UE21CS352B - Object Oriented Analysis & Design using Java

Mini Project Report

"Brushify – Paint Application"

Submitted by:

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6th Semester F Section

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Problem statement (synopsis) :

This project outlines the development of a digital paint application for PCs and laptops. The application provides users with a comprehensive set of tools to create and edit visual content.

Key Features:

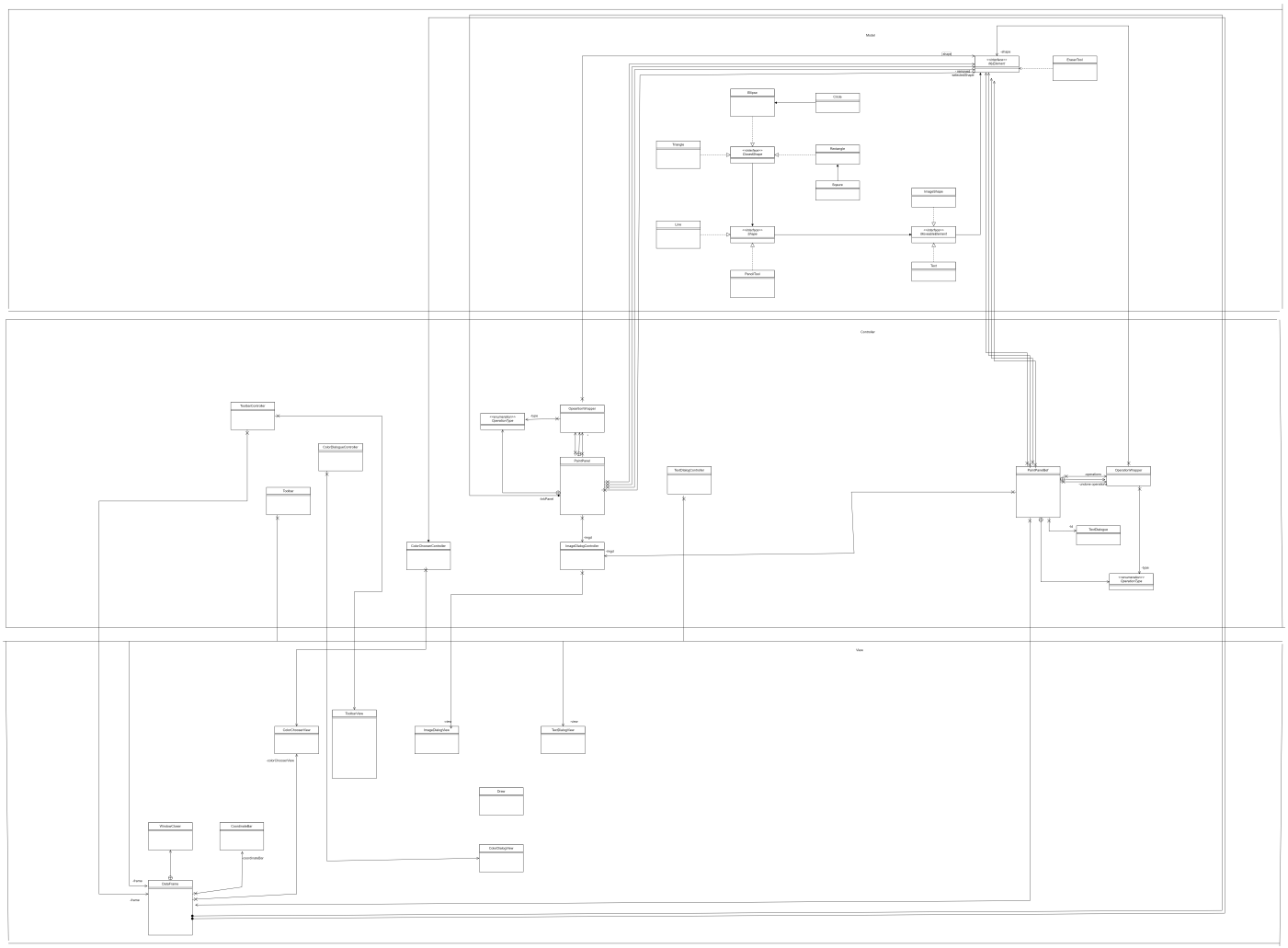
- Shape Creation: Users can create various shapes including rectangles, squares, circles, ellipses, triangles, lines, and curves.
- Object Manipulation: All created objects (shapes, text boxes, and images) can be moved, deleted, erased, and manipulated with undo/redo functionality.
- Customization:

1. Shapes can be filled with colors.
2. Lines and curves can be customized with different colors and thicknesses.
3. Text Integration: Text boxes can be incorporated into the artwork for annotations or creative purposes.
4. Image Inclusion: Users can import images to be integrated into their digital paintings.

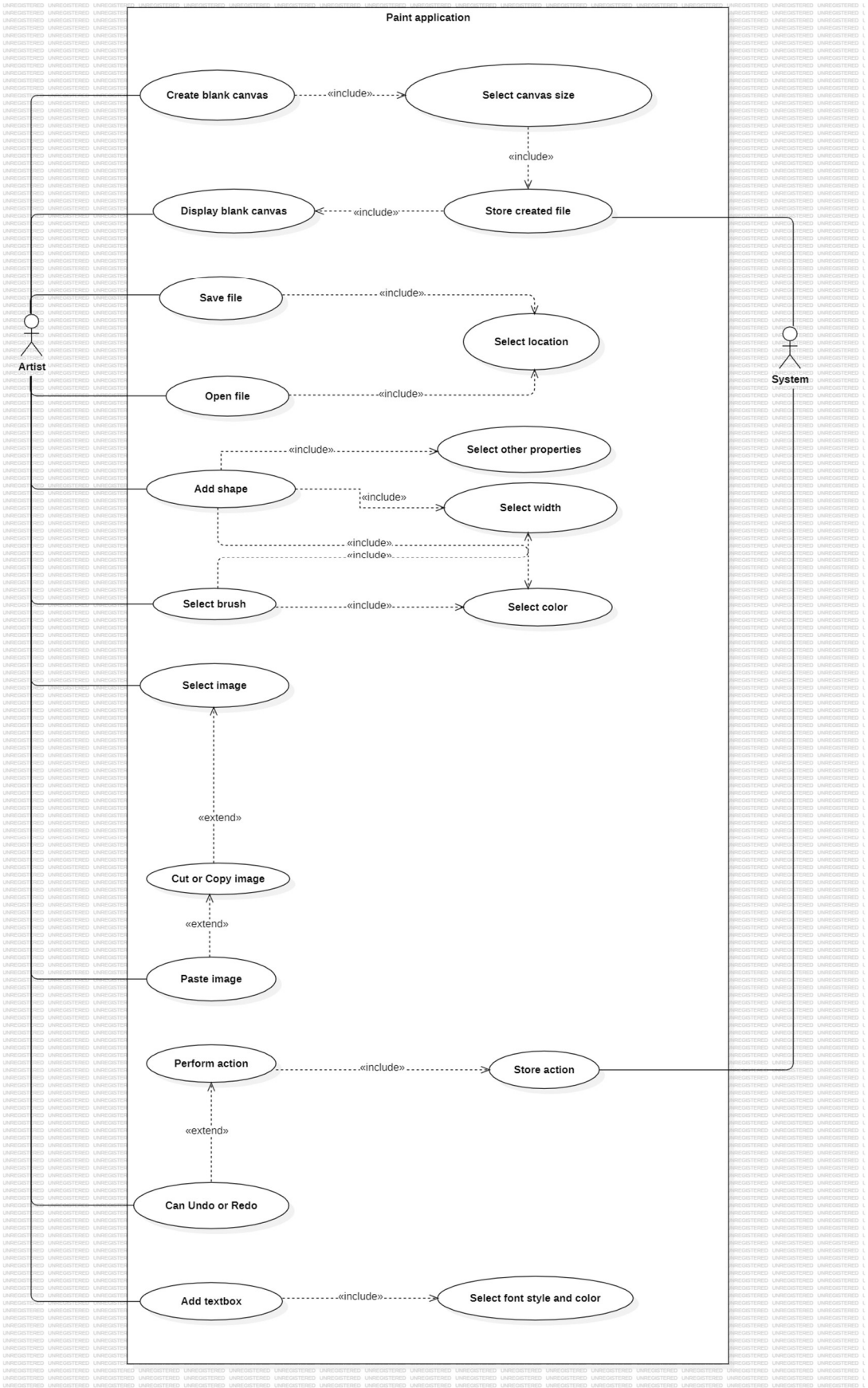
The intuitive interface and core functionalities allow users to express their creativity freely through digital painting.

Models :

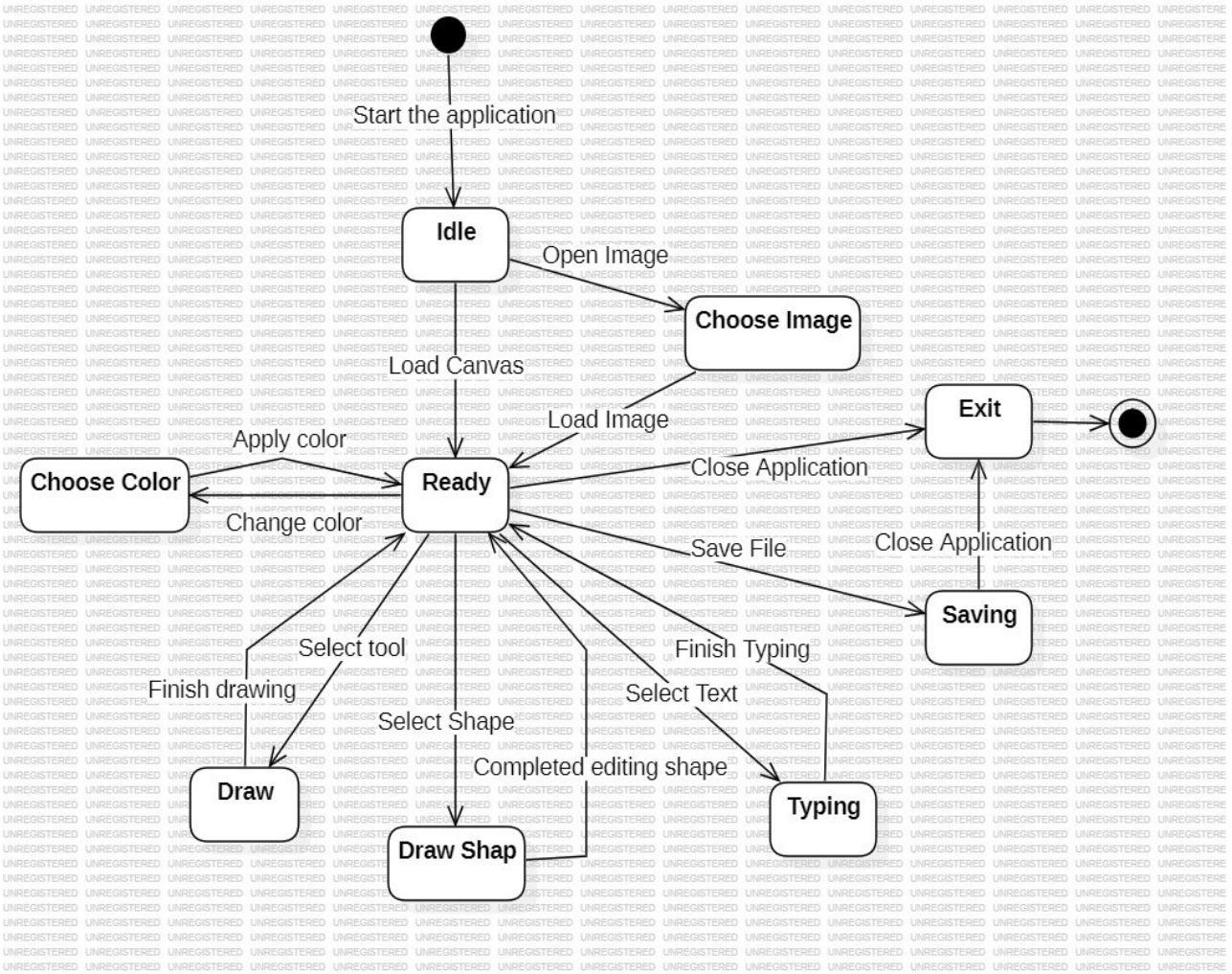
1. Class Diagram :



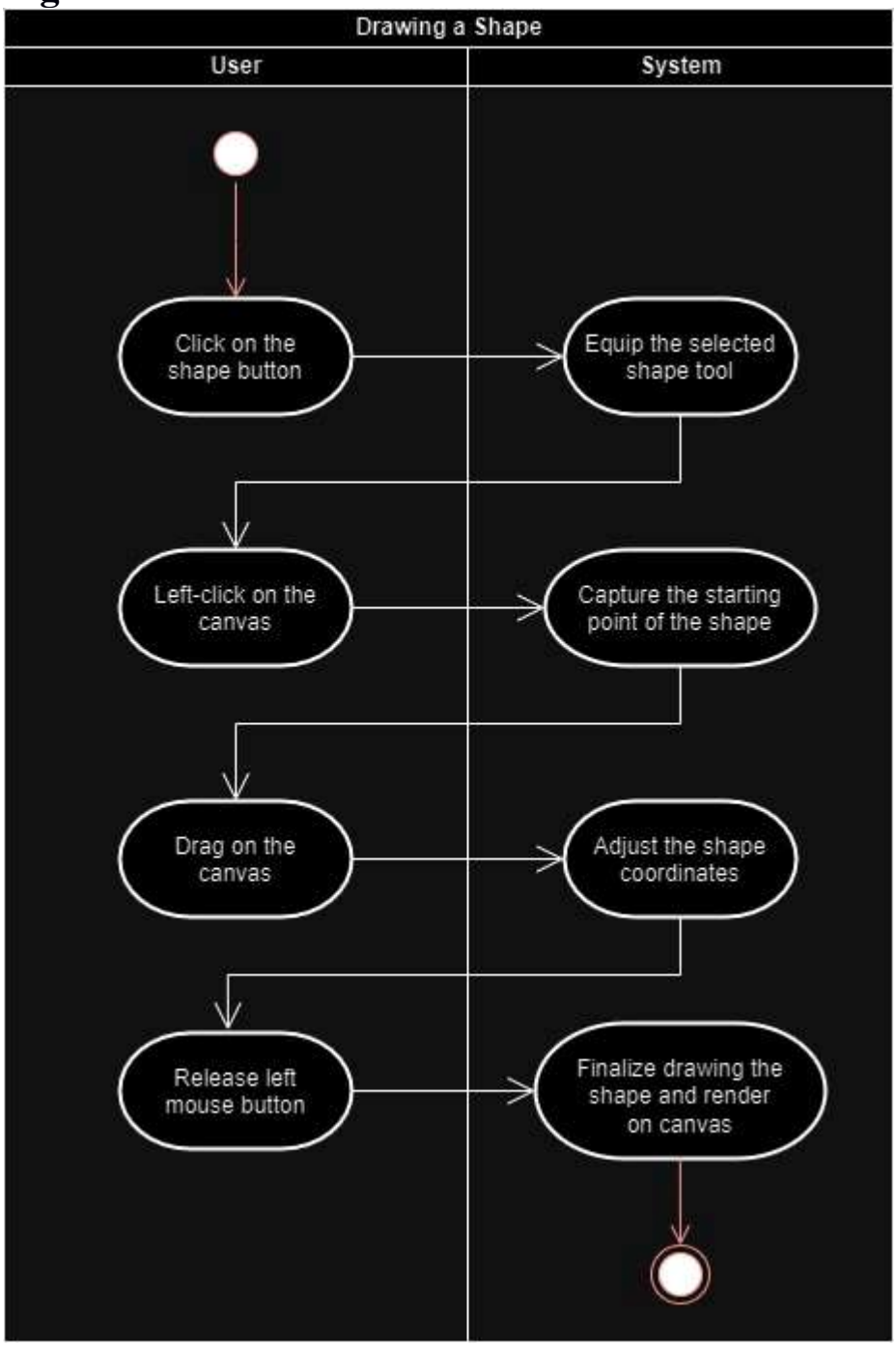
2. Use Case Diagram :



3. State Diagram :



4. Activity Diagram :



Architecture Patterns, Design Principles, and Design Patterns :

Architecture Pattern :

The application follows the Model-View-Controller (MVC) architecture for a clean separation of concerns. The Model encapsulates the data and logic of our drawing objects (shapes, text boxes, images, lines, and curves). It defines their attributes and functionalities. The Controller handles user interactions and manipulations. This includes creating, removing, undoing/redoing actions, and moving objects. The View is responsible for everything users see on the screen. It manages the rendering and display of the user interface elements like the toolbar, color bar, dialog boxes for adding text and images, the canvas itself, and any other visual components.

Design Principles :

- **Single Responsibility Principle:** This principle ensures each class within the Model, View, and Controller sections has a single, well-defined purpose. For example, a class in the Model might be solely responsible for representing a Shape object, while a Controller class might focus on handling user interactions like creating or moving shapes. This promotes clean, focused code that's easier to understand and modify.
- **Liskov Substitution Principle:** This principle ensures that our Model classes form a robust hierarchy. When a class inherits from another, it becomes a subtype that can be seamlessly used wherever the parent class is expected. This means any code that works with the parent class should also work correctly with the subclass, without introducing errors or unexpected behavior. This promotes code reliability and simplifies future development as new shapes or objects can be added while maintaining compatibility within the existing structure.

Design Pattern :

Our application incorporates the Command Pattern to enhance user experience, maintainability, and rendering efficiency. This pattern encapsulates user actions (creating a shape, changing color, moving an object, etc.) into individual command objects. These commands hold the necessary information to execute the action and potentially undo it later.

Benefits in our Paint Application:

- Undo/Redo Functionality: Each user action creates a corresponding command object. This allows us to store a history of commands, enabling seamless undo and redo functionalities for users.
- Decoupling: The Command Pattern separates the execution of actions from the specific UI elements (buttons, menus) that trigger them. This simplifies future UI modifications without affecting the underlying logic.

- Efficient Rendering: Commands encapsulate the information needed to draw objects on the screen. When the screen refreshes, the application can efficiently re-render all user-created objects by simply replaying the stored commands. This simplifies the rendering process and ensures the canvas always reflects the current state of the artwork.

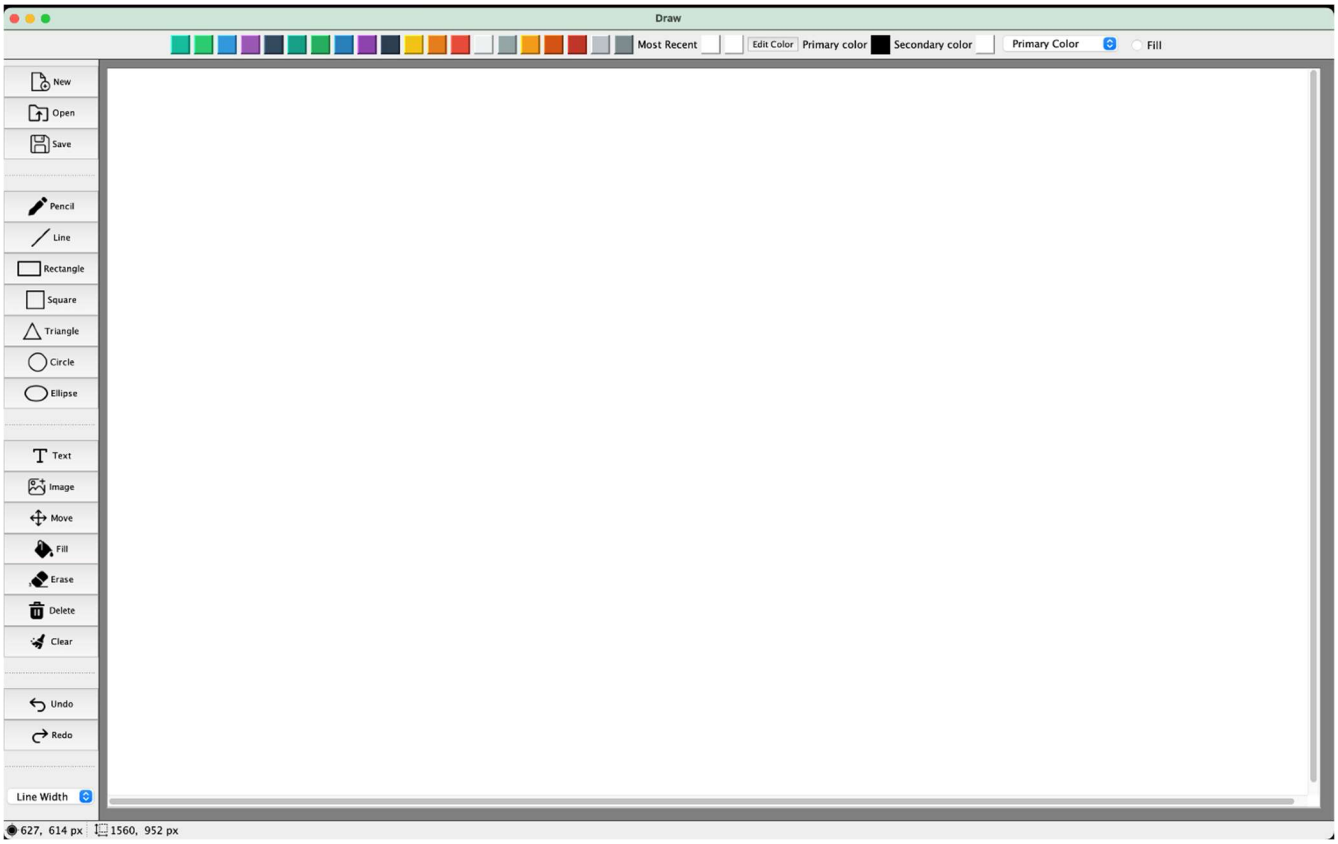
GitHub link : https://github.com/zaki-1337/brushify-java-paint-clone

Individual contributions :

- Manas Gowda M : View Classes and entire class structure
- Adnan Zaki M : Controller Classes
- Naga Saketh V : Model Classes
- Naitik Jain : View Classes

Screenshots :

Blank Canvas :



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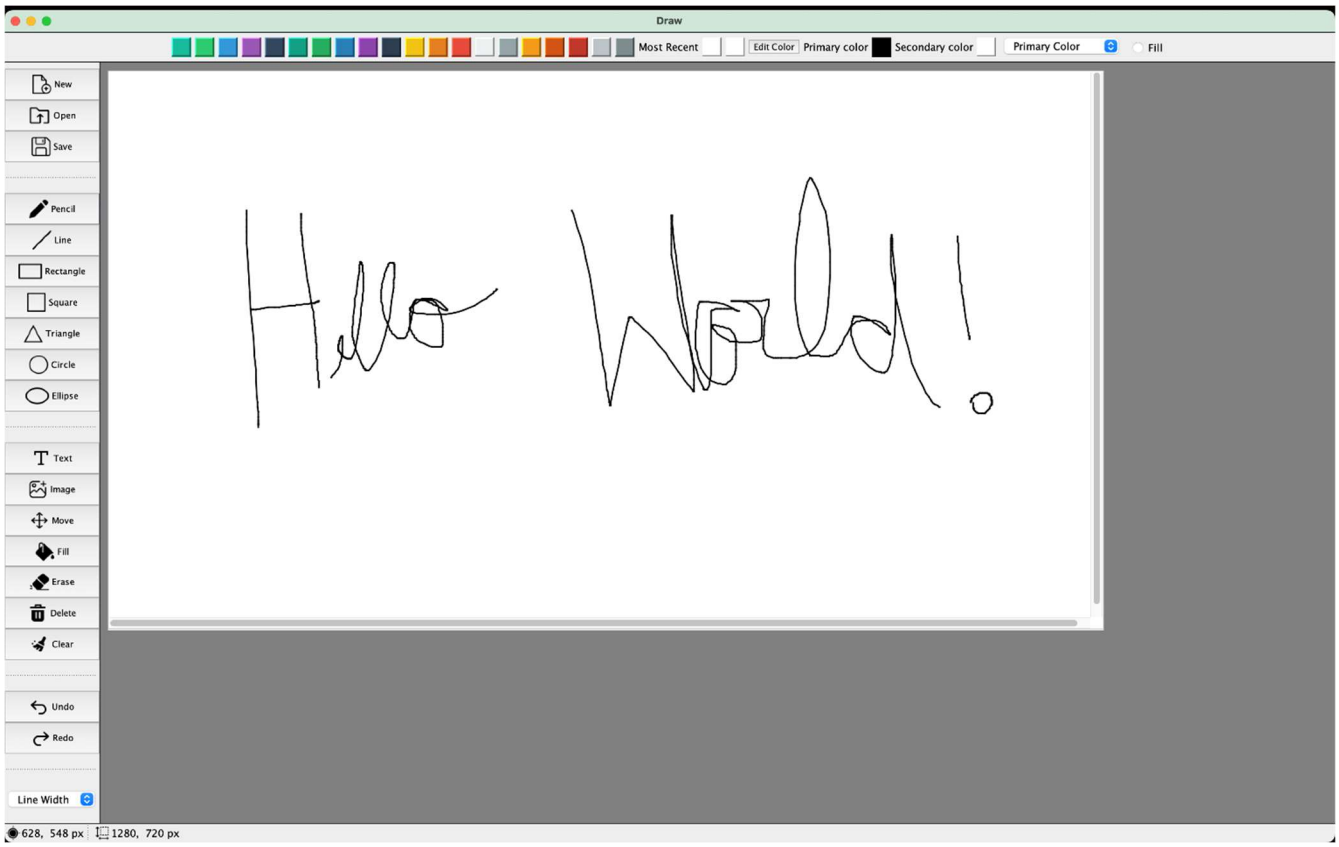

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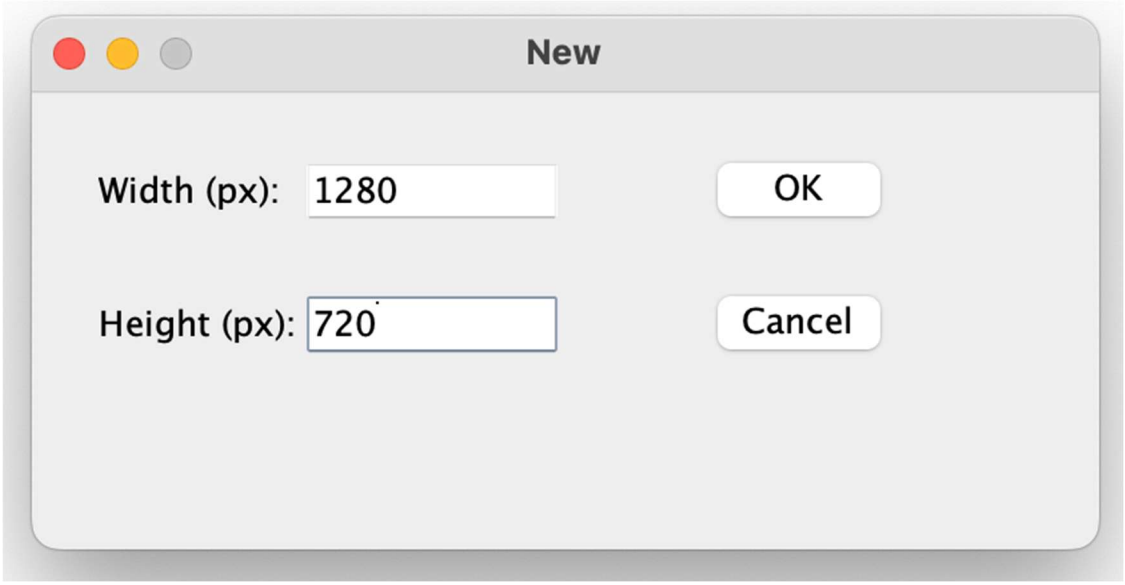

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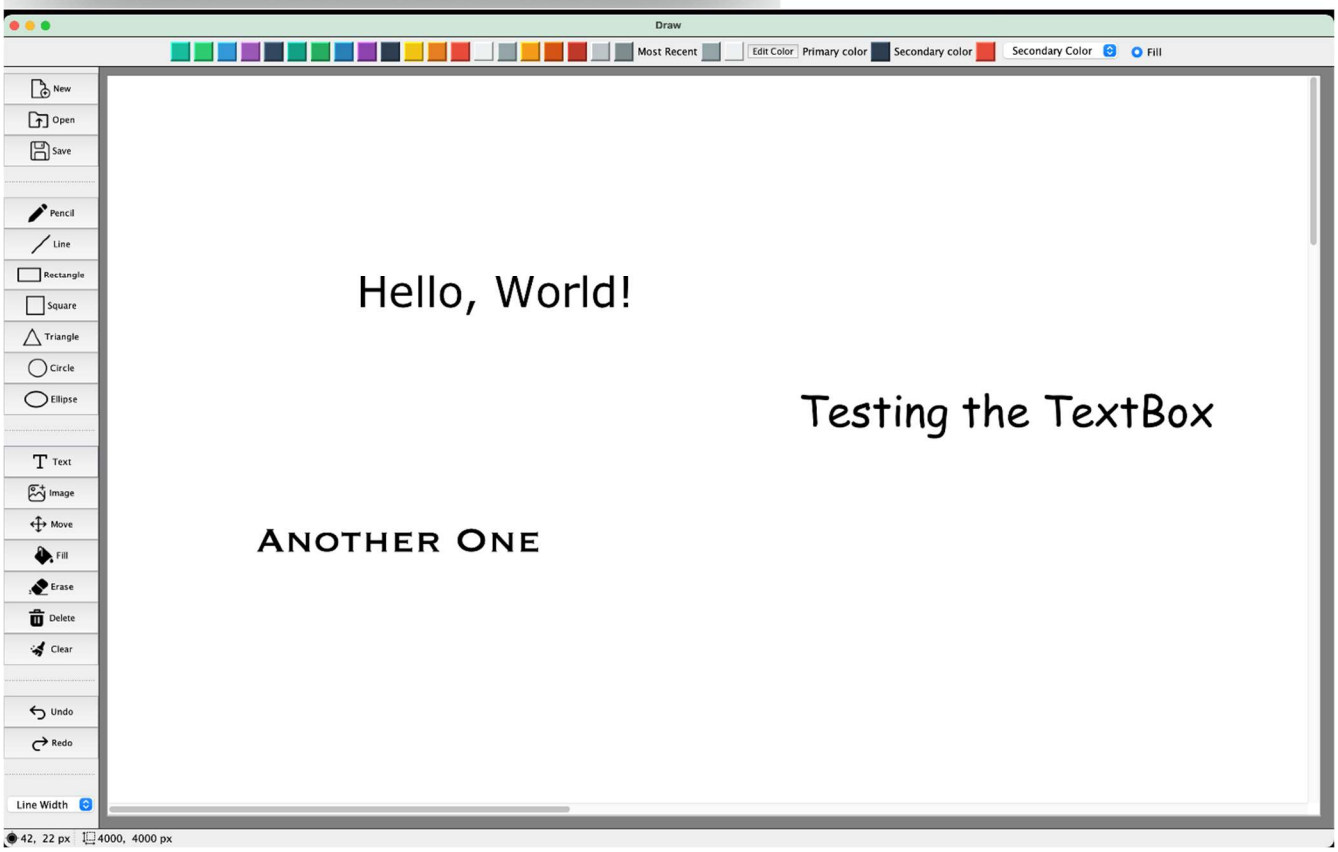
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Undo / Redo :

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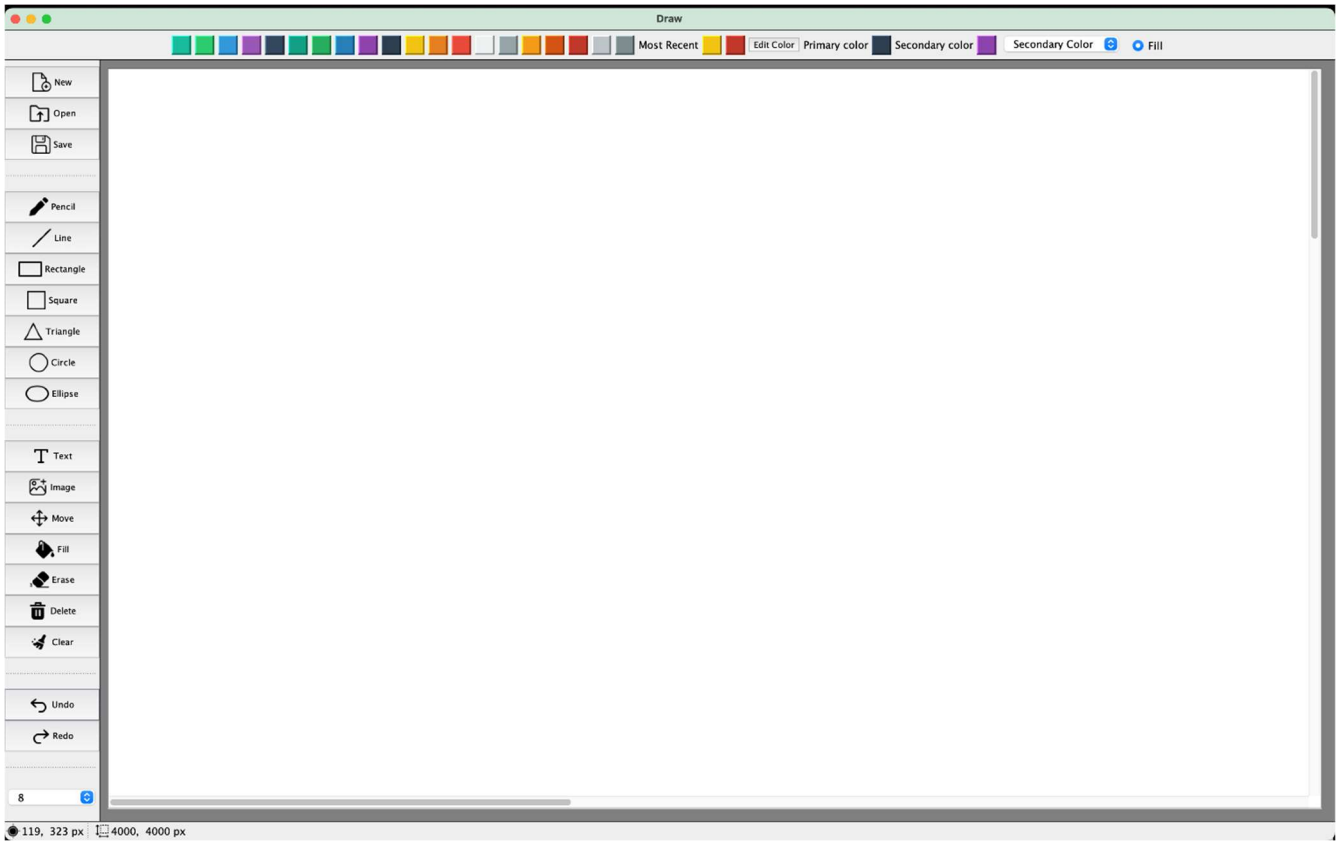

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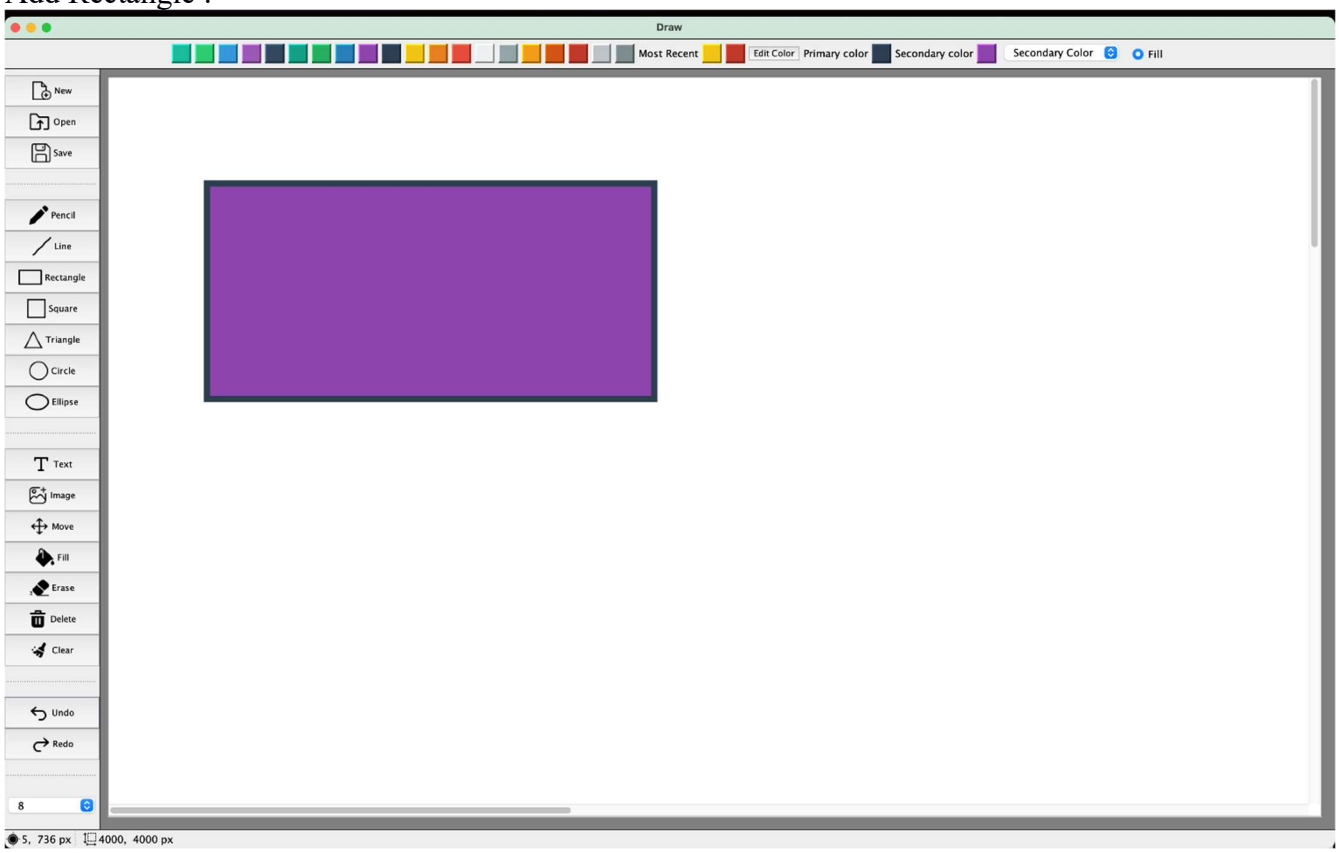

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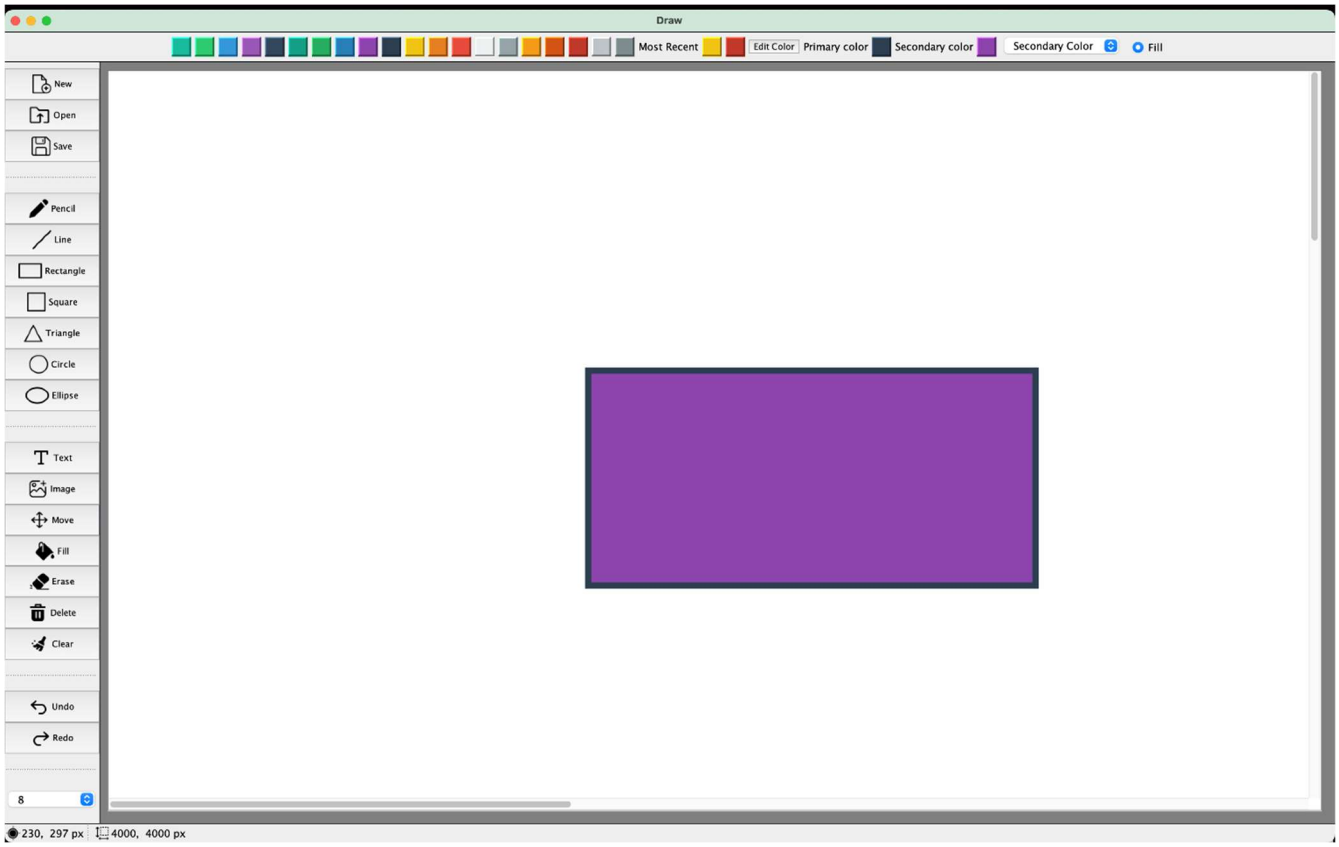
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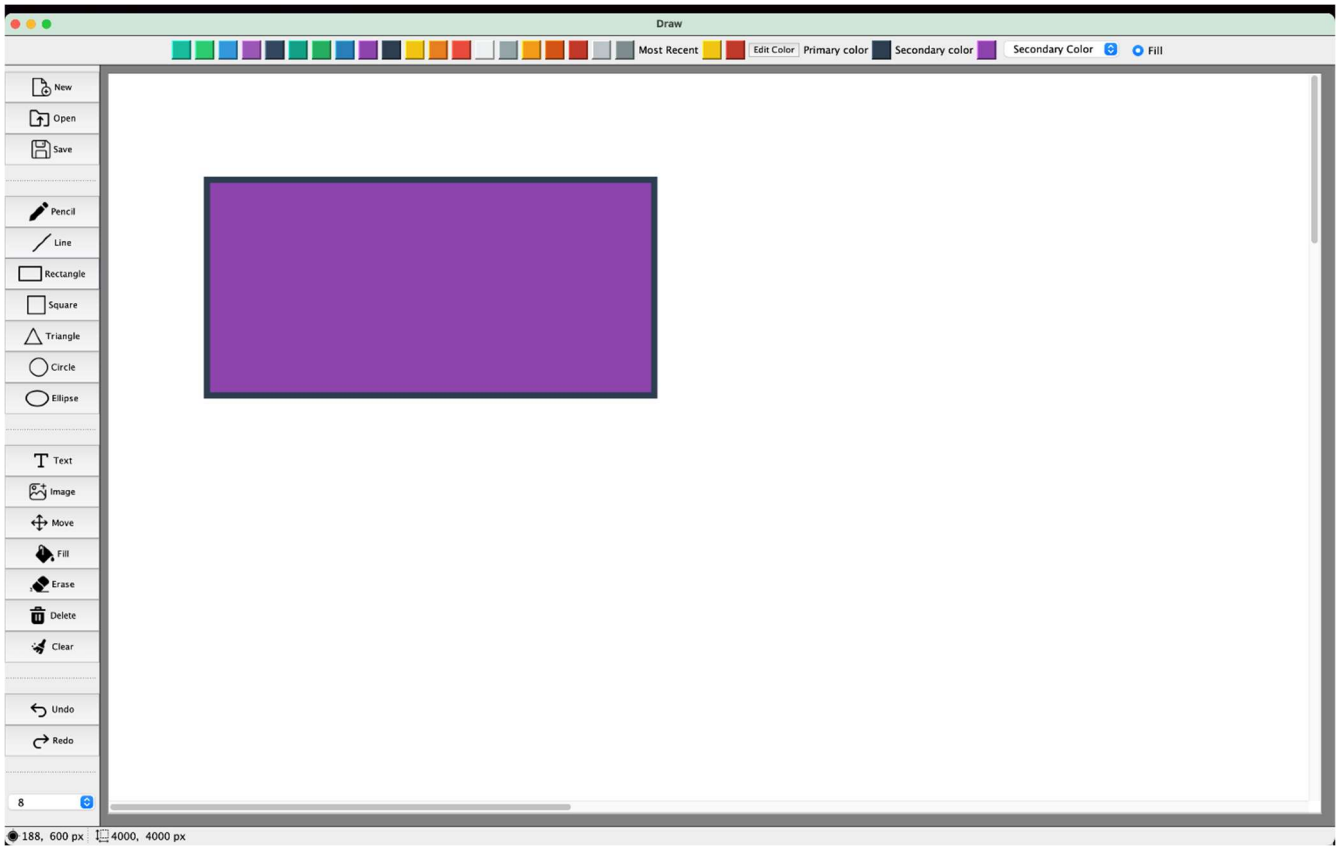
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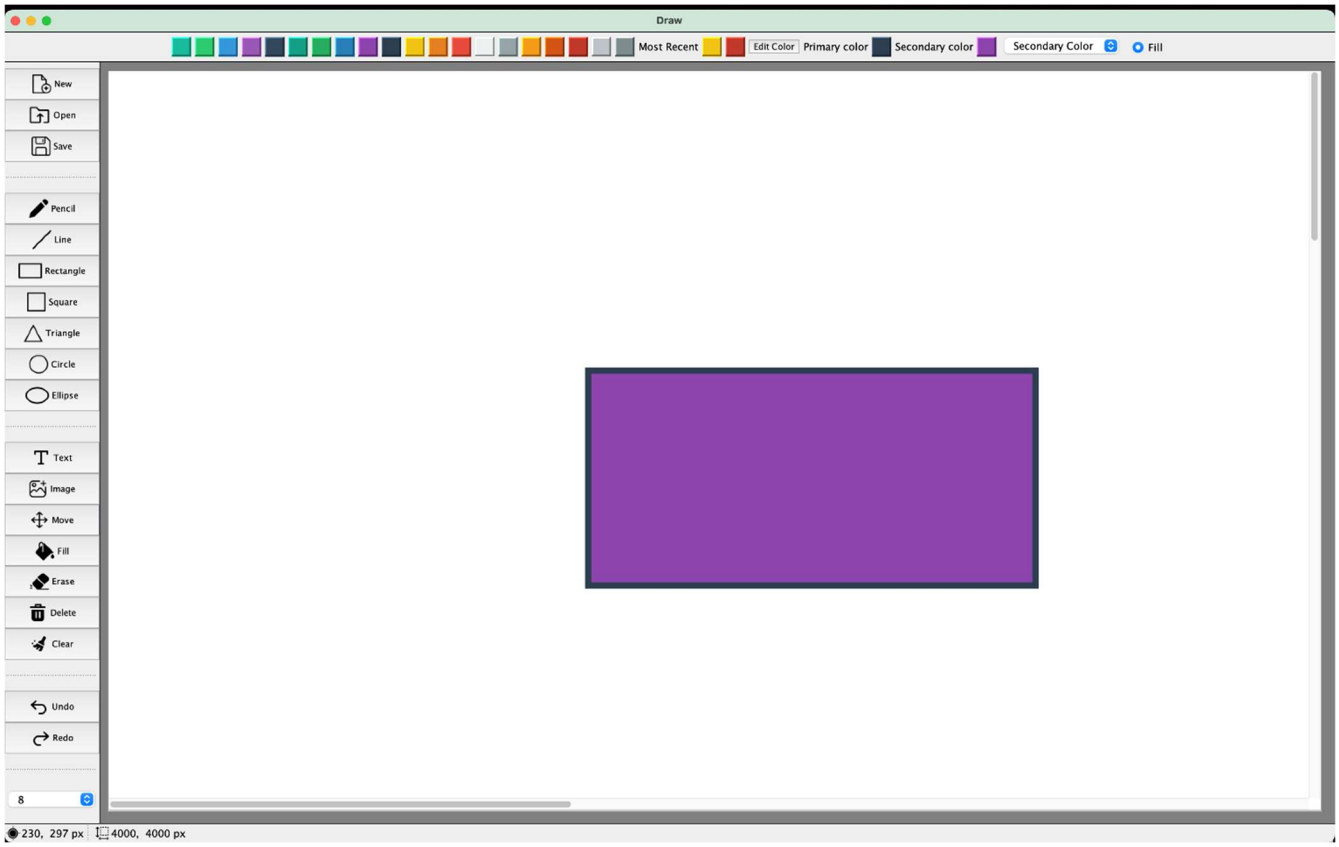
Redo :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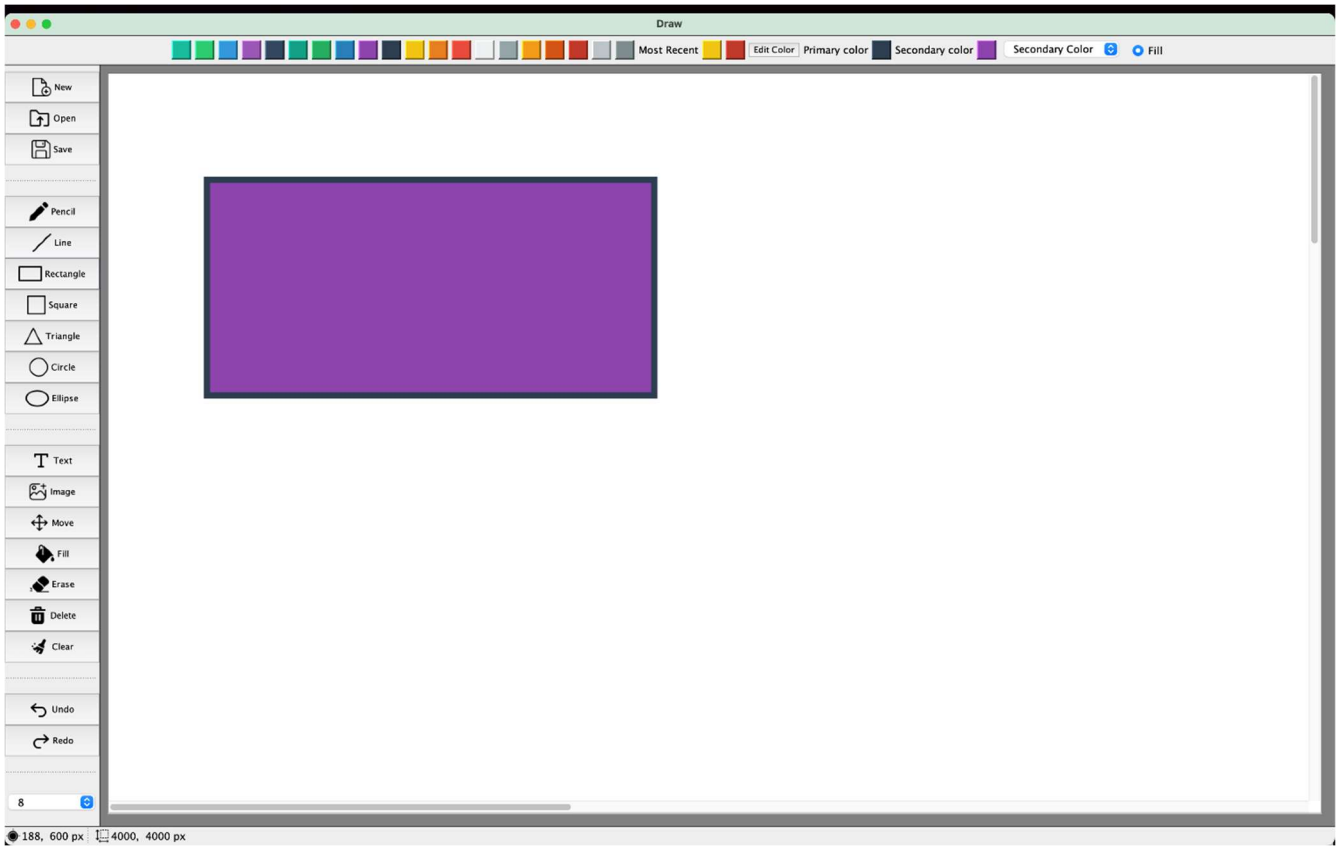
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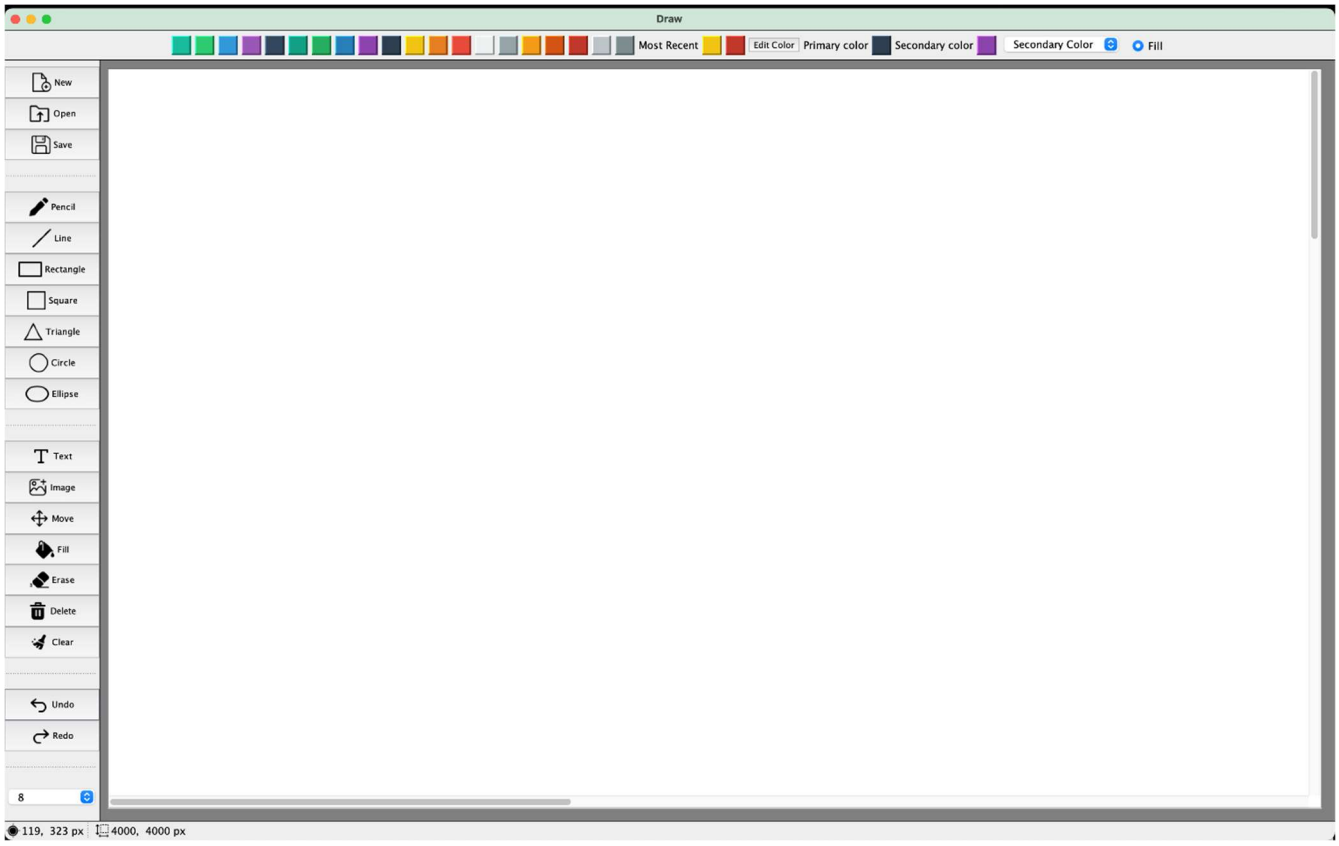
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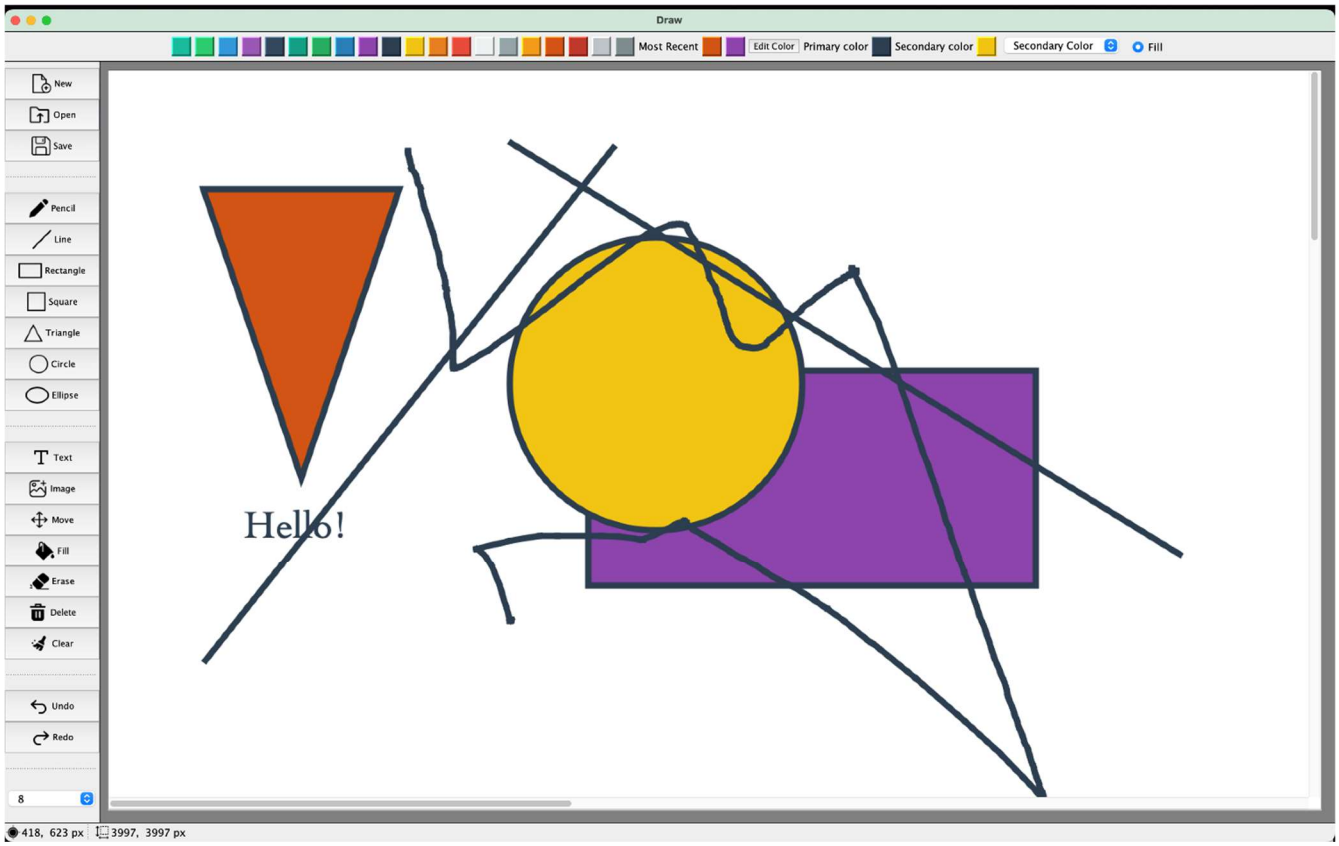

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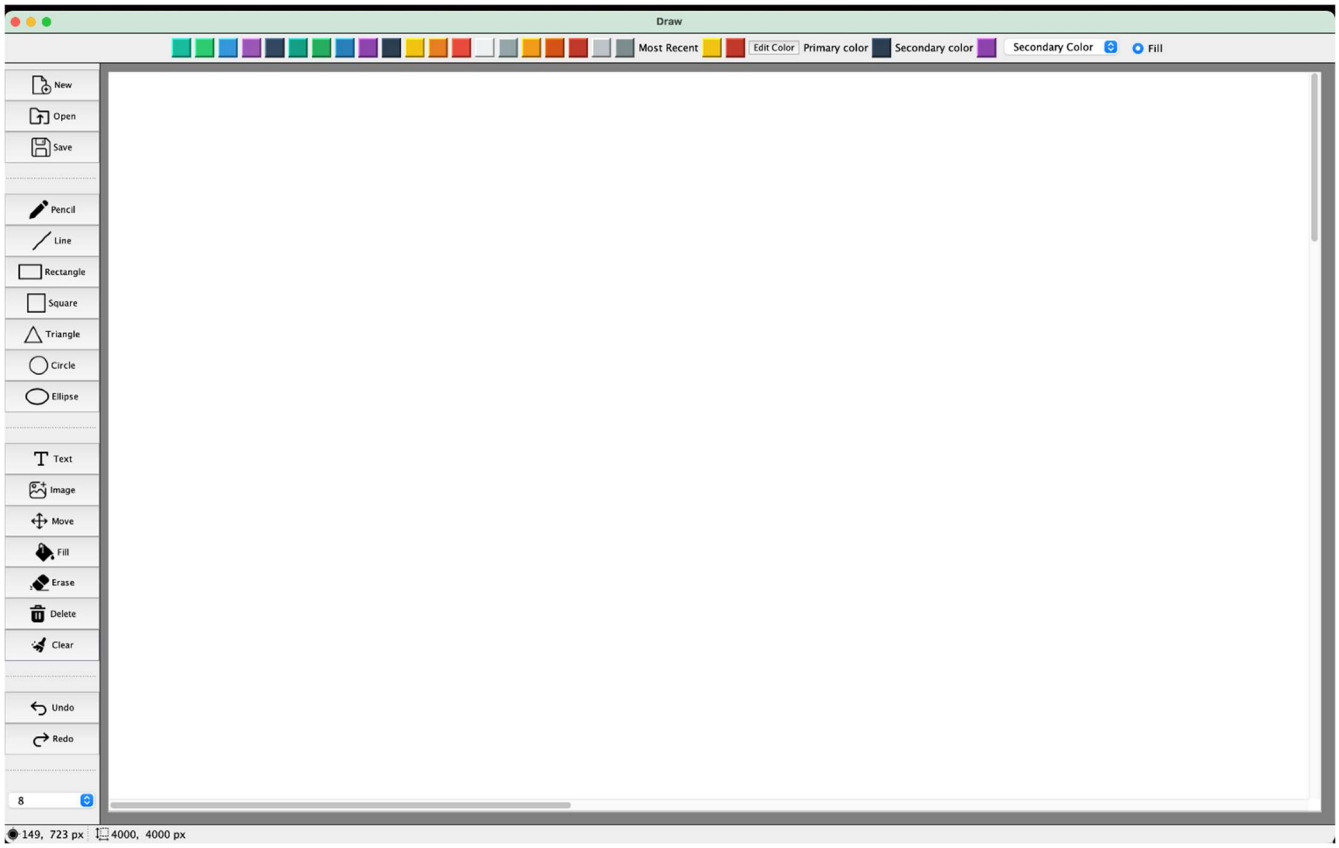

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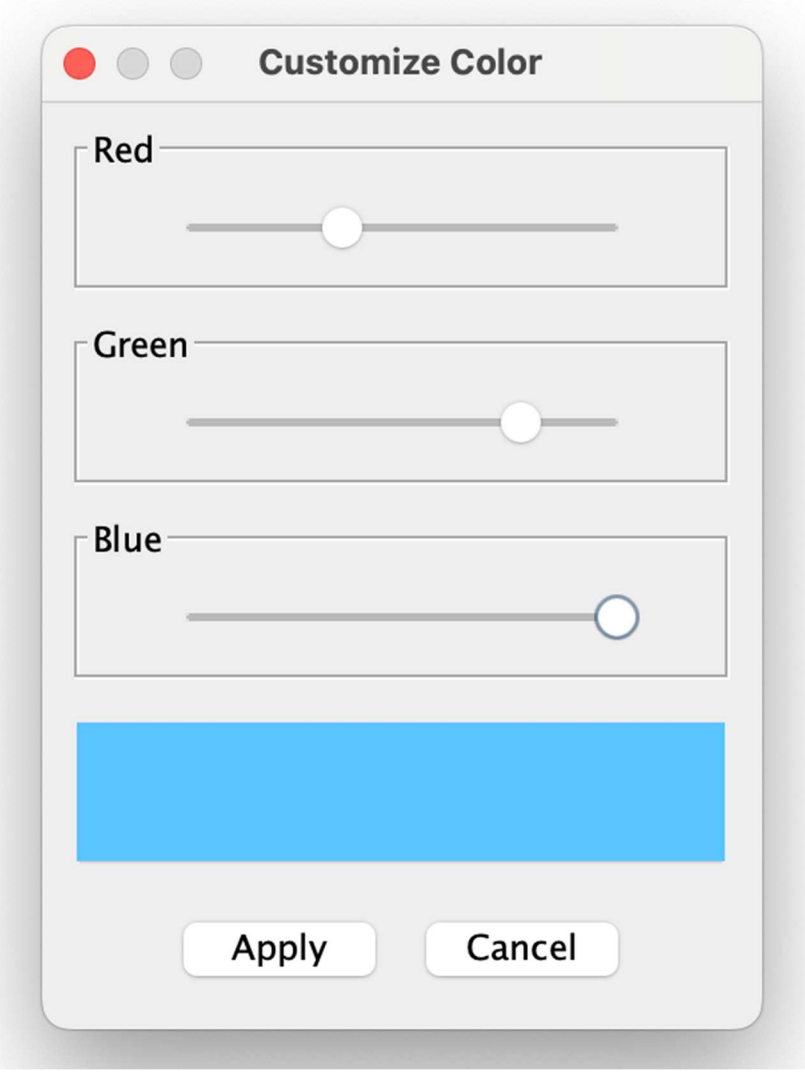

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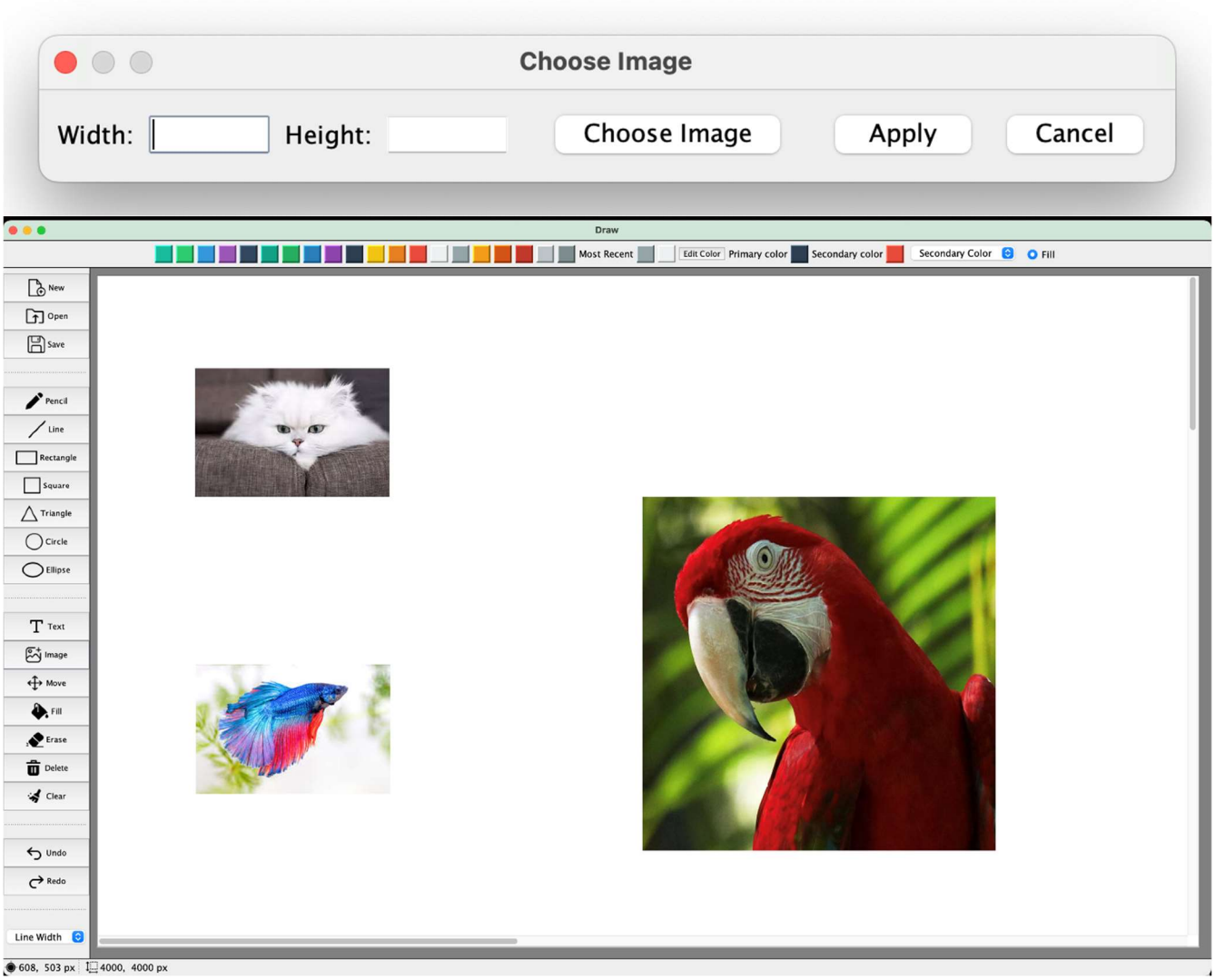
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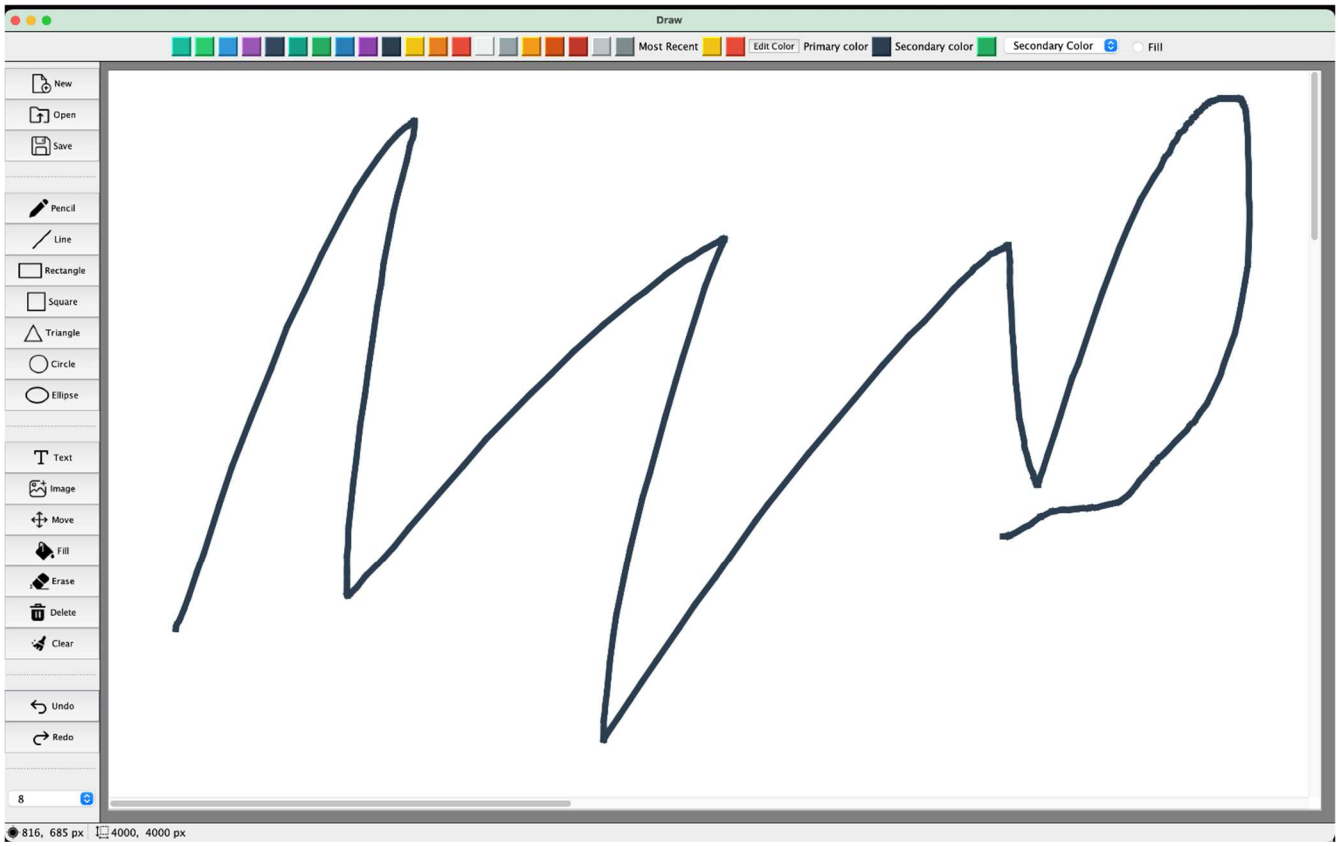

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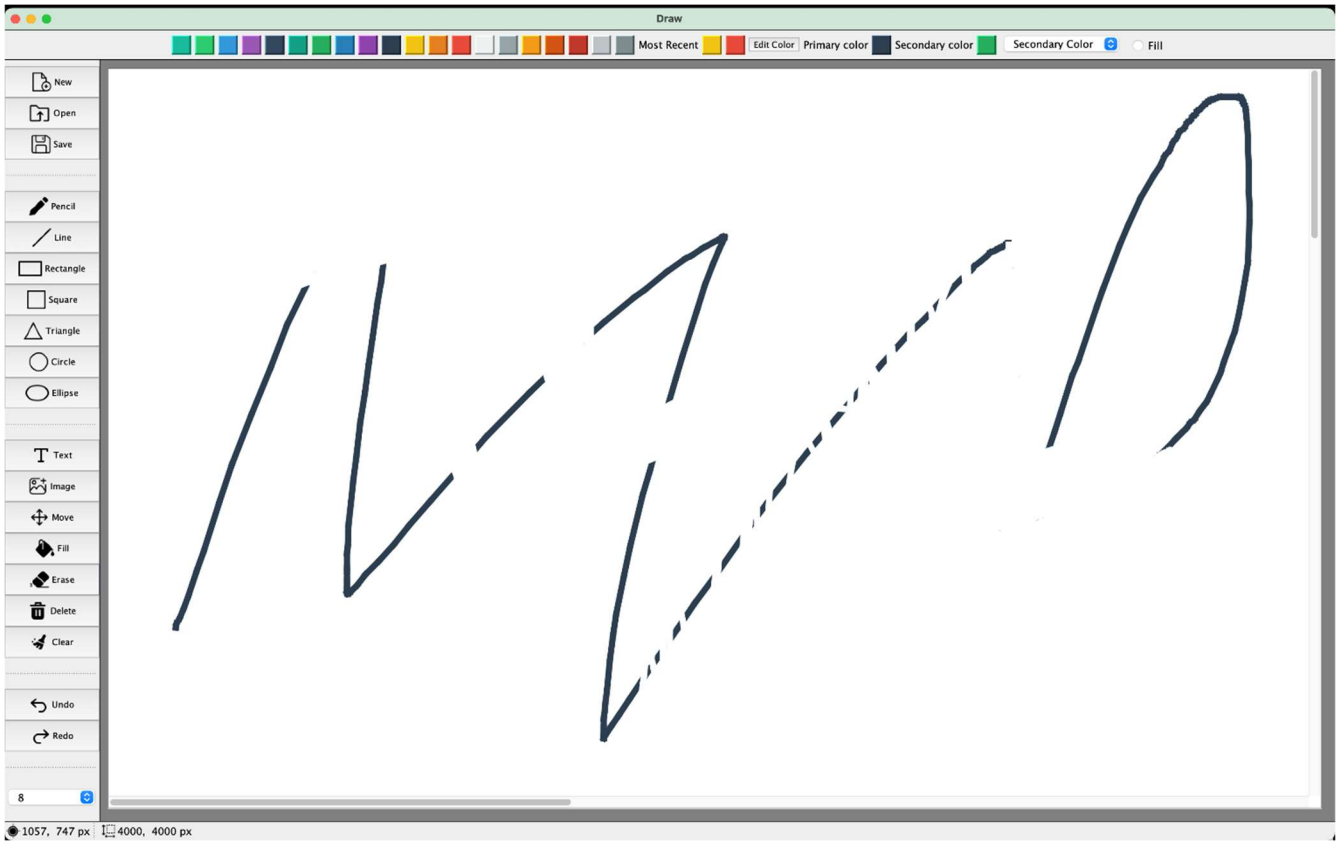

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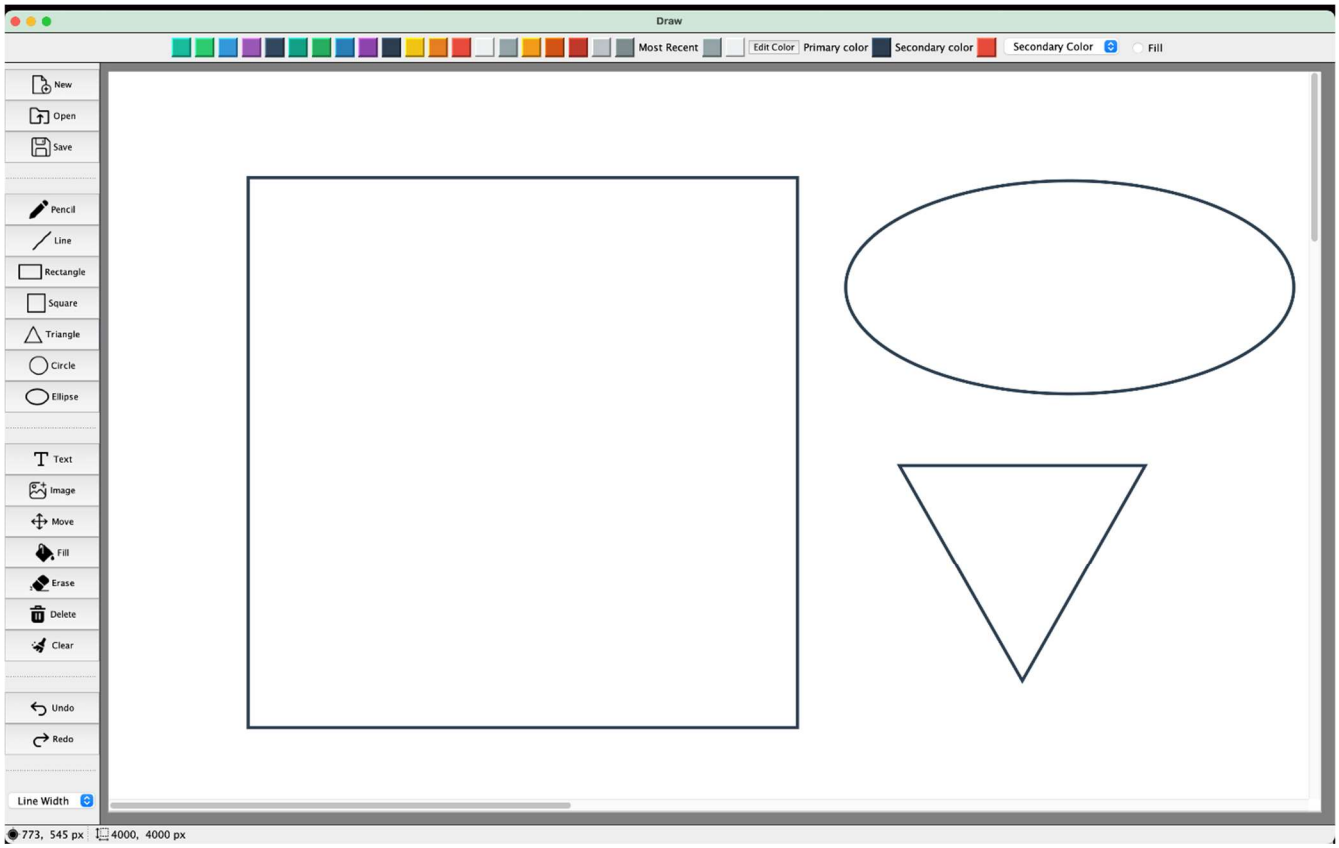

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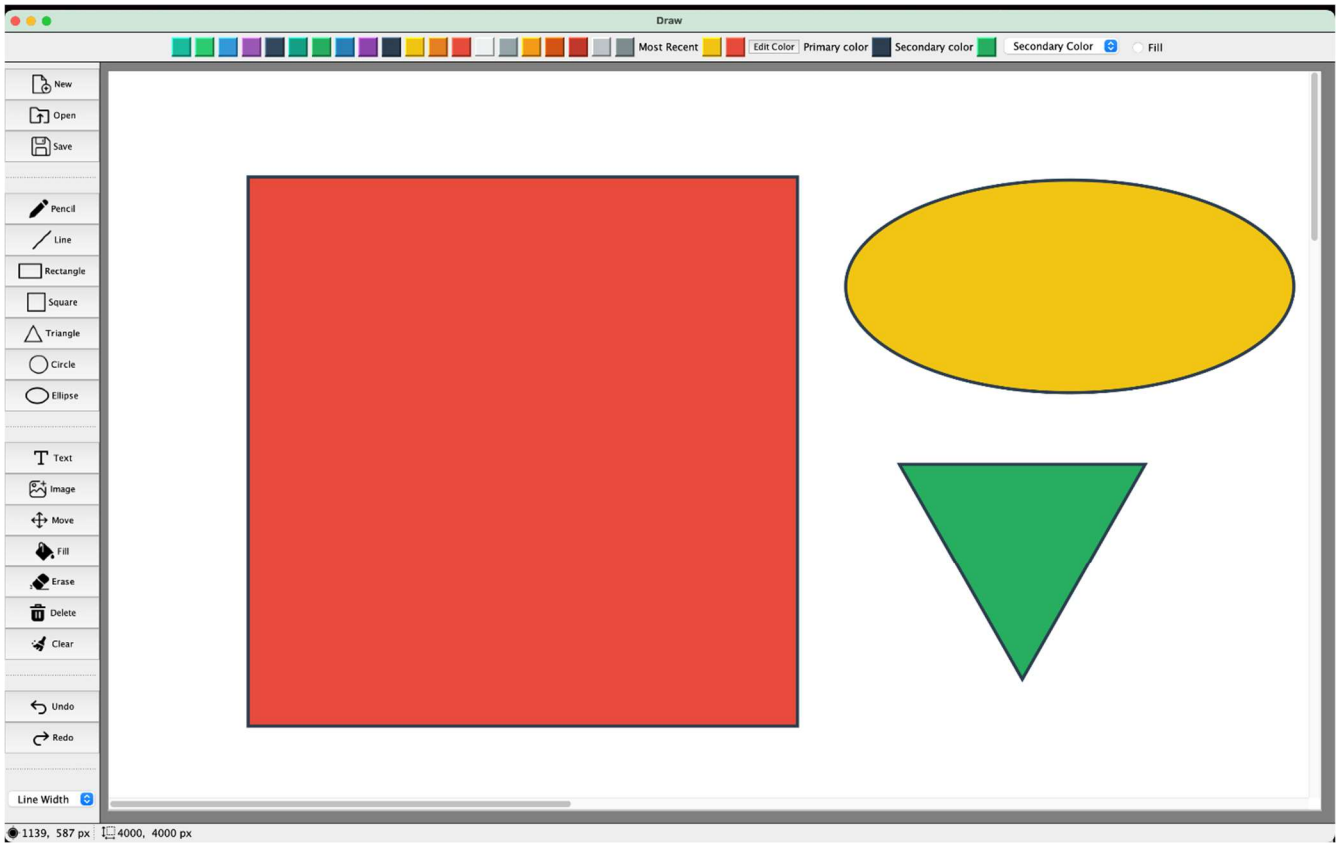

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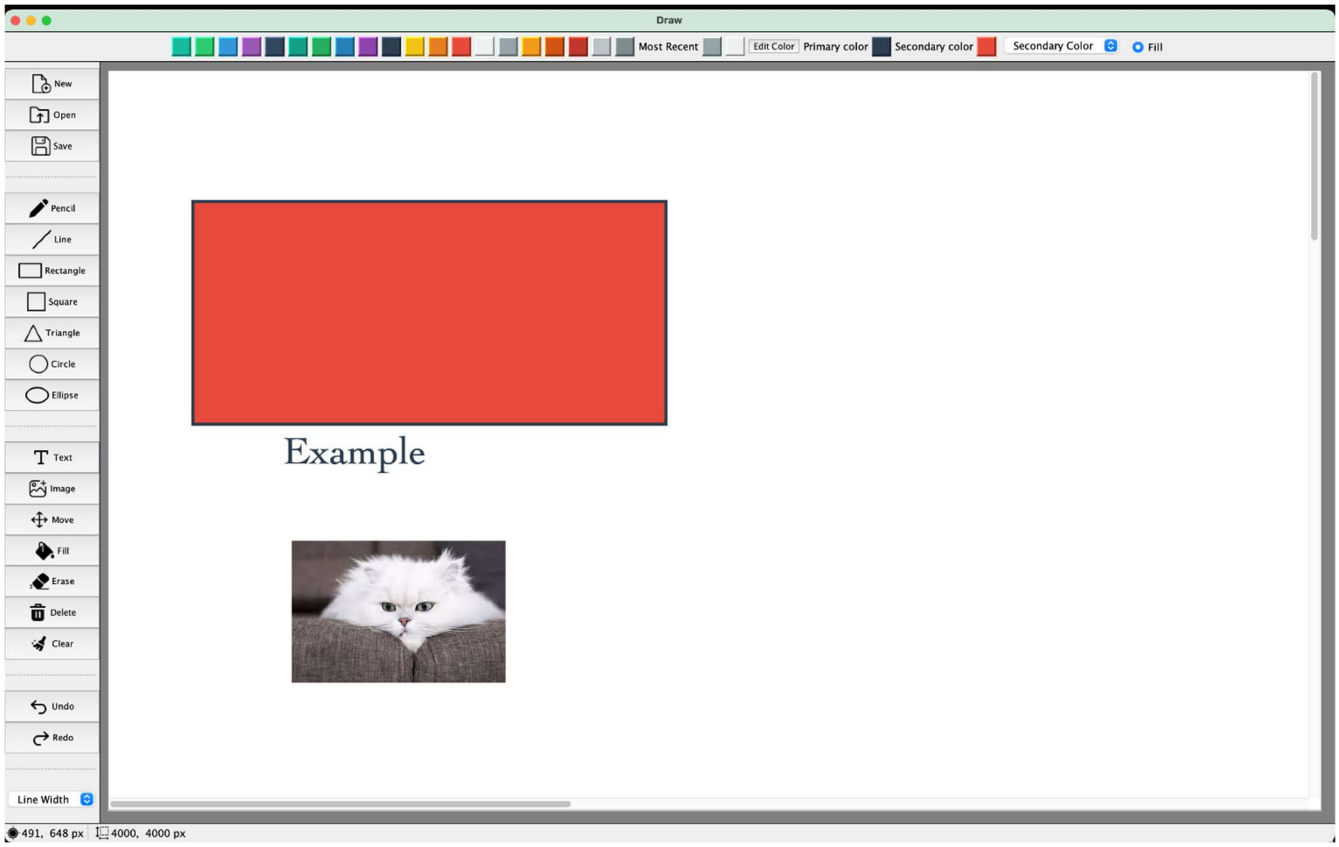

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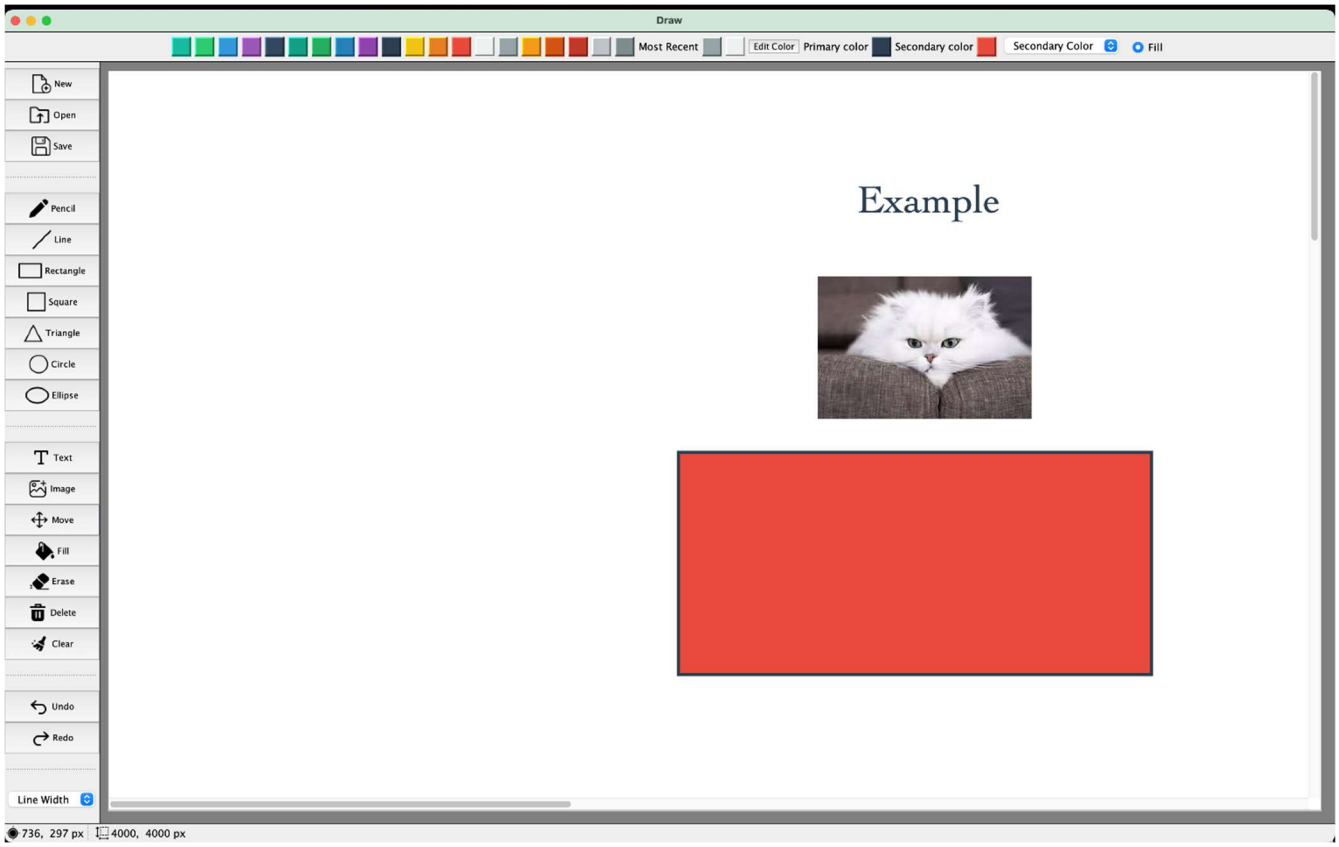

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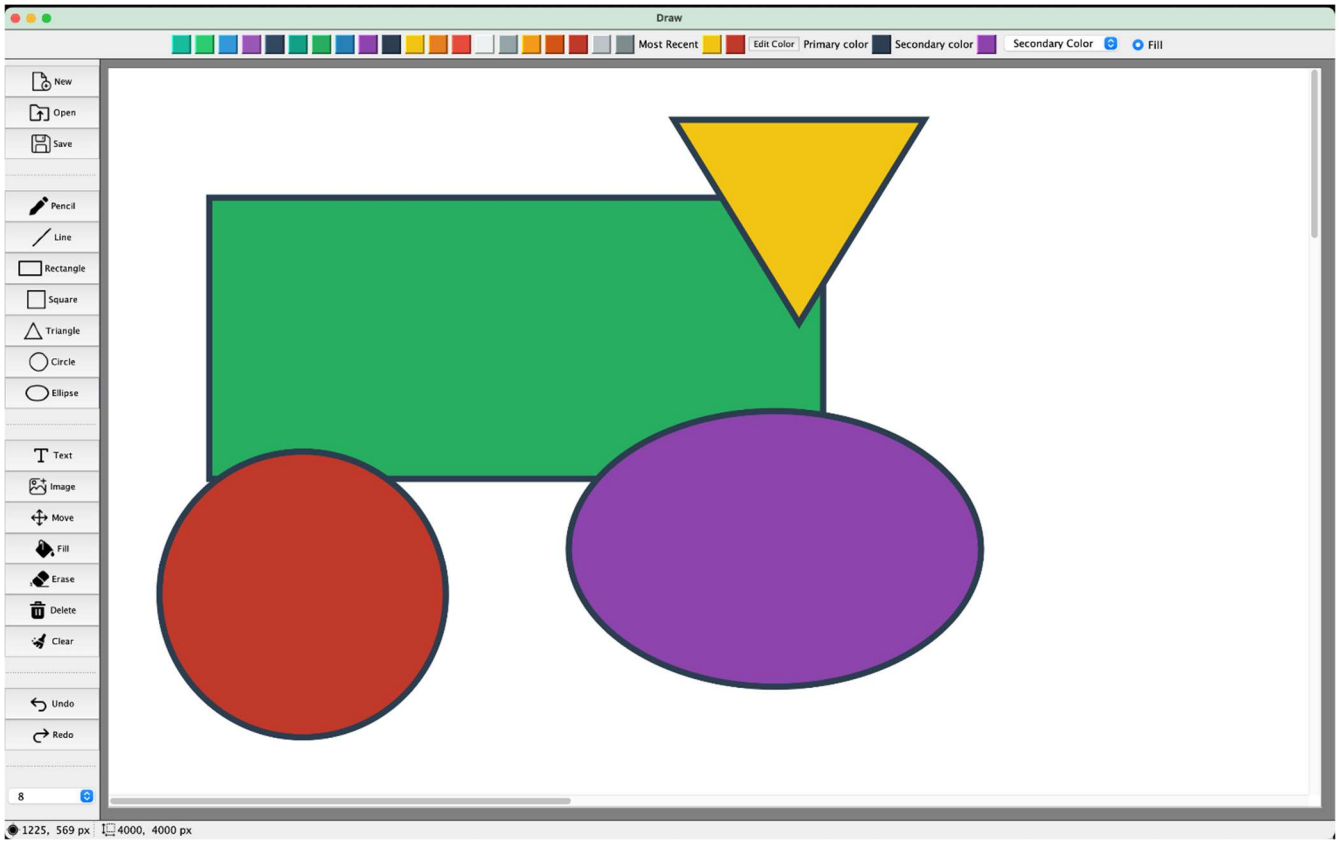

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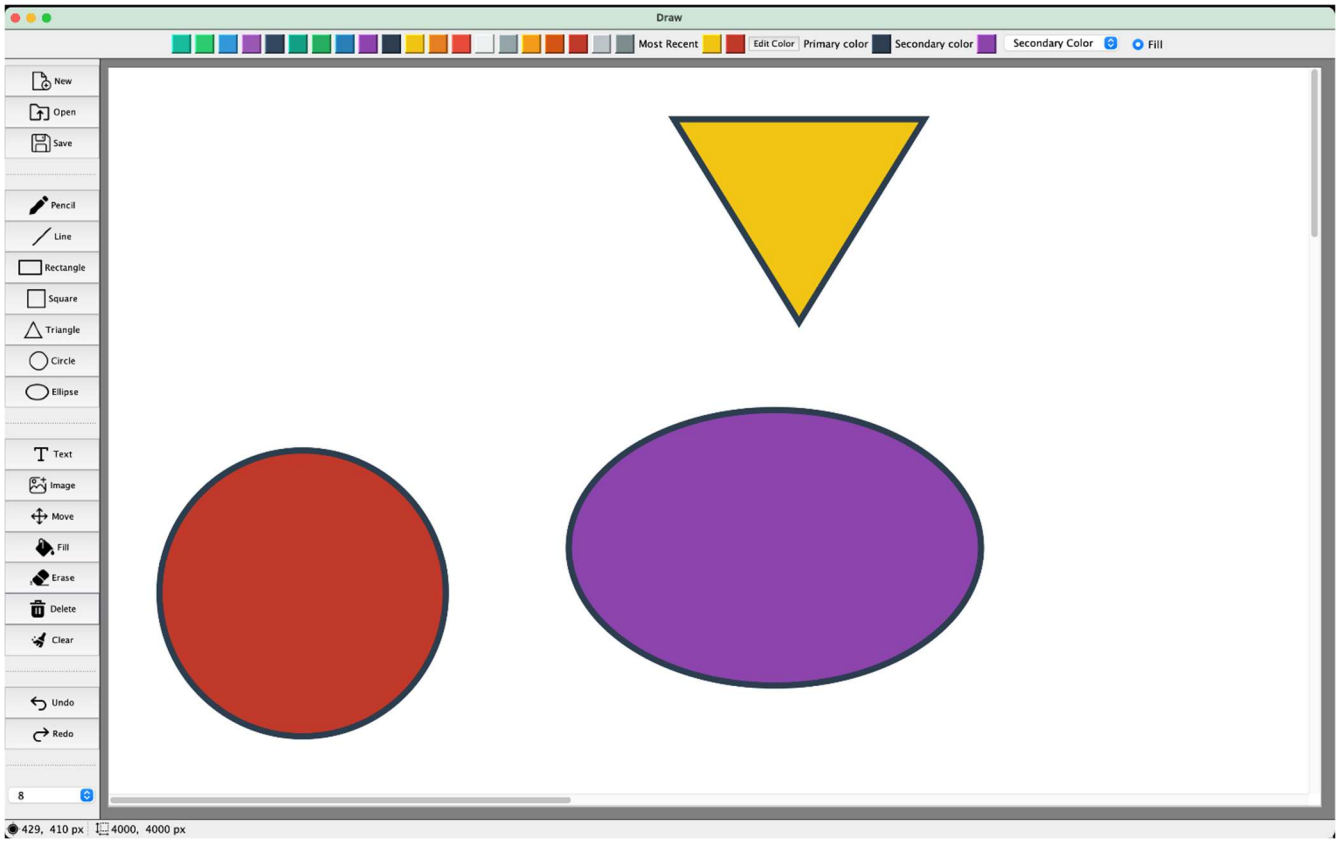

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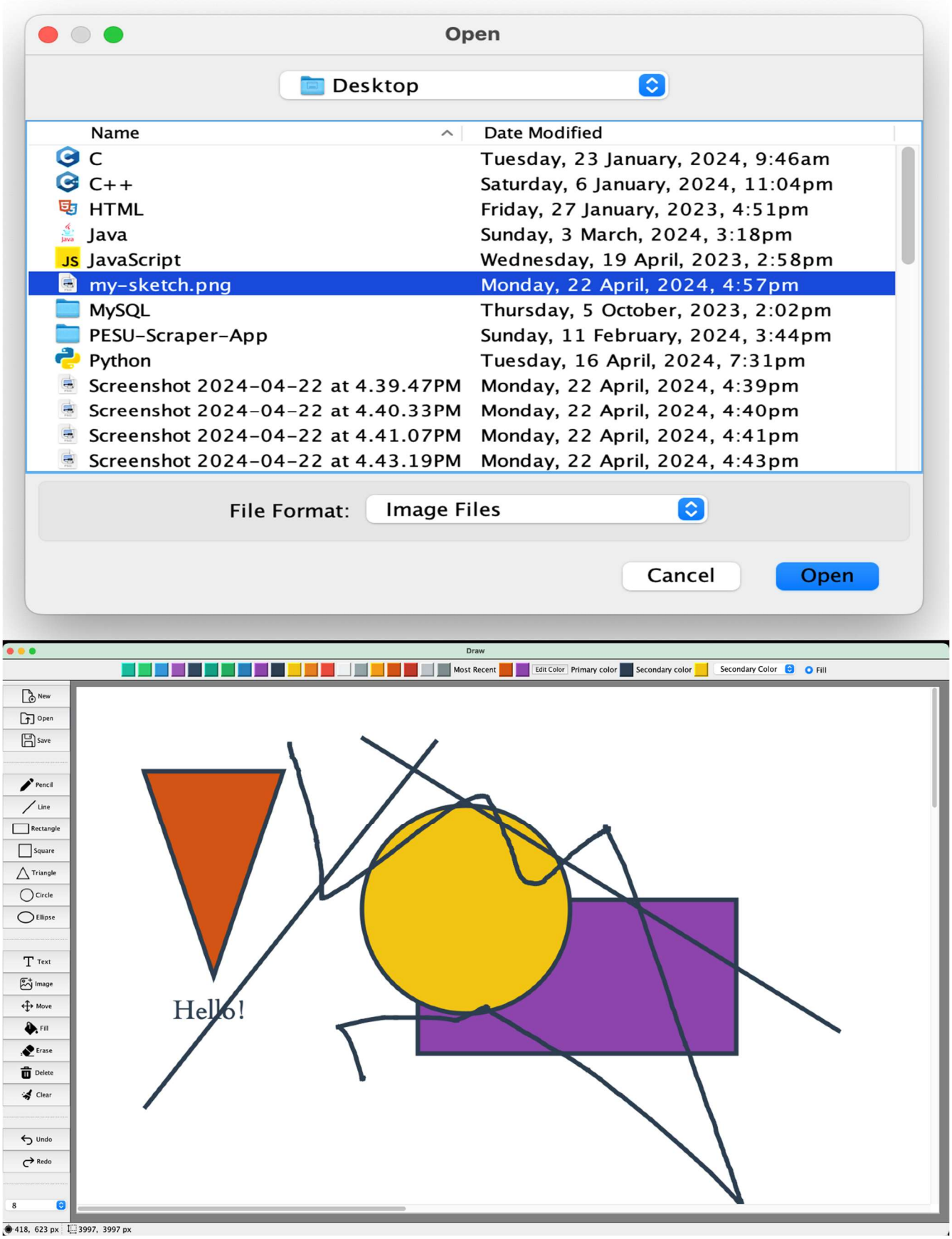
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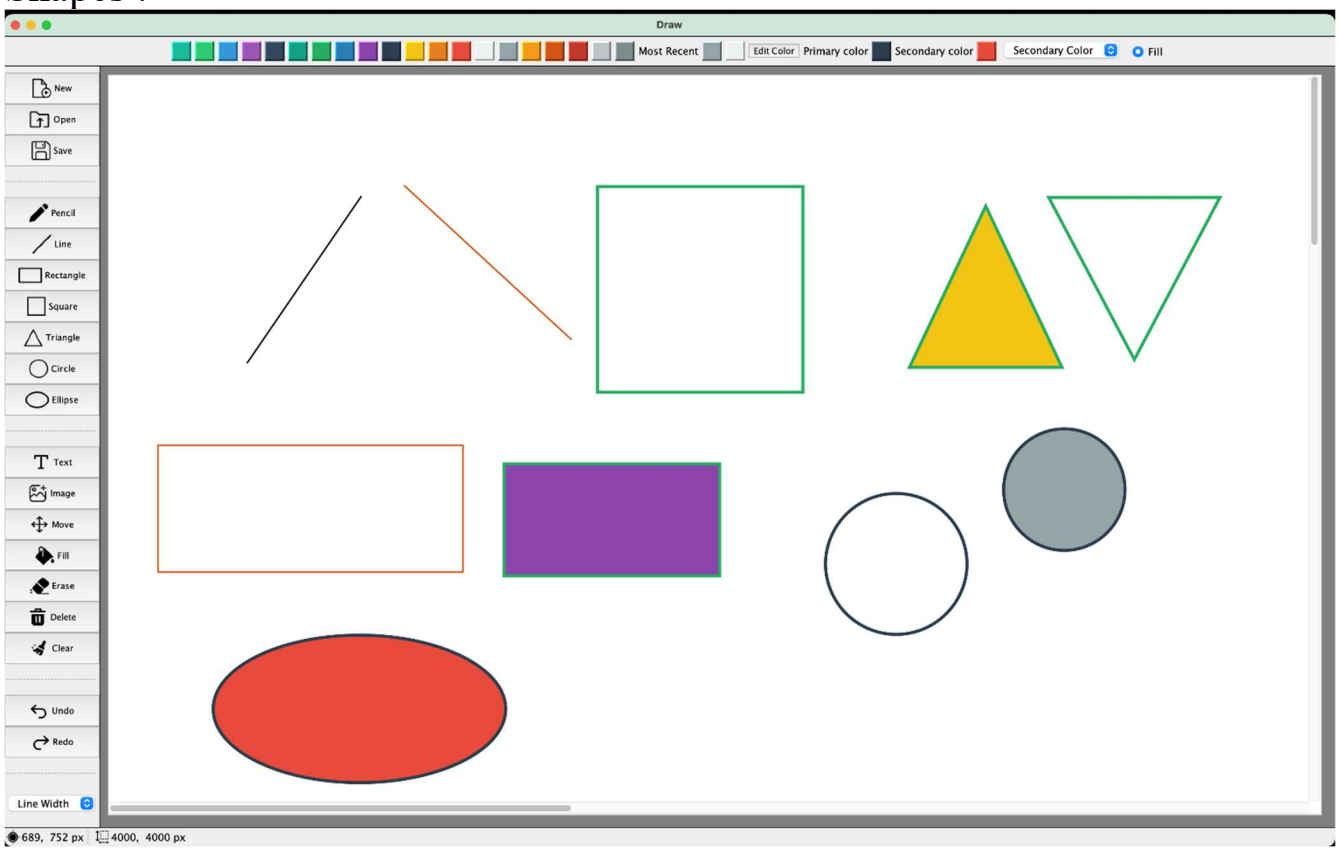

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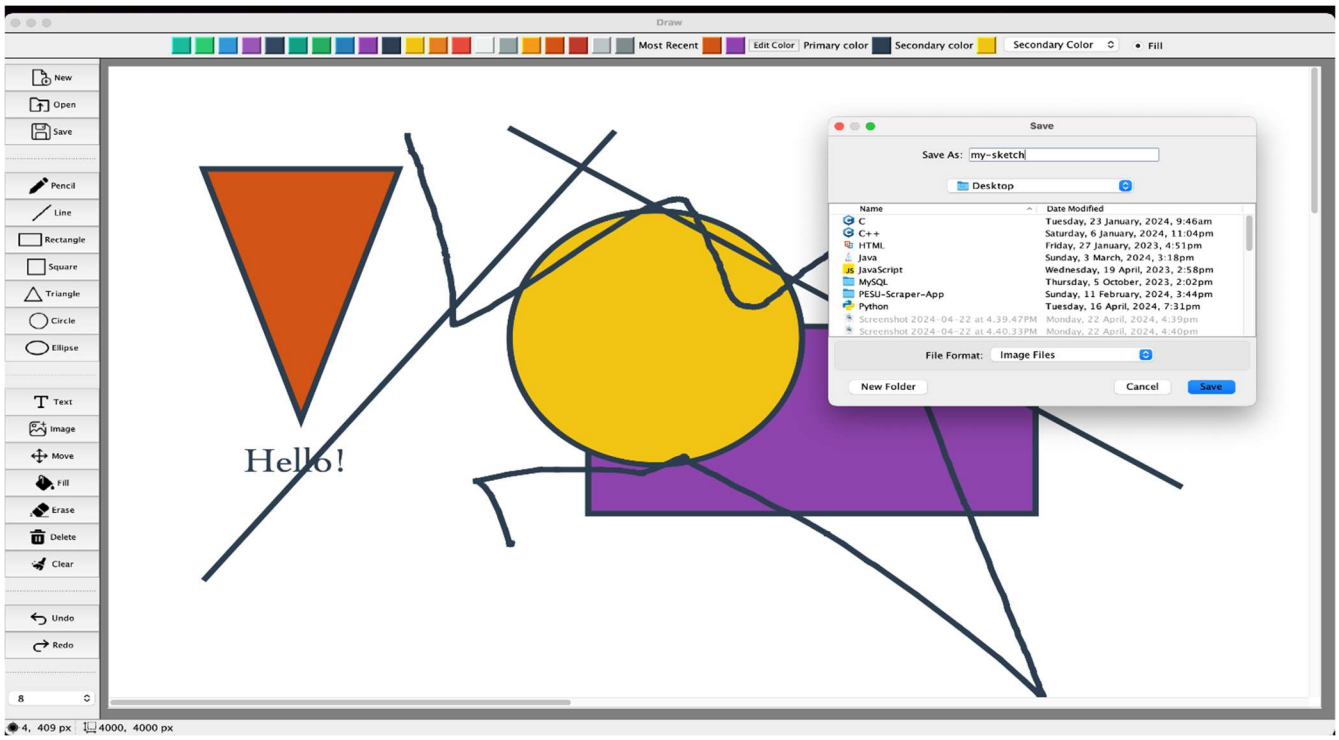

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