Problem Context:

In an airline context, passenger check-in and check-out processes can be disjointed and chaotic, leading to delays, confusion, and a negative experience for travelers. Our team has been chosen to create the initial iteration of a system that efficiently uploads passenger information, registers their arrival at the departure lounge and establishes the sequence of entry into the aircraft in order to improve the order in this process. In addition, you are required to give First Class customers precedence based on unique factors such as mileage accrual, personal care needs, seniority, etc.

Solution development:

The development of the solution has been carried out following an engineering-based approach, with the following steps:

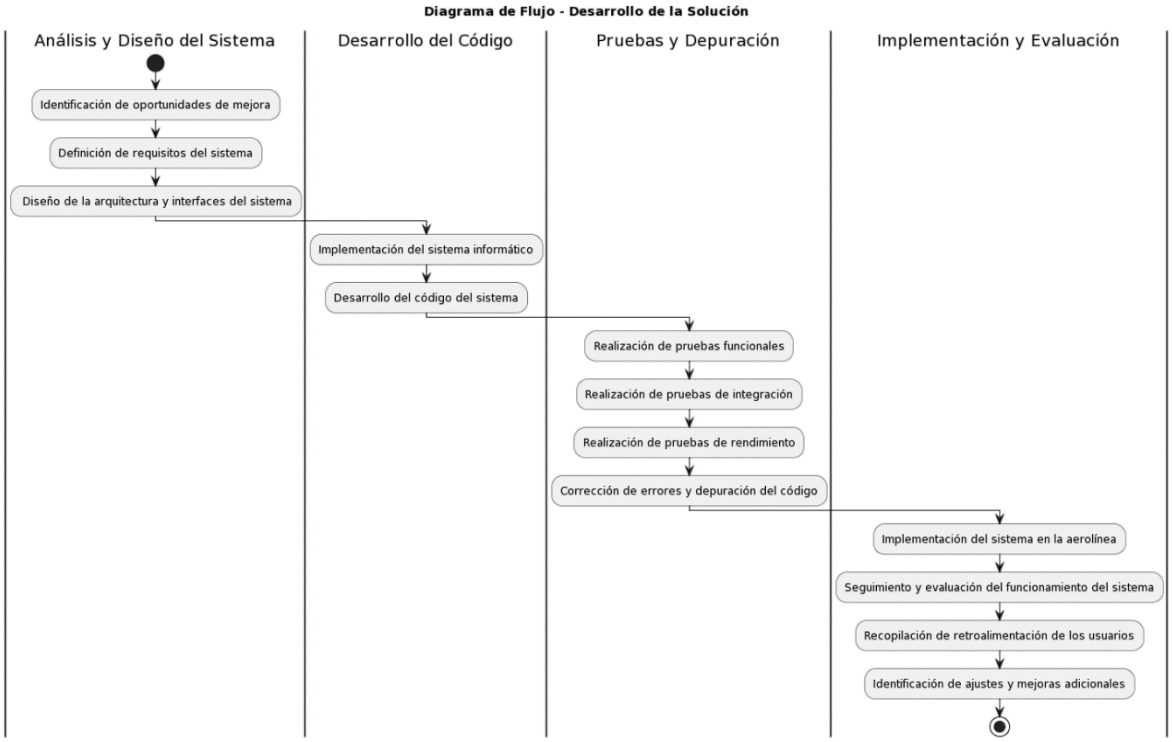
a) Analysis and Design of the System: A detailed analysis of the current passenger entry and exit process in the airline has been carried out, identifying problematic points and opportunities for improvement. Work has been done on the design of a computer system that allows the loading of passenger information, as well as their prioritization based on the special criteria established. The system requirements have been defined, including the necessary functionalities, the technological architecture, and the user interfaces.

b) Development of the Code: The computer system has been implemented, following the specifications defined in the analysis and design phase. Appropriate technologies and programming languages have been used for the airline's existing technological infrastructure. The system code has been developed, including the passenger information loading logic, the application of special prioritization criteria, and the user interfaces.

c) Testing and Debugging: Exhaustive tests of the system have been carried out to ensure its proper functioning and to identify possible errors or problems. Functional tests, integration tests with the existing technological infrastructure, and performance tests have been carried out. The identified errors have been corrected and the system code has been debugged to guarantee its quality and efficiency.

d) Implementation and Evaluation: Once the system has passed the tests and has been debugged, it has been implemented in the airline. The system's operation has been monitored and evaluated in real time, identifying possible adjustments and additional improvements. Feedback from users has been collected and the efficiency of the system has been evaluated in terms of improving the passenger entry and exit process.

Below is a diagram in PlantUML code that shows a visual representation of the phases and steps of solution development:



Identification of the problem:

The problem identified is the lack of an efficient system for the entry and exit of passengers in an airplane, which results in disorganization and delays in the process. In addition, prioritization of certain first class passengers based on special criteria is not considered.

Information Collection: (PENDING)

A compilation of information has been carried out on the current process of entry and exit of passengers in the airline, as well as the special criteria that must be taken into account to give priority to first class passengers. The existing technological infrastructure in the airline and the requirements of the proposed system have also been evaluated.

Search for creative solutions:

A search for creative solutions has been carried out to improve the process of entry and exit of passengers, including the development of a computer system that allows the loading of passenger information and the prioritization of the same based on the special criteria established.

- Implementation of facial recognition technology: Facial recognition technology could be used to identify passengers with special prioritization criteria, such as passengers with reduced mobility or special needs. This would speed up the process of identifying and prioritizing passengers, reducing waiting time and improving the user experience.

- Development of a mobile application: A mobile application could be developed so that passengers can pre-register their special needs or prioritization requirements before their trip. The recorded information could be used by the computer system to identify passengers with special priorities upon arrival at the airport, which would streamline the process and reduce the workload of customer service staff.

- Implementation of a queue management system: A queue management system could be implemented that allows passengers to register in a virtual queue to enter the airport, indicating their special needs or prioritization requirements. The computer system could use this information to assign priorities and manage the flow of passengers more efficiently, reducing waiting times and improving the organization of the process.

- Use of identification tags: Identification tags with color codes or symbols could be used to identify passengers with special needs or prioritization requirements. These tags could be provided to passengers at registration or check-in, and would be visible to airport security and customer service personnel, making it easier to identify and prioritize passengers during the check-in and check-out process.

- Implementation of a virtual customer service system: A virtual customer service system could be implemented, through chatbots or virtual assistants, which allows passengers to register their special needs or prioritization requirements, and receive information and guidance on the process of entering and leaving the airport. This could

help reduce the workload of customer service staff and streamline the process of identifying and prioritizing passengers.

These are just a few creative solution ideas that might address the problem at hand. It is important to evaluate the technical, economic and operational feasibility of each of them, as well as consider the possible impacts and benefits for passengers and airport staff, before selecting the best option to implement.

Transition from ideas to preliminary designs:

The transition from ideas to preliminary designs implies carrying out an iterative design process that involves the elaboration of concepts and the generation of concrete proposals to implement the identified creative solutions. The main steps in this process are described below:

- **Definition of requirements:**At this stage, the specific requirements of the system or proposed solution must be defined, taking into account the objectives of the project, the technical and operational restrictions, and the needs of the users. This implies identifying what functionalities or characteristics the solution must have to solve the problem posed effectively.

- **Generation of concepts:**Different concepts or ideas must be generated to implement the proposed solution. This implies the generation of various design alternatives that meet the defined requirements. It is important to encourage creativity and explore different approaches to approach the problem from different perspectives.

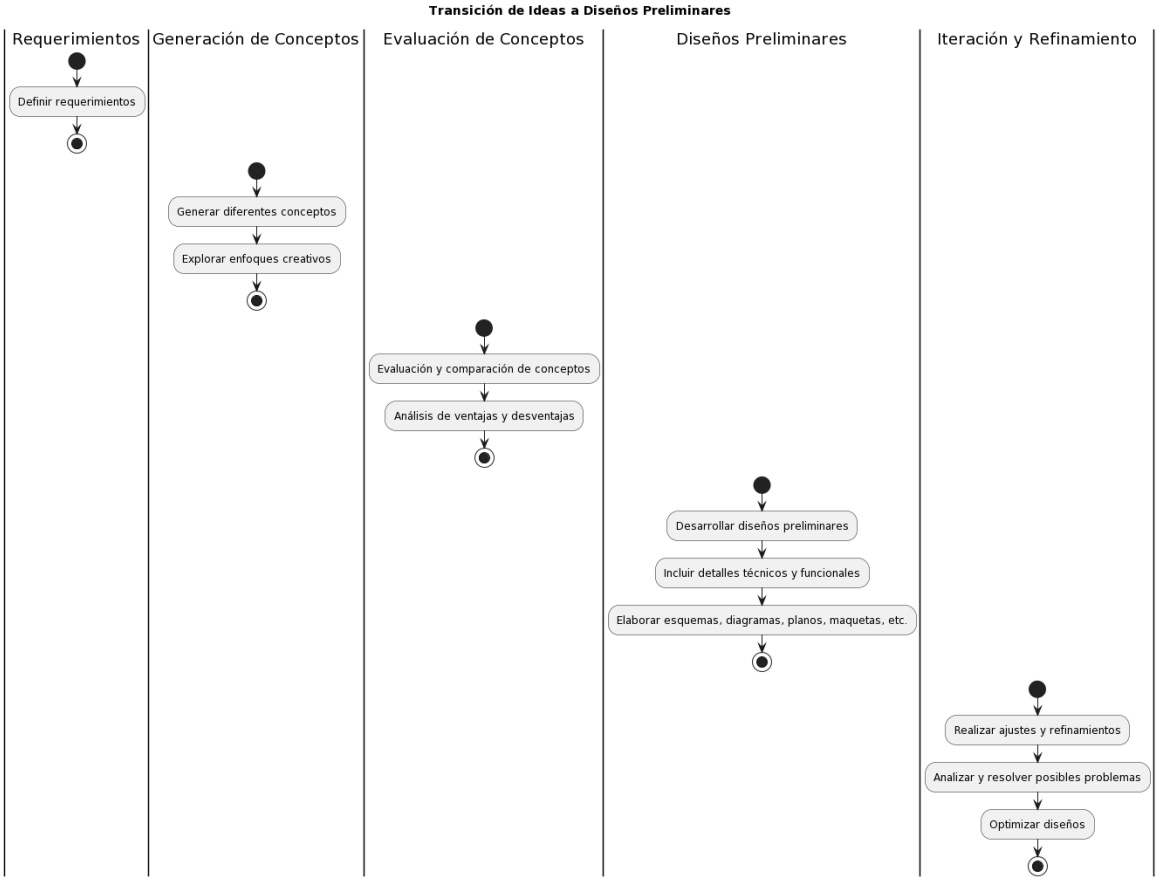
- **Concept evaluation:**The different concepts generated must be evaluated and compared, using objective and subjective criteria. This implies analyzing the advantages and disadvantages of each concept in terms of its technical, economic, operational feasibility and its ability to meet the defined requirements. Techniques such as cost-benefit analysis, risk analysis, impact assessment, and user feedback can be used to make informed decisions about which concept or combination of concepts is most appropriate.

- **Preliminary designs:**Based on the evaluation of the concepts, preliminary designs must be developed that include technical and functional details of the proposed solution. This involves creating schematics, diagrams, plans, mockups, or other visuals that help visualize and communicate how the solution will work in practice. It is important to take into account the technical and operational feasibility of the preliminary designs, as well as consider the feedback from users and other stakeholders involved.

- **Iteration and refinement:**The preliminary design process is iterative, which means that adjustments and refinements can be made to the designs based on the feedback received and the findings obtained during your review. This implies analyzing and solving possible technical, economic or operational problems identified, as well as making adjustments to the designs to optimize their operation and comply with the defined requirements.

Once these steps are completed, detailed preliminary designs of the proposed solution will be obtained, which can be reviewed and validated before advancing to the next stage of the engineering process, which is the evaluation and selection of the best solution.

Here is a diagram in PlantUML code that represents the flow of transition from ideas to preliminary designs:



Evaluation and Selection of the best solution:

Once different concepts and preliminary designs have been studied, it is important to evaluate and compare these solution alternatives to determine which one is the best option. For it,

Clear criteria must be defined that allow for an objective evaluation based on specific data. The steps to carry out the evaluation and selection of the best solution are described below:

- Define Evaluation Criteria: It is necessary to establish the criteria that will be used to evaluate the solution alternatives. These criteria must be aligned with the requirements and needs of the problem posed. For example, they can include technical, functional, economic, security, sustainability, and feasibility aspects, among others. It is important that the criteria are clear, measurable and relevant in order to be able to compare the alternatives objectively.

- Assign Weights to the Criteria: Weights or levels of importance must be assigned to each evaluation criterion, according to their relevance in solving the problem. This will allow the different criteria to be weighed and given due consideration in the evaluation. Weights can be assigned subjectively or through multi-criteria analysis techniques, such as AHP analysis (Analytic Hierarchy Process) or cost-benefit analysis.

- Evaluate Alternatives: Each one of the solution alternatives is evaluated based on the defined criteria. This may involve the collection and analysis of data, the performance of tests or simulations, the consultation of experts, or any other methodology that allows obtaining objective information on the performance of the alternatives in relation to the established criteria.

- Compare Results: The results of the evaluation of the alternatives are compared, considering the weights assigned to the criteria. An evaluation matrix or similar tool can be used to visualize the results in a clear and comparative way. It is important to consider both the quantitative and qualitative results obtained in the evaluation.

- Choose the Best Solution: Based on the results of the evaluation and considering the established criteria and weights, we proceed to select the best solution that best meets the needs of the problem posed. This selection must be objective and based on the data and analysis carried out during the evaluation. In some cases, it may be necessary to perform an additional review or iteration of the evaluation and selection process to ensure that the best solution is chosen.

It is important to note that the evaluation and selection of the best solution can be an iterative process and that decision making must be based on objective data and analysis. Once

Once the best solution has been selected, the next stage of the design process proceeds, which may include the development of detailed designs, prototyping or modeling, and implementation and testing of the selected solution.

Preparation of Reports and Specifications:

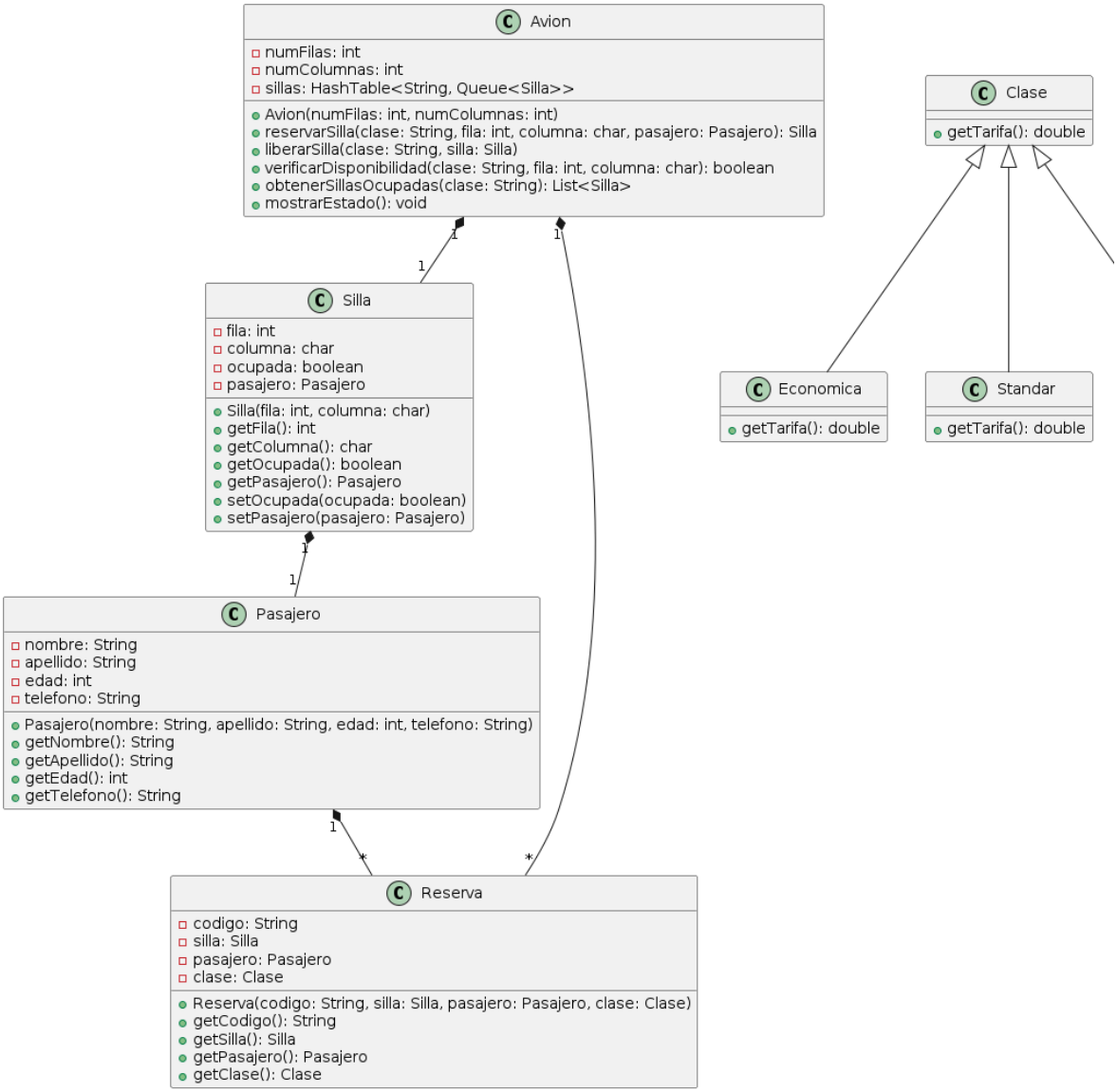
Once the best solution has been selected, it is important to document and communicate the results of the design process. The preparation of adequate reports and specifications is essential to ensure a correct implementation of the solution and to facilitate communication between members of the design team, stakeholders and other interested parties. The steps to carry out the preparation of reports and specifications are described below:

Problem Analysis: A summary of the problematic context is made, describing in a clear and concise way the problem that is sought to be solved. Relevant information can be included, such as background, requirements, constraints, and project goals.

Solution Description: A detailed description of the selected solution is presented, including the main elements that compose it, its operation and technical characteristics. You can use text, graphics, images or any other form of representation that helps to understand the solution.

Technical Specifications: The technical specifications of the solution are detailed, including the design requirements, the standards to be met, the materials and components to be used, and any other relevant information for the implementation of the solution. It is important that the specifications are clear, complete and precise, to guarantee a correct implementation.

PlantUML Class Diagram: PlantUML, a Unified Modeling Language (UML) modeling tool, can be used to create a class diagram that represents a simple solution to the problem. The class diagram allows you to visualize the classes, attributes, methods and relationships between the objects of the solution. Here is an example of a PlantUML class diagram for a fictional solution to the program:



Conclusions and Recommendations: Conclusions and recommendations based on the results obtained during the design process can be included, such as future improvements, additional considerations or possible adjustments in the solution.

The preparation of reports and specifications must be clear, complete and organized, with the aim of facilitating the implementation of the solution and ensuring that the objectives of the project are met. Additionally, it is important to keep the documentation up-to-date throughout the design process, making revisions and updates as necessary.

Design Implementation: