

ERIKA Enterprise Tutorial

for the dsPIC (R) DSC platform

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Evidence is a spin-off company of the ReTiS Lab of the Scuola Superiore S. Anna, Pisa, Italy. We are experts in the domain of embedded and real-time systems with a deep knowledge of the design and specification of embedded SW. We keep providing significant advances in the state of the art of real-time analysis and multiprocessor scheduling. Our methodologies and tools aim at bringing innovative solutions for next-generation embedded systems architectures and designs, such as multiprocessor-on-a-chip, reconfigurable hardware, dynamic scheduling and much more!

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1 RT-Druid and Erika Enterprise tutorial for dsPIC (R) DSC

This small tutorial describes a set of steps needed to compile a simple application that shows the main features of Erika Enterprise and RT-Druid for the dsPIC (R) DSC platform.

This tutorial has been tested on a FLEX board produced by Evidence and Embedded Solutions and on a Microchip Explorer 16 development board from Microchip.

We suppose the reader is familiar with the MPLAB IDE debug environment provided by Microchip.

2 Notes for Windows XP and Windows Vista users

If you are using Windows, and especially if you are using Windows Vista, please look carefully at the following warnings:

Warning: Do NOT install the Evidence package in a name containing spaces. `c:/Evidence/Evidence` works.

Warning: Do NOT install the Scilab package in a name containing spaces. `c:/Evidence/scilab-4.1.2` works.

Warning: If using Vista, be aware that directories like `c:/Programmi`, `c:/Users/Documenti` are not REAL directories but are aliases. DO NOT USE THEM. Put your RT-Druid workspace under `c:/Users/yourusername/workspace`.

Warning: Please install cygwin into its default directory, `c:/cygwin`.

Warning: Also if from the Windows Vista Explorer your Microchip compiler seems to be installed under `c:/Programmi/Microchip/...`, please remind to specify the REAL pathmname. In particular, `c:/Programmi` DOES NOT EXISTS, whereas the correct name is `c:/Program Files`.

3 Installing Erika Enterprise and RT-Druid on Microsoft Windows

This chapter will guide the developer to the installation procedure of Erika Enterprise and RT-Druid for the dsPIC (R) DSC platform.

The installation of Erika Enterprise and RT-Druid is composed by the following packages:

- The Eclipse development environment, which is used by RT-Druid to provide the basic development environment for Erika Enterprise applications.
- The Eclipse environment is based on the Java platform, so that a working Java Runtime Environment must be present for using RT-Druid.
- The RT-Druid plugins, which provide the code generation for Erika Enterprise for Eclipse.
- The Erika Enterprise source code.
- The Microchip MPLAB IDE.
- The Microchip C30 Compiler.
- A version of the Microchip C30 compiler recompiled from the GCC sources, which enables basic C language compilation without the need to buy the full fledged Microchip C30 Compiler.
- A set of examples for the dsPIC (R) DSC Platform, which can be used to compile a first set of running examples for the Evidence/Embedded Solutions FLEX board, the Microchip Explorer 16 board, and others. These applications are organized in “templates”, available at project creation.
- A subset of the Cygwin environment [1], including a set of utilities like `make`, `gawk`, and few others, which are used during the compilation process of an Erika Enterprise application.

To install the software, execute the following steps:

1. Install your favourite Java runtime environment, which is needed to run RT-Druid; in fact, RT-Druid is a plugin of the Eclipse editor, which requires Java to be executed.

3 Installing Erika Enterprise and RT-Druid on Microsoft Windows

2. Install the latest version of the Microchip MPLAB IDE; you can use the default install directory. At the end of the install process, accept the system reboot.
3. Install the Microchip C30 Compiler, available from the Microchip web site. Even in this case, you can use the default install directory. When it is asked to change the default environment, please do accept.
4. Run the Erika Enterprise and RT-Druid installer.
5. The installer will prompt a list of packages which can be installed. Select all the packages you wish to install and continue the installation procedure (see Figure 3.1).

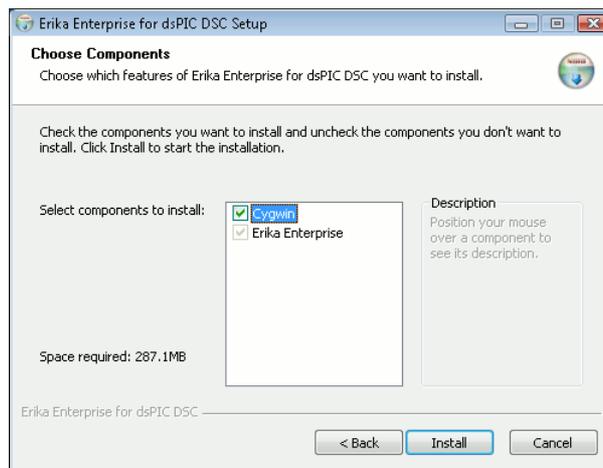


Figure 3.1: This screenshot shows the dialog box with the available install packages.

Note: The Erika Enterprise install package provides a version of the Microchip C30 compiler recompiled from the GCC sources made available from Microchip. Although that compiler is able to compile Erika Enterprise applications, it does not include Microchip include files and libraries which are only distributed with the Microchip package.

6. The installer will ask for a destination directory. If possible, please use `c:/Evidence/Evidence` (see Figure 3.2).
7. At this point, please check the *first* line of the file `evidencedir\bin\mymake_cygwin.bat` (where `evidencedir` is the directory you chose during the installation). For example, if Cygwin is installed inside `C:\cygwin`, then the first line of the file should look like the following one:

```
@set EE_BASH_PATH=C:\cygwin\bin\bash
```

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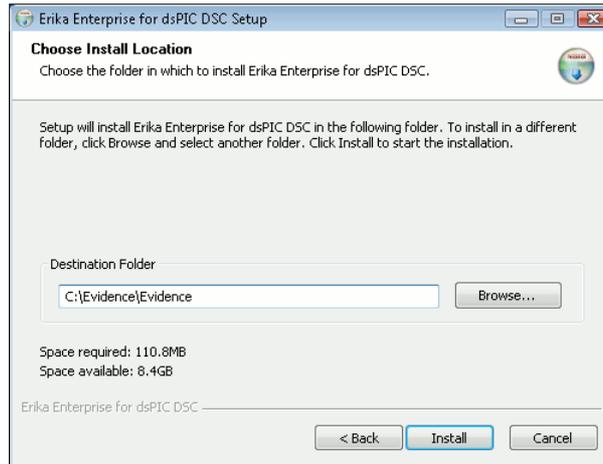


Figure 3.2: This screenshot shows the preferred destination dir for installing Erika Enterprise.

...that is, the line contains the correct path to the `bash.exe` file in your Cygwin installation. If you accepted the default settings, the correct pathname should be `C:\cygwin\bin\bash` as specified in the example before.

Note: We ask to perform this check because it seems that on some Windows machines the Cygwin installer does not correctly set the registry keys used by the Erika Enterprise installer.

The rest of this tutorial supposes that the Microchip MPLAB IDE is installed within the `C:\Programmi\Microchip` directory and that, consequently, the GNU Assembler for dsPIC (R) DSC is installed within `C:\Programmi\Microchip\MPLAB ASM30 Suite\bin`. Please note that these values may be different from the settings you have chosen on your machine. Please also read the chapter with the Windows Vista recommendations.

4 First RT-Druid startup and configuration

After all the required packages have been installed, you are ready to start RT-Druid for the first time.

Please follow the next steps:

1. As the first step, run the Eclipse IDE from the Evidence menu inside the Start menu of your Windows machine, choosing **Start/Programs/Evidence/RT-Druid**.
2. A dialog box will appear, asking to choose the right workspace (see Figure 4.1). Leave the default workpackage directory as it is, and proceed by pressing “OK”.

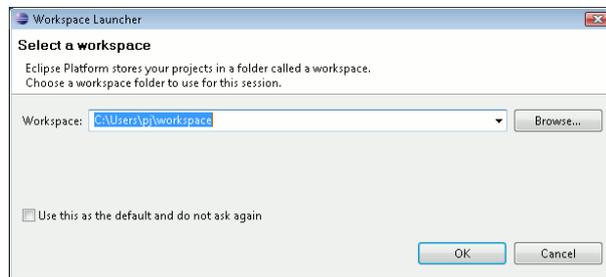


Figure 4.1: This screenshot shows the dialog box for the choice of the current workspace directory.

Warning: The workspace pathname MUST NOT contain any blank space, otherwise Erika Enterprise and RT-Druid may not work properly.

Note: If you are using Windows Vista, then the workspace directory `c:/Users/<username>/workspace` works.

3. The Eclipse Welcome screen appears, like in Figure 4.2.
4. Before being able to correctly build your application, you should set the path to the Microchip C30 compiler and the MPLAB ASM30 assembler programs. For doing so, please go to the “Preference” menu, as shown in Figure 4.3, and find the “RT-Druid/Oil/PIC30 Configurator” form as depicted in Figure 4.4. The first textbox, labeled `Gcc path`, refers to the installation directory of the Microchip C30

4 First RT-Druid startup and configuration



Figure 4.2: The Eclipse Welcome screen.

compiler. The second textbox, labeled `Asm path`, refers to the installation directory of the ASM30 assembler provided with the MPLAB IDE.

Warning: The install directories specified in the two textboxes of Figure 4.4 does *not* include the `bin` directory!

That is, `c:\Programmi\Microchip\MPLAB C30` is correct, whereas `c:\Programmi\Microchip\MPLAB C30\bin` is not.

Warning: The install directory of the assembler refers to the assembler provided with MPLAB IDE and *not* the assembler provided with the C30 compiler. The reason is that the directory is used to call the assembler and *also* to copy the `crt0.s` file, which has a different position in the two assemblers distributions made by Microchip.

Warning: If you are using a Student Edition of the Microchip C30 compiler which has an **expired license**, please check the “Use EE gcc to resolve dependencies” checkbox in Figure 4.4.

4 First RT-Druid startup and configuration

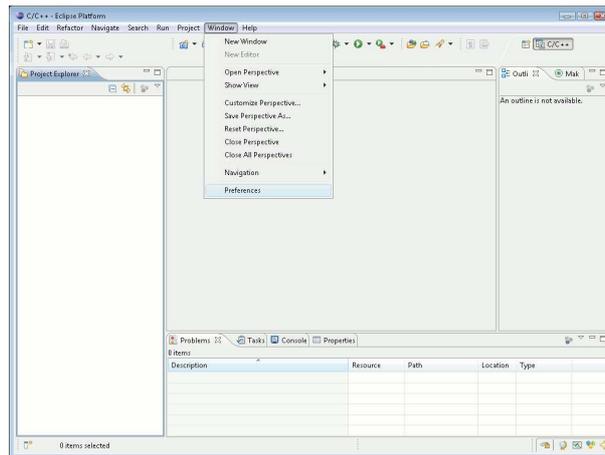


Figure 4.3: Go to the “Preference” menu.

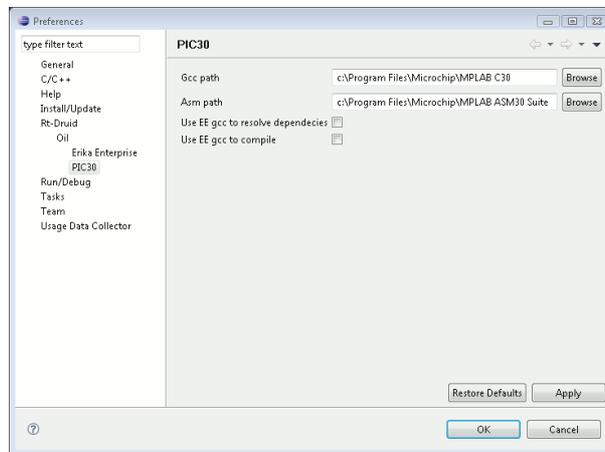


Figure 4.4: Select paths for compiler and assembler.

5. Before creating and building your application, please deselect the “Build Automatically” flag inside the “Project” menu, as shown in Figure 4.5.

4 First RT-Druid startup and configuration

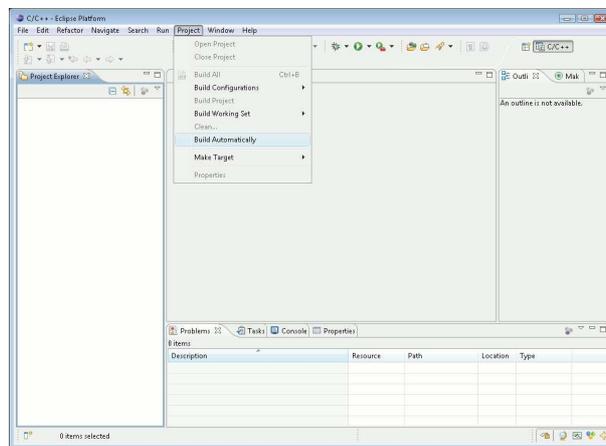


Figure 4.5: Deselect the “Build Automatically” flag in the “Project” menu.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

You are now ready to compile your first Erika Enterprise demo. Please execute the following steps:

1. Please select “New Project”, then “RT-Druid Oil and c/c++ Project” from the “File menu”, as in Figure 5.1.

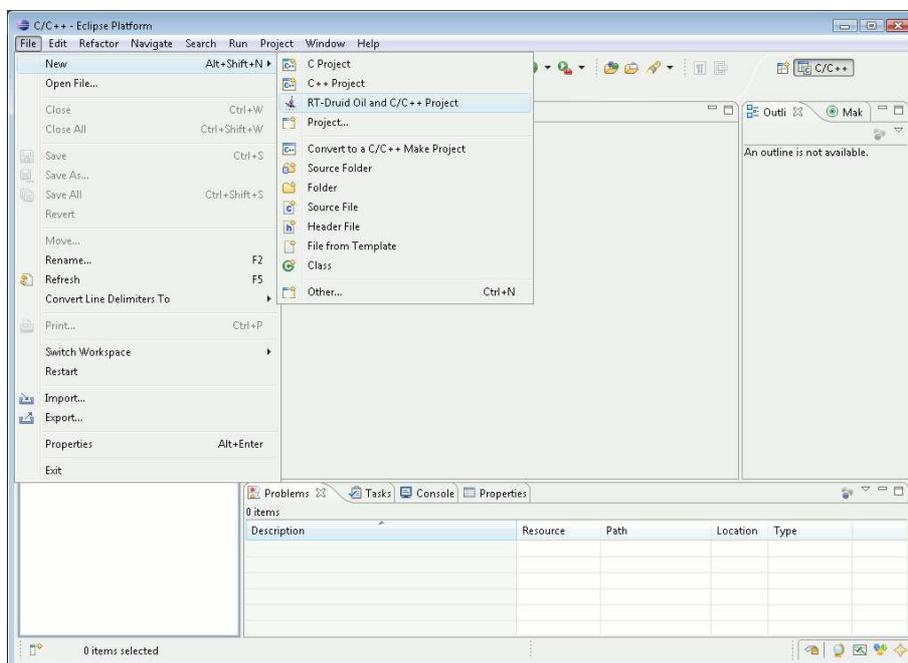


Figure 5.1: Select “New project” from the “File” menu.

2. A Dialog box appear. Please select a template for the new project, as in Figure 5.2.
3. Press “Next” .
4. Insert the name of the new project. Please type `taskdemo` (you can choose other names of course). Please see Figure 5.3. Press the “Finish” button.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

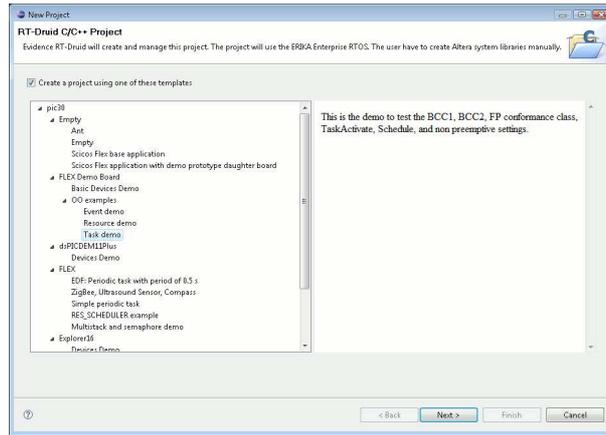


Figure 5.2: Select a template for your project.

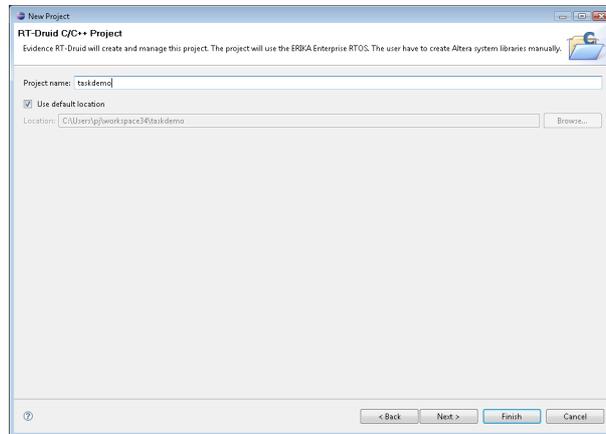


Figure 5.3: Type a name for the new project.

5. We are now ready to build the demo. Right click on the project name in the Eclipse navigation bar, and choose “Build Project”¹ (see Figure 5.4).
6. Then, the compilation process starts as depicted in Figure 5.5. Please note the message that appears when the compilation is successful.

Note: If the error depicted in Figure 5.6 appears (meaning that `mymake_cygwin.bat` is unable to find a file), then please follow the instructions at the last point of Chapter 3.

¹“Build Project” only appears if the “Build Automatically” flag is not selected in the “Project” menu.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

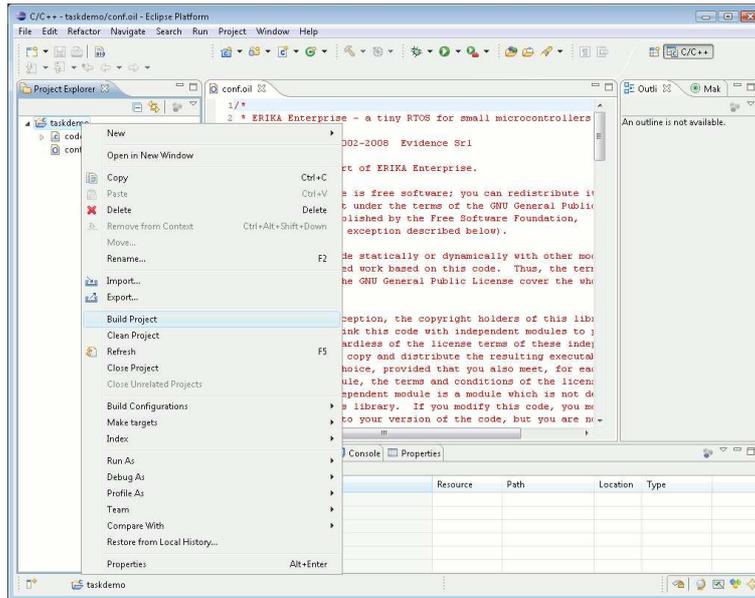


Figure 5.4: We are now able to build the project.

- At the end of the compiling process you will be able to find a file named 'pic30.cof' inside the Debug directory inside the project, as shown in Figure 5.7.
- You are now ready to import the produced COFF file inside Microchip MPLAB IDE. To do that, open MPLAB IDE as in Figure 5.8.
- Choose "Import..." from the "File" menu, as in Figure 5.9.
- A dialog box appear. Please select the pic30.cof file that has been produced by the compilation process in Eclipse, as shown in Figure 5.10. You can find that file inside the Eclipse workspace you selected at the beginning in Figure 4.1. In this example, the file is stored inside the directory `c:\Programmi\Evidence\eclipse\workspace\pic30_oo_mono\Debug`.
- You have now imported the COFF file inside MPLAB IDE. There is no need to create a MPLAB IDE Project, because the compilation process is handled by Eclipse. Figure 5.11 shows the "Disassembly Listing" and the "Program Memory" window. Please note that MPLAB IDE correctly recognizes the debug symbols of the source code produced inside Eclipse.
- You can now start debugging the demo application using MPLAB IDE.

Figure 5.12 shows the Explorer 16 board with the running `pic30\explorer16\Devices Demo` demo application, which uses the Explorer 16 onboard devices to monitor and display the environment temperature.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

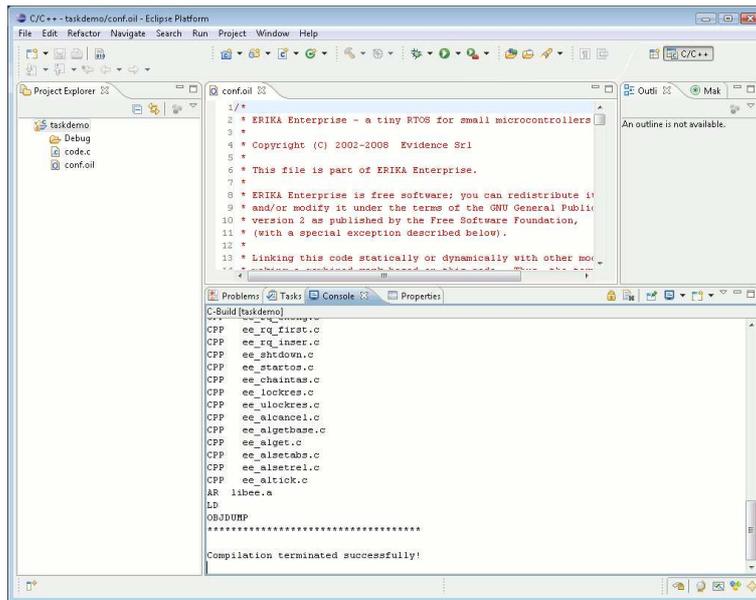


Figure 5.5: The compilation process.

Note: If you get an MPLAB IDE error like the following:

```
ICDWarn0015: Program memory has changed since
last program operation?
Continue with Debug operation?
Running Target
ICD0083: Debug: Unable to enter debug mode.
Please double click this
message for more information.
```

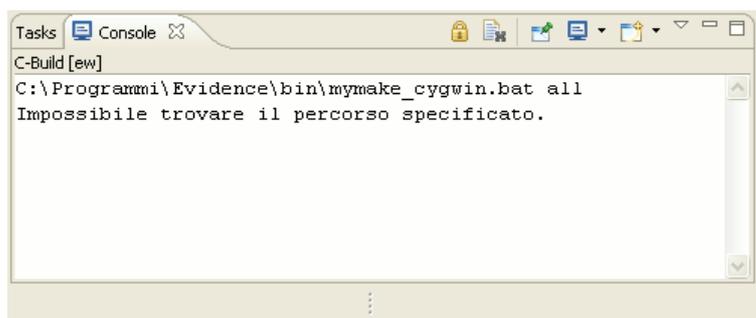
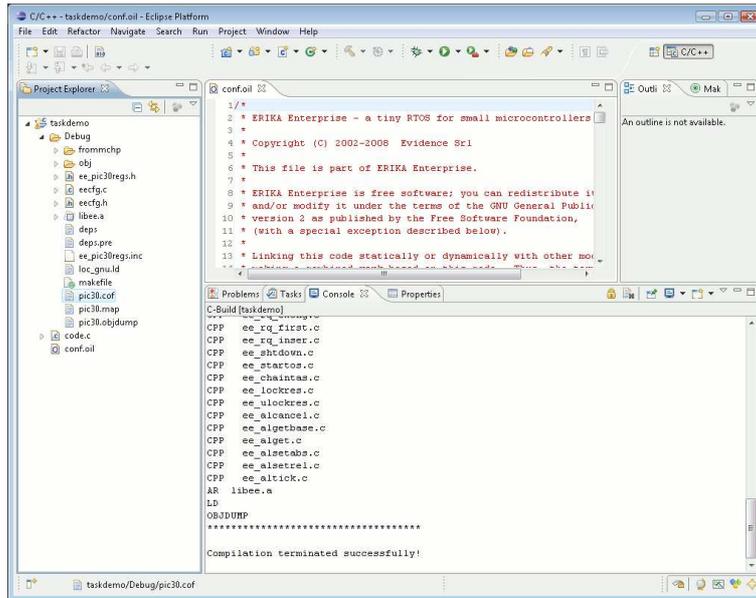


Figure 5.6: An error that shows up on some Windows machines. Please check the `mymake_cygwin.bat` file as explained in the last point of Chapter 3.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC



5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

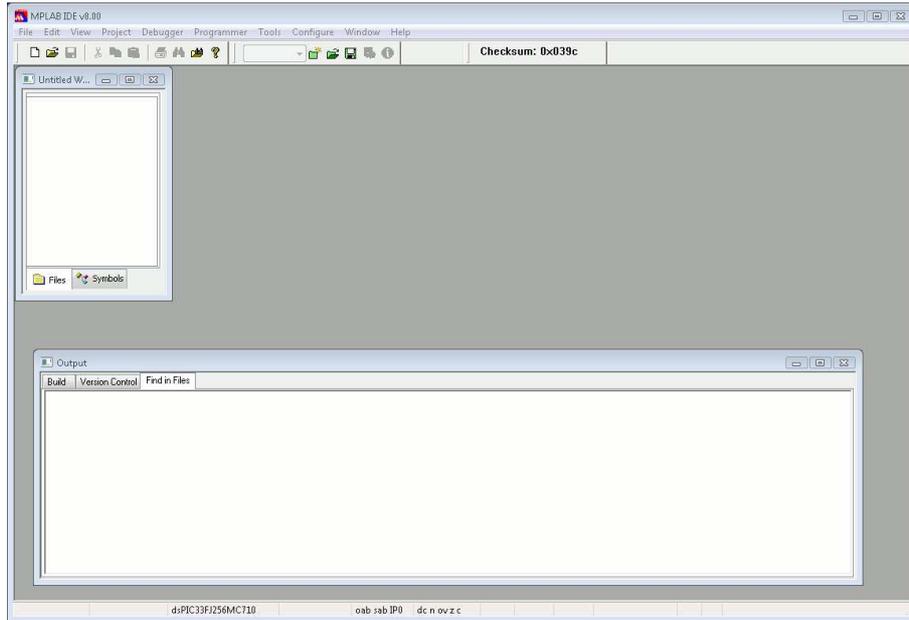


Figure 5.8: The Microchip MPLAB IDE.

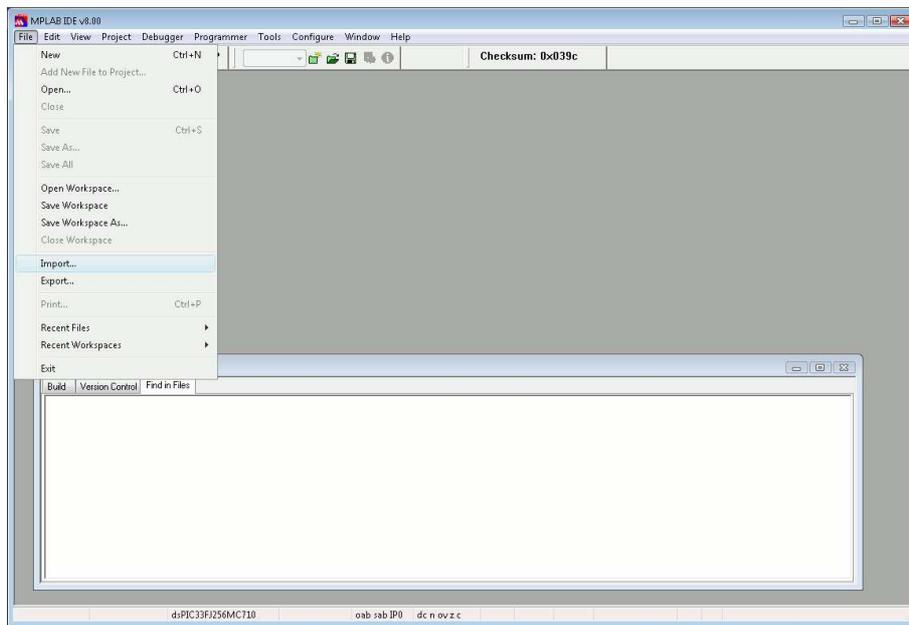


Figure 5.9: Choose “Import...” from the “File” menu to import the coff file produced in Eclipse.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

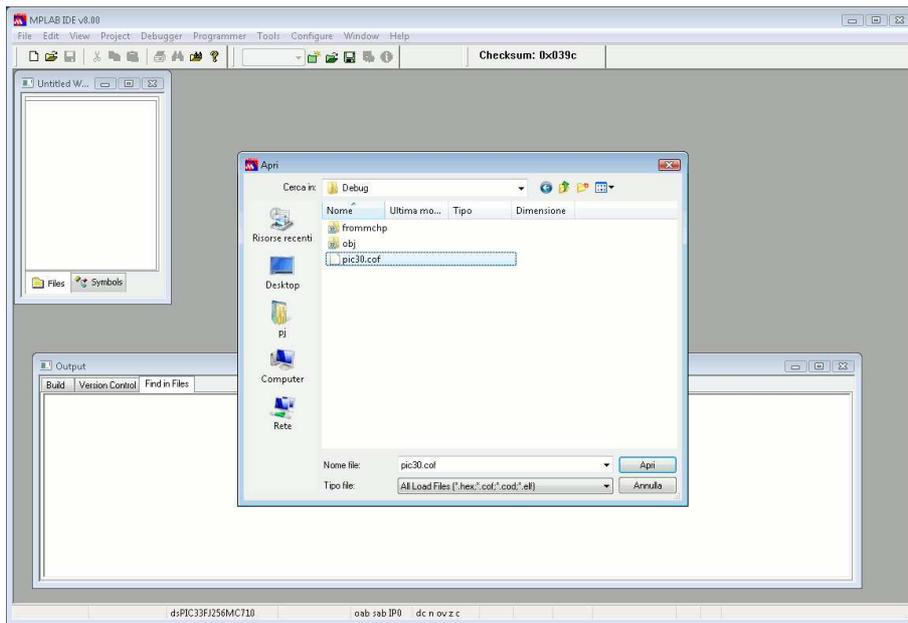


Figure 5.10: Select the COFF file you want to import.

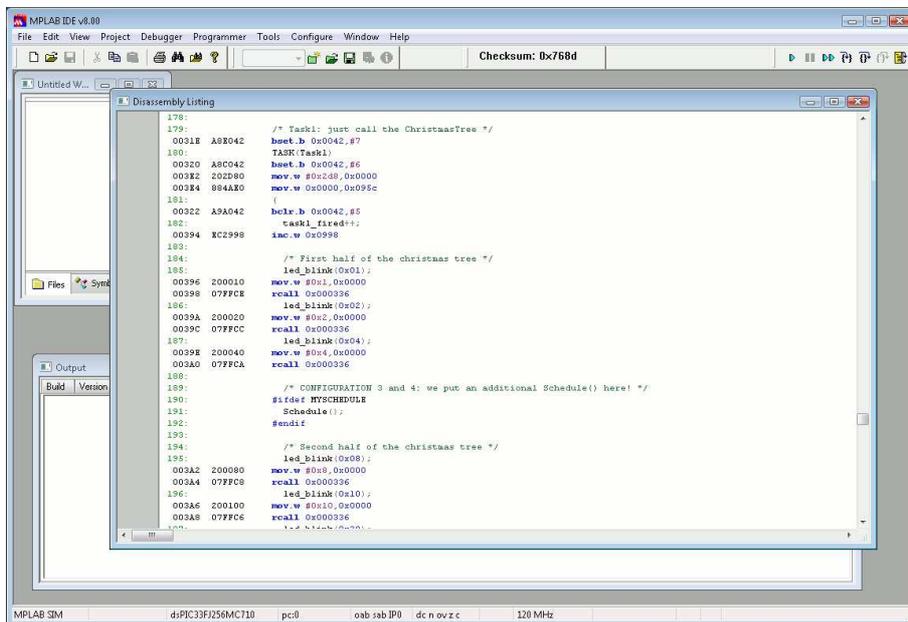


Figure 5.11: Debug symbols are correctly recognized.

5 Compiling your first Erika Enterprise demo for dsPIC (R) DSC

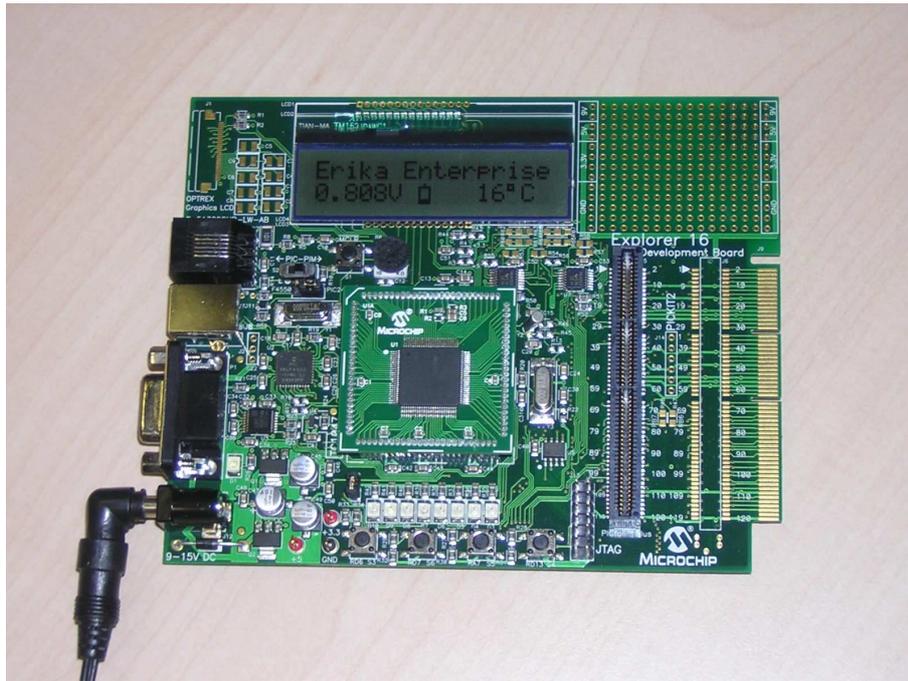


Figure 5.12: The Explorer 16 board with the running demo program.

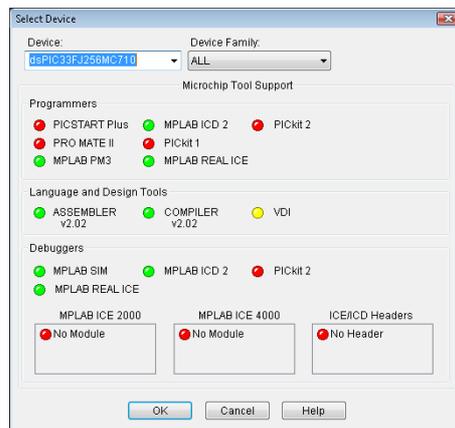


Figure 5.13: Selecting the dsPIC MCU mounted on the FLEX boards.

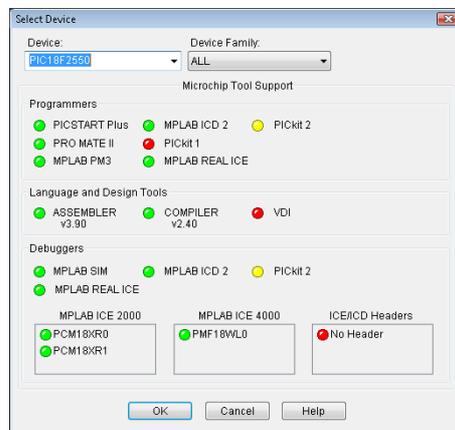


Figure 5.14: Selecting the PIC18 MCU mounted on the FLEX Full boards.

6 History

Version	Comment
1.0.0	Initial revision.
1.1.0	Updated with information and screenshots about Erika Enterprise version 1.4.
1.1.3	Updated with new screenshots about configuration; added warnings about blanks in pathnames.
1.1.4	Added some changes to the install instructions from comments by Simone Mannori.
1.1.5	Added Cygwin error workaround when the installer can not find the cygwin registry value.
1.1.6	Typos found when translating the document in italian.
1.1.7	Updated some figures Figure, added a few warning boxes.
1.1.8	Added notes about MPLAB IDE.
1.1.9	Added recommendations for Windows Vista.
1.1.10	Updated screenshots for EE 1.4.3. Erika Enterprise Basic renamed to Erika Enterprise.

Bibliography

- [1] Cygwin. The cygwin project. <http://www.cygwin.com>, 2005.