

**URL to the project:** <https://github.com/MiguelRAvila/projectTOBARA>

**URL to the Library:** <https://pypi.org/project/TOBARA/>

## Description

Our system is a Boolean function analyzer tool whose main task is to reduce the function in its simplest expression.

With this information we will create a library that allows any user to consulate the elements of any Boolean function they want to introduce.

## Process

Our main goal is the analysis of the Boolean functions and the breakdown of their main components:

- Get the function
- Determinate their variables
- Determinate their terms
- Simplify the function

## Objective

- Algorithms for reducing Boolean functions.

## Requirements

### 1. System actors

User. A person who uses the system.

- May consult if the Boolean function is in its simplest expression



(it cannot be simplified).

- May ingress a Boolean function to be reduced in its simplest expression.
- May get their Boolean function in its sum of product expression.

## 2. User requirements.

- If the user ingress an invalid input the system will return error and the user will have to change it.
- The users might ingress a Boolean function and get its simplest expression.
- The users might convert their Boolean function into its sum of product expressions.
- The users might install a library from the Pip service of Python.
- The users might create a truth table and minterms table for the Boolean functions.
- The users might create Kmaps for the Boolean functions.

## System requirements

### 1. Functionals

<b>FR001</b>	<b>Identification if the function is in its simplest expression</b>
Priority	High
Description	The system must be able to receive and determine the number of variables the function has.

<b>FR002</b>	<b>Minimization of the expression</b>
Priority	High
Description	The system must be able to receive and verify the number of terms the function has.

<b>FR003</b>	<b>Create the truth table</b>
Priority	High
Description	The system must be able to receive the Boolean function and read the minterms involved.



<b>FR004</b>	<b>Sum of products</b>
Priority	High
Description	The system must be able to receive a Boolean function and translate it in its sum of products expression.

<b>FR005</b>	<b>Reduce function</b>
Priority	High
Description	<p>The system must be able to reduce the function in its simplest expression introducing the number of variables and the minterms that integrate the function.</p> <p>The system must return a string with the literal terms of the simplified function.</p>

<b>FR006</b>	<b>Installation</b>
Priority	High
Description	The system must be re-raised to the Pip system so it might be used from the Python pip installation.

<b>FR007</b>	<b>Truth tables and minterms tables</b>
Priority	Medium
Description	The system must have a function that allows the user to create a truth table or a minterms table introducing the number or variables and minterms that integrate the function.

<b>FR008</b>	<b>Creation of the Kmaps</b>
Priority	Low
Description	The system must have a function



	that allows the user to introduce a Boolean function putting the number of variables and minterms that integrate the function and then generate a table that represents their Karnaugh Map.
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## 2. No functional

<b>NFR001</b>	<b>Inputs</b>
Description	The expression must be a Boolean function and contain non-repetitive variables.

<b>NFR002</b>	<b>Reduction algorithm</b>
Description	The system will be focused in the reduction of the function by the implementation of a reduction algorithm based in the K-maps.

<b>NFR003</b>	<b>Standardization of the matrix</b>
Description	The matrix will have an order for the creation of the truth tables.

<b>NFR004</b>	<b>Sum of Products</b>
Description	The expression will be given with the minterms of the Boolean function ( $2^n$ terms).

<b>NFR005</b>	<b>Installation (inclusion in the pip service)</b>
Description	The system must be registered y count with: A presentation repository to the library. Its presentation of functions and installer.

<b>NFR006</b>	<b>Maximum number of terms for a table</b>
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Description	The system will have a limit of 32 terms for the creation of tables(this includes the truth tables and the minterms tables).
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<b>NFR007</b>	<b>Maximum number of terms to be reduce</b>
Description	The system limit for the reduction of the Boolean functions will be 16 terms.

<b>NFR008</b>	<b>Kmaps limits</b>
Description	The limit for the creation of Kmaps will be of 4 variables and must consider the general notation of the Kmaps.

## Use cases

**UC001.** Simplest expression.

**Description.** Consult if the function is in its simplest expression.

**Sequence.**

1. Consult the tool Mini(funciónBool).
2. Receives a Boolean value (True or False).

**Alternative departures:** 1.1 If the user ingress an invalid input the system will return error and the user will have to change it.

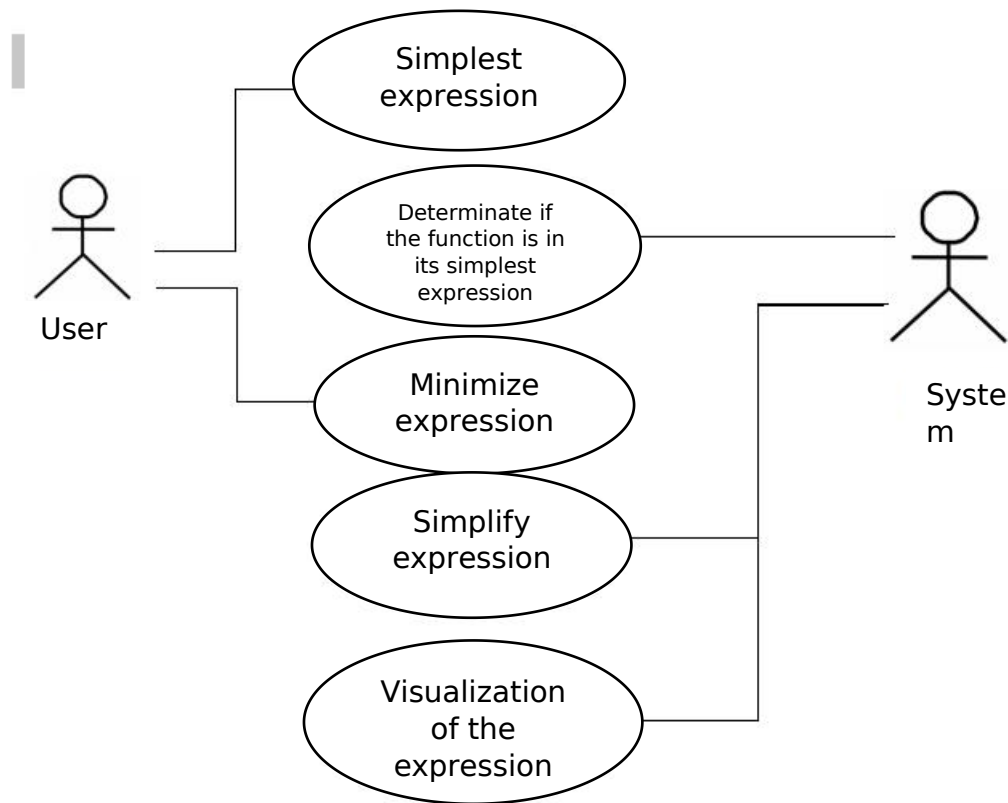
**UC002.** Simplify.

**Description.** Given a Boolean function, the system returns its simple expression.

1. Consult the tool reducc(funciónBool).
2. Receives an array with the simplified function.

**Alternative departures:** 1.1 If the user ingress an invalid character the system will return error and the user will have to change it.

## Use cases diagram



## Development process:

Our activity calendars start from January 20<sup>th</sup> until June 15<sup>th</sup>. With this period, we establish some range and important dates that follow this way: From January 21<sup>st</sup> until June 8<sup>th</sup> we will realize the documentation and the Python tests. There will be 3 sprints established in this period:

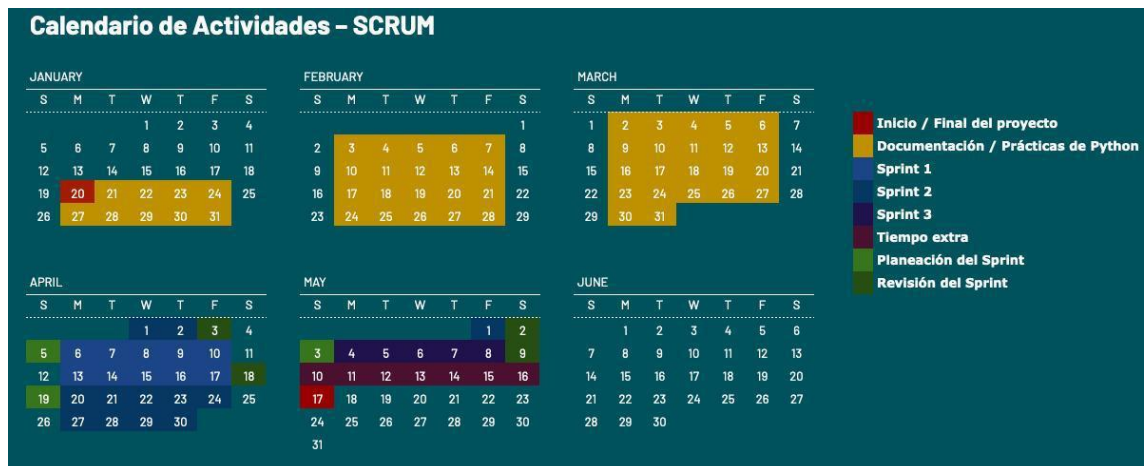
- Sprint 1: We establish the objectives on April 19<sup>th</sup> and the sprint ends on May 2<sup>nd</sup>. The results of the sprint will be evaluated on May 4<sup>rd</sup>.
- Sprint 2: We establish the objectives on May 5<sup>th</sup> and the sprint ends on May 21<sup>st</sup>. The results of the sprint will be evaluated on May 22<sup>nd</sup>.
- Sprint 3: We establish the objectives on April 19<sup>th</sup> and the sprint ends on June 9<sup>th</sup>. The results of the sprint will be evaluated on June 10<sup>th</sup>.

Additionally, we establish an extra time in case the team faces

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some problems that might delay the date of delivery. This period is established for June 10<sup>th</sup> until June 15<sup>th</sup>.



**Individual contribution metric:**

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Task	Evidence	Percent of the task	Responsible	Date of delivery	Complete
Investigation					
Algorithm	Presentation in the reunion	15%	Audny	April 19 <sup>th</sup>	Check
Algorithm operation in Python	Repository	4%	Pamela	May 2 <sup>nd</sup>	Check
Project organization	Repository and PyPi	10%	Miguel	May 2 <sup>nd</sup>	Check
Codification (Functions)					
getBin	Code in the repository	5%	Miguel	June 13 <sup>rd</sup>	Check
getTable	Code in the repository	14%	Jorge	June 13 <sup>rd</sup>	Check
getTer	Code in the repository	4%	Jorge	June 13 <sup>rd</sup>	Check
getVar	Code in the repository	4%	Pamela	June 13 <sup>rd</sup>	Check
reduceFun	Code in the repository	22%	Roberto	June 14 <sup>th</sup>	Check
Library organization	In the repository	5%	Miguel	June 13 <sup>rd</sup>	Check
Organization					
First presentation	Presentation in the meeting	2%	Miguel	March 6 <sup>th</sup>	Check
Second presentation	Presentation in the meeting	4%	Audny	May 1 <sup>st</sup>	Check
Logs	Repository	11%	Pamela	Per each activity	Check

Member	# Tasks mandated	# Tasks delivered complete.	Percentage
Audny	2	2	19%
Jorge	2	2	18%
Miguel	3	3	22%
Pamela	3	3	19%



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Roberto	1	1	22%
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## Standards

- Respects the delivery date
- Presents the pertinent evidence