

Report of the project :

HSLA Images

Made by :

-Zaoui zakariae

-cheddad mohamed-ali

Supervised by :

-Pr.Belcaid

Summary :

In this project , we have implemented 4 classes following the UML class diagram below:

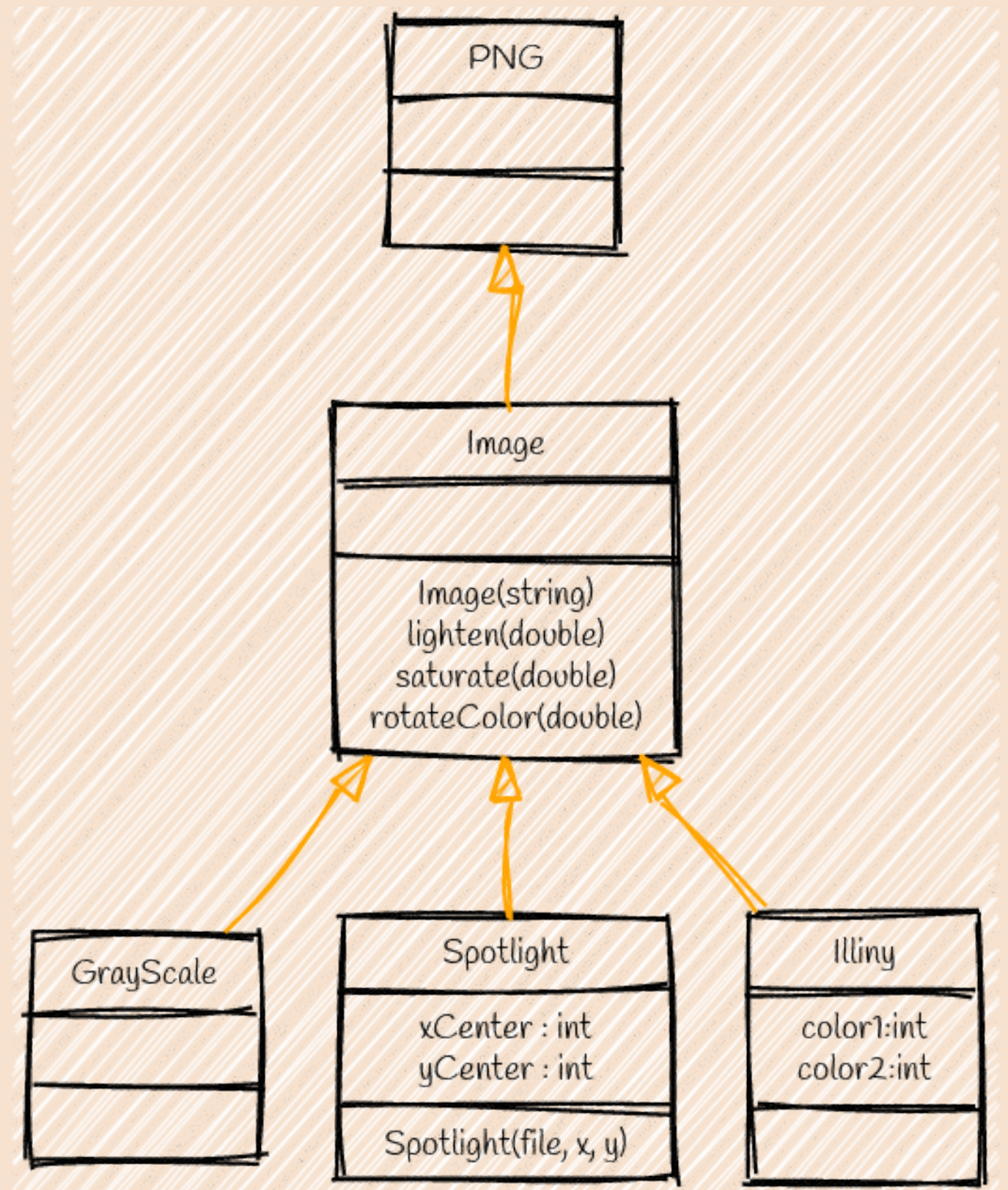


Image C:

Source Code

```
#ifndef IMAGE_H
#define IMAGE_H
#include "PNG.h"

class Image : public PNG
{
    //Additional attributs and methods
public:
    using PNG::PNG;
    Image(string filename);
    void lighten(double amount=0.1);
    void saturate(double amount=0.1);
    void rotateColor(double angle);
};

#endif // IMAGE_H
```

image.h

Image C:

Source Code

```
void Image::lighten(double amount)
{
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);
            P.l +=amount;
            P.l = (P.l>0) ? P.l :0;
            P.l = (P.l<=1) ? P.l:1;
        }
}
```

lighten method

image.cpp

Image C:

Source Code

```
void Image::saturate(double amount)
{
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);
            P.s +=amount;
            P.s = (P.s>0) ? P.s :0;
            P.s = (P.s<=1) ? P.s:1;
        }
}
```

saturate method

image.cpp

Image C:

Source Code

```
void Image::rotateColor(double angle)
{
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);
            P.h +=angle;
            while(P.h<0){
                P.h +=360;
            }
            while (P.h>360) {
                P.h -=360;
            }
        }
}
```

rotateColor method

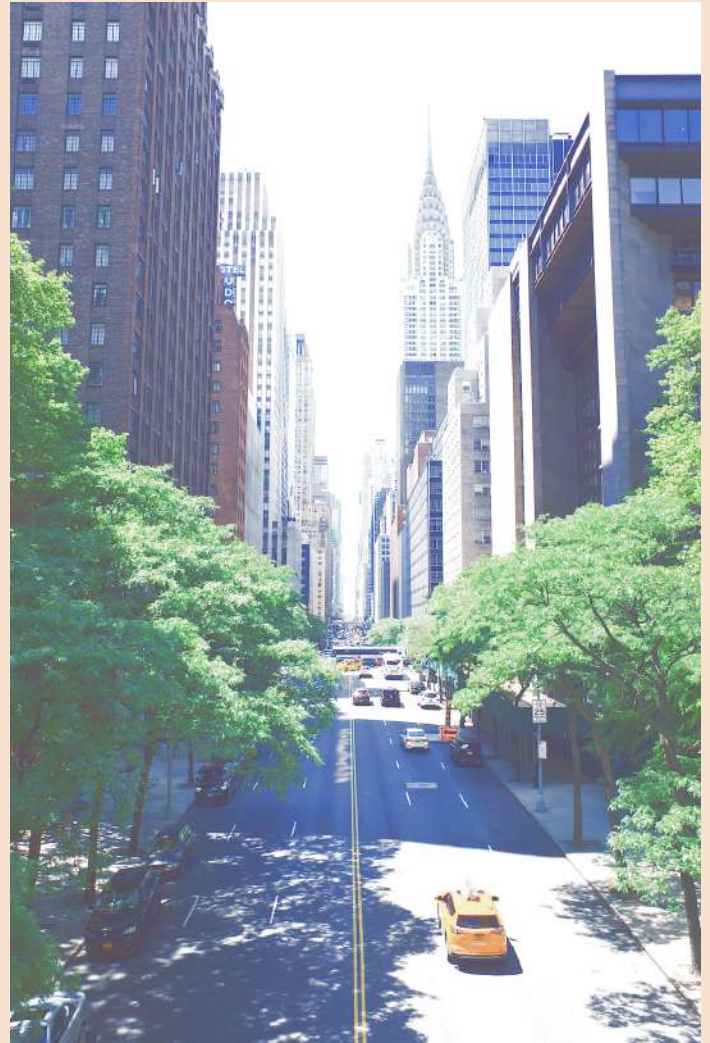
image.cpp

Results:

Changing the luminance of the image using `lighten(0.3)` :



Input :



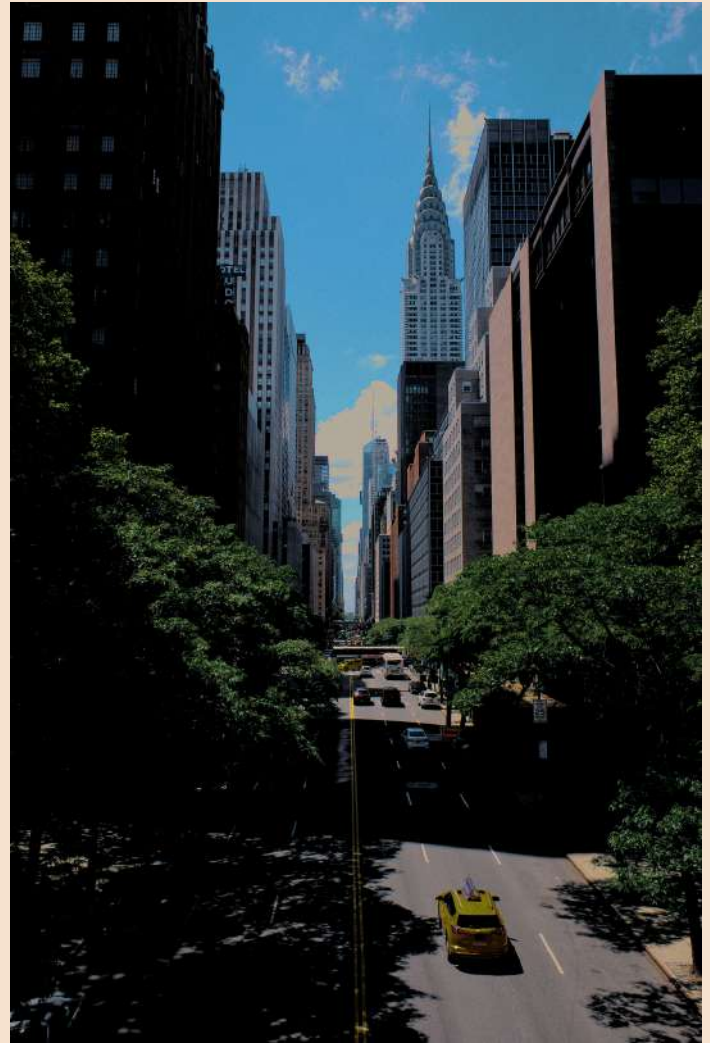
Output :

Results:

Changing the luminance of the image using `lighten(-0.2)` :



Input :



Output :

Results:

Changing the saturation of the image using `saturate(0.2)` :



Input :



Output :

Results:

Adding the value of an angle to the image using `rotatecolor(90)` :



Input :



Output :

GrayScale class :

Source code

```
#ifndef GRAYSCALE_H
#define GRAYSCALE_H
#include "image.h"
class Grayscale : public Image
{
public:
    using Image::Image;
    Grayscale(string filename);
};

#endif // GRAYSCALE_H
```

grayscale.h

GrayScale class :

Source code

```
#include "grayscale.h"
Grayscale::Grayscale(string filename):Image()
{
    readFromFile(filename);
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);
            P.s=0;
        }
}
```

grayscale.cpp

Results:

Eliminating all the colors of the image :



Input :



Output :

Illini class :

Source code

```
#ifndef ILLINI_H
#define ILLINI_H
#include "image.h"
class Illini : public Image
{
public:
    using Image::Image;

    Illini(string filename,int color1=11,int color2=216);
};

#endif // ILLINI_H
```

illini.h

Illini class :

Source code

```
#include "illini.h"

Illini::Illini(string filename,int color1,int color2):Image()
{
    readFromFile(filename);int a,b;
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);

            if(P.h>color1){
                if(P.h-color1<360+color1-P.h)
                    a=P.h-color1;
                else
                    a=360+color1-P.h;
            }else{
                if(-P.h+color1<360-color1+P.h)
                    a=-P.h+color1;
                else
                    a=360-color1+P.h;
            }
            if(P.h>color2){
                if(P.h-color2<360+color2-P.h)
                    b=P.h-color2;
                else
                    b=360+color2-P.h;
            }else{
                if(-P.h+color2<360-color2+P.h)
                    b=-P.h+color2;
                else
                    b=360-color2+P.h;
            }
            if(a<b)
                P.h=color1;
            else
                P.h=color2;
        }
}
```

illini.cpp

Results:

Replacing the hue of each pixel that are either the first or the second color using color1 = 11 (orange) and color2 = 216(blue).



Input :



Output :

Results:

Replacing the hue of each pixel that are either the first or the second color using color1 = 60 and color2 = 250.



Input :



Output :

Spotlight class :

Source code

```
#ifndef SPOTLIGHT_H
#define SPOTLIGHT_H
#include "image.h"
class Spotlight : public Image
{
public:
    using Image::Image;
    Spotlight(string filename,int x,int y);
};

#endif // SPOTLIGHT_H
```

spotlight.h

Spotlight class :

Source code

```
#include "spotlight.h"
#include <math.h>

Spotlight::Spotlight(string filename,int x,int y):Image()
{
    int a;
    readFromFile(filename);
    for(unsigned i=0;i<width();i++)
        for(unsigned j=0;j<height();j++)
        {
            HSLAPixel &P=getPixel(i,j);
            a=sqrt((x-i)*(x-i)+(y-j)*(y-j));
            if(a>160){
                P.l=0.2*P.l;
            }else{
                P.l=(1-((a*0.5)/100))*P.l;
            }
        }
}
```

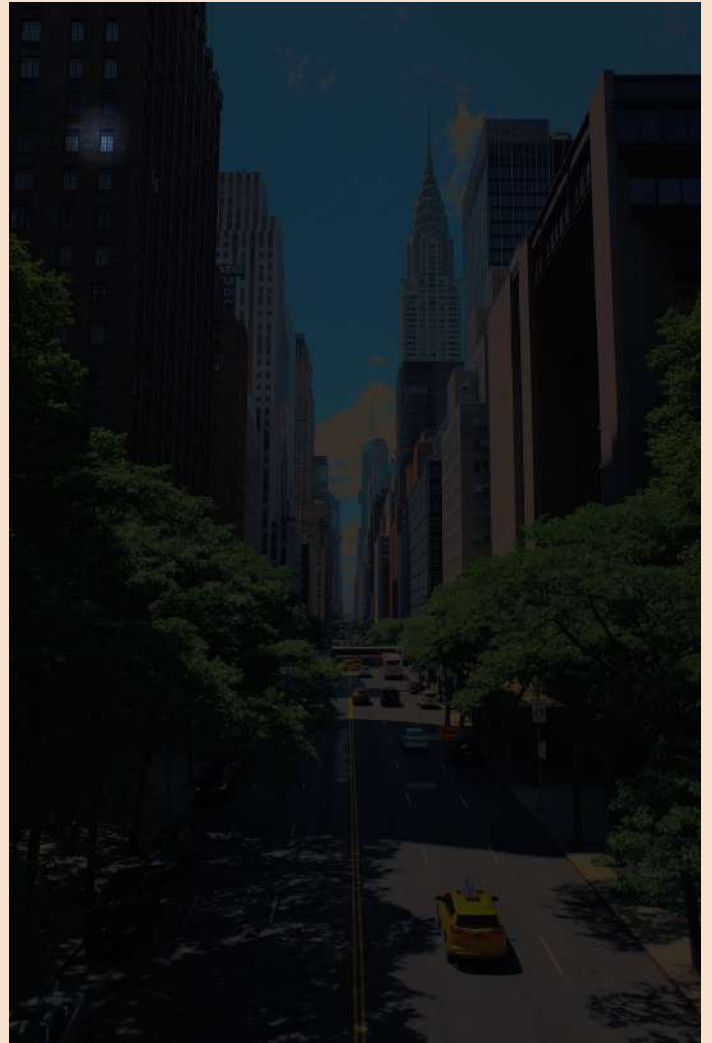
spotlight.cpp

Results:

Creating a spotlight centred at the point (200,300) :



Input :



Output :

Results Of PROVIDED_TESTS :

Tests from PROVIDED_TEST	
Correct	(PROVIDED_TEST, main.cpp:49) Image : lighten1
Correct	(PROVIDED_TEST, main.cpp:62) Image lighten() does not lighten a pixel above 1.0
Correct	(PROVIDED_TEST, main.cpp:72) Image darken(0.2) darkens pixels by 0.2
Correct	(PROVIDED_TEST, main.cpp:81) Image darken(0.2) does not darken a pixel below 0.0
Correct	(PROVIDED_TEST, main.cpp:90) Image saturate() saturates a pixels by 0.1
Correct	(PROVIDED_TEST, main.cpp:99) Image rotateColor(double) rotates the color
Correct	(PROVIDED_TEST, main.cpp:107) Image rotateColor(double) keeps the hue in the range [0, 360]
Correct	(PROVIDED_TEST, main.cpp:119) Grayscale Image
Correct	(PROVIDED_TEST, main.cpp:130) illini
Correct	(PROVIDED_TEST, main.cpp:143) Pixels closest to blue become blue
Correct	(PROVIDED_TEST, main.cpp:153) Pixels closest to orange become orange
Correct	(PROVIDED_TEST, main.cpp:162) Hue wrap-arounds are correct (remember: h=359 is closer to orange than blue)
Correct	(PROVIDED_TEST, main.cpp:171) Spotlight does not modify the center pixel
Correct	(PROVIDED_TEST, main.cpp:178) Spotlight creates an 80% dark pixel >160 pixels away
Correct	(PROVIDED_TEST, main.cpp:184) Spotlight is correct at 20 pixels away from center
Correct	(PROVIDED_TEST, main.cpp:191) Spotlight is correct at 5 pixels away from center
Passed 16 of 16 tests. Perfect!	

**THANK
YOU!**