



# Computer graphics project

## fract'ol

*Summary: This project is meant to create graphically beautiful fractals.*

*Version: 2*

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# Chapter I

## Foreword

Here's what Wikipedia has to say on hydraulic fracturing:

The "hydraulic fracturing," is the targeted disruption of geological formations with low permeability by means of injection under high pressure of a fluid to micro-cracking and crack the rock. This fracturing can be performed near the surface or at depth (over 1 km or more than 4 km in the case of shale gas) and from vertical wells, sloped or horizontal.

This relatively old technique (1947), developed for conventional oil deposits, is renewed by its association with horizontal drilling (developed from 1980). It is the gradual mastery of the economic viability of this association for non-conventional deposits, who guided the recent development of the operation of these: it made available formerly inaccessible resources, or which have been exploited at exorbitant costs and slowly.

It is carried out by fracturing the rock with a "stress" mécanique<sup>3</sup> using a fluid injected under high pressure from a surface drilling, to increase the macro-porosity and the micro-porosity. The fluid could be the water, a slurry or a technical fluid whose viscosity was adjusted.

This project is not called *fract'oil* and accordingly has no relation to hydraulic fracturing.

# Chapter II

## Introduction

The term fractal was first used by mathematician Benoit Mandelbrot in 1974, he based it on the Latin word **fractus**, meaning "broken" or "fractured". A fractal is an abstract mathematical object, like a curve or a surface, which has a similar pattern whatever the scale.

Various natural phenomena – like the romanesco cabbage – have some fractal features.



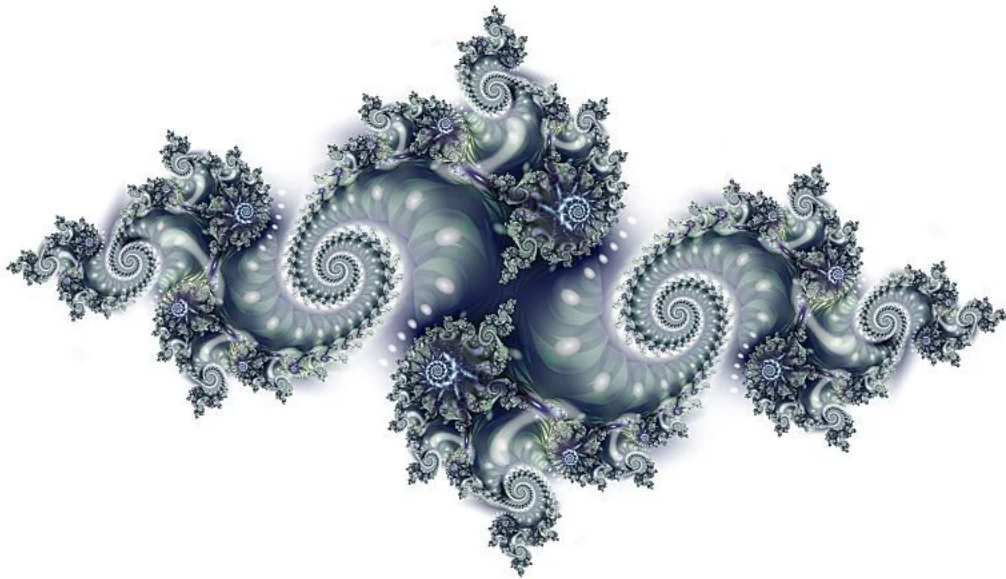
Now, it's your turn to generate some magnificent fractals!

# Chapter III

## Objectives

Now that you took over your first graphical library: the `miniLibX`, it's time for you to light all the pixels of your screen at the same time!

This new project will be the opportunity for you to hone your `miniLibX` skills, to make you discover/use the mathematical notion of **complex numbers** and to take a peek at the concept of **optimization** in computer graphics.



Don't forget to watch the videos on e-learning!

# Chapter IV

## General Instructions

- This project will be corrected by humans only. So, feel free to organize and name your files as you wish, but within the constraints listed here.
- You cannot use global variables.
- You must code in C.
- Your project must follow **the Norm**.
- You have to handle errors carefully. In no way can your program quit unexpectedly (Segmentation fault, bus error, double free, etc).
- Your program cannot have memory leaks.
- You **must** use the **miniLibX**. Either in the version that is available on the system, or from its sources. If you choose to work with the sources, you will need to apply the same rules for your **libft** as those written above.

# Chapter V

## Mandatory part - fractol

<b>Program name</b>	fractol
<b>Turn in files</b>	All your files
<b>Makefile</b>	all, clean, fclean, re, bonus
<b>Arguments</b>	
<b>External functs.</b>	<ul style="list-style-type: none"><li>• open, close, read, write, printf, malloc, free, perror, strerror, exit</li><li>• All functions of the math library (-lm man man 3 math)</li><li>• All functions of the MinilibX</li></ul>
<b>Libft authorized</b>	Yes
<b>Description</b>	

This project's goal is to create a small fractal exploration program. Start by seeing what a fractal is.

The constraints are as follows:

- Your software should offer the Julia set and the Mandelbrot set.
- The mouse wheel zooms in and out, almost infinitely (within the limits of the computer). This is the very principle of fractals.
- You must use at least a few colors to show the depth of each fractal. It's even better if you hack away on psychedelic effects.
- A parameter is passed on the command line to define what type of fractal will be viewed. If no parameter is provided, or if the parameter is invalid, the program displays a list of available parameters and exits properly.
- More parameters must be used for fractal parameters or ignored.

- You must be able to create different Julia set with the parameters of the program.

As for the graphic representation:

- ESC will exit the program.
- The use of `images` of the `minilibX` is strongly recommended.

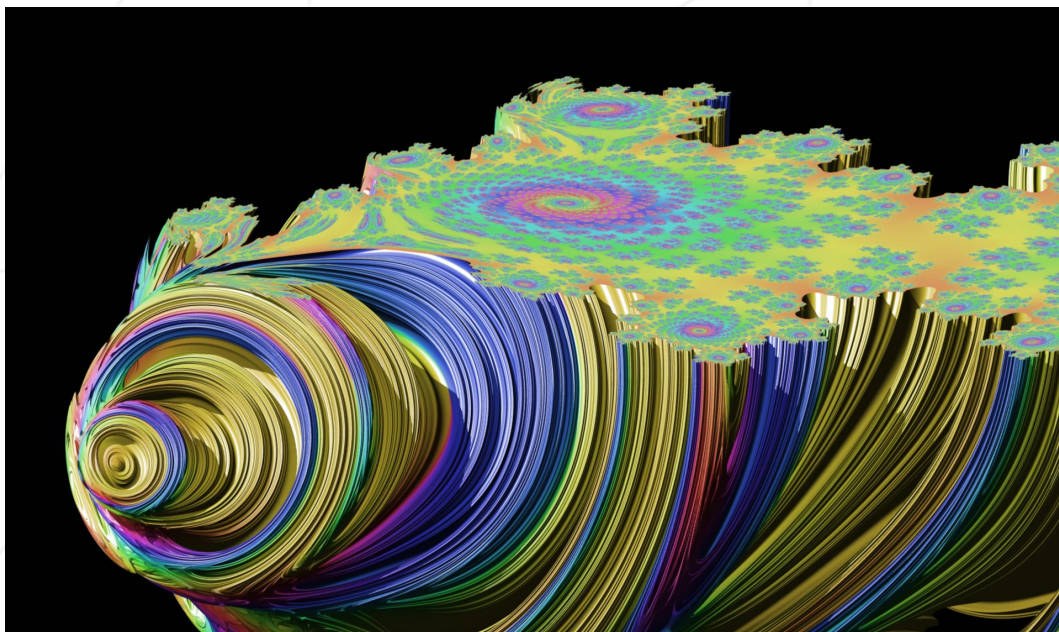


# Chapter VI

## Bonus part

Here are some interesting ideas for the bonuses.

- One more different fractal (there are more than a hundred different types of fractals referenced online).
- The zoom follows the actual mouse position.
- In addition to the zoom: moving with the arrows.
- Make the color range shift.



# Chapter VII

## Submission and peer-evaluation

Submit your work on your `Git` repository as usual. Only the work on your repository will be evaluated.

