



mpideXcode

Embedded Computing Template on Xcode 4.3

Installation Guide



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Documentation <http://embedXcode.weebly.com/>

GitHub repository <https://github.com/rei-vilo/embedXcode>

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1. Installation

Before installing the template, here are the pre-requisites:



For all boards:

- Install Arduino 0023 or Arduino 1.0.
- Launch it.
- Define the path of the sketchbook in the menu Arduino > Preferences > Sketchbook location.

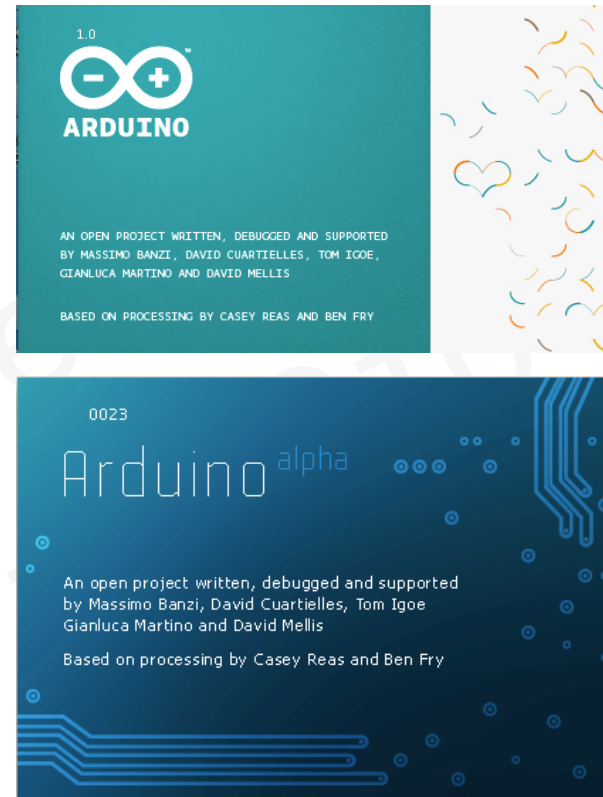
Arduino provides the reference for code-sense.

As a matter of fact, Wiring is considered as the reference.

Arduino 0023 should be preferred over Arduino 1.0 because Arduino 0023 is Wiring compliant. So is chipKIT MPIDE 0023.

Arduino 1.0 has introduced many small changes in the syntax which are not compatible with previous release. Energia 1.0 is derived from Arduino 1.0.

So I strongly recommend to pick the release which is compatible with your platforms, either Arduino 0023 or Arduino 1.0.





As an option:

- If chipKIT boards are to be used, install Mptide 0023.
- Launch it.
- Define the path of the sketchbook in the menu Mptide > Preferences > Sketchbook location.



As an option:

- If Wiring boards are to be used, install Wiring 1.0.
- Launch it.
- Define the path of the sketchbook in the menu Wiring > Preferences > Sketchbook location.

The two following files require to be deleted.



Multiplatform Arduino compatible IDE
Arduino 0023 Compatibility

Modified version of the Arduino IDE created by
Rick Anderson and Mark Sproul of Fair Use Building
and Research on May 21, 2011.
This software is not supported by the Arduino LLC

Version 1.0 Build 100



An open project initiated by Hernando Barragán

The Wiring team is composed of Hernando Barragán, Brett Hagman and Alexander Brevig

Special thanks to contributors: Paul Stoffregen, Michael Margolis, Hans-Christoph Steiner, Annelie Franke, Maarten Lamers, Christoph Wartenmann, Etienne Ribeiro, Nicholas Zambetti, Thomas Ouellet-Fredericks, Mikal Hart, Pascal Stang, Brian Dean, Carlos Mario Rodriguez, James Paralik, Savad Brooks, Yaniv Steiner, Tom Igoe, David Cuatrecasas, David Mellis, Massimo Banzi, Bill Verplank, Gillian Crampton-Smith and many others listed at wiring.org.co/about.html

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Processing is © 2004-2011 Ben Fry and Casey Reas

© 2001-2004 Massachusetts Institute of Technology

/Applications/Wiring.app/Contents/Resources/
Java/cores/AVR8Bit/program.cpp

/Applications/Wiring.app/Contents/Resources/
Java/cores/AVR8Bit/makefile



As an option:

- If LaunchPad board is to be used, install Energia 1.0.
- Launch it.
- Define the path of the sketchbook in the menu Energia > Preferences > Sketchbook location.

For other boards with a Processing-based IDE, same procedure:

- Install the corresponding Processing-based IDE.
- Launch it.
- Define the path of the sketchbook.
- Additionally, develop a specific makefile and adapt the Step1 makefile.

Now, the template can be installed:

Check and create ~/Library/Developer/Xcode



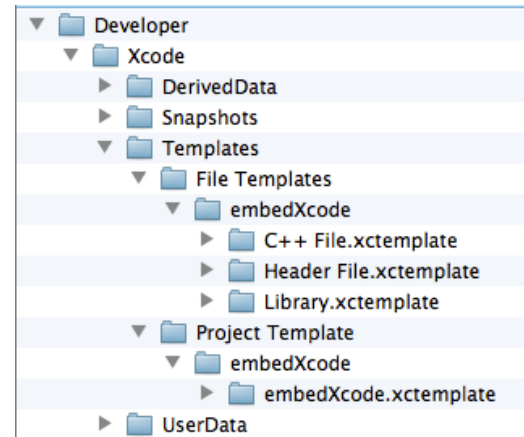
Energia 1.0

Modified version of the Arduino IDE for the Texas Instrument LaunchPad MSP430 created by Robert on January 2012.

This software is not supported by the Arduino LLC.



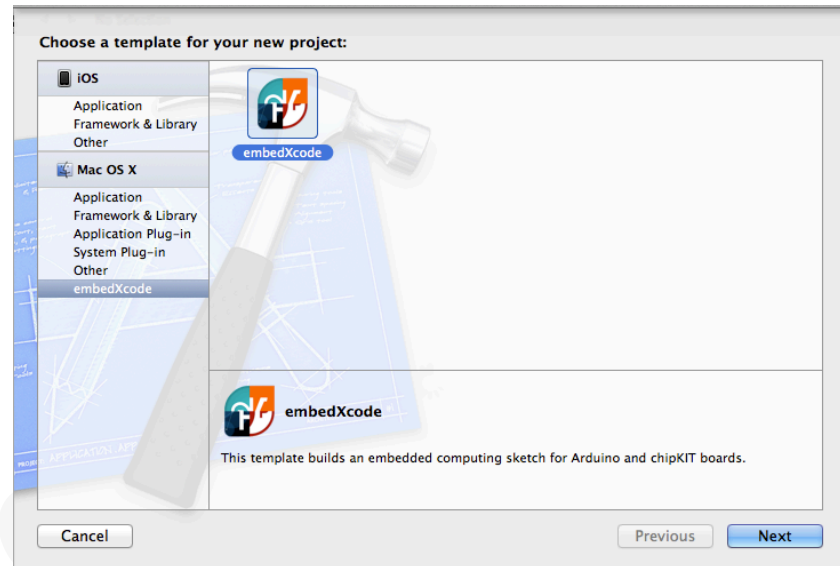
Copy the folder Templates into ~/Library/Developer/
Xcode



2. Create a New Project

Call the menu File > New > New Project... or press
⇧⌘N.

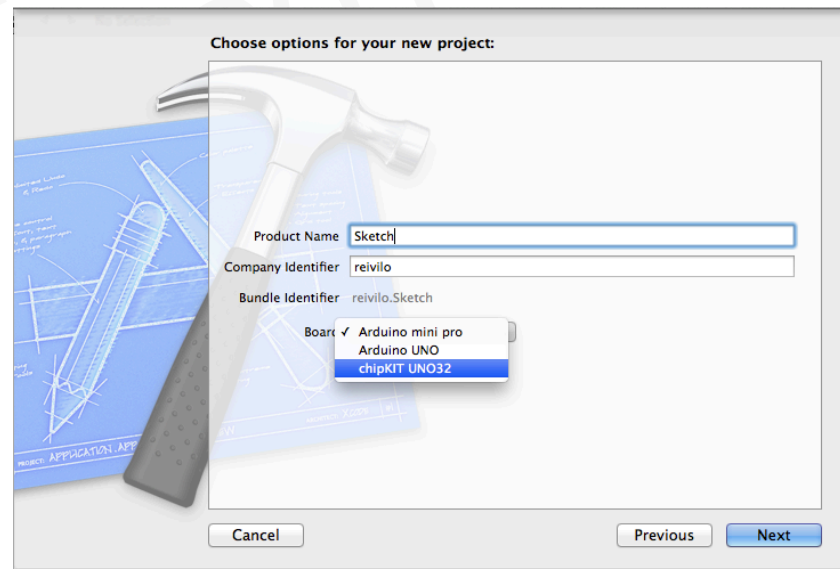
Select embedXcode > embedXcode.



Type in the name of the project.

Select the board on the drop-down list.

Click on Next to save.



3. Project Configuration

The template doesn't define all the parameters, so some of them need to be set manually.

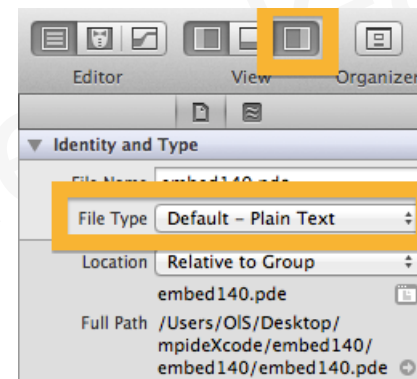
The goal is to have the following work done by the template, provided the right keywords are known.

3.1. *Declare Sketch .pde File as C++ File*

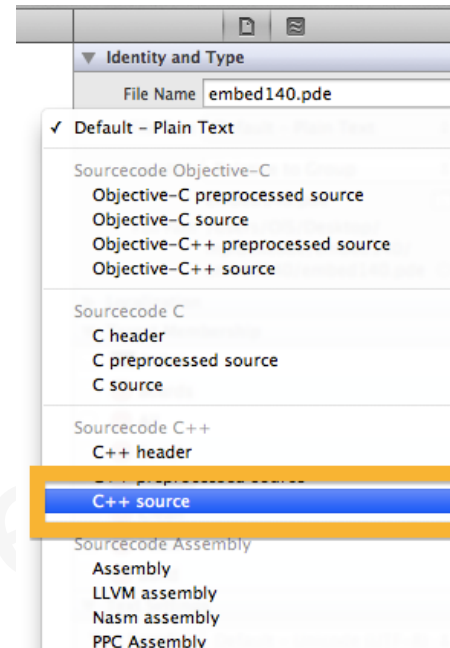
The sketch .pde file is considered as plain text. For code-sense, it should be declared as C++ file.

Select the sketch .pde file.

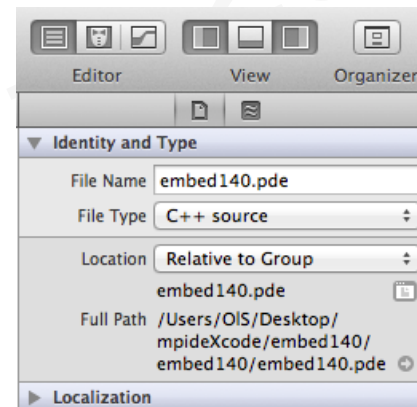
In the right-most column,



Click on the drop-down list of File Type.
Select C++ source.



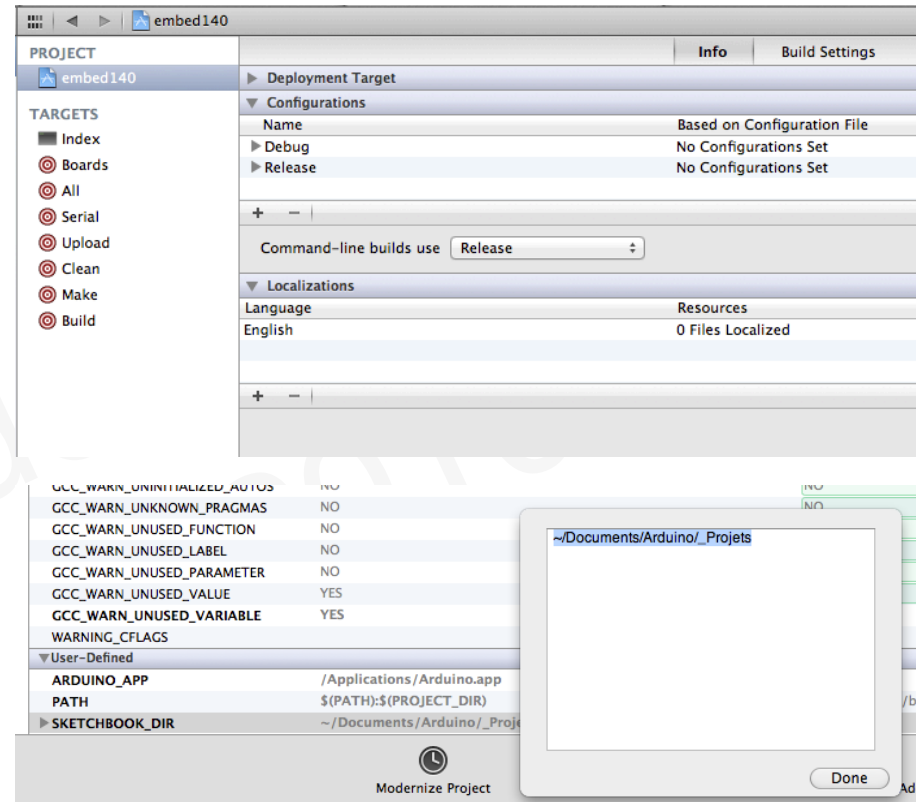
Now, the sketch is considered as C++ code for code-sense.



3.2. Declare User's Sketchbook

The user's sketchbook is a folder where the user's sketches are saved, among them the libraries in a dedicated sub-folder Libraries.

Select the project and the Build Settings pane.



At the very bottom, double-click on SKETCHBOOK_DIR and either type in the name of the folder or drag-and-drop it from a Finder window.

The ~ character is accepted.

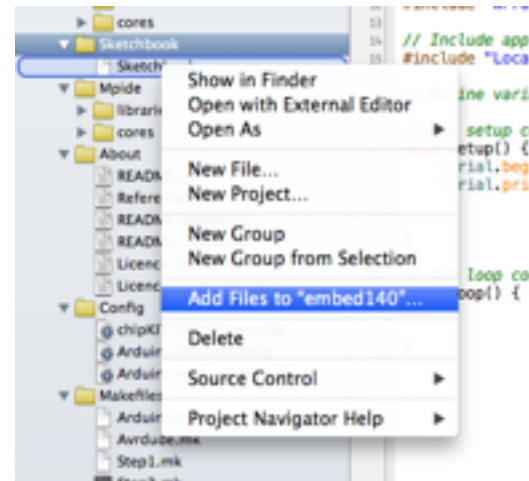
If no sketchbook is defined, SKETCHBOOK_DIR takes the value defined for Arduino or chipKIT during the installation process.

3.3. Add User's Libraries

Open the Sketchbook group on the project hierarchy.

Right-click to obtain the contextual menu.

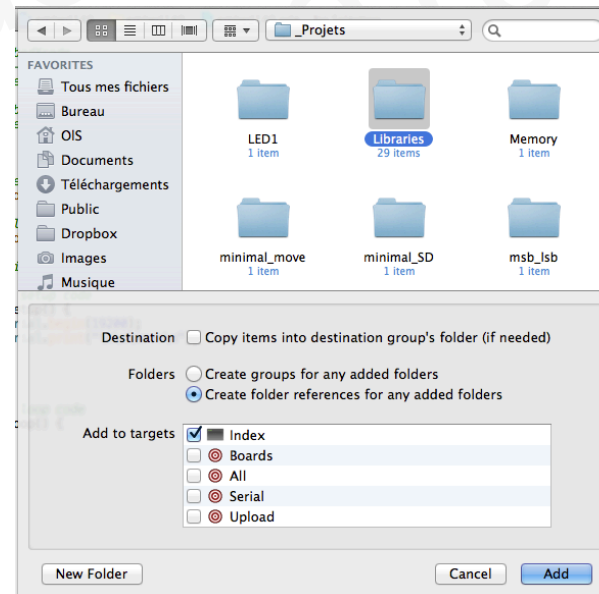
Choose Add file to...



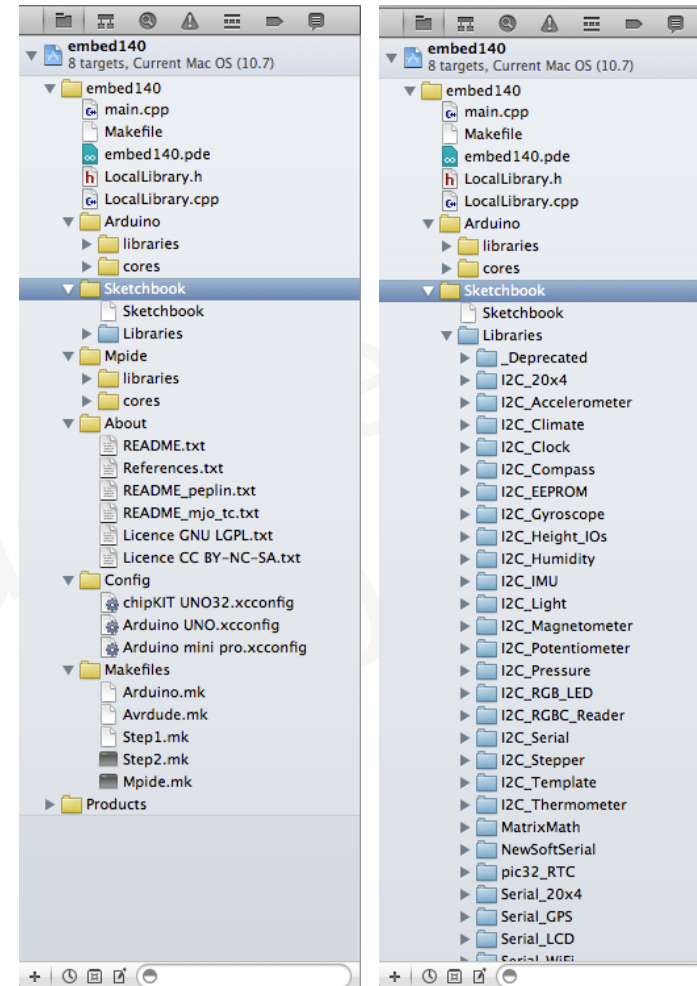
Select the Library sub-folder on the sketchbook folder, tick Add to target > Index and validate with Add.

Both Create group for any added folders and Create folder references for any added folders are relevant.

Don't tick Copy items into destination group's folder (if needed) folder (in needed) to avoid duplicating files.



The project hierarchy shows all your libraries.

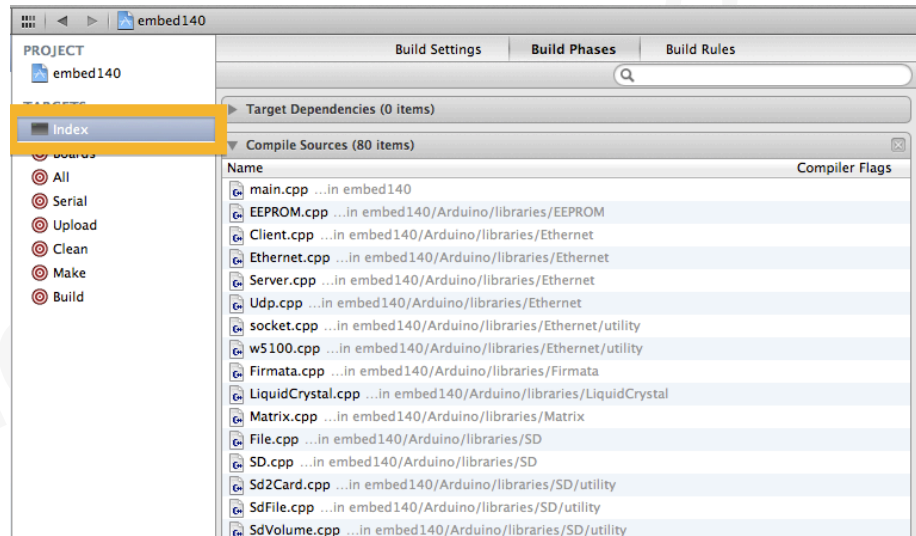


3.4. Declare Sources for Code-Sense

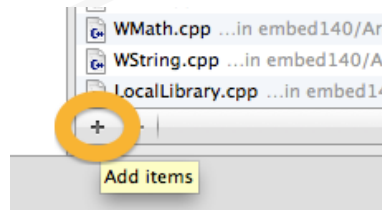
Standard C++ keywords are already known, but not the Arduino and user's library keywords.

So Xcode needs to be taught where to find them.

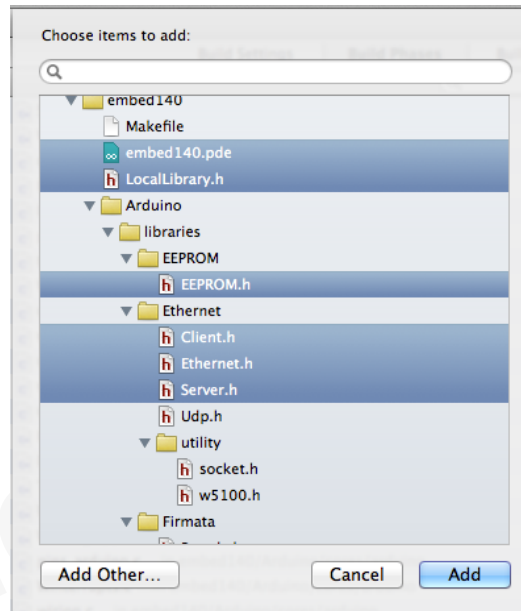
Select the target Index and the Build Phases pane.



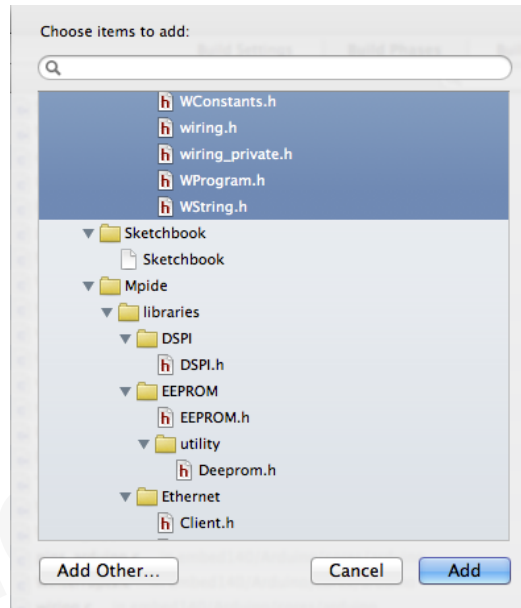
Go a the bottom of the list and click on the + button.



A list shows up.



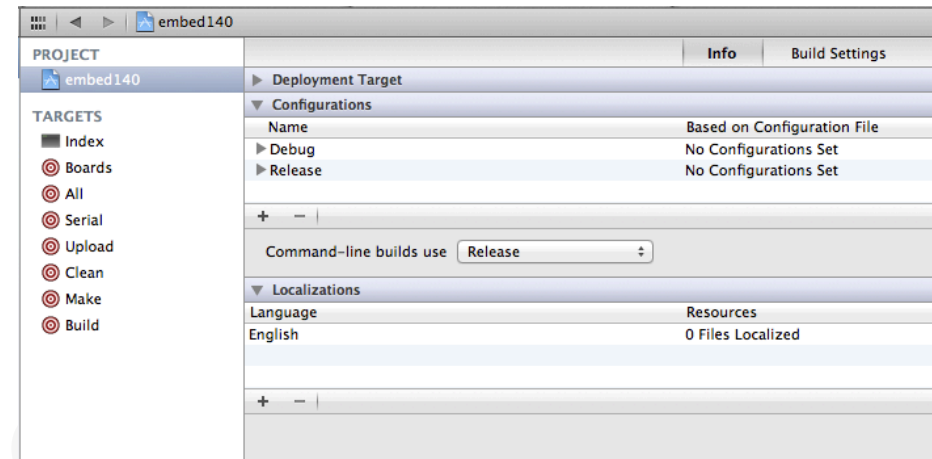
Select all the .h and .cpp files and click on Add.



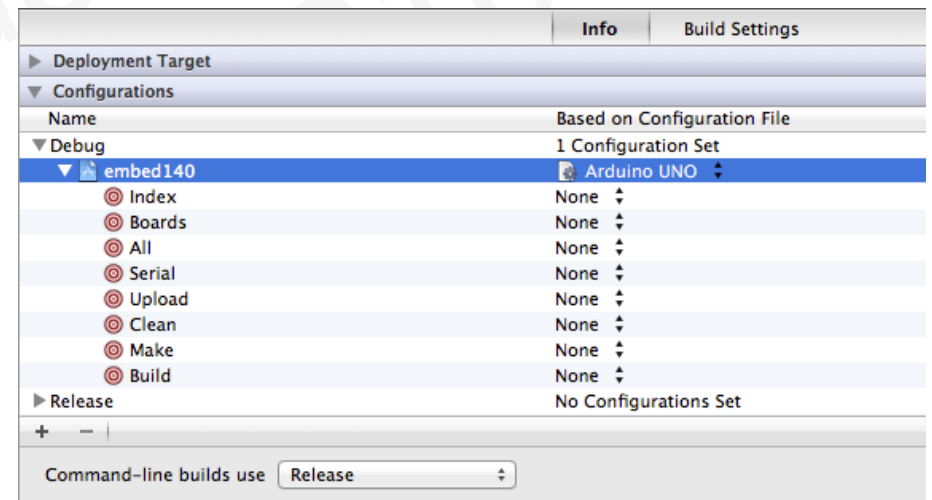
You're ready now!

4. Change the Board

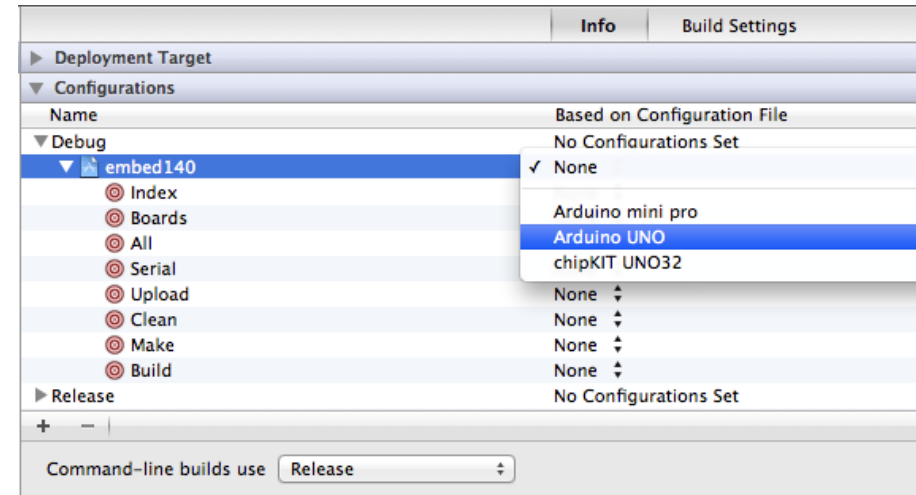
To change the board, select the project and the Info pane.



A drop-down list shows the boards available.



Just select one.



The sketch contains conditional `#include` for the supported IDEs.

They are now based on the micro-controller type.

In case Arduino version 0023 is used, replace `Arduino.h` by `WProgram.h`.

```
// Core library
#if defined (__AVR_ATmega328P__) || defined
(__AVR_ATmega2560__)
#include "Arduino.h"
#elif defined(__PIC32MX__)
#include "WProgram.h"
#elif defined(__AVR_ATmega644P__)
#include "Wiring.h"
#else
#error Platform not defined
#endif
```

5. Re-Indexing Keywords

If code-sense doesn't work, we need to force a re-indexing of the key words.

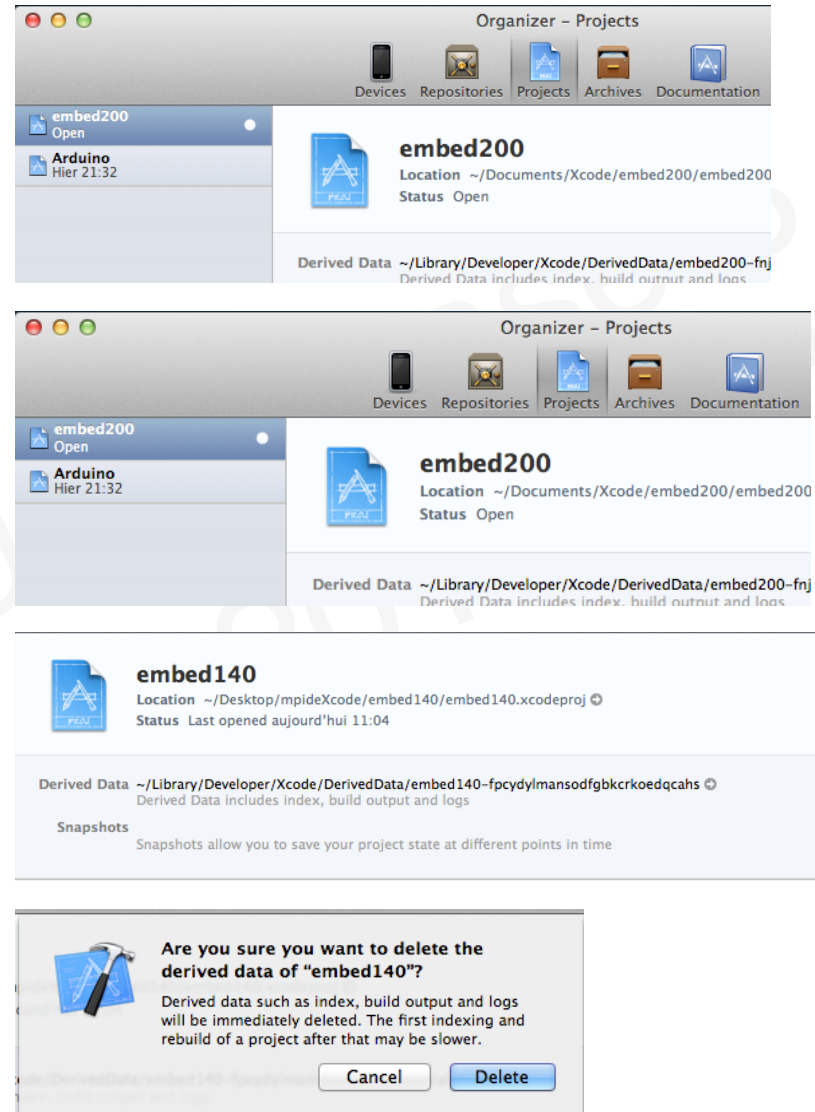
To do so, first close the project.

Call the menu Window > Organiser and select the Projects pane.

Select then the project.

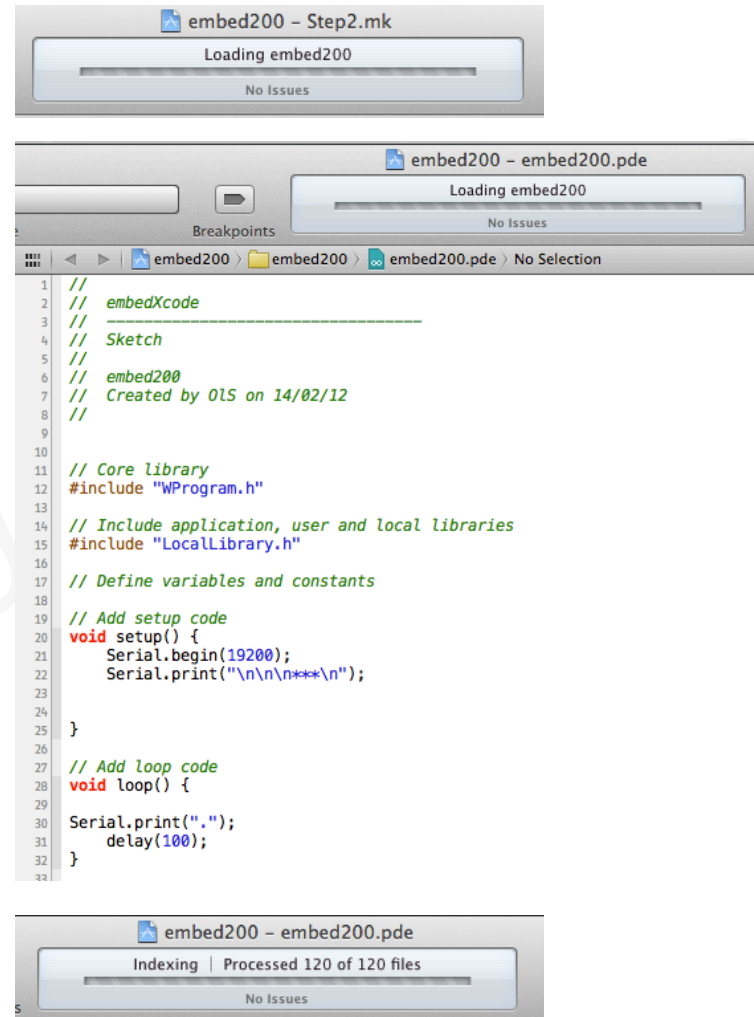
The index is saved within the Derived Data folder.
Click on the Delete button to delete them.

Confirm the deletion.



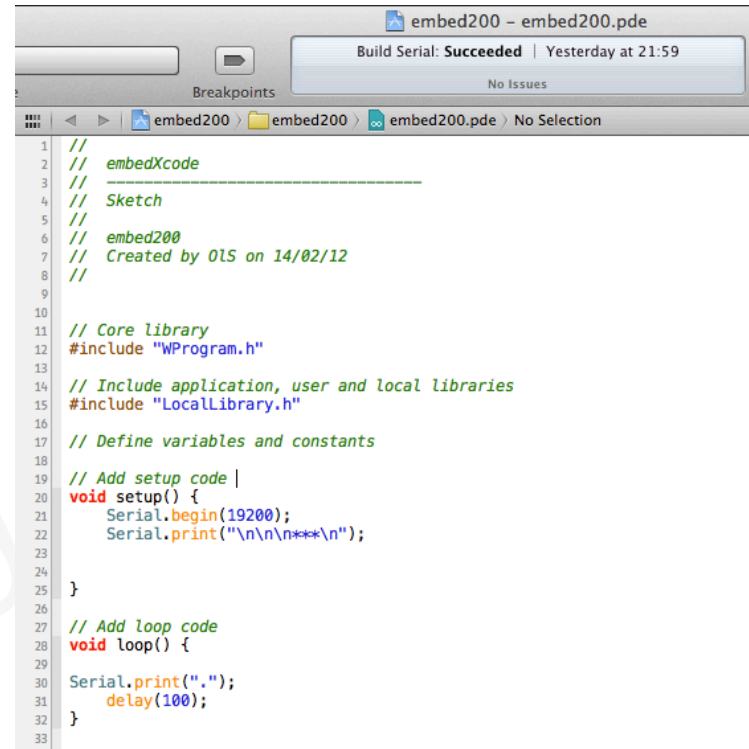
Load the project.

There's no code-sense yet: everything is black-and-white, except standard C++ keywords.



The index is being built.

When the index is built, code-sense shows pretty colours.



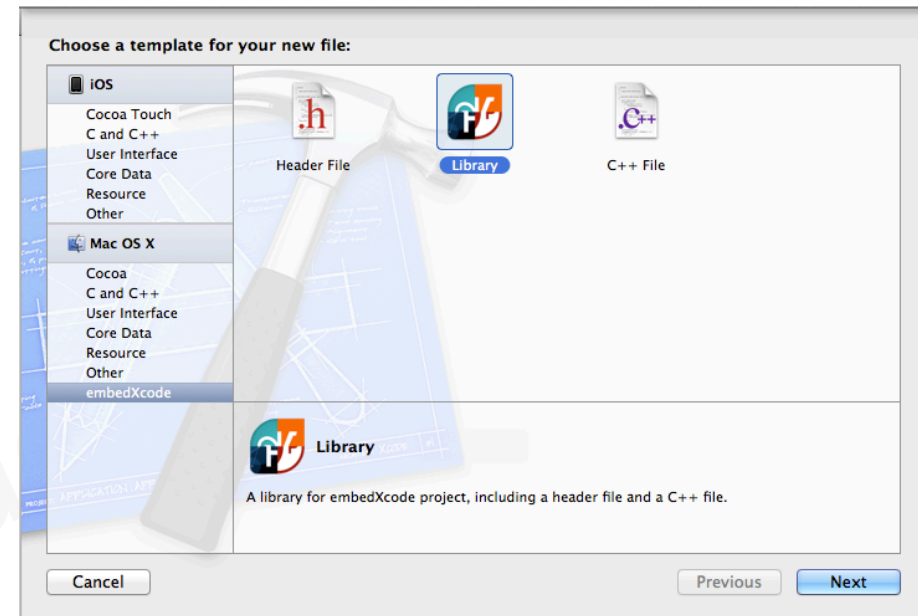
The screenshot shows the Arduino IDE interface with a sketch file named 'embed200.pde' open. The code is color-coded, indicating that the index has been built successfully. The code includes comments and function definitions for a serial communication sketch.

```
1 //  
2 // embedXcode  
3 // -----  
4 // Sketch  
5 //  
6 // embed200  
7 // Created by OLS on 14/02/12  
8 //  
9  
10  
11 // Core library  
12 #include "WProgram.h"  
13  
14 // Include application, user and local libraries  
15 #include "LocalLibrary.h"  
16  
17 // Define variables and constants  
18  
19 // Add setup code |  
20 void setup() {  
21   Serial.begin(19200);  
22   Serial.print("\n\n\n***\n");  
23  
24 }  
25  
26  
27 // Add loop code  
28 void loop() {  
29  
30   Serial.print(".");  
31   delay(100);  
32 }  
33
```

6. Add a File

Call the menu File > New > New File... or press
⌘N

Select embedXcode and then Header File, C++ file or Library.



Library creates a header file and a C++ code file with the `#include` statement ready!

```
#include "LocalLibrary.h"
```

7. Code-Sense Features

Apart from pretty colours on the code and enhanced visibility, code-sense brings:

- auto-completion,

```

13
14 // Include application, user and local libraries
15 #include "Locallibrary.h"
16 #include "I2C_Serial.h
17 I2C_Serial.h
18 // Define constants
19 I2C_Stepper.h
20 // Add setup code
21 void setup() {
22     Serial.begin(19200);
23     Serial.print("\n\n\rxxxx\r\n");

```

- code-snippets and check-as-you-type code monitoring,
- click-to-definition



8. What Has Been Tested

Platform	What Has Been Tested	What Has Not Been Tested	Reference Boards
Arduino	Sketch compilation and upload		Arduino Uno, Arduino mega2560 and Arduino mini pro
chipKIT	Sketch compilation and upload		chipKIT UNO32
Wiring	Sketch compilation and upload		Wiring S
LaunchPad	Sketch compilation and upload		LaunchPad with MSP430G2542

9. References

See documents on the About folder for additional contributions and detailed references.

10. Referenced Boards

According to the Boards.txt files:

Arduino	chipKIT	Wiring	LaunchPad
Arduino Uno	chipKIT UNO32	Wiring S @ 16 MHz	LaunchPad with mps430g2452
Arduino Duemilanove or Nano w/ ATmega328	chipKIT MAX32	Wiring S with Play Shield @ 16 MHz	LaunchPad with mps430g2231
Arduino Diecimila, Duemilanove, or Nano w/ ATmega168	chipKIT MAX32-USB for Serial	Wiring V1.0/Wiring Mini V1.0 @ 16 MHz	LaunchPad with mps430g2553
Arduino Mega 2560	Cerebot MX3cK	Wiring V1.1 ATmega1281 @ 16 MHz	
Arduino Mega (ATmega1280)	Cerebot MX4cK	Wiring V1.1 ATmega2561 @ 16 MHz	
Arduino Mini	Cerebot MX7cK		
Arduino Fio	Cerebot 32MX4		
Arduino BT w/ ATmega328	Cerebot 32MX7		
Arduino BT w/ ATmega168	Microchip PIC32 Starter kit		
LilyPad Arduino w/ ATmega328	Microchip PIC32 Ethernet Starter kit		
LilyPad Arduino w/ ATmega168	Microchip PIC32 USB Starter kit II		
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328	Microchip PIC32 Explorer 16		
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega168	MirkoElektronika PIC32 Multimedia Board		
Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega328	MirkoElektronika PIC32 mikroMedia Board		

Arduino	chipKIT	Wiring	LaunchPad
Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega168	Pic32 UBW32-MX460		
Arduino NG or older w/ ATmega168	Pic32 UBW32-MX795		
Arduino NG or older w/ ATmega8	Pic32 CUI32-Development Stick		

11. Version History

Date	mpideXcode	embedXcode	Installation Guide	Comment
Jan 22, 2012	a			Initial release
Feb 02, 2012	b			chipKIT operational
Feb 04, 2012	c			Code-sense operational
Feb 06, 2012	d			User libraries
Feb 06, 2012	e			Code checking while typing with Index as target
Feb 08, 2012	f			Code-sense, click-to-error with standard targets
Feb 14, 2012	g	1	1	Multi-application, check-as-you-type, template
Feb 18, 2012	6	2	2	Improvements
Feb 26, 2012		3		Modular makefiles
Mar 06, 2012	7	4	3	Arduino 1.0 implementation
Mar 12, 2012	8	5		Bugs fixed

Mar 15, 2012	9	6	4	All Arduino/chipKIT/Wiring/Energia and user libraries included by default
Apr 05, 2012	10	7	5	Wiring 1.0 and Energia 1.0 implementations
Apr 08, 2012	11	8	5	Bugs fixed

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