

Lab 0: Introduction to the Development Kit

Demo Due: February 5th, 2016

Learning Objectives:

In this lab, you will familiarize yourself with PIC microcontrollers, the PIC32 Starter Kit III, the expansion I/O board, and C-based software development using the MPLAB X Integrated Development Environment.

Datasheets and References

[Microchip PIC32 Starter Kit III User's Guide](#)

[Microchip PIC32MX470F512L Datasheet](#)

Provided Software Code:

1. lab0.X

Lab Procedure and Demo:

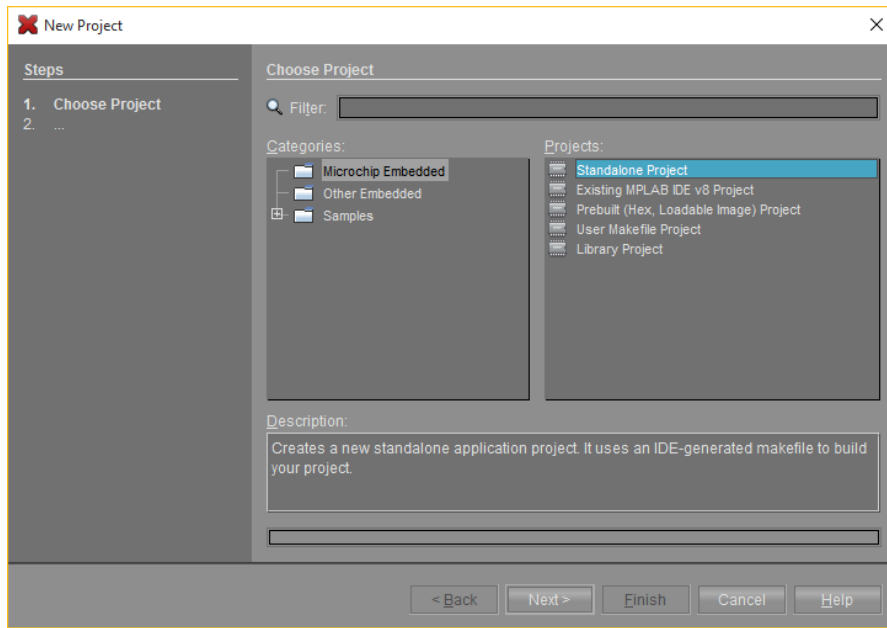
Part 1: Setting up the Development Environment

Description:

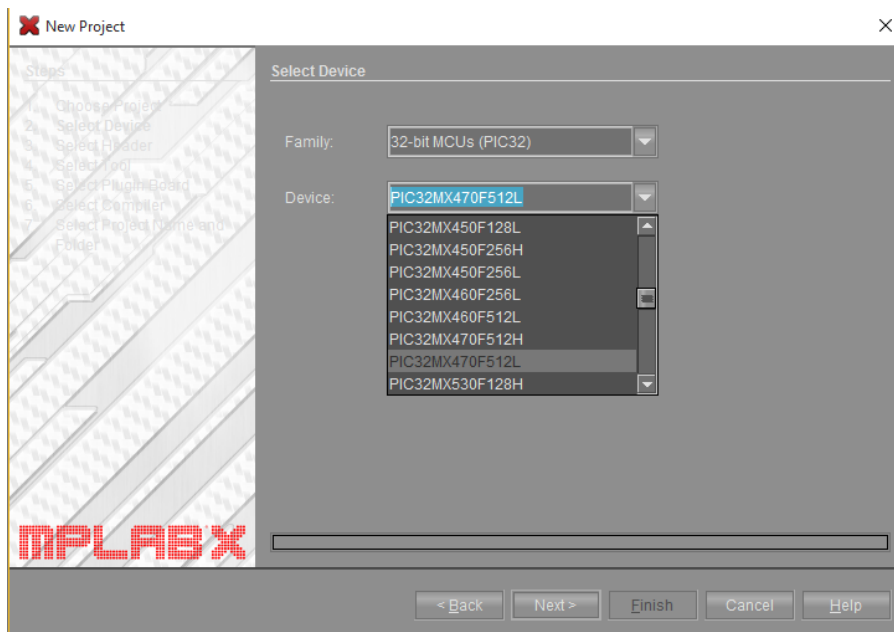
In this part, you will set up your development environment that you will use for all of the projects in this course.

Procedures

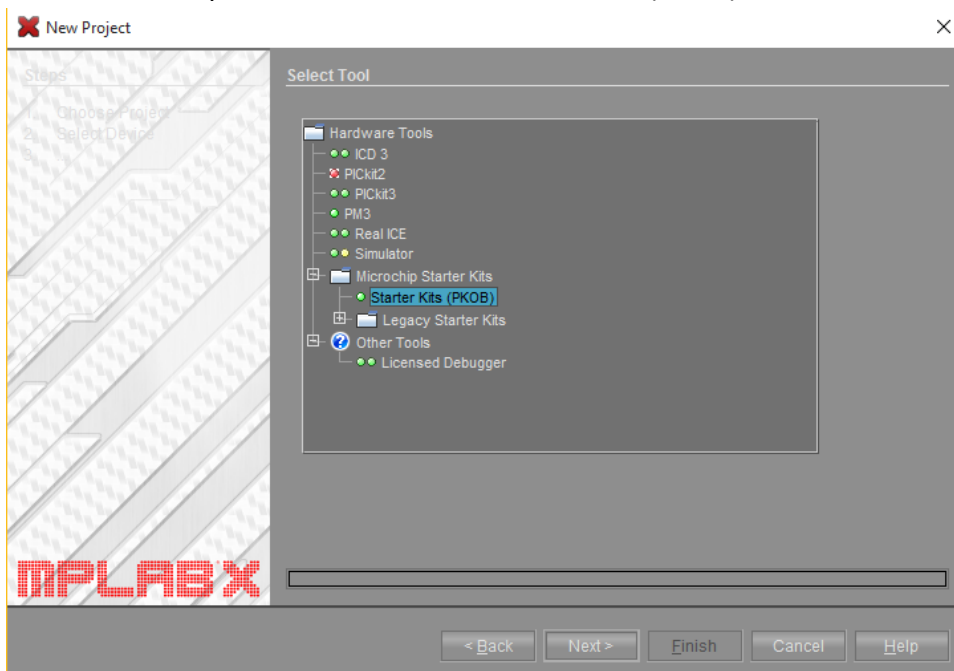
1. Install **MPLAB® X IDE** <http://www.microchip.com/pagehandler/en-us/family/mplabx/>
2. For **MPLAB® X IDE** user guide.
<http://ww1.microchip.com/downloads/en/DeviceDoc/52027B.pdf>
3. Install MPLAB C Compiler for PIC32 MCUs (**MPLAB XC32**). Use the MPLAB® X IDE link above and then click on MPLAB® X FREE DOWNLOAD tab.
4. Open MPLAB X IDE and create a new project.
5. Create a project from the microchip embedded category. Choose a standalone project from the projects: pane. Click next.



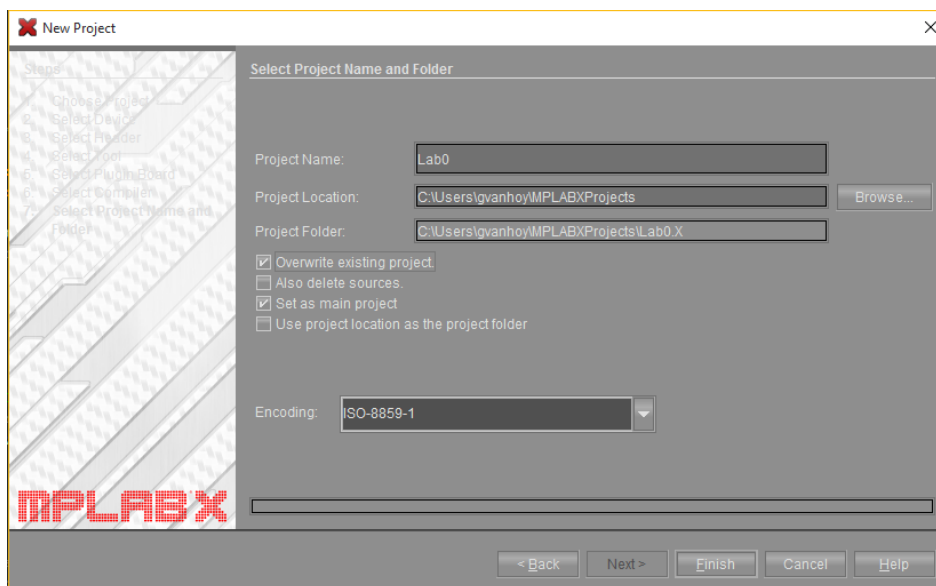
6. Now, choose the 32-bit MCUs (PIC32) for Family and PIC32MX470F512L for Device. Click next.



7. Under Microchip Starter Kits choose “Starter Kits (PKOB)” as the tool. Click next.



8. Choose XC32 as the compiler. If you have not correctly installed the XC32 compiler, this will not work for you. Install it correctly and try again. Click next.
9. Browse to a folder on your PC where you would like to keep your project files. Name the project “Lab0.”



10. Familiarize yourself with the MPLAB X IDE interface using sections 3.3.2 - 3.3.5 in the MPLAB X IDE user guide.
11. Download the lab0 zip file from D2L and extract it to a folder of your choosing.

12. Open the project folder from the locations you saved it.
13. Double-click the main.c file in the Projects window to open the file.
14. Connect the starter kit to the computer
 1. Mount the PIC32 Starter Kit 3 to the I/O Expansion Board. It does not require much force if you line things up correctly.
 2. Connect to your computer (laptop/PC) with the USB cable. You may need to install the software for the new hardware (if yes, read chapter 2 of the user guide). Make sure that you connect to the **USB mini** slot. This is the smaller USB port on the top of the starter kit. Connecting to the USB micro or the full-size USB will result in the debugger not being found.

Part 2: State Switching

Description:

In this part, you will use the provided project to create your first program for the PIC32 which controls the blinking of LEDs.

Requirements:

Every second, the LED on the development board changes in descending order using a finite-state machine. Once the third LED is lit up and one second passes, the first LED is lit up again and the process repeats. If the requirements are not clear, a video of the expected outcome can be found [here](#).

Interrupt Service Routines must be used for changing states every second.

Procedures

1. Create a program that fulfills the above requirements.

Part 3: Blinking LEDs

Description:

In this part, you build upon the previous part to incorporate more functionality.

Requirements:

For every distinct press of SW1 on the development board, the illuminated LED on the development board will change to the next LED. If the switch is pressed for a longer period of time (1 second), then the illuminated LED will change in the opposite direction. This will be implemented using a finite-state machine. This is done by using a switch statement in the code. Be sure to follow coding guidelines. If the requirements are not clear, a video of the expected outcome can be found [here](#).

Interrupt Service Routines must be used for measuring the duration a button is pressed (1 second)

Procedures

1. Create a program that fulfills the above requirements