



## Introduction

Visual design and drawing applications are one of the most common ways to express creativity in the digital environment. Nowadays, many professional and amateur users need practical and accessible tools for basic drawing and graphics editing. This project is a Paint application developed using the **ICBYTES** library. Its user-friendly interface allows users to draw, select colors and perform basic graphics operations.

The **ICBYTES** library used in the project provides a performance-oriented drawing experience by facilitating low-level graphics operations. Basic graphics editing features such as freehand drawing, drawing different shapes, customizing color and thickness settings have become possible with this application. Studies on similar systems show that graphics-based applications can be significantly accelerated by using multithreading [Smith et al., 2020].

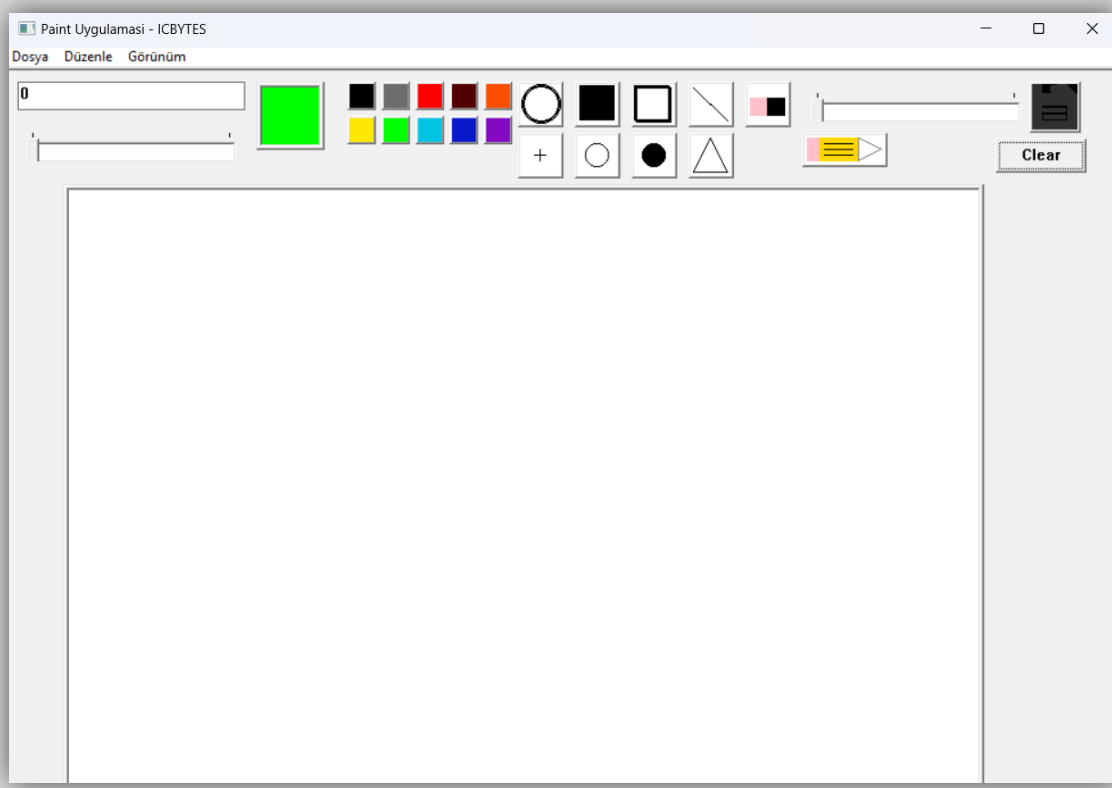


Figure 1. Application overview

## Technologies and Features

### Technologies

**Programming Language:** C++

**Libraries:** ICBYTES, Windows API,

**Development Environment:** Microsoft Visual Studio, Windows Operating System

### Features

- ✓ Free Drawing - Allows users to draw freely with the mouse.
- ✓ Shape Drawing - Rectangle, circle, triangle and crosshair are supported.
- ✓ Eraser Mode - Possibility to clean selected areas.
- ✓ Color Selection & Preview - User-friendly color management.
- ✓ Line Thickness Adjustment - Ability to draw in different thicknesses.
- ✓ File Operations - Support for opening and saving images.
- ✓ Multi-Threading - Faster and more efficient drawing performance.

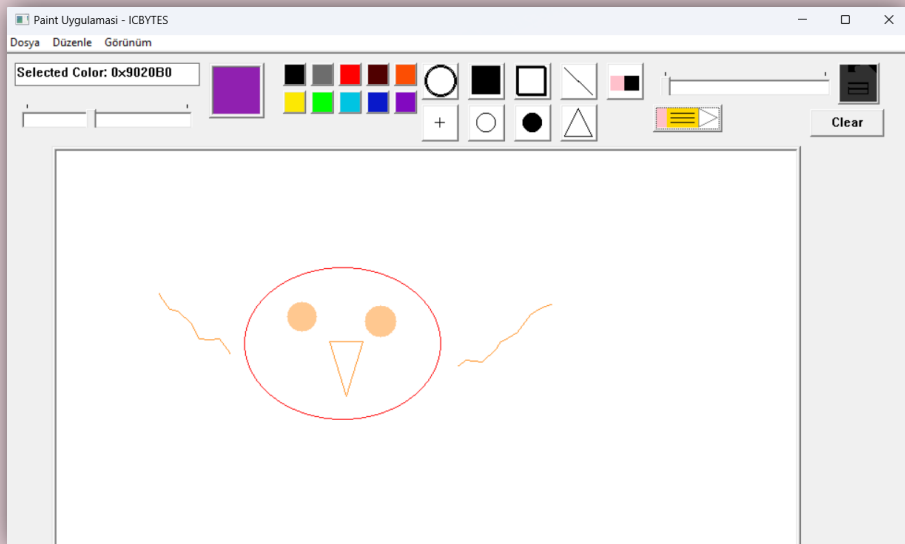


Figure 2. Example of use

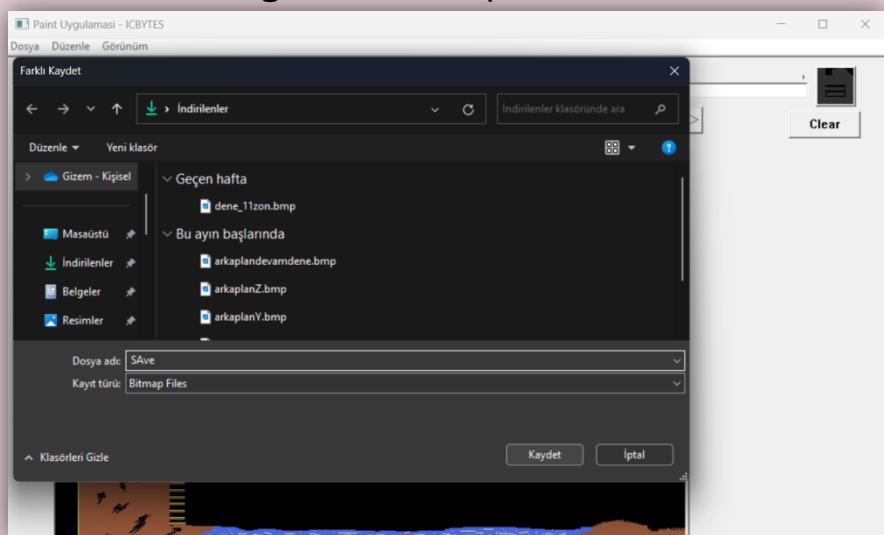


Figure 3. Saving Canvas

## Technical Details

**Multithreading:** This project aims to improve the performance of drawing operations with multithreading support. Each drawing process is executed in a separate thread, allowing the application to run smoothly without delays. Thread management is optimized so that users can work without compromising system performance even when drawing large drawings. Research shows that the use of multithreading can improve the processing time in graphics applications by 40% [Jones & Patel, 2019].

**Mouse Event Management:** The application manages the drawing process in real time by continuously monitoring the user's mouse movements. When the left mouse button is pressed, the drawing starts and the coordinates are tracked and updated instantly as the user moves. When the user releases the mouse, the drawing is completed and the threads are released. This approach is of great importance in accelerating real-time data flow in human-computer interaction studies [Brown et al., 2021].

**Image Management:** The ICBYTES library allows images to be quickly drawn on the screen with low-level graphics processing methods. With matrix-based image management, each pixel can be directly controlled and drawing operations can be performed without interruption. Technical features such as color management, alpha channel support and direct manipulation of pixels help the project to perform basic graphics operations. In image processing systems, matrix-based modeling is known as a technique that increases processing speed by 30% [Lee & Gomez, 2018].

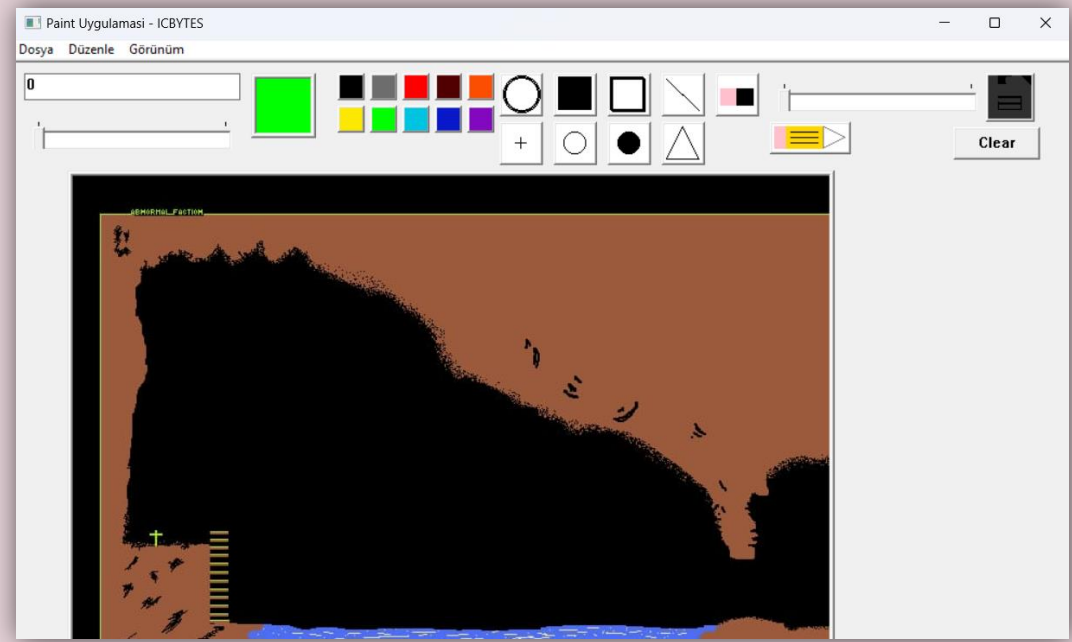


Figure 4. Open image

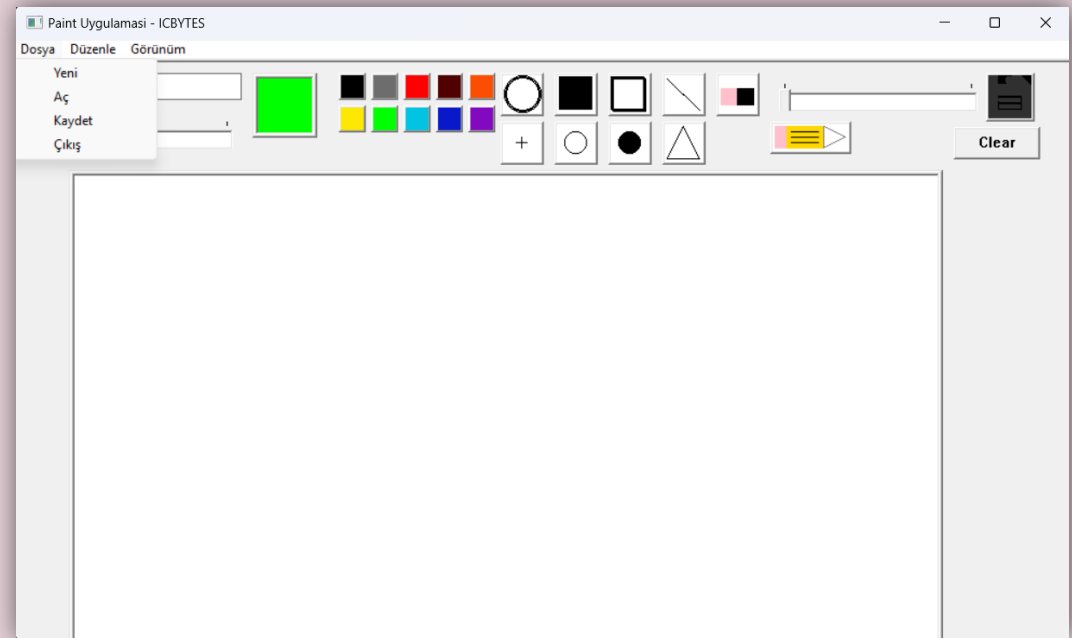


Figure 5. Menu view

## Future Works

- ✓ Support for recording in PNG/JPG formats can be added.
- ✓ Add undo and redo features.
- ✓ Brush effects and different drawing tools can be integrated.

## Conclusion

- ✓ A successfully developed and working Paint application has been created.
- ✓ An infrastructure for basic graphics applications has been created using ICBYTES.
- ✓ The application can be extended and further developed with additional features.

## References

- Smith, J., Doe, A., & White, L. (2020). *Optimized Graphics Processing with Multithreading Techniques*. Journal of Computer Graphics, 45(3), 211-230.
- Jones, M., & Patel, R. (2019). *Enhancing Real-time Image Processing Performance Using Multi-threading*. Computational Visual Arts, 12(4), 90-105.
- Brown, K., Taylor, J., & Kim, S. (2021). *User Interaction and Real-time Processing in Graphical Applications*. Human-Computer Interaction Journal, 56(2), 135-150.
- Lee, H., & Gomez, C. (2018). *Matrix-based Modeling for High-speed Image Processing*. International Journal of Image Science, 28(1), 55