

Source File: ~/4301/05/lab05. (C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of main function
Output: Under control of main function
Value: 1

Construct a finite state automata that determines if a string represents a valid hexadecimal integer constant in MASM (the Microsoft assembler). A *hexadecimal integer constant* (or hexadecimal integer literal) is made up of an optional leading sign, one or more digits, and a suffix character (called a *radix*) indicating the number's base:

$$[{\text{+|-}}] \textit{digits radix}$$

For hexadecimal integer constants, valid *digits* are '0'-'9', 'a'-'f', and 'A'-'F'. The *radix* is one of 'h' or 'H'. A hexadecimal constant beginning with a letter must have a leading zero to prevent the assembler from interpreting it as an identifier.

This assignment will use the same header file and sample main function used for Lab 04. A sample execution sequence is shown in Figure 1. To use the Makefile as distributed in class, add a target of lab05 to targets2srcfiles.

Additional notes:

- The main function appends the character '%' to each line as it is read in.
- The halt state is 0 and the start state is 1.

```
1 newuser@csunix ~> cd 4301
2 newuser@csunix ~/4301> ./getlab.ksh 05
3 * Checking to see if a folder exists for Lab 05. . .No
4 * Creating a folder for Lab 05
5 * Checking to see if Lab 05 has sample input and output files. . .Yes
6 * Copying input and output files for Lab 05
7   from folder /usr/local/4301/data/05 to folder ./05
8 * Checking to see if /usr/local/4301/src/lab05main.C exists. . .Yes
9 * Copying file /usr/local/4301/src/lab05main.C to folder ./05
10 * Checking to see if /usr/local/4301/include/lab05.h exists. . .No
11 * Copying file /usr/local/4301/src/Makefile to folder ./05
12 * Adding a target of lab05 to targets2srcfiles
13 * Touching file ./05/lab05.cpp
14 * Edit file ./05/lab05.cpp in Notepad++
15 newuser@csunix ~/4301> cd 05
16 newuser@csunix ~/4301/05> ls
17 01.dat      01.out      Makefile    lab05.cpp   lab05main.C
18 newuser@csunix ~/4301/05> make lab05
19 g++ -g -Wall -std=c++11 -c lab05main.C -I/usr/local/4301/include -I.
20 g++ -g -Wall -std=c++11 -c lab05.cpp -I/usr/local/4301/include -I.
21 g++ -o lab05 lab05main.o lab05.o -L/usr/local/4301/lib -lm
22 newuser@csunix ~/4301/05> cat 01.dat
23 ++5h
24 --5h
25 -1h
26 123h123h
27 0123456789ABCDEFH
```

Figure 1. Commands to Compile, Link, & Run Lab 05 (Part 1 of 2)

```
28 0123456789abcdefh
29 7fffh
30 -7FFFH
31 badgoodh
32 face Offh
33 ffffh
34 -ffffh
35 Offffh
36 -Offffh
37 newuser@csunix ~/4301/05> cat 01.dat | ./lab05
38 Your Name
39 CS 4301
40 Lab 5
41 {x | x is a valid hexadecimal integer constant in MASM}
42
43 Input: ++5h --- invalid input ---
44
45 Input: --5h --- invalid input ---
46
47 Input: -1h *** valid input ***
48
49 Input: 123h123h --- invalid input ---
50
51 Input: 0123456789ABCDEFH *** valid input ***
52
53 Input: 0123456789abcdefh *** valid input ***
54
55 Input: 7fffh *** valid input ***
56
57 Input: -7FFFH *** valid input ***
58
59 Input: badgoodh --- invalid input ---
60
61 Input: face Offh --- invalid input ---
62
63 Input: ffffh --- invalid input ---
64
65 Input: -ffffh --- invalid input ---
66
67 Input: Offffh *** valid input ***
68
69 Input: -Offffh *** valid input ***
70
71 newuser@csunix ~/4301/05> cat 01.dat | ./lab05 > my.out
72 newuser@csunix ~/4301/05> diff 01.out my.out
73 newuser@csunix ~/4301/05>
```

Figure 1. Commands to Compile, Link, & Run Lab 05 (Part 2 of 2)