# cpp-24

Marcus Birkenkrahe

March 10, 2024

## Pgm 1: Rectangle

### README

1. Open Emacs and download `rectangle.org` from `tinyurl.com/rectangleC` (use the Emacs browser EWW as you did in class multiple times, then write the file to `rectangle.org` with `C-x C-w`, kill the `*eww*` buffer and open the file to complete the assignment).
2. Submit the completed Org-mode file here for grading and comments.
3. Here is a complete submission sample Org file using "hello, world".
4. You can resubmit as often as you like.

### Problem

Design an algorithm to find the perimeter and area of a rectangle. You find the algorithm as pseudocode and as a diagram already here. All you need to do is write and run the code inside the already prepared code block and upload the complete Org-mode file.

The program should produce output like this (i.e. it should be clear what the input and what the output is):

```
A rectangle of length 5 and width 7 has an area of 35 and a perimeter of 24.
```

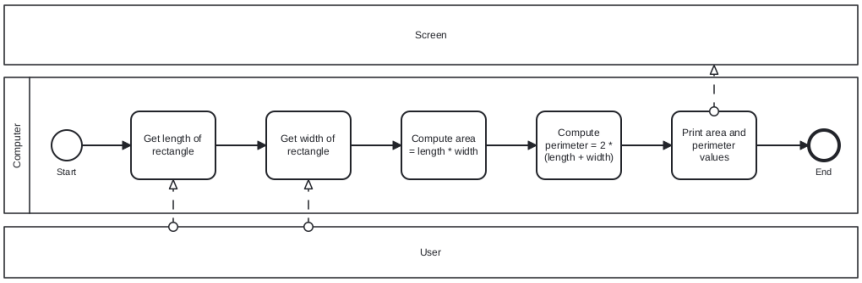
### Pseudocode

The pseudocode abstracts away any syntax. It identifies input and output variables.

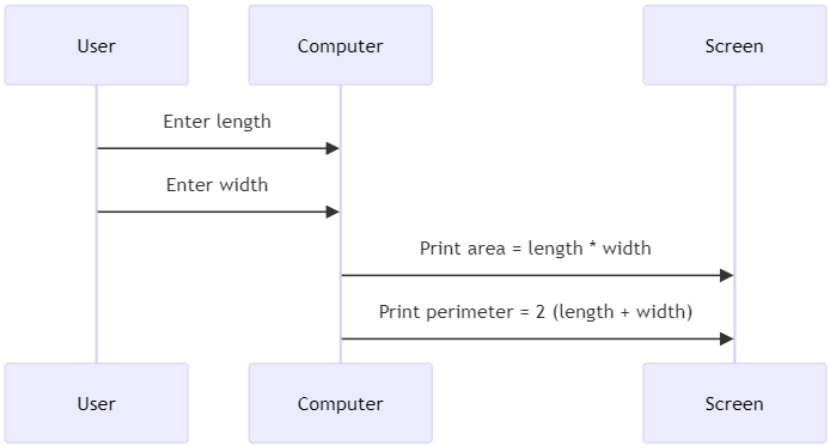
```
Algorithm: Calculate rectangle area and perimeter
Input: length, width (numbers)
Output: area, perimeter (numbers)

Begin
   // Calculate the perimeter of the rectangle
   perimeter = 2 * (length + width)

   // Calculate the area of the rectangle
   area = length * width

   // Return or print the perimeter and area
   return perimeter, area
End
```

## Process

The BPMN process diagram shows the program flow and explains the communication between the computer and the peripherals (User input via keyboard and screen output).




The UML diagram only shows the communication sequence:




## Program

The code is written in an Emacs Org-mode block that allows to tangle the source code into a C file `rectangle.c`, but it can also be run right here.

The code block should contain comments like th "Hello World" example program (link).

```
/* Compute area and perimeter of a rectangle
   (C) Marcus Birkenkrahe */

#include <stdio.h>

int main()
{
  int length = 5, width = 7;  // input
  int area, perimeter;  // output

  area = length * width;
  perimeter = 2 * (length + width);

  printf("If length = %d and width = %d then area = %d and perimeter = %d.\n",
         length, width, area, perimeter);

  return 0;
}
```

If length = 5 and width = 7 then area = 35 and perimeter = 24.