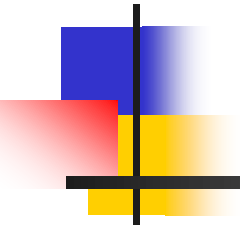

Interactive Fractals

Silicon Valley Forth Interest Group

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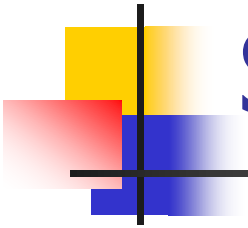
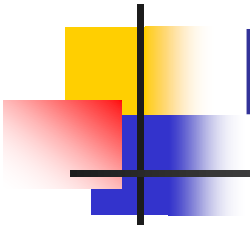
Chen-Hanson Ting



Summary

- Mandelbrot Plots
- Floating Point Computations
- Coloring
- Interactive Navigation
- Demonstrations

Mandelbrot Plots

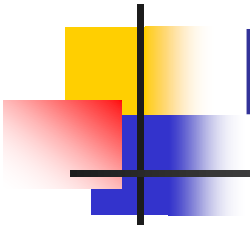


- Scan a complex plane Z=X+iY
- At an point Zo = Xo +iYo

  Compute Zn+1 = Zo + Zn*Zn

  Xn+1 = Xo + Xn*Xn – Yn*Yn

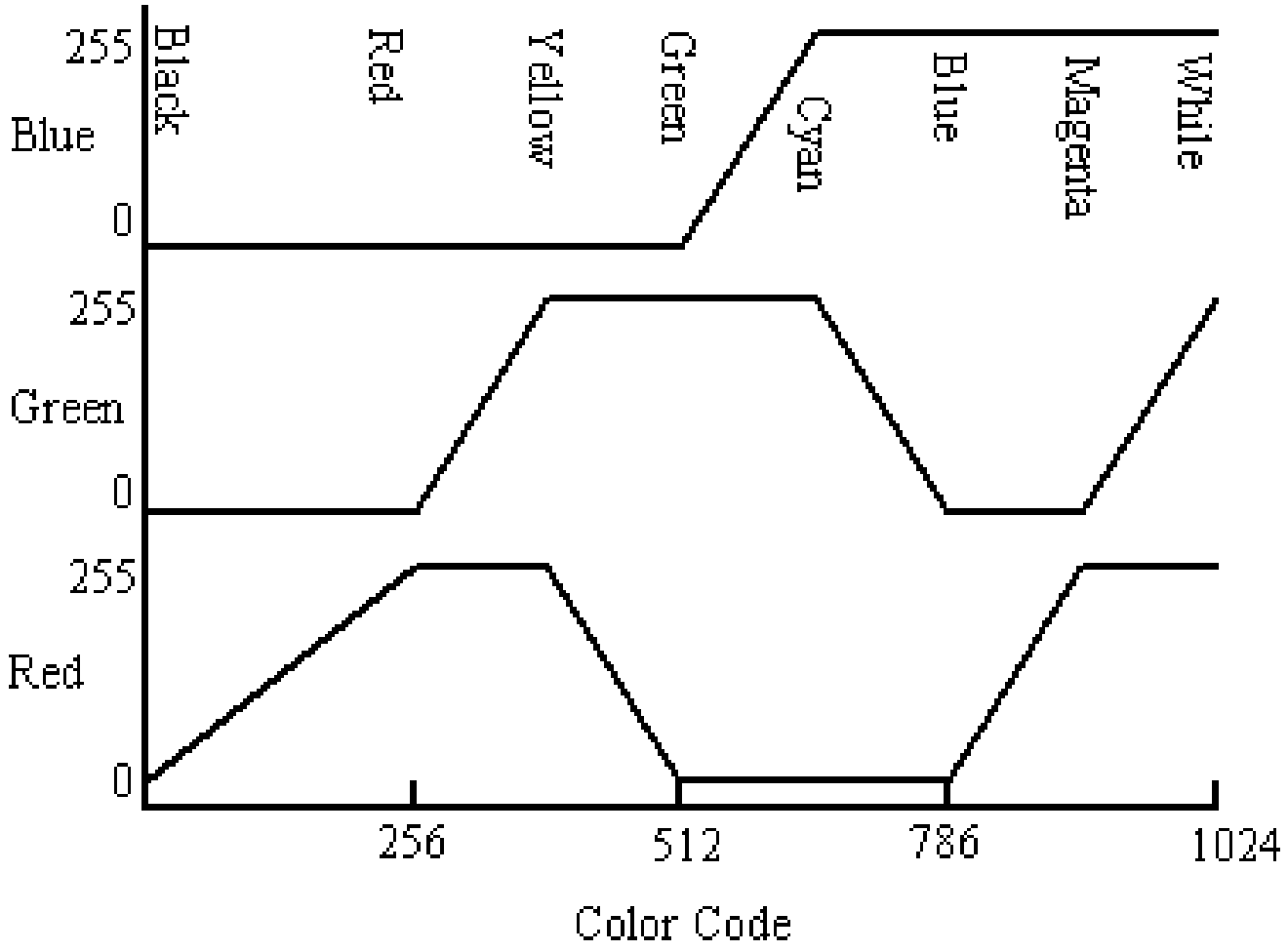
  Yn+1 = Yo + 2Xn*Yn
- When Xn+1*Xn+1 + Yn+1*Yn+1 > 4, stop iteration and plot n in color.

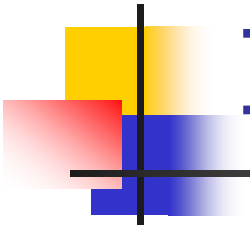


Floating Point Computation

- Screen coordinates: 768x512 pixels
- (X,Y) coordinates are scaled to 64 bit integers: 1.0 = 0x1000,0000,0000,0000
- In the original image, 1.0 is mapped to 256 pixels.
- Coordinates are fed into FPU and iteration is started to produce n for coloring.

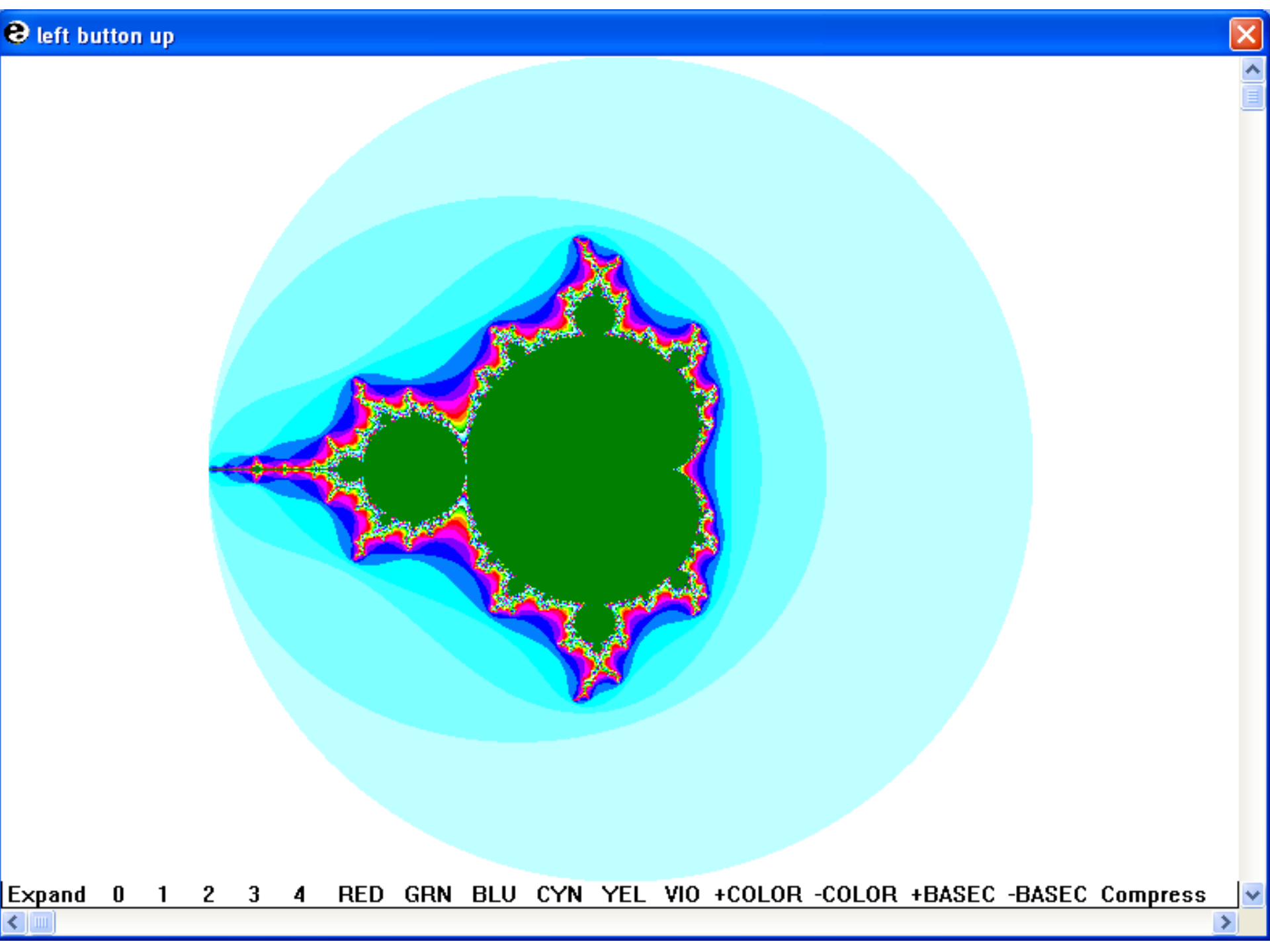
Coloring


255
Blue
0
255
Green
0
255
Red
0
Black
Red
Yellow
Green
Cyan
Blue
Magenta
While
256
512
786
1024
Color Code



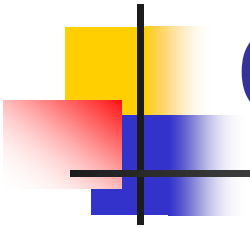
Interactive Navigation

- Mouse clicking any point on screen moves this point to the center of the screen.
- Mouse clicking buttons at the bottom of screen activates various functions.


left button up
Expand 0 1 2 3 4 RED GRN BLU CYN YEL VIO +COLOR -COLOR +BASEC -BASEC Compress

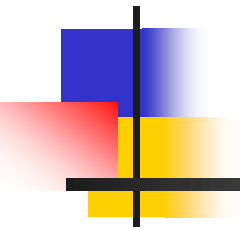
Interactive Navigation

Expand	Expand current image by a factor of 2.
0	Display the initial default Mandelbrot fractal.
1 -4	Display selected fractals.
RED	Change current display to red.
GRN	Change current display to green.
BLU	Change current display to blue.
CYN	Change current display to cyan.
YEL	Change current display to yellow.
VIO	Change current display to violet.
+COLOR	Increase the number of colors.
-COLOR	Decrease the number of colors.
+BASEL	Increase the baseline color code.
-BASEL	Decrease the baseline color code.
Compress	Compress current image by a factor of 2.



Conclusion

- Idiot proof.
- PC is fast enough to display fractals interactively.
- It will be released as a game with complete source code and F# operating system, for people to explore Forth.



Thank You