

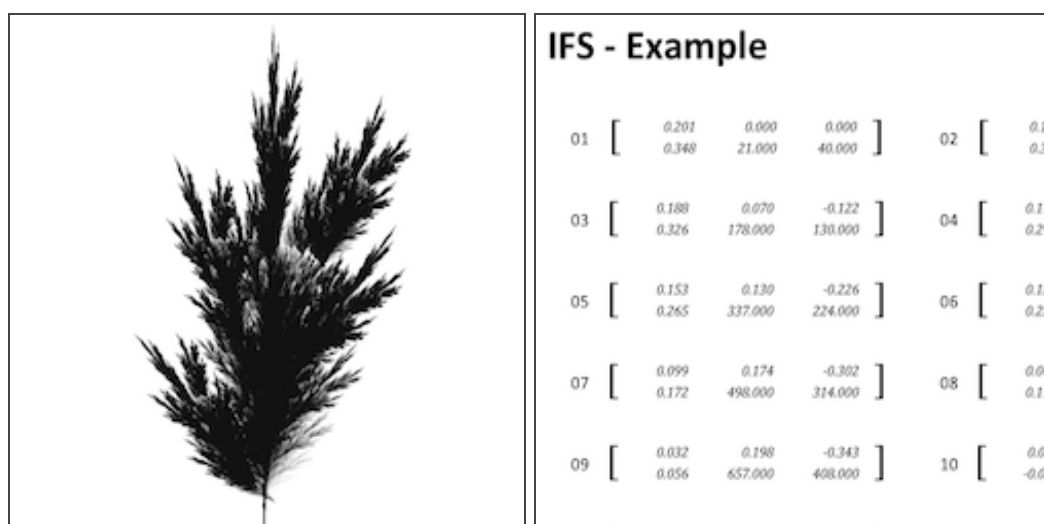
# IFS Explorer 1.0.3

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## Iterated Function System Explorer

An interactive **Iterated Function System** explorer. This program allows you to explore a vast world of complex and beautiful fractal images produced by simple mathematical rules, through a process of trial and error, experimentation and exploration. See the *References* section below for more details on the mathematics and concepts behind these systems.

**IFS Explorer** provides an interactive UI to create and manipulate a set of affine transforms, which are then iterated randomly to produce an image. The Java `AffineTransform` class is used to represent and plot the transforms. The systems can be saved and loaded as XML files, and rendered images can be exported as PNG graphics files.



Screenshots for the **Viewer** and **Details** modes.

## Program requirements

- Java 1.7.0 Runtime Environment
- Windows, Linux or OSX Operating System
- Maven and 1.7.0 JDK for building (*Optional*)

## Instructions

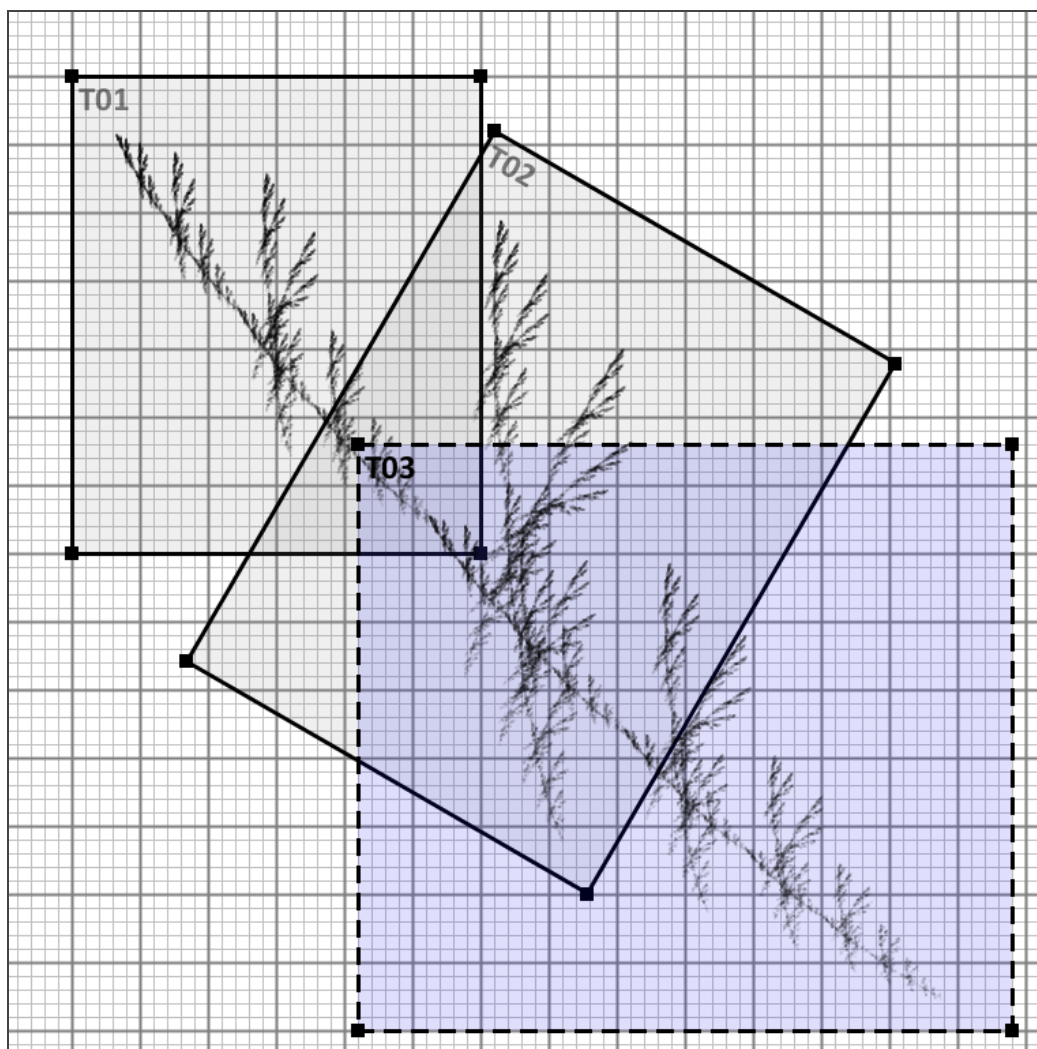
Either build the program using Maven or extract one of the packaged distributions. These can be [downloaded from GitHub](#) as either `.tar.gz` or `.zip` archives. Then run the relevant script for your operating system, using the optional flags `-f` or `--fullscreen` to

specify full-screen mode and `-c` or `--colour` to enable the experimental colour rendering mode.

A series of example XML data files for IFS transforms are provided in the `data` directory of the distribution. Some of these can be found in the *The Computational Beauty of Nature* book, details of which are available in the *References* section. To load these examples, specify the path to the file as the last argument on the command-line. Sample images for these transforms have also been provided, be sure to use the `.xml` file, not the `.png`.

```
$ ./bin/explorer.sh [-f|--fullscreen] [-c|--colour] [ifs.xml]
$ ./bin/explorer.command [-f|--fullscreen] [-c|--colour] [ifs.xml]
C> .\bin\explorer.cmd [-f|--fullscreen] [-c|--colour] [ifs.xml]
```

Once the program starts, it will display an empty grid in the **Editor** mode. The menus provide access to standard operations, including the ability to switch modes. The keyboard can also be used to toggle between modes using the *Tab* key.



Screenshot of the **Editor** mode with the live IFS view

In the **Editor** mode, clicking and dragging the mouse will create a new transform which can then be moved, resised and rotated (with *Shift* held down) as desired. In this mode,

the *Delete* or *Backspace* key will delete the selected transform and the *Left* or *Right* arrow keys will rotate it by ninety degrees. When in **Viewer** mode the *Space* key will pause or continue the rendering process. The **Details** mode shows the actual affine transform matrix coefficients for each transform.

## TODO

- Properties editor for transform
  - Matrix coefficients *or* rotation/displacement/scale values
- Printing
- Preferences dialog
- Better details view
- Weighting for transforms
- Better operating system integration
  - Native full-screen mode
  - Support native windowing system features
- Add skew transform
- Better UI for rotations
- Improve documentation
- JNLP Web Start mechanism
- JavaFX UI

## References

1. **Iterated Function System**; [http://en.wikipedia.org/wiki/Iterated\\_function\\_system](http://en.wikipedia.org/wiki/Iterated_function_system); *Wikipedia*
2. **Affine Transform**; [http://en.wikipedia.org/wiki/Affine\\_transformation](http://en.wikipedia.org/wiki/Affine_transformation); *Wikipedia*
3. **Construction of fractal objects with iterated function systems**; <http://www-users.cs.umn.edu/%7Ebstanton/pdf/p271-demko.pdf>; Demko, Stephen and Hodges, Laurie and Naylor, Bruce; *SIGGRAPH Computer Graphics, Volume 19, Number 3, 1985*
4. **The Computational Beauty of Nature: Computer Explorations of Fractals, Chaos, Complex Systems and Adaptation**; <http://www.amazon.co.uk/The-Computational-Beauty-Nature-Explorations/dp/0262561271>; Flake, Gary W; MIT Press; 1 Mar 2000; ISBN 978-0262561273