Object Oriented Programming
Assignment 04 - Making a complete Paint Program

April 6, 2023

1 Assignment Goal

The purpose of this assignment is to apply whatever we have learned throughout the course and applying it to one complete package in the form of your very own paint program. If you have been doing good programming so far, it will be great time to creating your github account and saving your project online. This is something you must make a habit of irrespective of course or assignment. Always back it up online. This tutorial is mainly for using github desktop for unity, but you can follow it to do it for any project. Best would be to learn to use github with command line interface. This is the best way to keep backups and you should make it a habit to use it. Any excuse about losing data due to PC crash will not be accepted.

You can access Java Documentation at this link.

For all the graphics, you will need to read the Java Documentation at this link.

2 The Task

In this assignment you will be completing the entire project whose groundwork you did in the previous assignment.

You will be doing the following tasks:

- You will create your own save functionality or by using Object Serialization to save the state of objects. This topic will be covered in the coming weeks.
- Undo and Redo will only work on the currently selected layer
- You will use the Singleton Design Pattern to create the Gradient Window
- You will use the Singleton Design pattern to create a Tooltip (more on that later)
- You will implement all the shapes
- You will implement the free drawing functionality with changing stroke length
- You will use a Singleton Design Pattern to create a Grid
- Every shape will be drawn with the selected stroke color as outline and fill color
- The stroke size will also work for the outline of the shapes that are drawn
- Complete functionality of all the items

2.1 Tooltip

You will create a Tooltip which will give relevant information about all the items in your application. For example, showing RGB value on color buttons, shortcuts on File menus, Shape names on shape buttons etc. This can easily be done using Interfaces.

Figure 1: Tooltip

2.2 Free Drawing

You can create free drawing by clicking and dragging on the screen. You can do this by drawing circles of unit radius or of a selected stroke width as radius. All the drawn circles will go in an arraylist in a Free Drawing Object that will inherit from Shape Abstract class.

2.3 Grid and Grid Button

You will create one more button, Grid Button. Clicking on which you will change the size of the grid from the default "OFF" state to 2, 4, 8, 16, 32 and 64 pixel size and then back to "OFF". The size is the size of the square side of which the entire grid will be made. Thus you will be able to see a grid on top of your drawing. The grid can be of any color but is normally made of dark-gray value

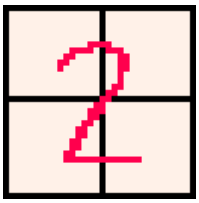

Figure 2: Grid Button

2.4 Layers

Layers will be active now. You will always draw on the top-most layer. The shapes will overlap each other based on their position in the layers. Removing a layer will remove all the objects inside that layer. The last remaining layer cannot be removed.

2.5 Bonus Marks

Due to overwhelming demand for some extra work for getting some bonus marks lost during the mid, you have a chance to regain 5 percent of your marks if you are able complete the requirements given below. Keep in mind that no extension will be given to achieve this and you will only get the marks if you manage to complete all the requirements. There are not going to be any partial marks. This is also only applicable if you are able to complete all the requirements of Assignment 4, so that should take priority. This is only for my 2 sections.

- You will need to implement Cubic Bezier Curves in your software. You can learn about bezier curves from this link.
- You will need to implement it mathematically without using any libraries.
- You will need to create an extra button to draw the curve.
- It will be added to the Shapes arraylist just like every other shape
- As you click to create anchor points, the curve should automatically change shape in real-time
- Once done, you will create a lecture video which explains what a bezier curve is and how you implemented it in your code. the video should not be longer than 15 mins.
- Upload the video to your Youtube channel and give the link to your video in a text file when making your submission.

3 Submission

The deadline of the assignment is 30th of April at 11:55 pm. There will be no extensions and no late submissions will be accepted. You should complete the assignment at least a day before the submission deadline.

You will zip the source folder and name it as your_name_ERP.zip. Suppose your name is John Doe and your ERP is 12345, then the name of your file should be John_Doe_12345.zip. You will then upload it to LMS before the deadline.

- If you upload the wrong file, you will not get any marks.
- If at the last moment LMS does not work, you will not get marks. LMS tends to fail at the last moment as everyone is uploading files. The load makes it crash so avoid uploading the files at the last moment. If you choose to take that risk, then it will be your choice.
- Do not email me your assignments or upload them to dropbox, they will not be checked
- If the size of the files is too big, you are uploading files that are not required so remove those files from the zip file and then upload them.
- If your files are not in a zip file, they will not be checked.

Keep in mind that any attempt at plagiarism or collusion will cause you to automatically fail the course, hence write your own code.