CSC.249.0001 Project Documentation

Project Name: Mini Paint App

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Project Summary:

The Mini Paint App is a simple drawing program made with Python and the Tkinter library. It lets users draw on a blank canvas using basic tools like a paintbrush, text tool, and eraser. The app runs in a small window and is easy to use. It’s meant to show how a basic drawing program can be built and how data structures like stacks can be used in real applications.

Key Capabilities and Requirements:

* Paintbrush Tool: Lets the user click and drag the mouse to draw lines on the canvas.
* Text Tool: Lets the user click anywhere on the canvas and type in text.
* Eraser Tool: Used to erase lines by clicking and dragging over them.
* Undo and Redo Buttons: Undo lets the user go back one step, and redo brings the step back if it was undone by mistake.
* Save as PDF: The app can save the picture the user makes as a PDF file, so they can keep or share their drawing.
* Canvas Setup: The canvas responds to user input and updates as the user draws or types.

Data Structure Used: Stack

To make the undo and redo features work, we used two stacks:

* One stack is used to keep track of all the actions the user has done (like drawing or typing).
* The second stack is used to store actions that have been undone, in case the user wants to redo them.

Why we used it:

Stacks work in a "last in, first out" way. This is perfect for undo and redo, because when you undo something, you want to remove the most recent action, not the oldest one. Stacks make it easy to add and remove the latest thing the user did.

Performance:

Adding or removing something from a stack takes constant time (O(1)), which means it works fast no matter how many actions there are.

Other Data Structure We Considered: Queue

We thought about using a queue, which works in a "first in, first out" way. That means it handles things in the order they were added.

Why we didn’t use it:

With undo and redo, we need to remove the last thing the user did, not the first. A queue would undo the oldest action first, which doesn’t make sense in a drawing app. That’s why stacks were a better choice.