## Context of the Problem

A videogame shop wants to innovate the way it offers its services, and requires a GUI based software which allows people from Cali to get familiar with the way the shop is intended to work.

## Development of The Solution

In order to solve the proposed situation, the engineering method has been chosen to develop the solution following a systematic framework and according to the problematic given.

Based on the description of the engineering method given in the book *Introduction to Engineering* by Paul Wright, the following flux diagram was drawn, and will be followed according to the steps shown in it during the development of the solution.

**Identifying the problem**

**Information gathering**

**Solution proposal**

**Design drafts**

**Testing and solution selection**

**Reports and specifications**

**Implementation**

**Do we need more information?**

Yes

No

Enhancement

**Search for a new solution?**

Yes

No

No

**Does it satisfy the requirements?**

Yes

### Step 1: Identifying the Problem

Identifying symptoms and necessities

* People of Cali should be able to familiarize with the new shop’s system and how it will work.
* The videogame shopping process should be simulated through software (the product).
* This software must have a GUI
* The software must inform the exit order of the clients, the value of each purchase and the order each client had their games packed up.

*Definition of the Problem*

The videogame store requires the development of a GUI software that simulates how the purchase process will work in the city of Cali.

### Step 2: Information Gathering

With the purpose of being as clear as possible regarding the concepts involved in this process a search is done for the definitions of the informatic specific terms most closely related with the given problem. It is important to use renown and trustworthy sources for this search, in order to know which elements take part in the problem and which ones don’t.

*Definitions*

Sources:  
<https://www.informaticamilenium.com.mx/>   
<https://softwareparatodo.com/>  
<https://www.ecured.cu/>

*Software*

Software is every application program and operative system that allow the computer can run smart tasks, directing the physical components or hardware with instructions and data through several different kinds of programs.

*Simulation Software*

A simulation software has the objective of facilitating or automating the modeling process for a real-world phenomenon, using mathematical formulas through programing. At its core, it is a program that allows the user to see what will happen after doing a specific action or set of actions, without having to do it in the real world.

*Graphical User Interface (GUI)*

A graphical user interface (GUI by its English acronym) is a program or environment that manages the interaction with the user basing itself on visual relations such as icons, menus, or pointers

### Step 3: Creative Solutions Proposal

In this step, a handful of creative solutions should be proposed for the problem in question. However, because of the requirements of the problem given, the solution alternatives rely on a matter of form, because any solution proposed must be a simulation. With this in mind, the following solution is proposed:

*Alternative 1:*

Ideally, the software will be divided in as many sections for the videogame purchase process (hereon referred to as “The main process”) as possible. In the statement given to us, there were four (4) sections. This process of division would be done via tabs or panes accessed by buttons on a menu. Furthermore, since the main process is a complex one with many abstract concepts like a payment queue, videogame shelves, and clients, the Object-Oriented Programming paradigm will be used for solving and modeling the problem.

The client begins in stage 1 by entering their name and ID number into the login prompt, and then will access the shopping catalogue from which they will choose the games they want to purchase and add them to their shopping kart. After that and when the client is satisfied with the interaction with the catalogue, the code for the client to enter the store in the next step of the stage is generated. This step requires the user to input said code into a field that will simulate the tablet, which will load the client’s list into the next stage for the client to use.

The input will consist as a pane of its own and will take the specifications of each test case to be ran in the simulation. Each test case takes the number of cashiers available during the simulation, the number of clients and the number of shelves as main parameters for the simulation. Particularly, each client

Upon starting stage 2, the user will search for the games in their list in the shelves. This will be done by taking the loaded list from the previous stage and the “tablet” returns the block and/or shelf each game is located at in a list. This list will be sorted according to the location of the shelves (shelves closest to the tablet will appear at the top of the list) in order to make the collection process easier. This could be showcased through a virtual map of the shelves in the store. Should the game be out of stock, the shelf where it is located will be omitted and not shown in the final list. The way the sorting is triggered is by user input since the user will be required to choose between two different sorting algorithms. A quantity of 1 + n minutes will be added under the client’s name, where n is the number of clients that arrived at the tablet first (the first one to arrive to the tablet will take 1 minute, the second, 2 minutes, and so on).

With the ordered list done, the next stage is triggered, and an automated basket will begin stacking the games in the list in order, in a way that the first game found, is the one at the bottom of the basket. For each game found a minute will be added under the client’s name (if they exit this stage with 3 games, 3 minutes will be added). This process is stage 3 in the main process.

Finally, stage 4 begins. Up until now the clients have taken a quantity of minutes, where n is their position in the line to use the tablet (index 1) and g is the number of games they have in their basket. A client that used the tablet 4th and gathered only 1 game will have 5 minutes to their name and will be placed before the clients who took **longer** or used the tablet **after** them, and before the clients who were **faster** or used the tablet **before** them. Using this rule, the clients will be queued in a single line. The way they exit