

ASCII Mandelbrot and Julia Set Renderer

The Mandelbrot Set is a beautiful fractal constructed on the complex plane. The fractal shape comes from the repeated iteration over the following equation for each point on the complex plane.

$$f_c(z) = z^2 + c$$

The value of z starts at 0 and changes through each iteration of the function while c represents a point on the complex plane and remains the same through each iteration of the function. A point is considered inside the Mandelbrot set if the function doesn't diverge or escape a radius of 2 through iteration. Points outside of the Mandelbrot set are often colored differently according to the number of iterations it takes for it to escape a certain radius. It's along these boundaries that the complex shapes and self-recursive images are produced with infinite precision and detail.

Similarly, the Julia Sets are fractal images on the complex generated through iteration over an equation. If c is held constant as some value on the complex plane and then each point on the plane is used as the initial value of z to iterate over, the Julia Set corresponding to point c is generated. The composition of the Julia Set (whether it is a filled or nowhere-dense set) is also an indicator of whether c is in the Mandelbrot Set.

I propose a parallel fractal renderer for the Mandelbrot and Julia Sets. This gives this program high potential for parallelization. Instead of using colors to encode the set borders to denote different rates of escape of bounded radius, an encoding of ASCII characters will be used to generate the image. This program will take input to either generate the Mandelbrot Set or the Julia Set given a certain a and b value to represent $a + bi$ as the c value. For both sets, the iteration over each point is perfectly independent of the iteration over each other points. The returned result of all these threads will be used to generate the composite set image.