



# Introduction to MPLAB X IDE

Laboratory Report Practice 4

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## Objectives

The main objective of this laboratory is to become familiar with the MPLAB integrated development environment tools. The student will create their first program using the MPLAB software and will put it into the PIC microcontroller ( $\mu\text{C}$  for short), making use of the Curiosity development/evaluation board.

## Introduction

The Curiosity HPC Development Board is an 8-bit prototyping board. It is designed from the ground-up to take full advantage of Microchip MPLAB X integrated development environment and supports Microchip 28- and 40-pin 8-bit PIC MCUs.

Programming/debugging is accomplished through the PICkit On Board (PKOB) circuitry, eliminating the need for external programming/debugging tools.

MPLAB X Integrated Development Environment (IDE) is an expandable, highly configurable software program that incorporates powerful tools to help you discover, configure, develop, debug and qualify embedded designs for most of Microchip microcontrollers and digital signal controllers. MPLAB X IDE works seamlessly with the MPLAB development ecosystem of software and tools, many of which are completely free.

## MPLAB Main program

```
Start Page x MainFinsh.c x device_config.h x
Source History
1 //+++++ LIBRARIES / HEADERS ++++++
2 #include "device_config.h"
3 //+++++ DIRECTIVES ++++++
4 #define _XTAL_FREQ 1000000
5 #define ONE_SECOND 1000
6
7 //+++++ DATA TYPES ++++++
8 enum por_dir{ output, input }; // output = 0, input = 1
9 enum por_ACDC { digital, analog }; // digital = 0, analog = 1
10 enum resistor_state { set_ON, res_ON }; // set_ON = 0, res_ON = 1
11 enum led_state { led_OFF, led_ON }; // led_OFF = 0, led_ON = 1
12 enum butto_state { pushed, no_pushed }; // pushed = 0, no_pushed = 1
13
14 //+++++ ISRs ++++++
15 // ISR for high priority
16 void __interrupt ( high_priority ) high_isr( void );
17 // ISR for low priority
18 void __interrupt ( low_priority ) low_isr( void );
19
20 //+++++ FUNCTION DECLARATIONS ++++++
21 void portsInit( void );
22
```

```

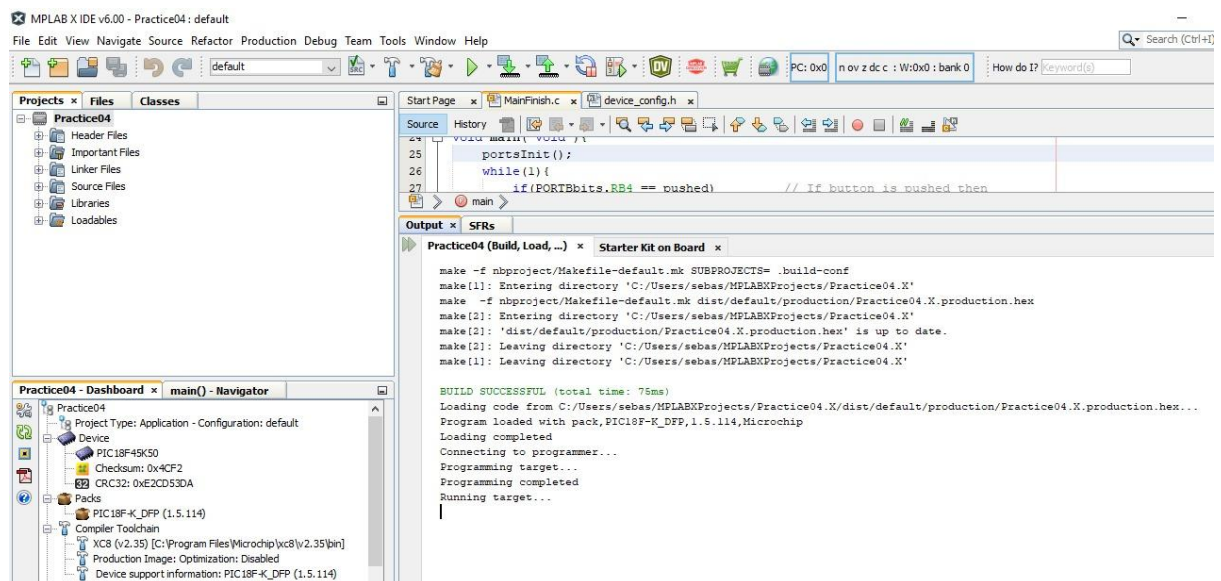
//+++++| MAIN |+++++
void main( void ){
    portsInit();
    while(1){
        if(PORTBbits.RB4 == pushed)    // If button is pushed then
            LATAbits.LATA7 = led_OFF;  // turn off RA4 LED
        else                            // Otherwise
            LATAbits.LATA7 = led_ON;    // turn on RA4 LED
        LATAbits.LATA4 = led_ON;        // Turn on RA4 LED
        __delay_ms(ONE_SECOND);         // Delay function XC8 compiler
        LATAbits.LATA4 = led_OFF;       // Turn off RA4 LED
        __delay_ms(ONE_SECOND);         // Delay function XC8 compiler
    }
}

//+++++| FUNCTIONS |+++++
void portsInit( void ){
    ANSELA = digital;                  // Set Port A as digital port
    TRISAbits.TRISA4 = output;         // RA4 as output
    TRISAbits.TRISA7 = output;         // RA7 as output
    ANSELB = digital;                  // Set Port B as digital port
    TRISBbits.TRISB4 = input;          // Set RB4 as input
}

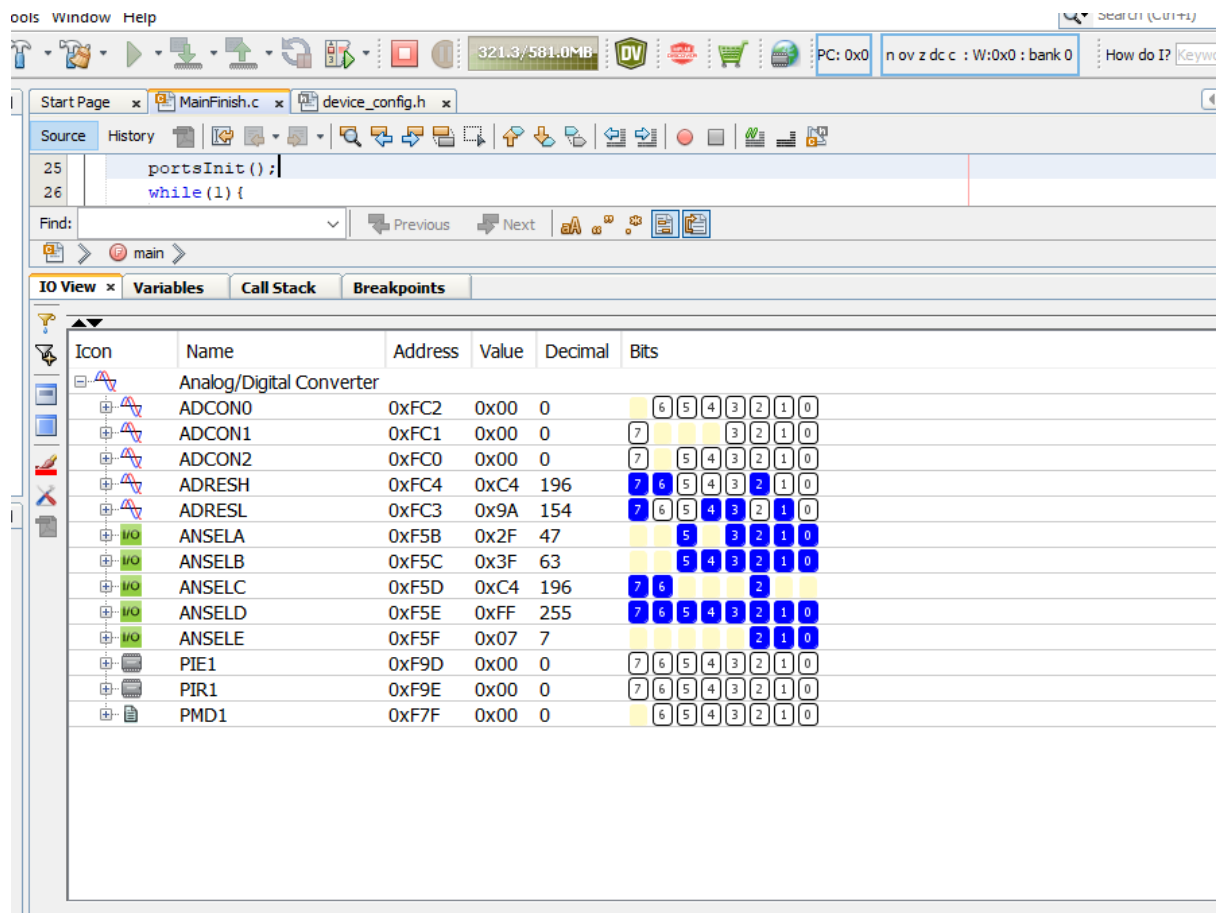
```

The function `main( void )` indicates the main program to be executed by the microcontroller in curiosity. The first line which is `portsInit()` calls up a function which initializes all the ports of the microcontroller to be utilized during the execution of the program. Here the port A and B are defined as digital ports and certain pins are defined as inputs or outputs depending on the use the user defines.

On the second line there is a `while` with a 1 in the condition which means it stays always inside this loop. What the rest of the lines are describing is basically when the push button is pressed turn led on pin 7 off. And as subsequent turns always led in pin 4 off and on with a one second delay in between.



Here it can be observed the **BUILD SUCCESSFUL** window at the end of the compile of the program.



Screenshot of Port I/O before the execution of the initialization of the ports.

#### Video:

<https://drive.google.com/file/d/188OazNIYIROchIzHfsup4JAP4puDm9DH/view?usp=sharing>

## Conclusions

### Sebastian Medina

In conclusion the curiosity board is a helpful tool to program and debug in the microcontroller. Together with the software MPLAB allows the user in a very friendly manner the development of new programs and applications.

### Eduardo Perez

The Curiosity board is a fully integrated microcontroller that offers a very easy way to develop and create programs now we are just starting in the area, also it is a cost-effective board.

### Ricardo Cárdenas

In this practice we set up the curiosity with the MPLAB software, that allows the user to control and program in a more friendly way the curiosity. I'm excited to see what we can achieve with this tools.

## Reference

- Matiaz, V. (2022). Introduction to MPLAB X IDE. Retrieved from: <https://github.com/matias-vazquez/microcontroladores/tree/main/Lab04>