//Student Name: Jing Ma

// Lab Session: Tuesday 5:00 P.M

#include "library.h"

void sun()//draw the sun

{

move\_to(400,100);

set\_pen\_width(100);

set\_pen\_color(color::yellow);

draw\_point();

}

void moon()//draw the moon

{

move\_to(400,100);

set\_pen\_width(100);

set\_pen\_color(color::white);

draw\_point();

}

void stars(){

int const number\_of\_stars = random\_in\_range(20,100);

for(int i=0; i<=number\_of\_stars;i++){

set\_pen\_color(color::white);

set\_pen\_width(3);

int pos\_x = random\_in\_range(0,1100);

int pos\_y = random\_in\_range(0,350);

move\_to(pos\_x,pos\_y);

draw\_point();

}

}

void day\_or\_night(){

int const time = random\_in\_range(0,23);

if(time==0|| time == 1||time==2||time==3||time==4||time==5||time==6||time==7)

{

set\_pen\_color(color::black);//early morning

fill\_rectangle(0,0,1100,700);

moon();

stars();

}

else if(time==8||time==9||time==10||time==11)

{

set\_pen\_color(color::light\_blue);//morning

fill\_rectangle(0,0,1100,700);

sun();

}

else if(time==12||time==13||time==14||time==15||time==16)

{

set\_pen\_color(color::orange);//noon

fill\_rectangle(0,0,1100,700);

sun();

}

else if(time==17||time==18||time==19||time==20)

{

set\_pen\_color(color::indigo);//evening

fill\_rectangle(0,0,1100,700);

moon();

}

else

{

set\_pen\_color(color::dark\_blue);//night

fill\_rectangle(0,0,1100,700);

moon();

stars();

}

}

void background() {

day\_or\_night();

set\_pen\_color(color::black);

fill\_rectangle(0,360,1100,50);

move\_to(0,365);

set\_pen\_color(color::yellow);

set\_heading\_degrees(90);

set\_pen\_width(2);

draw\_distance(1100);

move\_to(0,390);

set\_pen\_color(color::yellow);

set\_heading\_degrees(90);

set\_pen\_width(2);

draw\_distance(1100);

set\_pen\_color(color::black);

fill\_rectangle(0,390,1100,30);

move\_to(0,420);

set\_pen\_color(color::yellow);

set\_heading\_degrees(90);

set\_pen\_width(2);

draw\_distance(1100);

set\_pen\_color(color::dark\_green);

fill\_rectangle(0,420,1100,100);

set\_pen\_color(color::black);

fill\_rectangle(0,520,1100,30);

set\_pen\_color(color::dark\_green);

fill\_rectangle(0,535,1100,35);

}

void create\_window(double const x, double const y, double const width, double const height, double const r, double const g, double const b) {

int randomn\_mess= random\_in\_range(1,10);

if (randomn\_mess==1)// little dude in window , cat's too hard

{

set\_pen\_color(r,g,b);//window

fill\_rectangle(x,y,width,height);

set\_pen\_color(0,0,0);//start of dude in window

double const new\_x = x+width/2;

move\_to(new\_x,y);

set\_pen\_width(1);

set\_heading\_degrees(0);

draw\_distance(7);

set\_pen\_width(5);

draw\_point();

set\_heading\_degrees(180);

set\_pen\_width(1);

draw\_distance(7);

set\_heading\_degrees(45);

draw\_distance(5);

}

if (randomn\_mess==2)// curtains

{

set\_pen\_color(r,g,b);

fill\_rectangle(x,y,width,height);

int red= random\_in\_range(0,255);

double r= red/255.0;

set\_pen\_color(r,0,0);

double const curtain\_width = width/4;

double const new\_x = x+3\*width/4;

move\_to(x,y);

fill\_rectangle(x,y,curtain\_width,height);

fill\_rectangle(new\_x,y,curtain\_width, height);

}

if(randomn\_mess>2) //normal window

{

set\_pen\_color(r,g,b);

fill\_rectangle(x,y,width,height);

}

}

void row\_of\_windows(double const x, double const y, double const width, double const height, double const r, double const g, double const b, int num\_of\_windows\_row) {

double new\_x = x;

for(int i=1; i<=num\_of\_windows\_row; i++){

create\_window(new\_x, y, width, height, r, g, b);

new\_x = new\_x +width\*1.2;

move\_to(new\_x,y);

}

}

void building\_color() {

int red= random\_in\_range(200,255);

int green= random\_in\_range(104,255);

int blue= random\_in\_range(0,150);

double r= red/255.0;

double g= green/255.0;

double b= blue/255.0;

set\_pen\_color(r,g,b);

}

void all\_building\_windows(double const x, double const y, double const width, double const height, int const num\_windows\_row, int const num\_windows\_column, double const building\_width, double const building\_height){

int red= random\_in\_range(0,50);

int green= random\_in\_range(20,102);

int blue= random\_in\_range(20,102);

double r= red/255.0;

double g= green/255.0;

double b= blue/255.0;

double new\_y = y;

double const building\_x= x-width\*.3;

double const building\_y= y+height\*.4;

building\_color();

fill\_rectangle(building\_x, building\_y, building\_width, -building\_height);

for(int i=1; i<=num\_windows\_column; i++) {

row\_of\_windows(x, new\_y, width, -height, r, b, g, num\_windows\_row);

new\_y = new\_y-height\*1.4;

}

}

void cityscape(double const x, double const y){

int new\_x = x;

int const edge= 1100;

while(new\_x<= edge){

double width= random\_in\_range(10,20);

double height= random\_in\_range(15,25);

int number\_of\_windows\_row = random\_in\_range(3,7);

int number\_of\_windows\_column= random\_in\_range(3,7);

double building\_height= (height\*.8)+(number\_of\_windows\_column\*height\*1.4);

double building\_width= (width\*.4)+(number\_of\_windows\_row\*width\*1.2);

all\_building\_windows(new\_x, y, width, height, number\_of\_windows\_row, number\_of\_windows\_column, building\_width, building\_height);

new\_x= new\_x+30+building\_width;

}

}

void car(int const x, int const y){

int const color = random\_in\_range(1,5);//random color of car

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

if (color==1) set\_pen\_color(color::light\_blue);

if (color==2) set\_pen\_color(color::blue);

if (color==3) set\_pen\_color(color::pink);

if (color==4) set\_pen\_color(color::purple);

if (color==5) set\_pen\_color(color::orange);

fill\_rectangle(x,y,20,-15);//main body

fill\_rectangle(x+20,y,15,-10);//hood

}

move\_to(x+5,y);

set\_pen\_width(7);

set\_pen\_color(color::grey);

draw\_point();//wheel1

move\_to(x+20,y);

draw\_point();//wheel2

set\_pen\_color(color::grey);

fill\_rectangle(x+2,y-8,7,-5);//window 1

fill\_rectangle(x+11,y-8,7,-5);// window 2

set\_pen\_color(color::yellow);

fill\_rectangle(x+30,y-4,4,4);//front detail

}

void random\_leaf(){ //leaf color

int red= random\_in\_range(0,50);

int green= random\_in\_range(50,255);

int blue= random\_in\_range(20,102);

double r= red/255.0;

double g= green/255.0;

double b= blue/255.0;

set\_pen\_color(r,g,b);//random shade of green trees

}

void trees\_b(){

int x= 20;//start position of first tree

int y= 360;

int const number\_of\_leaf = random\_in\_range(200,300);// amount of leaves

for(int i=1; i<28; i++) {

set\_pen\_width(10);

move\_to(x+2,y-1);

draw\_point();

set\_pen\_color(color::dark\_green);// a lot of grass

set\_pen\_width(9);

move\_to(x+2,y-1);

draw\_point();

set\_pen\_color(color::brown);//tree trunk

fill\_rectangle(x,y,5,-20);

for(int i=0; i<=number\_of\_leaf; i++){//leaf loop

random\_leaf();

set\_pen\_width(5);

int pos\_x = random\_in\_range(x-5,x+10);

int pos\_y = random\_in\_range(y-30,y-45);

move\_to(pos\_x,pos\_y);

draw\_point();

}

x=x+100;

}

}

void trees(){

int x= 20;//start position of first tree

int y= 490;

int const number\_of\_leaf = random\_in\_range(200,300);// amount of leaves

for(int i=1; i<28; i++) {

set\_pen\_width(10);

move\_to(x+2,y-1);

draw\_point();

set\_pen\_color(color::dark\_green);// a lot of grass

set\_pen\_width(9);

move\_to(x+2,y-1);

draw\_point();

set\_pen\_color(color::brown);//tree trunk

fill\_rectangle(x,y,5,-20);

for(int i=0; i<=number\_of\_leaf; i++){//leaf loop

random\_leaf();

set\_pen\_width(5);

int pos\_x = random\_in\_range(x-5,x+10);

int pos\_y = random\_in\_range(y-30,y-45);

move\_to(pos\_x,pos\_y);

draw\_point();

}

x=x+80;

}

}

void bushes(){

int x= 40;//start position of first tree

int y= 520;

int const number\_of\_leaf = random\_in\_range(200,300);// amount of leaves

for(int i=1; i<28; i++) {

for(int i=0; i<=number\_of\_leaf; i++){//leaf loop

random\_leaf();

set\_pen\_width(5);

int pos\_x = random\_in\_range(x-5,x+10);

int pos\_y = random\_in\_range(y-30,y-45);

move\_to(pos\_x,pos\_y);

draw\_point();

}

x=x+40;

}

}

void house\_color() {

int red= random\_in\_range(200,255);

int green= random\_in\_range(104,255);

int blue= random\_in\_range(0,150);

double r= red/255.0;

double g= green/255.0;

double b= blue/255.0;

set\_pen\_color(r,g,b);

}

void first\_floor\_house(double const x, double const y, double const width, double const height, double const r, double const g, double const b, int const num\_windows\_row){

double new\_x = x;

int const door = random\_in\_range(1,num\_windows\_row);//random position of door

for(int i=1; i<=num\_windows\_row; i++){

if(i== door){

double const door\_height= height\*1.4;

int const color = random\_in\_range(1,4);//actual door

if(color==1) set\_pen\_color(color::dark\_red);

if(color==2) set\_pen\_color(color::light\_green);

if(color==3) set\_pen\_color(color::dark\_green);

if(color==4) set\_pen\_color(color::dark\_red);

double const door\_y = y-height\*.4;

fill\_rectangle(new\_x, door\_y, 17.0, door\_height);

}

else{

create\_window(new\_x, y, width, height, r, g, b);//if not door, then window

}

new\_x = new\_x +width\*1.2;

move\_to(new\_x,y);

}

}

void roof(int const x, int const y, int const width, int const height) {

set\_pen\_width(2);

int const roof\_start\_x = x-2;

int const roof\_start\_y = y-height;

move\_to(roof\_start\_x, roof\_start\_y);

set\_heading\_degrees(57);

double const drawing\_distance = width\*.595+2;

draw\_distance(drawing\_distance);

set\_heading\_degrees(123);

draw\_distance(drawing\_distance);

set\_heading\_degrees(-90);

draw\_distance(width+3);

set\_pen\_color(color::brown);// actual roof

set\_pen\_width(1);

move\_to(roof\_start\_x, roof\_start\_y);

set\_heading\_degrees(57);

start\_shape();

draw\_distance(drawing\_distance); note\_position();

set\_heading\_degrees(123);

draw\_distance(drawing\_distance); note\_position();

set\_heading\_degrees(-90);

draw\_distance(width+3); note\_position();

fill\_shape();

}

void all\_house\_windows(double const x, double const y, double const width, double const height, int const num\_windows\_row, int const num\_windows\_column, double const building\_width, double const building\_height){

int red= random\_in\_range(204,255);

int green= random\_in\_range(204,255);

int blue= random\_in\_range(0,50);

double r= red/255.0;

double g= green/255.0;

double b= blue/255.0;

double new\_y = y;

double const building\_x= x-width\*.2;

double const building\_y= y+height\*.4;

set\_pen\_color(color::brown);

fill\_rectangle(building\_x-1, building\_y+1,building\_width+2, -building\_height-2);

house\_color();

fill\_rectangle(building\_x, building\_y, building\_width, -building\_height);

roof(building\_x, building\_y, building\_width, building\_height);

for(int i=1; i<=num\_windows\_column; i++){

if(i==1){

first\_floor\_house(x,new\_y, width, -height, r, g, b, num\_windows\_row);

}

else{

row\_of\_windows(x, new\_y, width, -height, r, g, b, num\_windows\_row);

}

new\_y = new\_y-height\*1.2;

}

}

void house(int const x, int const y){

int new\_x = x;

int const edge= 1100;

while(new\_x<= edge){

double width= 20;

double height= 20;

int num\_windows\_row = random\_in\_range(2,3);

int num\_windows\_column= random\_in\_range(1,2);

double building\_height= (height\*.8)+(num\_windows\_column\*height\*1.1);

double building\_width= (width\*.4)+(num\_windows\_row\*width\*1.1);

all\_house\_windows(new\_x, y, width, height, num\_windows\_row, num\_windows\_column, building\_width, building\_height);

new\_x= new\_x+50+building\_width;

}

}

void all\_together(){

background();

car(30,407);

car(400,382

);

car(1000,407);

cityscape(10,355);

trees\_b();

trees();

bushes();

house(10,500);

}

void main(){

make\_window(1100,570);

all\_together ();

}

A picture containing grass, toy, yellow

Description automatically generated

A picture containing toy

Description automatically generated

A picture containing grass

Description automatically generated

A picture containing grass, clock

Description automatically generated