**Testing report**

**Acme Ans C2**

**Dibujo animado de un personaje animado

El contenido generado por IA puede ser incorrecto.**

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**C2.023**

**https://github.com/ManunGar/Acme-ANS-C2  
Seville may 16, 2025**

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# 1. Executive Summary

This document outlines the results of the tests conducted on the functionalities implemented by Student 1 for the airline manager role within the Acme ANS system. The functional testing aimed to verify the system’s correct behavior under various conditions, including valid inputs, invalid entries, and unauthorized access attempts, ensuring that all predefined validations were properly enforced and no critical errors were identified.

Additionally, performance tests were carried out on two different devices. Response times were collected and subjected to statistical analysis, including the computation of 95% confidence intervals and mean comparisons using a Z-test. This was done to assess the system’s efficiency across different environments.

The results indicate that the tested features are robust, stable, and effectively meet the defined requirements from both functional and performance perspectives.

# 2. Revision table

| **Version** | **Date** | **Description** |
| --- | --- | --- |
| 0.0 | 16/05/2025 | Initial version |
| 1.0 | 20/05/2025 | Implementing Functional Testing |
| 2.0 | 23/05/2025 | Implementing Performance Testing |
| 3.0 | 26/05/2025 | Finished document |
| 4.0 | 03/07/2025 | Update Performance Testing |

# 3. Introduction

The purpose of this report is to document and evaluate the functional and performance testing conducted on the system developed as part of the Acme ANS project, focusing specifically on the features associated with the airline manager role. These tests, implemented by Student 1, target essential operations involving the Flight and Legs entities.

Functional tests were designed based on systematic validation criteria to ensure the system performs correctly under various usage scenarios. In parallel, performance tests were executed on multiple devices, with the collected data analyzed statistically to draw meaningful insights into the application's efficiency across different technical environments.

This report offers a thorough overview of the quality assurance process, delivering essential information to support system evaluation and ongoing improvement efforts.

# 4. Functional Testing

In this section, the different test cases carried out by Student 1, corresponding to requirements 8 and 9, will be presented. The description of the test case, the result of the test case, and the effectiveness of finding bugs will be displayed.

## 4.1 Test cases for list features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Flight List | All flights belonging to a manager were shown | None |
| Flight List that doesn’t belong to the authenticated manager | An error appeared access not authorise | None |
| Flight List with another user who is not a manager | An error appeared access not authorise | None |
| Legs list belonging to a flight | All legs belonging to a flight were shown | None |
| List legs with an incorrect flight id | An error appeared access not authorise | None |
| Legs list that do not belong to the authenticated manager | An error appeared access not authorise | None |
| Legs list with another user who is not a manager | An error appeared access not authorise | None |

## 4.2 Test cases for show features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Show a flight | The data related to that flight was shown | None |
| Show a flight with an incorrect id | An error appeared access not authorise | None |
| Show a flight that doesn't belong to the authenticated manager | An error appeared access not authorise | None |
| Show a flight with another user who is not a manager | An error appeared access not authorise | None |
| Show a leg | The data related to that leg was shown | None |
| Show a leg with an incorrect id | An error appeared access not authorise | None |
| Show a leg that does not belong to the authenticated manager | An error appeared access not authorise | None |
| Show a leg with another user who is not a manager | An error appeared access not authorise | None |

## 4.3 Test cases for create features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Create a flight with all fields empty | The system prevented the creation of the flight with non-blocking errors | None |
| Create a flight with an invalid description | The system prevented the creation of the flight with a non-blocking error in the code format | None |
| Create a flight with an invalid highlight | The system prevented the creation of the flight with a non-blocking error | None |
| Create a flight with an invalid cost | The system prevented the creation of the flight with a non-blocking error in the code format | None |
| Create a flight with valid values | The system allowed the creation of the flight | None |
| Create a flight without being a user with the manager role | An error appeared access not authorise | None |
| Create a leg that belong to a flight | The system allowed the creation of the leg | None |
| Create a leg with empty values that belong to a flight | The system prevented the creation of the leg with non-blocking error | None |
| Create a leg with invalid Flight Number that belong to a flight | The system prevented the creation of the leg with non-blocking error | None |
| Create a leg that belong to a flight from other manager | An error appeared access not authorise | None |
| Create a leg that belong to a flight with another user who is not a manager | An error appeared access not authorise | None |
| Create a leg with a hacking departure airport | An error appeared access not authorise | None |
| Create a leg with a hacking arrival airport | An error appeared access not authorise | None |
| Create a leg with a hacking aircraft | An error appeared access not authorise | None |
| Create a leg with an invalid status | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with a hacking flight | The system ignores this changes | None |
| Create a leg with the same departure and arrival airport | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with an arrival before the departure | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with the departure before the arrival of the last leg | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with the departure and/or arrival before actual date | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with a departure airport different from the arrival airport of the previous leg. | The system prevented the creation of the leg with a non-blocking error | None |
| Create a leg with an aircraft that is using at that moment | The system prevented the creation of the leg with a non-blocking error | None |

4.4 Test cases for update features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Update a flight with all fields empty | The system prevented the update of the flight with non-blocking errors | None |
| Update a flight with an invalid description | The system prevented the update of the flight with a non-blocking error in the code format | None |
| Update a flight with an invalid highlight | The system prevented the update of the flight with a non-blocking error | None |
| Update a flight with an invalid cost | The system prevented the update of the flight with a non-blocking error in the code format | None |
| Update a flight with valid values | The system allowed the update of the flight | None |
| Update a flight with an incorrect id | An error appeared access not authorise | None |
| Update a flight without being a user with the manager role | An error appeared access not authorise | None |
| Update a flight without being the manager of them | An error appeared access not authorise | None |
| Update a flight that is published | An error appeared access not authorise | None |
| Update a leg that belong to a flight | The system allowed the update of the leg | None |
| Update a leg with empty values that belong to a flight | The system prevented the update of the non-blocking error | None |
| Update a leg with invalid Flight Number that belong to a flight | The system prevented the creation of the leg with non-blocking error | None |
| Update a leg with an incorrect id | An error appeared access not authorise | None |
| Update a leg that belong to a flight from other manager | An error appeared access not authorise | None |
| Update a leg that belong to a flight with another user who is not a manager | An error appeared access not authorise | None |
| Update a leg with a hacking departure airport | An error appeared access not authorise | None |
| Update a leg with a hacking arrival airport | An error appeared access not authorise | None |
| Update a leg with a hacking aircraft | An error appeared access not authorise | None |
| Update a leg with an invalid status | The system prevented the update of the leg with a non-blocking error | None |
| Update a leg with a hacking flight | The system ignores this changes | None |
| Update a leg with the same departure and arrival airport | The system prevented the update of the leg with a non-blocking error | None |
| Update a leg with an arrival before the departure | The system prevented the update of the leg with a non-blocking error | None |
| Update a leg with the departure before the arrival of the last leg | The system prevented the update of the leg with a non-blocking error | None |
| Update a leg with the departure and/or arrival before actual date | The system prevented the creation of the leg with a non-blocking error | None |
| Update a leg with a departure airport different from the arrival airport of the previous leg. | The system prevented the creation of the leg with a non-blocking error | None |
| Update a leg with an aircraft that is using at that moment | The system prevented the update of the leg with a non-blocking error | None |
| Update a leg that is published | An error appeared access not authorise | None |

## 4.5 Test cases for publish features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Publish a flight with all fields empty | The system prevented the publish of the flight with non-blocking errors | None |
| Publish a flight with an invalid description | The system prevented the publish of the flight with a non-blocking error in the code format | None |
| Publish a flight with an invalid highlight | The system prevented the publish of the flight with a non-blocking error | None |
| Publish a flight with an invalid cost | The system prevented the publish of the flight with a non-blocking error in the code format | None |
| Publish a flight with valid values | The system allowed the published of the flight | None |
| Publish a flight without being a user with the manager role | An error appeared access not authorise | None |
| Publish a flight with an incorrect id | An error appeared access not authorise | None |
| Publish a flight without being the manager of them | An error appeared access not authorise | None |
| Publish a flight that is published | An error appeared access not authorise | None |
| Publish a flight without legs | The system prevented the publish of the flight with a non-blocking error in the code format | None |
| Publish a flight with unpublished legs | The system prevented the publish of the flight with a non-blocking error in the code format | None |
| Publish a leg that belong to a flight | The system allowed the publish of the leg | None |
| Publish a leg with empty values that belong to a flight | The system prevented the publish of the non-blocking error | None |
| Publish a leg with invalid Flight Number that belong to a flight | The system prevented the creation of the leg with non-blocking error | None |
| Publish a leg with an incorrect id | An error appeared access not authorise | None |
| Publish a leg that belong to a flight from other manager | An error appeared access not authorise | None |
| Publish a leg that belong to a flight with another user who is not a manager | An error appeared access not authorise | None |
| Publish a leg with a hacking departure airport | An error appeared access not authorise | None |
| Publish a leg with a hacking arrival airport | An error appeared access not authorise | None |
| Publish a leg with a hacking aircraft | An error appeared access not authorise | None |
| Publish a leg with an invalid status | The system prevented the publish of the leg with a non-blocking error | None |
| Publish a leg with a hacking flight or modify the flight number | The system ignores this changes | None |
| Publish a leg with the same departure and arrival airport | The system prevented the publish of the leg with a non-blocking error | None |
| Publish a leg with an arrival before the departure | The system prevented the publish of the leg with a non-blocking error | None |
| Publish a leg with the departure before the arrival of the last leg | The system prevented the publish of the leg with a non-blocking error | None |
| Publish a leg with the departure and/or arrival before actual date | The system prevented the creation of the leg with a non-blocking error | None |
| Update a leg with a departure airport different from the arrival airport of the previous leg. | The system prevented the creation of the leg with a non-blocking error | None |
| Publish a leg with an aircraft that is using at that moment | The system prevented the publish of the leg with a non-blocking error | None |
| Publish a leg that is published | An error appeared access not authorise | None |

4.6 Test cases for delete features

|  |  |  |
| --- | --- | --- |
| Description | Result | Bugs detected |
| Delete a flight | The system allowed the booking to be deleted | None |
| Delete a flight that does not belong to the manager | An error appeared access not authorise | None |
| Delete a flight without the role of manager | An error appeared access not authorise | None |
| Delete a flight with an incorrect id | An error appeared access not authorise | None |
| Delete a leg | The system allowed the passenger to be deleted | None |
| Delete a leg that does not belong to the manager | An error appeared access not authorise | None |
| Delete a leg without the role of manager | An error appeared access not authorise | None |
| Delete a leg with an incorrect id | An error appeared access not authorise | None |
| Delete a published leg | An error appeared access not authorise | None |
| Delete a published flight | An error appeared access not authorise | None |

# 5. Performance Testing

Performance tests have been conducted on two different devices. The results on both devices will then be displayed, as well as the final comparison between the two.

## 5.1 First device performance tests

Regarding the first device, the following results were obtained:

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AI-generated content may be incorrect.

|  |  |  |
| --- | --- | --- |
| / Average |  | 1,843804396 |
| /airline-manager/flight/create Average | | 13,83521111 |
| /airline-manager/flight/delete Average | | 16,70195 |
| /airline-manager/flight/list Average | | 6,290764103 |
| /airline-manager/flight/publish Average | | 11,13395 |
| /airline-manager/flight/show Average | | 6,1543 |
| /airline-manager/flight/update Average | | 12,86905714 |
| /airline-manager/legs/create Average | | 54,72833333 |
| /airline-manager/legs/delete Average | | 26,50972857 |
| /airline-manager/legs/list Average | | 5,769813333 |
| /airline-manager/legs/publish Average | | 60,69306667 |
| /airline-manager/legs/show Average | | 9,137926316 |
| /airline-manager/legs/update Average | | 50,54139444 |
| /anonymous/system/sign-in Average | | 3,2588 |
| /any/system/welcome Average | | 1,06524127 |
| /authenticated/system/sign-out Average | | 1,944942857 |
| Grand Average |  | **11,67824446** |

Where its descriptive statistics are as follows:

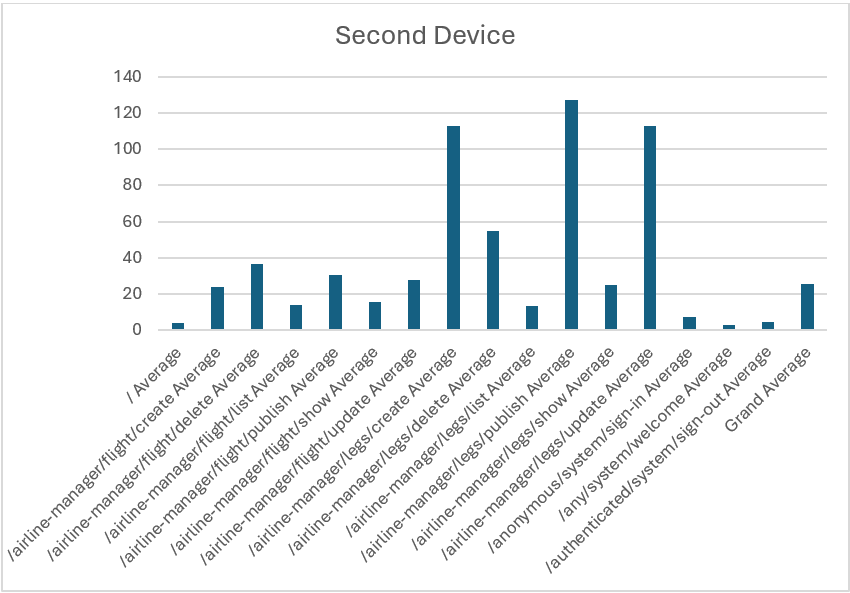
|  |  |
| --- | --- |
| *First Device* | |
|  |  |
| Mean | 11,67824446 |
| Standard Error | 0,839225954 |
| Median | 4,0969 |
| Mode | 0,8505 |
| Standard Deviation | 22,12439017 |
| Sample Variance | 489,4886404 |
| Kurtosis | 5,611028431 |
| Skewness | 2,623620294 |
| Range | 103,8676 |
| Minimum | 0,615 |
| Maximum | 104,4826 |
| Sum | 8116,3799 |
| Count | 695 |
| Confidence Level(95,0%) | 1,64772626 |

And therefore, its confidence interval is defined as:

|  |  |  |
| --- | --- | --- |
| Interval (ms) | 10,03052 | 13,32597 |
| Interval (s) | 0,010031 | 0,013326 |

## 5.2 Second device performance testing

For the second device, the following results were obtained:



|  |  |  |
| --- | --- | --- |
| / Average |  | 3,806943956 |
| /airline-manager/flight/create Average | | 23,60446667 |
| /airline-manager/flight/delete Average | | 36,30393333 |
| /airline-manager/flight/list Average | | 13,81631026 |
| /airline-manager/flight/publish Average | | 30,2302375 |
| /airline-manager/flight/show Average | | 15,42607674 |
| /airline-manager/flight/update Average | | 27,68484286 |
| /airline-manager/legs/create Average | | 113,0791208 |
| /airline-manager/legs/delete Average | | 54,63551429 |
| /airline-manager/legs/list Average | | 12,90637667 |
| /airline-manager/legs/publish Average | | 127,2364909 |
| /airline-manager/legs/show Average | | 24,62581579 |
| /airline-manager/legs/update Average | | 112,6624444 |
| /anonymous/system/sign-in Average | | 7,019711811 |
| /any/system/welcome Average | | 2,615670635 |
| /authenticated/system/sign-out Average | | 4,291225714 |
| Grand Average |  | **25,22719122** |

Where its descriptive statistic is as follows:

|  |  |
| --- | --- |
| *Second Device* | |
|  |  |
| Mean | 25,22719122 |
| Standard Error | 1,736122989 |
| Median | 9,2577 |
| Mode | 1,9844 |
| Standard Deviation | 45,76915454 |
| Sample Variance | 2094,815507 |
| Kurtosis | 5,993539745 |
| Skewness | 2,634842007 |
| Range | 251,7293 |
| Minimum | 1,6446 |
| Maximum | 253,3739 |
| Sum | 17532,8979 |
| Count | 695 |
| Confidence Level(95,0%) | 3,408683235 |

And therefore, its confidence interval is defined as:

|  |  |  |
| --- | --- | --- |
| Interval (ms) | 21,81850799 | 28,63587 |
| Interval (s) | 0,021818508 | 0,028636 |

## 5.3 Comparison between the two devices

Using the z-test to compare the results obtained on both devices, the following is obtained:

|  |  |  |
| --- | --- | --- |
|  | *First Device* | *Second Device* |
| Mean | 11,67824446 | 25,22719122 |
| Known Variance | 489,4886404 | 2094,815507 |
| Observations | 695 | 695 |
| Hypothesized Mean Difference | 0 |  |
| z | -7,0262909 |  |
| P(Z<=z) one-tail | 1,06049E-12 |  |
| z Critical one-tail | 1,644853627 |  |
| P(Z<=z) two-tail | 2,12097E-12 |  |
| z Critical two-tail | 1,959963985 |  |

It can be observed that the obtained value is 2.12097E-12. Since this value is below 0.05, it indicates that the performance difference between the two is statistically significant, allowing for direct comparison. Given that the first device has a lower mean than the second, it can be concluded, based on the test data, that the first device demonstrates superior performance.

# 6. Conclusion

This report presents a thorough evaluation of the functionalities assigned to the buyer role within the system, using both functional and performance testing. The functional tests confirmed that the system behaves correctly across a range of scenarios, including valid inputs, errors, and unauthorized access, with no critical faults detected. All expected validations operated correctly, ensuring consistent and reliable system behavior.

Performance testing revealed notable differences between the devices used. Statistical analysis, including Z-tests, confirmed that the first device achieved better average performance than the second, providing useful insights for future optimization and device compatibility considerations.

In summary, the testing results indicate a strong level of reliability and stability in the evaluated features. This validation process plays an essential role in ensuring software quality prior to final deployment.

# 7. Bibliography

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