## 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 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 modelling the problem.

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, for each shelf an id and a number of games must be provided, as well as the metadata related to the imputed game (Name, price, code, and stock). For each client that is added, a comma separated list with the codes or names of the games (either or) is imputed, as well as the ID of each client. Finally, the user will decide which of the two provided sorting algorithms will be used to sort the list of stage 2.

The input will count as stage 1 in which the list of games from the catalogue for each client is provided. And the way they arrive at the tablet in stage 2 is determined by who is added first (which ever client gets added first is the first in line to use the tablet) and will also represent the amount of minutes that will be added to each user (2nd in line will get 2 minutes added). After clicking a submit or confirm button, each client is given a numeric random unique number which will be their code. This code will be used to identify each client. With this code the program will get the list of games for each client and sort it by distance to the tablet with the algorithm given in the input

With the ordered list done, the next stage is triggered, and a stack that represents the automated basket will begin stacking the games in the list. The length of the stack will be then get added to the client’s total purchasing time (if they exit this stage with 3 games in the stack, 3 minutes will be added).

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 to pay, and for each game in their basket they will take 1 minute paying for it. The way they exit follows the queue formed by this rule and will be displayed from top to bottom on screen, where the topmost client exited first, and the bottommost, last.

For each client in this screen a context menu will be triggerable which will show: their ID number, shop code, and the list of games they purchased, as well as the total price they paid for. On hover, or right clicking a game, the price, shelf, code, and name will be displayed, as well as the amount of it the client bought. This screen will be the final output and marks the end of the simulation. Additionally, this pane will show the real quantity of time the simulation took, as well as how many minutes the full interaction took for each client (from the moment they entered the store to the moment they exit it).

### Step 4: Design Drafts