

INSTALLING THE BUILD TOOLS

AARON HOOVER & BRAD MINCH

JANUARY 24, 2020

1 *Installing the Compiler*

In this class, you'll be working with the PIC24FJ128GB206. As you will learn, it's a very capable 16-bit microcontroller. To compile firmware for the microcontroller, you need (at a minimum) to install the C compiler for the hardware. The compiler for this family of PICs is a variant of the GNU C compiler (gcc) from Microchip (the maker of the PIC) called XC16. Let's get started:

1. Download the correct installer for your operating system from [Microchip's compilers page](#). The download links are in the left column toward the bottom of the page.
2. If you are running 64-bit Ubuntu (and you probably are) you'll need to run the following commands in a terminal **before attempting to run the installer**. (These install compatibility libraries that allow your OS to run 32-bit programs because the Microchip compilers are not yet 64-bit compatible.)

```
$ sudo dpkg --add-architecture i386
$ sudo apt-get update
$ sudo apt install libc6:i386 libx11-6:i386 libxext6:i386 libstdc++6:i386 libexpat1:i386
```

3. On Linux, the installer for the compiler is a shell script with the suffix `.run`. In order to run it, you must first make it executable by running the following at the command line:

```
$ chmod u+x xc16-v*-full-install-linux-installer.run
```

4. Run the installer executable on your platform. On Windows, just double-click the `.exe` file. On Mac, just click the `.dmg` file. On Linux, run the following command in a terminal window:

```
$ sudo ./xc16-v*-full-install-linux-installer.run
```

5. By default on **Windows**, the compiler will be installed in

```
C:\Program Files (x86)\Microchip\xc16\v1.41
```

On **OSX**, the default path is:

```
/Applications/microchip/xc16/v1.41/bin
```

On Ubuntu Linux, the default path is:

```
/opt/microchip/xc16/v1.41/bin
```

6. Accept all the defaults in the installer, and leave the license key field blank to install the free version.

2 *Additional build tools*

The compiler is the bare minimum you need to get started, but any project that consists of more than one file typically makes use of some kind of build system. Build systems are essentially scripting languages that let you automate compiling, linking (more on this later), and even executing other scripts to do stuff like make directories or create/delete files.

We strongly recommend that you use a build system called **SCons**. **SCons** is a build automation tool in which the configuration files are all just Python scripts. It's lightweight, fast, aggregates all configuration in a single file, and is easy to understand.

2.1 *Installing SCons*

Windows

Before downloading SCons, you need to make sure that the locations of the Python executable and included scripts are on your path.

1. Click on the "Windows" menu and expand "Windows System"
2. Click "Windows Administrative Tools"
3. In the resulting window, right-click "This PC" and select "Properties"
4. Click "Advanced System Settings" on the left at the bottom of the list
5. In the resulting window, click the "Environment Variables" button in the lower right-hand corner
6. In the window titled "System variables" double-click the entry for the "Path" variable
7. If it's not already there, add the following entries to variable by clicking "New"

```
C:\Users\\AppData\Local\Programs\Python\Python38
C:\Users\\AppData\Local\Programs\Python\Python38\Scripts
```

8. Now, if you open a cmd window and type python you should see a message, the first line of which should look something like this:

```
Python 3.8.1 (default, Aug 13 2019, 15:17:50)
```

NOTE: The path to your Python installation may actually be different than above. Replace the path above with the path to Python on your particular machine.

TO INSTALL SCONS:

1. `$ pip install scon`

```
$ scon --help
```

and you should be greeted with the help file for SCons.

OS X

1. `$ brew install scon`

Ubuntu Linux

1. `$ sudo apt-get install scon`

2.2 MPLABX

MPLABX is an integrated development environment (IDE) for PIC microcontrollers. It provides a graphical user interface (GUI) for organizing your files and configuring your builds. Microchip has recently released a web-based version of MPLABX called MPLABX-press. You are welcome to use either, but the teaching team has more experience and familiarity with supporting SCons.

1. [Download the correct installer for your operating system](#)
2. Run the executable or mount the dmg file to install the IDE.