ECSE-4790 Microprocessor Systems

Introl M6812 C Cross-Compiler

Lab Guidelines

In MPS we you will be developing code for the 68HC12 EVB. This board is from Motorola. For that purpose, you will be using a Pentium based PC (coprocessor card in a Sun Ultra 10 workstation) to write and compile the controller programs. This type of development is called Cross Platform Development. After generating the machine code for the target environment and before you can run it you must download it to the EVB.

When doing cross platform development, extra knowledge of the target environment is needed. Questions as the following are very important:

- ***What is the target processor?***
  Motorola 68HC12 (http://www.motorola.com)

- ***What memory resources does the execution environment have?***
  16 kBytes of RAM that extends from $4000 to $7FFF. The compiler - and more specifically the linker - have been configured to make use of this memory address space.

- ***Are we dealing with only hardware or is there a monitor we have to go through?***
  The evaluation board is currently running under D-Bug12 4.00 monitor from Motorola.

- ***Compilation Issues:***
  You will be using the Introl 4.0 cross compiler. The compiler generates Motorola S record files with the extension .S19 from the C source files.

  To create an executable program that runs on the 68HC12 EVB processor from C code, there are three steps that must be taken. First the compiler takes the C source file (.C) and creates an object file (.O12). A linker takes the object file from the compiler and adds in the language library routines to create a link file (.OUT). Finally a hex converter (or loader) takes the link file and generates a downloadable S19 file (.S19) that can be passed to the D-Bug12 monitor program running on the EVB. The D-Bug12 program converts the ASCII S19 file into a memory image that can be executed.

  Fortunately there is a batch file that will perform all these operations with a single command. For a C source file named "Myprog.c", the command to generate the S19 download file is:

  ```
  CC6812 Myprog
  ```

  Notice that although the source file must have a .C extension, you must leave it off when passing it to the batch file. In order to work correctly, your file must be in the C:\Cstudio\HC12 directory where the header files (.H), compiler (CC12.EXE), linker (ILD12.EXE), and hex converter (IHEX.EXE) are located.

  The PC computer will display any compiler errors you may have on the terminal. Also any errors detected by the linker will be displayed.

- ***Transferring the machine code tot he EVB:***

Upon successful completion of the above steps, an S19 file will be ready to download to the EVB. We have two packages with which to download code to the evaluation board - HyperTerminal and ProComm Plus. To begin the process, start either HyperTerminal or ProComm Plus as a dumb terminal to the EVB.

Run the program HYPERTRM.EXE from Program Files:Accessories:HyperTerminal

Create a new connection configured for a direct connection to COM1 (no modem) with 9600 bits per second, 8 data bits, no (none) parity, 1 stop bit, and no (none) flow control (handshaking).

Connect a DB-9 serial cable from the Sun PCi PC card serial port to the SCI0 (not SCI1) serial port on the EVB. Power up the EVB by connecting up the +5 V and ground wires to the power supply. You should see the following opening message displayed on the terminal:

```
D-Bug12 V1.0.4
Copyright 1995 - 1996 Motorola Semiconductor
For commands type "Help"
>
```

At the D-Bug12 prompt (>), after establishing the connection between the PC - which is a dumb terminal at this point - and the EVB, you can download the .S19 file and run it on the EVB using the following commands:

```
>load<Return>
```

Type 'load' followed by the 'Return' key and then select the menu item Transfer -> Send Text File... At the bottom of the window, click on the Text file (*.TXT) and slide down to All files (*.*). Now you can select the your S19 (Myprog.S19) file for downloading. A series of *s will be typed out as the file is downloaded. When it is done, you will get a '>' prompt. By default, Introl loads programs into memory to start at 5000 hex. Begin executing your program by typing:

```
>g 5000
```

at the prompt.

NOTE: the S record is downloaded as a text file.