maximum | 493,5479 |
| Sum | 45805,34 |
| Count | 894 |
| Confidence Level(95,0%) | 5,300975 |

|  |  |  |
| --- | --- | --- |
| Interval (ms) | 45,93543 | 56,53738 |
| Interval (s) | 0,04593542856 | 0,05653738 |

PC B is considerably slower and its performance is far less consistent than PC A. The average processing time for PC B is more than three times that of PC A. Furthermore, PC B's significantly higher standard deviation indicates much greater unpredictability in its response times. This data clearly shows PC A has superior and more reliable performance.

### Confidence Intervals

To assess the statistical reliability of the results, 95% confidence intervals were calculated for the average execution times on each machine:

* **PC A:** mean execution time = 15.80 ms ± 1.64 ms → interval = [14.16 ms, 17.45 ms].
* **PC B:** mean execution time = 51.24 ms ± 5.30 ms → interval = [45.94 ms, 56.54 ms].

These intervals, which do not overlap, indicate that the observed difference in performance between the two machines is statistically significant. We can be 95% confident that the true mean execution time for PC A is substantially lower than that of PC B. The wider confidence interval for PC B also reflects its greater performance variability compared to the more consistent performance of PC A.

### Hypothesis Testing

|  |  |  |
| --- | --- | --- |
| z-Test: Two Sample for Means | | |
|  |  |  |
|  | *PC A* | *PC B* |
| Mean | 14,629 | 46,36666 |
| Known Variance | 350,4231 | 6521,909 |
| Observations | 556 | 1002 |
| Hypothesized Mean Difference | 0 |  |
| z | -11,8782 |  |
| P(Z<=z) one-tail | 0 |  |
| z Critical one-tail | 1,644854 |  |
| P(Z<=z) two-tail | 0 |  |
| z Critical two-tail | 1,959964 |  |

A z-test for two independent means was performed to determine whether the performance difference between PC A and PC B is statistically significant. The null hypothesis stated that both machines have equal mean execution times.

The test yielded a **z-score of -11.88** and a **p-value of approximately 0**. Since the p-value is far below the standard threshold of 0.05, we reject the null hypothesis.

After analyzing the mean values obtained for both systems (14.63 ms for PC A vs. 46.37 ms for PC B), it is clear that **PC A achieves considerably lower execution times** than PC B. This confirms that PC A is significantly faster in executing the system operations, demonstrating that hardware configuration has a measurable influence on the system’s responsiveness.

# Conclusions

This testing report provides a comprehensive evaluation of the system from both a functional and performance standpoint.

On the functional side, the test suite thoroughly covered all core features related to **claim and tracking log management**. The results confirm that the system is stable and correctly implements the required business logic, including access control and state transitions. While most test cases indicated a robust implementation with low bug detection effectiveness, the test plan was successful in identifying and resolving critical issues, such as enforcing the immutability of published claims (**TC-15**) and handling exceptional business rules for tracking logs (**TC-28**).

On the performance side, testing on two different machines revealed a significant impact of hardware on system responsiveness. The results clearly demonstrated that **PC A provides a substantially faster and more consistent user experience than PC B**. This conclusion is supported by strong statistical evidence: the 95% confidence intervals for mean execution times did not overlap, and the hypothesis test decisively rejected the null hypothesis (**z = -11.88, p ≈ 0**), confirming the performance gap is statistically significant.

In conclusion, the system successfully meets all functional requirements with a high degree of stability and correctness. While its performance is dependent on the hardware environment, it operates efficiently on suitable configurations. These findings validate both the **quality of the software implementation** and the **effectiveness of the testing strategy** employed.

# Bibliography

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