Source File: ~/1337/63/lab63.(C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of `main` function
Output: Under control of `main` function
Value: 3

   The purpose of this assignment is to develop the implementation for the `Time` class. A header file containing the specification is shown in Figure 1, a sample `main` function for testing your implementation is shown in Figure 2, and a sample execution sequence is shown in Figure 3. To use the `Makefile` as distributed in class, add a target of `lab63` to `targets2srcfiles`.

```
 1  #ifndef LAB63_H
 2  #define LAB63_H
 3
 4  #include <iostream>
 5
 6  using namespace std;
 7
 8  class Time
 9  {
10   public:
11     // Constructor - Uses hr to initialize hour, min minute, and sec second
12     Time(int hr = 0, int min = 0, int sec = 0);
13
14     // Function getHour - returns private data member hour
15     int getHour() const;
16
17     // Function getMinute - returns private data member minute
18     int getMinute() const;
19
20     // Function getSecond - returns private data member second
21     int getSecond() const;
22
23     // Function setTime - set hour, minute, second
24     //   if hr is in the range [0..23] then assign hr to hour;
25     //      otherwise, assign 0 to hour
26     //   if min is in the range [0..59] then assign min to minute;
27     //      otherwise, assign 0 to minute
28     //   if sec is in the range [0..59] then assign sec to second;
29     //      otherwise, assign 0 to second
30     void setTime(int hr, int min, int sec);
31
32     // Function isAM - returns true if the time is ante meridiem; that
33     // is, before noon.  By definition, 12:00:00 A.M. denotes midnight
34     // (that is, hour, minute, and second are all zero), and 12:00:00 P.M.
35     // denotes noon (that is, hour equals 12 and minute and second
36     // are both zero).
37     bool isAM() const;
38
```

Figure 1. /usr/local/1337/include/lab63.h (Part 1 of 2)

```
39    // Function printStandard - prints the time in the format
40    //    hh:mm:ss DD
41    // where
42    //    hh is the hour displayed as a two-digit, blank-filled number in
43    //      the range [1..12]
44    //    mm is the minute displayed as a two-digit, zero-filled number
45    //      in the range [0..59]
46    //    ss is the second displayed as a two-digit, zero-filled number
47    //      in the range [0..59]
48    //    DD is a four-character string equal to one of "A.M." or "P.M."
49    //      (call isAM() to determine)
50    void printStandard(ostream& os) const;
51
52    // Function timeToSeconds - converts time to total number of seconds
53    // since midnight
54    int timeToSeconds() const;
55   private:
56    int hour;      // 0 <= hour <= 23
57    int minute;    // 0 <= minute <= 59
58    int second;    // 0 <= second <= 59
59  };
60
61  #endif
```

Figure 1. /usr/local/1337/include/lab63.h (Part 2 of 2)

```
1   #include <iostream>
2   #include <iomanip>
3   #include <string>
4   #include <lab63.h>
5
6   using namespace std;
7
8   void testTimeFunctions(const Time& t, string name, ostream& os);
9
10  int main()
11  {
12    Time t1, t2(6), t3(9, 30), t4(14, 2, 3);
13
14    testTimeFunctions(t1, "t1", cout);
15    testTimeFunctions(t2, "t2", cout);
16    testTimeFunctions(t3, "t3", cout);
17    testTimeFunctions(t4, "t4", cout);
18
19    t1.setTime(131, 5, 7); // invalid hour
20    testTimeFunctions(t1, "t1", cout);
21
```

Figure 2. /usr/local/1337/src/lab63main.C (Part 1 of 2)

```
22    t1.setTime(1, 60, 59); // invalid minute
23    testTimeFunctions(t1, "t1", cout);
24
25    t1.setTime(24, 6, 100); // invalid hour & second
26    testTimeFunctions(t1, "t1", cout);
27
28    t1.setTime(23, 59, 59);
29    testTimeFunctions(t1, "t1", cout);
30
31    return 0;
32  }
33
34  void testTimeFunctions(const Time& t, string name, ostream& os)
35  {
36    os << name << ".printStandard() = ";
37    t.printStandard(os);
38    os << ' ' << name << ".isAM() = "
39       << boolalpha << setw(5) << left << t.isAM()
40       << ' ' << name << ".timeToSeconds() = "
41       << setw(5) << right << t.timeToSeconds() << endl;
42  }
```

Figure 2. /usr/local/1337/src/lab63main.C (Part 2 of 2)

```
1   newuser@csunix ~> cd 1337
2   newuser@csunix ~/1337> mkdir 63
3   newuser@csunix ~/1337> cd 63
4   newuser@csunix ~/1337/63> cp /usr/local/1337/data/63/* .
5   newuser@csunix ~/1337/63> cp /usr/local/1337/include/lab63.h .
6   newuser@csunix ~/1337/63> cp /usr/local/1337/src/lab63main.C .
7   newuser@csunix ~/1337/63> cp /usr/local/1337/src/Makefile .
8   newuser@csunix ~/1337/63> touch lab63.cpp
9   newuser@csunix ~/1337/63> # Edit Makefile and lab63.cpp
10  newuser@csunix ~/1337/63> make lab63
11  g++ -g -Wall -std=c++11 -c lab63main.C -I/usr/local/1337/include -I.
12  g++ -g -Wall -std=c++11 -c lab63.cpp -I/usr/local/1337/include -I.
13  g++ -o lab63 lab63main.o lab63.o -L/usr/local/1337/lib -lm -lbits
14  newuser@csunix ~/1337/63> cat 01.dat
15  newuser@csunix ~/1337/63> cat 01.dat | ./lab63
16  t1.printStandard() = 12:00:00 A.M. t1.isAM() = true  t1.timeToSeconds() =     0
17  t2.printStandard() =  6:00:00 A.M. t2.isAM() = true  t2.timeToSeconds() = 21600
18  t3.printStandard() =  9:30:00 A.M. t3.isAM() = true  t3.timeToSeconds() = 34200
19  t4.printStandard() =  2:02:03 P.M. t4.isAM() = false t4.timeToSeconds() = 50523
20  t1.printStandard() = 12:05:07 A.M. t1.isAM() = true  t1.timeToSeconds() =   307
21  t1.printStandard() =  1:00:59 A.M. t1.isAM() = true  t1.timeToSeconds() =  3659
22  t1.printStandard() = 12:06:00 A.M. t1.isAM() = true  t1.timeToSeconds() =   360
23  t1.printStandard() = 11:59:59 P.M. t1.isAM() = false t1.timeToSeconds() = 86399
24  newuser@csunix ~/1337/63> cat 01.dat | ./lab63 > my.out
25  newuser@csunix ~/1337/63> diff 01.out my.out
26  newuser@csunix ~/1337/63>
```

Figure 3. Commands to Compile, Link, & Run Lab 63