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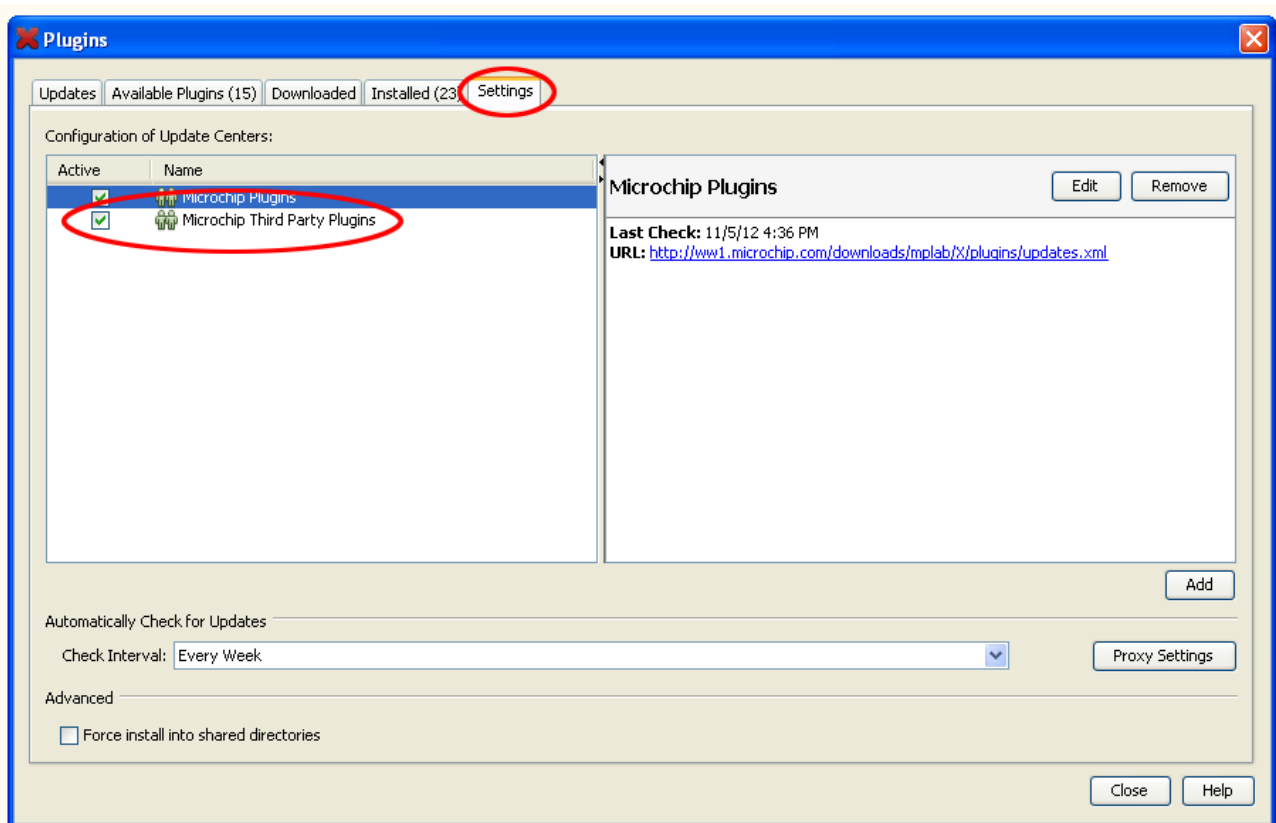
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MPLAB X + CCS C Compiler Tutorial

How to install the CCS C Compiler inside MPLAB X

Before the CCS C Compiler can be used inside MPLAB X, the CCS C MPLAB X Plug-in must be installed. This process can be done inside MPLAB X.

1. Launch MPLAB X.
2. From the MPLAB X menu, select **Tools -> Plugins**
3. Verify that MPLAB X is searching Microchip's Third Party plug-in repository. This can be done by selecting the **Settings** Tab in the Plugins window and verifying that **Microchip Third Part Plugins** is available and checked.

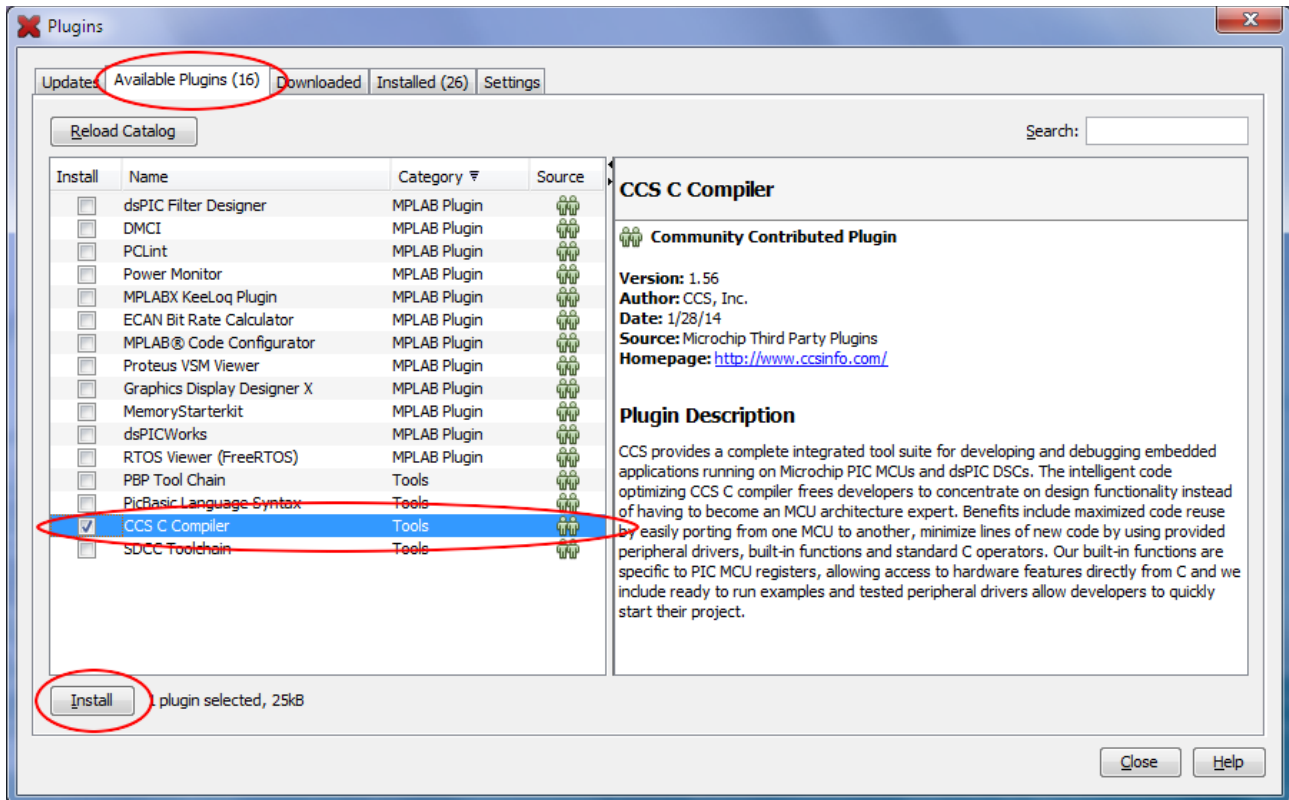




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4. Goto the **Available Plugins** tab. Check the box next to **CCS C Compiler**. Once checked, press the **Install** button.



If you do not see CCS C Compiler in the Available Plugins tab, it is possible the plugin is already installed in your MPLABX. Skip to step 6 to verify that it is installed.

5. After you press the Install button, a few new dialog windows will ask to verify that you want to install the plug-in and that you accept the license.

If you get a dialog window saying the plugin is signed but not trusted, ignore it and continue the installation of the plugin.

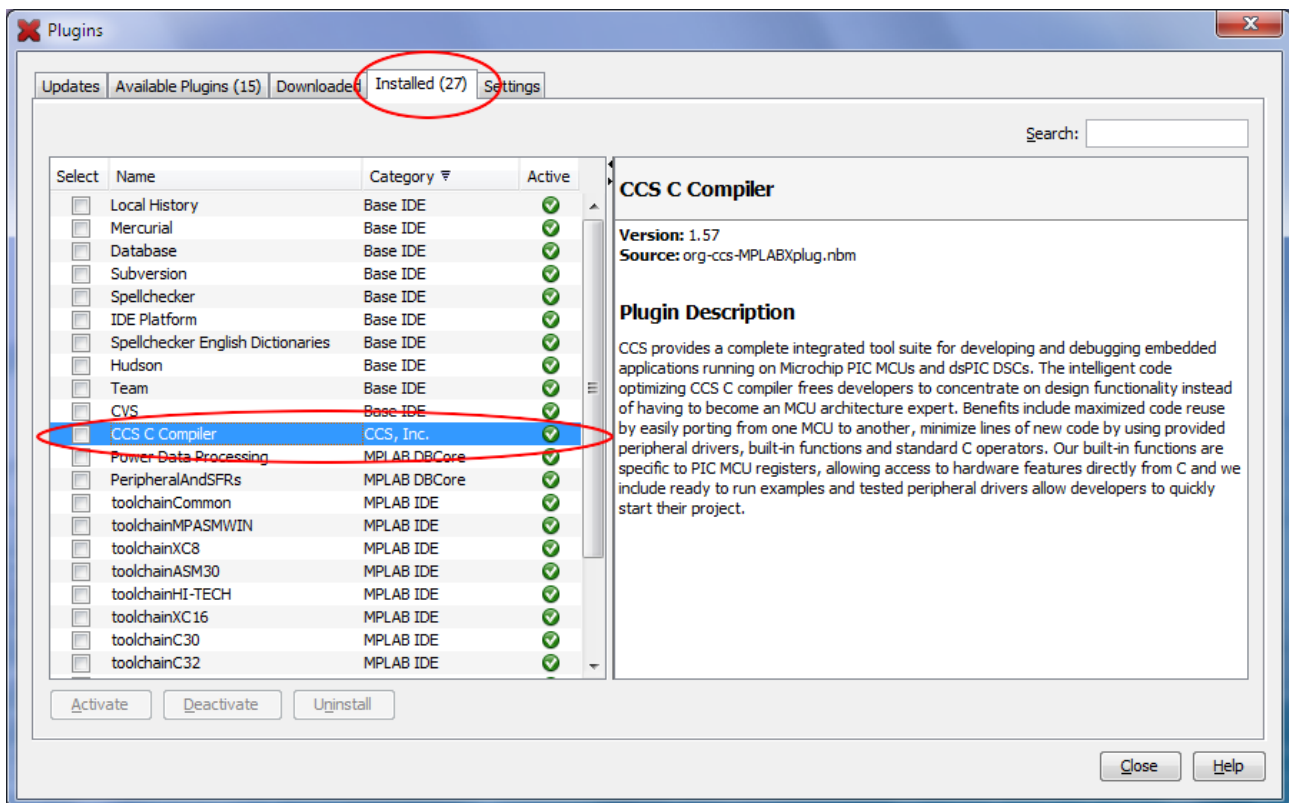
After the plugin is installed, MPLABX will ask you to restart the software. The plugin will not install without MPLABX being restarted.



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- The CCS C Compiler plugin should be installed now. Before attempting to use the plugin, verify that it is installed. To do this open the Plugins window by selecting **Tools -> Plugins** from the MPLABX menu. Select the **Installed** tab. Look for **CCS C Compiler**, it should have the **Active** column checked to signify that the plugin is installed and running.



If **CCS C Compiler** is missing from this window, go back to step 1 to install the plugin.

This window can also be used to inspect the version of the plugin. (This is the version of the plugin, not the compiler). By highlighting/selecting **CCS C Compiler**, the text description on the right will change and display the version number.



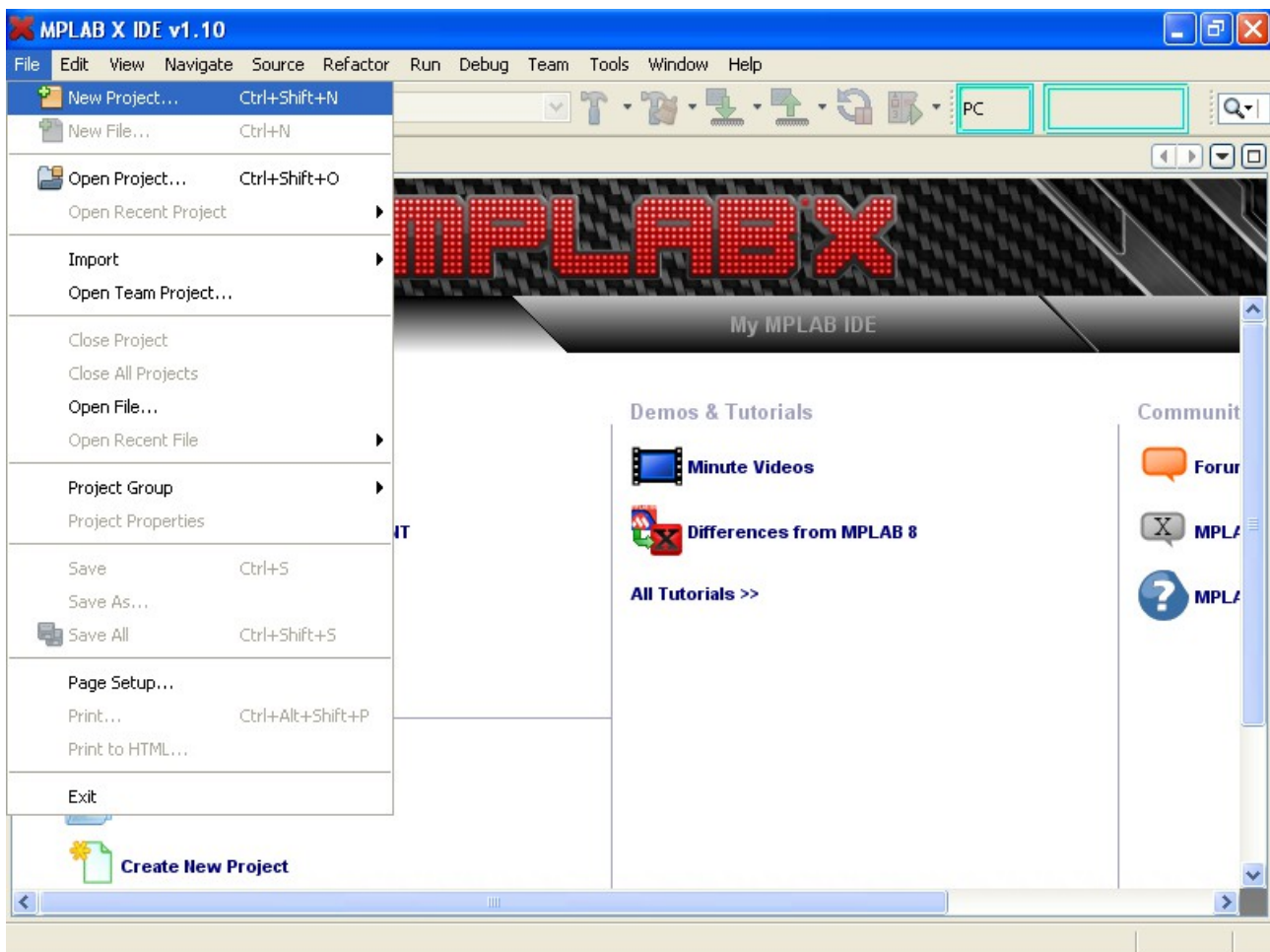
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How to create an MPLAB X project that uses the CCS C Compiler

Before attempting to use the CCS C Compiler in MPLAB X for the first time, verify that the CCS C Compiler plug-in is installed in MPLAB X. This can be done via step 6 of the section labeled **How to install the CCS C Compiler inside MPLABX.**

1. Launch MPLAB X.
2. Ensure that no other projects are open by selecting File -> Close All Projects from the menu.
3. Start a new project by selecting **File -> New Project**

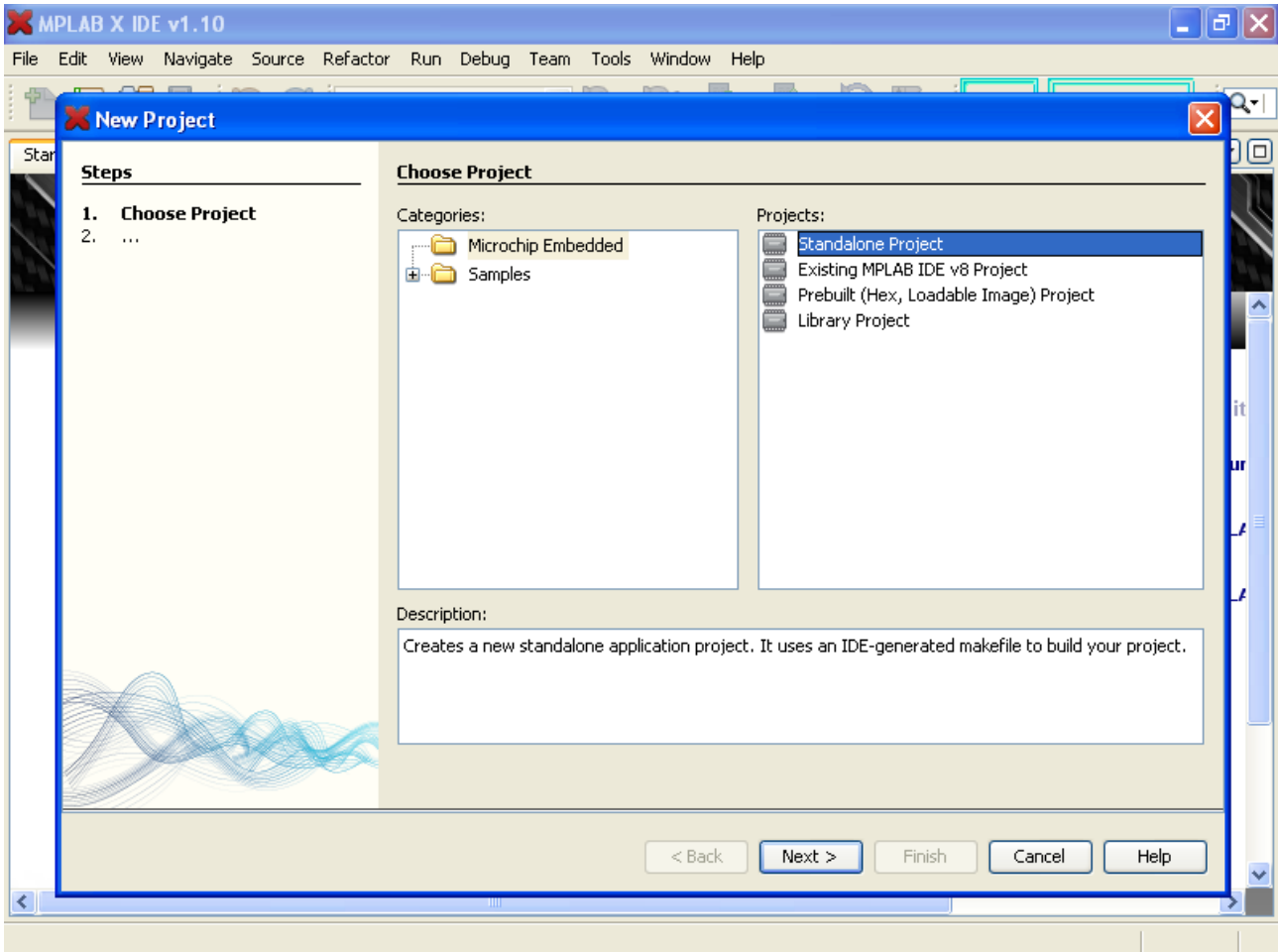




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4. MPLAB X's New Project dialog will start. It will first ask you what kind of project you want to create. Select 'Standalone Project' and press the 'Next' button.

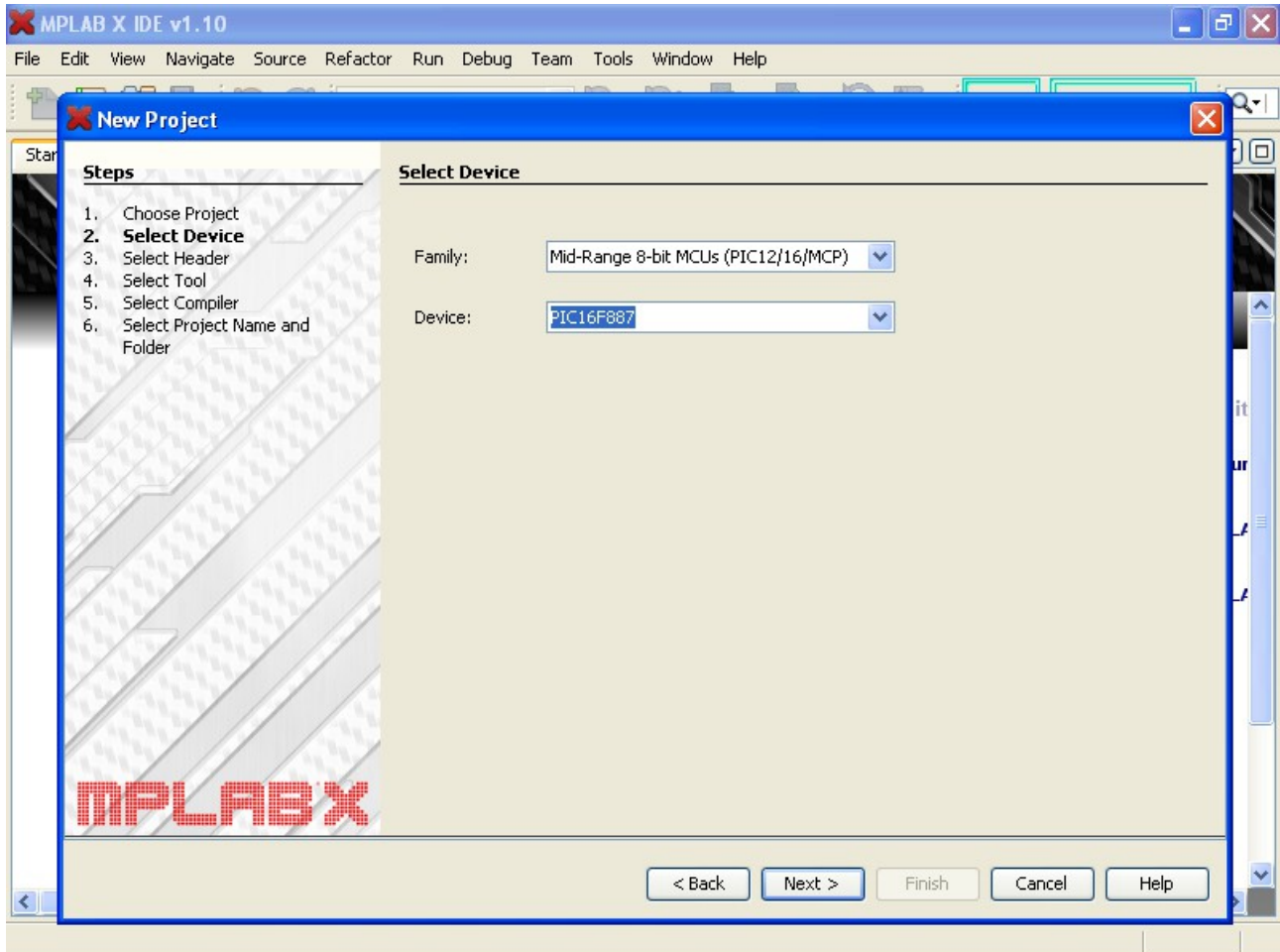




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5. A dialog will ask you what PIC you want to use. Select the PIC you want to use for your project from the pull-down selector and then press the 'Next' button.

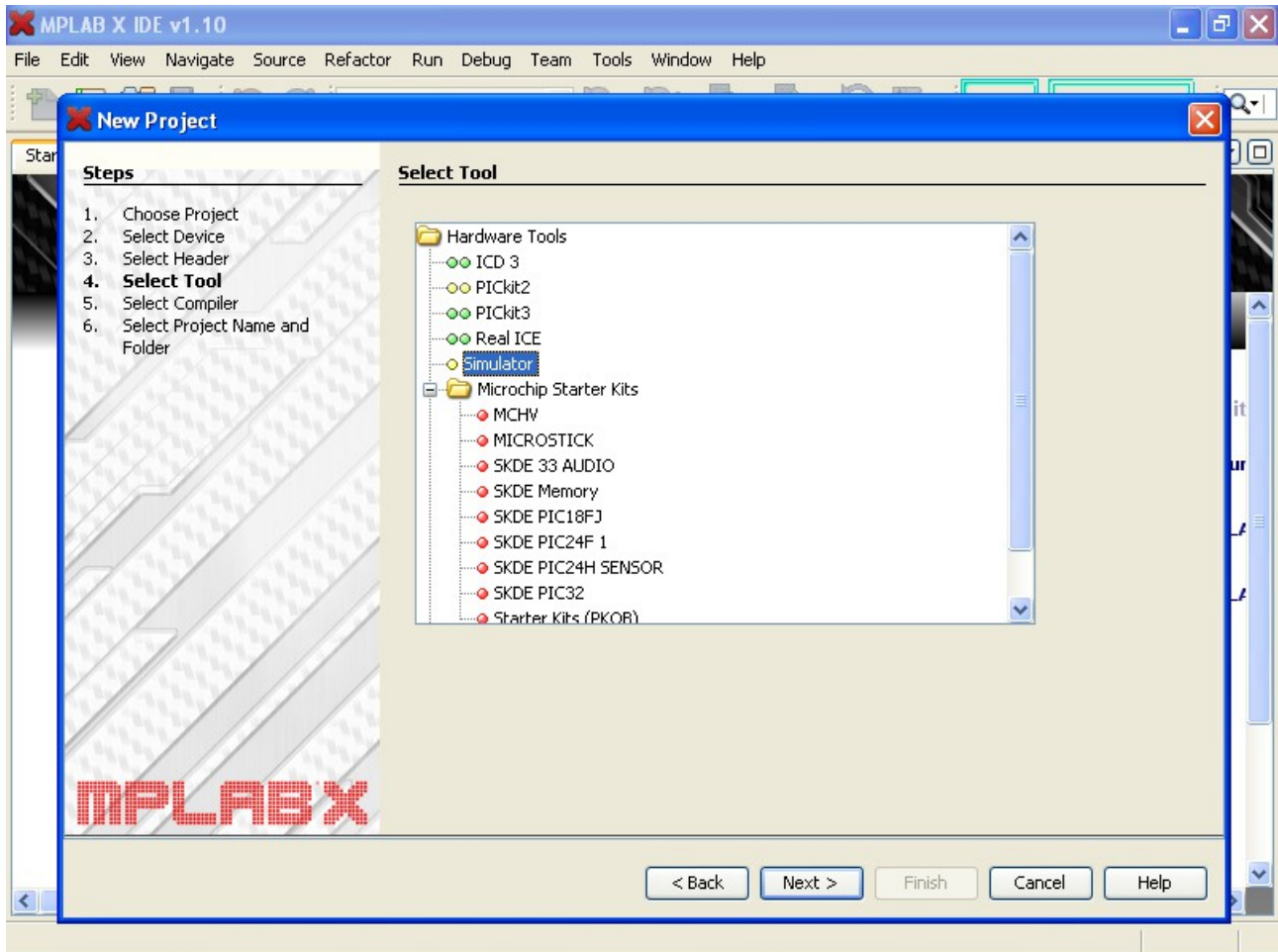




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- The dialog will ask you what Programmer/Debugger tool you want to use. If you are not using such a tool, then select 'Simulator'. After you have made your selection press the 'Next' button.

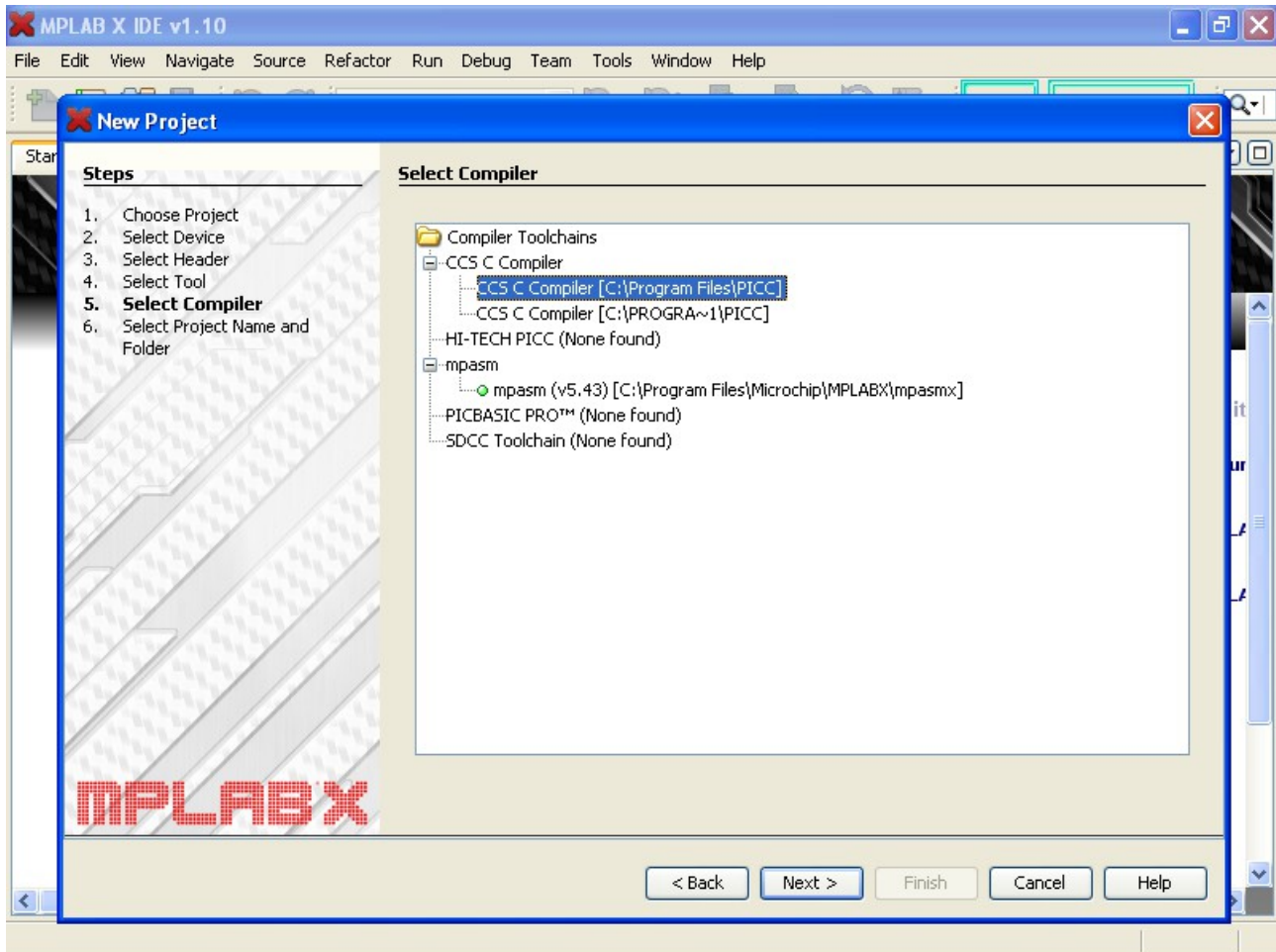




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- The dialog will now ask which compiler you want to use. You should see a section labeled 'CCS C Compiler', and under this section you may have a few CCS C Compilers to choose from. You would have several choices to choose from if you have installed multiple versions of the compiler on your computer at once. If you only have one installed CCS C Compiler then you will only have one choice. Select the 'CCS C Compiler' version you want to use and press the 'Next' button.



Not getting an option for CCS C Compiler here?

First, verify that the CCS C Compiler plug-in has been installed by following the first section of this tutorial titled **"How to install the CCS C Compiler inside MPLAB X"**.

If the plug-in is installed but there still isn't an option to select the CCS C Compiler here, it's probably because MPLAB X doesn't know where the compiler is located. To resolve this, find the section of this tutorial labeled **"How do I add CCS C Compilers to MPLABX's list of compiler toolchains?"**

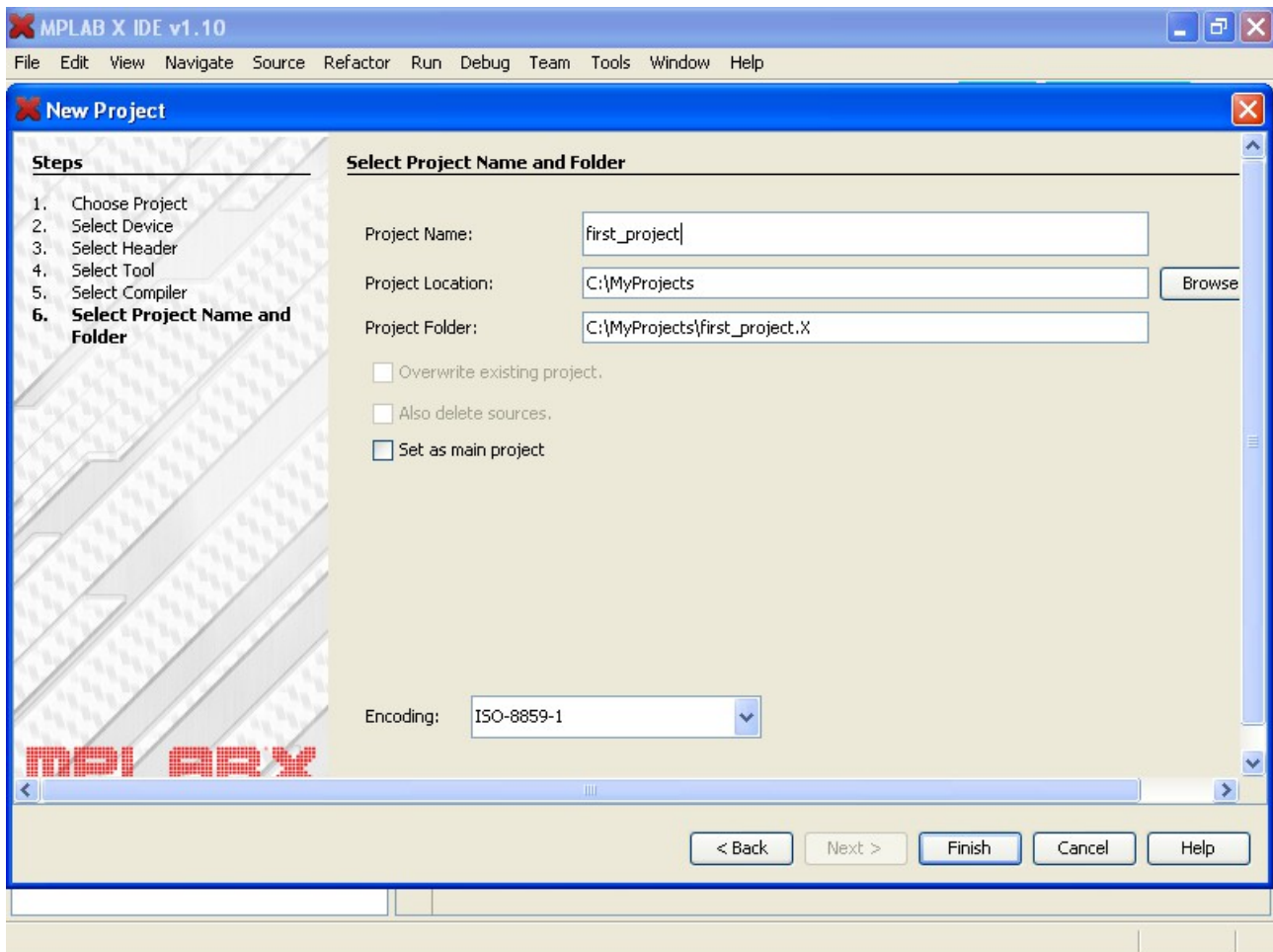


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- The dialog will now ask you what to call the project and where to save the project. The project directory is where MPLAB X will store configuration files for the project and where output files generated after a compile will be stored. The source code does not necessarily have to be placed into the project directory.

After choosing project name and project directory, press the 'Next' button.



- The New Project dialog is now finished and the project is created, but the project is empty and there is no source code attached to the project. We now need to add source to the project. Source can be added to the project in one of two ways: creating a new file or adding an existing file.

- Creating a new file: Right click on 'Source Files' and select 'New -> C Main File' or 'New -> C Source File'. A dialog will ask you what to name the file and where to save it.
- Adding an existing file: Right click on 'Source Files' and select 'Add Existing Item'. A dialog will allow you to browse your computer to chose the file to add the project. A file chosen this way will be left in the directory it was found, it will NOT be copied to the project directory.



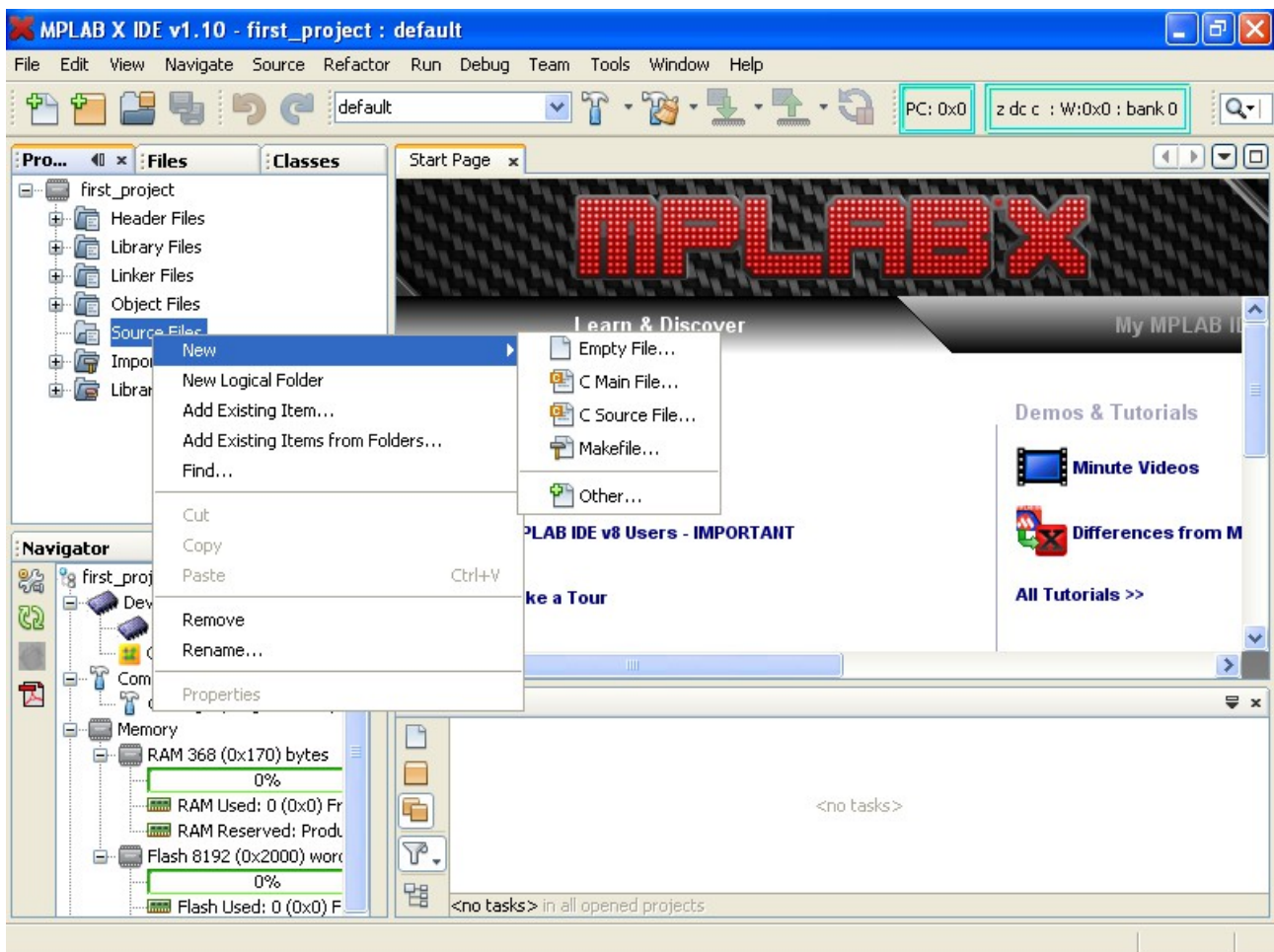
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For this tutorial, ex_sqw.c from the CCS C Compiler's examples directory (if the compiler is installed to the default directory, will be found at C:\program files\picc\examples\ex_sqw.c) was copied to the project directory and then inserted using 'Add Existing Item'

If you only insert one source C file into your project, MPLAB X will call the CCS C Compiler to compile and link in one step. No intermediate .o files used for multiple compilation units are generated.

If you insert more than one source C file into your project, MPLAB X will call the CCS C Compiler multiple times to compile each C file separately. After each C file is compiled separately, the .o output files are then linked in the final step to create the .HEX and .COF file. This process of multiple compilation units is only supported by licensed users of the PCW IDE. Command-line only customers do not have this feature.

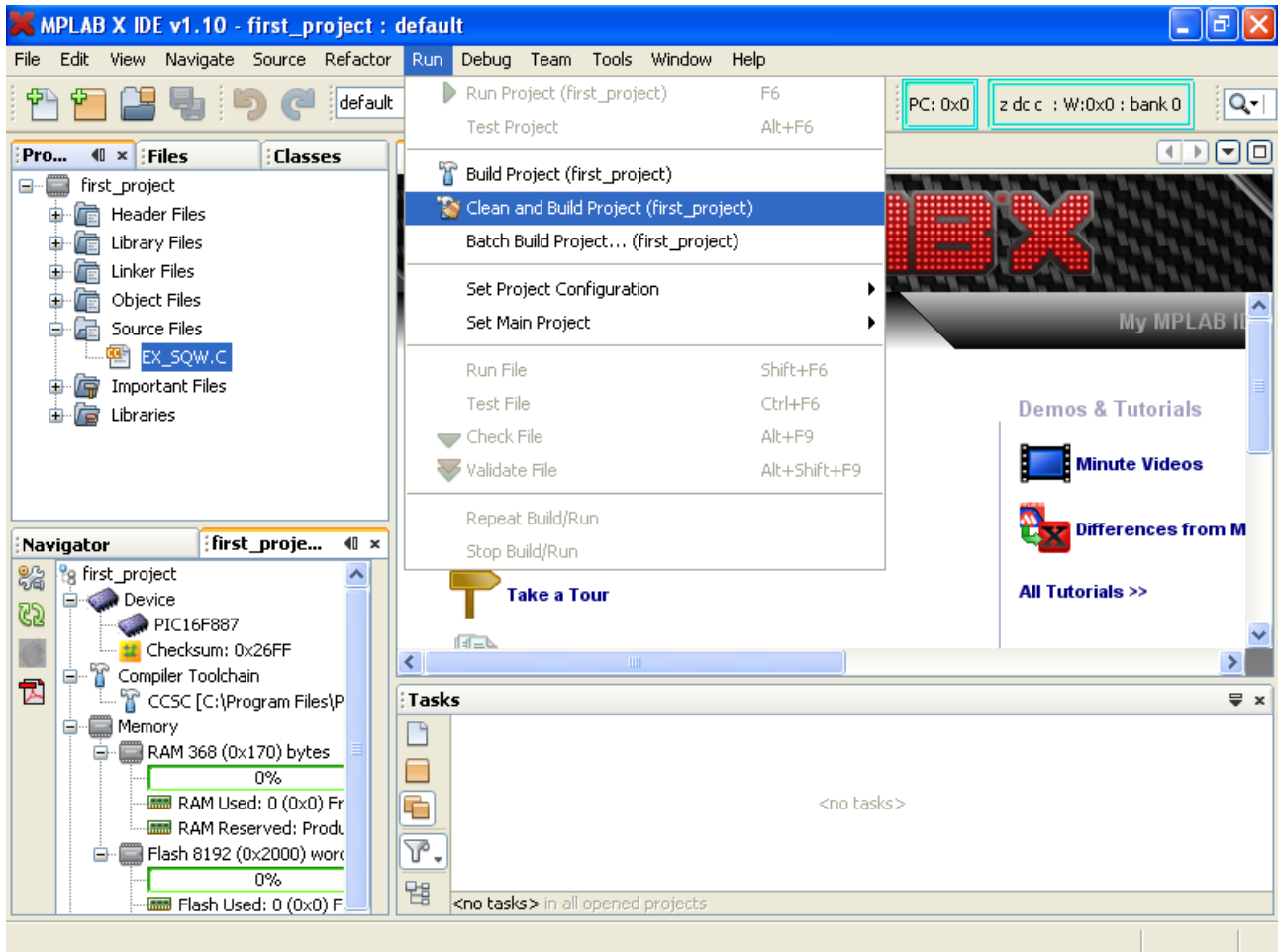




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10. Compile (build) the project by selecting 'Run -> Build Project' from the menu. 'Clean and Build Project' can also be used, which will erase all output files and intermediate .o files before building.

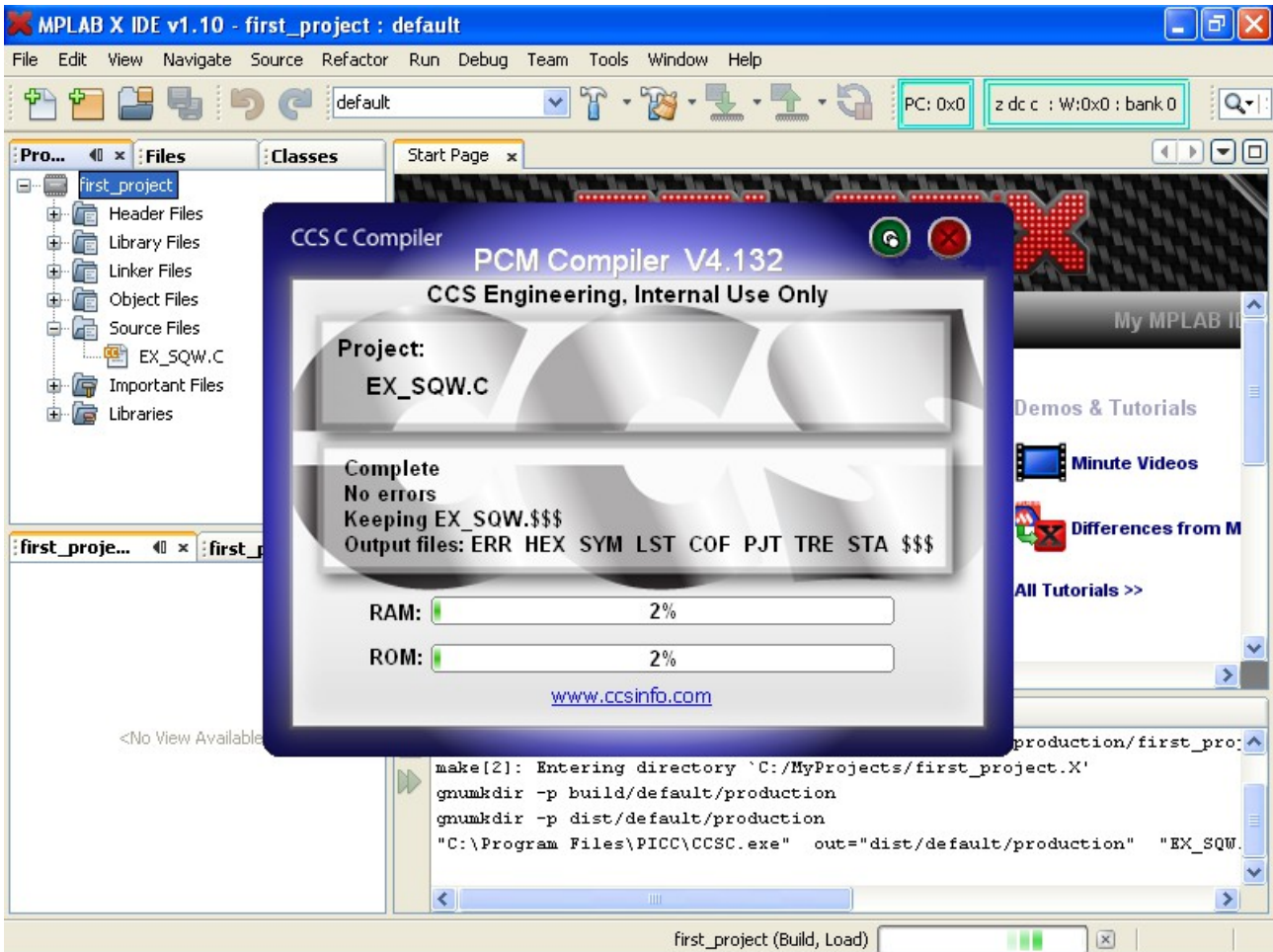




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11. During the build process, MPLAB X will invoke the CCS C Compiler. You should see the CCS C Compiler window pop-up during this process (depending on the size of your file this may disappear quickly).

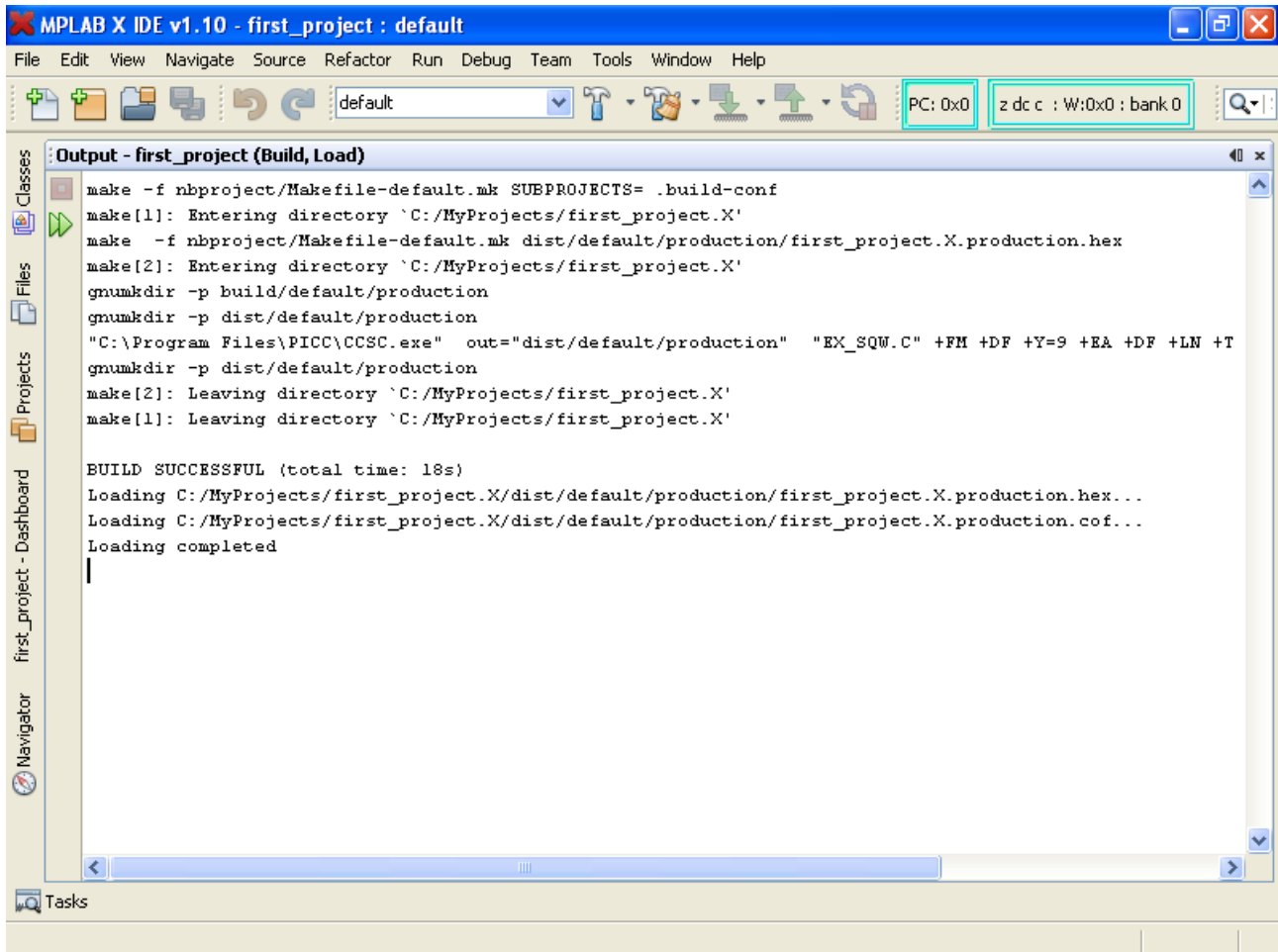




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12. Compile status and compiler output messages will be displayed in MPLAB X's output window. The output window will also display where MPLAB X saved the result .HEX and .COF file output of the compiler.

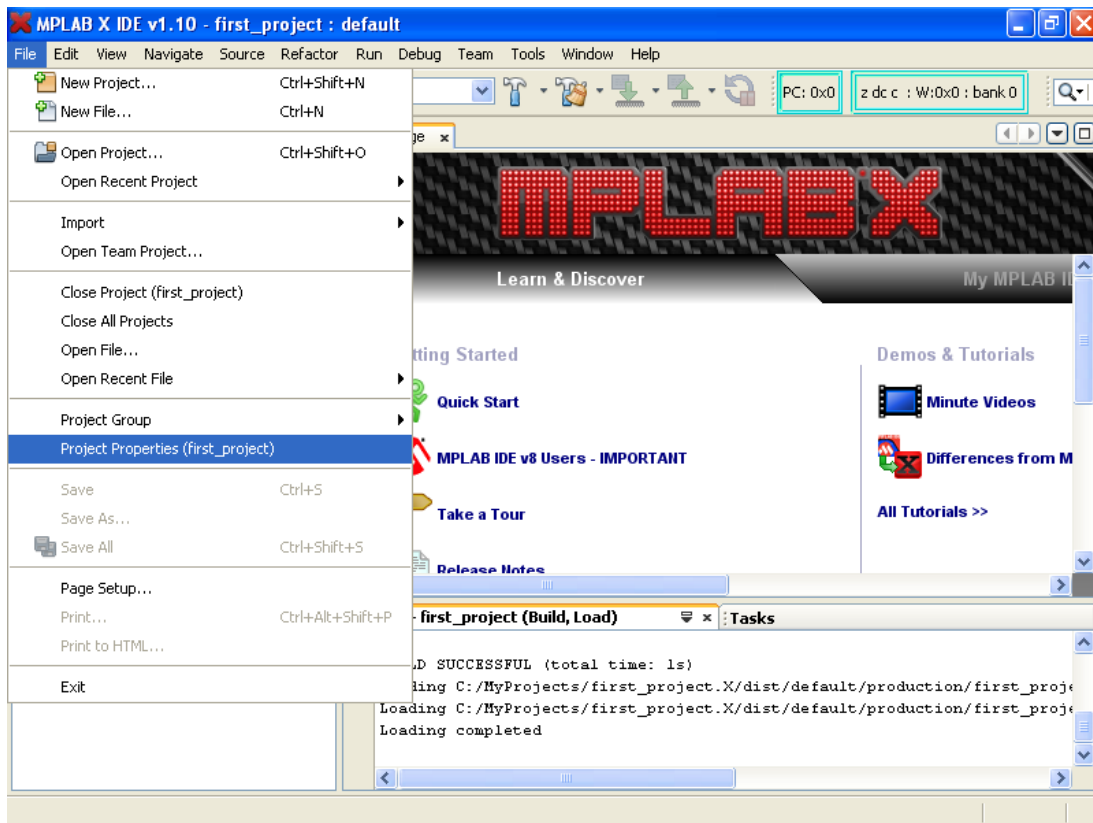




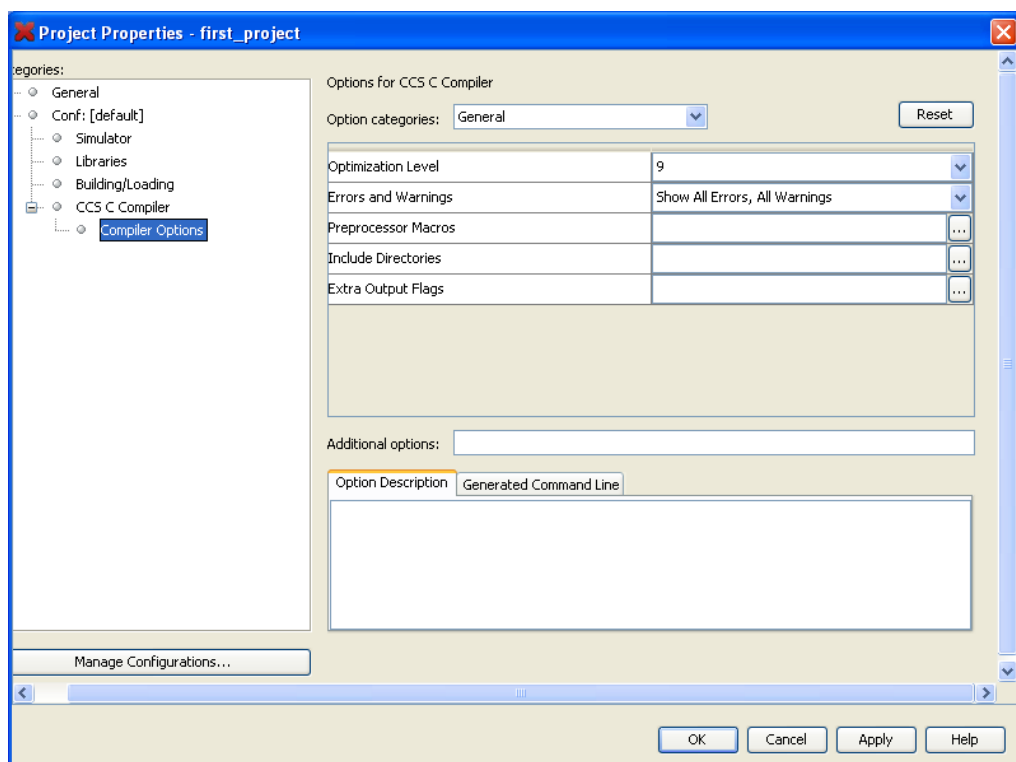
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How do I change project properties, like the include path?

This can be done in MPLAB X by selecting 'File -> Project Properties' from the menu.



This will open the project properties dialog. CCS C Compiler specific options can be found in the section labeled 'Compiler Options':





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How do I add CCS C Compilers to MPLABX's list of compiler toolchains?

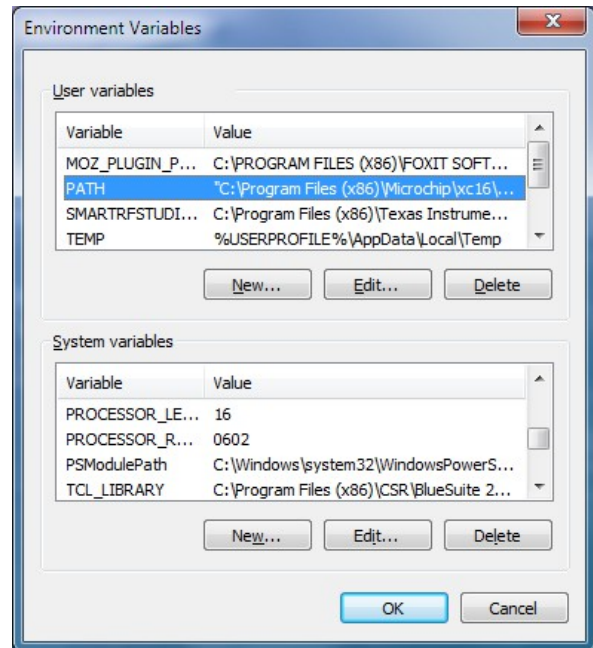
Why isn't MPLAB X finding my CCS C Compiler even though I have the plugin installed?

Option 1 – Add ccsc.exe to Window's PATH.

When MPLAB X starts, it searches the computer's execution path for any compatible compiler toolchains. In CCS C Compiler's case, it searches for CCSC.EXE and CCSCON.EXE.

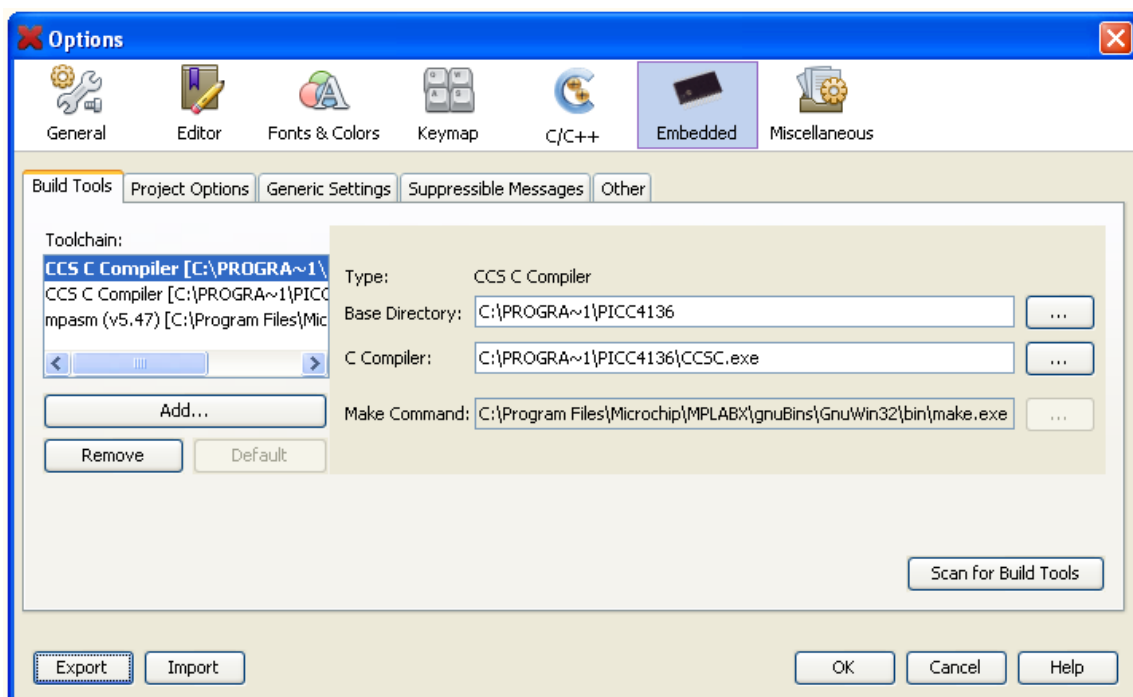
In Windows, to changing the execution path requires changing the PATH environment variable. The process of finding this dialog is different for each Windows, but typing Environment Variable in the Control Panel's search bar should find the proper tool.

Once PATH has been updated with the location of the CCS C Compiler's installed directory, exit and start MPLABX and it will automatically find the compiler.



Option 2 – Add ccsc.exe to MPLABX's Build Tools.

To manually add a compiler to MPLAB X that isn't in the computer's execution path can be done from MPLAB X's Option screen. From the MPLAB X menu, select **Tools->Options**. On the **Options** screen, select the **Embedded** screen and then the **Buld Tools** tab:





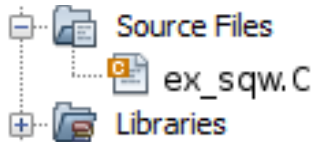
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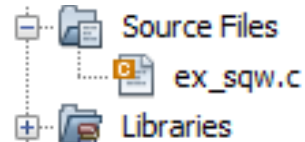
In my project, why do I get many red underlines because MPLAB X thinks there are a lot of syntax errors in the code?

MPLAB X treats any file with an upper case .C extension as a C++ file. Since the CCS C Compiler is not a C++ compiler MPLAB X will trigger many valid lines as a syntax error.

Bad file:

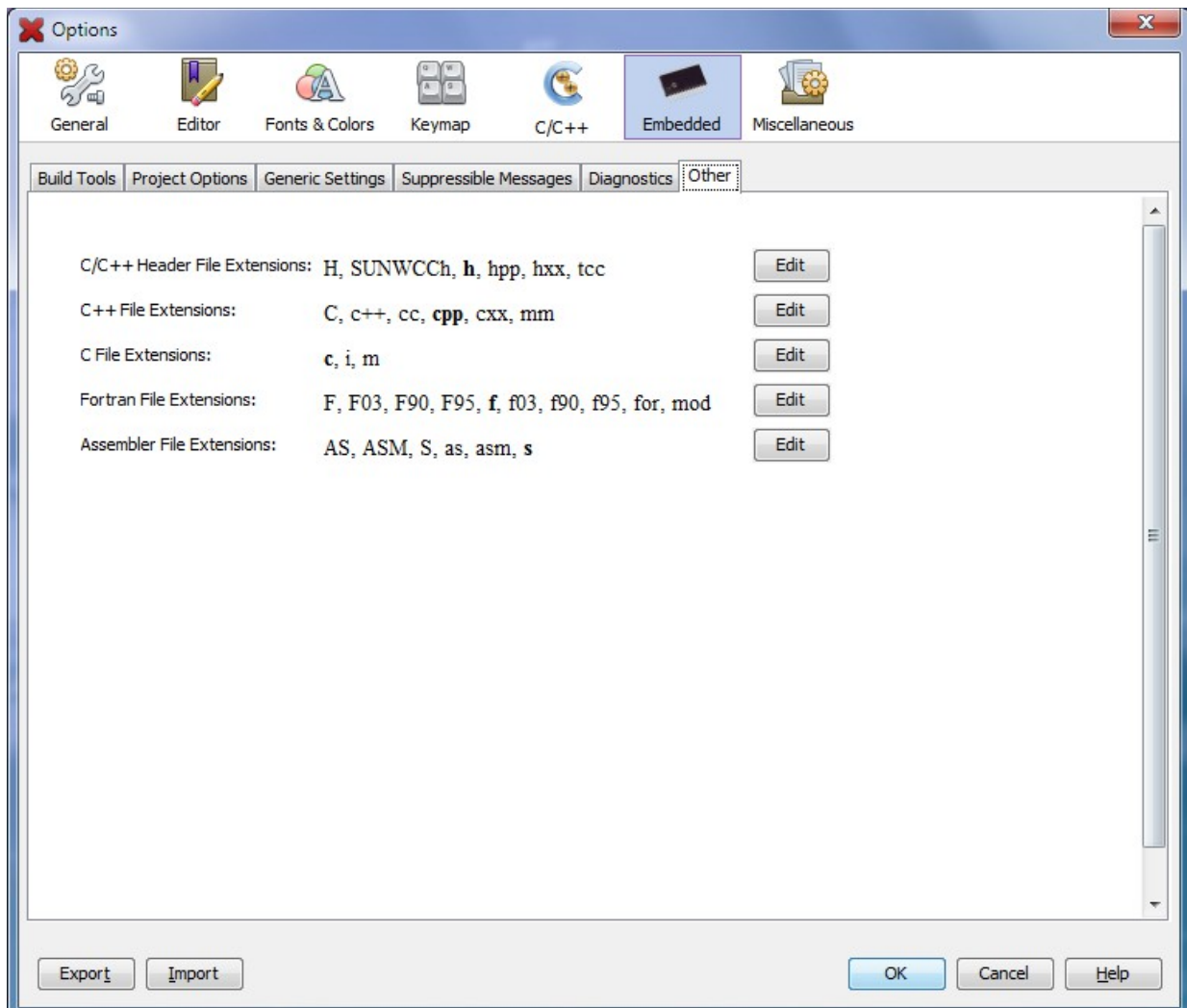


Good file:



There are 2 possible resolutions. First, rename the file to have a .c extension instead of a .C extension. Second, change the MPLAB X settings so a .C file is a C file and not C++. Performing either of these steps may require you to delete your MPLAB X project and create a new one.

To change the MPLAB X properties to make a .C file a C file, from the MPLAB X menu, select **Tools->Options**. On the **Options** screen, select the **Embedded** screen and then the **Other** tab:



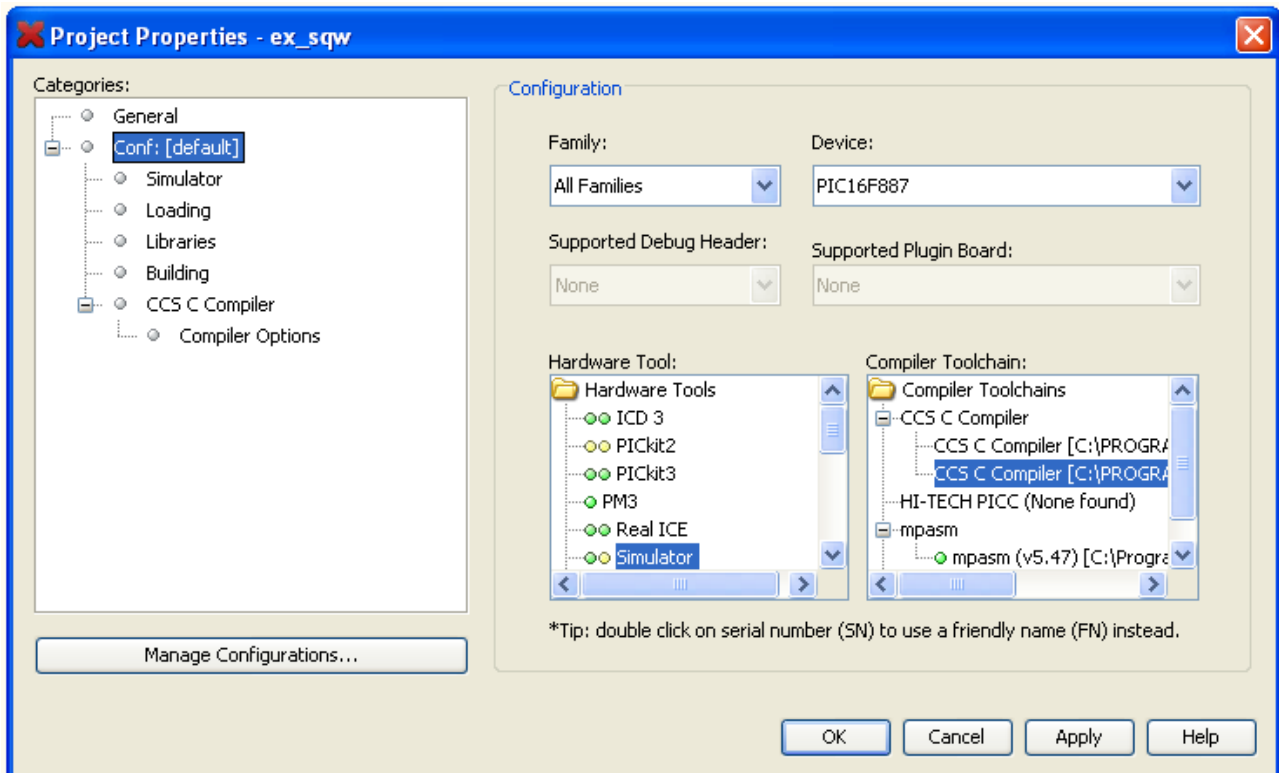


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I have several versions of CCS C Compilers installed on my computer, how do I tell MPLAB X which to use?

This setting is saved to each individual project. To change which compiler to use, the project settings need to be changed. From the MPLAB X menu, select **File -> Project Properties**.



From the Project Properties window, select the **Conf** category on the left side of the window. On the right side of the window you will see all the available compilers under the **Compiler Toolchain** section. The full path to the compiler executable is shown with each available compiler toolchain. Select the compiler you want to use, and press the **Ok** button.

MPLAB X is able to scan your computer to find compatible compilers. But MPLAB X may not show your compiler if it fails to find it or if you have too many different compiler versions installed. In this condition you will have to manually add a compiler to MPLAB X's compiler list. To do this, select **Tools -> Options** from the MPLAB X menu. Once the Options window is open, select **Embedded** and then the **Build Tools** tab.

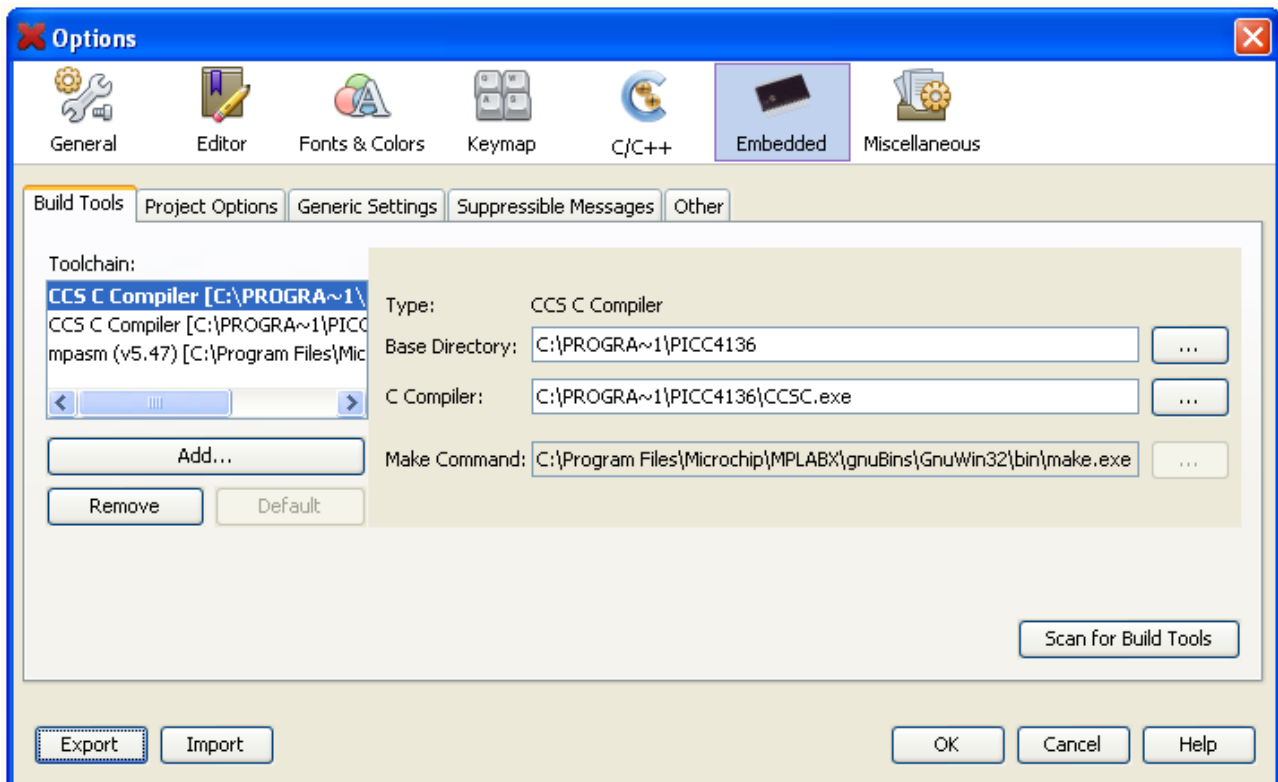


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I have several versions of CCS C Compilers installed on my computer, how do I tell MPLAB X which to use? (Continued)

Under **Toolchain**, MPLABX will list all the CCS C Compilers that it has found. You can use this dialog window to add or modify MPLAB X's list of available compilers.



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