

Engineering Method

Algoritmos y Estructuras de Datos

Tarea Integradora 1

1. Problem Identification

The store requires providing an efficient and innovative service to the customer in their process of buying video games. There is no system in store currently allowing this. The problem solution must be efficient, so that the service can be delivered to the largest number of clients with the minimum resource consumption, minimizing the purchase time of each user.

2. Information gathering

Algorithm

An algorithm is a sequence of instructions that are made to solve a specific problem. An algorithm must be precise, so there is no place for ambiguities. Algorithms are independent from programming languages. It is concluded that an algorithm must be sufficient to solve a problem. In the case of having two algorithms that lead to the same objective, a complexity analysis must be carried out to determine the preferable one.

Data Structures

A data structure is a way of organizing data so that it can be used effectively. This is a collection of data correlated with each other, in addition to the fact that different functions and operations can be applied to them. There are different types of data structures that are used according to the needs of the developer.

Stack

A stack is an abstract data type that contains a linear sequence of items. It is a last in, first out (LIFO) structure, which means you can only take a value from the top of the stack, and you can only add a value to the top of the stack. It is usually compared with a stack of plates.

Linked List

A linked list is a dynamic data structure, this means the size can vary through time. As the name says it, the elements in the list are linked together, these are nodes. A node stores the element or data and a pointer to the next node.

Generics

Generics allow the author of a class or method to introduce type parameters, which are symbols that can be substituted for any type. Some of the benefits of using generics are stronger type checks at

compile time, elimination of casts and enabling developers to implement generic solutions, which leads to code being reused in future instances.

ADT or Abstract Data Type

An ADT is a mathematical model for data types. It is defined by its behavior, possible values and operations. The definition of ADT only mentions what operations are to be performed but not how these operations will be implemented.

3. Search of creative solutions

Alternative 1. Create a website.

Develop a website in which the customer chooses the video games, adds them to a virtual cart and this generates a QR code that is later presented in the store so that the shopkeeper obtains the list of games and delivers them after the payment is completed.

Alternative 2. Create a software.

Develop a software that allows the client to choose the games from a catalog, then, go into the store and manage the order, analyze it and generate an effective and fast experience to fulfill the order in the least amount of time for each client.

Alternative 3. Organize a call center.

Develop a call center in which the client calls, tells the assistant the games they need, the assistant prepares and packs the client's games, and the client goes to the shop, pays, and picks up a box with all the requested games.

4. Preliminary designs

After reviewing the three proposed alternatives, the third one was discarded since the complexity of it. Organizing a call center requires a lot of personnel and financial resources for it to successfully fulfill its objective. In addition to this, it is not the most efficient method, due to long waiting lines and poor interaction between the client and the store.

This leaves us with two alternatives, which are analyzed as follows:

Alternative 1. Create a website.

- A catalog with all the video games is available for clients on the website. This is a process carried out by the client independently.
- After the video game selection process, a QR code is generated containing the client's list of games.
- This code is scanned in the store, to prepare the order and wait for it to be delivered.
- This alternative does not ensure that the wished games are available at the time of delivery.

- Developing a website represents the costs of hosting a domain on the network.
- It also represents little effectiveness for the shopkeeper, when looking for the games and packing them, since there is no method that allows him to do it in the fastest and most efficient way.

Alternative 2. Create a software.

- A catalog is available for the client to choose the games from.
- The client presents a code in the shop that loads the order and then sends him to the search section.
- The search section allows the client to search for their games in the most efficient way and order them. As a result of this, the fastest route to find the games is given to the client.
- The client follows the route and picks all the games and pays for them.
- The process is divided into sections which allows it to be very efficient, in addition to this, it implements sorting algorithms.

5. Choosing the best solution

To choose the best solution, criteria was established to successfully evaluate each alternative. Each criteria has a numerical value to represent the most desirable option.

Criteria A. Completion of the order.

- [1] Not all the games in the list are available at the store.
- [2] All the games in the list are available at the store.

Criteria B. Time taken to finalize the order.

- [1] Lot of time
- [2] Normal time
- [3] Little time

Criteria C. Searching algorithms.

- [1] Searching algorithms are not included in the solution to make the process more efficient.
- [2] The solution includes searching algorithms to make the process more efficient.

Criteria D. Maintenance costs.

- [1] High maintenance costs.
- [2] Normal maintenance costs.
- [3] Low maintenance costs.

Results

	Criteria A	Criteria B	Criteria C	Criteria D	Total
Alternative 1. Website	1	2	1	1	5
Alternative 2. Software	2	3	2	3	10

Selection

Developing software is the most suitable alternative to solve the problem. After applying the criteria, this solution had the most amount of points.

6. Reports and Specifications

Refer to the project documentation in the project's GitHub repository.

7. Design implementation

Refer to the project implementation in the project's GitHub repository.

GitHub Repository: https://github.com/DaniBonica001/Play_Store