

abc.lib- News from Multichannel Audio Processing in Mixed Music

A.Bonardi *P.Goutmann*



Outline

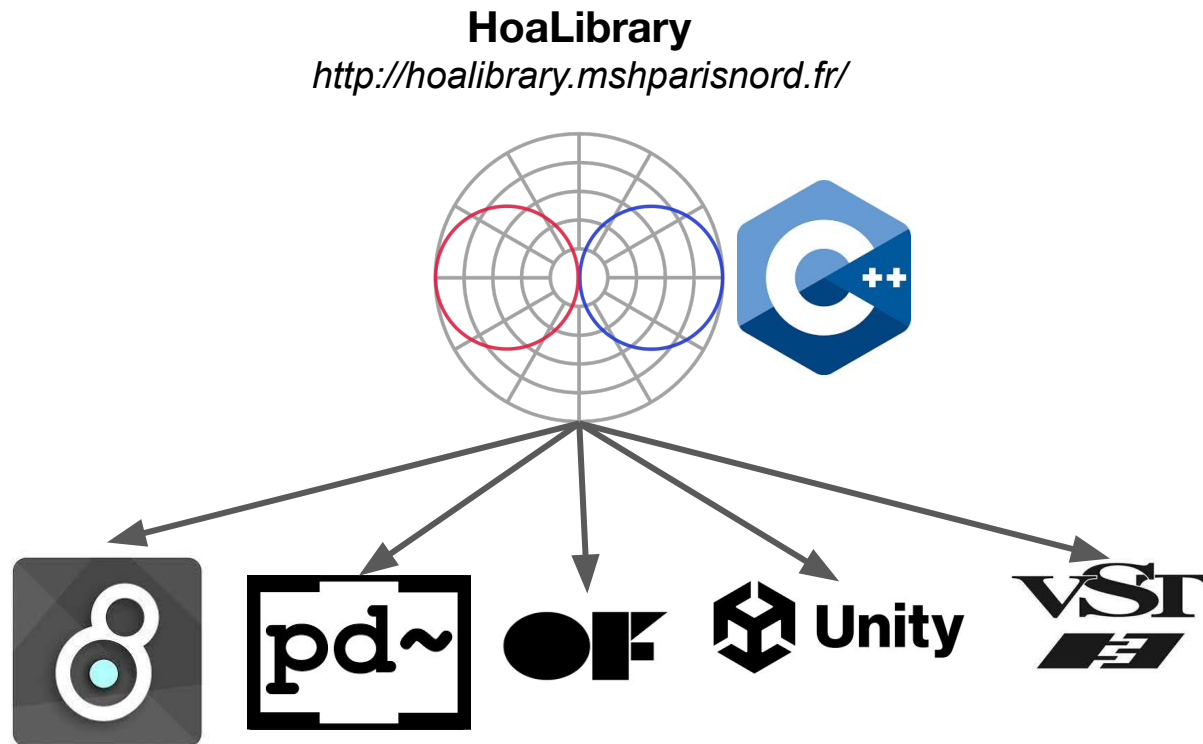
- Context of abc.lib
- Architecture of the lib
- Distributions
- Max Package (v.1.1.0)
- Example of MC processing and HOA2D

Development of HOA Library (High Order Ambisonics Library)

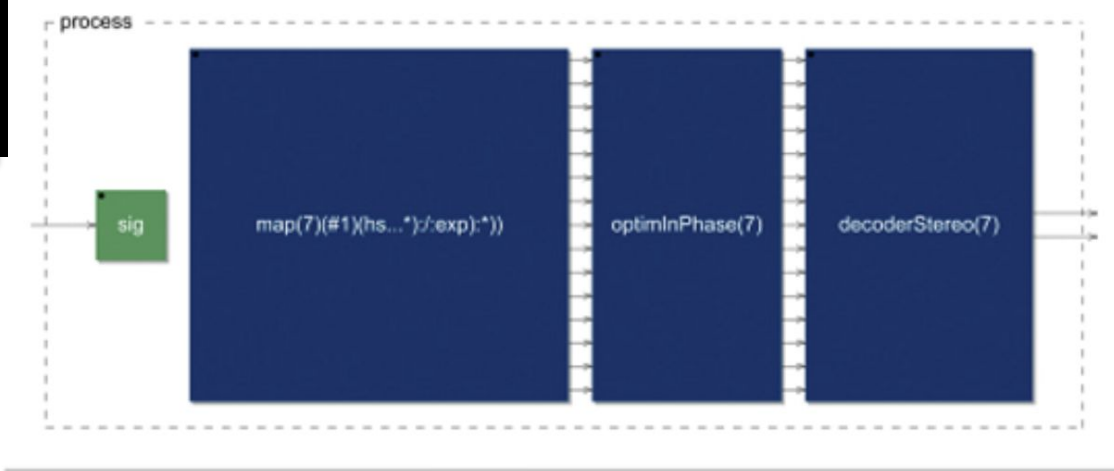


3 projects of the Labex Arts H2H:

- Spatialisation by and for musicians - 2012-2013
- interfaces for spatialisation - 2013-2014
- HOA 3D - 2014-2015



F.A.U.S.T



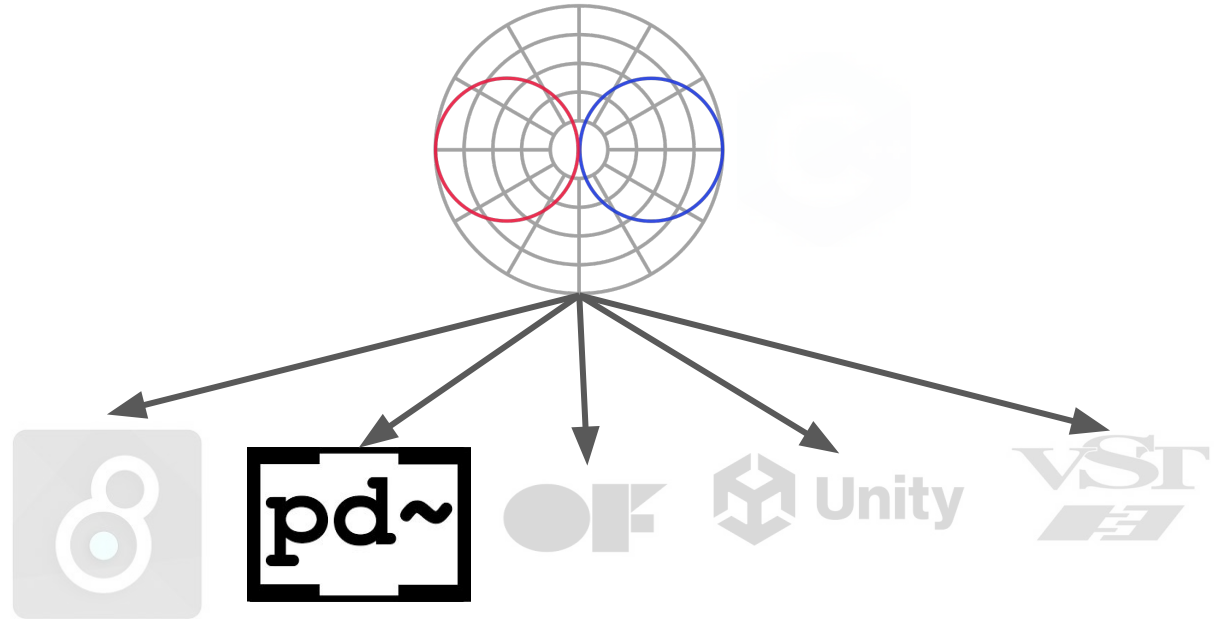
```
import("filter.lib");
import("hoa.lib") ;

radius = hslider("Source Radius", 1., 0, 10, 0.001) : smooth(tau2pole(0.02));
angle = hslider("Source Angle", 0., -2*PI, 2*PI, 0.001) : smooth(tau2pole(0.02));

process(sig) = map(7, sig, x1, y1) : optimInPhase(7) : decoderStereo(7);
```

HoaLibrary

<http://hoalibrary.mshparisnord.fr/>



abc in Paris 8 University education

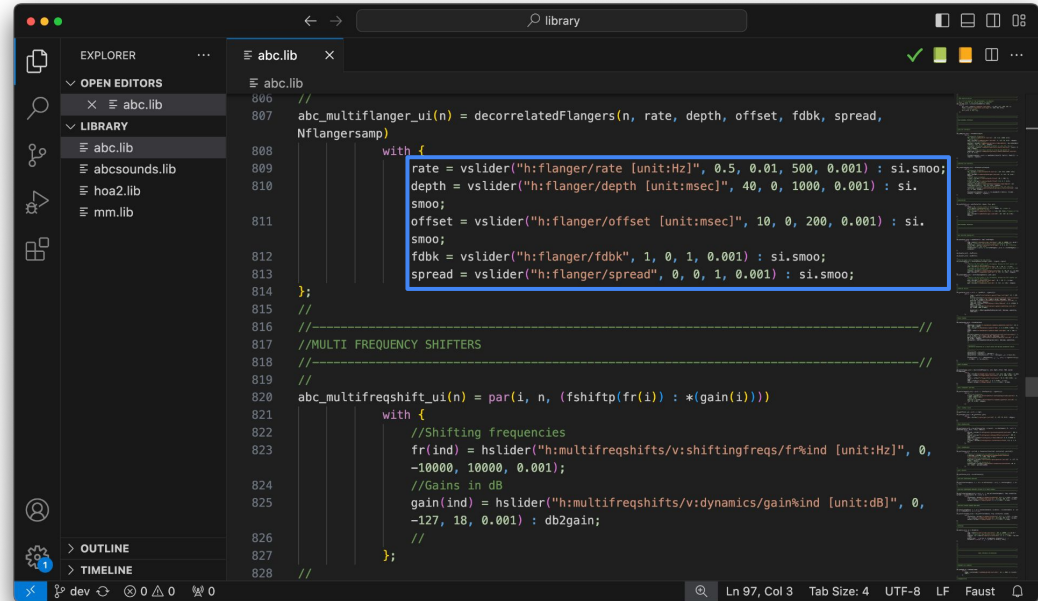


- *Max & Pd programming lvl2 (L3)*
- *Programming Languages (L3)*
- *Music and Computerized Tools (M1/M2)*
- *Compositions in “J.Combier’s workshop”*
- *PhD students*

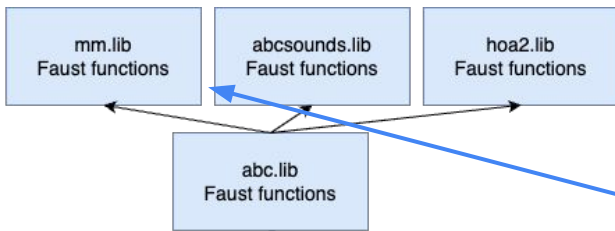
Music and Informatic Tools (2023-2024) - MIP of EUR ArTeC with CAIRN musicians

abc.lib
Faust functions

ex: line 807-828 abc.lib

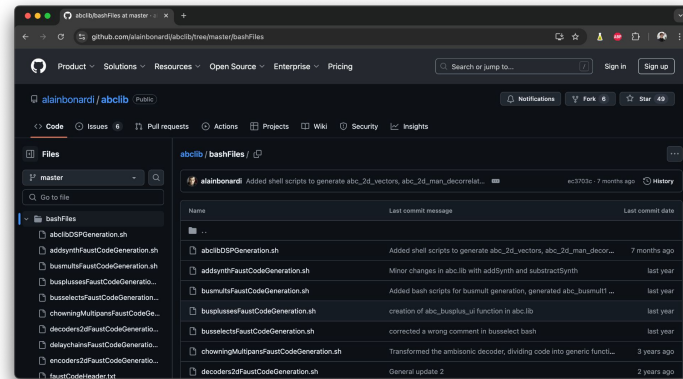
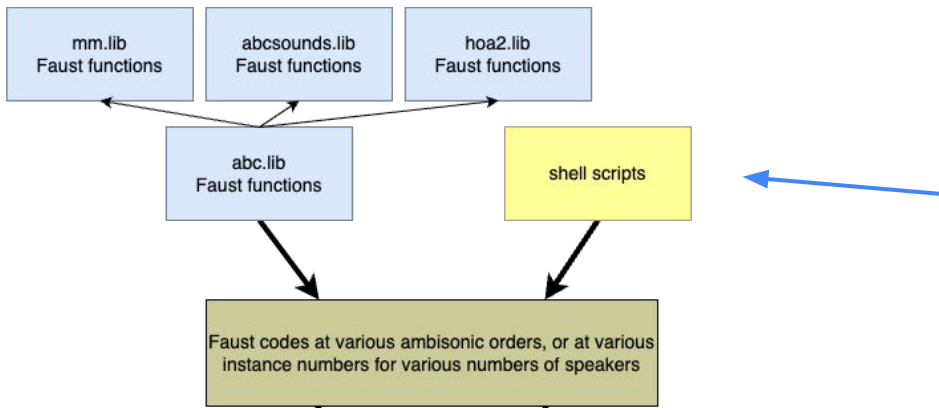


```
806 //
807 abc_multiflanger_ui(n) = decorrelatedFlangers(n, rate, depth, offset, fdbk, spread,
Nflangersamp)
808     with f
809         rate = vslider("h:flanger/rate [unit:Hz]", 0.5, 0.01, 500, 0.001) : si.smoo;
810         depth = vslider("h:flanger/depth [unit:msec]", 40, 0, 1000, 0.001) : si.
smoo;
811         offset = vslider("h:flanger/offset [unit:msec]", 10, 0, 200, 0.001) : si.
smoo;
812         fdbk = vslider("h:flanger/fdbk", 1, 0, 1, 0.001) : si.smoo;
813         spread = vslider("h:flanger/spread", 0, 0, 1, 0.001) : si.smoo;
814     };
815 //
816 //-----//
817 //MULTI FREQUENCY SHIFTERS
818 //-----//
819 //
820 abc_multifreqshift_ui(n) = par(i, n, (fshiftp(fr(i)) : *(gain(i))))
821     with {
822         //Shifting frequencies
823         fr(ind) = hslider("h:multifreqshifts/v:shiftingfreqs/fr&ind [unit:Hz]", 0,
-10000, 10000, 0.001);
824         //Gains in dB
825         gain(ind) = hslider("h:multifreqshifts/v:dynamics/gain&ind [unit:dB]", 0,
-127, 18, 0.001) : db2gain;
826         //
827     };
828 //
```

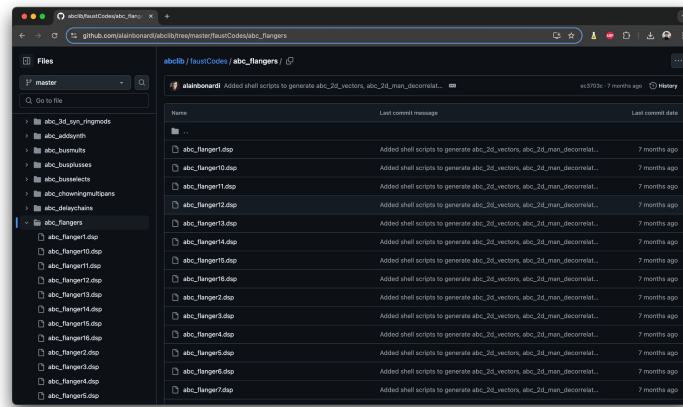


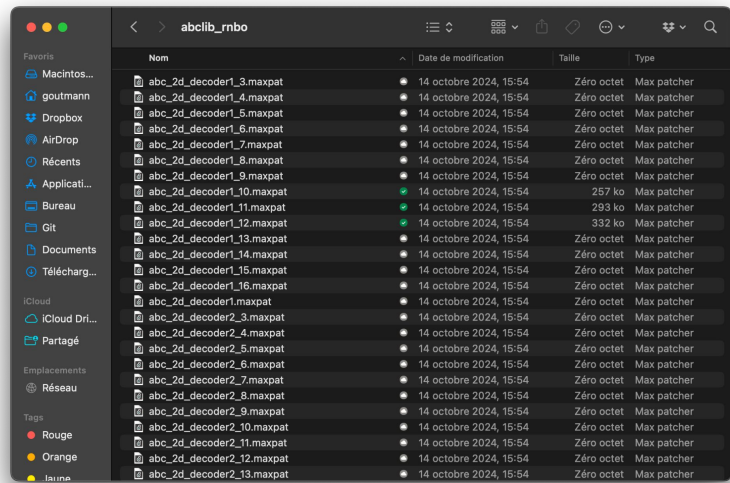
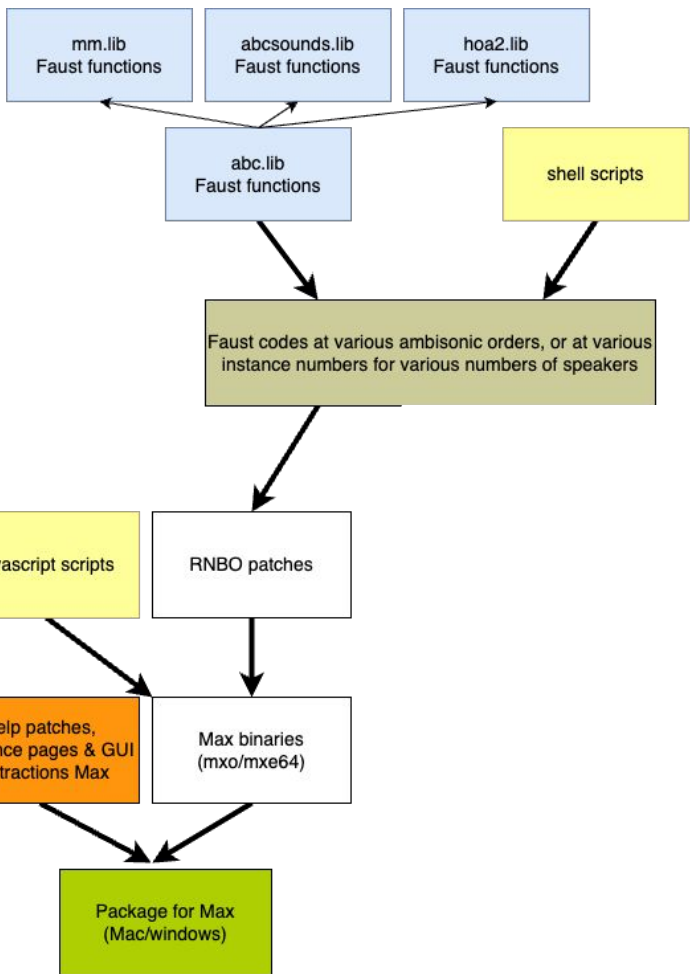
ex: call of “decorrelatedFlangers” from mm.lib

```
806 //
807 abc_multiflanger_ui(n) = decorrelatedFlangers(n, rate, depth, offset, fdbk, spread,
      Nflangersamp)
808
809     with {
810         rate = vslider("h:flanger/rate [unit:Hz]", 0.5, 0.01, 500, 0.001) : si.smoo;
811         depth = vslider("h:flanger/depth [unit:msec]", 40, 0, 1000, 0.001) : si.
      smoo;
812         offset = vslider("h:flanger/offset [unit:msec]", 10, 0, 200, 0.001) : si.
      smoo;
813         fdbk = vslider("h:flanger/fdbk", 1, 0, 1, 0.001) : si.smoo;
814         spread = vslider("h:flanger/spread", 0, 0, 1, 0.001) : si.smoo;
815     };
816 //-----
817 //MULTI FREQUENCY SHIFTERS
818 //-----
819 //
820 abc_multifreqshift_ui(n) = par(i, n, (fshiftp(fr(i)) : *(gain(i))))
821
822     with {
823         //Shifting frequencies
824         fr(ind) = hslider("h:multifreqshifts/v:shiftingfreqs/fr%ind [unit:Hz]", 0,
      -10000, 10000, 0.001);
825         //Gains in dB
826         gain(ind) = hslider("h:multifreqshifts/v:dynamics/gain%ind [unit:dB]", 0,
      -127, 18, 0.001) : db2gain;
827         //
828     };
```

ex: shell scripts and faust codes on Github





...
(718 RNBO patches)



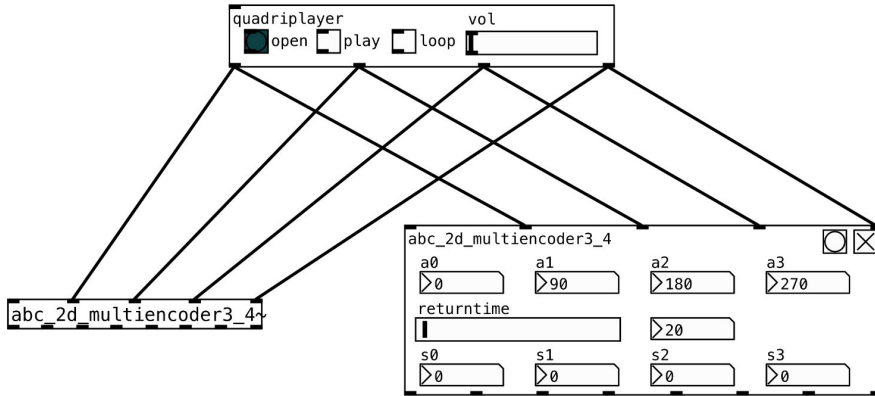
→ ? faustgen2~ (A. Graef)
for Mac OS / Windows / Linux
or wrapper pd

'Classical' - non multichannel

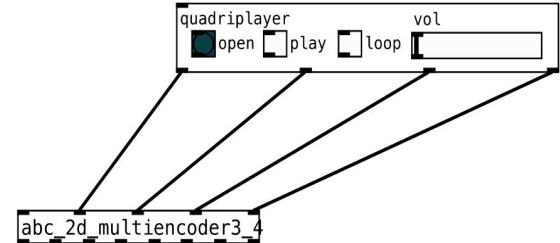


Pure Data

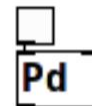
external compilation (online or local)



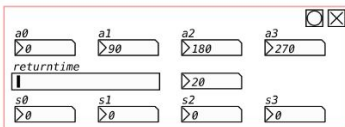
faustgen2 (inside the Pd patch)



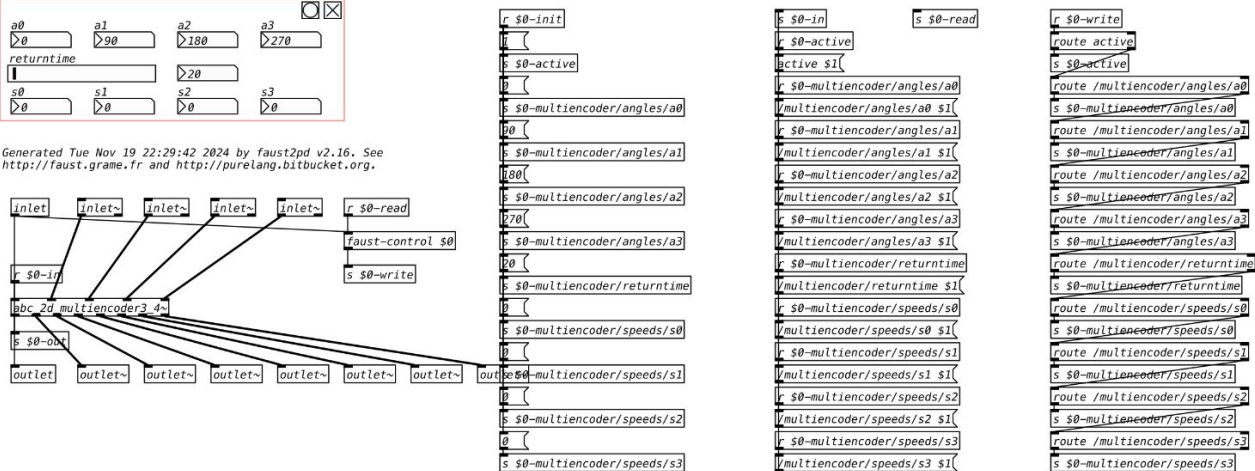
ui generation by the online compiler



Pure Data



Generated Tue Nov 19 22:29:42 2024 by faust2pd v2.16. See <http://faust.grame.fr> and <http://purelang.bitbucket.org>.



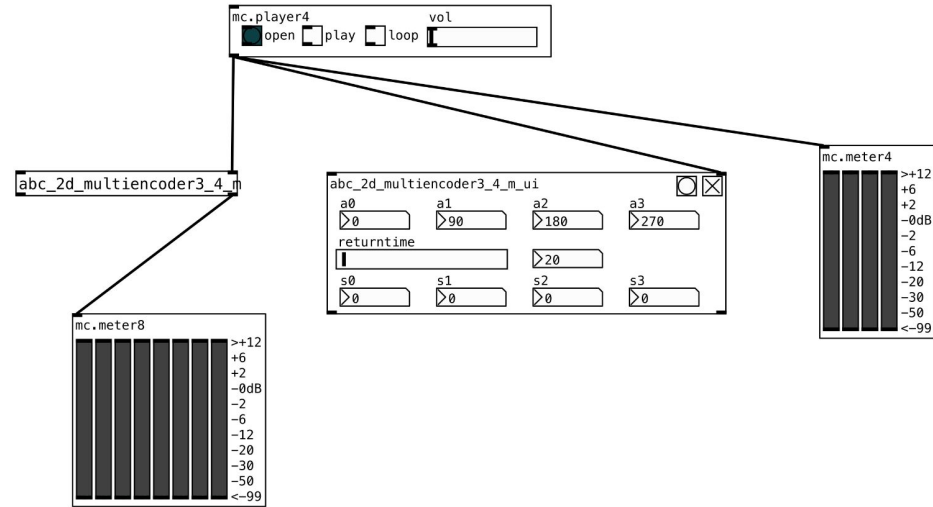
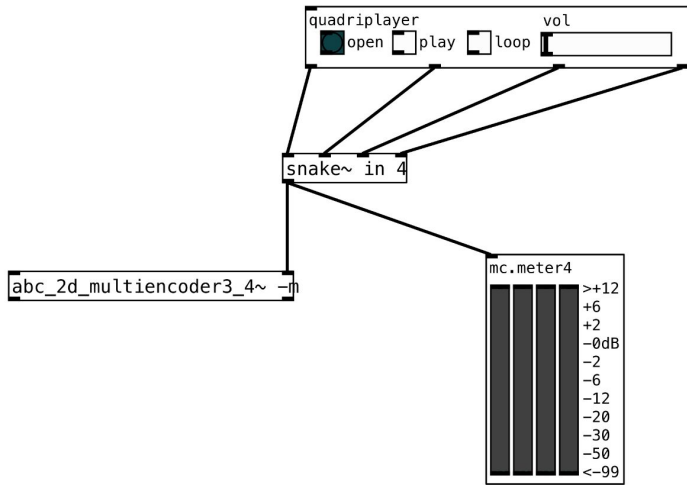
Multichannel



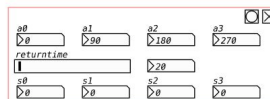
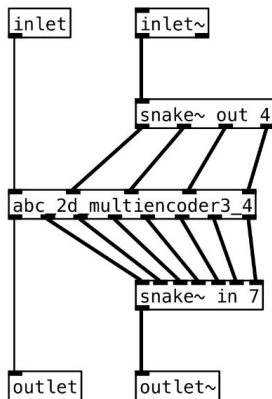
Pure Data

external compilation (since Faust v.2.75.7, sept. 2024)

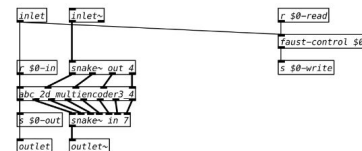
faustgen2



inside the abstractions using faustgen2 (generated by a Python program)



Generated Tue Nov 19 22:29:42 2024 by faust2pd v2.16. See <http://faust.grame.fr> and <http://purelang.bitbucket.org>.



```
r s0-init
r (
  f s0-active
  f (
    r (
      f s0-multienncoder/angles/a0
      f (
        f s0-multienncoder/angles/a1
        f (
          f s0-multienncoder/angles/a2
          f (
            f s0-multienncoder/angles/a2 s1(
            f s0-multienncoder/angles/a3
            f (
              f s0-multienncoder/returntime
              f s0-multienncoder/returntime s1(
              f s0-multienncoder/speeds/s0
              f (
                f s0-multienncoder/speeds/s1
                f (
                  f s0-multienncoder/speeds/s2
                  f (
                    f s0-multienncoder/speeds/s3
                    f (
                      f s0-multienncoder/speeds/s3 s1(
```

```
f s0-in
f s0-active
f s0-read
f s0-write
route active s1(
f s0-multienncoder/angles/a0
route /multienncoder/angles/a0
f s0-multienncoder/angles/a1
route /multienncoder/angles/a1
f s0-multienncoder/angles/a2
route /multienncoder/angles/a2
f s0-multienncoder/angles/a2 s1(
route /multienncoder/angles/a2
f s0-multienncoder/angles/a3
route /multienncoder/angles/a3
f s0-multienncoder/returntime
route /multienncoder/returntime
f s0-multienncoder/returntime s1(
route /multienncoder/returntime
f s0-multienncoder/speeds/s0
route /multienncoder/speeds/s0
f s0-multienncoder/speeds/s1
route /multienncoder/speeds/s1
f s0-multienncoder/speeds/s2
route /multienncoder/speeds/s2
f s0-multienncoder/speeds/s3
route /multienncoder/speeds/s3
f s0-multienncoder/speeds/s3 s1(
```

```
r s0-write
route active s1(
f s0-multienncoder/angles/a0
route /multienncoder/angles/a0
f s0-multienncoder/angles/a1
route /multienncoder/angles/a1
f s0-multienncoder/angles/a2
route /multienncoder/angles/a2
f s0-multienncoder/angles/a2 s1(
route /multienncoder/angles/a2
f s0-multienncoder/angles/a3
route /multienncoder/angles/a3
f s0-multienncoder/returntime
route /multienncoder/returntime
f s0-multienncoder/returntime s1(
route /multienncoder/returntime
f s0-multienncoder/speeds/s0
route /multienncoder/speeds/s0
f s0-multienncoder/speeds/s1
route /multienncoder/speeds/s1
f s0-multienncoder/speeds/s2
route /multienncoder/speeds/s2
f s0-multienncoder/speeds/s3
route /multienncoder/speeds/s3
f s0-multienncoder/speeds/s3 s1(
```

generated by pdCanvasToMC.py / abclib - CICM



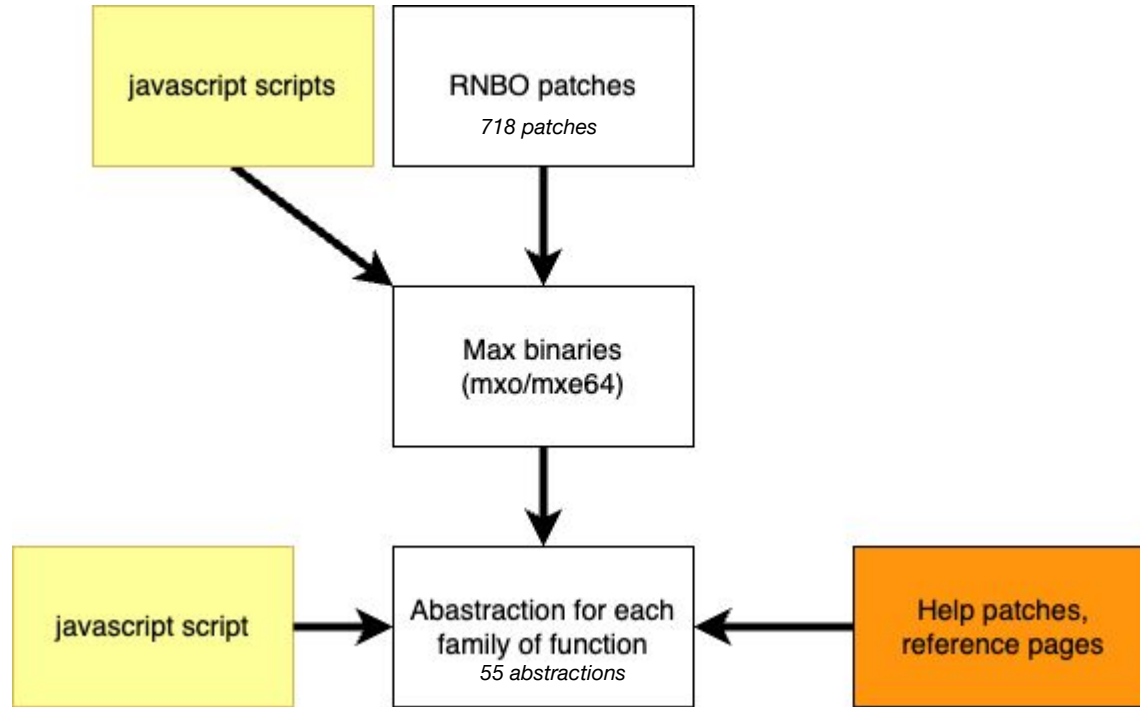
Max 8

- Wrapper (D.Fierro)
- GUI Abstractions
- Documentation with reference pages



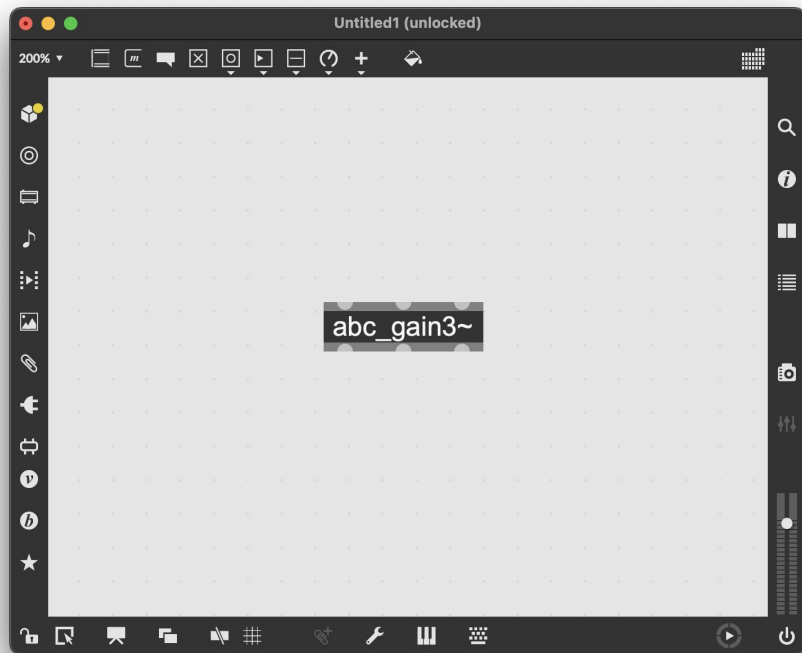
Max 8

- Wrapper (D.Fierro) **718 externals => 55 abstractions**
- GUI Abstractions
- Documentation with reference pages





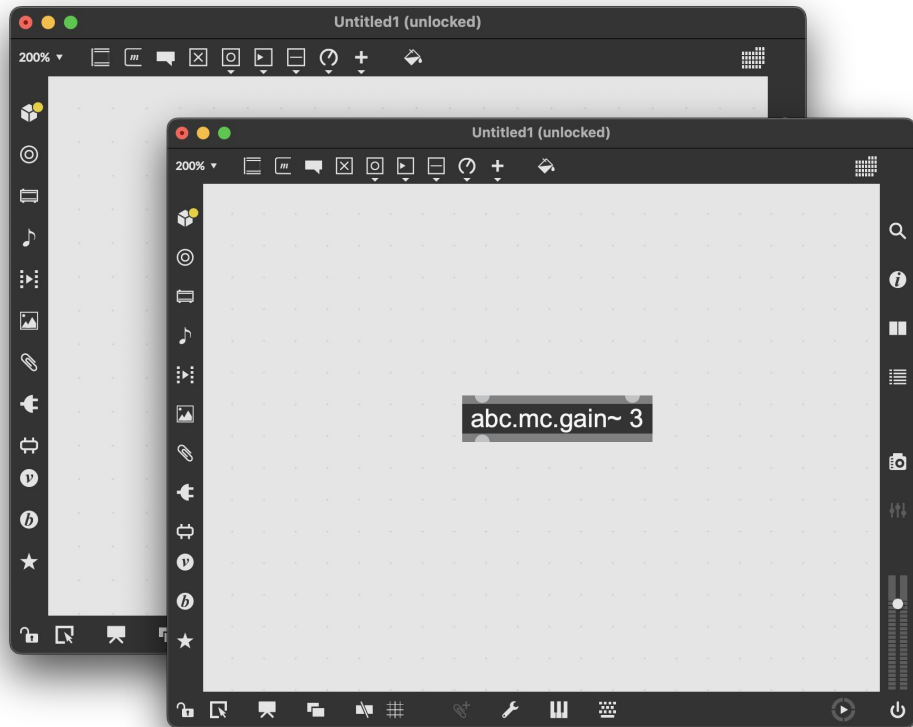
Max 8



Context | Architecture & compilation | Distributions | **Package** | Examples



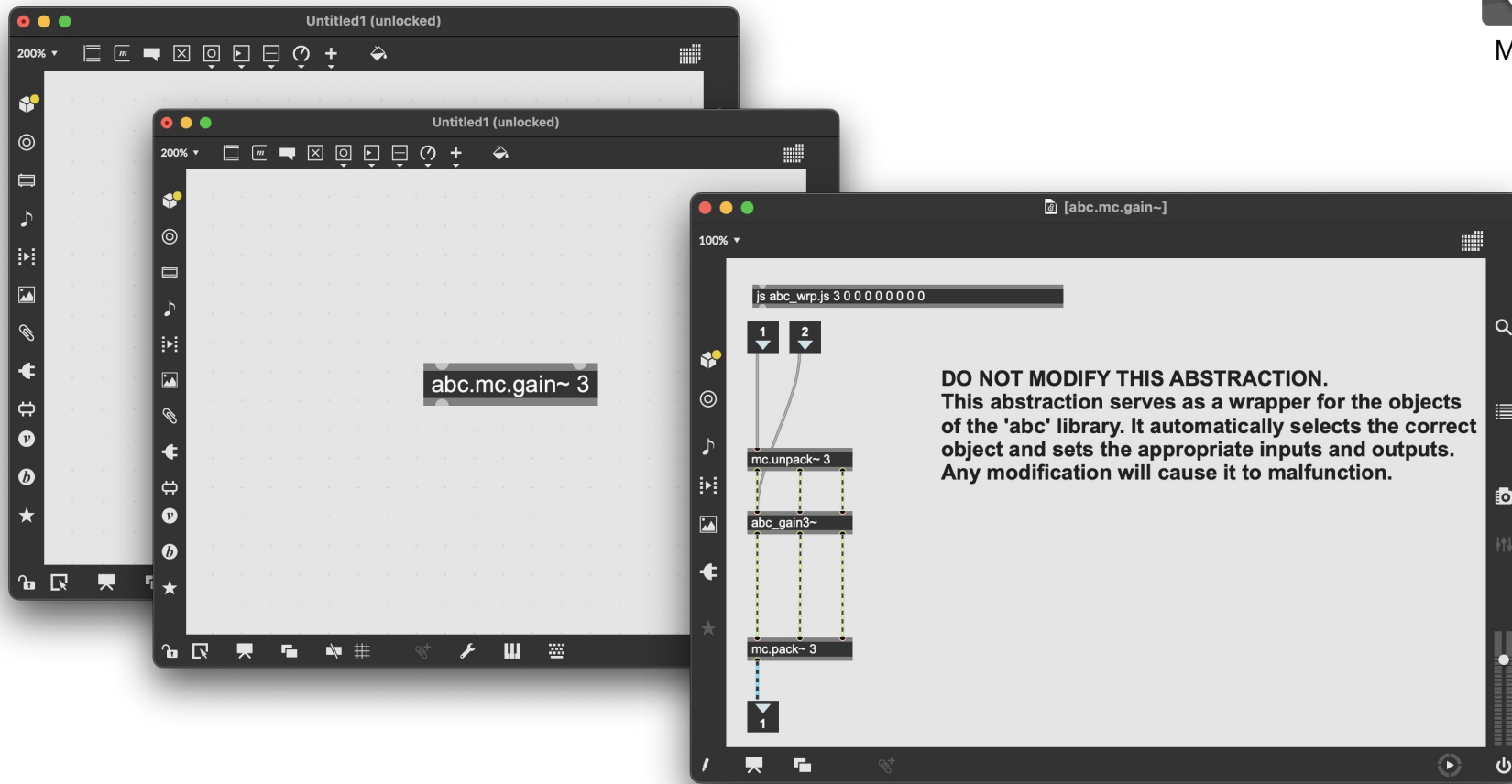
Max 8



Context | Architecture & compilation | Distributions | **Package** | Examples



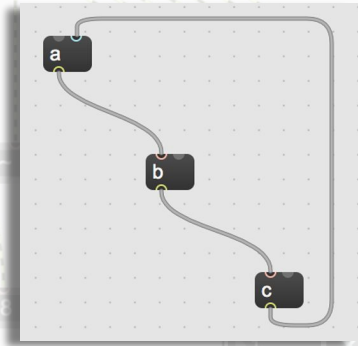
Max 8



<https://github.com/alainbonardi/abclib/releases/tag/v1.1.0>

F.A.U.S.T

abc.lib



Context | Architecture & compilation | Distributions | Package | Examples