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Experiment with Fractals

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Julia 2D



Iterations



Bass Strength



Treble Strength



Primary Color



Secondary Color

☐ Rainbow mode

Julia Set

-0.4 - 0.59i



#### Julia Info

##### About Julia Sets:

Julia sets are 2D fractals derived from the Mandelbrot set. Each Julia set is generated by fixing a complex constant  $c$  and iterating the formula  $z_{n+1} = z_n^2 + c$  for every pixel. While the Mandelbrot set varies  $c$  per pixel, a Julia

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## UPLOAD AN AUDIO FILE FIRST

Mandelbrot 2D



Iterations



Bass Strength



Primary Color



Secondary Color

☐ Rainbow mode

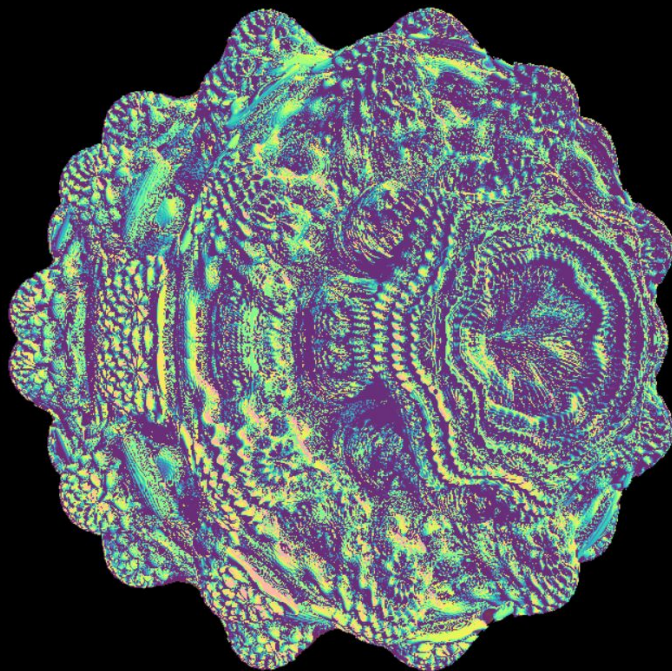
## Mandelbrot Info

## About Mandelbrot Sets:

The Mandelbrot set is a famous 2D fractal defined by iterating the formula  $z_{n+1} = z_n^2 + c$  for each pixel, where  $z_0 = 0$  and  $c$  represents the complex coordinate of that pixel. Points that remain bounded after many iterations are part of the set; others escape to infinity. The resulting shape exhibits intricate, self-similar patterns at all scales.

## Parameters:

• **Iterations:** Number of iterations applied

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Mandelbulb 3D



Ray Steps

Bass Strength

Treble Strength

Rotation Speed

Zoom Pulse

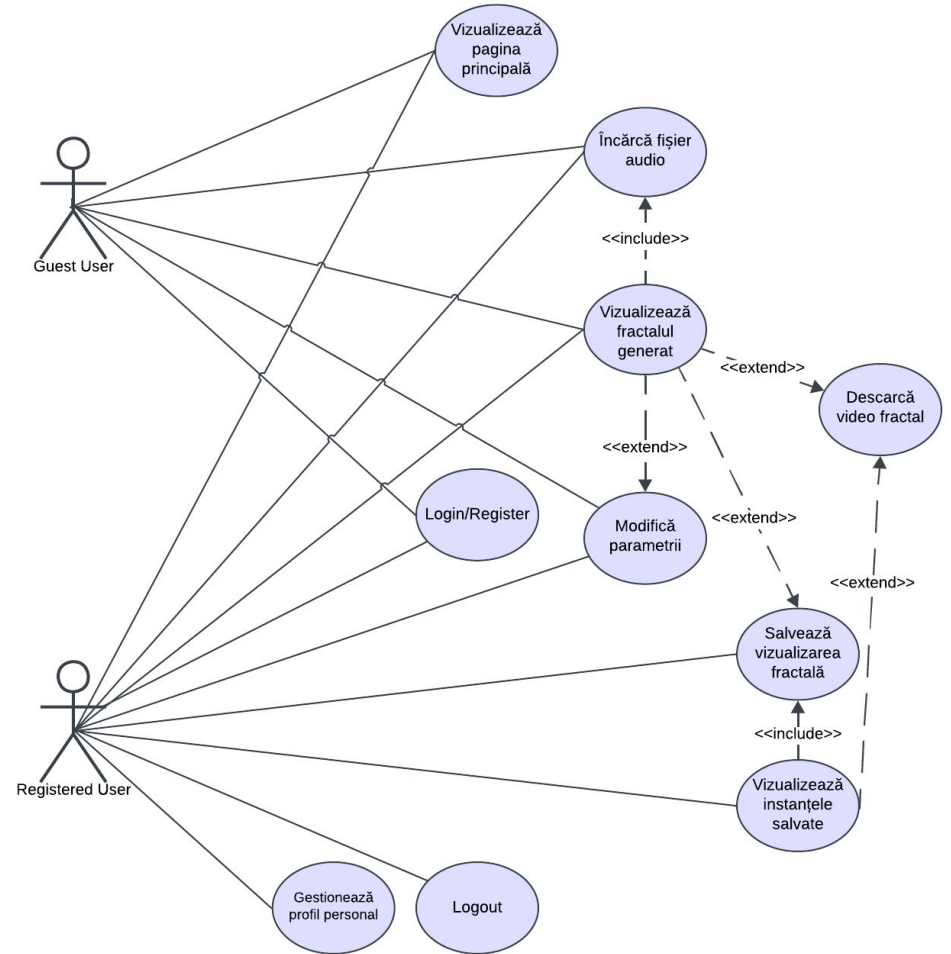
Primary Color

Secondary Color

☒ Rainbow mode[Mandelbulb Info](#)



# Use Case Diagram





# Playwright

## Test-Driven Development

✕Unit.net



coverlet



## Pair Programming

# Test-Driven Development

Follow **Red** → **Green** → Refactor

## PROS

- Helped clarify expected behavior early
- Safer refactoring because existing tests immediately detected mistakes

## CONS

- TDD was only applied to C# backend logic
- Difficult for complex JavaScript logic
- Fractal logic evolved frequently, making early tests unstable or irrelevant



# Pair Programming

Roles: **Driver** & **Navigator**

## PROS

- Useful when working with complex logic
- Instant feedback
- Knowledge sharing
- Easier to continue work when one person is stuck
- When requirements evolved during development

## CONS

- Effectiveness strongly depends on the compatibility of the two developers
- Requires good communication and similar coding styles or architectural visions

**Pragmatic approach: testing strategy  
adapted to the nature of each technology.**

# Test Coverage

```
(base) PS C:\Users\bianc\Desktop\Synesthesia-Web-App\Synesthesia.Web.Tests> ./run-coverage.bat
Restore complete (0.8s)
Synesthesia.Web succeeded (0.6s) → C:\Users\bianc\Desktop\Synesthesia-Web-App\Synesthesia.Web\bin\Debug\net8.0\Synesthesia.Web.dll
Synesthesia.Web.Tests succeeded (0.5s) → bin\Debug\net8.0\Synesthesia.Web.Tests.dll
[xUnit.net 00:00:00.00] xUnit.net VSTest Adapter v2.5.3.1+6b60a9e56a (64-bit .NET 8.0.22)
[xUnit.net 00:00:00.19] Discovering: Synesthesia.Web.Tests
[xUnit.net 00:00:00.22] Discovered: Synesthesia.Web.Tests
[xUnit.net 00:00:00.22] Starting: Synesthesia.Web.Tests
[xUnit.net 00:00:00.96] Finished: Synesthesia.Web.Tests

Synesthesia.Web.Tests                                     Testing (2.2s)

Synesthesia.Web.Tests                                     GenerateCoverageResult (2.2s)
Generating report '.\TestResults\coverage.cobertura.xml'

                                                                    (2.3s)

+-----+-----+-----+-----+
| Module      | Line  | Branch | Method |
+-----+-----+-----+-----+
| Synesthesia.Web | 98.24% | 50%    | 92.85% |
+-----+-----+-----+-----+

+-----+-----+-----+-----+
|          | Line  | Branch | Method |
+-----+-----+-----+-----+
| Total    | 98.24% | 50%    | 92.85% |
+-----+-----+-----+-----+
| Average  | 98.24% | 50%    | 92.85% |
+-----+-----+-----+-----+

Synesthesia.Web.Tests test succeeded (2.3s)

Test summary: total: 22, failed: 0, succeeded: 22, skipped: 0, duration: 1.7s
Build succeeded in 4.7s

Generating HTML report...
2026-01-13T02:24:35: Arguments
2026-01-13T02:24:35: -reports:.\TestResults\coverage.cobertura.xml
2026-01-13T02:24:35: -targetdir:.\TestResults\CoverageReport
2026-01-13T02:24:35: -reporttypes:Html
```

# Test Coverage

Summary

♥ Sponsor

★ Star

## Information

Parser: Cobertura  
Assemblies: 1  
Classes: 7  
Files: 7  
Coverage date: 1/13/2026 - 2:24:35 AM

## Line coverage

98%

Covered lines: 56  
Uncovered lines: 1  
Coverable lines: 57  
Total lines: 505  
Line coverage: 98.2%

## Branch coverage

50%

Covered branches: 3  
Total branches: 6  
Branch coverage: 50%

## Method coverage

Feature is only available for sponsors

Upgrade to PRO version

Name	Covered	Uncovered	Coverable	Total	Percentage	Covered	Total	Percentage
— Synesthesia.Web	56	1	57	505	98.2%	3	6	50%
Synesthesia.Web.Data.ApplicationDbContext	15	0	15	34	100%	0	0	
Synesthesia.Web.Models.BaseEntity	8	0	8	27	100%	0	0	
Synesthesia.Web.Pages.ErrorModel	8	0	8	28	100%	3	4	75%
Synesthesia.Web.Pages.IndexModel	6	0	6	20	100%	0	0	
Synesthesia.Web.Pages.PrivacyModel	6	0	6	20	100%	0	0	
Synesthesia.Web.Pages.ProfileModel	8	0	8	202	100%	0	0	
Synesthesia.Web.Pages.StudioModel	5	1	6	174	83.3%	0	2	0%

# Project Management and Issue Tracking

The screenshot displays a Trello project board for a project named "Synesthesia". The board is organized into five columns: "To Do", "Doing", "Done - Sprint 1", "Done - Sprint 2", and "Done - Sprint 3". Each column contains cards representing tasks, with progress bars and user avatars indicating assignment and completion status. The "To Do" and "Doing" columns have "Add a card" buttons. The "Done" columns also have "Add a card" buttons at the bottom. The bottom navigation bar includes "Inbox", "Planner", "Board" (selected), and "Switch boards".

**Board: Synesthesia**

**Columns:**

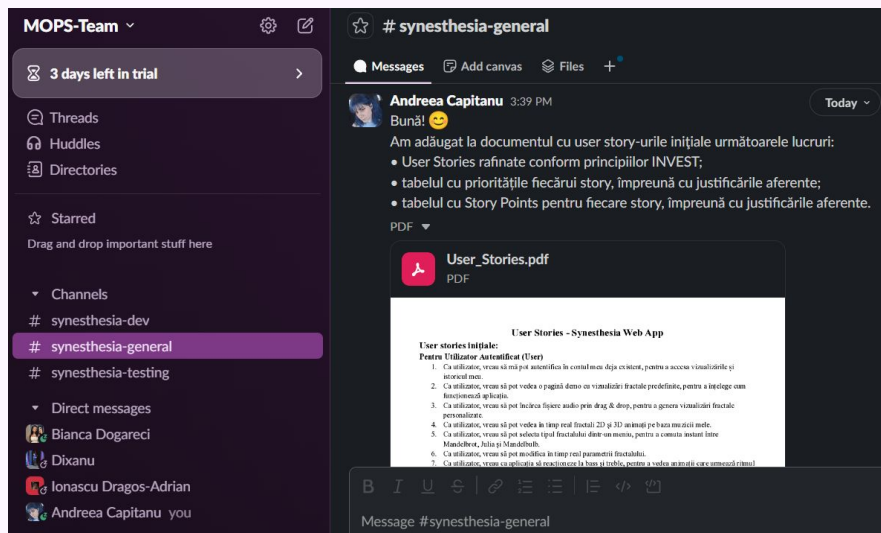
- To Do**
  - + Add a card
- Doing**
  - + Add a card
- Done - Sprint 1**
  - Ca utilizator, vreau să mă pot autentifica în contul meu deja existent, pentru a accesa vizualizările mele salvate.
  - Ca vizitator, vreau să îmi pot crea un cont, pentru a salva vizualizările mele preferate.
  - Ca vizitator, vreau să mă pot autentifica în contul creat, pentru a accesa funcțiile complete ale aplicației.
  - + Add a card
- Done - Sprint 2**
  - Ca utilizator, vreau să văd în timp real fractali 2D/3D animați sincron cu ritmul și frecvențele piesei.
  - Ca utilizator, vreau să pot selecta tipul fractalului dintr-un meniu, pentru a comuta instant între Mandelbrot, Julia și Mandelbulb.
  - Ca utilizator, vreau ca aplicația să reacționeze la bass și treble, pentru a vedea animații care urmează ritmul
  - + Add a card
- Done - Sprint 3**
  - Ca vizitator, vreau să am control de bază asupra vizualizării (pauză, schimbare culori), pentru a explora interactivitatea aplicației.
  - Ca utilizator, vreau să pot modifica în timp real zoom-ul, culorile, rotația și viteza fractalului.
  - Ca utilizator, vreau să pot salva vizualizarea generată, pentru a o accesa ulterior.
  - + Add a card

**Bottom Navigation:** Inbox | Planner | **Board** | Switch boards

# Communication



**slack** -> sharing docs etc.



**Discord**

-> pair programming, meetings etc.



Bianca started a call that lasted 6 hours. Yesterday at 22:16



# Impediments

- 01** Code coverage tool including files like: migrations, ApplicationDbContext.cs etc.
- 02** Making fractal parameters change with music, not the viewport/camera
- 03** Recording video at a higher quality

## Version Control & Collaboration



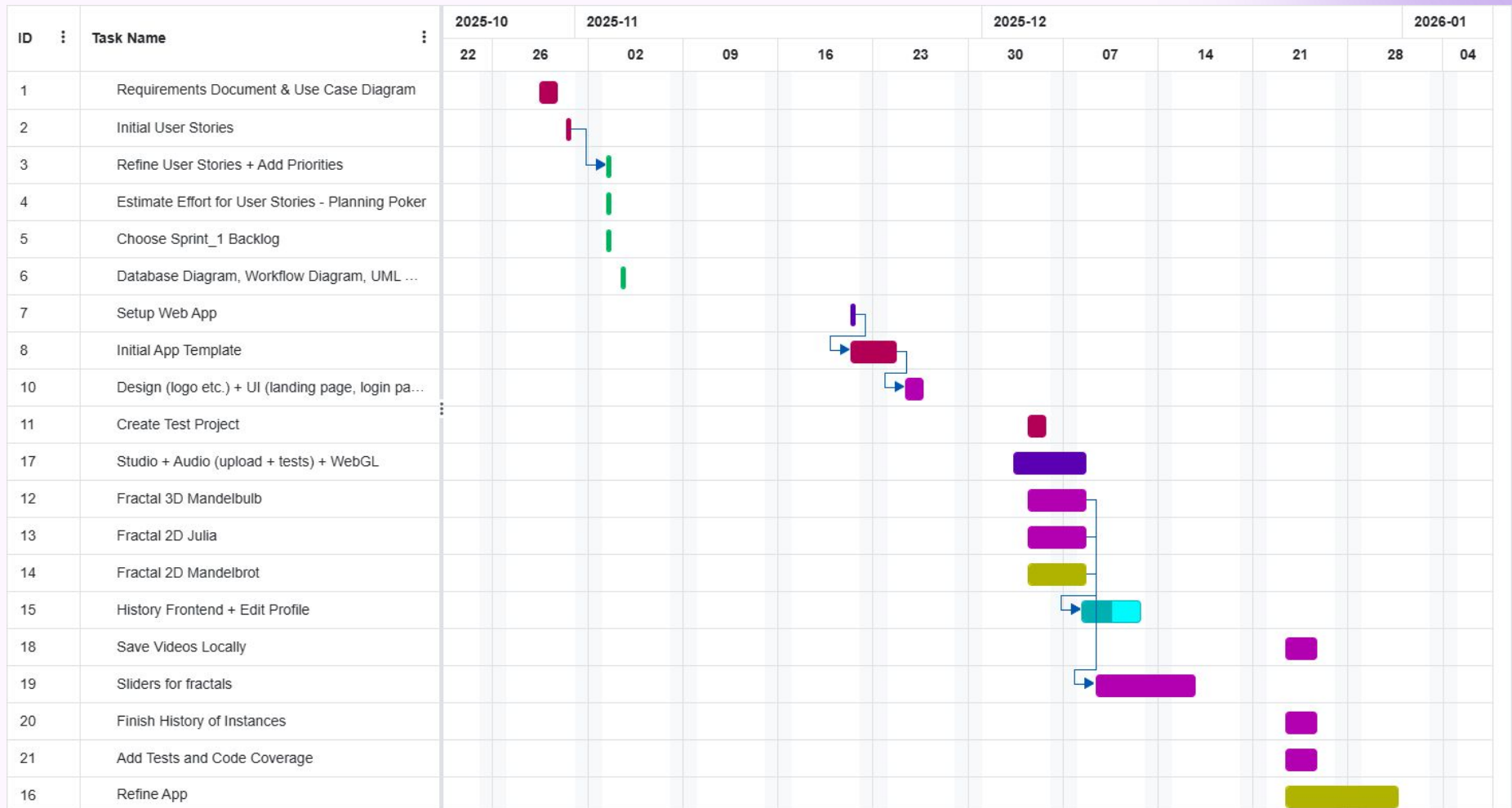
**git**



[Link to our GitHub repository!](#)

# Contribution of each member

- Căpitanu Andreea – **35%**
- Dogăreci Bianca–Alexandra – **35%**
- Ionașcu Dragoș–Adrian – **20%**
- Dițoiu Andrei–Adelin – **10%**





**Thank you!**