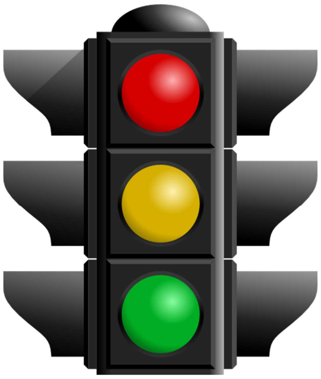
# COP2272C – Fall 2015



## Homework #3

### Title: The Chatterbox Light System

Your control system for the City of Smallville continues to operate well and now emergency vehicles no longer have to wait for a red light to change. However, the city's safety inspector has been taking a very careful look at your code. What he's found disturbs him. It turns out that the majority of your control logic is contained in the main routine. Since this part of the control system runs in a box located at the intersection, there is always the possibility that a car could hit it and take out the entire stoplight system.

He's asking you to redesign your system. What he wants you to do is to move your light control logic up into the four light objects that you create and minimize the amount code that is in the main routine. What this means is that the traffic lights are going to have to start to "talk" to each other. North will have to tell South when to change and South will have to tell East and so on.

1. Remove all of the traffic light control logic from your program's "main" routine. Move it into methods that you create for each of the four traffic light objects.

2. Implement new logic as methods for the light objects that allows each of the light objects to communicate with each other in order to signal when a light should change from red to green.

**<u>Create a traffic light control program that will do the following things:</u>**

1. Remove the traffic control logic from the main program.

2. Add methods to the traffic light objects that will (1) allow them to talk to each other using pointers and (2) control how they display green / yellow / red.

3. Run the program for 60 seconds. Print out a complete display of the current state of each light every time a light changes color and print the current time. See below for the sample output format.

4. At 40 seconds into the simulation, simulate an emergency vehicle approaching the East traffic light.

5. At 50 seconds simulate the emergency vehicle moving on and the system returning to normal.

6. Run the system until you reach the 60 second mark and then terminate the program.

**Notes:**

- You must modify Dr. Anderson's solution to HW #2 to create your solution to this homework.

- You are only permitted to use the C++ commands that we have covered in class so far. Yes, there are many more, but no, you can't use them in solving this homework!

- You must use a class in your solution.

- You must declare at least 4 objects in your solution.

- The output of your program is to be in the 5 column format shown at the end of this homework assignment in order to simplify the grading process.

- No hardcoding of a solution is permitted. Your program should be able to be run for any amount of time (e.g. two days) and produce the correct output for the entire time.

**→ Homework Assignment: Turn in a listing of your program and output based on running for the specified time as a part of this assignment.**

## Assignment Requirements:

1. You are required to print out (1) a listing of your C++ program and (2) a printout of the results of running your program for the specified amount of time.

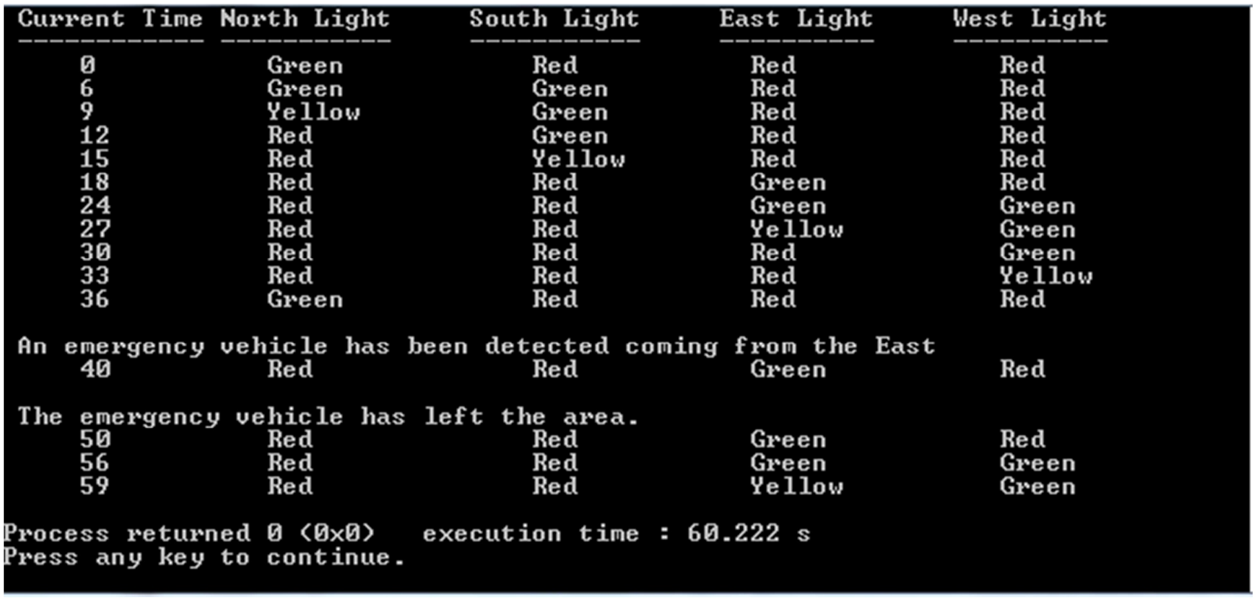
Your code must contain the following comment header:

```
//
// COP2272C – Fall Semester, 2015
//
// Homework #2: A Smarter Stoplight Problem
//
// Description:
//
// File name:
//
// By:(Your Name)
//
//
```

2. **This homework is due at the start of class on Tuesday, 11/03/2015.**

## Program Output

**I am expecting your program to produce the following output through logical processing, not hardcoding!**



```
 Current Time North Light     South Light     East Light     West Light
 ------------ -----------     -----------     ----------     ----------
     0           Green            Red           Red             Red
     6           Green            Green         Red             Red
     9           Yellow           Green         Red             Red
     12          Red              Green         Red             Red
     15          Red              Yellow        Red             Red
     18          Red              Red           Green           Red
     24          Red              Red           Green           Green
     27          Red              Red           Yellow          Green
     30          Red              Red           Red             Green
     33          Red              Red           Red             Yellow
     36          Green            Red           Red             Red

 An emergency vehicle has been detected coming from the East
     40          Red              Red           Green           Red

 The emergency vehicle has left the area.
     50          Red              Red           Green           Red
     56          Red              Red           Green           Green
     59          Red              Red           Yellow          Green

Process returned 0 (0x0)   execution time : 60.222 s
Press any key to continue.
```