Source File:	~/1337/30/lab30.(C CPP cpp c++ cc cxx cp)
Input:	Under control of main function
Output:	Under control of main function
Value:	2

Write a function whose prototype is given by

unsigned int scan0(unsigned int word, unsigned int startingBit);

The function scans word, starting from bit startingBit, toward more significant bits, until the first zero (0) bit is found. The function returns the index of the found bit. If the bit at startingBit is already what's sought, then startingBit is returned. If there's no bit found, then UINT_MAX (defined in climits) is returned.

A sample main function for testing your function is shown in Figure 1 and a sample execution sequence is shown in Figure 2. To use the Makefile as distributed in class, add a target of lab30 to targets2srcfiles.

```
#include <iostream>
1
   #include <iomanip>
2
   #include <cstdlib>
   #include <bitset>
   #include <climits>
   using namespace std;
9
   /*
10
   Scan word, starting from bit startingBit, toward more significant
   bits, until the first 0 bit is found. Return the index of the found
11
   bit. If the bit at startingBit is already what's sought, then
12
   startingBit is returned. If there's no bit found, then UINT_MAX is
13
14
   returned.
15
   */
16
   unsigned int scan0(unsigned int word, unsigned int startingBit);
17
   extern const int N = sizeof(int) * CHAR_BIT; // # of bits in an int
18
19
20
   int main()
21
   {
     unsigned int i, x;
22
23
     while (cin >> x)
^{24}
25
     {
26
       cout << setw(10) << x << " base 10 = "
             << bitset<N>(x) << " base 2" << endl;
27
       for (i = 0; i < static_cast<unsigned int>(N); ++i)
28
         cout << "scan0(x, " << setw(2) << i << ") = "
29
               << setw(2) << scan0(x, i) << endl;
30
31
       cout << endl;</pre>
     }
32
33
     return EXIT_SUCCESS;
34
   }
35
```

Figure 1. /usr/local/1337/src/lab30main.C

```
newuser@csunix ~> cd 1337
1
  newuser@csunix ~/1337> mkdir 30
2
   newuser@csunix ~/1337> cd 30
3
   newuser@csunix ~/1337/30> cp /usr/local/1337/data/30/* .
^{4}
   newuser@csunix ~/1337/30> cp /usr/local/1337/src/lab30main.C .
\mathbf{5}
  newuser@csunix ~/1337/30> cp /usr/local/1337/src/Makefile .
\mathbf{6}
  newuser@csunix ~/1337/30> touch lab30.cpp
7
   newuser@csunix ~/1337/30> # Edit Makefile and lab30.cpp
8
   newuser@csunix ~/1337/30> make lab30
9
   g++ -g -Wall -std=c++11 -c lab30main.C -I/usr/local/1337/include -I.
10
   g++ -g -Wall -std=c++11 -c lab30.cpp -I/usr/local/1337/include -I.
^{11}
   g++ -o lab30 lab30main.o lab30.o -L/usr/local/1337/lib -lm -lbits
^{12}
   newuser@csunix ~/1337/30> cat 01.dat
13
14
   1362
   4294967295
15
   newuser@csunix ~/1337/30> cat 01.dat | ./lab30
16
17
         scan0(x, 0) = 0
^{18}
^{19}
   scan0(x, 1) =
                    2
   scan0(x, 2) =
                    2
20
   scan0(x, 3) =
                    3
^{21}
   scan0(x, 4) =
                   5
22
   scan0(x, 5) =
^{23}
                    5
   scan0(x, 6) = 7
^{24}
   scan0(x, 7) =
25
                  7
   scan0(x, 8) =
^{26}
                    9
^{27}
   scan0(x, 9) = 9
   scan0(x, 10) = 11
^{28}
   scan0(x, 11) = 11
^{29}
   scan0(x, 12) = 12
30
31
   scan0(x, 13) = 13
32
   scan0(x, 14) = 14
33
   scan0(x, 15) = 15
   scan0(x, 16) = 16
^{34}
   scan0(x, 17) = 17
35
36
   scan0(x, 18) = 18
   scan0(x, 19) = 19
37
   scan0(x, 20) = 20
38
   scan0(x, 21) = 21
39
  scan0(x, 22) = 22
40
   scan0(x, 23) = 23
41
42
   scan0(x, 24) = 24
   scan0(x, 25) = 25
43
^{44}
   scan0(x, 26) = 26
   scan0(x, 27) = 27
^{45}
   scan0(x, 28) = 28
46
   scan0(x, 29) = 29
47
   scan0(x, 30) = 30
^{48}
   scan0(x, 31) = 31
49
```



50		
51	4294967295 base	e 10 = 111111111111111111111111111111111
52	scan0(x, 0) =	4294967295
53	scan0(x, 1) =	4294967295
54	scan0(x, 2) =	4294967295
55	scan0(x, 3) =	4294967295
56	scan0(x, 4) =	4294967295
57	scan0(x, 5) =	4294967295
58	scan0(x, 6) =	4294967295
59	scan0(x, 7) =	4294967295
60	scan0(x, 8) =	4294967295
61	scan0(x, 9) =	4294967295
62	scan0(x, 10) =	4294967295
63	scan0(x, 11) =	4294967295
64	scan0(x, 12) =	4294967295
65	scan0(x, 13) =	4294967295
66	scan0(x, 14) =	4294967295
67	scan0(x, 15) =	4294967295
68	scan0(x, 16) =	4294967295
69	scan0(x, 17) =	4294967295
70	scan0(x, 18) =	4294967295
71	scan0(x, 19) =	4294967295
72	scan0(x, 20) =	4294967295
73	scan0(x, 21) =	4294967295
74	scan0(x, 22) =	4294967295
75	scan0(x, 23) =	4294967295
76	scan0(x, 24) =	4294967295
77	scan0(x, 25) =	4294967295
78	scan0(x, 26) =	4294967295
79	scan0(x, 27) =	4294967295
80	scan0(x, 28) =	4294967295
81	scan0(x, 29) =	4294967295
82	scan0(x, 30) =	4294967295
83	scan0(x, 31) =	4294967295
84		
85	newuser@csunix	~/1337/30> cat 01.dat ./lab30 > my.out
86	newuser@csunix	~/1337/30> diff 01.out my.out
87	newuser@csunix	~/1337/30> cat 02.dat ./lab30 > my.out
88	newuser@csunix	~/1337/30> diff 02.out my.out
89	newuser@csunix	~/1337/30>

Figure 2. Commands to Compile, Link, & Run Lab 30 (Part 2 of 2)