Simple Factorial Program   Demonstrates Recursivity

Purpose: To become familiar with the CodeWarrior IDE, and to learn how to add multiple files to a project. This lab shows the student the proper way to include an additional file for function prototypes. The student will use provided C code and add functionality to the code. The C code functionality enforces advanced C programming aspects such as arrays, value returning functions, function calls, parameter passing, loop/decision structures.

Pre-Lab:
Read Starting a C Program in CodeWarrior

First make a C language project. Select *Programs | Freescale CodeWarrior | CodeWarrior IDE*. Select the *Create New Project* button. Open HCS12X | *HCS12XE Family* | *MC9S12XEP100* and *Full Chip Simulation*. Click *Next*. On the next dialog box select *Single Core (HCS12X)* and click *Next*. On this final dialog box make sure C language is checked. Set Project name: LastName_Lab01and ensure your file name includes the .mcp extension. Click *Set* and browse for a convenient drive/folder to save your project, if you have not set the Project name you can name/rename it in this dialog. (Note: Save as type: Project files (*.mcp). Click Save, then click *Finish*.

Build the project (Project – Make or F7).
   Note: We do this to ensure the CodeWarrior IDE created the appropriate temp files and the project is "set up" on your pc correctly. If no errors or warnings appear, continue. Otherwise, ask for assistance or close the program, delete your program and start again.

Setting the IDE Preferences: Make sure you have read *Starting a C program in CodeWarrior.pdf* and applied **Setting the IDE Preferences** as instructed. If not, reference the document and make the IDE changes as instructed.

Next:
Double click on main.c file (under Sources in the project explorer on the left side of the screen).

Add the factorial code to your project. Paste the factorial code into your *main.c* file.
   Note: place the code in the main.c file, after the main() function.

Write the code to:
   1. Call function ***FillTable()*** from within the *main() function*.
         a. Note: do not put the call inside the endless for loop. Think….why not?
   2. In the main.c file: Define a global array *table* as an array with six elements.
   3. Next, add a Prototypes file called protos.h to your project
         a. To do this; Select *File | New Text File*. When new file opens, Select *File | Save As,* in folder *Sources* in your project, *Object name: protos.h,* click save.
         b. Ensure file has new name and its path is in your project's folder.
         c. Next, you will add the file to your project:
               i. In the project explorer Right-click "Includes" folder,

        ii. select Add Files.., navigate to and select *protos.h*
            the file should now appear in explorer folder tree.
   d. Next: In the protos.h file, type your commented header, and add the function prototypes for the functions.
   e. Then in the main.c file, include *protos.h* by adding *#include "protos.h"*

Build the project. (Project – Make) Ignore the Recursive Function Warning. No additional warnings or errors should display.

1. Run the program as a simulation (Project – Debug or F5).
2. Use Keyboard key F11 to step through the program.
3. Use the appropriate debugger window to observe the values loaded into array *table*
    a. Add the array table values as comments to your program.
       Note: clearly denote and format your array table value as a comment section in your program's main.c file
    b. As another comment in your main.c program file; indicate how many times the function Fact() executes.
       Note: your comment must clearly denote your answer to this part
4. Demonstrate your completed program to the instructor or TA.
5. In a word document Flow Chart the program: use proper flow chart symbols

Ensure you have commented headers in both your main.c and protos.h files:
Example commented header at top of file.
// Programmer(s) Name: Your Name
// Title of Program: Lab ##
// Date: mm/dd/yyyy
// Class: ECET 30900
// Due Date: mm/dd/yyyy

// Brief explanation of program, one to three lines

Submit your well-formatted flow chart document and three program files: *main.c*, *protos.h* and zipped file of your entire program and to appropriate Canvas tool.