**Testing report**

**Acme Ans D04**

Dibujo animado de un personaje animado

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**Group: C2.023**

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**Repository:** [**https://github.com/ManunGar/Acme-ANS-C2**](https://github.com/ManunGar/Acme-ANS-C2)

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# 1. Executive Summary

This report presents the results of the functional and performance tests applied to the functionalities corresponding to airport management operations by administrators, framed within functional requirement No. 11 of the system. These functionalities include the list of airports, the visualization of their details, as well as the creation and updating of these, operations that require explicit confirmation by the user.

The functional tests have been designed with a comprehensive approach that covers both valid scenarios and situations of error or unauthorized access attempts, with the aim of ensuring the robustness, security and correctness of the application. This strategy has included positive, negative and hacking cases, following a formal methodology of verification and validation of the expected behavior of the system.

In addition, performance tests have been carried out on different devices, measuring response times and analysing the data obtained using statistical techniques. A 95% confidence interval has been calculated to compare the behavior of the system in different environments and determine possible significant differences in terms of efficiency.

# 2. Revision table

|  |  |  |
| --- | --- | --- |
| Date | Version | Description |
| 25/05/2025 | 0.0 | Document creation |
| 26/05/2025 | 0.1 | Test Analysis |
| 01/07/2025 | 2.0 | Fix after changes on code |

# 3. Introduction

As a team of the C2.023 group, we face the fourth and final installment of the Acme Ans project focused on testing. We intend to rigorously validate the functionalities assigned to the role of administrator, in particular those related to airport management defined in Functional Requirement No. 11.

The purpose is to ensure that the system behaves correctly under all types of situations, including both expected usage scenarios such as boundary conditions, erroneous entries or improper access attempts. To do this, we have developed a complete set of tests covering various cases. These tests will make it possible to identify potential failures and verify compliance with the established requirements, guaranteeing a robust, reliable and safe system.

In addition, a performance evaluation phase has been incorporated, where the response times of the system are compared on two different devices. Based on these measurements, a statistical analysis is carried out based on hypothesis testing with 95% confidence, which will allow us to obtain objective conclusions about the efficiency of the system in different environments.

With a meticulous approach and oriented towards continuous improvement, we aspire to ensure that the functionalities developed not only work correctly, but are also prepared for deployment in a real environment.

# 4. Functional Testing

This section presents the different test cases carried out collaboratively by the team, corresponding to functional requirement No. 11. For each test case, a detailed description is included, the result obtained after its execution and an assessment of its effectiveness in detecting errors or unwanted behaviors. This battery of tests has been designed with the aim of exhaustively validating the functionalities related to airport management by administrators, covering both expected scenarios and extreme or unauthorized situations.

## 4.1 Test cases for list features

|  |  |  |
| --- | --- | --- |
| DESCRIPTION | RESULT | BUGS DETECTED |
| List airports | Se mostró todos los aeropuertos siendo un administrador | None |
| List airports on a non-admin user | An error appeared access not authorise | None |

## 4.2 Test cases for show features

|  |  |  |
| --- | --- | --- |
| DESCRIPTION | DESCRIPTION | BUGS DETECTED |
| Show airport data | Displayed all airport data while being an administrator | None |
| Display airport data to a non-admin user | An error appeared access not authorise | None |

## 4.3 Test cases for create features

|  |  |  |
| --- | --- | --- |
| DESCRIPTION | RESULT | BUGS DETECTED |
| Create an airport with all fields empty | The system prevented the creation of the reservation with non-blocking errors | None |
| Create an airport with a different user than the administrator | An error appeared access not authorise | None |
| Create an airport with a valid name | The system allowed the creation of the airport | None |
| Create an airport with a name that is too long | The system prevented the creation of the airport with a non-blocking error indicating that the name must be less than 255 characters | None |
| Create an airport with a non-Latin name | The system allowed the creation of the airport | None |
| Create an airport with a valid IATAcode | The system allowed the creation of the airport | None |
| Create an airport with a different pattern IATAcode than the one specified | The system prevented the creation of the airport with a non-blocking error indicating that the IATAcode must follow the specified pattern | None |
| Create an airport with an IATAcode identical to another airport | The system prevented the creation of the airport with a non-blocking error indicating that the IATAcode should not be the same as that of another airport | None |
| Create an airport with a valid city | The system allowed the creation of the airport | None |
| Create an airport with a city that is too long | The system prevented the creation of the airport with a non-blocking error indicating that the city must be less than 255 characters | None |
| Create an airport with a non-Latino city name | The system allowed the creation of the airport | None |
| Create an airport with a valid country | The system allowed the creation of the airport | None |
| Create an airport with a country that is too long | The system prevented the creation of the airport with a non-blocking error indicating that the country must be less than 255 characters | None |
| Create an airport with a non-Latino country name | The system allowed the creation of the airport | None |
| Create an airport with an empty website URL | The system allowed the creation of the airport | None |
| Create an airport with an empty website URL | The system allowed the creation of the airport as it is an optional value | None |
| Create an airport with a different pattern webpage URL than the one specified | The system prevented the creation of the airport with a non-blocking error indicating that the URL of the web page must follow the specified pattern | None |
| Create an airport with a valid email address | The system allowed the creation of the airport | None |
| Create an airport with empty email | The system allowed the creation of the airport as it is an optional value | None |
| Create an airport with an invalid email address | The system prevented the creation of the airport with non-blocking error indicating that the email must follow the specified pattern | None |
| Create an airport with an email address identical to another airport | The system prevented the creation of the airport with a non-blocking error indicating that the email should not be the same as that of another airport | None |
| Create an airport with a valid contact phone number | The system allowed the creation of the airport | None |
| Create an airport with an empty contact phone number | The system allowed the creation of the airport as it is an optional value | None |
| Create an airport with a contact phone number other than the allowed range | The system prevented the creation of the airport with a non-blocking error indicating that the contact telephone number must be included in the specified range | None |
| Create an airport with a hacked operational scope | An error appeared access not authorise | None |
| Create an airport with a valid operational scope | The system allowed the creation of the airport | None |

## 4.4 Test cases for update features

|  |  |  |
| --- | --- | --- |
| DESCRIPTION | RESULT | BUGS DETECTED |
| Update an airport with all fields empty | The system prevented booking update with non-blocking errors | None |
| Update an airport with a different user than the administrator | An error appeared access not authorise | None |
| Update an airport with a valid name | The system allowed the airport to be updated | None |
| Update an airport with a name that is too long | The system prevented the airport update with a non-blocking error stating that the name must be less than 255 characters | None |
| Update an airport with a non-Latin name | The system allowed the airport to be updated | None |
| Update an airport with a valid IATAcodeUpdating an airport with a valid IATAcode | The system allowed the airport to be updated | None |
| Update an airport with a different pattern IATAcode than the one specified | The system prevented the airport update with non-blocking error stating that the IATAcode should follow the specified pattern | None |
| Update an airport with an IATAcode identical to another airport | The system prevented the airport from being updated with a non-blocking error indicating that the IATAcode should not be the same as that of another airport | None |
| Update an airport with a valid city | The system allowed the airport to be updated | None |
| Update an airport with a city that is too long | The system prevented the airport update with a non-blocking error stating that the city must be less than 255 characters | None |
| Update an airport with a city with a non-Latin name | The system allowed the airport to be updated | None |
| Update an airport with a valid country | The system allowed the airport to be updated | None |
| Update an airport with a country that is too long | The system prevented the airport update with a non-blocking error indicating that the country must be less than 255 characters | None |
| Update an airport with a country with a non-Latin name | The system allowed the airport to be updated | None |
| Update an airport with an empty webpage URL | The system allowed the airport to be updated | None |
| Update an airport with an empty webpage URL | The system allowed the airport to be upgraded as it is an optional value | None |
| Update an airport with a different pattern webpage URL than the one specified | The system prevented the airport update with a non-blocking error stating that the URL of the web page must follow the specified pattern | None |
| Update an airport with a valid email address | The system allowed the airport to be updated | None |
| Update an airport with empty email | The system allowed the airport to be upgraded as it is an optional value | None |
| Update an airport with an invalid email | The system prevented the airport update with a non-blocking error indicating that the email must follow the specified pattern | None |
| Update an airport with an email address identical to another airport | The system prevented the airport update with a non-blocking error indicating that the email should not be the same as that of another airport | None |
| Update an airport with a valid contact phone number | The system allowed the airport to be updated | None |
| Update an airport with an empty contact phone number | The system allowed the airport to be upgraded as it is an optional value | None |
| Update an airport with a contact phone number other than the allowed range | The system prevented the airport update with a non-blocking error indicating that the contact phone should be in the specified range | None |
| Update an airport with a hacked operational scope | An error appeared access not authorise | None |
| Update an airport with a valid operational scope | The system allowed the airport to be updated | None |

Texto

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# 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:

## 

|  |  |  |
| --- | --- | --- |
| **Promedio /** |  | 9,04918 |
| **Promedio /administrator/airport/create** |  | 55,72293625 |
| **Promedio /administrator/airport/list** |  | 28,2502 |
| **Promedio /administrator/airport/show** |  | 32,62055 |
| **Promedio /administrator/airport/update** |  | 51,01708514 |
| **Promedio /anonymous/system/sign-in** |  | 8,7355 |
| **Promedio /any/system/welcome** |  | 3,387470968 |
| **Promedio /authenticated/system/sign-out** |  | 6,244716667 |
|  |  |  |
| **Promedio general** |  | 35,65686603 |

Where its descriptive statistics are as follows:

|  |  |
| --- | --- |
| *first* | |
|  |  |
| Media | 38,0036614 |
| Error típico | 1,7047003 |
| Mediana | 44,098 |
| Moda | 2,4848 |
| Desviación estándar | 26,6827802 |
| Varianza de la muestra | 711,970761 |
| Curtosis | 4,51424535 |
| Coeficiente de asimetría | 0,98086533 |
| Rango | 197,0353 |
| Mínimo | 1,8549 |
| Máximo | 198,8902 |
| Suma | 9310,89704 |
| Cuenta | 245 |
| Nivel de confianza(95,0%) | 3,35780612 |

And therefore, its confidence interval is defined as:

|  |  |  |
| --- | --- | --- |
| Intervalo (ms) | 34,6458553 | 41,3614675 |
| Intervalo (s) | 0,03464586 | 0,04136147 |
|  |  |  |

## 5.2 Second device performance testing

|  |  |  |
| --- | --- | --- |
| **Promedio /** |  | 3,37462 |
| **Promedio /administrator/airport/create** |  | 13,8938338 |
| **Promedio /administrator/airport/list** |  | 9,24963 |
| **Promedio /administrator/airport/show** |  | 6,68201667 |
| **Promedio /administrator/airport/update** |  | 12,0333365 |
| **Promedio /anonymous/system/sign-in** |  | 3,33614 |
| **Promedio /any/system/welcome** |  | 1,25565806 |
| **Promedio /authenticated/system/sign-out** |  | 1,91658333 |
|  |  |  |
| **Promedio general** |  | 9,04365115 |

Where its descriptive statistic is as follows:

|  |  |
| --- | --- |
| *second* | |
|  |  |
| Media | 9,53801191 |
| Error típico | 0,40145092 |
| Mediana | 11,4989 |
| Moda | 0,9365 |
| Desviación estándar | 6,2837008 |
| Varianza de la muestra | 39,4848958 |
| Curtosis | 11,4537643 |
| Coeficiente de asimetría | 1,66373833 |
| Rango | 55,3381 |
| Mínimo | 0,7258 |
| Máximo | 56,0639 |
| Suma | 2336,81292 |
| Cuenta | 245 |
| Nivel de confianza(95,0%) | 0,79075152 |

And therefore, its confidence interval is defined as:

|  |  |  |
| --- | --- | --- |
| Intervalo(ms) | 8,74726039 | 10,3287634 |
| Intervalo(s) | 0,00874726 | 0,01032876 |

## 5.3. z-test for mean of 2 samples

|  |  |  |
| --- | --- | --- |
|  | *First Device* | *Second Device* |
| Media | 35,656866 | 9,04365115 |
| Varianza (conocida) | 711,970761 | 39,4848958 |
| Observaciones | 262 | 262 |
| Diferencia hipotética de las medias | 0 |  |
| z | 15,7143459 |  |
| P(Z<=z) una cola | 0 |  |
| Valor crítico de z (una cola) | 1,64485363 |  |
| Valor crítico de z (dos colas) | 0 |  |
| Valor crítico de z (dos colas) | 1,95996398 |  |

The results show a p-value of 0, which, while it appears as exactly zero due to computational limitations, actually indicates an extremely small probability of observing such a large difference under the null hypothesis (typically smaller than 1e-50). This is well below the significance level α = 0.05, indicating that you can compare the values of both with each other because the difference in performance between the two is significant. Therefore, the second device, having a lower average (9.04) than the first (35.66), is more powerful according to the data collected during the tests.

# 7. Conclusion

The performance of this battery of tests has made it possible to rigorously verify the correct functioning of operations related to airport management by administrators, as specified in functional requirement No. 11. Through positive, negative and hacking tests, a wide range of casuistry has been covered, detecting possible points of failure and validating the robustness of the system against incorrect entries or unauthorized access.

In addition, performance analysis across devices has provided a clear view of application behavior in different environments, supported by hypothesis testing with a 95% confidence level. This approach has reinforced the reliability and robustness of the system, ensuring that the functionalities developed are ready for deployment in a real environment.

In short, the work carried out demonstrates a joint commitment to the quality of the software, reflecting a solid, secure development aligned with the objectives of the Acme Ans project

8. Bibliography

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