Alexandria University Faculty of Engineering Computer and Systems Engineering Dept. CS221: Object Oriented Programming

Paint

Made by:

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1. Introduction:

i) Problem Statement.

Design and implement an OOP model of a Vector Drawing Based application where the user can draw various shapes (Circle, line, Ellipse, triangle …. etc.) The model also supports resizing, Coloring and Movement of already drawn shapes. Furthermore, online collaborative drawing is supported in real-time.

Progress can be saved or loaded through 2 different formats(JSON, XML) at any time. Dynamic class loading is also supported to load different shapes at runtime.

2. Software Design

The project consists of multiple packages.

i) GUI:

This package includes the UI design.

(a) **Controller**

It is responsible for drawing on the screen and links the ShapesSimulator and ShapeHandler classes to the GUI sending the user's actions to these classes to draw or resize the shapes as requested.

ii) Backend:

1. ShapesHandler

It is responsible for accessing shapes using their respective ID or checking if an ID is a valid shapeID. It also determines if the the point clicked intersects with a shape and outlines it. Furthermore, it is responsible for resizing and moving shapes by changing their properties.

2. ShapesSimulator

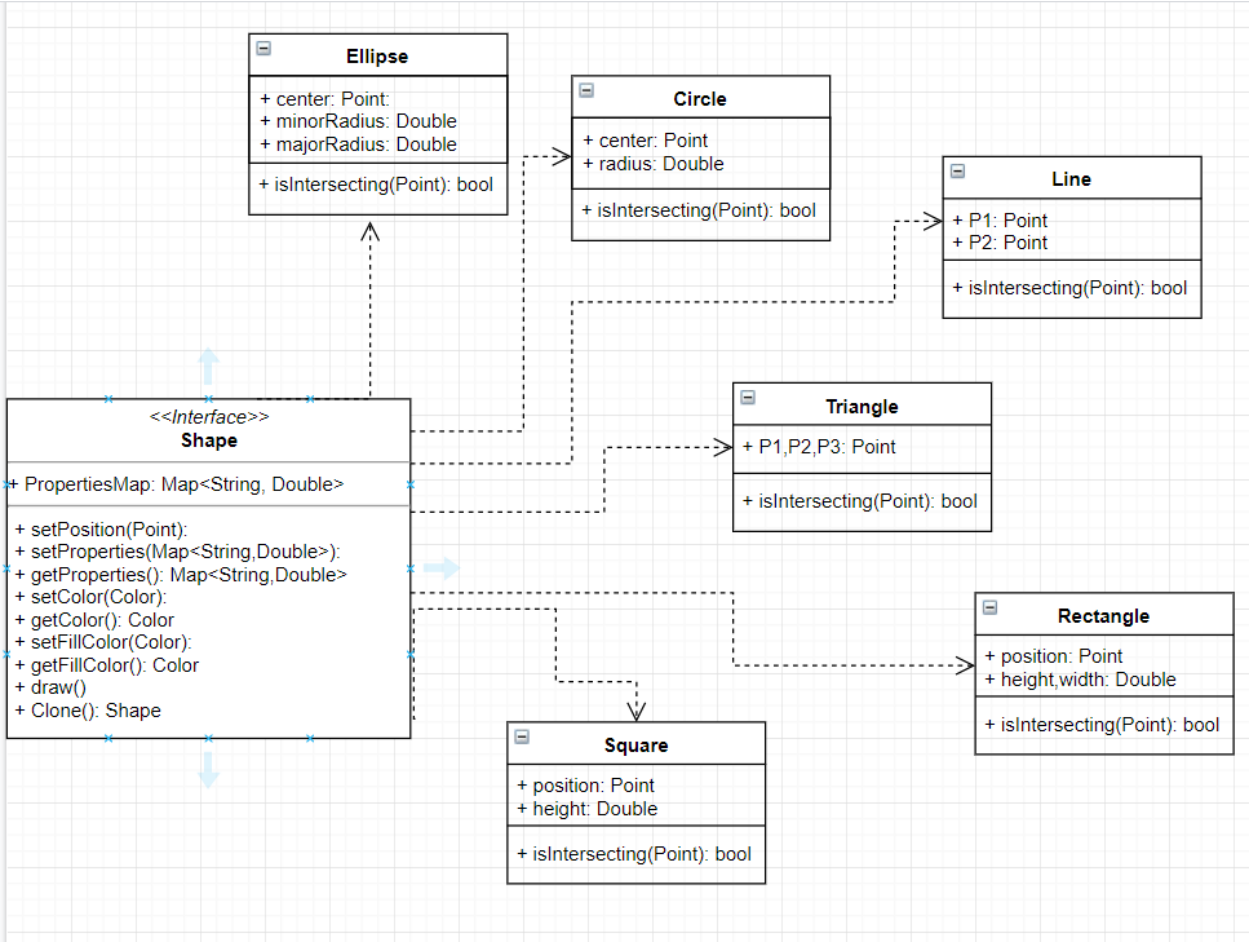
It interacts with the GUI, receives the points clicked by the user to specify the shape’s coordinates. Then, it simulates the shape by choosing the correct shape and creating one with the proper parameters and draws it.

3. PaintEngine

Implementing the DrawingEngine interface, this class holds the shapes list and can refresh the drawn shapes. Moreover, it offers the ability to save & load in different formats (XML and JSON) Undo & Redo is also implemented in the PaintEngine class. All changes on shapes list occur here (Updating, removing and adding)

iii) Shapes:

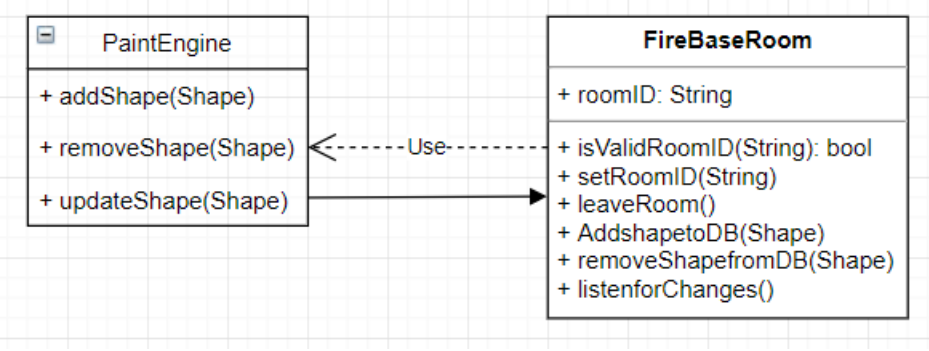
This includes all the support shapes and can increase in classes at runtime through dynamic loading.



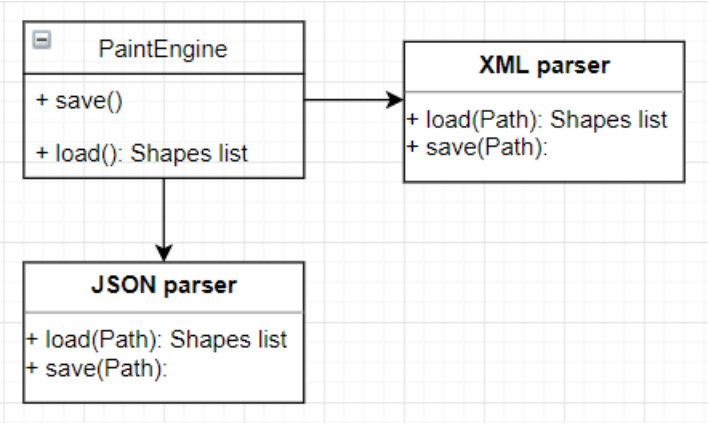
All shapes implement the Shape interface. They include the isIntersecting method which states whether a point is in the shape or not. They also include strokeSize and colors.

iv) Firebase:

A firebase database is used to support collaborative real-time drawing.

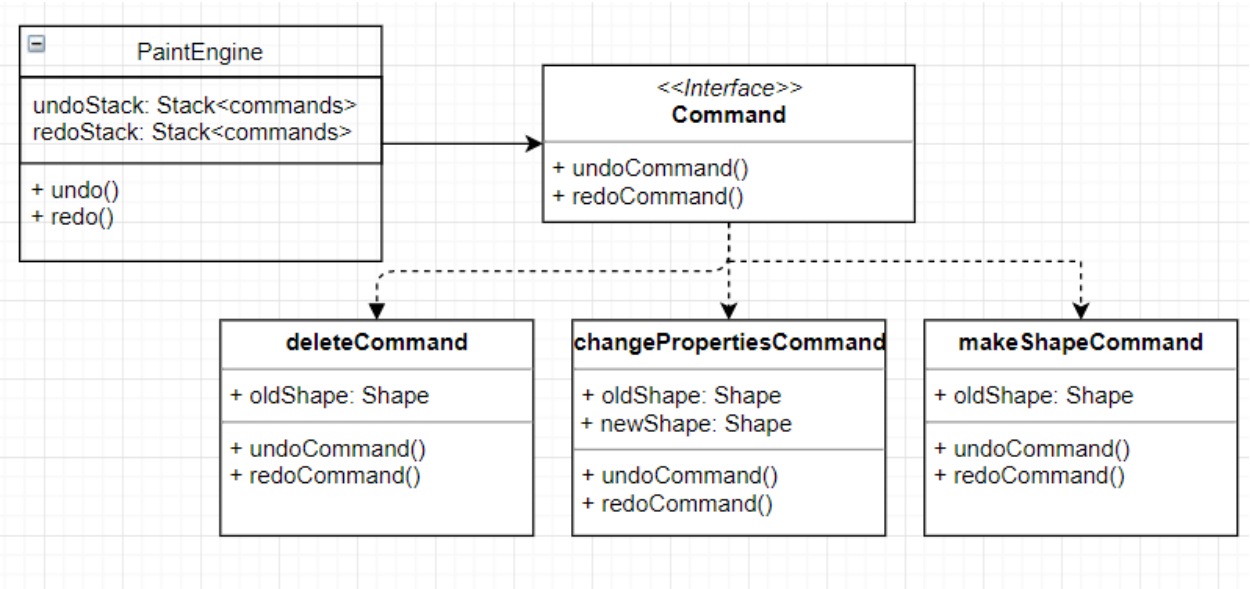


3. Other important UMLs



Save & load UML diagram.

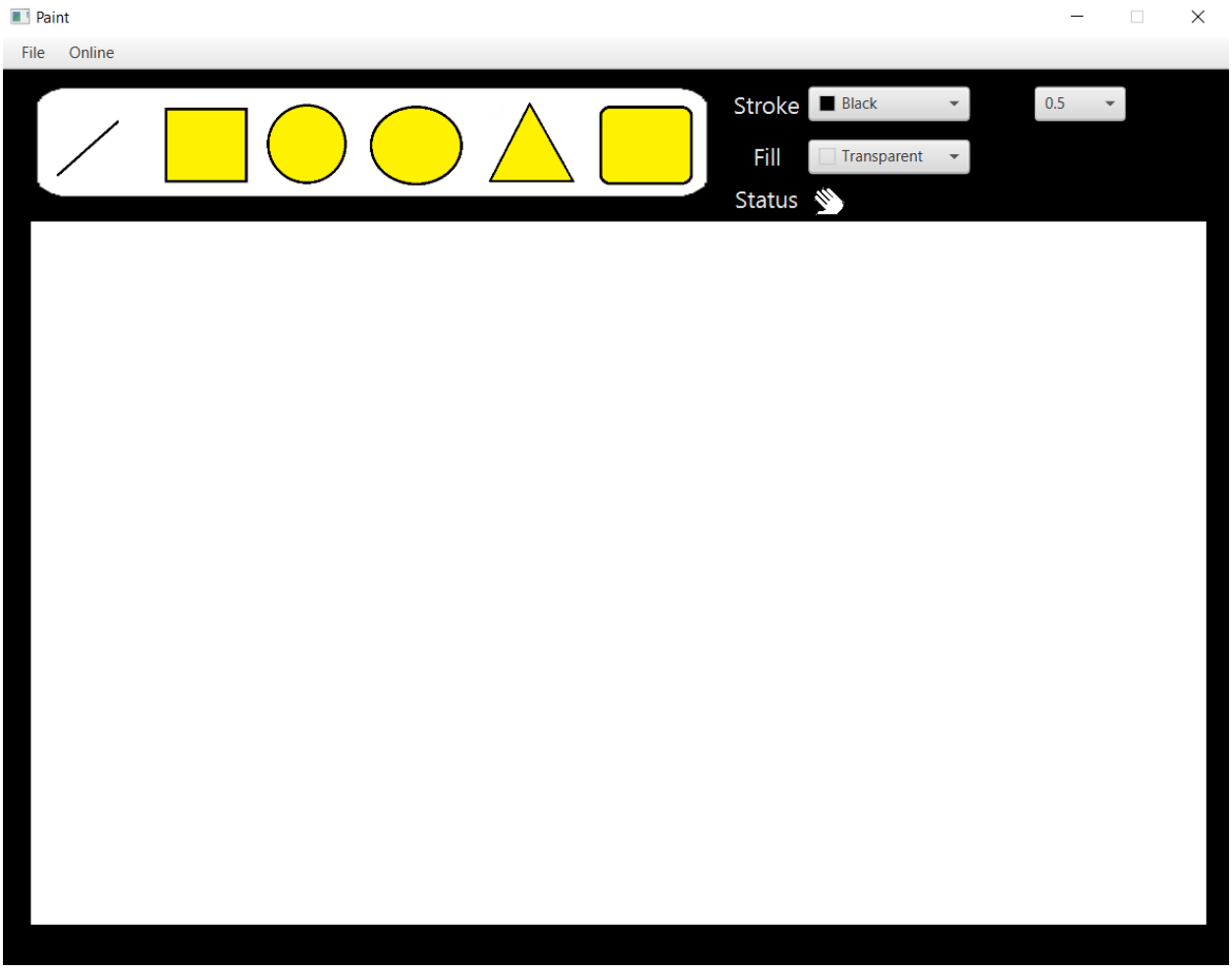
The appropriate parser is chosen by the paint Engine according to the format chosen by the user. The shapes list is then imported or exported to the specified path.



Undo & redo UML Diagram.

When undo is called, the undoStack is popped and the command that was in the peak is undone using the undoCommand method. Same goes for the redo.

4. GUI Overview:



The design is rather simple and straightforward. Colors are chosen using pickers on the topside. Stroke size is also chosen from a drop-down menu. Status indicates whether the user is currently in drawing mode or select mode.

The menu bar has 2 menus:

1. File: includes Save& Load and load JAR
2. Online: Create new room, join an existing room and leave current room

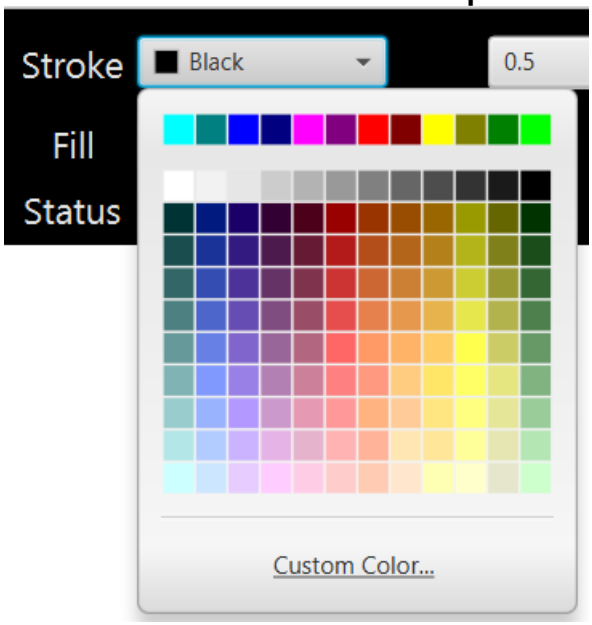
5. User Manual

I. Drawing:

1. Specify the required shape by clicking on its image on the upper panel.
2. Click on the first position of the shape.
3. Specify the second point which will indicate radius for circle & ellipse, length and width for rectangle
4. The triangle however, requires a third point specified.

II. Changing color:

1. Click on the Color drop-down menu in the upper panel.



Choose the desired color.

III. Move, Resize & Delete

1. Select the desired shape using left click on the shape.
2. To move: hold the left mouse button and drag the mouse to the required location that the shape needs to be moved to.
3. To resize: Hold the right mouse button and drag the mouse to the desired size of shape.
4. To delete: press the delete button on your keyboard.

IV. Undo & Redo

To undo press Z and to Redo press X.

V. Save & Load

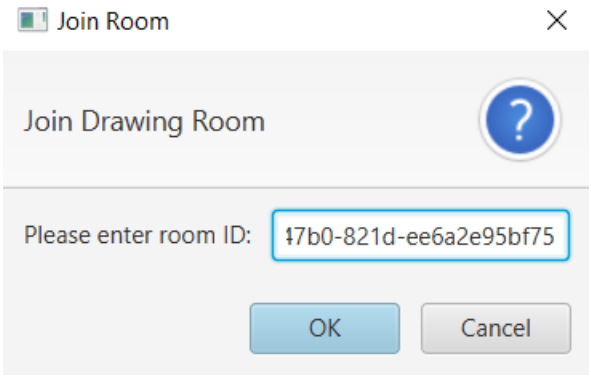
1. Press File on the menu bar.
2. Select save or load accordingly.
3. Specify the required path.
4. Specify the required format in case of saving.

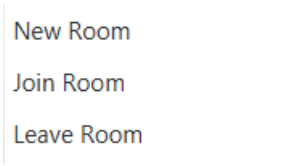
VI. Dynamic Loading

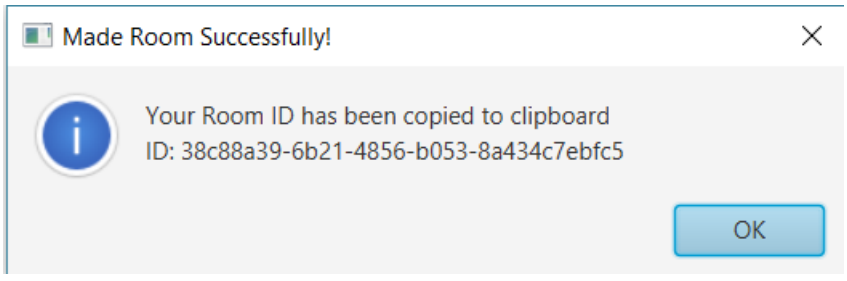
1. Press File on the menu bar
2. Select load JAR
3. Specify the JAR's path

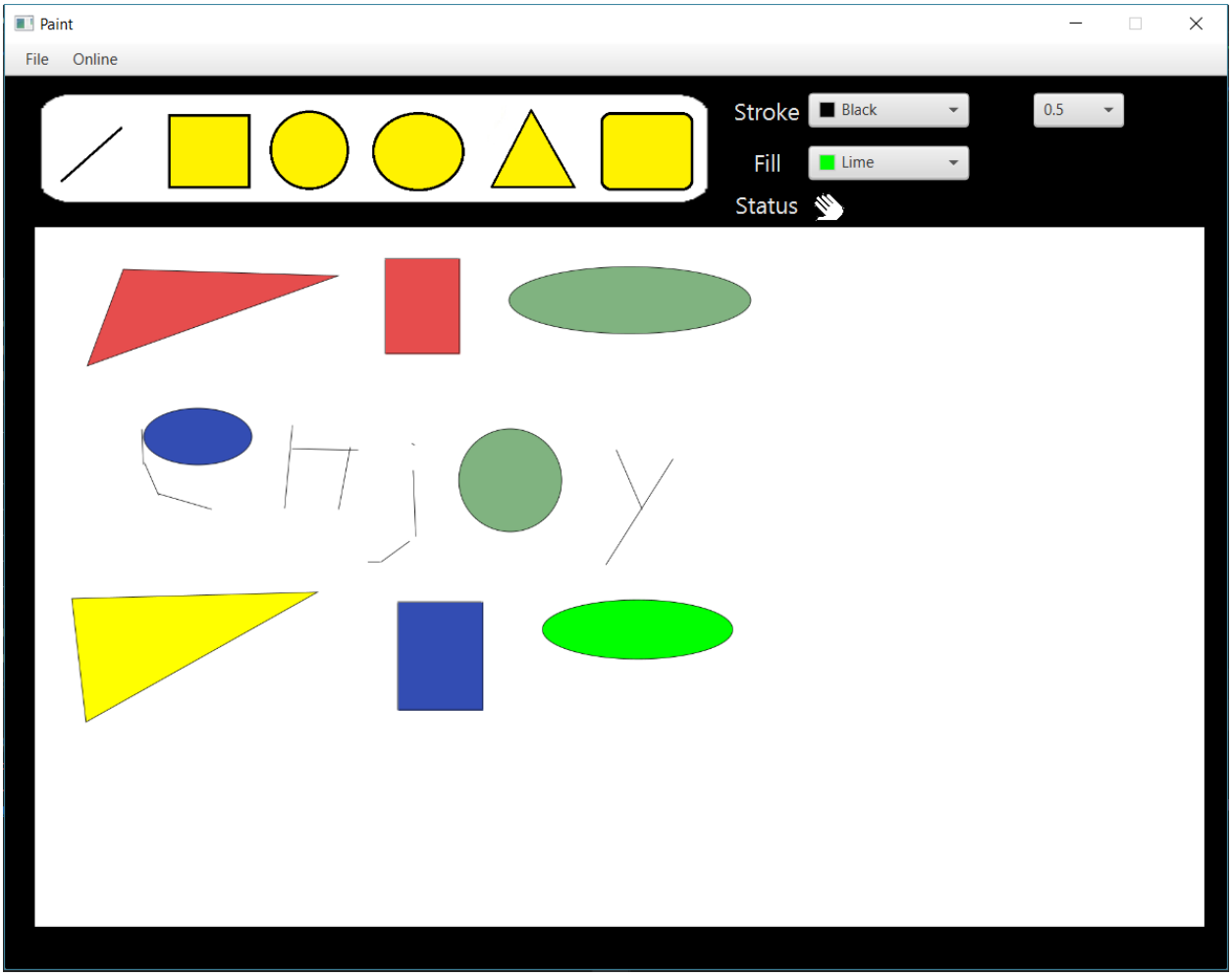
VII. Online Drawing

1. Press Online on the menu bar
2. Use New Room to create a new Room
3. Use Join Room and insert the Room ID to access a friend's room.
4. Enjoy the collaborative drawing.








Paint
File
Online
Stroke
Black
0.5
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Status