

The XaoS Project: a community-driven enterprise

Zoltán Kovács

The Private University of Education, Diocese Linz

30 Years of XaoS: Past, Present and Future
České Budějovice, Gymnázium Jírovcova 8

19 September 2026

A long time ago in a galaxy far, far away...



Somewhere in the Czech Republic, around 1994...

A long time ago in a galaxy far, far away...



Somewhere in the Czech Republic, around 1994...

A long time ago in a galaxy far, far away...



Somewhere in the Czech Republic, around 1994...

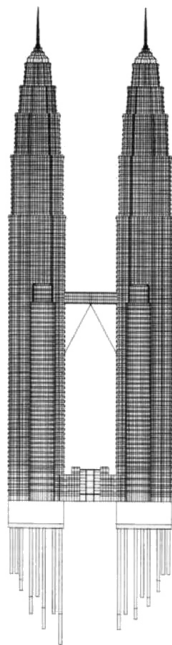
The Year 1996...

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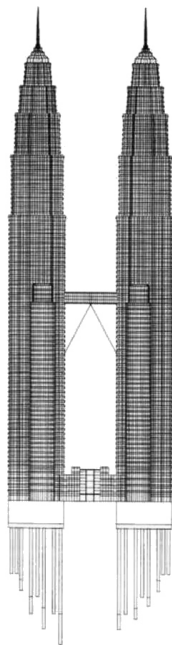
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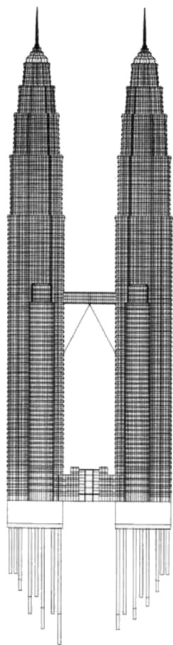
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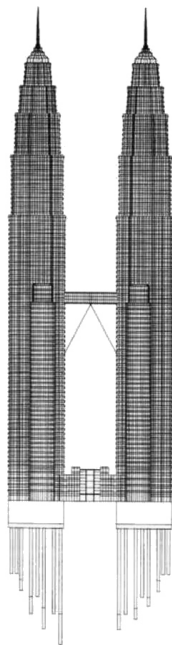
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- ▶ June 8–30 — England hosts the UEFA Euro 1996 football tournament, which is won by Germany.
- ▶ July 26 — Jan Hubička (hubicka@limax.paru.cas.cz) and Thomas Marsh (amadeus@bga.com) announce XaoS 1.0.

>X a o S<

CREDITS:

Jan Hubicka	(hubicka@limax.paru.cas.cz)
Thomas Marsh	(amadeus@bga.com)

INTRODUCTION:

XaoS is a real-time interactive fractal zoomer for X Windows and SVGAlib. It displays the Mandelbrot set (among other escape time fractals) and allows you zoom smoothly into the fractal. Various coloring modes are provided for both the points inside and outside the selected set. In addition, switching between Julia and Mandelbrot fractal types is provided. The first version was a poorly written Mandelbrot view by Thomas later modified by Jan to support high frame-rate zooming. Other additions were later made including autopilot (for those of you without drivers licenses), palette changing, GIF saving, and fractal inversion.

REQUIREMENTS:

XaoS, by default, uses floating point math for its calculations. This may be slow on some computers. The program was developed on a Pentium running at 100 MHz, so we can't guaranty that it will run well on any slower system. If you just want to catch a cursory glance at XaoS' capabilities on faster systems then you might try compiling it for fixed point arithmetic by editing config.h accordingly.

HOME PAGE:

U.S.: <http://www.realtime.net/~amadeus/XaoS/>
Europe: <http://www.paru.cas.cz/~hubicka/XaoS/>

USAGE:

XaoS has no command line options as of yet. It is one entirely self contained executable. Runtime help is provided by typing "H".

THANKS TO:

Stanislav "XaoS" Mikes
- for the name of our program
Borislav Deianov
- for sharing ideas
Isaac Newton
- for discovering his method
Benoit B. Mandelbrot
- for ordering the Julia sets
Linus Torvalds
- for the best operating system
Tim Wegner & Bert Tyler
- for Fractint
Darryl House
- for making Fractint's code readable

NO THANKS TO:

Bill Gates

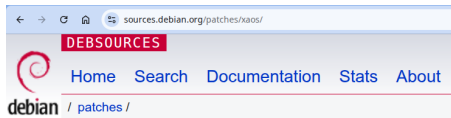
XaoS 1.0

26 files – 112,560 bytes

< ~/talks/2026/x30/src/XaoS-1.0		.[^]>		
.n	Name	Size	Modify	time
/. ..		UP--DIR	Sep 5	16.12
	COPYING	17976	Jul 26	1996
	INSTALL	151	Jul 26	1996
	Imakefile	566	Jul 26	1996
	Makefile.svga1ib	690	Jul 26	1996
	README	2201	Jul 26	1996
	XaoS.lsm	1483	Jul 26	1996
	autopilot.c	1556	Jul 26	1996
	autopilot.h	150	Jul 26	1996
	complex.h	1549	Jul 26	1996
	config.h	2102	Jul 26	1996
	formulas.c	12552	Jul 26	1996
	formulas.h	722	Jul 26	1996
	gif.c	4860	Jul 26	1996
	gif.h	85	Jul 26	1996
	gifcompr.c	10001	Jul 26	1996
	palette.c	2025	Jul 26	1996
	palette.h	145	Jul 26	1996
	port.h	2274	Jul 26	1996
	ui.c	8776	Jul 26	1996
	ui.h	530	Jul 26	1996
	ui_svg.c	7089	Jul 26	1996
	ui_x11.c	4812	Jul 26	1996
	xlib.c	11040	Jul 26	1996
	xlib.h	2821	Jul 26	1996
	zoom.c	15485	Jul 26	1996
	zoom.h	919	Jul 26	1996

XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

Released on July 24, 1998

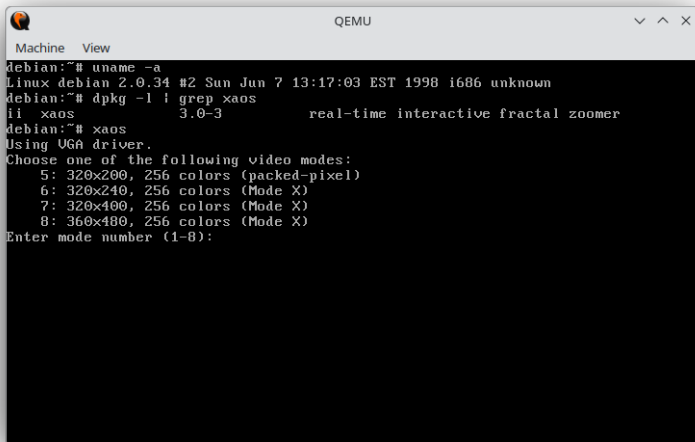


Package: xaos

- [4.3.6-1](#) (main) [forky, sid] *
- [4.3.2-1](#) (main) [trixie] *
- [4.2.1-2](#) (main) [bullseye, bookworm]
- [3.5+ds1-3.1](#) (main) [stretch, buster]
- [3.5+ds1-2](#) (main) [jessie, jessie-kfreebsd]
- [3.5+ds1-1](#) (main) [squeeze, wheezy]
- 3.4-1 (main) [lenny]
- 3.2-3 (main) [etch, etch-m68k]
- 3.1r-8 (main) [sarge]
- 3.0-23.woody2 (main) [woody]
- 3.0-18 (main) [potato]
- 3.0-5 (main) [slink]
- 3.0-3 (main) [hamm]

XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

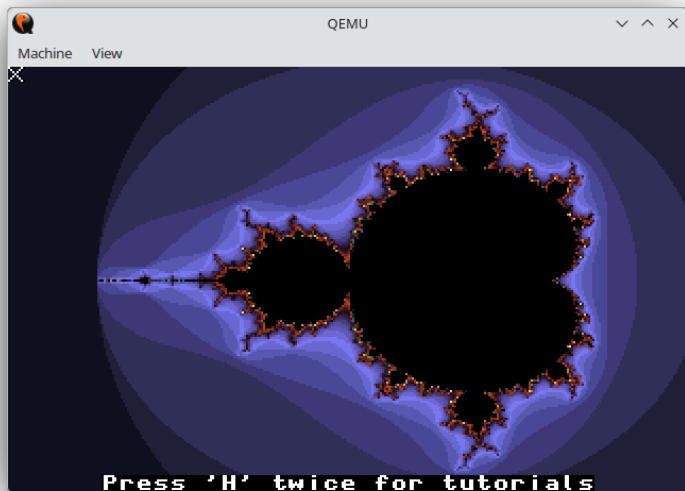
Running in QEMU 10.2.1 on Ubuntu Linux 26.04



```
QEMU
Machine View
debian:~# uname -a
Linux debian 2.0.34 #2 Sun Jun 7 13:17:03 EST 1998 i686 unknown
debian:~# dpkg -l | grep xaos
ii  xaos          3.0-3          real-time interactive fractal zoomer
debian:~# xaos
Using UGA driver.
Choose one of the following video modes:
    5: 320x200, 256 colors (packed-pixel)
    6: 320x240, 256 colors (Mode X)
    7: 320x400, 256 colors (Mode X)
    8: 360x480, 256 colors (Mode X)
Enter mode number (1-8):
```

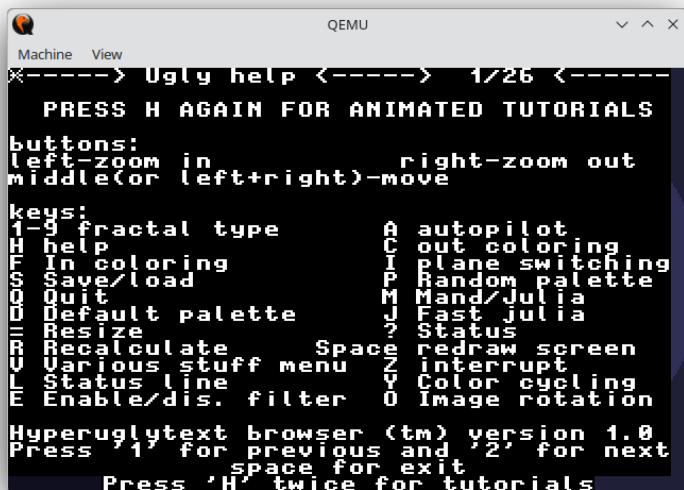
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XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

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```
Machine View
X-----> Ugly help <-----> 1/26 <-----
PRESS H AGAIN FOR ANIMATED TUTORIALS

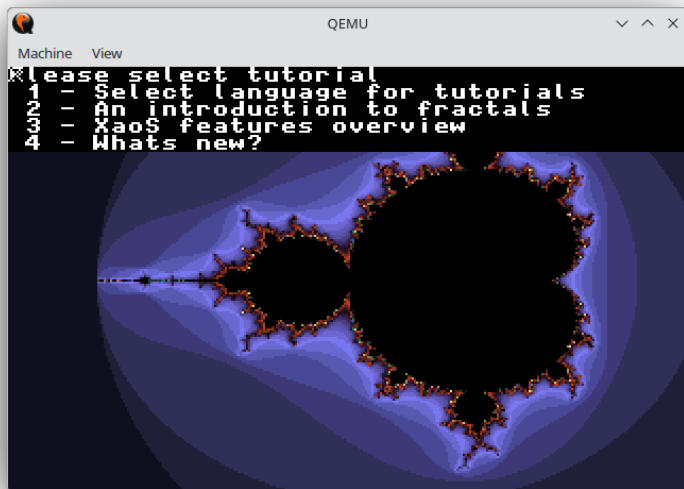
buttons:
left-zoom in           right-zoom out
middle(or left+right)-move

keys:
1-9 fractal type      A autopilot
H help                C out coloring
F In coloring         I plane switching
S Save/load           P Random palette
Q Quit                M Mand/Julia
D Default palette     J Fast julia
= Resize              ? Status
R Recalculate         Space redraw screen
V Various stuff menu  Z interrupt
L Status line         Y Color cycling
E Enable/dis. filter  0 Image rotation

Hyperuglytext browser (tm) version 1.0
Press '1' for previous and '2' for next
                        space for exit
Press 'H' twice for tutorials
```

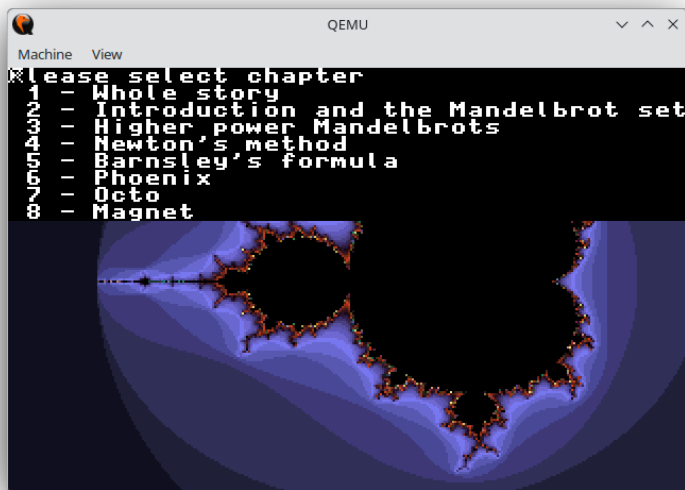
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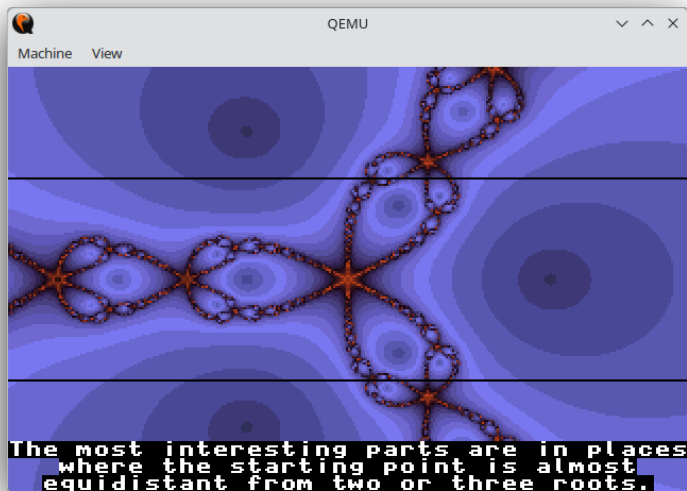
XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

Running in QEMU 10.2.1 on Ubuntu Linux 26.04



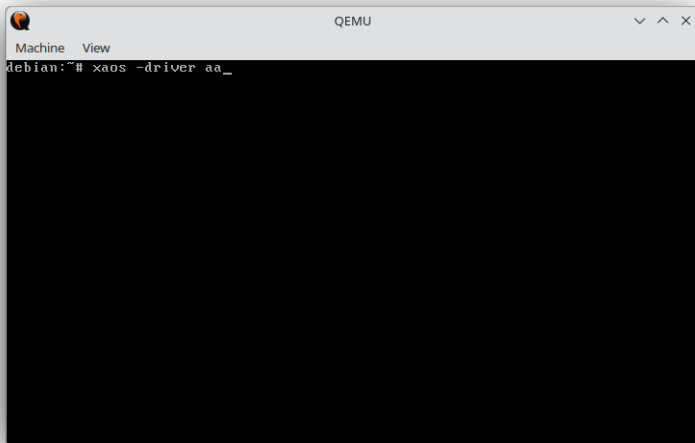
XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

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XaoS 3.0 in Debian GNU/Linux 2.0 (Hamm)

Running in QEMU 10.2.1 on Ubuntu Linux 26.04

[illegible]

How I joined the XaoS project. . .

Budapest 2002 March, Nürnberg 2002 summer



How I joined the XaoS project. . .

Budapest 2002 March, Nürnberg 2002 summer



A conference paper that explains Honza's idea

Conference on CAS and DGM Based Teaching, Pécs, Hungary, 2004

Visualizations on the Complex Plane

Visualizations on the Complex Plane

Jan Hubička, Prague (Czech Republic)

Zoltán Kovács, Szeged (Hungary)

Zoltán Kovács, Nyíregyháza (Hungary)

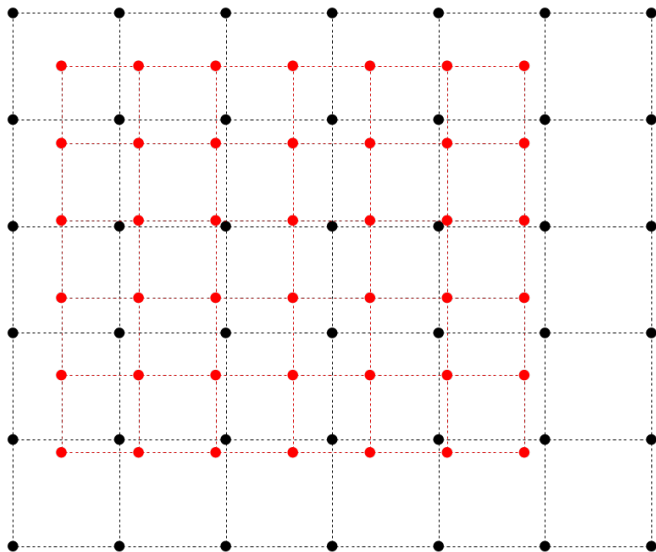
Abstract: We demonstrate the power of the *domain coloring method* using the *color wheel* in visualizing complex functions. A new approach for the real-time presentation of zooming in for complex variable functions is also introduced. Both didactical and technical details give a wide overview for this important novel topic in computer-aided mathematical visualization.

ZDM-Classification: I85, H65.

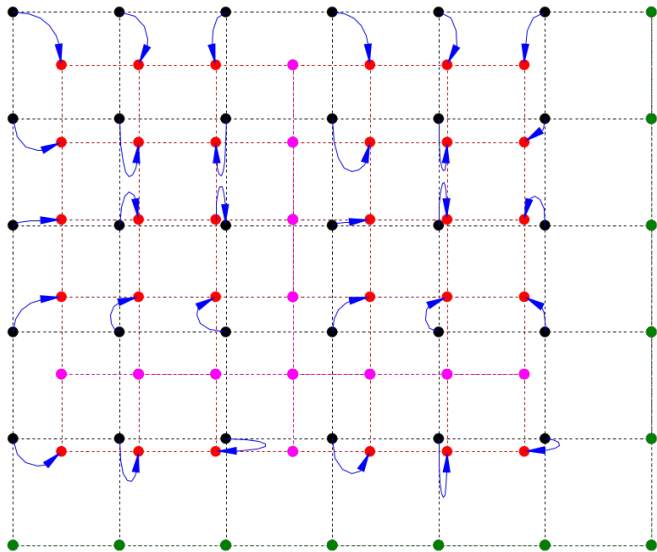
1 Introduction

Thinking in complex arithmetic and complex functions, besides real variable mathematics, opens up possibilities both in teaching and research. From the teacher's view, modern men of the future need extended mind not only in mathematical thinking, but in answering “every day challenges”. If mathematics may be a kind of art, not only calculations, humane minded people may move their interests towards such mathematics. That's why non-standard geometry is so popular among not only mathematicians, but artists and even among children. The authors experienced in the latter 10 years that fractal geometry is a tremendous tool in making mathematics popular, even for laymen [12].

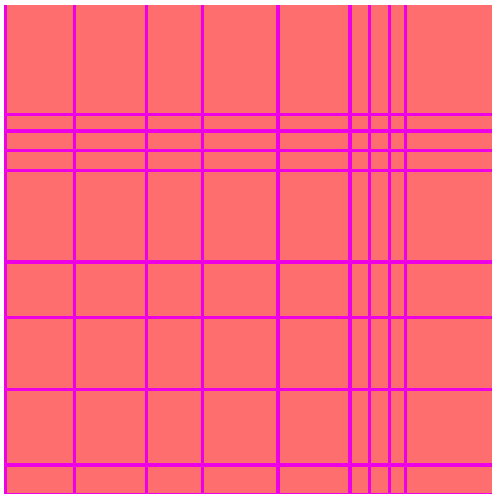
A conference paper that explains Honza's idea



A conference paper that explains Honza's idea



A conference paper that explains Honza's idea



CEEPUS summer school on fractals

Technical University of Vienna, 2006 June

Visualizing Complex Dynamical Systems

Zoltán Kovács

June 16, 2006

1 Introduction

1.1 About the author

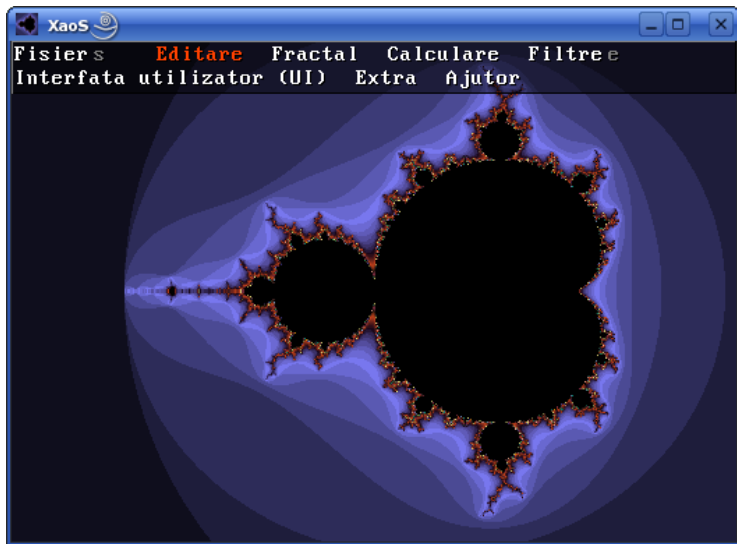
- is an assistant professor at Univ. of Szeged, Hungary,
- teaches introductory analysis and algebra for prospective mathematics teachers,
- maintainer and developer of the XaoS fractal software,
- has got a wife and a boychild.

1.2 The fractal story

1. Mandelbrot, the early 1980s.
2. Douady and the frontiers, the midst of 1980s.

CEEPUS summer school on fractals

Technical University of Vienna, 2006 June



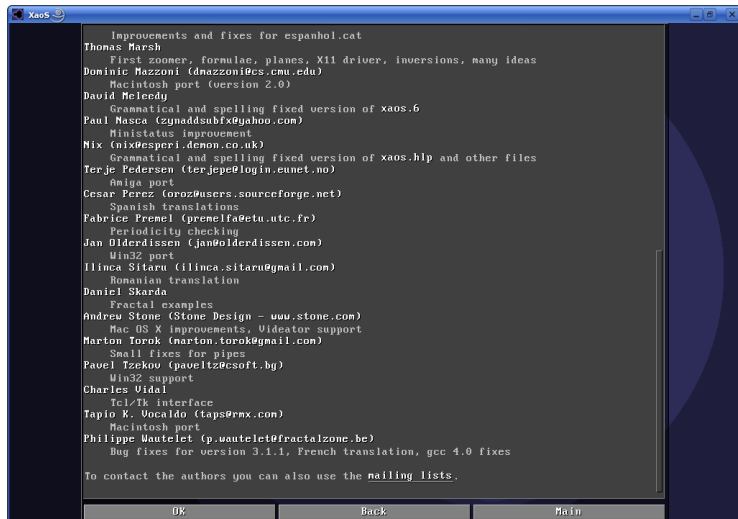
CEEPUS summer school on fractals

Technical University of Vienna, 2006 June



CEEPUS summer school on fractals

Technical University of Vienna, 2006 June



GNU GPL guidelines, e-mail communication

2006 October

XaoS and the Fractal Foundation

Beérkező levelek x

XaoS x



J.B. Langston III <jb.langston@gmail.com>

2006. okt. 24. 22:08



címzett: info, én, Andrew

Mr. Wolfe,

I am the author of the new Mac OS X port of XaoS. Andrew Stone wrote me to tell me the experiment you did using XaoS with Videator and I think it sounds great. I had never heard of the Fractal Foundation, so I googled and found your web site at www.fractalfoundation.org. I think what you're doing is excellent. I am thrilled to hear you're getting kids interested in math/art with your fractal presentations, and that XaoS is a part of it. I think this is exactly how the authors of XaoS hoped that it might be used!

I do have one small request though. Next to the download link for XaoS on your sight, please provide a link to the XaoS homepage at <http://xaos.sourceforge.net>. XaoS is free software under the GNU Public License, and in the spirit of free software, it is important that people be able to find out how they can contribute back to XaoS.

GNU GPL guidelines, e-mail communication

2006 October



Jonathan Wolfe <jonathan@fractalfoundation.org>

2006. okt. 26. 22:59



címzett: jblangston, én, Andrew ▼

Hi there J.B. - THANK YOU for porting XaoS to Mac OSX. This is something I've been eager to see for a while. I have shared the XaoS program with hundreds of students in New Mexico. I wish I had the time to be more involved in the development of the code, but I'm glad that people like you are working away to make it better. I've put up new links on the Fractal Foundation website to the new Mac and Win versions of XaoS, as well as to the SourceForge development page for people who would like to help contribute to the project. Thanks for making that request!

I do have some raw videos of a couple of presentations, but they're way too big for web delivery, and I haven't edited anything down yet enough to share. Basically we spend about half of an hour-long presentation exploring mathematical fractals with a fun and dazzling XaoS tour, and the other half hour is a slideshow/lecture exploring fractals in nature, from trees and lungs to coastlines, mountains, rivers, turbulence, micro+macroscopic spirals, etc. This way we relate the patterns we see in XaoS to the real world (or universe) and make it more relevant.

Personal communication

Budapest, 2008 August



Personal communication

Budapest, 2008 August



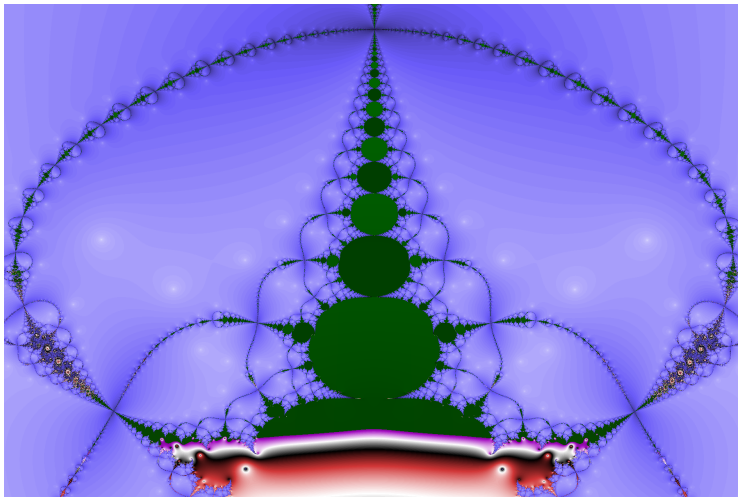
E-mail communication

Christmas, 2008 – a caricature of JB drawn by KovZsi



Fractals as season greetings

Christmas, 2008



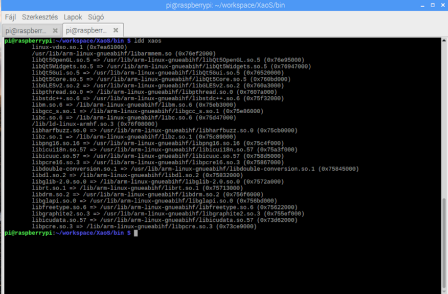
Personal communication

Szeged, Hungary, 2010 August – with Viola and Mayumi



2019 May, preliminary version of 4.0 on Raspberry Pi 3 (Linux)

2019 May, preliminary version of 4.0 on Raspberry Pi 3 (Linux)



Google Summer of Code (GSoC) 2020

Anurag Aggarwal (India) works on several minor improvements, 2020 June

The screenshot shows a Google Meet window with the title "Anurag Aggarwal prezentál". The main content area displays a presentation of the "fractaltool" application. The application window is titled "fractaltool" and shows a fractal image. A "Custom points" dialog box is open, displaying a table with columns for "Algorithm number", "Seed", "Order", "Iterations", and "Algorithm (0-3)". The table contains the following data:

Algorithm number	Seed	Order	Iterations	Algorithm (0-3)
1	63	8	1	1
2	62	8	1	1

The application also shows a "Sources" panel on the left and a "Messages" panel at the bottom. The "Messages" panel contains the following text:

```
fractaltool: starting JavaSwing/JavaSwing/JavaSwing/JavaSwing...
fractaltool: starting JavaSwing/JavaSwing/JavaSwing/JavaSwing...
fractaltool: starting JavaSwing/JavaSwing/JavaSwing/JavaSwing...
fractaltool: starting JavaSwing/JavaSwing/JavaSwing/JavaSwing...
fractaltool: starting JavaSwing/JavaSwing/JavaSwing/JavaSwing...
```

At the bottom of the screen, there is a "Megbeszélés részletei" button and a "Download" button.

Google Summer of Code (GSoC) 2020

Anurag Aggarwal (India) works on several minor improvements, 2020 June

The screenshot shows a Google Meet interface with three participants. The main window displays a presentation titled "Anurag Aggarwal prezentál". The presentation content includes a fractal visualization application. A "Custom palette" dialog box is open, showing fields for "algorithm number: 1", "Seed: 117", "Shift: 0", "Iteration: 1", and "Seed: 10". The fractal image shows a complex, self-similar pattern. The bottom of the screen shows the Meet controls, including a "Megbeszélés részletei" link and icons for download, call, and chat. The bottom right corner shows the name "Anurag Aggarwal prezentál" and a small icon.

A paper that announces XaoS 4.0

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XaoS 4.0 and Beyond: Fractals in Mathematics Education

Published: 09 April 2021

Volume 15, pages 775–788 (2021) [Cite this article](#)

 [Save article](#)



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Anurag Aggarwal, Zoltán Kovács  J. B. Langston & Jonathan Wolfe

 316 Accesses  1 Citation [Explore all metrics](#) →

Abstract

We report on recent improvements on the free fractal software tool XaoS, including the latest features added during the Google Summer of Code 2020 project.

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Google Summer of Code 2023

Abhishek Tiwari (India), WebAssembly version

tabhishek432 / GSoC-2023-xaos

Code Issues Pull requests Agents Actions Projects Security and quality Insights

main GSoC-2023-xaos / README.md

tabhishek432 Update README.md 5965f16 · last year History

Preview Code Blame 67 lines (51 loc) · 8.73 KB

Google Summer of Code 2023

GSoC 2023 Final Report

- Author : [Abhishek Tiwari](#) (yours truly :D)
- Mentors : [Dr. Zoltán Kovács](#) & [Mr. Anurag Aggarwal](#)
- The Project Name : **Adding web user interface to XaoS**
- The Proposed Problem : [GSoC 2023 Idea for XaoS](#)
- My Proposal Summary ->
 - The project aims to enable XaoS, a fractal program, to function effectively on web browsers through the use of Qt. Currently, XaoS requires the user to download and install the software, which limits its accessibility. However, the current implementation of XaoS using Qt web assembly is not functioning well on web platforms due to issues with the synchronous, infinite loop used in XaoS's event loop. Browsers typically run JavaScript, which is single-threaded and relies on asynchronous events to avoid blocking the main thread, making the current implementation unsuitable. The proposed solution is to use a QTimer to periodically update the fractal using UIH functions. By refactoring the code to use a QTimer, XaoS can be made compatible with browser architecture and enable a single Qt source code for implementation across different platforms.

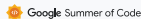
Google Summer of Code 2023

Abishek Tiwari (India), WebAssembly version



Google Summer of Code 2023

Abishek Tiwari (India), WebAssembly version



Certificate of Appreciation presented to

Zoltan Kovacs

for serving as a mentor for

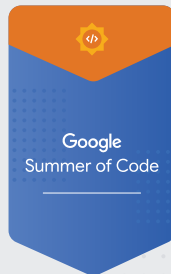
GNU Project

during Google Summer of Code 2023

MAY 4 – SEPTEMBER 4, 2023

A handwritten signature in black ink, reading "Stephanie Taylor".

Stephanie Taylor
Program Manager, Google



GSoC meetup 2024, Munich, Germany



GSoC meetup 2024, Munich, Germany

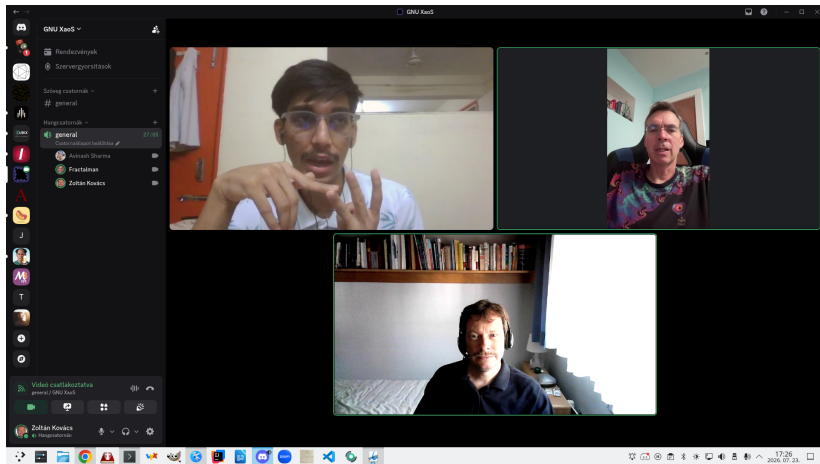


GSoC meetup 2024, Munich, Germany



GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



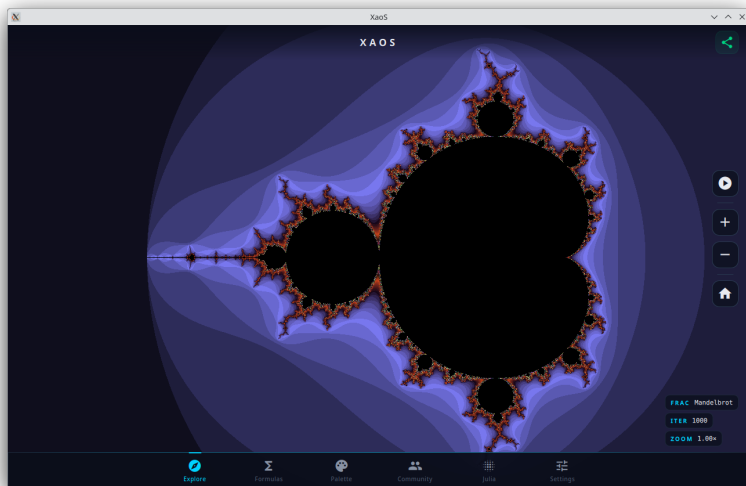
GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



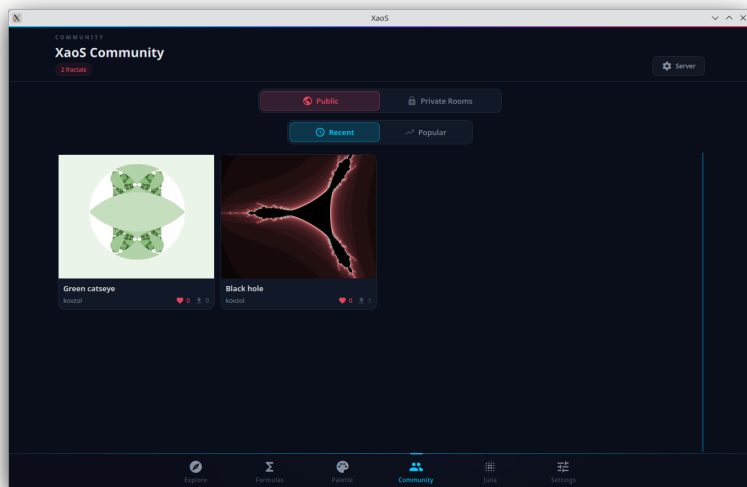
GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



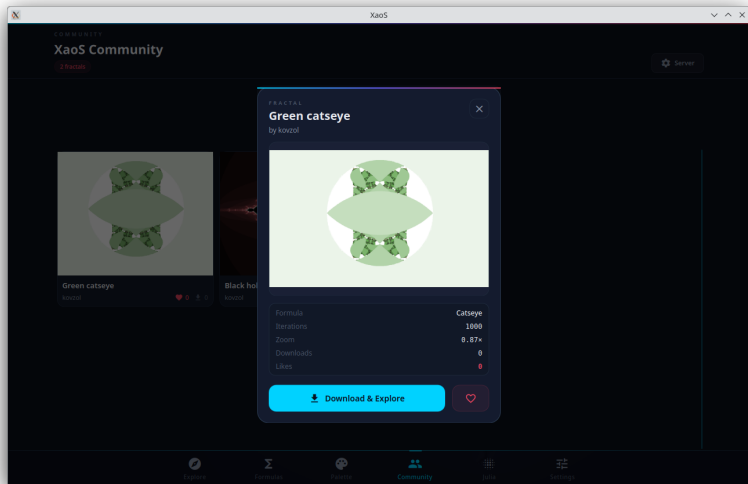
GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



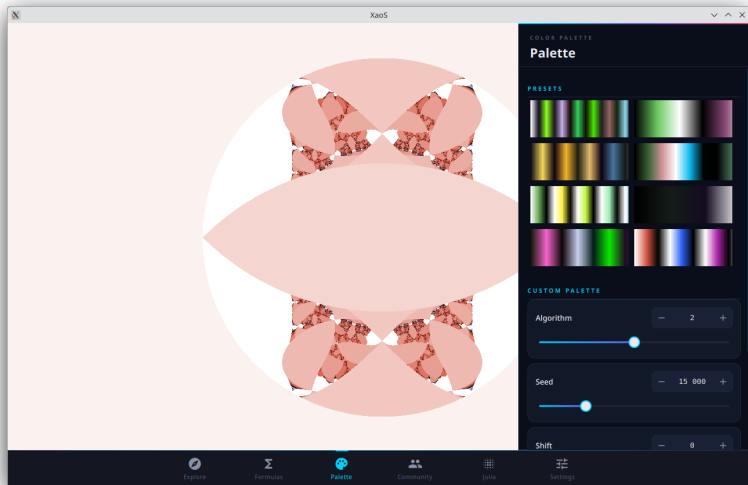
GSoC 2026

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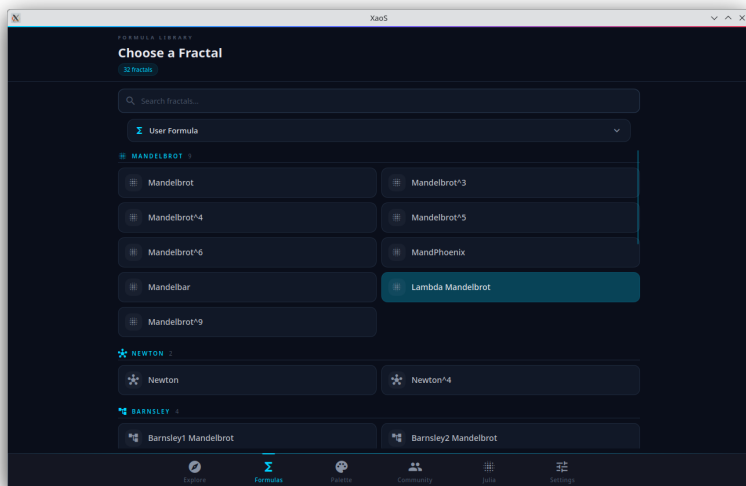
GSoC 2026

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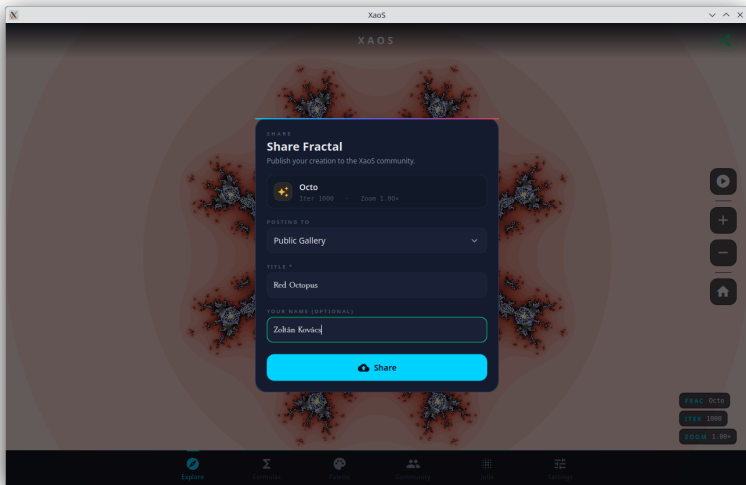
GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



GSoC 2026

Avinash Sharma (India), mobile interface, 2026 May–September



GSoC 2026

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Activity of some contributors (since 2001)

<i>Author</i>	<i>Activity</i>	<i>Commits</i>	<i>Summary</i>
Anurag Aggarwal	2020–21	79	Palettes
Árpád Fekete	2006–09	10	New fractal types
Jan Hubička	2001–02	21	Code improvements
Zoltán Kovács	2002–26	701	Translations, WASM
J.B. Langston	2006–25	531	Native Mac port, Qt
Matthias Mailänder	2022–24	3	Code fixes
Mateusz Malczak	2008–09	2	User formulas
Dominic Mazzoni	2001	7	Macintosh port
Armin Müller	2020	3	Code cleanup
Herrmann Reiner	2020	2	Code cleanup
Avinash Sharma	2026	51	Mobile interface
Abishek Tiwari	2023	5	WASM
osi1	2022–24	6	Code cleanup
a1346054	2021	6	Code cleanup

List of translators I

<i>Author</i>	<i>Activity</i>	<i>Language</i>
Anurag Aggarwal	2020	Hindi
Emine Nur Ünveren Bilgiç	2024	Turkish
Natalija Budinski	2020	Serbian
IoeCmcomc	2021	Vietnamese
Eric Courteau	1997	French
Jean-Pierre Demailly	2003	French
Martin Dózsa	2020	Czech
Selen Galiç	2024	Turkish
Tim Goodwin	1997	English
Jonas Hall	2020	Swedish
Davit Harutyunyan	2025	Armenian
Jan Hubička	1997	Czech
Jens Kilian	1997	German
Zbyněk Konečný	2020	Czech
Zoltán Kovács	2002	Hungarian
Prafulla Kumar	2020	Hindi

List of translators II

<i>Author</i>	<i>Activity</i>	<i>Language</i>
Bjarnheiður Kristinsdóttir	2020	Icelandic
Alexey Loginov	2019	Russian
Giorgio Marazzi	2004	Spanish
Thomas Marsh	1997	English
David Meleedy	1997	English
Armin Müller	2020	German
Nix	1997	English
César Pérez	1997	Spanish
Ilinca Sitaru	2006	Romanian
Daniel Tsirkin	2026	Hebrew
Zuhal Ünan	2024	Turkish
Clément Vermot	2020	French
Philippe Wautelet	2006	French
xydcheng	2026	Chinese
Veysel Yıldız	2024	Turkish
Sergio Zanchetta	1997	Italian

Other contributors

<i>Author</i>	<i>Summary</i>
Radek Doulik	TK interface, windowid patches
Asher Gordon	Bugfix for rendering files in a subdirectory
Ben Hines	autoconf suggestions, Mac OS X port
iaoesch	Outcoloring mode smoothlog
Thomas A. K. Kjaer	OS/2 ports (320 × 200 graphics and AA-lib)
Zsigmond Kovács	Fractal examples
Andreas Madritsch	New fractal types, bailout, many fixes
Thomas Marsh	First zoomer, formulae, planes, X11 driver, inversions, many ideas
Paul Nasca	Ministatus improvement
Terje Pedersen	Amiga port
Fabrice Premel	Periodicity checking
prrt714	New fractal type “clock”
Jan Olderdissen	Win32 port
Daniel Skarda	Fractal examples
Andrew Stone	Videator Support, Cocoa improvements, performance mode, bug fixes
Márton Török	Small fixes for pipes
Pavel Tzekov	Win32 support
Charles Vidal	Tcl/Tk interface
Tapio K. Vocaldo	Macintosh port
Tormod Volden	Fixes for X11 driver to improve compatibility with Xorg, ...
Werner Volken	Support for cmake, quad precision support for MacOS

The future...?



Jírovcova 8, gymnázium
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