

Source File: ~/1337/65/lab65. (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 add to 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 lab65 to targets2srcfileswithlibrary.

```
1  #ifndef LAB65_H
2  #define LAB65_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
35     // P.M. 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/lab65.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
56 // Function addSecond - adds one second to the time represented by
57 // *this
58 void addSecond();
59
60 // Function isEqualTo - returns true if the time represented by
61 // *this is equal to the time represented by secondTime
62 bool isEqualTo(const Time& secondTime) const;
63
64 // Function isEarlierThan - returns true if the time represented by
65 // *this is earlier than the time represented by secondTime
66 bool isEarlierThan(const Time& secondTime) const;
67
68 private:
69     int hour;    // 0 <= hour <= 23
70     int minute; // 0 <= minute <= 59
71     int second; // 0 <= second <= 59
72 };
73
74 #endif
```

Figure 1. /usr/local/1337/include/lab65.h (Part 2 of 2)

```
1 #include <iostream>
2 #include <iomanip>
3 #include <string>
4 #include <lab65.h>
5
6 using namespace std;
7
8 int main()
9 {
10     Time t1, t2;
11     int hr1, min1, sec1, hr2, min2, sec2;
12
13     cout << boolalpha;
14     while (cin >> hr1 >> min1 >> sec1 >> hr2 >> min2 >> sec2)
15     {
16         t1.setTime(hr1, min1, sec1);
17         cout << "t1 = ";
18         t1.printStandard(cout);
19         cout << endl;
20
21         t2.setTime(hr2, min2, sec2);
22         cout << "t2 = ";
23         t2.printStandard(cout);
24         cout << endl;
25
26         cout << "t1 == t2 = " << t1.isEqualTo(t2) << endl;
27         cout << "t1 < t2 = " << t1.isEarlierThan(t2) << endl;
28
29         cout << " Adding one second to t1 yields ";
30         t1.addSecond();
31         t1.printStandard(cout);
32         cout << endl << endl;
33     }
34
35     return 0;
36 }
```

Figure 2. /usr/local/1337/src/lab65main.C

```
1 newuser@csunix ~> cd 1337
2 newuser@csunix ~/1337> mkdir 65
3 newuser@csunix ~/1337> cd 65
4 newuser@csunix ~/1337/65> cp /usr/local/1337/data/65/* .
5 newuser@csunix ~/1337/65> cp /usr/local/1337/include/lab65.h .
6 newuser@csunix ~/1337/65> cp /usr/local/1337/src/lab65main.C .
7 newuser@csunix ~/1337/65> cp /usr/local/1337/src/Makefile .
8 newuser@csunix ~/1337/65> touch lab65.cpp
9 newuser@csunix ~/1337/65> # Edit Makefile and lab65.cpp
10 newuser@csunix ~/1337/65> make lab65
11 g++ -g -Wall -std=c++11 -c lab65main.C -I/usr/local/1337/include -I.
12 g++ -g -Wall -std=c++11 -c lab65.cpp -I/usr/local/1337/include -I.
13 g++ -o lab65 lab65main.o lab65.o -L/usr/local/1337/lib -lm -lbits \
14 -Wl,-whole-archive -llab65 -Wl,-no-whole-archive
15 newuser@csunix ~/1337/65> cat 01.dat
16 9 30 30 9 30 49
17 11 45 59 11 45 15
18 14 59 59 15 0 1
19 23 59 59 5 12 13
20 17 23 0 17 5 39
21 21 0 0 21 51 45
22 0 0 0 0 0 0
23 23 59 59 23 59 59
24 -1 5 7 25 5 7
25 1 -60 59 1 60 59
26 2 6 -100 23 6 100
27 -2 -6 10 24 60 10
28 -2 10 -6 24 10 60
29 10 -2 -6 10 60 60
30 -10 -2 -6 24 60 60
```

Figure 3. Commands to Compile, Link, & Run Lab 65 (Part 1 of 2)

```

31 newuser@csunix ~/1337/65> cat 01.dat | ./lab65
32 t1 = 9:30:30 A.M.
33 t2 = 9:30:49 A.M.
34 t1 == t2 = false
35 t1 < t2 = true
36 Adding one second to t1 yields 9:30:31 A.M.
37
38 t1 = 11:45:59 A.M.
39 t2 = 11:45:15 A.M.
40 t1 == t2 = false
41 t1 < t2 = false
42 Adding one second to t1 yields 11:46:00 A.M.
43
44 t1 = 2:59:59 P.M.
45 t2 = 3:00:01 P.M.
46 t1 == t2 = false
47 t1 < t2 = true
48 Adding one second to t1 yields 3:00:00 P.M.
49
50 t1 = 11:59:59 P.M.
51 t2 = 5:12:13 A.M.
52 t1 == t2 = false
53 t1 < t2 = false
54 Adding one second to t1 yields 12:00:00 A.M.
55
56 t1 = 5:23:00 P.M.
57 t2 = 5:05:39 P.M.
58 t1 == t2 = false
59 t1 < t2 = false
60 Adding one second to t1 yields 5:23:01 P.M.
61
62 t1 = 9:00:00 P.M.
63 t2 = 9:51:45 P.M.
64 t1 == t2 = false
65 t1 < t2 = true
66 Adding one second to t1 yields 9:00:01 P.M.
67
68 t1 = 12:00:00 A.M.
69 t2 = 12:00:00 A.M.
70 t1 == t2 = true
71 t1 < t2 = false
72 Adding one second to t1 yields 12:00:01 A.M.
73
74 t1 = 11:59:59 P.M.
75 t2 = 11:59:59 P.M.
76 t1 == t2 = true

77 t1 < t2 = false
78 Adding one second to t1 yields 12:00:00 A.M.
79
80 t1 = 12:05:07 A.M.
81 t2 = 12:05:07 A.M.
82 t1 == t2 = true
83 t1 < t2 = false
84 Adding one second to t1 yields 12:05:08 A.M.
85
86 t1 = 1:00:59 A.M.
87 t2 = 1:00:59 A.M.
88 t1 == t2 = true
89 t1 < t2 = false
90 Adding one second to t1 yields 1:01:00 A.M.
91
92 t1 = 2:06:00 A.M.
93 t2 = 11:06:00 P.M.
94 t1 == t2 = false
95 t1 < t2 = true
96 Adding one second to t1 yields 2:06:01 A.M.
97
98 t1 = 12:00:10 A.M.
99 t2 = 12:00:10 A.M.
100 t1 == t2 = true
101 t1 < t2 = false
102 Adding one second to t1 yields 12:00:11 A.M.
103
104 t1 = 12:10:00 A.M.
105 t2 = 12:10:00 A.M.
106 t1 == t2 = true
107 t1 < t2 = false
108 Adding one second to t1 yields 12:10:01 A.M.
109
110 t1 = 10:00:00 A.M.
111 t2 = 10:00:00 A.M.
112 t1 == t2 = true
113 t1 < t2 = false
114 Adding one second to t1 yields 10:00:01 A.M.
115
116 t1 = 12:00:00 A.M.
117 t2 = 12:00:00 A.M.
118 t1 == t2 = true
119 t1 < t2 = false
120 Adding one second to t1 yields 12:00:01 A.M.
121

122 newuser@csunix ~/1337/65> cat 01.dat | ./lab65 > my.out
123 newuser@csunix ~/1337/65> diff 01.out my.out
124 newuser@csunix ~/1337/65>

```

Figure 3. Commands to Compile, Link, & Run Lab 65 (Part 2 of 2)