# THE ENGINEERING METHOD

Context: A foreigner decided to invest in Cali. He want to build a videogame store with an innovative way of service.

Desarrollo de la solución

In order to solve the situation, we were faced, we decided to use the engineering method to focus on a systematic view that match with the problem.

Following the steps of the engineering method from the book "introduction to engineering" from Paul Wright, we defined the next diagram which describe the steps we are going to use in the process.
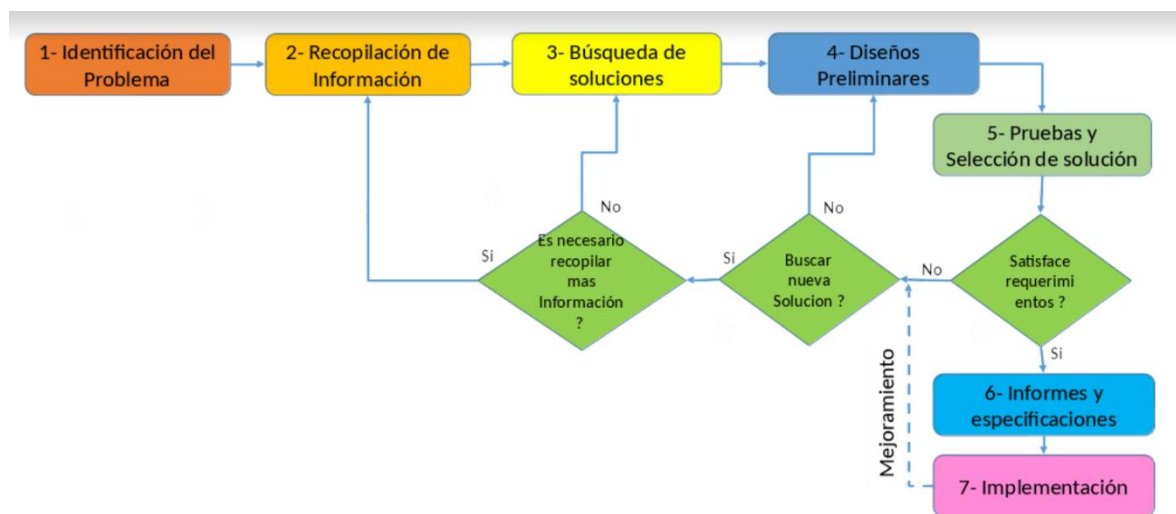
I.   PROBLEM IDENTIFICATION.

Usually, in a common game store, the customer tend to take a long period of time searching each game of interest, or even the new ones in order to try them. Also, some times by the unuseful interaction with the staff could bring more delays int the time people spend inside the store.

- Customers need, before entering the store, to know the catalogue that's available

- The catalogue must have reviews of the games available in the store when the customer needs them.

- The customer must be able to add games in a shopping list.

- The shopping list f each customer, after it's finished, has to generate a id code that the customer Will use to enter the store.

- Each game has to have it's own id code.

- The store Will have a group of stages that let the customers to make fast revisions.

- When the customer uses the list code, the program Will load the game's names to the first stage. Where Will be found the rack, it is placed or where to search for it.

- The game list must be organized based in the location of each rack in order to create the best route.

- If the game it's sold out, it's code won't appear in the games list.

- The customer must be able to choose between 2 different type of sorting algorithm to organize the route.

- The customer must have an automatized basket that will follow the steps to track the games.

- Each client must have a waiting time depending on the time it walked through.

- The order by the customers get to the cashier it's given by the time the customer walk through the store plus the time it took to get the games.

- All customers must do a unic queue even if there's more than 1 cashier.

- If there are cashiers working along, the customers Will be checked out in the as much as the cashiers available.

- The exit order can variate depending on how long the cashier takes to check out the games which it's equal to the number of games to buy.

- In the check out, the games Will be organized in a way that the last videogame put in the basket will be the first checked out.

- After completing the check out, the program must show the total cost if the games bought.

The problem requires to develop a software that let the customers caleños know more about how the store Works. The possible solution should be able to simulate de process of buying videogames since the start of the application until the checkout wanting to solve the problem.

II. **Data recopilation**

In order to solve the problem we have to aknowledge the process of the store itself and show it to the customers. In the following part we explain the concepts we searched to be able to solve the problema using the simulated software.

Generics:

[1]Generics mean parameterized types. The idea is to allow type to be a parameter to methods, classes, and interfaces. Using Generics, it is possible to create classes that work with different data types. An entity such as class, interface, or method that operates on a parameterized type is called a generic entity.

Stacks:

[2]A stack is an array or list structure of function calls and parameters used in modern computer programming and CPU architecture. Similar to a stack of plates at a buffet restaurant or cafeteria, elements in a stack are added or removed from the top of the stack, in a "last in first, first out" or LIFO order.

Queue:

[3]A Queue is a linear structure which follows a particular order in which the operations are performed. The order is First In First Out (FIFO). A good example of a queue is any queue of consumers for a resource where the consumer that came first is served first. The difference between stacks and queues is in removing. In a stack we remove the item the most recently added; in a queue, we remove the item the least recently added.

---

[1] https://www.geeksforgeeks.org/generics-in-java/
[2] https://www.thoughtco.com/definition-of-stack-in-programming-958162
[3] https://www.geeksforgeeks.org/queue-data-structure/

TAD:

[4]An Abstract Data Type it's a group of operations defined b yan specification that doesn't depend on any representation.

Tablas Hash:

[5]Hash Table is a data structure which stores data in an associative manner. In a hash table, data is stored in an array format, where each data value has its own unique index value. Access of data becomes very fast if we know the index of the desired data.

Github:

[6]GitHub is one of the world's largest community of developers. It's an intricate platform that fosters collaboration and communication between developers. GitHub has several useful features that enable development teams to work together on the same project and easily create new versions of software without disrupting the current versions

III. **Creative ideas research**

To develop the alternatives listed below, the brainstorming technique was carried out: Spontaneous generation of ideas designed to solve a problem. However, it should be noted that the store owner requested a software that simulates the operation of the establishment. Therefore, all the alternatives are inclined to the development of a simulated, effective and concrete solution.

---

[4] http://webdiis.unizar.es/~elvira/eda/material0304/TADespec/TAD.pdf
[5] https://www.tutorialspoint.com/data_structures_algorithms/hash_data_structure.htm
[6] https://blog.devmountain.com/what-is-github-and-how-do-you-use-it/

1st alternative. 3D simulation

thisalternative, it's a program made in Java that simulates, with a 3D visualization the entry and exit of customers to the video game store. Using data structures such as Queues, Stacks and Hash Tables, a rough simulation of the order of customer departure to the store based on the number of games, order of arrival and estimated times in the store of each of the customers. With an interface that allows the user to see in an approximate way and in first person, the steps that would be made by each section graphically exemplifying the real experience of going to the store with the new and innovative service system.

2nd alternative. GUI simulation
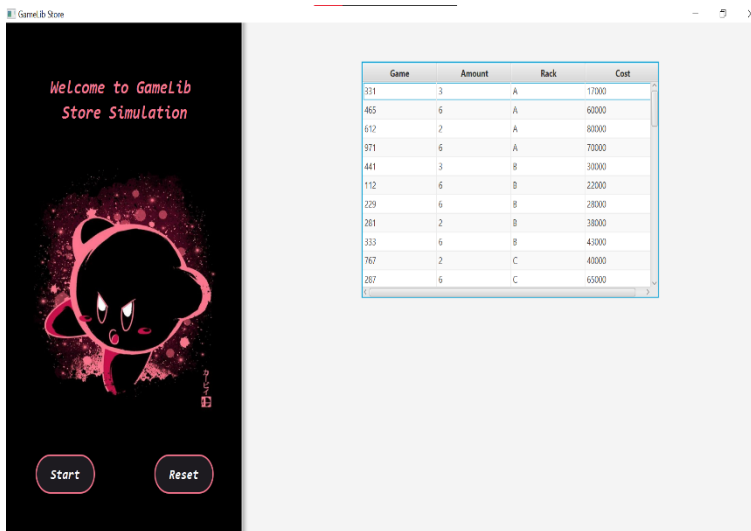
It consists in implementing a simulation software in GUI , a simulation with a graphical interface like most current applications. which simulates the entry and exit of customers to the videogame store. Using data structures such as: Queues, Stacks and Hash Tables

3rd *alternative. CLI simulation*
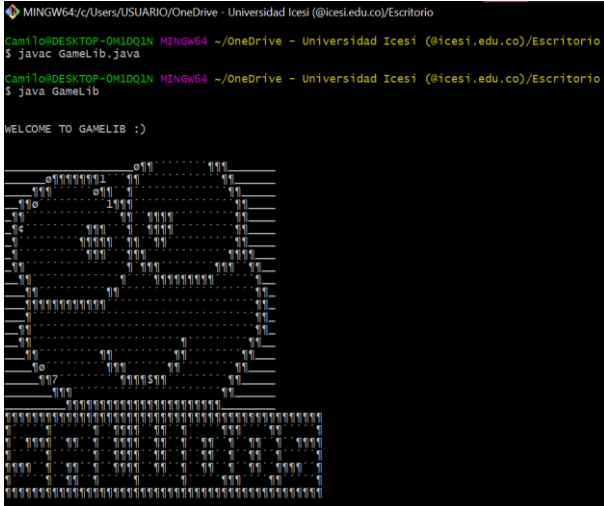
This option would implement a simulation software in CLI (command line interface) that is, a simulation using command line in the console or terminal of the device that is implemented which simulates the entry and exit of customers to the videogame store. Using data structures such as: Queues, Stacks and Hash Tables

IV. TRANSICIÓN DE LA FORMULACIÓN DE IDEAS A LOS DISEÑOS PRELIMINARES (mockup)

Now, the ideas will be discarded in order to narrow the options and thus more easily choose the most viable solution.

Alternative 1. Simulation program with a 3D view of the store, since due to the difficulty of 3D simulation, its implementation may be imprecise and may not provide an optimal solution to the problem.

The review of the other alternatives leads us to the following:

(diseños)

V. EVALUATION AND SELECTION OF THE BEST SOLUTION

Wanting to judge all the alternatives we've planned in order to choose the most accurate, some parameters have been chosen and enumerated in the following statements.

-Parameter A:

      Simulation accuracy. The program gives a:

      - [2] Highly accurate simulation

      - [1] Approximated simulation

-Parameter B:

      User operation. The program let the customer:

      - [2] Manage the program easily and clearly

      - [1] Manage the program with a little complexion

-Parameter C:

      Visual attractiveness. The program would:

      - [2] Be more attractive for the customer to increase to shopping rate

      - [1] Be plane and not so attractive for the customer

Judgment:

By analysing the parameters, we get to the following graphic:

	Parameter A	Parameter B	Parameter C	Total
2nd alternative – GUI simulation	2	2	2	6
3rd alternative	1	1	1	3

Selecting:

After checking the judge, we can conclude that the 2nd alternative it's the most reliable to solve the problem because, it got the highest score with the parameters.

VI.   REPORTS AND SPECIFICATIONS

The specification, design and require documents that the program needs to implement can be found in the docs folder of the Github repository where the project is stored.

VII.   DESING IMPLEMENTATION

The implementation can be founded in the Github repository. It's made with java and javafx.

Imagen tomada de:

https://www.alamy.es/mujer-de-mediana-edad-con-gafas-de-realidad-virtual-jugando-videojuegos-en-3d-viendo-simulacion-futurista-emocionado-experiencia-image417392506.html