PHAUSTO:

FAST AND ACCESIBLE DSP PROGRAMMING WITH PHARO

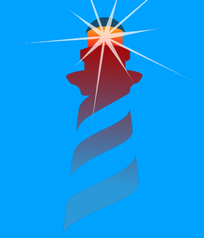
Made with FAUST

WHAT IS PHAUSTO?

- **Phausto** is a multi-platform library and API that enables the programming Digital Signal Processors (DSPs) and sound generation in **Pharo**

- The audio is generated through FFI calls to a *dynamic engine* that computes audio signal by leveraging the power on an embedded **FAUST** compiler.

- Phausto has been developed with three main goals:
    1. To allow sound artists and musician to program synthesisers and effects and compose music with Pharo;
    2. To teach DSP programming to beginners and offer a fast prototyping platform for musician and audio developers, thanks to its Cmajor and C++ exporters
    3. To enrich Pharo applications with sound;



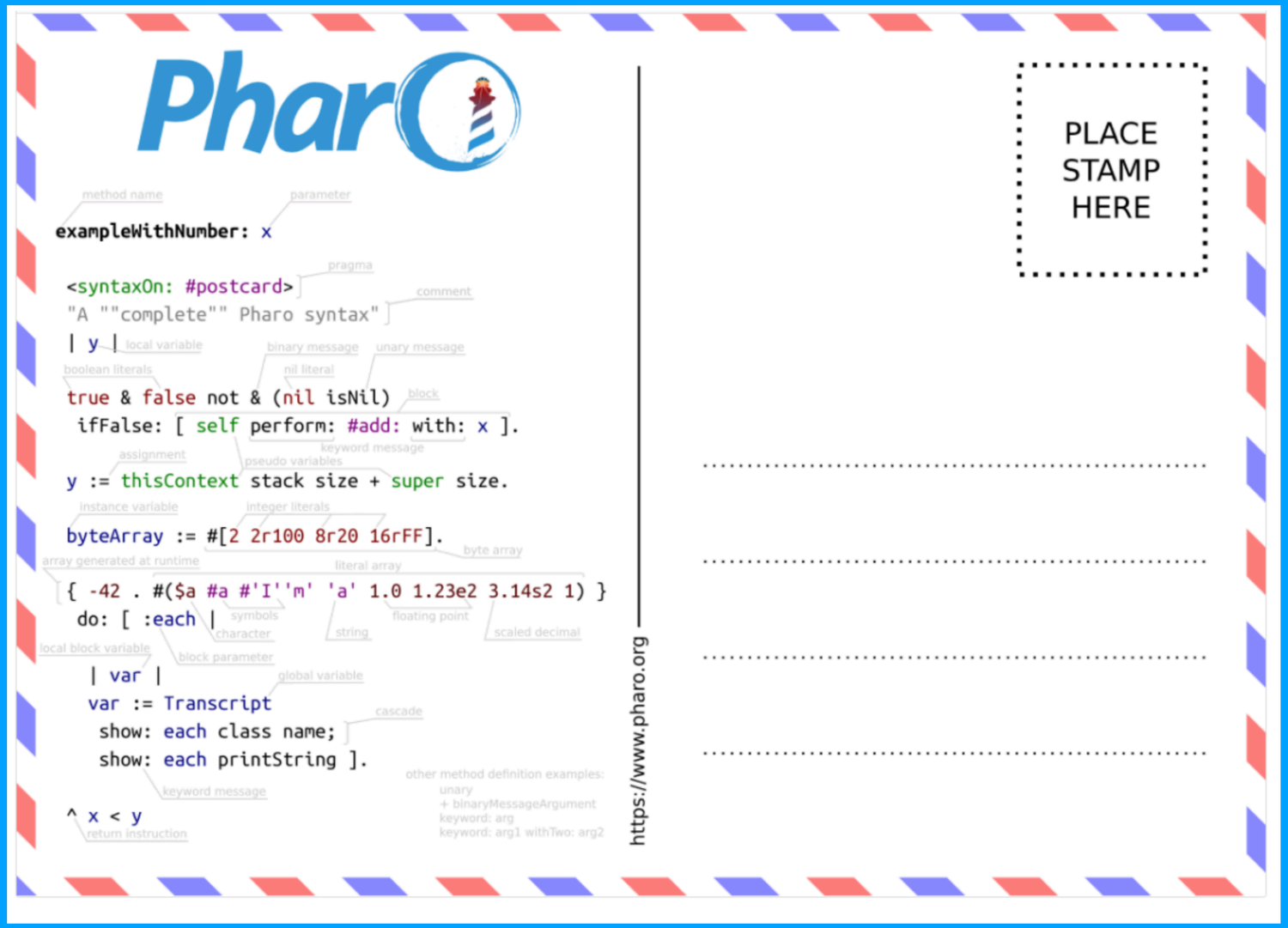
WHAT IS PHARO?

- **Pharo** is a pure object-oriented, dynamically typed, and reflective language; its syntax fits in a postcard and it comes with a platform-independent IDE.
- **Pharo** is a cross-platform implementation of the classic Smalltalk-80 programming language and runtime system. But it comes with a non-viral MIT license!
- Like the original **Smalltalk-80**, **Pharo** provides many live programming features such as immediate object manipulation, live updates, and just-in-time compilation (JIT).
- **Pharo** comes with Integrated *Git* support and with with an integrated framework for SUnit Tests

SYNTAX FIT A POSTCARD

- All **Pharo** syntax fit on a Postcard!

Rule 1: Everything is an Object
Rule 2: Every Class has a superclass
Rule 4: Everything happens by sending messages
Rule 5: Method lookup follows inheritance chain
Rule 6 : Classe are Objects too and they follow the same rules

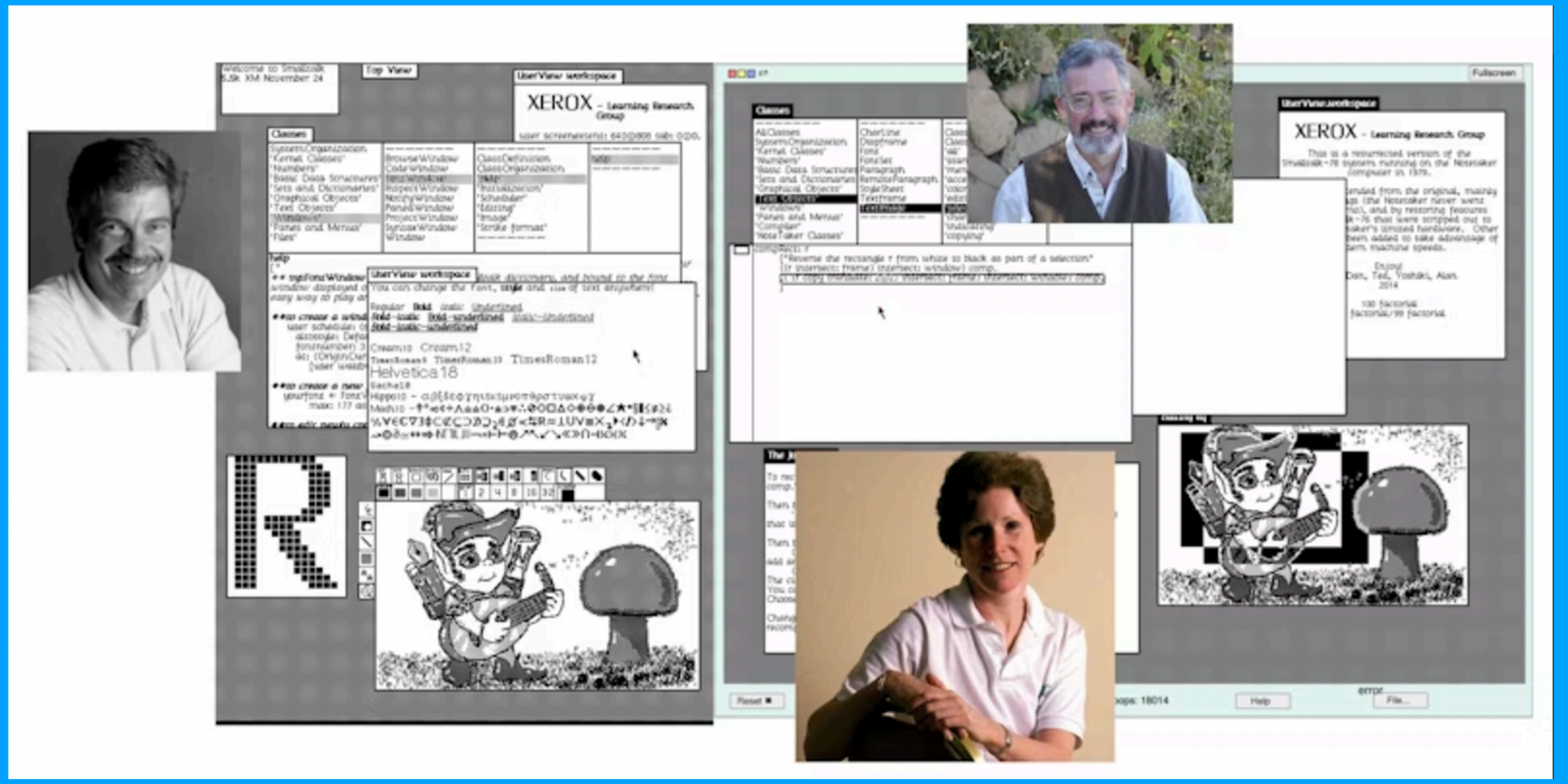


Domenico Cipriani - 2024

Postcard by Pavel Krivanek, 2018

WHAT IS SMALLTALK?

- Alan Kay, Adele Goldberg and Dan Ingalls created Smalltalk at Xerox Parc in 1972.
- It was designed as purely Object-Oriented language designed for teaching programming to young people

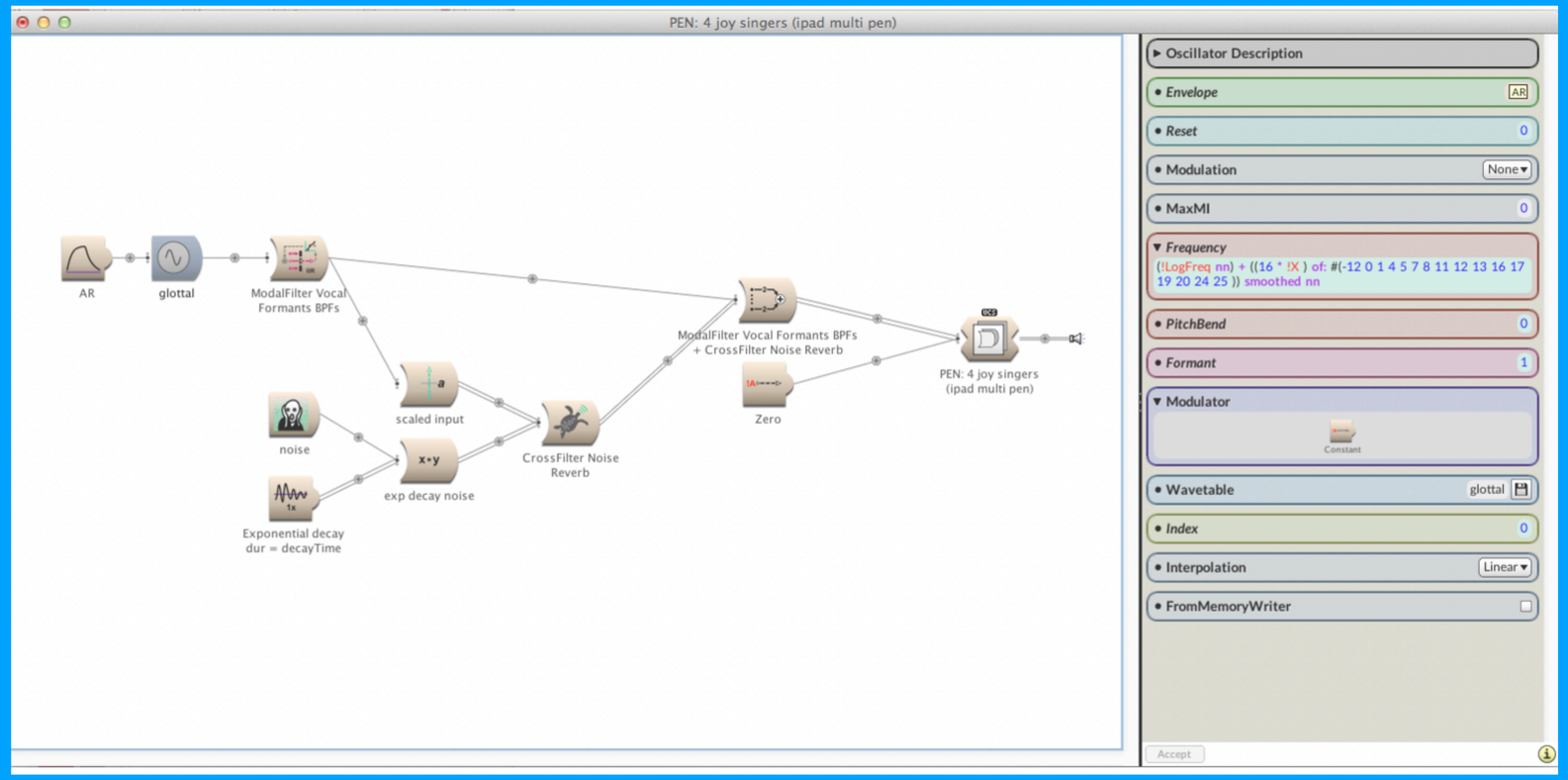


Domenico Cipriani - 2024

SYMBOLIC SOUND KYMA

pharo.org

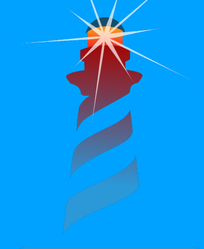
- Music programming language and IDE written in Smalltalk created by Carla Scaletti and Kurt J. Hebel at Urbana Champaign, Illinois.



- The Smalltalk code is compiled on an external DSPs called Capybara, Paca(rana), Pacamara (Ristretto)

- “The Holy Grail of sound design”

Domenico Cipriani - 2024



LEARN PHARO

- The **Pharo** MOOC: https://mooc.pharo.org/
- Advanced OOP Design and Development with **Pharo**: https://advanced-design-mooc.pharo.org/

INSTALL PHAUSTO

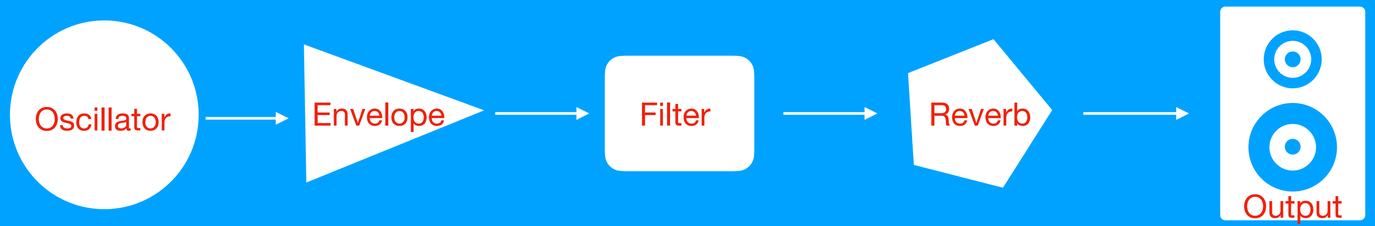
- First, download the **Pharo** launcher: https://pharo.org/download
- The *Pharo Launcher* is a tool allowing you to easily download Pharo core images.
- Download the packed *librariesBundle* for your platform from the Phausto repo, https://github.com/lucretiomsp/phausto
- Open a Playground (CMD +OW), then copy and evaluate (CMD+D) this script.

```
Metacello new
    baseline: 'Phausto';
    repository: 'github://lucretiomsp/phausto:main';
    load
```

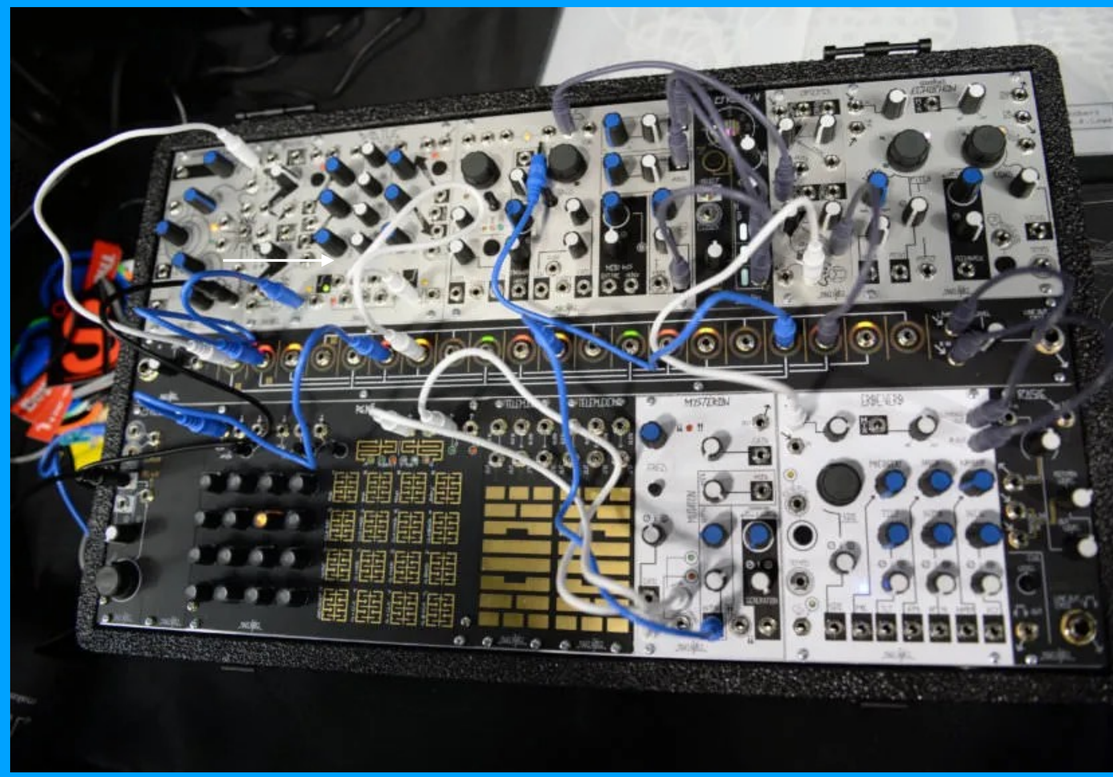
MODULAR DSP PROGRAMMING

- Phausto offers an approach to develop and design synthesisers and effect that is inspired by modular synthesiser patching.

- In Phausto, we connect Unit Generator setting their members value or using the **ChucK** operator => .



Synth := SineOsc new => ADSREnv new => ResonLp new => SatRev new.



Domenico Cipriani - 2024

EXPORT TO Cmajor

- We can export our DSP to a Cmajor plug-in.
- We can use the plug-in we created we the Cmajor wrapper plug-in: https://github.com/cmajor-lang/cmajor/releases

- Cmajor allows simple procedural DSP code to be easily composed into graph structures.
- It makes impossible to write code that can crash or break real-time safety rules.
- It can be very easily learned by anyone who’s dabbled with C/C++, javascript or other C-style languages.

Domenico Cipriani - 2024