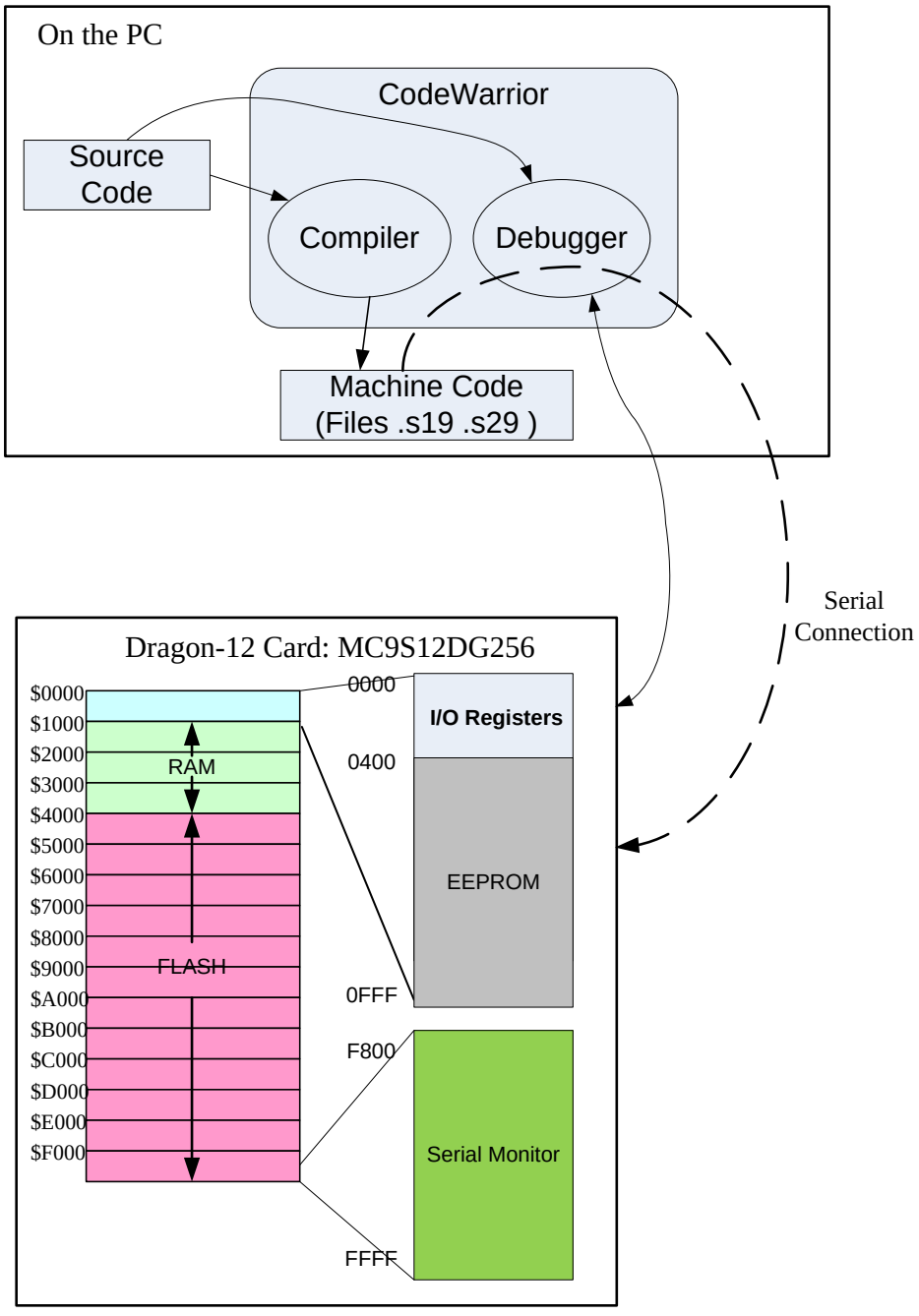
CEG 3136 – Computer Architecture II
Tutorial 5 – Introduction to CodeWarrior - 2019

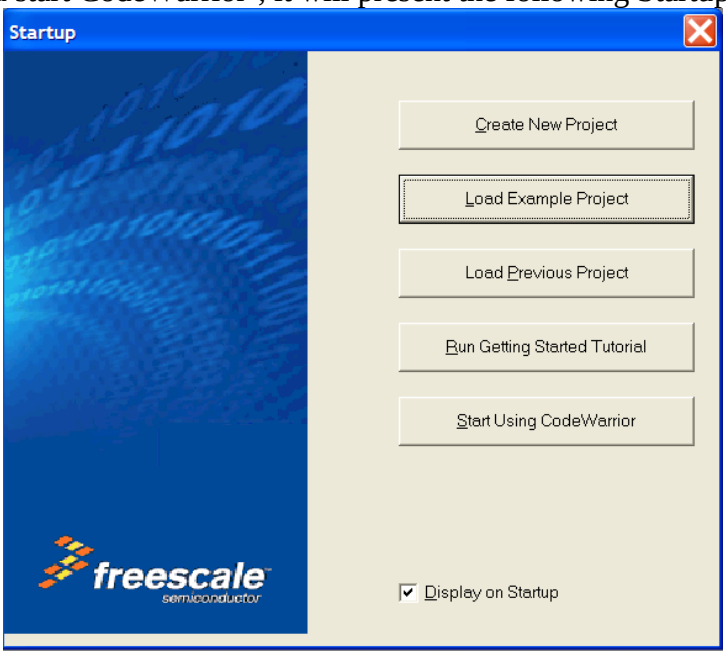


For Labs 3 to 5, CodeWarrior will be used to develop software for the Dragon-12 card.

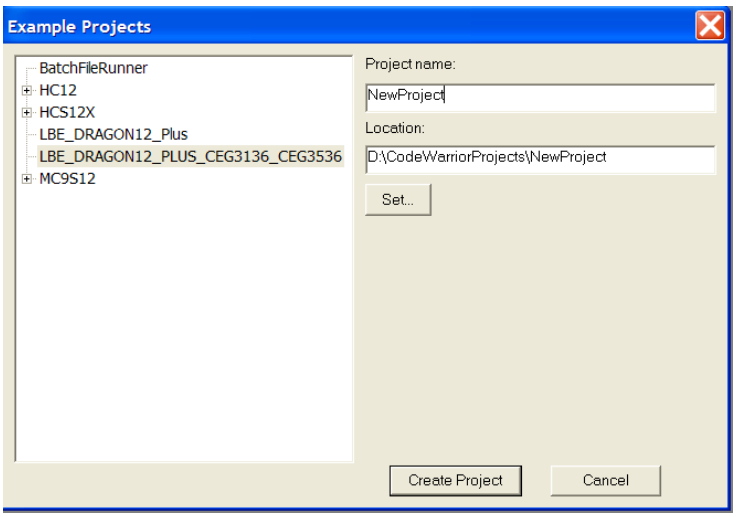
- Debug-12 has been removed and replaces with a small piece of software, the Serial Monitor. Code Warrior communicates with this monitor to coordinate downloading and debugging of software.
- Software is downloaded into the first part of the flash memory (at $4000).
- Both assembler and C modules can be integrated into CodeWarrior (more on this during class).

Creating a new Project

To create a new project for loading into the Dragon-12 card, a project template has been prepared. When you start CodeWarrior[1], it will present the following Startup window:



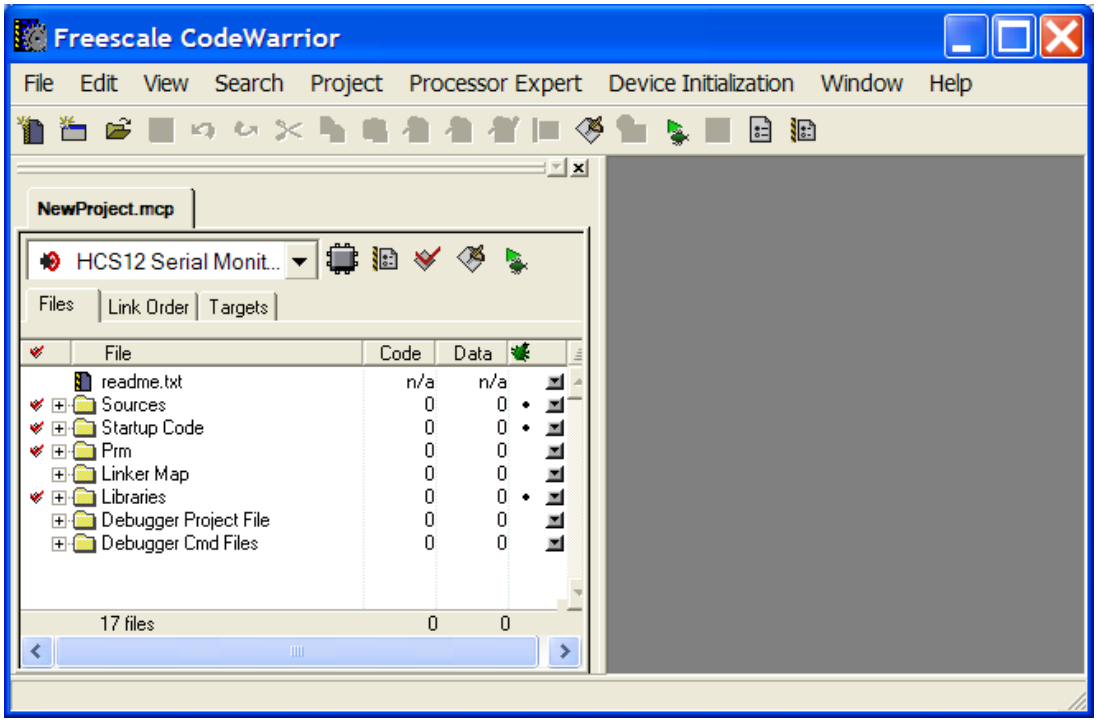
Click on "Load Example Project" to access predefined projects; the following window will appear:



Select LBE_DRAGON12_PLUS_CEG3136_CEG3536 as shown. Type in a name in the Project Name text box. Define a location (directory) by clicking on the "Set" button; this will produce a browsing window which you can use to navigate to the desired directory. Please note that the Project Name is appended to the selected directory. As well you will note that the extension ".mcp" is appended to the Project Name when you set the Location.

When you click on the Create Project button, the project directory is created along with all files required for a basic project. The main CodeWarrior window will look as follows:

[1] If CodeWarrior is already running you may select new project from the file menu or click the icon on the tool bar.



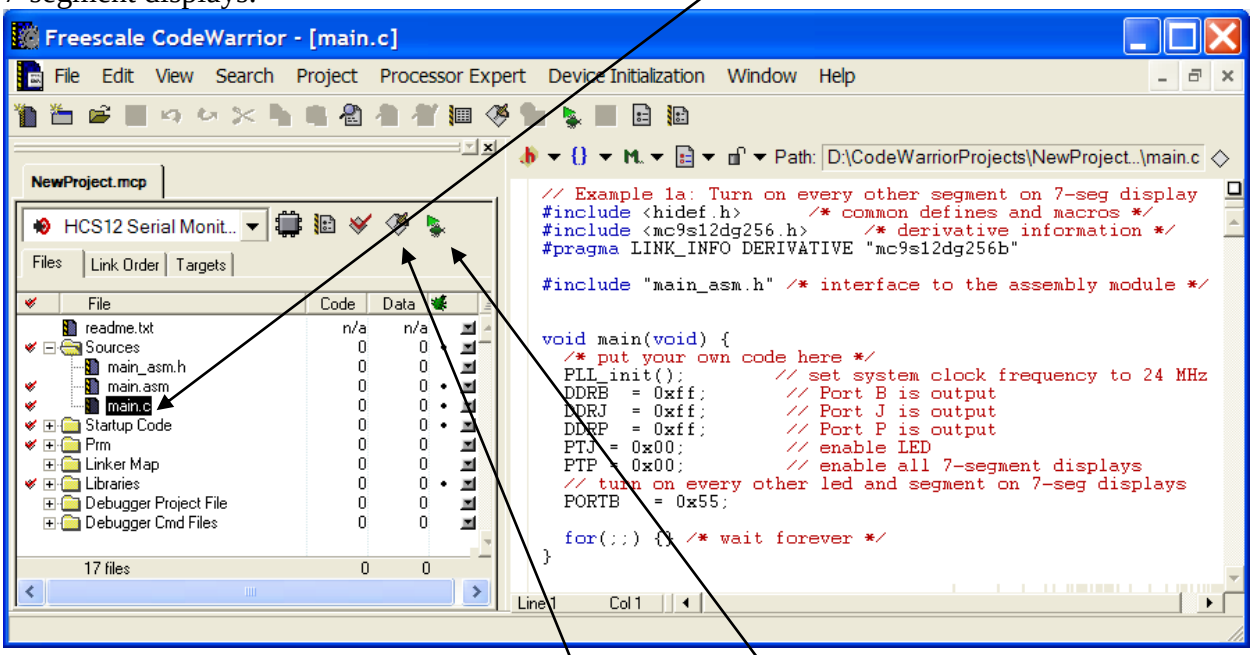
You are now ready to modify the project. This template is designed to download and debug software in the Dragon-12 card and facilitates project creation. In fact, a CodeWarrior project will be provided to you for Lab 3 and you will not have to create a new project – these instructions have been provided for creating your own personnal projects (or testing small sample code).

The project template is installed in the SITE systems. If you wish to install the project template on your system, after you have installed CodeWarrior on your system (this file is available from the course Virtual Campus (see the Labs page in the Course Material), unzip the file *LBE_DRAGON12_Plus_CEG3136_CEG3536.zip* in the directory *C:\Program Files\Freescale\CWS12v5.1\(CodeWarrior_Examples).*

For Windows 7, the CodeWarrior must be installed and run in the XP Mode Virtual Machine – see Windows 7 documentation on this mode or consult the Web Page: http://www.microsoft.com/windows/virtual-pc/ .

Compiling and Debugging

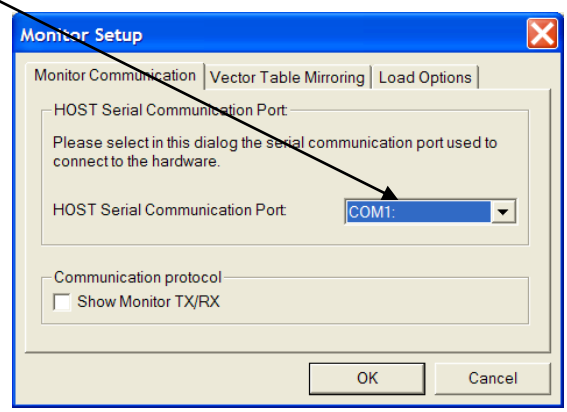
Expand the Sources folder to see the project source files. The sample project comes with three files as shown in the window bellow. If you double-click on main.c, its content is displayed in the editor window. The sample project simply lights up certain LEDs and certain segments in all 7-segment displays.

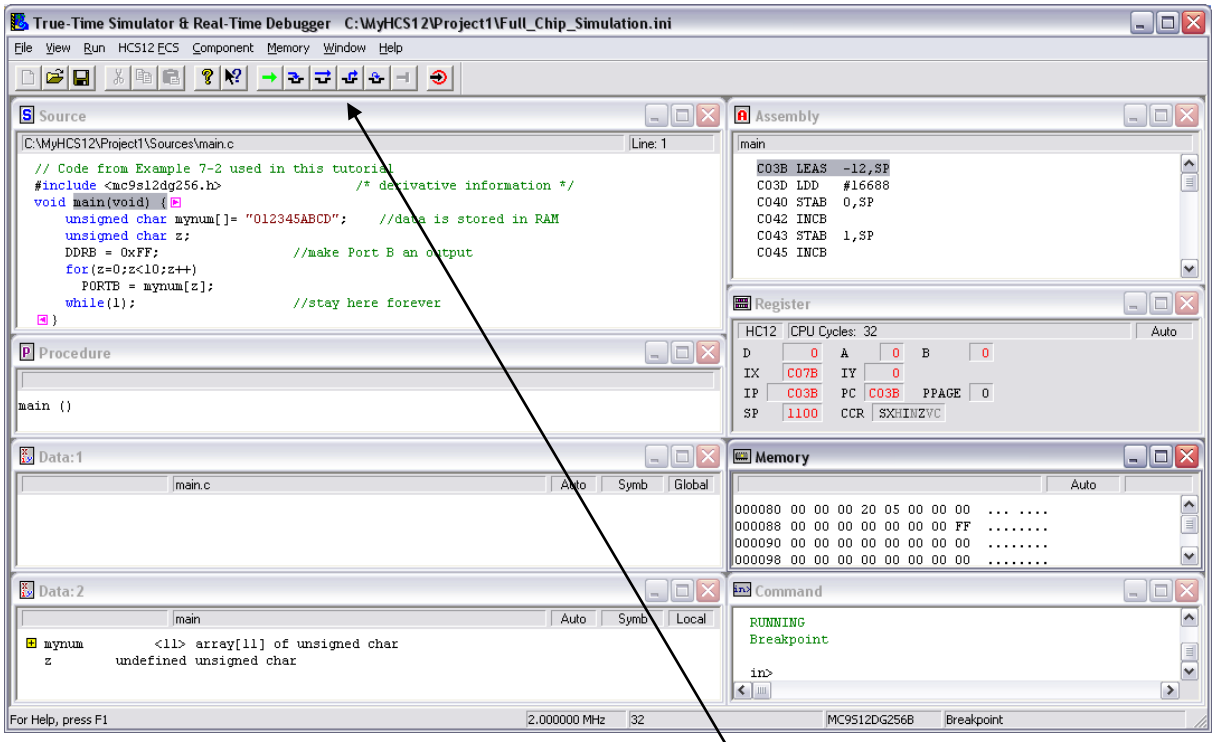


To compile the project, click on the Make button (or type F7). You will see changes in the Code and Data columns during compilation.

Connect your Dragon12 board to the x86 PC USB port and power up the board. Press RESET button. To download and debug the software, click on the Debug button (or type F5). Be sure to connect the Dragon-12 card serial port to the PC USB port. This will start the Debugging Window (see the next page).

When connecting to the board – you may need to reset the card or change the "Host Serial Communication Port" if the Monitor Setup window appears; or you may need or reset to Dragon-12 card.

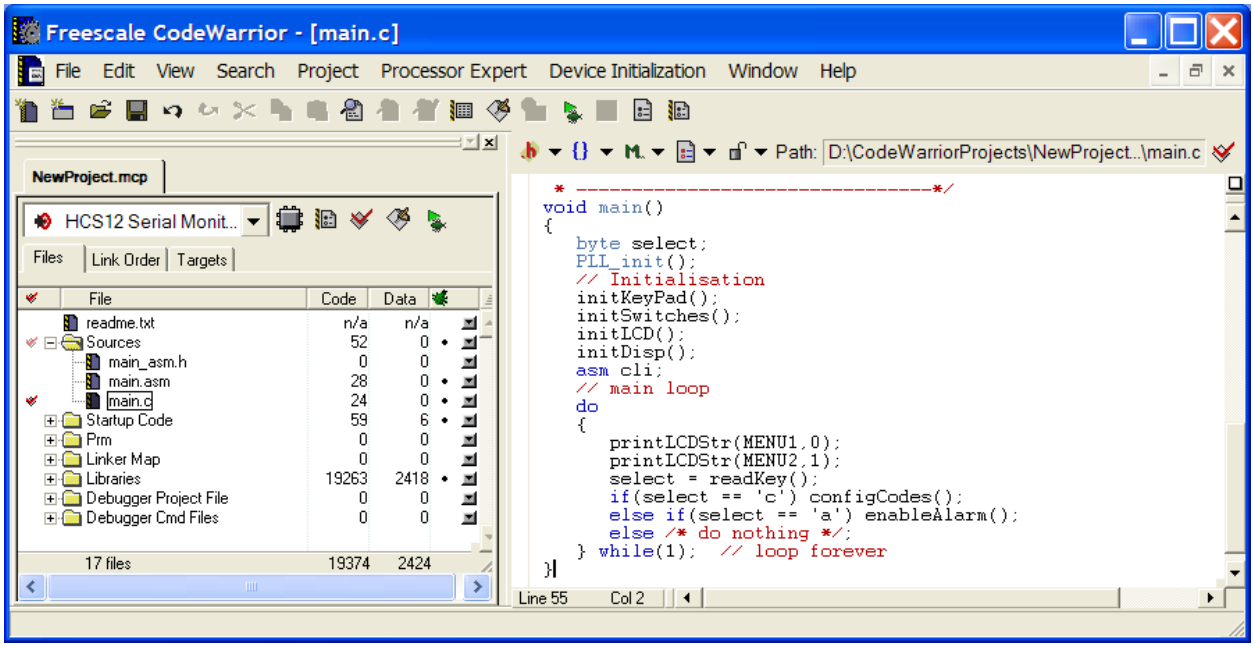




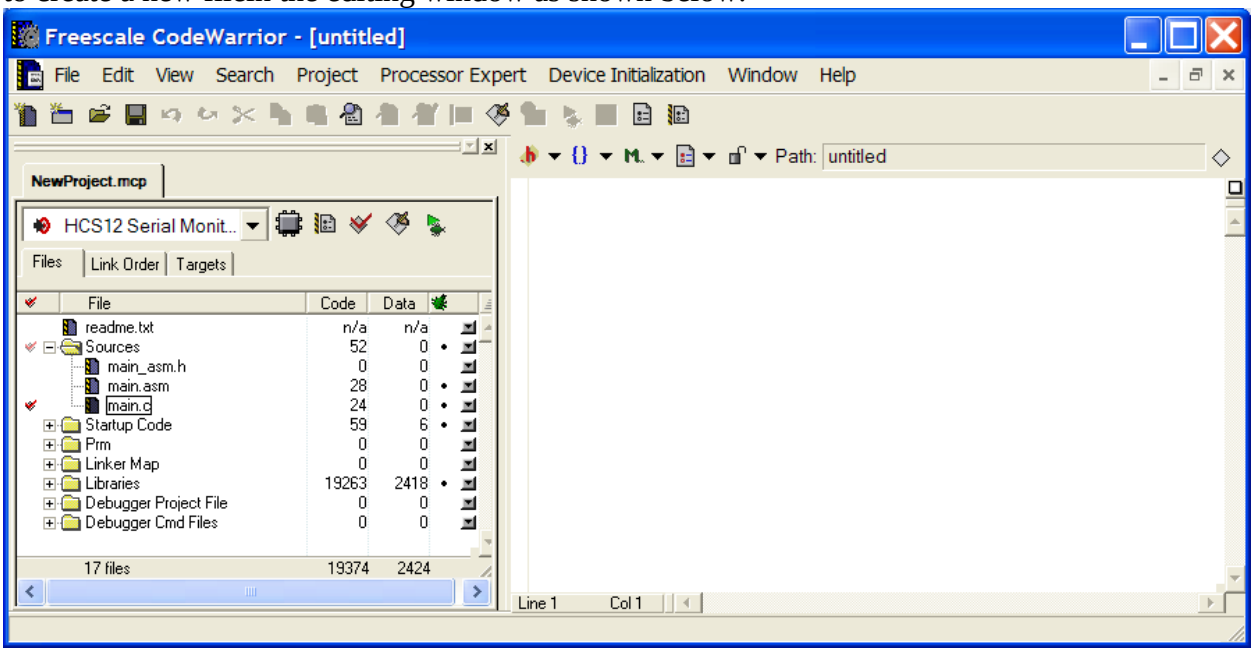
Use F11 to single step through the program or use blue icons to debug the program. To examine the contents of memory locations click on Memory window and you will see Memory at the top (next to Component). Click on Memory and drop-down menu gives you the options.

Creating New Source

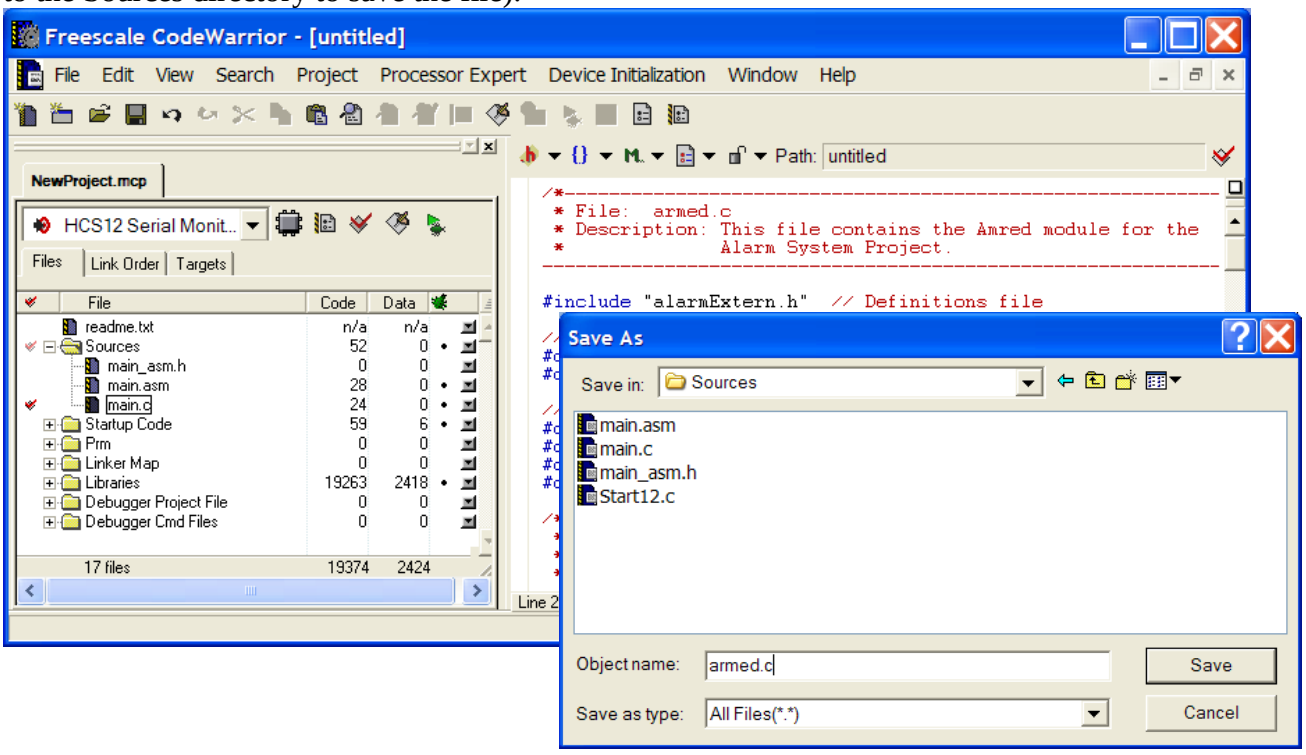
You can replace the template code with your own code. Note that the minimal requirements for a C program are the header file, that defines the registers of the MCU, and the function *void main(void)* {…} with a blocking function at the bottom or the program should be an infinite loop. The *main.asm* and *main_asm.h* files contain the assembler routine to initial the MCU phase-lock loop and system clock (recall *inithw* from Lab1). Always start the *main* function with the call to the function *PLL_init()*.



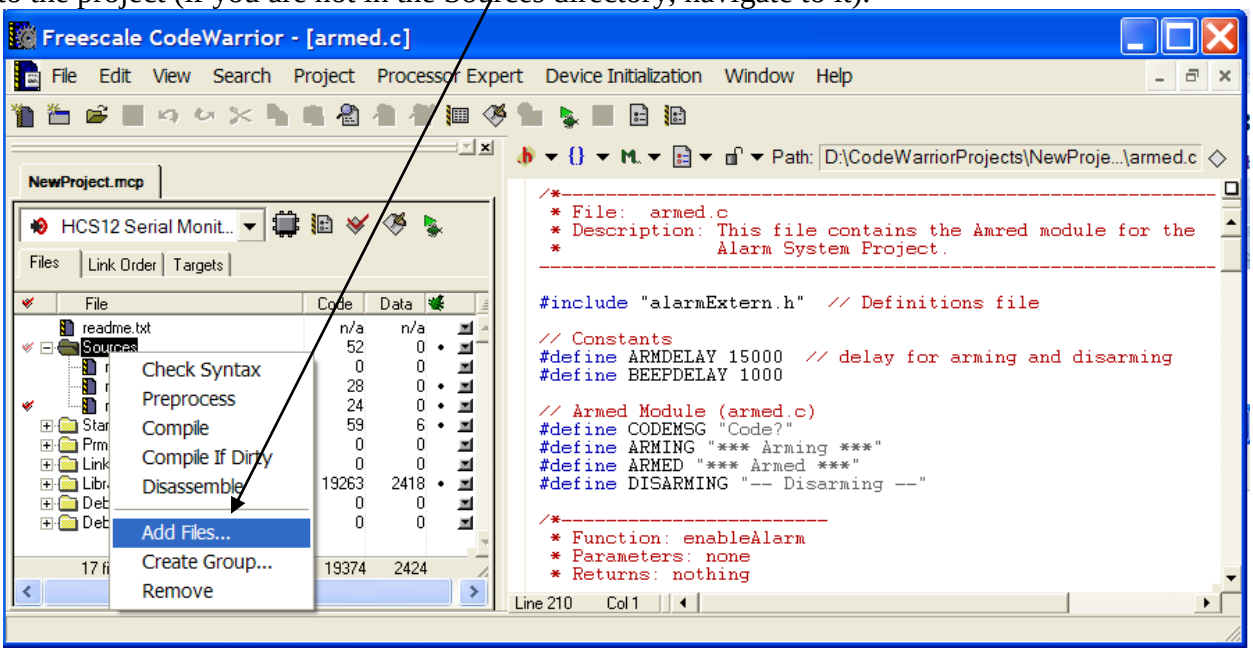
To add new files (modules) to the project, in the File menu, select *New File* (or type Cntrl-N), to create a new filein the editing window as shown below.



Insert the desired code and save the file (using File/Save, or type Cntrl-S – be sure to navigate to the Sources directory to save the file).



After the file has been saved it must be added to the project. Right-click on the Source folder in the main window and select *Add files*…. In the window that appears select the files to add to the project (if you are not in the Sources directory, navigate to it).



Typically a module consists of two source files, the C Source, e.g. Disp.C, and an include file, e.g. Disp.h (the header file contains C function prototypes of the entry points to the module and definitions for using themodule).