**Assignment 1 – Oisin Mc Laughlin 22441106**

**Question 1 – Analysis**

For this assignment I am going to need three different classes. A TrafficLight class indicating which one of the three light objects that are currently lit. A Light class indicating each lights colour and which light is currently on or off. The last class I will need is a testing class called TestTrafficLight, this class is used to test the functionality of the Traffic Light class.

The TrafficLight class will have three class fields green, amber and red which all contain three Light objects. The constructor of the class will create instances of Light for green, amber and red. There will be four methods in this class, go() turns the green light on, turns off amber and red. prepareToStop() turns amber on, turns off green and red. stop() turns red on, turns green and amber off. The last method is printState() which prints the state of each of green, amber and red, all these methods will achieve this by referencing parts of the Light class.

The Light class will have two class fields, a String called colour to represent the current colour and a Boolean called Lstate to represent if the light is on or off. The Light class constructor will have a String parameter for the colour and will initialise the colour field using this.colour to initialise it with a colour. The constructor will also set light state to off by setting the Lstate value to false. The Light class will have two Accessors, getState() will return if the light is on (true) or off (false), getColour() will return the current colour as a String. The mutators of the light class will be setState which will take a Boolean parameter and will set Lstate to whatever the parameter is, setColour that will have a String parameter and will set this.colour to whatever the parameter is. Additionally there will be three methods in the Light class, on() which will set the Lstate to true, off() that will set Lstate to false and printstate() that will print the current colour if the Lstate is true, else it will print “Off”.

The TestTrafficLight class will interact with the TrafficLight class to test the functionality of it by initiating a object of it and looping 5 times, in each iteration of the loop it will call each of the go, prepareToStop and stop methods as well as printing the state after each method.

**Question 2 – Coding**

TrafficLight:

/\*\*

\* A class composed of three Light objects that indicates which is currently lit.

\*

\* @author (Oisin Mc Laughlin)

\* @version (v1.0)

\*/

public class TrafficLights

{

//Represents the state of each light.

private Light green;

private Light amber;

private Light red;

public TrafficLights()

{

//Initializes the light states with their respective labels.

green = new Light("[ Green ]");

amber = new Light("[ Amber ]");

red = new Light("[ Red ]");

}

public void go()

{

//Turn on green, turn off amber and red.

green.on();

amber.off();

red.off();

}

public void prepareToStop()

{

//Turn on amber, turn off green and red.

green.off();

amber.on();

red.off();

}

public void stop()

{

//Turn on red, turn off green and amber.

green.off();

amber.off();

red.on();

}

public void printState()

{

//Prints the state of all lights.

green.printstate();

amber.printstate();

red.printstate();

}

}

Light:

/\*\*

\* A class that represents a single light. All lights have a colour and indicator of whether

they are currently on or off (a Boolean variable).

\*

\* @author (Oisin Mc Laughlin)

\* @version (v1.0)

\*/

public class Light

{

//Indicates if light is on (true) or off (false).

private boolean Lstate;

//Colour of light.

private String colour;

public Light(String colour)

{

//Initialises light with a colour.

this.colour = colour;

//Sets light to off (false).

Lstate = false;

}

//Accessors

public boolean getState()

{

//Returns state of light.

return Lstate;

}

public String getColour()

{

//Returns colour of light.

return colour;

}

// Mutators

public void setState(boolean state)

{

//Changes state of light to on or off (true or false).

Lstate = state;

}

public void setColour(String colour)

{

//Changes colour of light to green, amber or red.

this.colour = colour;

}

//Methods

public void on()

{

//Turns light on

Lstate = true;

}

public void off()

{

//Turns light off.

Lstate = false;

}

public void printstate()

{

//Prints current state of the light (colour and if its on or off).

//If light is on, print out colour.

if (Lstate == true) {

System.out.println(colour);

}

//Else print "Off".

else {

System.out.println("[ =Off= ]");

}

}

}

TestTrafficLight:

/\*\*

\* This is a testing class which will have a main method, and which will test

the functionality of the TrafficLights class. The Light class will be implicitly tested since it is

used by the TrafficLight class.

\*

\* @author (Oisin Mc Laughlin)

\* @version (v1.0)

\*/

public class TestTrafficLight

{

public static void main(String[] args)

{

//Creates an instance of the TrafficLights class.

TrafficLights myObj = new TrafficLights();

//Loops through 5 times.

for (int i = 0; i < 5; i++) {

//Prints which run it is on.

System.out.println("\n-----Run " + (i+1) + "-----");

//Simulates each state of traffic light and then prints the state.

myObj.go();

myObj.printState();

myObj.prepareToStop();

myObj.printState();

myObj.stop();

myObj.printState();

}

}

}

**Question 3 – Testing**

**A table of numbers with black text

Description automatically generated with medium confidence**A screenshot of a computer

Description automatically generated

As you can see, the code ran as expected without any errors and displayed what I wanted it to display.A screenshot of a computer

Description automatically generated