## **DP2 – Testing Report**

**Group:** C3.027  
**Repository:** <https://github.com/DP2-C1-027/AirNav-Logistics-C3>

**Member:** Niza Cobo, Manuel Jesús.

**Corporate Email:** [mannizcob@alum.us.es](mailto:mannizcob@alum.us.es)  
**Date:** 10/16/2025

**Table of Contents**

1. Executive Summary
2. Revision Table
3. Introduction
4. Contents
5. Conclusions
6. Bibliography

## **Executive Summary**

This report provides an overview of the testing phase conducted to assess the functionalities developed by Student 3. The objective of the testing process was to ensure that the implemented features meet the defined quality standards in terms of functionality and performance.

Functional testing confirmed that the developed requirements generally behave as expected, fulfilling the specified criteria. Performance testing was also conducted to evaluate the system’s efficiency under different load conditions. The results indicate that the software performs within acceptable limits, with some areas identified for potential optimization.

Overall, the tests demonstrate that the implemented functionalities are stable and meet the project’s requirements, although minor improvements could further enhance performance and maintainability.

## **Revision Table**

|  |  |  |
| --- | --- | --- |
| **Revision Number** | **Date** | **Description** |
| 1.0 | 02/17/2025 | Initial version of the document |
| 2.0 | 07/04/2025 | Adapted to C2. |
| 3.0 | 10/13/2025 | Adapted to C3. |

## **Introduction**

The purpose of this document is to analyze and evaluate the operation and performance of the requirements developed by Student 3. Through various functional and performance tests, the aim is to ensure that the implemented functionalities meet the expected quality criteria, both in terms of correct behavior and efficiency.

First, there is a section dedicated to functional testing, whichcollects the results obtained after running various tests on thedeveloped functionalities. Secondly, there is a section focused on performance testing, which studies the efficiency of the software under certain conditions.

## **Content**

## **Functional Testing**

Functional testing was carried out to verify that #8 and #9 requirements behave according to the expected specifications. The tests were executed using .safe and .hack files that represent different input scenarios, including typical and boundary cases.

All test cases executed successfully, and no functional defects were detected during this phase:

8) Operations by **flight crew members** on **flight assignments**:

* List the flight assignments separately, one for completed flight legs and another one for those planned but that have not taken place yet.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| List flight assignments with planned legs | - Access the planned flight assignments with a flight crew member account. | list-planned.safe | High (100%) |
| - Attempting to access the planned flight assignments with a technician member account. | list-planned.hack |
| List flight assignments with completed legs | - Access the completed flight assignments with a flight crew member account. | list-completed.safe | High (100%) |
| - Attempting to access the completed flight assignments with a technician member account. | list-completed.hack |

* Show the details of their flight assignments and the associated legs and flight crew members.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| Show the details of a flight assignment | - Access to a published flight assignment with a flight crew member account.  - Access to a draft flight assignment with a flight crew member account. | show.safe | High (99.4%) |
| - Attempting to access a flight assignment with technician member account.  - Attempting to access a flight assignment that does not belong to a specific flight crew member.  - Attempting to access a flight assignment without an id provided.  - Attempting to access a flight assignment with an incorrect id. | show.hack |

* Create, update, and publish their flight assignments. Only crew members with duty “LEAD ATTENDANT” can perform these operations. Please, note that to publish a flight assignment these cannot be linked to legs that have already occurred. Additionally, only flight crew members with an "AVAILABLE" status can be assigned to a leg, and they cannot be assigned to multiple legs simultaneously. Lastly, each leg can only have one pilot and one co-pilot. ~~The allocation of remaining roles for other flight crew members is at the discretion of the “LEAD ATTENDANT”~~. Flight assignments can be updated or deleted as long as they have not been published.

**NOTE:** A flight assignment cannot be linked to legs that have already occurred. This is implemented on each authorise method due that if a user try to hack and introduce an invalid leg and does not belong to a set of valid legs is not authorised.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| Create a flight assignment | - Create a valid flight assignment.  - Attempting to create an invalid flight assignment, testing all the fields with incorrect data.  - Attempting to create a flight assignment with a leg that overlap with another leg timeframe.  - Attempting to create a flight assignment with a duty (pilot or copilot) and a leg that already contains a flight assignment with one pilot or copilot. | create.safe | High (99.7%) |
| - Attempting to access the create flight assignment view with technician member account.  - Attempting to create a flight assignment without and id provided.  - Attempting to create a flight assignment with and id provided different from 0.  - Attempting to create a flight assignment without a leg id provided.  - Attempting to create a flight assignment with a leg that does not belong to the available legs of that airline. | create.hack |
| Update a flight assignment | - Update a valid flight assignment.  - Attempting to update an invalid flight assignment, testing all the fields with incorrect data.  - Attempting to update a flight assignment with a leg that overlap with another leg timeframe.  - Attempting to update a flight assignment with a duty (pilot or copilot) and a leg that already contains a flight assignment with one pilot or copilot. | update.safe | High (99.8%) |
| - Attempting to access the update flight assignment view with technician member account.  - Attempting to update a flight assignment without and id provided.  - Attempting to update a flight assignment with and id provided that belongs to an existing published flight assignment owned by the flight crew member.  - Attempting to update a flight assignment with and id provided that belongs to an existing draft flight assignment not owned by the flight crew member.  - Attempting to update a flight assignment with and id provided that belongs to an existing published flight assignment not owned by the flight crew member.  - Attempting to update a flight assignment without a leg id provided.  - Attempting to update a flight assignment with a leg that does not belong to the available legs of that airline. | update.hack |
| Delete a flight assignment | - Detele a valid flight assignment. | delete.safe | High (99.4%) |
| - Attempting to access the delete flight assignment view with technician member account.  - Attempting to delete a flight assignment without and id provided.  - Attempting to delete a flight assignment with and id provided that belongs to an existing published flight assignment owned by the flight crew member.  - Attempting to delete a flight assignment with and id provided that belongs to an existing draft flight assignment not owned by the flight crew member.  - Attempting to delete a flight assignment with and id provided that belongs to an existing published flight assignment not owned by the flight crew member. | delete.hack |
| Publish a flight assignment | - Publish a valid flight assignment.  - Attempting to publish an invalid flight assignment, testing all the fields with incorrect data.  - Attempting to publish a valid flight assignment with an status different from “AVAILABLE”.  - Attempting to publish a flight assignment with a leg that overlap with another leg timeframe.  - Attempting to publish a flight assignment with a duty (pilot or copilot) and a leg that already contains a flight assignment with one pilot or copilot. | publish.safe | High (100%) |
| - Attempting to access the publish flight assignment view with technician member account.  - Attempting to publish a flight assignment without and id provided.  - Attempting to publish a flight assignment with and id provided that belongs to an existing published flight assignment owned by the flight crew member.  - Attempting to publish a flight assignment with and id provided that belongs to an existing draft flight assignment not owned by the flight crew member.  - Attempting to publish a flight assignment with and id provided that belongs to an existing published flight assignment not owned by the flight crew member.  - Attempting to publish a flight assignment without a leg id provided.  - Attempting to publish a flight assignment with a leg that does not belong to the available legs of that airline. | publish.hack |

9) Operations by **flight crew members** on **activity log records**:

* List the activity log records in their flight assignments.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| List activity logs | - Access the activity logs with a flight crew member account. | list.safe | High (100%) |
| - Attempting to access the activity logs with a technician member account.  - Attempting to access the activity logs without a flight assignment id provided.  - Attempting to access the actvity logs with an invalid flight assignment id.  - Attempting to access the activity logs with a flight assignment id provided that belongs to an existing planned draft flight assignment not owned by the flight crew member.  - Attempting to access the activity logs with a flight assignment id provided that belongs to an existing planned published flight assignment not owned by the flight crew member.  - Attempting to access the activity logs with a flight assignment id provided that belongs to an existing completed published flight assignment not owned by the flight crew member. | list.hack |

* Show the details of their activity log records.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| Show the details of an activity log | - Access to a published activity log with a flight crew member account.  - Access to a draft activity log with a flight crew member account. | show.safe | High (100%) |
| - Attempting to access the published activity log with a technician member account.  - Attempting to access the draft activity log with a technician member account.  - Attempting to access an activity log without a activity log id provided.  - Attempting to access an actvity logs with an invalid activity log id.  - Attempting to access the activity log with an id provided that belongs to an existing draft activity log not owned by the flight crew member.  - Attempting to access the activity log with an id provided that belongs to an existing published activity log not owned by the flight crew member. | show.hack |

* Create, update, delete and publish activity log records. They cannot be published if their corresponding flight assignments have not been published yet. No updating or deletion is possible once an activity log record has been published.

|  |  |  |  |
| --- | --- | --- | --- |
| Feature | Description | File | Result |
| Create an activity log | - Access to a published activity log with a flight crew member account.  - Access to a draft activity log with a flight crew member account. | create.safe | High (100%) |
| - Attempting to access the published activity log with a technician member account.  - Attempting to access the draft activity log with a technician member account.  - Attempting to access an activity log without a activity log id provided.  - Attempting to access an actvity logs with an invalid activity log id.  - Attempting to access the activity log with an id provided that belongs to an existing draft activity log not owned by the flight crew member.  - Attempting to access the activity log with an id provided that belongs to an existing published activity log not owned by the flight crew member. | create.hack |
| Update an activity log | - Update a valid activity log.  - Attempting to update an invalid activity log, testing all the fields with incorrect data. | update.safe | High (100%) |
| - Attempting to update a published activity log owned by the flight crew member.  - Attempting to update the published activity log with a technician member account.  - Attempting to update the draft activity log with a technician member account.  - Attempting to update an activity log without a activity log id provided.  - Attempting to update an actvity log with an invalid activity log id.  - Attempting to update the activity log with an id provided that belongs to an existing draft activity log not owned by the flight crew member.  - Attempting to update the activity log with an id provided that belongs to an existing published activity log not owned by the flight crew member. | update.hack |
| Delete an activity log | - Detele a valid activity log. | delete.safe | High (100%) |
| - Attempting to delete a published activity log owned by the flight crew member.  - Attempting to delete the published activity log with a technician member account.  - Attempting to delete the draft activity log with a technician member account.  - Attempting to delete an activity log without a activity log id provided.  - Attempting to delete an actvity log with an invalid activity log id.  - Attempting to delete the activity log with an id provided that belongs to an existing draft activity log not owned by the flight crew member.  - Attempting to delete the activity log with an id provided that belongs to an existing published activity log not owned by the flight crew member. | delete.hack |
| Publish an activity log | - Publish a valid activity log. | publish.safe | High (100%) |
| - Attempting to publish a published activity log owned by the flight crew member.  - Attempting to publish a draft activity log with flight crew member account.  - Attempting to publish the published activity log with a technician member account.  - Attempting to publish the draft activity log with a technician member account.  - Attempting to publish an activity log without a activity log id provided.  - Attempting to publish an actvity log with an invalid activity log id.  - Attempting to publish the activity log with an id provided that belongs to an existing draft activity log not owned by the flight crew member.  - Attempting to publish the activity log with an id provided that belongs to an existing published activity log not owned by the flight crew member. | publish.hack |

We will analyze the code coverage we have achieved thanks to the functional tests performed. Code coverage indicates what percentage of the source code has been executed during testing. This allows us to identify the areas that have been verified and those that have not yet been analyzed (which may contain undetected errors):

Interfaz de usuario gráfica, Aplicación, Tabla, Excel

Descripción generada automáticamente

With regard to the functionalities of both entities (FlightAssignment and ActivityLog), we can see that they reach close to 100%. This implies that much of the code implemented to perform these functionalities is tested in case there is an error that has not been contemplated.

To justify the remaining 0.3% in Flight Assignments, I will explain which concepts have not been analyzed or taken into account:

Texto

Descripción generada automáticamente

The authorization method contemplated testing with two roles, one of which was suitable for authorization by the system. Although Eclipse was unable to capture this test, the request appears in the test log. The test log shows that the request was made, but Eclipse was unable to capture it. This problem appear also on all the classes with missed instructions.

## **Performance Testing**

Here we present the results obtained after running the functional tests, developed for requirements 8 and 9 of Student 3. The main objective is to evaluate the impact of the tests on response times, evaluate the performance of the software, and the performance of the hardware on each of the different devices.

The results obtained by analyzing the log trace when running the launcher replay. During this process, the average response times of the feature was recorded, allowing statistics to be generated.

Tabla

El contenido generado por IA puede ser incorrecto.Gráfico, Gráfico de barras

El contenido generado por IA puede ser incorrecto.

The performance tests without indexes meet some basic response requirements, so we decided to add indexes and improve some line codes on the flight assignment and activity log features to check if the improvement is worth.

Tabla

El contenido generado por IA puede ser incorrecto.

Gráfico, Gráfico de barras

El contenido generado por IA puede ser incorrecto.

Based on the data obtained, the average response times showed an increase, going from 17.2 ms before optimization to 9.9 ms after the implementation of indexes in average.

Interfaz de usuario gráfica, Aplicación, Tabla

El contenido generado por IA puede ser incorrecto.

Interfaz de usuario gráfica, Aplicación, Tabla, Excel

El contenido generado por IA puede ser incorrecto.

The two-tailed p-value is close to 0.002, which reinforces the claim that there is sufficient evidence to assert that response times improved substantially, as this value is below the alpha threshold of 0.05 in device 1.

**The 95% confidence intervals overlap:**

Before the change: [12.67 ms, 21.71 ms]

After the change: [8.75 ms, 11.03 ms]

The performance of the system will now be compared on two different computers, PC1 and PC2 (another laptop). Will be the actual project with indexes in both computers.

Interfaz de usuario gráfica, Tabla

El contenido generado por IA puede ser incorrecto.

Tabla

El contenido generado por IA puede ser incorrecto.

The two-tailed p-value is 0.998, which confirms that there is not improvement between PC1 and PC2, since this value is above the alpha threshold of 0.05. This makes sense, as both computers have similar computational characteristics.

**The 95% confidence intervals overlap:**

PC1: [8.75 ms, 11.03 ms]

PC2: [7.72 ms, 9.48 ms]

## **Conclusions**

Since we want to evaluate the impact of functional tests and system performance, multiple functional tests were carried out, satisfying 99.7% coverage for the Flight Assignment entity, 100% coverage for the Activity Log entity and their functionalities.

In performance testing, it can be stated that neither device showed statistically significant differences in response times between them. However, with regard to changes made to the code (including the addition of indexes), response times have improved substantially. Therefore, we can say that there have been substantial changes since before making changes to the code and adding the indexes.

## **Bibliography**

Intentionally blank.