EE 675 Microprocessor Applications in Power Electronics

Department of Electrical Engineering, IIT Bombay

Assignment 1

Due: 30.08.2012
10 Marks

This assignment is in two parts. Each part requires you to write a C program that is concerned with COFF files. Both your C programs must be compiled with the GNU C compiler *gcc*. You will need to submit the source code for both programs. You will also submit a report of up to two pages, outlining the structure of your programs.

Part 1

In this part, you will write a program to read a specified file, find out if it is a COFF binary file, and if it is then print its contents to the computer screen in the format example given overleaf. Your program should take the filename as its argument. If the specified file is not found, of if it is not a COFF file, then your program should print an appropriate error message and exit.

Your program should be able to identify the COFF version. It need not print line number entries and auxiliary symbol table entries. However, it should print header, relocation, symbol table and raw data entries. We shall compile your program, and test it with different input files.

Part 2

In this part, you will create a COFF v.2 binary executable file for the following data in the `.text` and `.data` sections. The `.text` section begins at memory location 0x809800. The `.data` section begins at memory location 0x800000.

```
.text
0x50700080
0x07200000
0x14200001
0x08600003
0x0ae00004
0x15200002
0x6a00fff9
.data
0x12345678
0xabcd1234
0x1a2b3c4d
0xa1b2c3d4
```

You may embed the data above directly in your program; there is no need for your program to read a file that contains the data.

Your program should create a COFF binary that contains file- and optional-file headers, the section headers and the section raw data as per the COFF v.2 format. Note that there are no symbols; you may omit the symbol table. We shall compile and test your program.

Sample output of COFF file reading program:

```
+-------------------------------------+
+ EE675 Group 007                    +
+ Assignment 1                       +
+ COFF Binary Read Utility           +
+-------------------------------------+
Bytes read: 528
COFF Version: 2
File Header:
COFF version bytes: 00c2
No. of section headers: 0003
TIMESTAMP: Thu Jan  1 05:30:00 1970
Symbol table pointer: 000000fe
Symbol table entries: 0000000f
Optional header size: 0000
Flags: 0104
Target ID: 0093

Section name: .text
Section physical address: 00000000
Section virtual address: 00000000
Section size in words: 00000007
File pointer to raw data: 000000a6
File pointer to reloc entries: 000000ce
File pointer to line numbers: 00000000
Number of relocation entries: 0004
Number of line numbers: 0000
Section flags: 0020
Memory page number: 039

Section raw data:
00000000 -- 50700000
00000001 -- 07200000
00000002 -- 14200001
00000003 -- 08600003
00000004 -- 0ae00004
00000005 -- 15200002
00000006 -- 6a05fff9

Section relocation entries:
Entry 1:
Virtual address: 00000000
Symbol table index: 0000000b
Relocation type: 0021
--
Entry 2:
Virtual address: 00000001
Symbol table index: 0000000b
Relocation type: 0020
--
Entry 3:
Virtual address: 00000002
Symbol table index: 0000000b
Relocation type: 0020
--
Entry 4:
Virtual address: 00000005
Symbol table index: 0000000b
Relocation type: 0020
--
-- Section .text end --


Section name: .data
Section physical address: 00000000
Section virtual address: 00000000
Section size in words: 00000003
File pointer to raw data: 000000c2
File pointer to reloc entries: 00000000
File pointer to line numbers: 00000000
Number of relocation entries: 0000
Number of line numbers: 0000
Section flags: 0040
Memory page number: 039

Section raw data:
00000000 -- f6449ba6
00000001 -- fb0f5c29
00000002 -- 80000000
-- Section .data end --


Symbol table entries:

Symbol table index: 0
Symbol name: long_symbol_name
Symbol value: 00000000
Symbol section number: 0002
Symbol type: 0000
Symbol class: 0003
Symbol aux entry: 0000
```