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Project 3 Report

1. One obstacle I encountered was when checking for syntax errors in the command string, my code originally had a lot of repetition which made it hard to read and difficult to find and fix errors. I fixed this by creating a separate function to check the syntax. Also, I had trouble in reporting a syntax error before reporting that a command could not be performed. I solved this by checking the syntax of the command before attempting to process the commands. I also had difficulty when reading the digit part of the command because it was challenging to account for all the variation in how the digit could be presented, possibly with a negative sign and up to two digits.
2. The program prompts a user for a command string until they enter an empty string. If the string is not empty, the command is processed by performsCommands. If the command has no errors, performsCommands returns 0, otherwise it returns an error code which will result in a specific error message. The pseudocode for performsCommands is:

check if there are any syntax errors with isValid() function

if there are errors

set index of error and return from function with error code 1

loop while at an index in the string:

if the command starts with v or h

read the digits and call plotting function

if result of plotting function is false (meaning the line is outside grid)

set index of error and return with error code 2

otherwise increase either row or column position by length of line

increase index variable by length of digit command

else if command starts with f

set mode to foreground and change plot char to next char in string

increment index

else if command starts with b

set mode to background and change plot char to next char in string

increment index

else if command is c

clear grid and reset plotting variables

increment index variable

return 0 meaning plotting was successfully completed

Then there is the implementation of the plotting function plotLine which takes an input position for the row and column, distance of line, direction of line, and plotting character:

check if line will be in grid and return false if not

loop for number of times equal to distance of line:

if foreground mode, or background mode and current character is empty

set character to plotting character

if distance is positive

increment row position if vertical line or column position if horizontal

or if distance is negative

decrement row position if vertical line or column position if horizontal

return true

Then there is the implementation of the syntax checking function which takes a string as a parameter and checks if it is valid or not based on the syntax instructions given.

Finally, there is the implementation of the digit reading function which is called when there is a horizontal or vertical line command. This returns the integer value of the digits that follow the command.

1. Some data to test the program would be:
   * A command with correct syntax and which plots inside the grid (“v5h7f@h3”)
     + This would check that the program works correctly in the regular case
   * A command with more than two digits (“v5h6h123”)
     + This would check that the program correctly identifies this as a syntax error and does not just take any digits that it sees after the command
   * A command with a negative distance to plot (“v7h10v-3”)
     + This would check that the program correctly handles a negative distance which would have a negative sign directly after the direction command rather than a digit
   * A command with incorrect syntax after the h or v drawing command (“h8v6h+6”)
     + This would check that the program correctly handles an error in the digit part of the command and returns the correct index – the index of where the correct digits should begin
   * A command with f or b as the last character (“h5v6f”)
     + This would make sure that the program correctly handles a case where there is no character after this command because using this command requires accessing the next character in the string, and it would be undefined behavior if the command was the last character in the string and you tried to access something beyond that
   * A command with a plotting command that would be outside the grid (“h65v8h6”)
     + This would make sure that the program gives the correct error message for when a line would have any part outside the grid.
   * A command with a plotting command that would be outside the grid and a syntax error (“h78v+7h7”)
     + This would make sure that the program identifies a syntax error first