04JCJLZ - COMPUTER SCIENCES - 2015/2016
Laboratory 1

Objectives:
- To design flow-chart
- To acquire confidence with the C IDE (Integrated Development Environment) and the compiler
- To learn how to use the debugger
- To use the basic functions provided by the C language in order to acquire, manipulate and display integer numbers using the keyboard and the screen

Technical Content:
- Definition and implementation of the main function in a C program
- Definition of integer (*int*) variables
- Implementation of simple structures in flow charts.

Preferably to solve in the lab

Exercise 1. Using the IDE (Integrated Development Environment) write, compile and run the following program in C language, verifying that neither errors or warnings appear during compilation:

```c
#include <stdio.h>
int main(void)
{
        int x , y, z;

        printf("Enter an integer: ");
        scanf("%d", &x);
        y = 3;
        z = x/y;

        printf("%d/%d=%d\n", x, y, z);
        return 0 ;
}
```

Once the program is correctly compiled, run the program and check your results. Then, try to check by yourself, how to execute the program step-by-step observing the values of variables x, y and z with the help 'watch' management; try using different values: 0, 9, 15, 20.

Exercise 2. Draw the flow-chart diagram for computing the absolute value of a number, in particular the program should:
a) Read an integer value, positive or negative, and save it in a previously defined variable
b) Using the conditional expression *if-then-else* determine, whether the variable is negative or positive, and in the case of a negative value, the program must transform the value into its corresponding positive number
c) Print the final value which is the absolute value of the input number.

Exercise 3. Using the IDE write, compile and run the following program in C language, verifying that neither errors or warnings appear during compilation; finally, draw the flow-chart of the program.

```c
#include <stdio.h>

int main (void)
{
    int x;

    printf("Insert a number: ");
    scanf("%d", &x);

    if (x>0)
        printf("The value %d is positive\n", x);
    else
        printf("The value %d is negative or equal to 0\n", x);

    return 0;
}
```

After having run the program, try yourself how to execute the program step-by-step observing the values of variables x, y and z with the help of 'watch' management; try by using different values: 10, -10, 0, 9, -15.

To be solved at home

Exercise 4. Draw the flow-chart to determine if a number is a prime number; in particular, the solution must:
a) Acquire using the keyboard an integer value
b) Use the simple structures *while-do* or *do-while* to determinate, using a loop, if the number is a prime number
c) Print in the screen a message depending on the cases.

Exercise 5. Write a C program that defines 3 integer variables called *operand1*, *operand2* and *result*. The program must:
a) Acquire using the keyboard the values of *operand1* e *operand2* using the *scanf* function
b) Compute the sum of *operand1* and *operand2* and save it in the *result* variable
c) Display on the screen the value of the *result* variable using the *printf* function

Exercise 6. Write a C program able to solve a first degree equation given in the form $ax+b=0$; the program must:
a) Define two integer values (*int*), *a* and *b* to store the coefficients of the equation
b) Define an integer variable *x* in order to store the result of the equation
c) Acquire using the keyboard the value of the coefficients *a* and *b*
d) Compute the value *x* and display it on the screen.
In-depth: consider, among the others, the case in which the value *a* is equal to *0*.

Exercise 7. [1] Write a C program able to translate a temperature value from Celsius degrees to Fahrenheit degrees, and vice versa. The program must ask the user for the temperature scale, provided as a letter: C for Celsius degrees and F for Fahrenheit. Then, the user is asked to provide the temperature value to be translated. Finally, the program must transform the provided value and show the obtained result into the screen. In the case, the Celsius to Fahrenheit transformations is not known, search for this in internet.

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[1] This exercise will be solved using a multimedia format, and its solution will be provided in the course site during the following weeks.