

cs6550

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1 Implementation

Implementation courtesy of Dr. Watson.

The program took a little over a second to create and render a 512x512 ppm image.

2 Code

```
1 #include <iostream>
2 #include <unistd.h>
3 #include <cmath>
4 // #include "/usr/local/include/mpi.h"
5 #define MCW MPI_COMM_WORLD
6 #define PIXELS 512
7
8 using namespace std;
9
10 void printColor(int i){
11     int r,g,b;
12     r=(log(i)/log(1024))*255;
13     g=0;
14     b=0;
15     if (i==1024) {r=0; g=0; b=0;}
16     cout << r << " ";
17     cout << g << " ";
18     cout << b << " ";
19 }
20
21 struct Complex{
22     double r;
23     double i;
24 };
25
26 Complex operator * (Complex a, Complex b){
27     Complex c;
28     c.r = a.r*b.r-a.i*b.i;
29     c.i = a.r*b.i+a.i*b.r;
30     return c;
31 }
32
```

```

33 Complex operator + (Complex a, Complex b){
34     Complex c;
35     c.r = a.r+b.r;
36     c.i = a.i+b.i;
37     return c;
38 }
39
40 Complex operator - (Complex a, Complex b){
41     Complex c;
42     c.r = a.r-b.r;
43     c.i = a.i-b.i;
44     return c;
45 }
46
47 int mbrot_iters(Complex c){
48     int i=0;
49     Complex z = c;
50     while(z.r*z.r+z.i*z.i<2.0*2.0 && i<1024){
51         z = z*z+c;
52         i++;
53     }
54     return i;
55 }
56
57
58 int main(int argc, char **argv){
59     Complex c1,c2,cx,cdiff;
60     double rinc;
61     double iinc;
62     int iters;
63     c1.r = -2.0;
64     c2.r = 0.0;
65     c1.i = 1.0;
66     c2.i = -1.0;
67
68     cdiff = c2-c1;
69     rinc = cdiff.r/PIXELS;
70     iinc = cdiff.i/PIXELS;
71
72     cout << "P3" <<endl;
73     cout << PIXELS << " " << PIXELS << endl;
74     cout << "255" <<endl;
75
76
77     for(int i=0;i<PIXELS;++i){
78         for(int j=0;j<PIXELS;++j){
79             cx.i = c1.i+j*iinc;
80             cx.r = c1.r+i*rinc;
81             iters = mbrot_iters(cx);
82             printColor(iters);
83         }
84         cout << endl;
85     }
86
87
88
89     return 0;

```

90 }

3 Compile and Run Commands

```
1 g++ Assignment5/Assignment5.cpp -o Assignment5/run.out
2 time Assignment5/run.out > mbrot.ppm
```