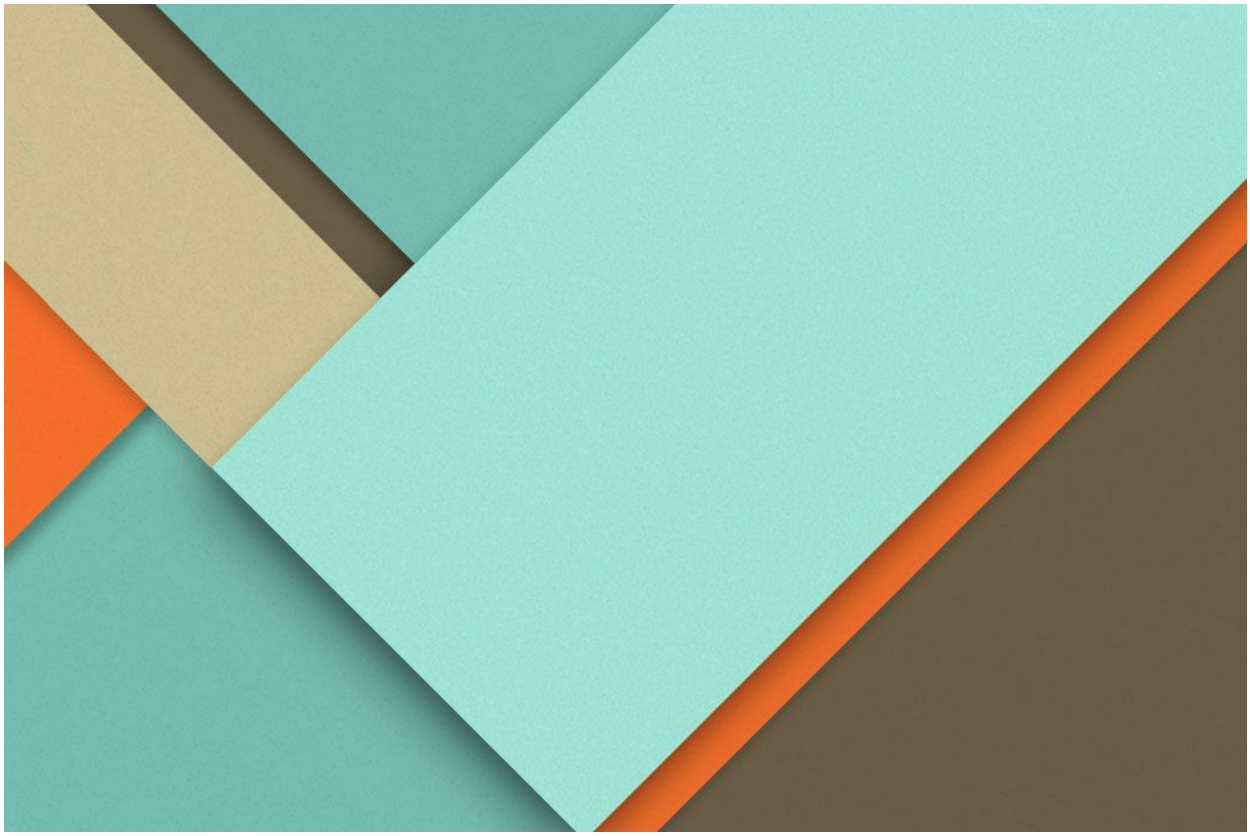

Draw

CS221 Programming II Project

Fall 2017

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Design

1. Abstract Shape

An abstract class that implements the shape interface. It has all the common functionalities and defaults of any shape. All shape classes inherit from this class.

2. Shapes Factory

We used the factory design pattern to manage creating shapes of different types. It takes a string of the class name of the shape and returns a reference on a shape of the desired class.

3. Drawing Engine Singleton

The drawing engine is accessed through the singleton pattern. This ensures only one entry point to the drawing engine and prevents any other instantiations from it.

4. Commands

Undoable commands (such as create shape, remove shape, update shape) are created using the command pattern. Each command type is a class that has an execute and an unexecute method. This makes it easy in the design to implement undo and redo features.

5. Undo/Redo

Undo and redo are implemented using two stacks of commands. When a command invoked by the user, the command's execute method is executed and the command object itself is added to the undo stack. When the user uses undo, the last command in the stack is popped, its unexecute method is executed and then it is added to the redo stack.

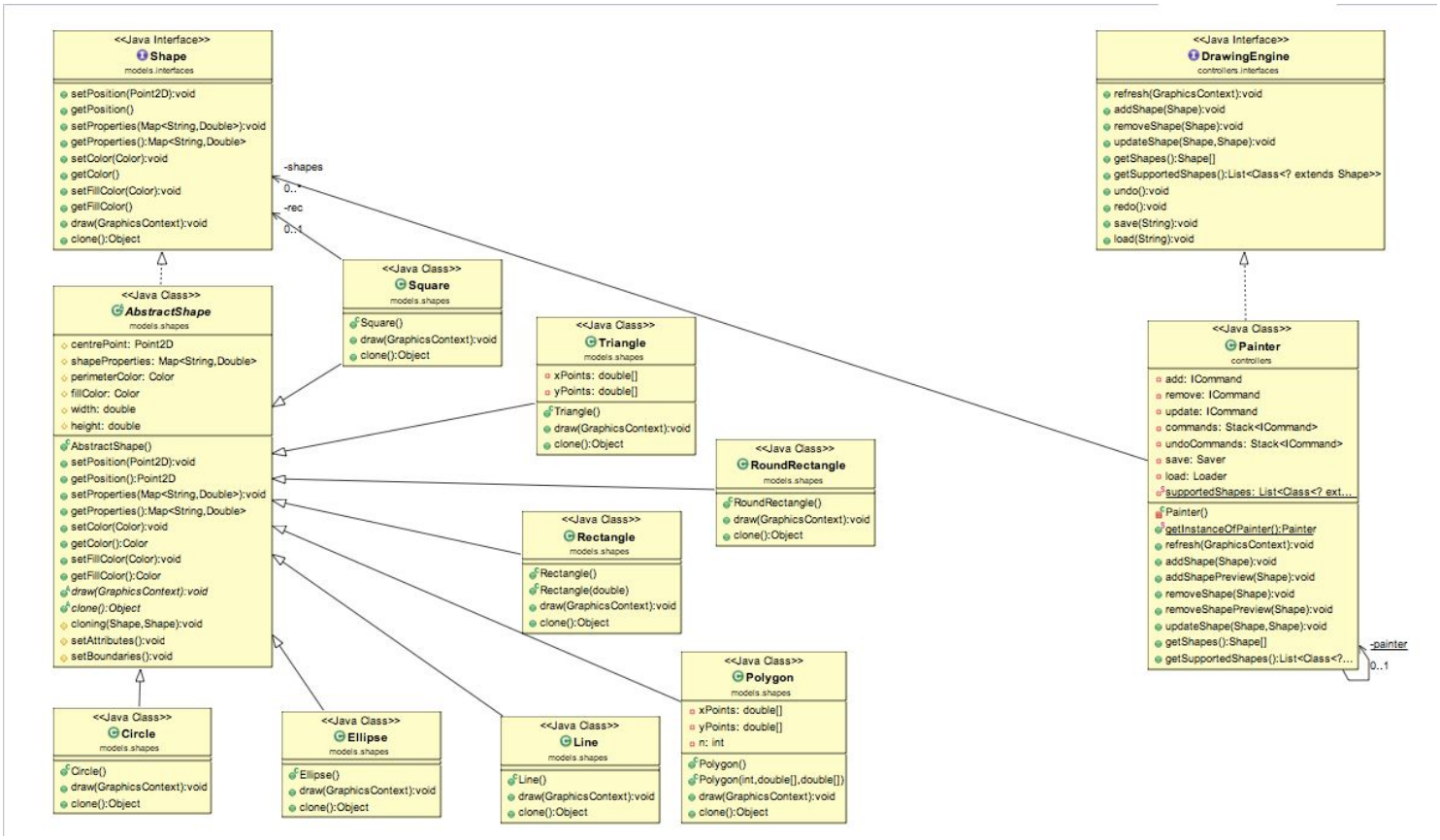
6. MVC Architecture

We followed the MVC architecture by separating our code into the 3 main modules:

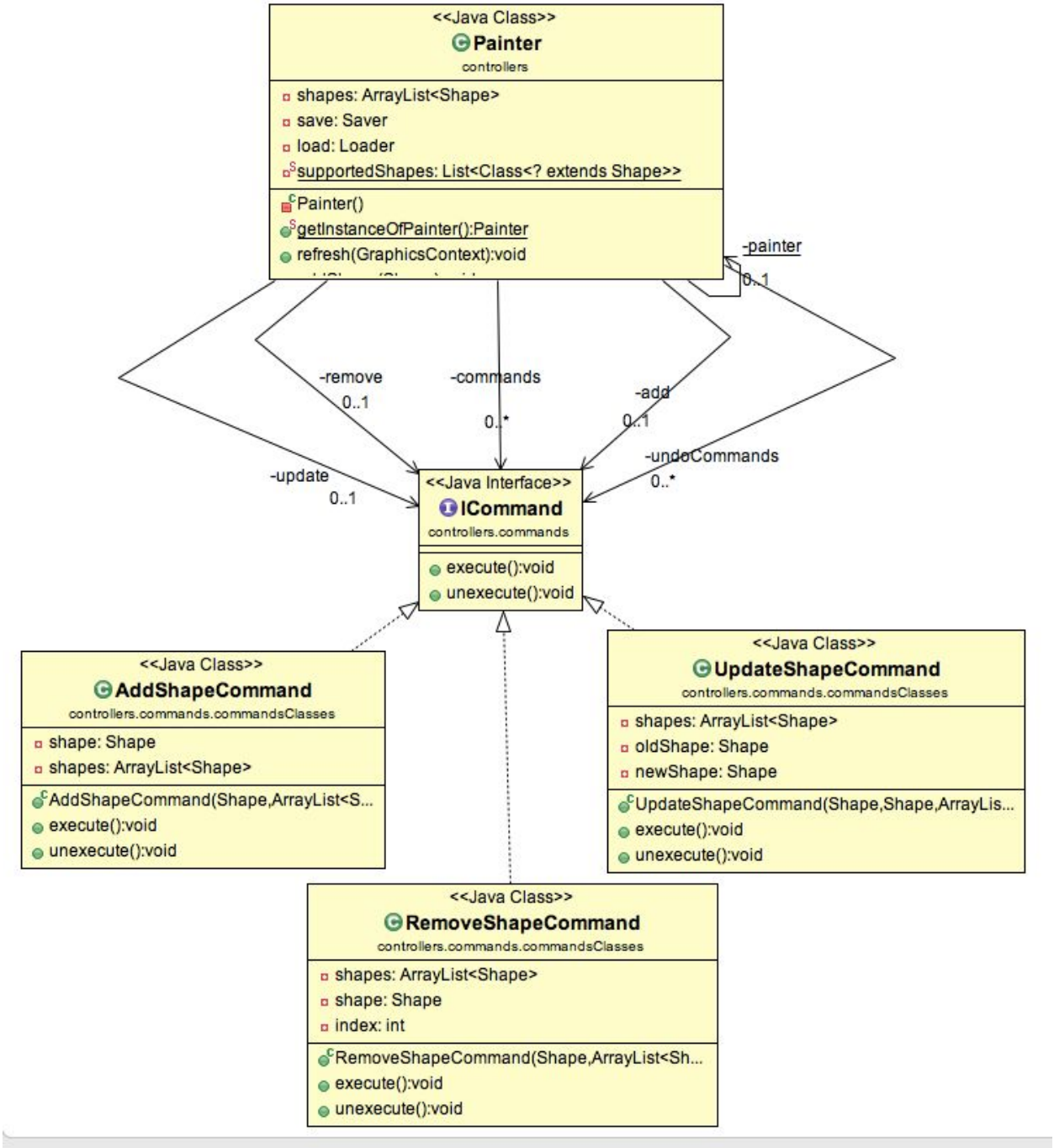
- Model: Include all shapes and logic relating to their states.
- Controller: Handles user input and GUI related logic.
- View: Contains FXML files and their styles.

UML

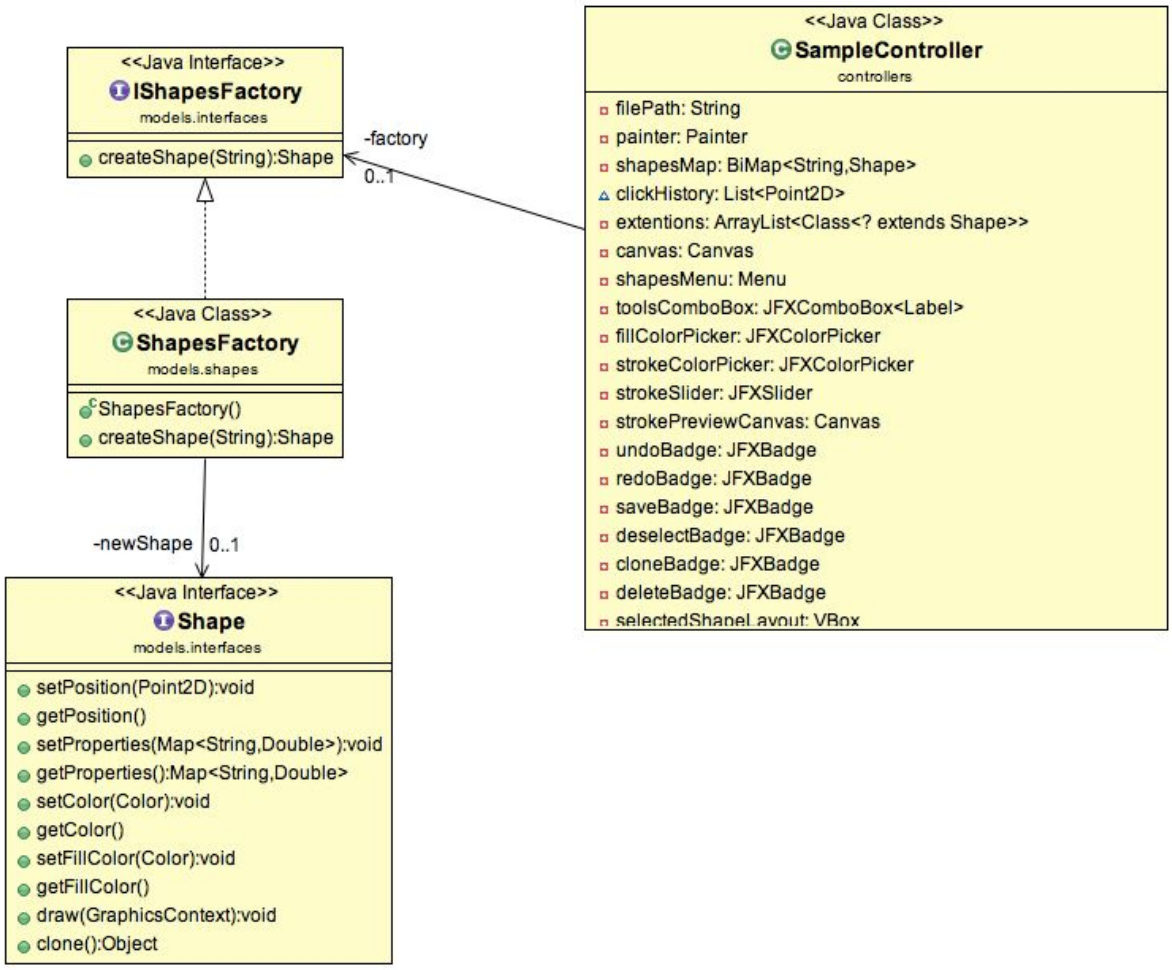
1. All shapes' class diagram and the relation between drawing engine and shape



2. Class diagram for commands and the relation between commands and drawing engine

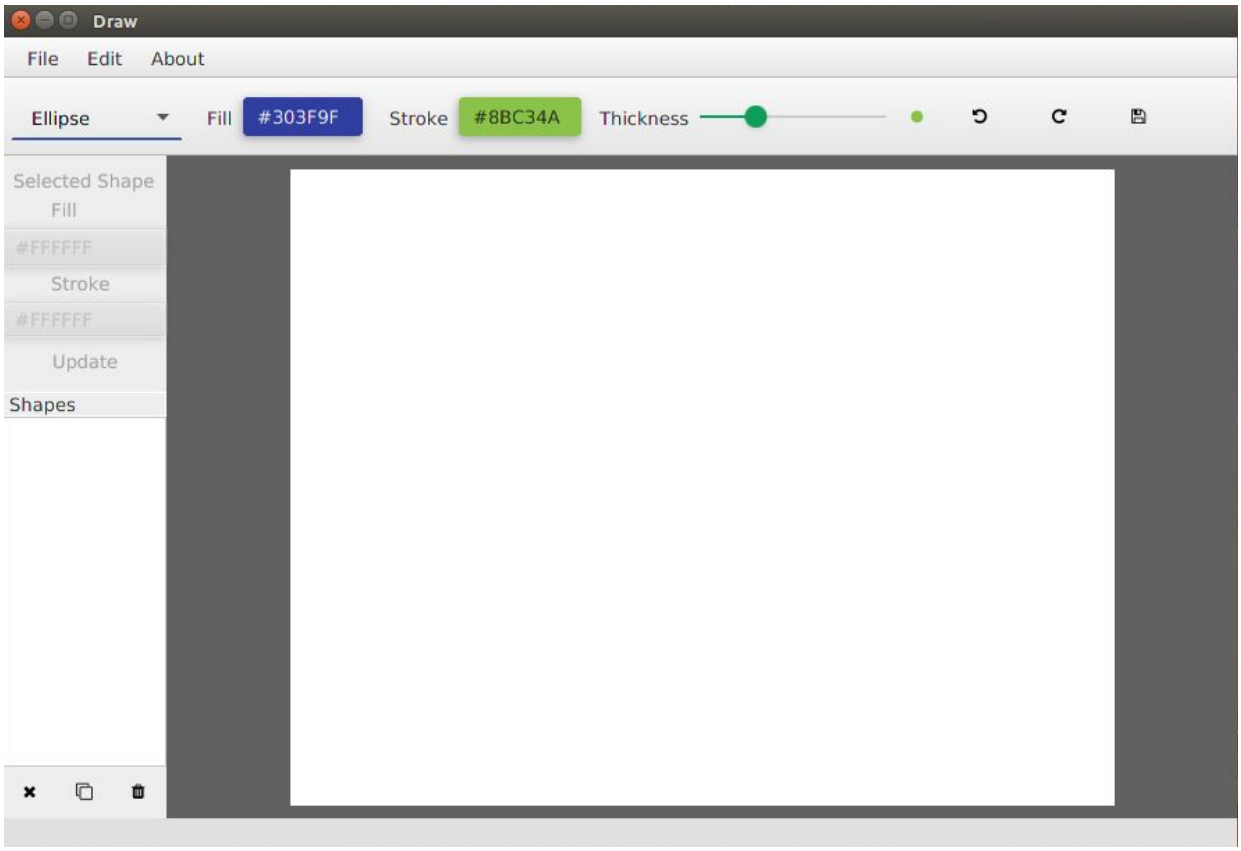


3. Shapes factory and relation between factory, shape's interface and controller



GUI

The GUI is straightforward and oriented towards the average user's experience with similar program.



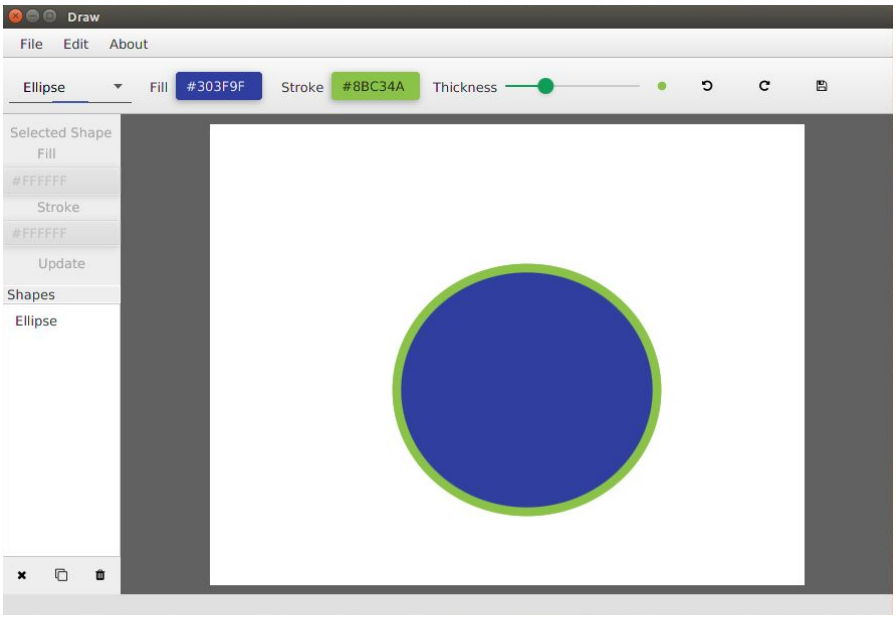
The toolbar on top includes (from left to right):

- A Combobox to choose the tool to edit an existing shape or draw new ones.
- Color Picker for the fill and stroke, as well as a stroke thickness slider.
- Undo, Redo and Save buttons.

The left pane includes:

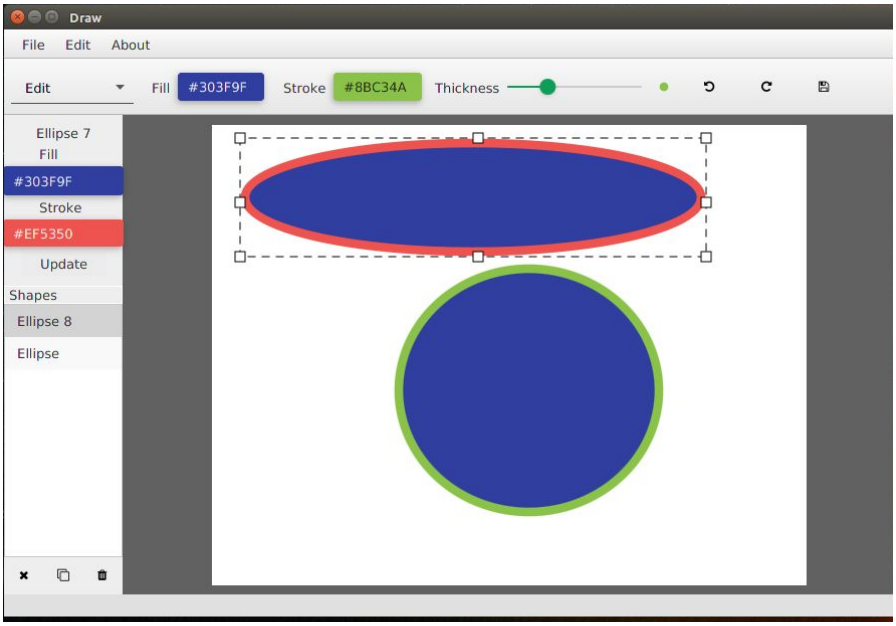
- Options for editing colors of selected shapes.
- A list of existing shapes so user can choose one or more shape to edit them (Shapes can be translated or scaled and their colors can be changed)
- Cancel Selection button, Duplicate Shapes button and a Delete Shapes button

The following screenshot contains an example of drawing a new shape. The ellipse tool is selected, fill and stroke colors as well as stroke thickness are set. The user can then drag and drop across the canvas to draw the shape.



Here is an example on cloning and transformation. The previous shape is duplicated using the duplicate button at the bottom left toolbar.

The new shape can the be dragged anywhere on the canvas and resized by dragging the small boxes on its sides.



User Guide

To create a new shape:

- Select shape tool from the top left combobox. Then, use the fill and stroke color pickers to choose its fill and stroke colors. You can adjust the stroke slider to the stroke thickness desired (A preview of the thickness is shown to the right of the slider.)

To Edit an existing shape(s):

- Select the desired shapes by Shift + Click the shapes you want to edit.
- Choose the edit tool.
- You can move the shapes by dragging inside the bounding box of the shapes
- You can resize the shapes by dragging the small handles on the bounding box of the shapes.
- You can duplicate the selected shapes by using the clone button in the bottom left toolbar.
- You can delete the selected shapes by using the delete button in the bottom left toolbar.
- You can change the fill and stroke colors by using the color pickers in the left pane and pressing the update button.

At any point the user can:

- Undo a previous action using the undo button on the top right
- Redo an action that was undone before.
- Save the drawing as an xml drawing.

Menubar:

- File
    - Open Drawing: Opens a dialog for the user to open an existing XML drawing
    - Save: saves the current state to the XML drawing
    - Save as: saves the current XML drawing to a new directory
    - Import plugins: enables the user to import shape plugins
    - Quit: terminates the program
- Edit:
    - Undo
    - Redo
    - Draw Shape: to manually draw shapes by entering their properties or draw imported shapes