Faculty of Computers, Informatics and Microelectronics

Technical University of Moldova

WINDOWS PROGRAMMING

Laboratory work #3

Basics of Working with Mouse. GDI Primitives. Bezier Curve.

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Laboratory work #2

1 Purpose of the laboratory

Gain knowledge about basics of event-driven programming, understanding of window's class and basic possibilities of Win32 API. Work with Mouse. GDI Primitives. Bezier Curve.

2 Laboratory Work Requirements

– **Basic Level (grade 5 - 6) you should be able to:**

a) Draw 5 lines of different colors and weights

b) Draw 2 Bezier curves

c) Draw 2 different objects using mouse

– **Normal Level (grade 7 - 8) you should be able to:**

a) Realize the tasks from *Basic Level*.

b) Draw a custom bitmap image

c) Fill 2 object with gradient

d) Hook keyboard input. Add 2 different keyboard combinations that will change mouse ability to draw objects (ex. on Ctrl+C will draw circles, on Alt+R will continue to draw circles but of read color)

e) Draw a Bezier curve using mouse

– **Advanced Level (grade 9 - 10) you should be able to:**

a) Realize the tasks from *Normal Level*.

b) Use mouse as an eraser with adjustable width

c) Added 1 button for clearing the drawing area

3 Laboratory work implementation

3.1 Tasks and Points

-Draw few lines of different colors and weights

Lines are drawn with the MoveToEx() function which moves to the specified point and LineTo() - draws a line from specified position to another one.You can choose whatever color and weight you want your line to be from the menu..

-Draw a Bezier(one or more) curve

Bezier Curve is determined by 4 points(x,y). I've specified a POINT array with custom points. Therefore curve is drawn with the PolyBezier() function.

-Draw few plane objects of different colors, weights, filled and not

Drawn objects : Ellipse with Ellipse() function, rectangle with Rectangle() function. Weight is determined by the value of weight variable. For filled option there is a checkbox, if it is checked - the object is drawn filled, otherwise - not.Therefore you can draw whatever objects you want and I even made shortcuts for one of them.

-Draw 2 different objects using mouse

Objects that are drawn with mouse, are managed in the WMLBUTTONDOWN , WMLBUTTONUP , WMMOUSEMOVE and WMRBUTTONDOWN. Objects that are drawn with mouse - Pen, Line, Polyline, Ellipse, Rectangle.

-Draw a custom bitmap image (1 pt)

I actually made a bitmap image in paint from more elements, aka mended more tools in one picture.The bitmap was attached to the application with the help of LoadImage() , GetObject() and BitBlt() functions.

-Add a switch (button, select list...) that will change mouse ability to draw objects

There is a group-box of radiocheck buttons for choosing desired color, made with WSGROUP style. Also there are several push buttons that allows the user to choose the desired tool to draw (paint).

-Hook keyboard input. Add 2 different keyboard combinations that will change mouse ability to draw objects (ex. on Ctrl+C will draw circles, on Alt+R will continue to draw circles but of read color)

I made some shortcuts to be used from the keyboard.One is for choosing to draw rectangles by pressing CTRL + E and another option is clearing the screen from the keyboard by pressing CTRL + C.
-Added 1 button for clearing the drawing area

The clear button which also has a shortcut

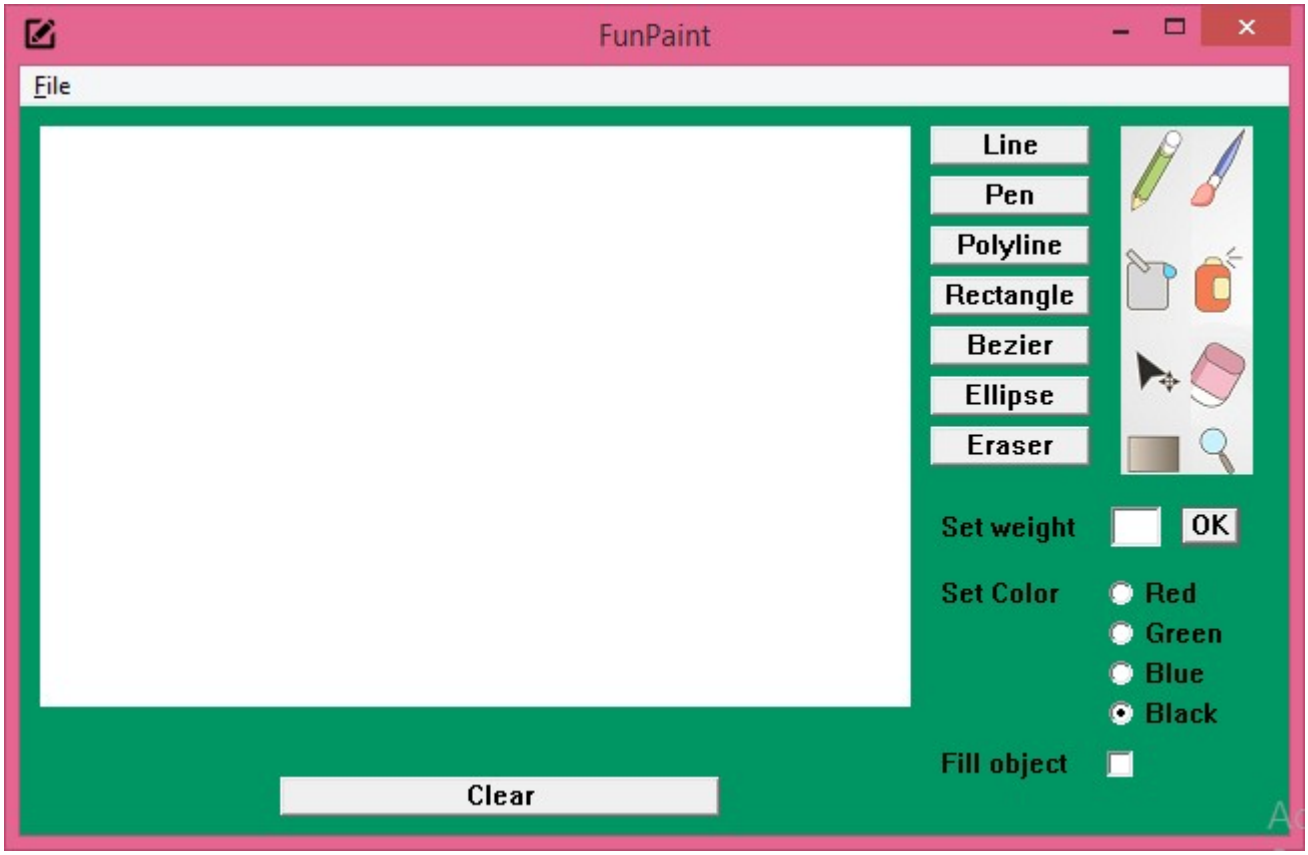
3.2 Laboratory work analysis

Add link to your repository. Create a README.md file for each laboratory work you submit. `https://github.com/ValeriaBega/PW`

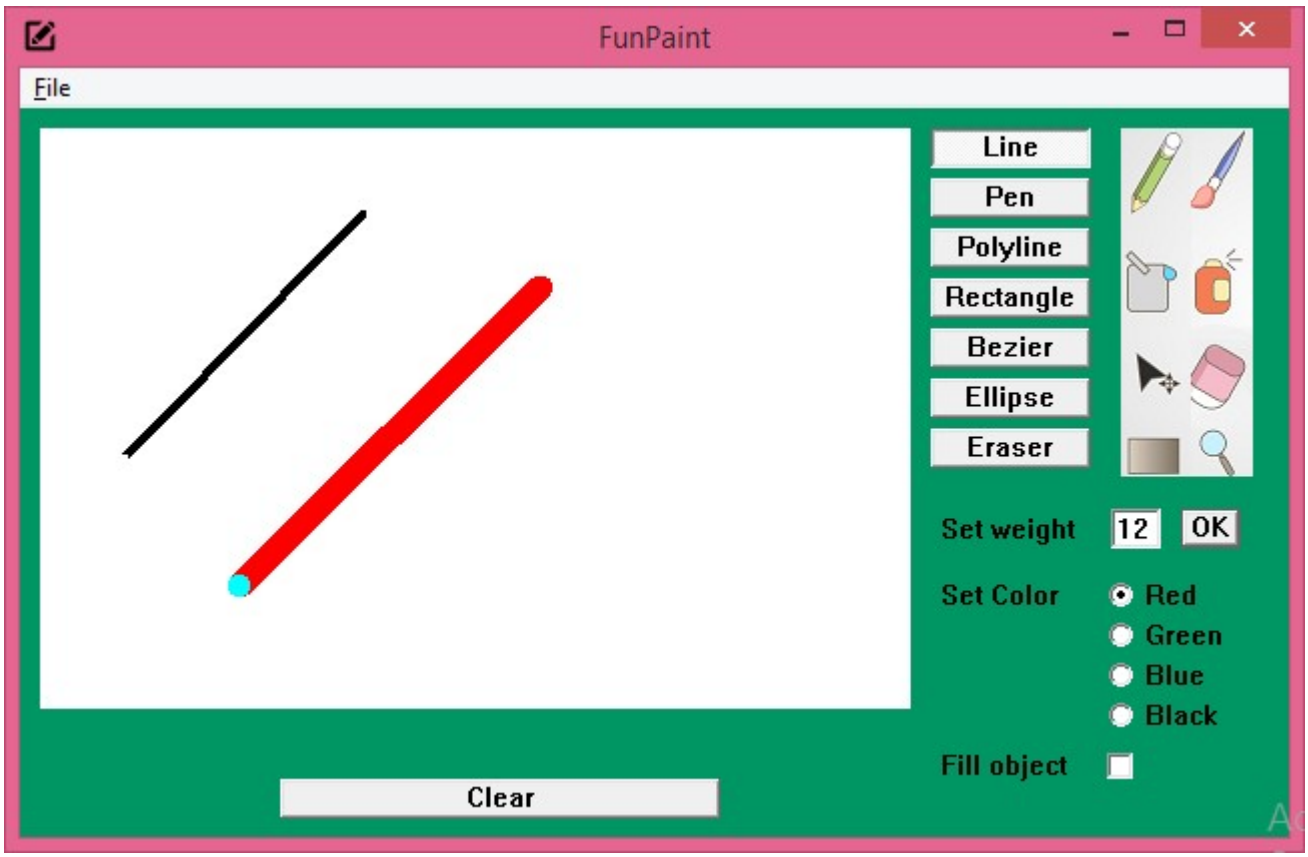
I already explained what my laboratory works contains in the paragraph above.We had to work with some new features than in the previous laboratory works.This application was some kind of paint so I had to do the research of how to draw different kinds of line or objects.See further explanation in the paragraph above.

3.3 Prove your work with screens

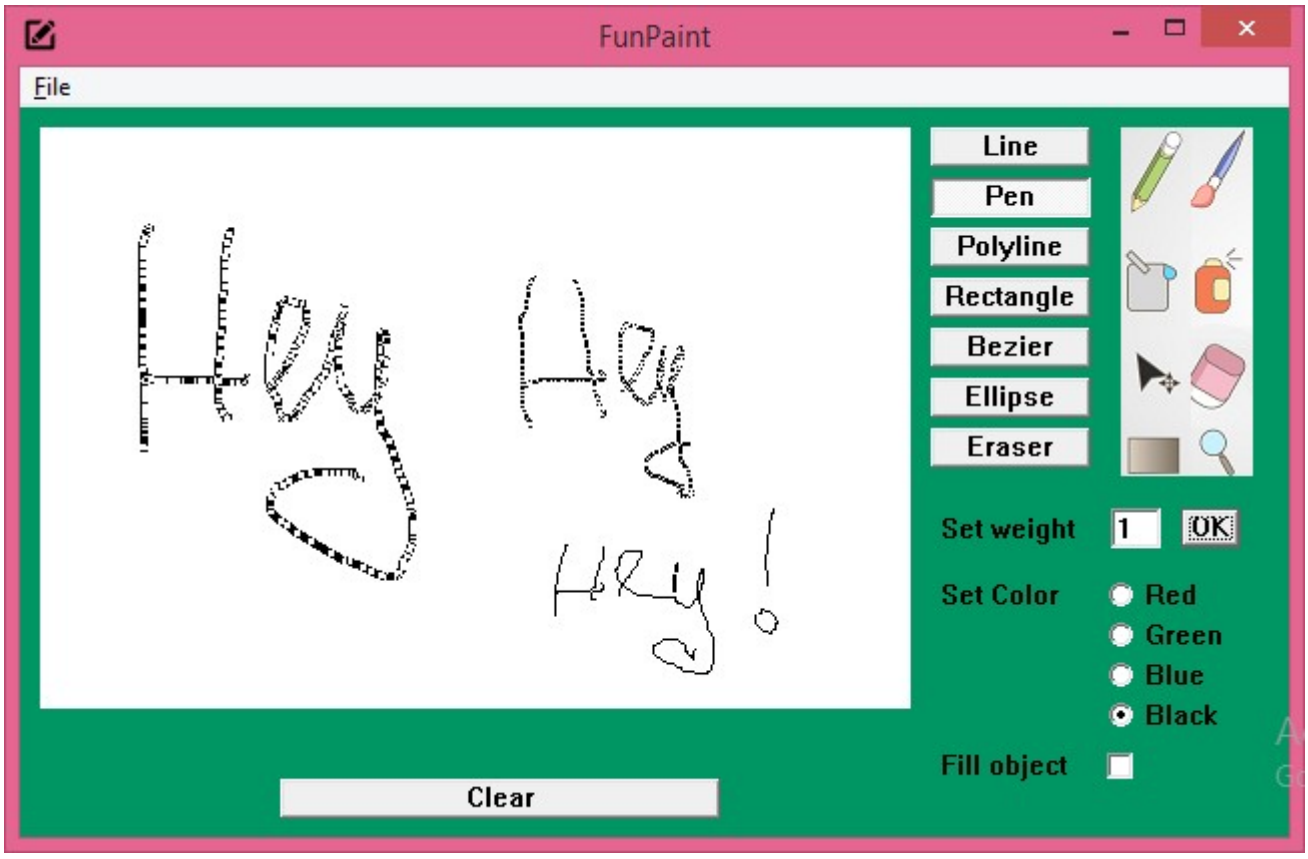
The basic window as we have it:



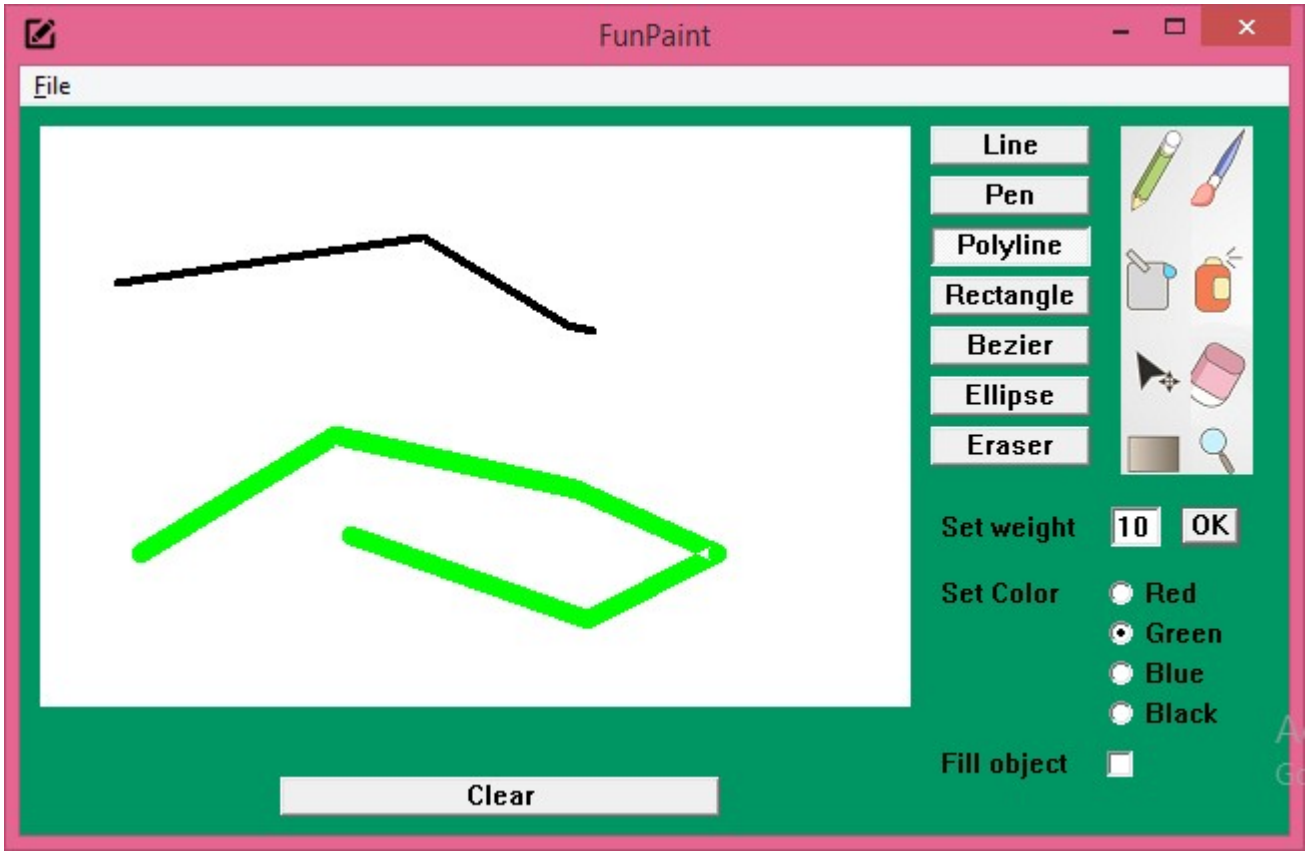
Drawing some different lines:



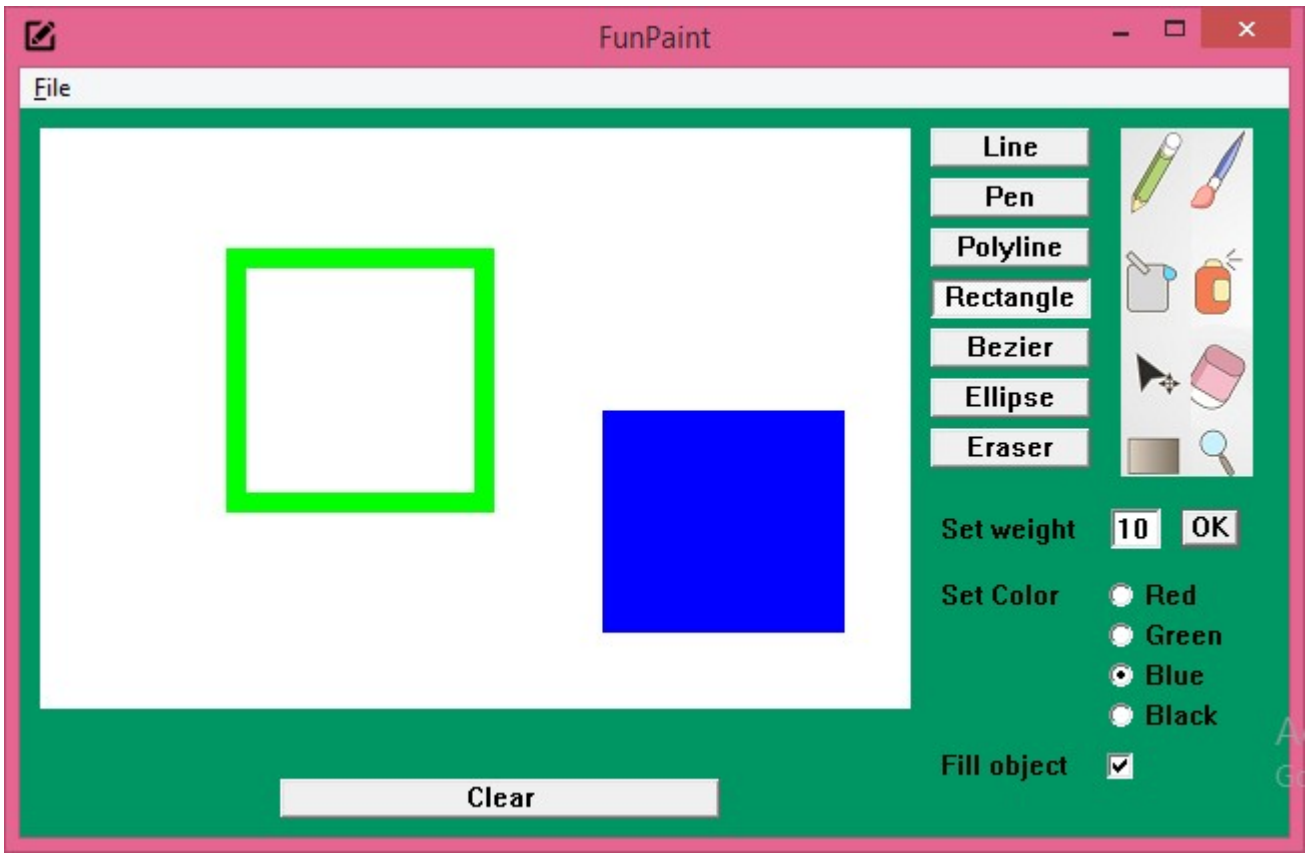
Using the pen tool:



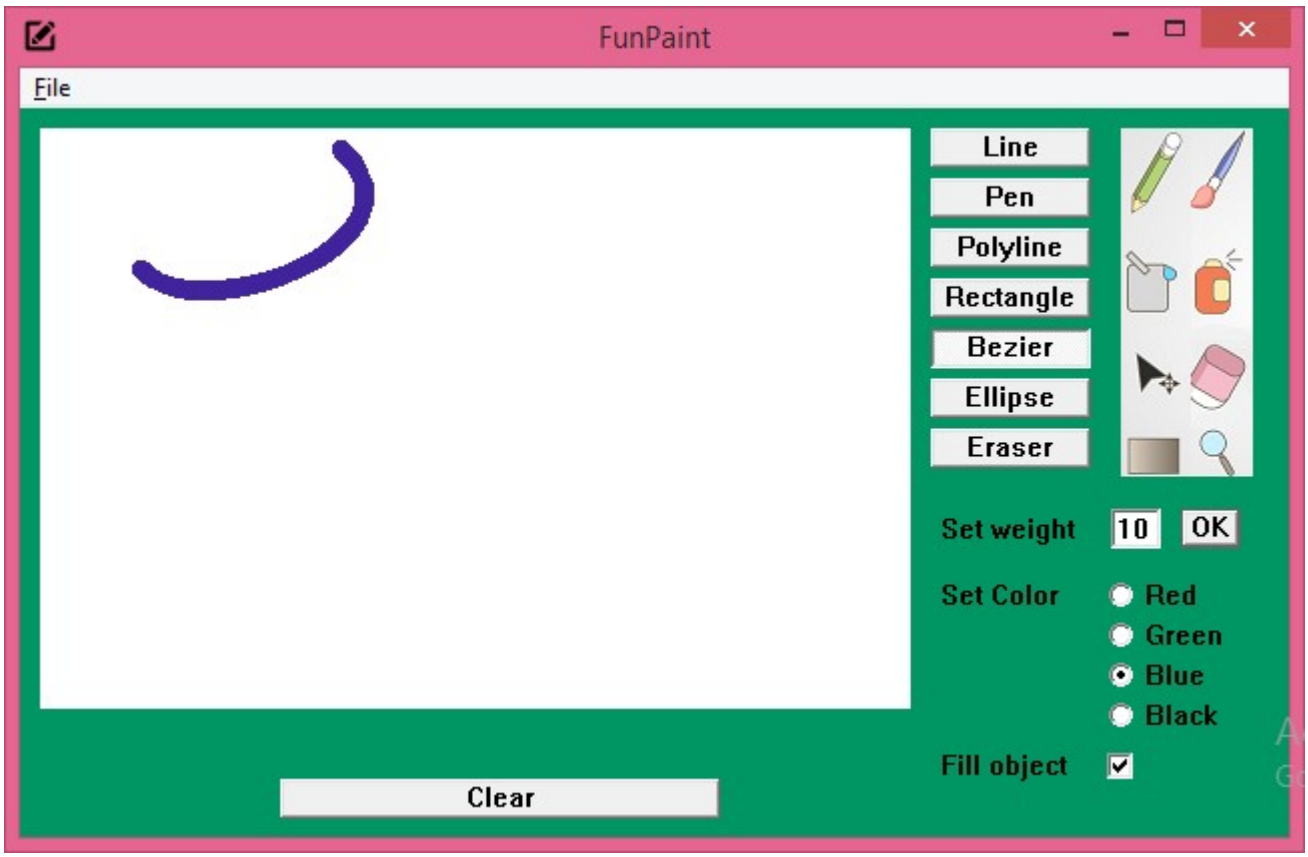
Using the polyline option:



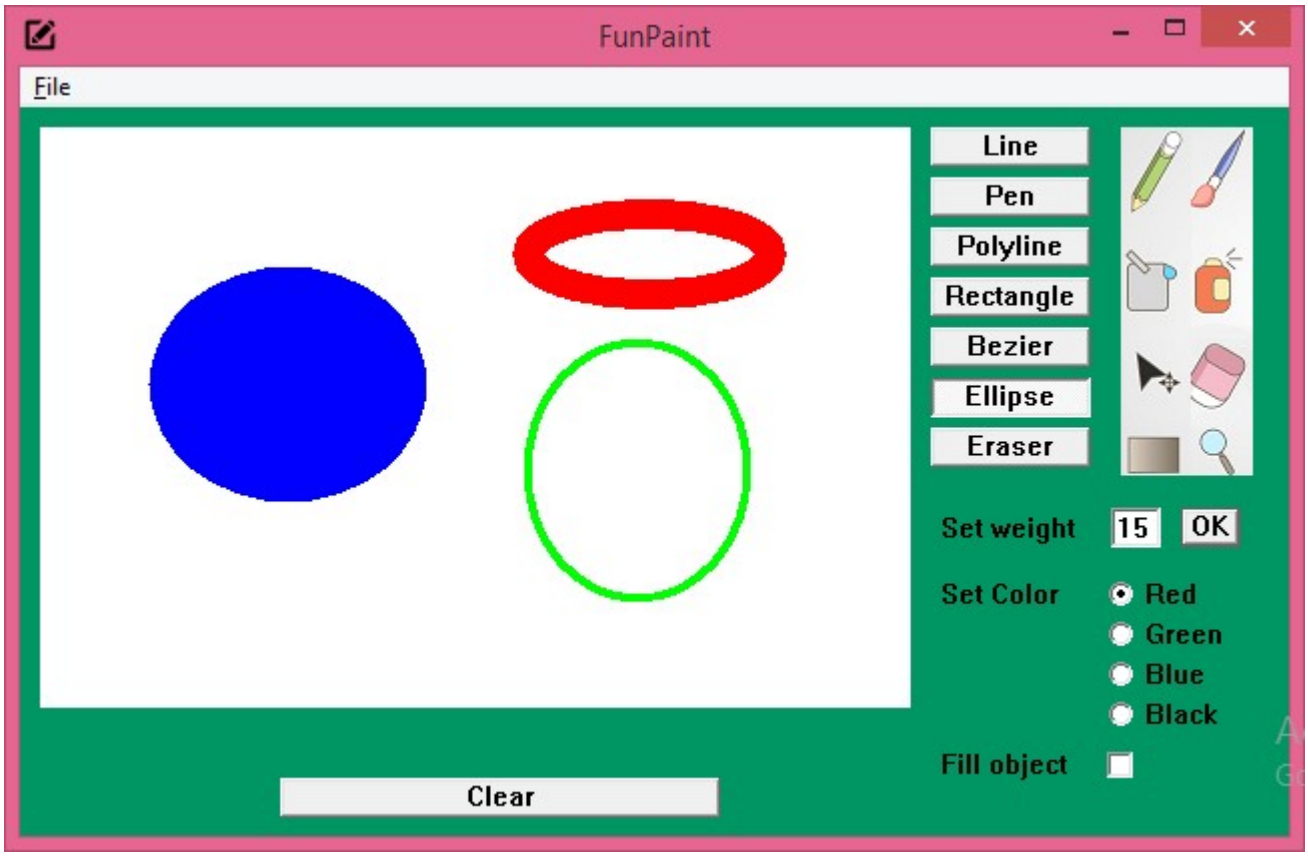
Drawing some filled in and not rectangles:



Here we have the bezier:



Drawing some ellipses with the mouse:



Unfortunately I was too lazy to make a gif to show the shortcuts and presenting them on screenshots is kinda impossible, so they are not shown here, but they do exist and they work!

Conclusions

This laboratory work was hard but with a lot of fun. I developed skills in working with GDI primitives. It was shown that we can draw different objects like (lines, ellipses) with different width and colors.I had a lot of problems with drawing the bezier, but after some research and help I finally managed to do it.In this laboratory work I familiarized myself with all the drawing possibilities the Windows API gives us, and with the right way of working with the mouse, and letting the user control the application features using mouse clicks.

It was challenging to complete the tasks, I really enjoyed performing them. For me it's a new experience and it improve my skills as programmer. I think there are a little bit space for improvements, and I'll make them as soon as possible. This laboratory work broadened and deepened my understanding of Event-Driven Programming, message-sending, and Win32 API in particular.

References

1 Microsoft Windows, *official page*, https://msdn.microsoft.com/en-us/library/bb384843.aspx

2 C++ website, http://www.cprogramming.com/tutorial/opengl_first_windows_app.html

3 LateX basics, https://www.sharelatex.com