Introduction

In this assignment, you will start to introduce a graphic interface to the semester’s project, using GLUT and Open GL. The next assignment will complete the process.

Assignment

Download the example code and put it into an new directory gui-src that will be a sibling to the src folder. The Makefile should link code from the src folder into the glut_main program in the gui-src. This starter code will draw a Julia set image if the user enters the J key.

You will extend this code to add a few more actions.

Programming Requirements

GlutApp.{h,cpp}

Add the following methods to the class. Each of these is copies code that was in createJulia() and moving it to a method to make it reusable, or it does actions that are similar to those.

- void selectJulia(); Sets up the input and output streams, and calls takeAction with the “julia” choice.
- void selectMandelbrot(); Sets up the input and output streams, and calls takeAction with the “mandelbrot” choice.
- void selectComplexFractal(); Sets up the input and output streams, and calls takeAction with the “complex-fractal” choice.
- void configureGrid(int max); Sets up the input and output streams, and calls takeAction with the “grid” choice. Uses mHeight and mWidth for the height and width, and max for the maximum number.
- void juliaParameters(double a, double b); Sets up the input and output streams, and calls takeAction with the “julia-parameters” choice.
- void fractalPlaneSize(double x_min, double x_max, double y_min, double y_max); Sets up the input and output streams, and calls takeAction with the “fractal-plane-size” choice.
- void fractalCalculate(); Sets up the input and output streams, and calls takeAction with the “fractal-calculate” choice.
- void gridApplyColorTable(); Sets up the input and output streams, and calls takeAction with the “grid-apply-color-table” choice.

Update the following method:

- void createJulia(); Rewrite this method to use the methods created above to take the same actions.

Create the following methods:

- void createJulia2(); Creates a different Julia set that createJulia. Must use different Julia parameters and fractal plane size. Must also look interesting. Use the methods defined above, as appropriate.
- void createMandelbrot(); Creates a Mandelbrot set. Must look interesting. Use the methods defined above, as appropriate.
- void createMandelbrot2(); Creates a Mandelbrot set. Must be different than the other one. Must look interesting. Use the methods defined above, as appropriate.
- void createComplexFractal(); Creates a Complex Fractal. Use the methods defined above, as appropriate.
- void createComplexFractal2(); Creates a Complex Fractal. Must be different than the other one. Use the methods defined above, as appropriate.

glut_callback.cpp

Update the following functions.

- void keyboard_cb(unsigned char c, int x, int y); Add options for j, m, M, c, and C. Each of these will call a different method of the GlutApp class, similar to the J option causing createJulia() to be called. j calls createJulia2(), M calls createMandelbrot(), m calls createMandelbrot2(), c calls createComplexFractal(), C calls createComplexFractal2()
Update `src/Makefile`

No changes here: The following commands should work correctly.

- `make hello` - builds the hello program
- `make questions_3` - builds the questions_3 program
- `make ascii_image` - builds the ascii_image program
- `make image_file` - builds the image_file program
- `make ppm_menu` - builds the image_file program
- `make all` - builds all programs
- `make clean` - builds all programs (same as `make all`)
- `make clean` - removes all .o files, and all executable programs

Update `gui-src/Makefile`

Should be able to use the file as is.

- `make glut_main` - builds the application.
- `make clean` - removes all .o files, and all executable programs

Additional Documentation

- [C++ Reference](#)
- [Examples from class](#)

Show Off Your Work

To receive credit for this assignment, you must

- complete the unit tests available in CodeGrinder (if available)
- use git to add, commit and push your solution to your repository for this class.

Additionally, the program must build, run and give correct output.

Extra Challenges (Not Required)

- Allow the user to design their own color tables.
- Allow the user to change the maximum number (max escape count).
- Allow the user to move the center point with the arrow keys.
- Other interesting user interactions.