INTRODUCTION TO VBA PROGRAMMING

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Agenda

□ First Example
  ▪ Simple Calculator

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First Example

The world's simplest calculator...

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Simple Calculator

- We want to design and implement a very simple calculator
  - Only one operation supported: difference
 - Very simple Graphical User Interface

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Simple calculator - GUI

- Draw a very simple window
  - A window in VBA is called **Form**
  - To create a new Form
    - Select: Insert → Form or click the Form button (on the left of the toolbar)
  - After creating the Form, the Properties view shows a new entry called "UserForm"
    - Change the Form name to "sCalc"
    - Change the Form caption to "Simple Calculator"

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Simple calculator - GUI

Properties View

Caption entry

Form
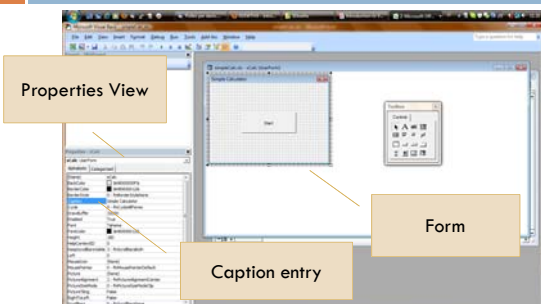
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Simple calculator - GUI

- Add a button for starting the program
  - A button in VBA is called **CommandButton**
  - To draw the Button
    - Select the button icon on the toolbox window
    - Drag the button icon over the Form area
  - To rename the Button
    - Select the button
    - Change the "Caption" field in the properties view to "Start"

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Now? What else?

- We defined the calculator Graphical Interface
- We need to
  - Write the calculator program
  - Define a way to start the program
  - Save the result

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Simple Calculator - program

- Requirements:
  - perform the subtraction between to numbers
- First Solution:
  1. Ask for the first number
  2. Ask for the second number
  3. Compute the subtraction
- Is it complete? Can we write a VBA program?
  - No, it is still too complex
    - E.g. How to remember the first number? And the second?

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Simple Calculator - program

- Second solution:
  1. Ask for the first number
  2. Store the first number
  3. Ask for the second number
  4. Store the second number
  5. Compute the subtraction
  6. Store the result
  7. Show the result

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Simple Calculator - VBA

1. Ask for the first number
   - `InputBox("Insert the first number")`

2. Store it
   - `x = InputBox("Insert the first number")`
   - `x` will contain the value of the first number

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Simple Calculator - VBA

- What happens for the 2° number?
  - Same instructions
  - Different storage named `y`
    - `y = InputBox("Insert the second number, please...")`
- Now
  - `x` contains the first number
  - `y` contains the second number
  - `x` and `y` are called **variables**

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Simple Calculator - VBA

5. Compute the subtraction
   - `x-y`
6. Store the result
   - `result = x-y`
7. Show the result
   - `MsgBox("The result of "&x&"-"&y&" is "&result)`

> Concatenation: to join 2 pieces of information in a single string

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Sample Calculator – Complete Code

```
x = InputBox("Insert the first number, please...")
y = InputBox("Insert the second number, please...")
result = x – y
MsgBox("The result of "&x&"-"&y&" is "&result)
End
```

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Where to put the code?

- To start the code pressing the "Start" button
  - Double click the button
  - Put the code inside the 2 lines of code automatically written by the VBA IDE

```
Private Sub CommandButton1_Click()
    x = InputBox("Insert the first number, please...")
    y = InputBox("Insert the first number, please...")
    result = x – y
    MsgBox ("The result of " & x & "-" & y & " is " & result)
    End
End Sub
```

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Let's Play!

- Click on the green "play" button to run the program
- Does it work? Great!

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Summary

- Very simple problem
- Solved by
  - Splitting the problem in steps
  - Coding each step
  - Running the resulting program
- Open questions
  - What happens when we click "Start"?
  - Why do we put the code inside that strange `Sub` instructions?
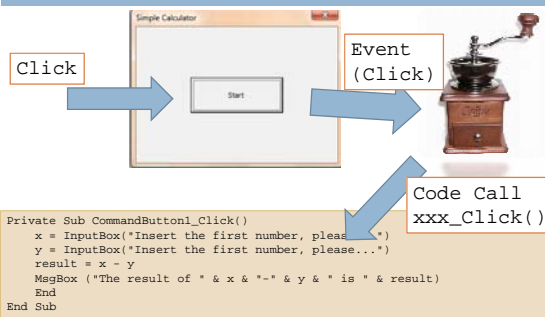
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Open questions

- What happens when we click "Start"?
  - The Graphical User Interface we designed works on an event based paradigm
  - Everything is activated by events
- Event
  - A software message indicating that something has happened, such as a keystroke or mouse click
  - When we click the button with the mouse we raise a button-click event

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Open question

Click

Event
(Click)

Code Call
xxx_Click()

```
Private Sub CommandButton1_Click()
    x = InputBox("Insert the first number, please...")
    y = InputBox("Insert the first number, please...")
    result = x - y
    MsgBox ("The result of " & x & "-" & y & " is " & result)
    End
End Sub
```

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Exercises...

To perform in the lab and/or at home...

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Exercise 1

□ Write a VBA program that prompts the user for 3 values A, B, and C and shows, using 3 different message boxes the results of
  □ A-B
  □ A-C
  □ A-B-C

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Exercise 2

- Write a program that prompts for two values A and B, exchange the contents of the variables where A and B are stored and finally displays the new A and B values.
  - A=47 B=53
  - Result A=53 B=47
- How many variables are needed?
  - 2
  - 3
  - 4
  - more

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