

## **CEG 3136 – Computer Architecture**

### **II Tutorial 5 – Exercises– 2019**

#### **Exercise 1 – Creating your first project**

1. Create a project using the CEG3136 sample project for the Dragon-12 card as described in the accompanying Tutorial 5 document “Introduction to CodeWarrior”. Call the project Tutorial5 and save the project in a location (directory) of your own choosing.
  - a. You may wish to examine the contents of the directory created by CodeWarrior, in particular to see where source files are located.
2. Double click on main.c source to examine the contents of this file. The program simply manipulates the DDR registers for the ports that control the LEDs and 7-segment display.
  - a. Compile the software.
3. Start the debugger which downloads the software into the card.
  - a. Note that the C source file appears in the Source window, while the corresponding assembler source appears in the assembly window.
  - b. The other two windows to note are the Register window that displays the contents of the CPU register, and the Memory window that displays the contents of the microcontroller memory.
  - c. Trace over the call to PLL\_init(). If you trace into the subroutine, communication between CodeWarrior and the Dragon-12 card will freeze.
  - d. Trace over the other instructions, noting how the register contents change and the memory changes. Follow the execution in the Assembly window as well.

#### **Exercise 2 – Exploring Alarm System Project**

1. Download the following files for lab 3 – CEG3136Lab3.pdf and CEG3136Lab3CodeWarrior.zip. Unzip the CodeWarrior project in a location of your choosing. Double click on the lab3.mcp file – this will start CodeWarrior. If you compile the project, you will note a number of errors due to missing code and missing files.
2. Examine the last page of the CEG3136Lab3.pdf file; it gives instructions on how to integrate an Assembler module into the Codewarrior project. For each step in the instructions, examine the corresponding files of the LCD ASM Module (i.e. the files lcd\_asm.h and lcd.asm).