LAB - 7-1

7. Generate fractal patterns using i) Bezier ii) Koch Curve

i) Bezier

Source Code :

```
#include<stdio.h>
#include<stdlib.h>
#include<math.h>
#include<SDL2/SDL.h>

SDL_Window* window = NULL;
SDL_Renderer* renderer = NULL;
int mousePosX , mousePosY ;
int xnew , ynew ;

void drawCircle(int xc, int yc, int x, int y)
{
        SDL_RenderDrawPoint(renderer,xc+x,yc+y) ;
        SDL_RenderDrawPoint(renderer,xc-x,yc+y);
        SDL_RenderDrawPoint(renderer,xc+x,yc-y);
        SDL_RenderDrawPoint(renderer,xc-x,yc-y);
        SDL_RenderDrawPoint(renderer,xc+y,yc+x);
        SDL_RenderDrawPoint(renderer,xc-y,yc+x);
        SDL_RenderDrawPoint(renderer,xc+y,yc-x);
        SDL_RenderDrawPoint(renderer,xc-y,yc-x);
}
```

```
void circleBres(int xc, int yc, int r)
{
	int x = 0, y = r;
	int d = 3 - 2 * r;
	while (y >= x)
	{

		drawCircle(xc, yc, x, y);
		x++;



		if (d > 0)
		{
			y--;
			d = d + 4 * (x - y) + 10;
		}
		else
			d = d + 4 * x + 6;
		drawCircle(xc, yc, x, y);
	}
}

void bezierCurve(int x[] , int y[])
{
	double xu = 0.0 , yu = 0.0 , u = 0.0 ;
	int i = 0 ;
	for(u = 0.0 ; u <= 1.0 ; u += 0.0001)
	{
		xu = pow(1-u,3)*x[0]+3*u*pow(1-u,2)*x[1]+3*pow(u,2)*(1-u)*x[2]
			+pow(u,3)*x[3];
```

```
            yu = pow(1-u,3)*y[0]+3*u*pow(1-u,2)*y[1]+3*pow(u,2)*(1-u)*y[2]
                +pow(u,3)*y[3];
            SDL_RenderDrawPoint(renderer , (int)xu , (int)yu) ;
        }
}
int main(int argc, char* argv[])
{

    if (SDL_Init(SDL_INIT_EVERYTHING) == 0)
    {

        if(SDL_CreateWindowAndRenderer(640, 480, 0, &window, &renderer) == 0)
        {
            SDL_bool done = SDL_FALSE;

            int i = 0 ;
            int x[4] , y[4] , flagDrawn = 0 ;

            while (!done)
            {
                SDL_Event event;


                SDL_SetRenderDrawColor(renderer, 0, 0, 0,
SDL_ALPHA_OPAQUE);
                SDL_RenderClear(renderer);


                SDL_SetRenderDrawColor(renderer, 255, 255, 255,
SDL_ALPHA_OPAQUE);
```

```
                if(i==4)
                {
                        bezierCurve(x , y) ;
                        flagDrawn = 1 ;
                }


                SDL_SetRenderDrawColor(renderer, 128, 128, 128,
SDL_ALPHA_OPAQUE);
                circleBres(x[0] , y[0] , 8) ;
                SDL_SetRenderDrawColor(renderer, 255, 0, 0,
SDL_ALPHA_OPAQUE);
                SDL_RenderDrawLine(renderer , x[0] , y[0] , x[1] , y[1]) ;


                SDL_SetRenderDrawColor(renderer, 128, 128, 128,
SDL_ALPHA_OPAQUE);
                circleBres(x[1] , y[1] , 8) ;


                SDL_SetRenderDrawColor(renderer, 255, 0, 0,
SDL_ALPHA_OPAQUE);
                SDL_RenderDrawLine(renderer , x[1] , y[1] , x[2] , y[2]) ;


                SDL_SetRenderDrawColor(renderer, 128, 128, 128,
SDL_ALPHA_OPAQUE);
                circleBres(x[2] , y[2] , 8) ;
```

```
                    SDL_SetRenderDrawColor(renderer, 255, 0, 0,
SDL_ALPHA_OPAQUE);
                    SDL_RenderDrawLine(renderer , x[2] , y[2] , x[3] , y[3]) ;


                    SDL_SetRenderDrawColor(renderer, 128, 128, 128,
SDL_ALPHA_OPAQUE);
                    circleBres(x[3] , y[3] , 8) ;


                    if (SDL_PollEvent(&event))
                    {

                        if (event.type == SDL_QUIT)
                        {
                            done = SDL_TRUE;
                        }

                        if(event.type == SDL_MOUSEBUTTONDOWN)
                        {
                            /*If left mouse button down then store
                            that point as control point*/
                            if(event.button.button ==
SDL_BUTTON_LEFT)
                            {

                                if(i < 4)
                                {
                                    printf("Control
Point(P%d):(%d,%d)\n"
                                    ,i,mousePosX,mousePosY) ;
```

```
                    x[i] = mousePosX ;
                    y[i] = mousePosY ;
                    i++ ;
                }
            }
        }

        if(event.type == SDL_MOUSEMOTION)
        {

            xnew = event.motion.x ;
            ynew = event.motion.y ;

            int j ;


            if(flagDrawn == 1)
            {
                for(j = 0 ; j < i ; j++)
                {

                    if((float)sqrt(abs(xnew-x[j]) *
abs(xnew-x[j])

                        + abs(ynew-y[j]) *
abs(ynew-y[j])) < 8.0)

                    {

                        x[j] = xnew ;
                        y[j] = ynew ;
```

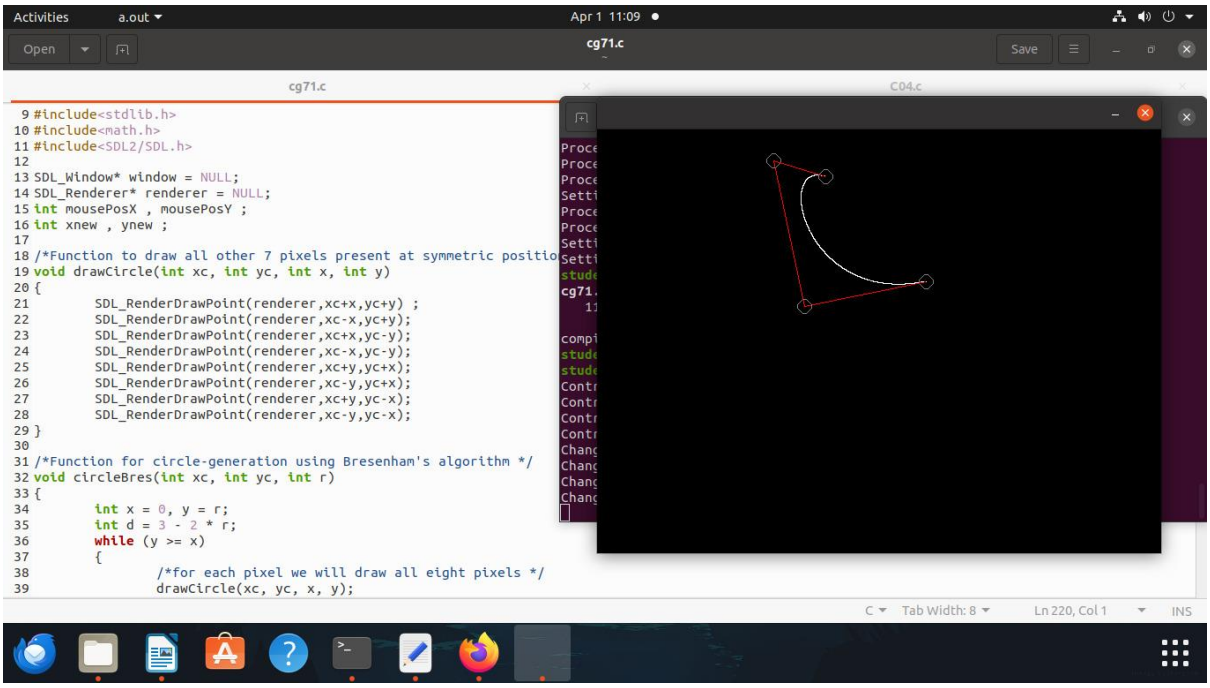
```
                                                    printf("Changed Control
Point(P%d):(%d,%d)\n"
                                                                    ,j,xnew,ynew) ;
                                                            }
                                                    }
                                            }

                                            mousePosX = xnew ;
                                            mousePosY = ynew ;
                                    }
                            }

                            SDL_RenderPresent(renderer);
                    }
            }

            if (renderer)
            {
                    SDL_DestroyRenderer(renderer);
            }
            if (window)
            {
                    SDL_DestroyWindow(window);
            }
    }
    SDL_Quit();
    return 0;
}
```

Output :


Activities
a.out
Apr 1 11:09
Open
cg71.c
Save
cg71.c
C04.c
#include<stdlib.h>
#include<math.h>
#include<SDL2/SDL.h>
SDL_Window* window = NULL;
SDL_Renderer* renderer = NULL;
int mousePosX , mousePosY ;
int xnew , ynew ;
/*Function to draw all other 7 pixels present at symmetric positio
void drawCircle(int xc, int yc, int x, int y)
{
SDL_RenderDrawPoint(renderer,xc+x,yc+y) ;
SDL_RenderDrawPoint(renderer,xc-x,yc+y);
SDL_RenderDrawPoint(renderer,xc+x,yc-y);
SDL_RenderDrawPoint(renderer,xc-x,yc-y);
SDL_RenderDrawPoint(renderer,xc+y,yc+x);
SDL_RenderDrawPoint(renderer,xc-y,yc+x);
SDL_RenderDrawPoint(renderer,xc+y,yc-x);
SDL_RenderDrawPoint(renderer,xc-y,yc-x);
}
/*Function for circle-generation using Bresenham's algorithm */
void circleBres(int xc, int yc, int r)
{
int x = 0, y = r;
int d = 3 - 2 * r;
while (y >= x)
{
/*for each pixel we will draw all eight pixels */
drawCircle(xc, yc, x, y);
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