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## PHASE 1: PROBLEM IDENTIFICATION AND REQUIREMENTS SPECIFICATION

### Problem identification:

A well-known airline has been presenting serious problems in the handling of the times for the arrival and departure of its passengers. As a result, flights are delayed for long periods of time and customers choose to look for new airlines that can meet their needs. As a result of the above, the airline has incurred losses in the millions of dollars and needs to solve the problem as soon as possible.

### Stakeholder identification:

- The company's managers who require to have greater control over the aircraft's check-in and check-out mechanisms.
- -The crew member in charge of passenger check-in and check-out.
- Airline customers as it allows them to minimize waiting times, as well as a much more orderly check-in and check-out.

### Functional requirements:

1. Passenger information corresponding to flight X must be able to be loaded.
2. Search the information of a passenger.
3. Register the arrival of a passenger in the lounge.
4. Show the order in which the passengers must enter the lounge.
5. Show the order in which passengers must leave.

### Specification of requirements:

Name or identifier	1. Upload the corresponding passenger information.		
Summary	The system must allow the user to upload the information to the system by means of a text file containing all the objects created in the JSON language.		
Inputs	Input name	Datatype	Selection or repetition condition
	None	None	None

<b>General activities necessary to obtain the results</b>	<ul style="list-style-type: none"> <li>The program must be started in order to be able to read the information.</li> </ul>		
<b>Result or post-condition</b>	All information must be passed to the corresponding objects		
<b>Outputs</b>	<b>Output name</b>	<b>Datatype</b>	<b>Selection or repetition condition</b>
	None	None	None

<b>Name or identifier</b>	<b>2. Search for passenger information</b>		
<b>Summary</b>	The system must allow the user to search for passenger information.		
<b>Inputs</b>	<b>Input name</b>	<b>Datatype</b>	<b>Selection or repetition condition</b>
	passengerId	String	None
<b>General activities necessary to obtain the results</b>	<ul style="list-style-type: none"> <li>The program should already have the data loaded and organized in a hash table.</li> <li>You must press the option to search for the information</li> <li>The object must already be created</li> </ul>		
<b>Result or post-condition</b>	Passenger information must be displayed		
<b>Outputs</b>	<b>Output name</b>	<b>Datatype</b>	<b>Selection or repetition condition</b>
	passenger	String	None

<b>Name or identifier</b>	<b>3. Register the arrival of a passenger in the lounge.</b>		
<b>Summary</b>	The system must be able to register the arrival of passengers in the lounge.		

Inputs	Input name	Datatype	Selection or repetition condition
	passengerId	String	Solo si se hace la llegada manual
General activities necessary to obtain the results	<ul style="list-style-type: none"> <li>The program should already have the data loaded and organized in a hash table.</li> <li>You have to press the passenger arrival option either manually or automatically.</li> <li>The object must already be created</li> </ul>		
Result or post-condition	Passenger arrival must be recorded automatically or manually.		
Outputs	Output name	Datatype	Selection or repetition condition
	arrivalMessage	String	None

Name or identifier	4. Show the order in which passengers must enter		
Summary	The system must be able to show the order in which the passengers must enter the system		
Inputs	Input name	Datatype	Selection or repetition condition
	None	None	None
General activities necessary to obtain the results	<ul style="list-style-type: none"> <li>The program should already have the data loaded and organized in a hash table.</li> <li>You must click on the option to show passenger input</li> <li>Objects must be created</li> </ul>		
Result or post-condition	The arrival of passengers must be shown to the user.		
Outputs	Output name	Datatype	Selection or repetition condition
	entranceMessage	String	None

<b>Name or identifier</b>	<b>5. Show the order in which passengers should depart</b>		
<b>Summary</b>	The system must be able to display the order in which passengers must depart		
<b>Inputs</b>	<b>Input name</b>	<b>Datatype</b>	<b>Selection or repetition condition</b>
	None	None	None
<b>General activities necessary to obtain the results</b>	<ul style="list-style-type: none"> <li>• The program must already have the data loaded and organized in a hash table.</li> <li>• You must click on the option to display the output of the passengers.</li> <li>• Objects must be created</li> </ul>		
<b>Result or post-condition</b>	Passenger departure must be shown to the user.		
<b>Outputs</b>	<b>Output name</b>	<b>Datatype</b>	<b>Selection or repetition condition</b>
	exitMessage	String	None

## PHASE 2: GATHERING THE NECESSARY INFORMATION

In order to be clear about the entry and exit of passengers, relevant information was sought in order to have control over them. In addition, information was sought on how other airlines have solved the problem of passenger check-in and check-out.

- Most of the airlines respect the rule of boarding people traveling with children, elderly, pregnant women, and people with disabilities.
- Many airlines give priority passage to people with disabilities or families with children under 2 years old. After that, they start calling by groups and each group has a number that establishes the order of preference to enter the plane.
- Other airlines assign a priority to different groups and classify people in these groups depending on their age, profession, executive pay and other important aspects.

- The airline provides us with the order of departure of passengers where those who leave first are those who are in the first rows and for each row the order is established by proximity to the aisle or order of arrival as the last instance.

#### **Sources:**

- <https://www.edestinos.com.pa/consejos-para-viajeros/pasajes-de-avion/check-in-y-servicio-a-bordo/prioridad-de-embarque#:~:text=En%20la%20mayor%C3%ADa%20de%20los,las%20personas%20con%20tarjetas%20de>
- <https://www.iberia.com/co/embarque/>
- [https://www.aa.com/i18n/travel-info/boarding-process.jsp?reportedLocation=homePage.do&reportedPosition=1&reportedTitle=Un+proceso+de+embarque+m%C3%A1s+simple&repositoryName=PromotionContentRepository&repositoryId=16826212&locale=es\\_US&cint=DSP%7C%7C20170227%7CMKT%7CMKT%7CTXL%7C%7CLPM\\_Boarding](https://www.aa.com/i18n/travel-info/boarding-process.jsp?reportedLocation=homePage.do&reportedPosition=1&reportedTitle=Un+proceso+de+embarque+m%C3%A1s+simple&repositoryName=PromotionContentRepository&repositoryId=16826212&locale=es_US&cint=DSP%7C%7C20170227%7CMKT%7CMKT%7CTXL%7C%7CLPM_Boarding)
- <https://www.elal.com/es/PassengersInfo/Unique-Services/Pages/Priority-Boarding.aspx>

### **PHASE 3: SEARCH FOR CREATIVE SOLUTIONS**

#### **Brainstorming for the entry and exit of economy class passengers:**

- Entry: organize people in groups and each group has a priority, after having called the passengers with disabilities and the exit is based on what is provided by the airline.
- Admission: The call of people with any disability is prioritized regardless of the group to which they belong.
- Admission: All persons with any type of disability or required priority are assigned to the first groups on the aircraft.
- First, people with any type of motor disability are admitted (if there are two people with motor disabilities, admission will be evaluated depending on their age), then the elderly and then children.

On the other hand, people who do not require any type of priority admission will be evaluated according to their punctuality within their group.

#### **Brainstorming for the entry and exit of business class passengers:**

- Admission: organize people into groups and each group to have a priority, after calling for passengers with disabilities and departure is based on what is provided by the airline.
- Admission: The call of people with any disability is prioritized within the group to which they belong.
- Admission: All persons with any type of disability or required priority are assigned to the first groups on the aircraft.
- First, people with any type of motor disability are admitted (if there are two people with motor disabilities, admission will be evaluated depending on their age), then the elderly and then the children.
- Exit: For the exit, the people who are in a seat next to the aisle must be removed first, then those in the middle and then those next to the window, this can be done by placing them in the stack in an orderly manner, first those at the window, then those in the middle and then those in the aisle.

On the other hand, for people who do not require any type of priority entry, the miles and secondly their punctuality will be evaluated.

#### **Brainstorming for the selection of the necessary data structures:**

- For arrival use of a priority queue.
- For departure, use of a priority queue.
- For departure use of three stacks
- Hash to store passengers and search for them
- Heap to organize passengers at check-in time
- ArrayList to store and search passengers

#### **PHASE 4: TRANSITION FROM IDEA FORMULATION TO PRELIMINARY DESIGNS**

During the design phase of a program or project, it is essential to conduct a thorough review of all proposed ideas to determine their feasibility and establish their potential for successful project development. At this stage, ideas that are not feasible are discarded, and promising ideas are molded and modified to form preliminary drafts and feasible designs.

In this review, all proposals are analyzed and critically evaluated, considering project objectives, available resources, timelines, and technical and financial constraints. Potential drawbacks and risks associated with each idea are identified to determine if they can be overcome or mitigated.

Once all the ideas have been reviewed, those with the best chances of success and that meet the established requirements are identified. These ideas are transformed into preliminary

drafts and designs, which are elaborated in detail to define the necessary resources, the action plan, the objectives and the expected results.

During the process of reviewing ideas for the development of the program, all proposals submitted were thoroughly evaluated. The objective was to select the most viable option to achieve the established objectives and meet the needs of the users.

After a detailed and rigorous analysis of each of the ideas, it was concluded that all of them were viable options for the development of the program. Each proposal presented strengths and weaknesses that were carefully evaluated and considered.

Each of the ideas presented proved to be a viable option for program development, and all proposals were considered as possible solutions. In summary, after a detailed evaluation of all the ideas presented, it was concluded that all of them are viable options for program development.

## **PHASE 5: EVALUATION AND SELECTION OF THE BEST SOLUTION**

As the engineering design process evolves, the engineer may evaluate over and over again alternative ways to solve the problem at hand. Commonly, the engineer abandons design possibilities that are not promising, resulting in a progressively smaller set of options. Feedback, modification and evaluation may occur repeatedly as the device or system evolves from concept to final design. Depending on the nature of the problem to be solved, evaluation may be based on several factors, such as economic, social, environmental, etc.

In order to select the best decision in each of the cases, 2 criteria will be taken into account, which will be evaluated from 1 to 5, with 1 being the worst case and 5 being the best.

- Effectiveness: The relationship between the result obtained and the desired or expected result will be evaluated.

-Completeness: It is the criteria in which we see if the option, complete all the requirements we solicited.

- **Search for passengers:**

Options	Effectiveness	Completeness	Total
ArrayList	2	1	3
Hash Table	5	5	10

- **Arrival of passengers to the aircraft:**

Options	Effectiveness	Compleitud	Total
Cola prioritaria	5	5	10
Heap	4	5	9

- **Departure of passengers from the aircraft:**

Options	Effectiveness	Compleitud	Total
Cola prioritaria	5	5	10
Tres pilas	3	5	8

#### **Selection:**

It could be observed that, in the search for people, the most viable option is to use a hash table and for the arrival and departure of people, the best option was the priority queue. This is because these three options had a higher score in the decision table.